

Coming Together to Toast and Feed the Dead in the Cotahuasi Valley of Peru

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Abstract There has been little discussion on the macrobotanical remains from Andean Middle Horizon sites. In this article, we present macrobotanical data from archaeological excavations at Tenahaha, a small mortuary center in the Cotahuasi Valley of Peru. While the people who attended Tenahaha may not have definitively been Wari, evidence suggests that they were likely influenced by the Wari. Our analysis revealed new insights into site use and the distribution of botanical staples during the Andean past. People used plants differently across time and how people chose to utilize plant resources from their environment provides insights into cultural practices. The local plant staples of quinoa (*Chenopodium quinoa*) and maize (*Zea mays*) were found in high densities in concentrated areas of the site. In addition, local plants such as Echinocactus (*Echinocactus* sp.), tubers (e.g., *Solanum* sp.), and the Peruvian peppertree (*Schinus molle*) were recovered in abundance. These remains provide insights into past public ceremonies and how the inhabitants used different areas of the site. The occurrence of sprouted maize and the fruit of peppertree in certain areas of the site seems to indicate ritual and/or ceremonial use of chicha during the Middle Horizon (AD 600–1050). The analysis of these macrobotanical remains provides a glimpse into the importance placed on bringing people together to commemorate the dead within the ancient Andes.

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Introduction

The Wari State was the major power during the Middle Horizon—a period spanning AD 600 to 1050—in the Central Andes. There has been significant research on the nature of the empire and its outposts (Jennings and Castillo 2014; Schreiber 1992), but there has been less research on the domestic lives of people who lived during this time of considerable cultural change. Located in the Cotahuasi Valley of southern Peru (Figure 1), the site of Tenahaha was a Wari-influenced ritual center founded during the Middle Horizon. Although evidence for direct imperial control over the valley is weak (Jennings and Yépez Álvarez 2015), village life was nonetheless shaped by Wari ideas and ideals.

The Middle Horizon was a period of surging population, social stratification, and foreign influence in Cotahuasi (Jennings 2015a), and Tenahaha may

have served as a neutral gathering place to socialize during a tense period of change (Jennings 2015b). Excavation data from Tenahaha suggest that the site was used only sporadically and for festivals associated with celebration, internment, and interaction with the dead (Jennings 2015a:210). One particular aspect of life, plant use, at the site has not been the subject of previous publications. The macrobotanical data presented here confirm the site's intermittent occupation. Our analysis provides a greater understanding of the Tenahaha's spatial and temporal variation. In sum, the macrobotanical data recovered from Tenahaha provide new insights into Middle Horizon plant use and food production.

Site Background

Tenahaha is a four-hectare archaeological site that was first occupied during the second half of the Middle Horizon—a period spanning AD 850 to 1050



Figure 1 Landsat image showing the location of the Tenahaha site in the Cotahuasi-Ocoña Valley in southern Peru.

(Jennings and Álvarez 2015a). The site's river bottom location is unusual since most people who lived in the Pre-Columbian highlands chose to live on valley flanks where they were closer to spring-fed agricultural terraces and camelid grazing lands (Jennings 2006:363–365). The few rain-fed agricultural terraces associated with Tenahaha were capable of sustaining only a few families, but the site is located near the geographic center of the valley along what would have been a major transportation route (Jennings et al. 2015:88–90).

Tenahaha can be divided into a ceremonial/residential sector and a mortuary component. Our excavation revealed a collection of houses, storerooms, and open spaces that were built and experienced in a manner quite distinct from those seen in the valley's Middle Horizon villages (Jennings 2015:33–34; Jennings et al. 2015). Houses, for example, lacked patios and were sporadically occupied, holding little of the refuse associated with daily living (Figure 2). The storerooms are a block of conjoined rooms rather than each being attached to a home. Of note is Area 18, an excavation unit that exposed two 1x1 m storerooms with raised doorways and two superimposed stamped earth floors

containing wood charcoal dating to the late Middle Horizon period. Area 19, a 5x3 m excavation unit bisecting the western wall of the western enclosure, covered the interior of the enclosure and an entrance that extends past a smaller, conjoined enclosure that was also filled with kitchen debris (Jennings et al. 2015:78–79).

Built in an unsustainable location, Tenahaha may have served as a meeting place rather than a village (Jennings 2015a). Feasts have a long-standing importance in the Andes (Jennings and Bowser 1999), and multi-day celebrations of the dead were a common occurrence at the time of the Spanish Conquest (e.g., Gose 2008:14–21; Hastorf 2003; Isbell 1997:38–100; Ramírez 2005:23–142). With this in mind, we suggest that people from the valley flanks came with their dead to Tenahaha. These rituals likely helped villagers in the Cotahuasi Valley adjust to the sweeping societal changes that were occurring in the region during the Middