



Ritual practices and social organisation at the Middle Yayoi culture settlement site of Maenakanishi, eastern Japan

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Abstract

Combined archaeobotanical and archaeological data from Middle Yayoi (fourth century BCE–first century CE) cultural layers of the Maenakanishi site (36°08'55" N, 139°24'08" E) in northern Saitama Prefecture indicate that rice was less significant as everyday food, but played an important role in ritual practices and in strengthening social stratification at the studied settlement site. The results further suggest that the crop was used in feasting performed in context of pillared buildings that were often large and occupied a spatially separated central location within a settlement. We propose that these pillared buildings were residences of political/religious leaders, who directed these rituals related to agricultural production and worship of elite ancestors. Such ritual practices were likely introduced to Japan from continental East Asia as part of the 'Yayoi package' and conducted for empowerment and labour mobilisation.

Keywords Early agricultural societies · Social stratification · Inclusive feasting · Ancestral worshipping

Introduction

One of the most relevant cultural developments during the Yayoi period (tenth/fourth century BCE–250 CE) in Japan is the introduction of agriculture from the East Asian continent. While this new lifestyle spread over large parts of the islands of Kyushu, Shikoku and Honshu (Fig. 1) the scale and drivers of agriculturalisation in some regions (e.g. the Chubu Highlands, Kanto and Tohoku; Fig. 1) within this core area during the Yayoi period is still debated (Barnes 2019).

Although other cultivars were also grown, Yayoi agriculture was mainly based on the cultivation of three cereal crops, namely rice (*Oryza sativa*), foxtail millet (*Setaria italica*) and broomcorn millet (*Panicum miliaceum*) (Nakazawa 2017; Nasu and Momohara 2016; Shitara 2019). There is basic agreement that this change in subsistence from a hunter-fisher-gatherer to an agricultural economy promoted substantial population growth and the advent of local chiefdoms, developments that later led to the formation of the first centralised state during the Kofun period (250–710 CE) (Kidder 1993; Mizoguchi 2013). However, the contentious issue remains when social stratification emerged. Mizoguchi (2013) claims that social stratification already became increasingly visible by mortuary practices, agricultural rituals, and different building types towards the end of the Early Yayoi period (seventh–fourth century BCE) induced by inevitable fixation of certain communal roles linked to the establishment of agriculture (especially paddy field rice cultivation) and population growth. The same timing is suggested by Imamura (1996) and Terasawa (2004) for northern Kyushu inferred from changes in the regional burial prestige goods record, although Barnes (2007) suggests that rank was not inherited but achieved through aggrandization. By contrast, Hosoya (2009) advocates the view that communal leaders had existed since Jomon times, but suggests that social stratification emerged not before the Late Yayoi period (first century–250 CE). Her hypothesis is mainly based on the evolution of a

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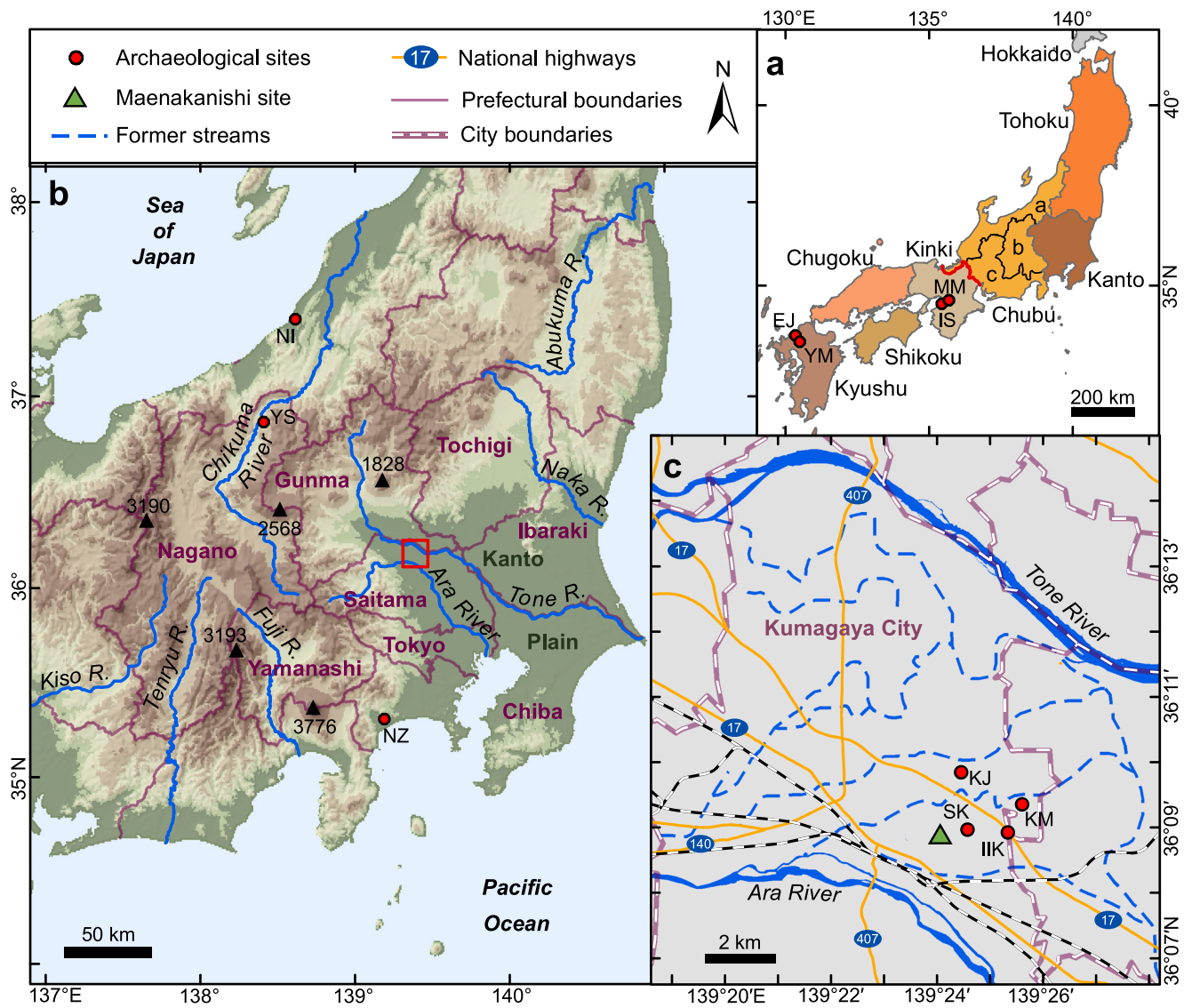


Fig. 1 (a) The main regions of Japan including subdivisions of Chubu (a – Hokuriku, b – Central Highlands, c – Tokai), thick red line between Chubu and Kinki marks the boundary separating the Yayoi cultural regions of eastern and western Japan according to Mizoguchi (2013); (b) the physical environment of Central Honshu with the study region in the north-western part of the Kanto Plain (red square); (c) the Maenakanishi

archaeological site, the two main regional rivers, and the estimated course of former anabranches and streams. Location of other archaeological sites mentioned in the text including Etsuji – EJ, Ikegamisone – IS, Koshikida – KK, Kitajima – KJ, Komiya – KM, Makimuki – MM, Nakazato – NZ, Nishiiwano – NI, Suwanoki – SK, Yanagisawa – YS, Yubihonmura – YM

specific type of pillared building of communal significance that appeared in the Yayoi period and supposedly transformed into the residence of regional chief of the succeeding Kofun period (250–710 CE).

It has been a widespread narrative that rice became the major crop and thus the main food source during the Yayoi period (Imamura 1996; Mizoguchi 2013; Steinhaus and Kaner 2016). However, different recent studies have demonstrated the heterogeneity of the Yayoi agricultural landscape marked by spatio-temporal variations in crop preferences (Endo 2019; Leipe et al. 2020b; Shitara 2014b; Shitara and Takase 2014). Another common view is that rice cultivation was the main driver of the socio-political transformations that occurred over

the Yayoi period (Imamura 1996; Ishikawa 2011; Mizoguchi 2013). Most evidence for these changes, such as ritual practices using bronze objects, social hierarchy and emergence of political/religious leaders and large regional centres, are reported from western Japan (Fig. 1a), which has been recognised as the core region of the Yayoi culture with important cultural hubs in northern Kyushu and the Kinki region (Fig. 1a) (Mizoguchi 2013; Steinhaus and Kaner 2016).

Most evidence for the socio-political role of rice in Japan comes from the historical and modern periods. Rice had a long history as tax value, spanning at least from the time of early state formation (end of seventh century CE) to Early Modern (1603–1867 CE) times (Batten 1993; Ohnuki-Tierney 1993).

Furthermore, it has been suggested that rice played an important role in religious customs that, in turn, are regarded a key factor in the development of social stratification during the Yayoi (Terasawa 2000) and precursory practices of religious traditions that are today often summarised as Shinto (Mori 2003; Ohnuki-Tierney 1993). Ohnuki-Tierney (1993) advocates the view of Amino (1980; Amino 1994) that since its introduction, rice has not always been the main staple food but the main component in ritual practices. On the other hand, von Verschuer (2017) disagrees with the unique role of rice in mythology and rituals and emphasises that it was just one of a whole set of crops used for such purposes, which emphasises that there is no agreement about the importance of rice for religious practices in prehistoric Japan. Until today, our understanding of religious beliefs and practices during the Yayoi period is limited (Kaner 2011) and mostly based on the interpretation of iconography or specific objects, such as bronze and bone artefacts, that are identified as religious material culture based on their inferred archaeological context and functionality (Hosoya 2009; Hudson 1992; Kaner 2011).

The current paper uses the results of archaeological work and archaeobotanical analyses conducted at the Maenakanishi site (Fig. 1) to discuss ritual practices and social organisation of Middle Yayoi culture communities in the Kanto region of eastern Japan. Unless otherwise stated, cultural chronologies related to the end of the Jomon period and the Yayoi period are given according to Matsumoto et al. (2017) and Steinhaus and Kaner (2016), respectively.

Site setting and archaeological context

The Maenakanishi archaeological site complex

The Maenakanishi archaeological site complex in the eastern part of Kumagaya City (Saitama Prefecture) spans an area of 316,500 m² and is situated between the Tone River (Tonegawa) in the north and the Ara River (Arakawa) in the south (Fig. 1). The area between these two major rivers of the Kanto Plain is nearly flat, has fertile alluvial soils, and was traversed by numerous smaller rivers and streams until pre-modern times making the location ideal for paddy field rice cultivation. Within Kumagaya City, the Board of Education has documented 91, 28 and 211 sites associated with the Jomon, Yayoi and Kofun cultures, respectively (Konan Cultural Heritage Center 2018). Since the mid-1990s, the municipal and prefectural authorities have conducted numerous archaeological surveys, which have produced an extensive archaeological record indicating a long human occupation spanning several cultural phases, i.e. from the Yayoi to the Edo (1603–1868 CE) period (Kanto Yayoi Culture Research Group 2014).

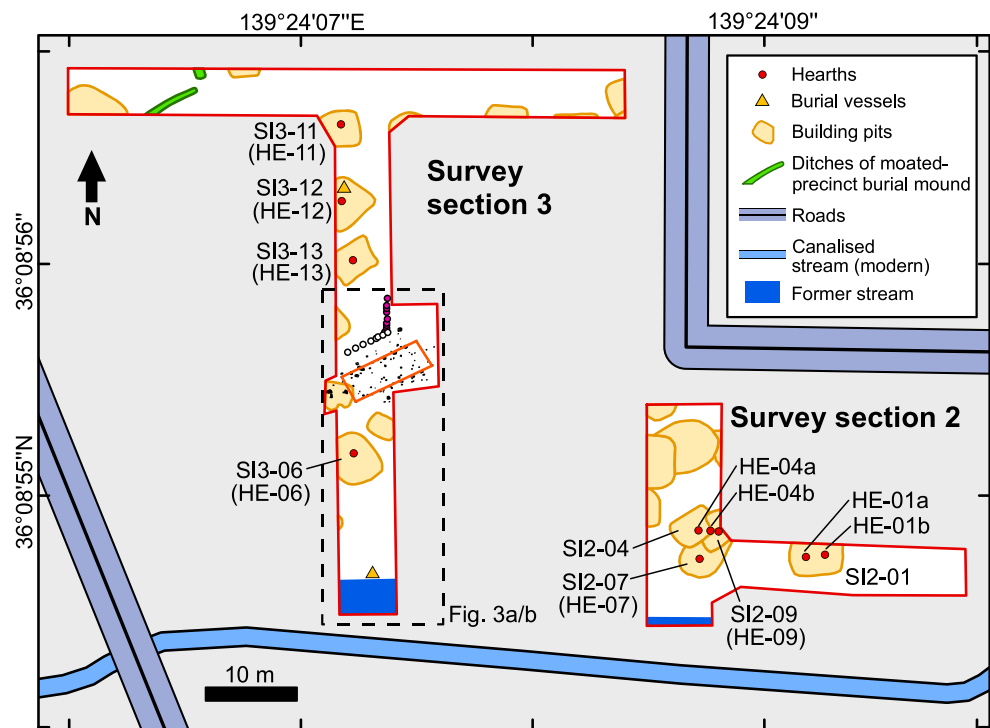
Most of the Maenakanishi archaeological record dates to the Yayoi culture period. Based on pottery typology, the occupation phase has been dated to between the middle Middle Yayoi and the early Late Yayoi (ca. 100 BCE–100 CE) period (Kumagaya City Buried Cultural Heritage Center 2008). During this time, a large settlement of ca. 30 ha existed, which is one of the largest known of the Yayoi culture in the Kanto region. Until 2018, archaeological reports list 60 pit buildings, 30 ditches, 20 burial mounds, 13 jar burials, and one grave assigned to the Yayoi culture. In the vicinity of Maenakanishi, a number of other, smaller Yayoi culture sites have been excavated. The pottery assemblages show connections of the inhabitants with Yayoi populations of other regions. Pottery from the Hokuriku (Kuromatsu style), the southern Tohoku (Kawaramachiguchi style), the southern Kanto (Miyonodai style), and the northern Central Highland (Kuribayashi style) regions (Fig. 1a) has been excavated. The continuously increasing amount of Kuribayashi style pottery over the late Middle Yayoi period has been interpreted as increasing cultural influence by migrations from and/or exchange with the northern Central Highland region (Fig. 1a) (Kanto Yayoi Culture Research Group 2014).

Sections 2 and 3 of the archaeological survey in 2018

The deposits analysed in the present study come from sections 2 and 3 of the 2018 archaeological survey performed in the northern part of the Maenakanishi site (36°08′55″ N, 139°24′08″ E, 24 m above sea level; Fig. 2) covering an area of 380 and 800 m², respectively. The survey documented in the unpublished excavation report has identified 26 building pits of which 11 pits (SI2-01–11) are located in section 2 and further 15 pits (SI3-01–15) are located in section 3 (Fig. 2). Inside eight building pits, hearth deposits were identified. Other notable finds from section 3 (Figs. 2 and 3) are two ceramic burial vessels of which one was located in a pit within SI3-12 and the other in a pit close to the former bank of the Koromo River, two ditches of a moated-precinct burial mound, a well containing a cluster of pot sherds (Fig. 4), a plot of diffuse soil discolorations (Fig. 3) that appear to be the remains of seeping of helocrene springs (Springer and Stevens 2008) that are often found on alluvial plains close to river/stream banks (Brunke and Gonser 1997), numerous post-holes, and stake pits of two fence-like constructions of which segment SA3-01 was built before SA3-02.

The space in which seeping spots of helocrene springs were recorded (Fig. 3) covers an area of about 20 m². Probably not all of the springs were active at the same time or during the existence of SI3-06. At the southern end of the spring area, ditches were documented (Fig. 3), which were either formed naturally by seeping water draining into the Koromo River or may have been dug by the dwellers of the site. In one ditch an adze was found, which does not show traces of use and thus was

Fig. 2 Outline of the Maenakanishi 2018 archaeological survey sections 2 and 3 with locations of ditches of a moated-precinct burial mound, burial vessels, and building pits (labelled as SI2/3) from which hearths (labelled as HE) deposits were collected for archaeobotanical analysis. Black dashed frame marks the outline of Fig. 3a/b



probably deposited for ritual purpose. Another evidence for possible ritual practices at this place is a circular earth pit next to the ditches (Fig. 3) in which pottery remains were found.

The concentration of post-holes is interpreted as typical remains of a pillared building (Miyamoto 1991) that had an elevated floor space of approximately 30–35 m². The number and relative position of the post-holes suggest that it was rebuilt several times at the same location (Fig. 3). Two pits documented within the outline of SI3-08 likely represent the disturbed remains of two ridgepole pillars that are commonly associated with a special type of pillared building often referred to as ‘central building’ (Hirose 1998; see Discussion chapter ‘Worship buildings’ for further details). Three post-holes at the north-eastern traverse side likely represent the location of the counterparts at the opposite side of the pillared building. The recorded piles were set into the ground at a depth of ca. 50 cm. All piles had a similar diameter of about 20–25 cm.

While fence SA3-01 runs parallel to the longitudinal side of the pillared building, and thus seems to be associated with this structure, SA3-02 does not appear to be temporally related to it (Fig. 3). The pillared building and the building pits SI3-06, 07, 08, and 15 are bounded by SA3-01 in the north and the former course of the Koromo River in the south (Fig. 3). This section is spatially separated from the area to the north (Fig. 2). SI3-08 overlaps with the pillared building and was built after the latter had existed. On the other hand, SI3-06 seems to be temporally related with the pillared building and the moated-precinct burial mound documented in the northern part of survey section 3. Like one of the burial mound’s ditches, the longitudinal side of the pillared building is aligned

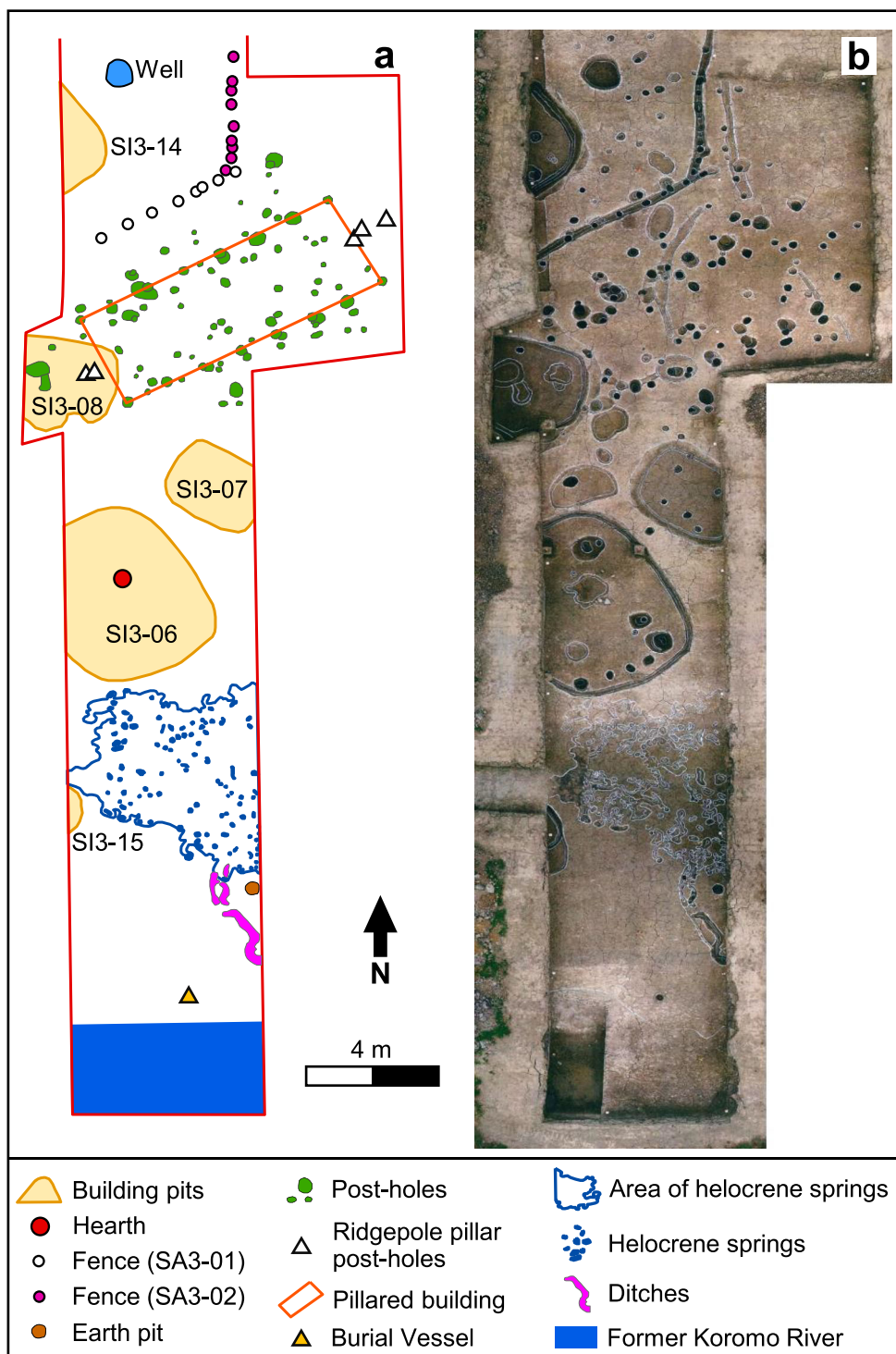
in identical southwest-northeast direction. Regarding the longitudinal alignment of SI3-06, the long side of the pillared building runs at right angle. In addition, the entrance of both buildings pointed towards the same south-eastern direction. In the case of SI3-06, the entrance location is indicated by remains of stairs. As for the pillared building, the entrance must have been on the southeast-facing side, as the remaining sides were either bounded by fence SA3-01 or by the ridgepole pillars. Further evidence from radiocarbon dating (this study) for the coeval existence of SI3-06 and several pit buildings outside the enclosed space is presented in the Results chapter ‘AMS radiocarbon dating’.

At the well (Fig. 4) and SI3-06, rich pottery assemblages were recorded. At SI3-06, earthenware was randomly distributed across the floor (Fig. 5a) and located inside earth pits (Fig. 5b, c) and in the hearth (HE-06) deposits. Among the earthenware recorded in SI3-06 are remains of at least six vessels with perforation at the base, which are believed to have been used for steam cooking. In building pits SI3-07 and 08, no cultural remains were found.

Material and methods

Flotation-based archaeobotanical analysis was conducted on sediment samples collected from ten hearths identified inside eight building pits within survey sections 2 and 3 (Fig. 2). Except for SI2-01 and SI2-04, which contained two hearths, all building pits contained one hearth. The light fraction of all samples was extracted using bucket flotation. For on-site

Fig. 3 (a) Sketch map and (b) aerial photo of the southern part of the Maenakanishi 2018 archaeological survey sections 3 (Fig. 2) showing the area accommodating the pillared building and building pit SI3-06 bounded by the fence structure SA3-01 to the north and the former Koromo River bank to the south



sample fractionation, the floating fraction was collected by pouring the supernatant through two stacked metal sieves with a mesh size of 1000 and 250 μm . Only carbonised plant remains were considered at identification. To avoid counting fragments from the same seed more than once, we omitted fragments that comprise less than 50% of their original size. This approach prevents artificial inflation of the total counts

and serves the same function as minimum number of individual estimates.

Direct AMS radiocarbon (^{14}C) dating of the nine selected domesticated plant seeds was performed at the Poznan Radiocarbon Laboratory and the Division of Chronological Research at the Institute of Space–Earth Environmental Research of Nagoya University. AMS ^{14}C dates were

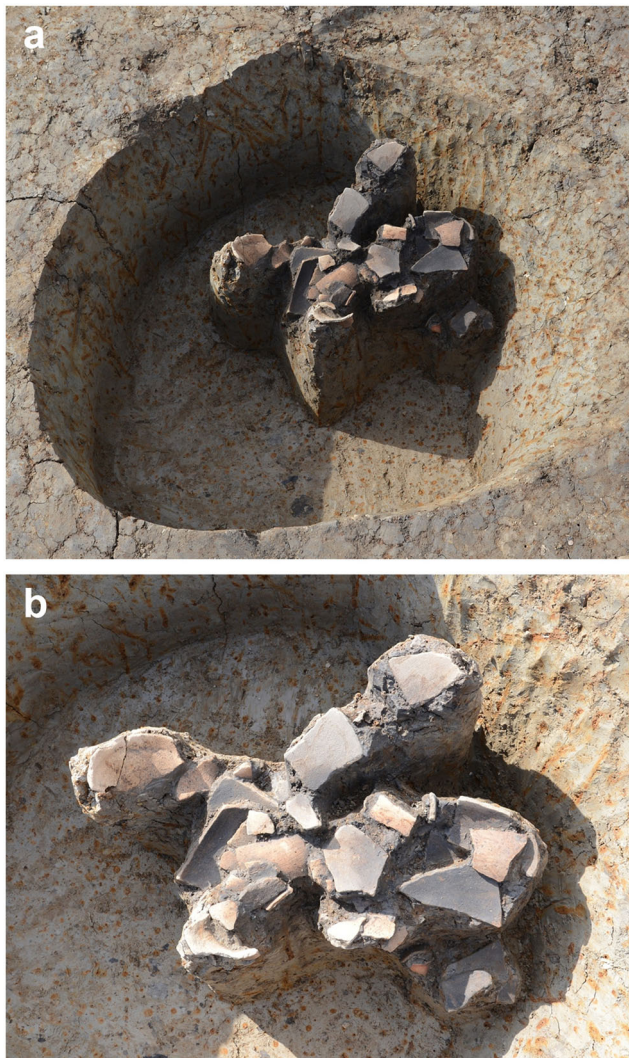


Fig. 4 Photographs including (a) overview and (b) close-up of the pottery filling of the well (SK09) located in the Maenakanishi 2018 archaeological survey sections 3 (Figs. 2 and 3)

calibrated to calendar ages using OxCal v4.3.2 software (Bronk Ramsey 1995) and the calibration curve Intcal13 (Reimer et al. 2013).

Results

Macrobotanical analysis

In sum, 719 specimens of the total carbonised seeds assemblage ($n = 761$) from the ten hearth deposit samples were identified and assigned to 18 different plant taxa (Leipe et al. 2020b). The archaeobotanical record (Leipe et al. 2020a) is dominated by grains of cultivated plants especially rice (*Oryza sativa* subsp. *japonica*), foxtail millet, and broomcorn millet with absolute abundances of 537, 124, and 10, respectively (Table 1). In the hearth sample from building pit SI3-06, two

clusters of rice husks, each comprising approximately 10–20 specimens, were recorded. The derived cereal (rice, foxtail millet, broomcorn millet) counts per sample (i.e. hearth) reveal obvious differences between the assemblage from building SI3-06 and those from other buildings. In the SI3-06 sample, the number of identified cereal grains ($n = 526$) is much higher than in the nine other samples in which the number of specimens ranges between 2 and 50. A second distinction is the discrepancy between the ratio of rice and millet, which is about ten times higher in the SI3-06 sample. In the assemblage from building SI3-06, the concentration of rice grains is 92%. In the other samples, the concentration of millet ranges between 46 and 82%. Except for hearths HE-04a and HE-04b located inside building SI2-04, where the number of millet grains is slightly below that of rice, millet dominates over rice.

AMS radiocarbon dating

The dated seed samples consisted of either single grains of rice or broomcorn millet or 3–9 grains of foxtail millet and represent six flotation samples from hearths located in five pit buildings (Table 2, Fig. 6). The confidence intervals of the calibrated ages of all nine samples (see Leipe et al. 2020b for detailed discussion of chronological issues) range between 352 BCE and 127 CE (68% probability range) and 359 BCE and 239 CE (95% probability range). Our results indicate that occupation of the excavated area by Yayoi culture people spanned at least from around the late third century BCE (early/middle Middle Yayoi transition) until the end of the first century BCE (late Middle Yayoi). This predates the onset of the Maenakanishi site occupation around 100 BCE (middle Middle Yayoi) as suggested by pottery typology (Kumagaya City Buried Cultural Heritage Center 2008).

The age ranges of D-06-1 and D-06-2 indicate use of pit building SI3-06 over a longer period, up to 300 years according to the 68% confidence intervals. Both dates suggest that pit building SI3-06 is contemporary with the surrounding buildings outside the enclosed area. Given the evidence for the coexistence of SI3-06 and the pillared building within the space enclosed by the fence structure, this site complex as a whole is associated with the remaining pit buildings in both survey sections. In addition, it appears that building SI3-06 and the enclosed space including the pillared building were used over a longer, possibly the entire occupation period, as indicated by the dates. This is supported by the rich pottery assemblages found within building pit SI3-06 pointing to a longer period of use (Fig. 5).

Interpretation and discussion

The botanical remains derived from deposits of ten hearths each located inside an individual pit building were used to

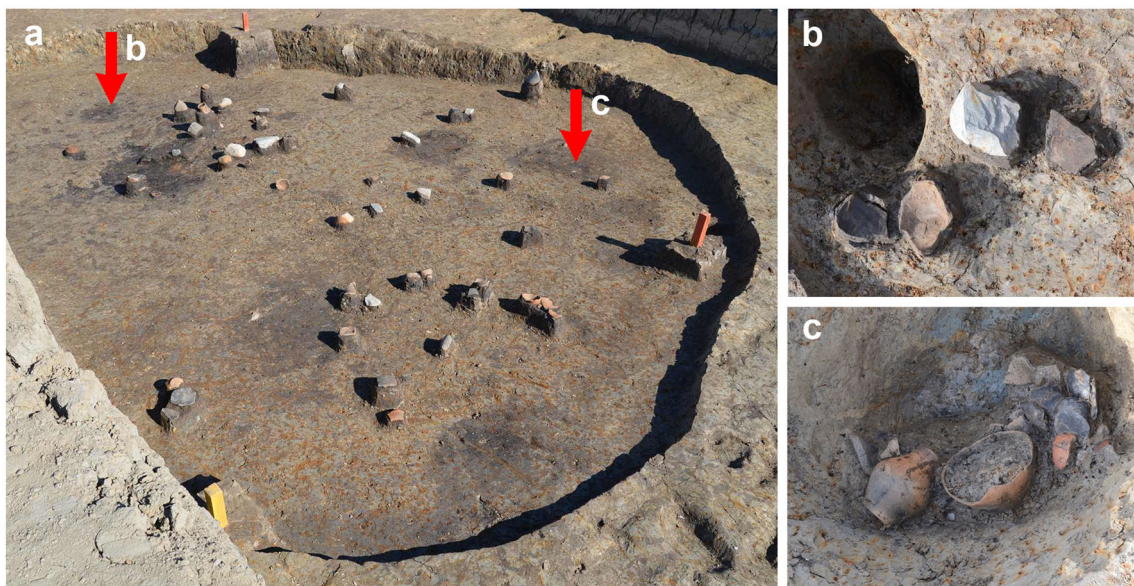


Fig. 5 Notable pottery depositions (a) on the floor and (b and c) in two pits of building SI3-06 (Fig. 3)

reconstruct the agricultural activities and food production of Middle Yayoi culture communities in the Kanto region (Leipe et al. 2020b). The current paper discusses ritual practices and social organisation of the Middle Yayoi Maenakanishi settlement using the archaeobotanical and archaeological evidences from building SI3-06, which differs substantially from the other excavated buildings of the same age. First, the number of identified rice grains is large and exceeds that of millet by more than ten times. Second, together with the neighbouring pillared building, the pit building forms a spatial complex that is separated from the other pit buildings within survey section 3 by the fence structure SA3-01 in the north and the Koromo River in the south. In the following sections, we discuss the possible function of pit building SI3-06 relying on its obvious difference from the other buildings, which likely represent the dwellings of commoners.

Rice and feasting activities

The most plausible interpretation of the archaeobotanical assemblage from SI3-06 is that it reflects communal ritual practices with a focus on rice. It appears that SI3-06 served as a communal facility for preparing food (primarily rice) used in feasting rites conducted in context of SI3-06 and the pillared building. Ceremonial food preparation and consumption is corroborated by the abundant remains of vessels used for steam cooking found inside SI3-06. Dietler (2001) defines feasting as public ritual events centred around food/alcohol-consumption serving to create, strengthen and maintain community by building and maintaining social relations that bind together people in a group. Due to the comprehensive evidence described in ethnographic and historic publications, Dietler and Herbich (2001) identify feasting as a fundamental

and universal feature of agrarian societies, whose antiquity is demonstrated by a growing body of archaeological studies (Dietler 2011). If feasting activities took place in context of building SI3-06 and the pillared building within the enclosed space separated from the commoners, it is likely that it was related to social stratification and the presence of a community member of superior social status, who manifested its status and function by food offerings that were of high value in terms of prestige, exchange and/or caloric yield per unit area. These social events would have created social bonds and sentiments of community across the different social groups but at the same time would have also defined and manifested social boundaries, i.e. the elevated status of the leader (Dietler 2011). The introduction of agriculture has been identified as one of the main drivers for the emergence of community leaders during the Yayoi period, who would have organised collaborative work, such as landscape opening, irrigation system construction and maintenance, crop harvest and storage and organising a seed bank (Hirose 1996, 1998; Kondo 1959; Kondo 1966). Such process of social stratification had occurred much earlier in the Yellow River region during the third-millennium BCE representing the late Neolithic Longshan period (Barnes 2015) or on the Korean Peninsula during the Bronze Age Middle Mumun period ca. 850–550 BCE (Barnes 2015).

Various examples from prehistoric times indicate that crops were first introduced for being used by elites as precious food in social events rather than as staple food. Scholars generally agree that after its initial introduction into northern South America, domesticated maize was associated with elites and primarily used for religious ceremonies (Benz and Staller 2006; Logan et al. 2012). In non-fully agrarian societies of the Hopewell tradition in North America, maize was

Table 1 Total counts of carbonised grains of main cereals and floated litres per analysed hearth deposit sample from sections 2 and 3 of the archaeological survey at the Maenakanishi site in 2018. Sample location

Sample ID	Sample volume (litres)	Pit building/hearth ID	Rice	Foxtail millet	Broomcorn millet	Ratio rice/millet
F-04a	7	SI2-04/HE-04a	13	10	1	1.18
F-04b	5	SI2-04/HE-04b	10	9		1.11
F-01a	6	SI2-01/HE-01a	4	11	1	0.33
F-01b	4	SI2-01/HE-01b	2	9		0.22
F-07	5	SI2-07/HE-07	1	3	1	0.25
F-09	5	SI2-09/HE-09	3	11	1	0.25
F-06	24	SI3-06/HE-06	484	40	2	11.52
F-11	10	SI3-11/HE-11	19	27	4	0.61
F-12	8	SI3-12/HE-12		3		0
F-13	6	SI3-13/HE-13	1	1		1

is indicated by associated pit house and hearth IDs (Fig. 2). For the complete archaeobotanical dataset, the reader is referred to the supplementary material presented in Leipe et al. (2020a)

associated with elites and ritual practices and had little importance as staple food for many centuries after its adoption (Knight 2001; Pluckhahn et al. 2006). Evidence for the use of ‘exotic’, precious food in feasting rites orchestrated by elites is also known from ancient China. Using Bayesian modelling of directly ^{14}C -dated seeds of wheat, Long et al. (2018) inferred an early appearance of this West Asian crop in the lower Yellow River region around 2600 BCE. However, the crop did not become important in the regional food economy that continued to be dominated by millet over the following centuries (Ma et al. 2016) or even not until 600 CE (Zhou and Garvie-Lok 2015). The introduction of wheat roughly coincides with the Neolithic/Early Bronze Age transition, which is marked by development of social hierarchy and societal complexity in this region (Long et al. 2017).

But had rice a higher ‘value’ compared to other crops cultivated during the Yayoi period? Evidence that rice might not have been the common main staple food comes from written sources of the Medieval period that indicate that rice was

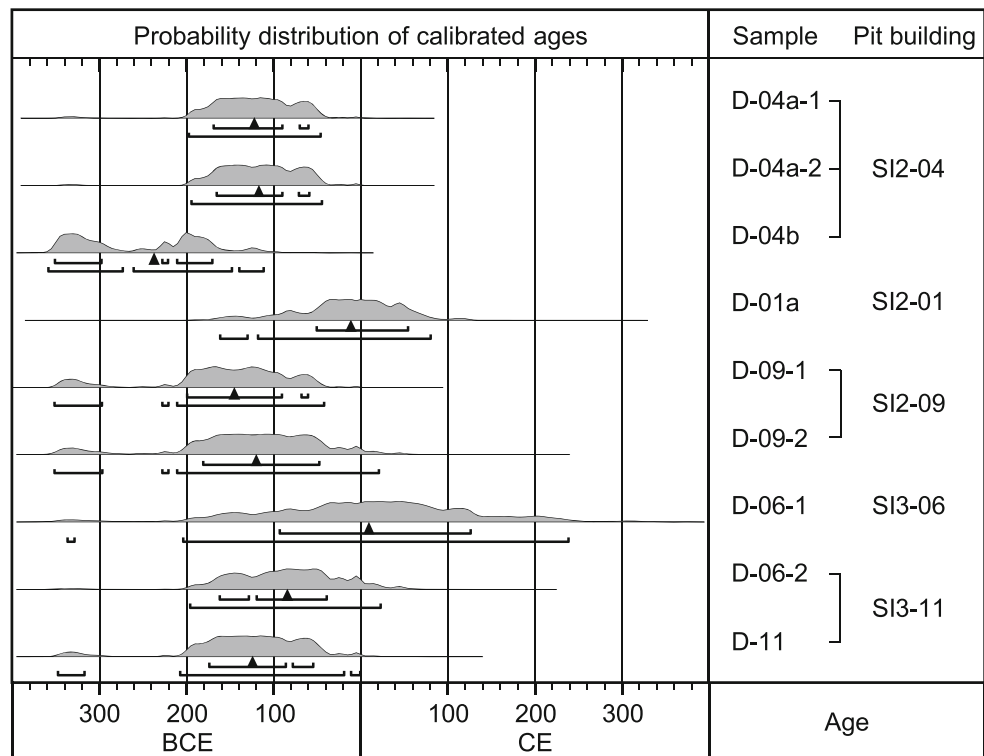
valuable food or an important source for the production of alcoholic beverages (Ohnuki-Tierney 1993; von Verschuer 2016). Medieval written records also prove that especially in western Japan, rice was used as land tax paid to local or regional leaders and that farmers often fed mainly on other crops, such as millet (Amino 1980). More substantial records from the subsequent Edo period show that the meaning of rice as land tax continued through early modern times (Ohnuki-Tierney 1993). Evidence exists for a similar situation in early state-level societies (first–third century CE) on the Korean Peninsula, where rice was a luxury commodity and its production overseen by central power (Kim 2015). Records of carbonised seeds from Jeju Island located south of the Korean Peninsula dating to the Late Mumun period (ca. fifth–first century BCE) provide more straightforward evidence for the status of rice as an exotic and luxurious food. While wheat and barley were apparently the main staples there, rice was used by emerging elites in ritualised feasts (Kim et al. 2018).

Table 2 AMS ^{14}C dates and calibrated ages of carbonised millet and rice grains from the analysed hearth deposits of the Maenakanishi site. Sample origin is indicated by related pit building and hearth ID (Fig. 2).

Sample ID	Lab ID	Dated material	Pit building/hearth ID	Conventional age, ^{14}C BP	Calibrated 68% range, BCE/CE	Calibrated 95% range, BCE/CE	Calibrated median, BCE/CE
D-04a-1	Poz-113871	<i>Oryza sativa</i>	SI2-04/HE-04a	2100 ± 30	– 170– 61	– 198– 47	– 123
D-04a-2	Poz-114334	<i>Panicum miliaceum</i>	SI2-04/HE-04a	2095 ± 30	– 166– 60	– 195– 45	– 117
D-04b	Poz-114335	<i>Setaria italica</i>	SI2-04/HE-04b	2165 ± 30	– 352– 171	– 359– 112	– 239
D-01a	NUTA2-21202	<i>Oryza sativa</i>	SI2-01/HE-01a	2007 ± 50	– 51– 55	– 162– 81	– 11
D-09-1	NUTA2-21204	<i>Oryza sativa</i>	SI2-09/HE-09	2120 ± 40	– 200– 61	– 352– 43	– 146
D-09-2	NUTA2-21205	<i>Setaria italica</i>	SI2-09/HE-09	2095 ± 50	– 182– 48	– 352– 22	– 120
D-06-1	NUTA2-21206	<i>Oryza sativa</i>	SI3-06/HE-06	1981 ± 90	– 94– 127	– 337– 239	10
D-06-2	NUTA2-21209	<i>Setaria italica</i>	SI3-06/HE-06	2065 ± 40	– 163– 40	– 196– 24	– 85
D-11	NUTA2-21208	<i>Setaria italica</i>	SI3-11/HE-11	2101 ± 40	– 175– 55	– 348– 1	– 125

Calibration was performed using OxCal v4.3 (Bronk Ramsey 1995) and the calibration curve Intcal13 (Reimer et al. 2013)

Fig. 6 Probability densities at 68% (upper square brackets) and 95% (lower square brackets) confidence level and medians (arrows) of calibrated AMS ^{14}C dates (Table 2) of carbonised rice and millet grains from hearth deposits (Fig. 2) at the Maenakanishi site. For complete results of AMS ^{14}C dating and age calibration the reader is referred to Leipe et al. (2020b)



The cultural context of feasting at the Maenakanishi site

A specific perspective from which the recorded rice-centred feasting at building SI3-06 may be evaluated is that of religious practices. In Japan, religious practices have been mainly inferred from artefacts identified *per se* as ritual objects such as oracle bones, which are believed to have been used for divination, or from a combination of functionality, iconic depiction and find situation of artefacts such as bronze objects and ceramic food vessels (Hudson 1992; Kaner 2011). The most common ritual bronze artefacts of Yayoi time are bells, spearheads, halberds, daggers, and mirrors (Hudson 1992; Steinhaus and Kaner 2016) and have been mainly documented in western Japan. So far, only at the Yanagisawa site in northern Nagano Prefecture (Fig. 1b), remains of bronze bells ($n = 5$) and the largest assemblage of bronze halberds ($n = 8$) known from eastern Japan have been excavated (Nagano Prefecture Buried Cultural Heritage Center 2012). Remains of two halberds have been also reported from Yayoi layers of the Maenakanishi site (Kumagaya City Buried Cultural Heritage Center 2008), but they are stone-made and likely represent imitations of specimens made of bronze. Together with a pottery influx (Baba 2008), it seems that these halberds indicate the eastward transmission of cultural practices from western Japan via the Nagano region into the study area during the late Middle Yayoi period but the substitution of the original production material (bronze) by stone argues for the

peripheral status of the region around Maenakanishi. The findings of the current study provide independent support for the abovementioned theoretical concepts and indirect evidence, i.e. for feasting in religious context performed in context of building SI3-06 and the pillared building. Further, we discuss the cultural background of the feasting by examining analogies between the archaeological record from the studied site section and different religious aspects from Japan and continent East Asia.

Ritual offering

Several analogies exist between the archaeobotanical and archaeological records from the Maenakanishi site and aspects of religious practices recorded in Japanese early historical sources. The earliest evidence for religious offerings to deities is related to ceremonies called *matsuri*. While in contemporary Japan, *matsuri* may describe all kinds of communal festivities sometimes even without any religious background, Naumann (2000) notes that it originally translates the Chinese term *ji* meaning ‘sacrifice’. Other scholars found evidence for the meaning ‘to submit to the will of the deities’ (Hardacre 2017) or that it involves food offerings to deities (Orikuchi cited in Ohnuki-Tierney 1993). The earliest written accounts on *matsuri* date to the seventh century CE when Yamato kings transformed themselves into heavenly emperors and established an imperial court office that defined and instructed ceremonial practices

to manifest the divine nature of imperial rule (Naumann 2000). The earliest documented rituals belong to the category of thanksgiving *matsuri* during which the new cereal harvest was ‘tasted’ by the emperor after having it offered to his ancestors, practices that are believed to have been adopted from Chinese codes (Naumann 2000). Although rituals were continuously diversified, this type signals a connection between rituals, food offerings/consumption and secular rule, thus yields parallels to the presented archaeobotanical and archaeological records from Maenakanishi. However, whether the suggested performance of feasting practices in the enclosed space at the site are precursory to the earliest known religious ceremonies defined by the imperial court remains open.

Worship buildings

The pillared building that existed in survey section 3 is another feature that suggests linkage to religious practice dating back at least to Japan’s early historic times. Suspended-floor constructions are also documented from Jomon cultural sites with the oldest examples dating back to the Middle Jomon period (Habu 2004; Togashi 2003). Although their function is not known, a religious background is often discussed. A new type of suspended-floor construction appeared during the Yayoi period, which is generally believed to have functioned as a granary (Uchiyama et al. 2014) because they prevent rodents to access the harvest and promote ventilation to decrease moisture levels and thus the risk of mould infestation. These buildings probably originated in ancient rice-farming societies of southern China and were introduced into Japan as part of the Yayoi agricultural package (Wakabayashi 1991). Based on the continuous disappearance of rice remains from storage pits over the Middle Yayoi period (Terasawa and Terasawa 1981), Hosoya (2014) claimed that people started to shift the storage of rice from earth pits to granaries, which, especially in western Japan, became more common over the same time interval.

In Japan, shrines, which are sanctuaries where priests and worshippers interact with deities and to which the religious concept of Shinto is related to (Breen and Teeuwen 2010), constitute different suspended-floor-style architectural categories (Kuroda 2005). One building style (*shinmei-zukuri*) in this group, which is among the oldest known types, shows analogies with the pillared building at Maenakanishi. In addition to the suspended floor that is built on pillars set into pits outlining a rectangular area, common features are two free-standing outer wooden columns (i.e. ridgepole pillars) that support the roof ridge (Fletcher and Cruickshank 1996). These features distinguish them from pillared buildings without these ridgepole pillars that are generally interpreted as granaries. Traces of such specific constructions often called ‘central buildings’ have been also identified in Yayoi cultural layers at other site, and variation in size and ridgepole pillars, which

were sometimes absent or located not outside but inside the dwellings, suggest that there was no uniform construction design at that time (Ikegamisone Heritage Preservation Committee 1997). Although most of these pillared buildings have been found at Yayoi sites in western Japan, some examples are also reported from ‘peripheral’ eastern Japan. A large pillared building with free-standing ridgepole pillars was identified at the Kitajima site (Yoshida 2002) located close to Maenakanishi (Fig. 1c). Remains of another large pillared building near Maenakanishi that fits the criteria of this pillared building type was identified at the Komiya site (Suzuki 2004; Fig. 1c). Two more examples are reported from the Nakazato site (Shitara 2006) in Odawara City, Kanagawa Prefecture (Fig. 1b) and the so far northernmost structure from the Nishiiwano site (Kashiwazaki City Board of Education 2019) located in Kashiwazaki City, Niigata Prefecture, Hokuriku region (Fig. 1b). The specific architectural features of these pillared buildings are also found in stylised images of buildings depicted on ceramic vessels and bronze bells of the Yayoi era (Hosoya 2009).

The most prominent example of the *shinmei-zukuri* architectural style is the Ise shrine complex in Mie Prefecture, which is one of the oldest and highest sanctuaries of Shinto dedicated to the sun goddess *Amaterasu Omikami* regarded as the ancestor of the Japanese imperial line (Teeuwen and Breen 2017). The shrine is mentioned in one of the first Japanese written records (*Nihon shoki*). However, no solid evidence can be found in this mytho-historical text dating to 720 CE for the shrine’s age or the character of the rituals performed there at that time. What is often inferred from the early written sources is that the Ise shrine played a central role in the establishment of an imperial court cult that promoted the divine nature of imperial rule related to early state-building efforts starting in the seventh century CE (Teeuwen and Breen 2017).

The architectural analogies outlined above have provoked speculations that some Yayoi pillared buildings demarcated sacred space used for ritual practices and were early forms of suspended-floor shrines (Deal 2017). Furthermore, Kidder (2007) hypothesised that pillared buildings belonged to elite members (shamans) of the community that had both political and spiritual power (see also Mizoguchi 2002) and their architectural style was adopted for the earliest known shrines, such as the one in Ise. Our results suggest that ritual practices took place at or in the Maenakanishi pillared building and that the construction was likely used as the residence of the communal leader. Another feature that links the pillared building and SI3-06 with ritual practice and political/religious power is the fencing (Fig. 3). Fence structures are part of the *shinmei-zukuri* architectural style. Pillared buildings demarcated by fences are also documented at other ancient settlement sites in western Japan, although not before the late Late Yayoi (Kondo 1995; Shitara 2014a), and it is believed that they indicate the spatial separation of the living area of local leaders

that later transformed into residences of kings during the Kofun period (Hosoya 2009; Shitara 2014a). Whether the Jomon culture pillared building tradition played a role in this context is a question that requires further analyses. It cannot be excluded that they had an influence on the Yayoi culture pillared buildings and associated practices especially in regions of eastern Japan, where the more abundant Jomon population played a greater role in the formation of the Yayoi culture.

Water symbolism

Further potential relation to religious beliefs and practices is provided by the location of the pillared building and building SI3-06 near the cluster of springs and the former riverbank (Fig. 3), a typical setting for shrines and ritual places (Mori 2003; Nelson 2000). Since the earliest mythological accounts on Japanese religious traditions that are usually called Shinto, rituals involving water (*misogi*) are the most common for physical and mental purification (Kasulis 2004). In addition, water itself is regarded as sacred and worshipped as different deities (*suijin* or *mizugami*) at shrines that are often located near sources of water such as springs and wells, which these deities are associated with (Bocking 1997). In turn, these deities are associated with spirits of the rice field (*tanokami*), a connection which seems natural since sufficient supply of water is crucial for agriculture, especially wet-field rice farming (Iwai 2005).

We assume that (i) the assemblages of pot sherds inside the well (Fig. 4) close to the Maenakanishi pillared building, (ii) the ritual stone axe deposited in one of the ditches and the earth pit next to the helocrene springs, and (iii) the springs themselves (Fig. 3) are related to religious beliefs and ritual practices. Evidence for ritual practices in context of wells and springs has been also reported from other sites. Extensive numbers of pottery sherds, wooden objects and rice chaff found in 92 pits on a former river sandbank at the Makimuku site (Nara City, Nara Prefecture), a large Early Kofun trading hub of interregional importance, dated to the third and fourth centuries CE were interpreted by Ishino (1992) as evidence for rituals centred around rice consumption and agriculture. Co-occurrence of both pot sherds and rice chaff is also reported from the Ikegamisone site. At Ikegamisone, which during the Middle phase developed into one of the largest known settlements of the Yayoi culture, pottery was apparently deposited intentionally in a large well. This structure, which Inui (1999) identified as a 'ritual well', was, like the one at the Maenakanishi site, situated in close vicinity to a large pillared building. Hosoya (2009) conducted flotation-based archaeobotanical analyses on sediments collected from the area of the large well and pillared building including burnt soils and deposits from post-holes and pits. The latter appears to be similar to the ones analysed at the Kofun culture Makimuku site by Ishino (1992) and thus may be interpreted as ritual sites. The

majority (ca. 90%) of the archaeobotanical assemblage from the Ikegamisone site, which comprises more than 5000 charred seeds, belongs to rice supplemented by a 'certain number' identified as millet. In addition, about 2000 chaff were recorded in the samples, of which 97% were assigned to rice. Although Hosoya (2009) referred this finding to communal activities around the rice-farming routine such as dehusking and winnowing, such interpretation does not rule out that the combined finds of pot sherds and rice remains in spatial relation with the well, the pillared building, and the pits indicate a venue primarily used for ritual practices related to food consumption, which may be associated with water supply and, consequently, agriculture.

Ancestral worship

The use of large Yayoi culture pillared buildings often occupying a central position in settlements has been also discussed in context of mortuary practices. Mizoguchi (2013) points out that many large rectangular buildings (often pillared buildings) were built close to cemeteries (sometimes of elites) and concludes that the activities carried out inside the buildings were related to ancestors. This opinion is shared by Shitara (2009), who notes that some pillared buildings with ridgepole pillars were positioned on top of burial chambers. This spatial proximity between burials and large buildings is also documented at one of the earliest known Yayoi settlements (Etsuji site, northern Kyushu) suggesting that the relation between both features had existed since the beginning of the Yayoi period. Similar settings are known from Middle Mumun culture (ca. 800–400 BCE; Lee 2016) sites in the southern part of the Korean Peninsula illustrating that these customs were also introduced from the continent (Mizoguchi 2013). In the dual function of a special type of globular ceramic vessel as containers for crop (especially rice) storage and as coffins documented since the earliest Yayoi period, Mizoguchi (2013) sees a link between the cycle of rice cultivation and the cycle of human life and, in combination with findings from the Yubihonmura site, speculates that some of these elaborated vessels were used in ancestor-related feasts conducted in or at the site's large pillared building. As Shitara (2014a) argues, it seems plausible that such mortuary customs originated from China, where ancestral rites involving feasting have a long history that may be traced back at least to the Middle Neolithic (Nelson 2003; Underhill 2002). Evidence from prehistoric cultural contexts of eastern China is reported from the Dawenkou culture (ca. 4100–2000 BCE) comprising ritual vessel sets with elaborate devices for elegantly pouring and drinking alcohol and serving dishes that were buried in tombs of wealthy deceased (Wagner 2009). These customs were carried on by the Chinese royal and imperial dynasties into historical times (Wagner 2009). A prominent example from the Bronze Age Shang period (ca. 1600–1050 BCE) is the ancestor

worship carried out by rulers to affirm kinship and their claim to power, to ensure loyalty of the community members and to acquire labour for group-based agricultural tasks by offering valued food (rice) and/or alcoholic beverages to community members (Underhill 2002). Descent of ancestor worship from Bronze Age China seems plausible when examining the record of Yayoi culture ritual objects. Practices around oracle bones as well as bronze objects, such as bells and mirrors, also had their roots in Chinese traditions (Deal 2017; Hudson 1992; Kanaseki and Sahara 1978) and religious and political influence from the continent can be traced over a long period well into the time of state formation.

Mortuary traditions such as ancestral worshipping is an alternative or additional purpose for which the feasting documented at the Maenakanishi site may have been conducted. This interpretation is corroborated by the proximity of the space containing the pillared building to the burial mound in the northern part of survey section 3 (Fig. 2). The southwest–northeast alignment of one of the burial’s ditches runs parallel to the long axis of the pillared building. One more ditch-enclosed burial mound was found ca. 150 m southeast of the pillared building during a previous excavation (Kumagaya City Board of Education 2015). In addition, ditch-enclosed burial mounds dated to the Middle Yayoi period were found at the Suwanoki site and at the Koshikida site (Saitama Prefecture Buried Cultural Heritage Research Organization 1991) in a respective distance of ca. 500 m towards the northeast and 1500 m towards the east of the Maenakanishi pillared building (Fig. 1). All these burial mounds show the same southwest–northeast alignment, thus appears to be related with the burial and the pillared building at Maenakanishi.

Conclusions

Based on the documented archaeological features at the Maenakanishi site, we assume that the area between the fence structure and the riverbank including the pillared building, building SI3-06, and the alluvial springs represents a space that served different religious rituals. These ritual practices involved water and the preparation and consumption of food (feasting) with a focus on rice under the guidance of a secular and spiritual ‘leader’. One scenario is that, similar to their counterparts in Bronze Age China, acting leaders worshipped their ancestors to affirm kinship and to legitimise political power, to ensure support of the community members and to mobilise labour for agricultural activities by offering valued food, such as rice and/or alcoholic beverages, to community members. A second aspect includes ritual practices linked to agricultural production that appear to have lived on in the religious cult enforced by the imperial court during early state formation and religious traditions known from early modern times. It is thinkable that deities related to water (springs) and/

or crops were worshipped for a bountiful harvest by offerings that involved ceramics and ritual tools but possibly also communal food consumption.

Building SI3-06 was apparently used for preparing food for the feasts that were conducted within the enclosed space. It is conceivable that this construction served further ritual functions or was even the dwelling site of the communal leader. It cannot be excluded that the pillared building was at the same time used as a granary for storing crop yields or was a purely spiritual facility similar to a shrine. However, based on the discussed evidence from the continent, we assume that this building functioned as the residence of a communal spiritual and political leader. The archaeological data does not allow to unequivocally determine the function of the pillared building. No diagnostic artefacts were encountered at its position.

The archaeological and archaeobotanical records from the Maenakanishi site emphasise that rice played an essential role in ritual practices and growing social stratification during the Yayoi period. The current findings provide rare direct evidence from the Yayoi period for the intertwining of rice cultivation, ritual practices, and social stratification. Based on the discussed archaeological evidence, we hypothesise that social stratification did not evolve over the Yayoi period. What seems most plausible is that new social organisation involving rulers of elevated status was introduced by the immigrants that arrived from the continent along with other cultural elements, such as domesticated crops, new pottery styles and metal objects.

The Maenakanishi site is a prime example of a large settlement centre of eastern Japan with evidence for a large pillared building within enclosed space, features which are normally found at larger settlements of the Yayoi core domain of western Japan. Although likely less pronounced compared to the core domain, our findings corroborate the existence of settlement and social hierarchies in the Yayoi cultural periphery of eastern Japan. Remains of pillared buildings similar to the one at Maenakanishi documented at different nearby Yayoi culture sites suggest that a cluster of contemporaneous or consecutive central settlements existed in the area of Kumagaya City likely determined by favourable environments and a strategic position close to two major inland waterways promoting multi-crop agriculture and interregional exchange.

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Authors' contributions C.L. designed the research. S.K. led the archaeological survey of sections 1 and 2 in 2018/2019 and compiled and organised the archaeological data. C.L. performed flotation and identification of archaeobotanical assemblages. C.L., S.K., M.W., and P.E.T. discussed the results. C.L. compiled the tables and figures and wrote the manuscript with contributions from S.K., M.W., and P.E.T.

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Data Availability Archaeobotanical data used in the current paper are available as supplementary material (Leipe et al. 2020a) stored in the online Open Access information system PANGAEA (<https://www.pangaea.de/>). The ^{14}C data based on selected archaeobotanical remains from the Maenakanishi site are reported in (Leipe et al. 2020b).

Code availability Not applicable.

Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflict of interest.

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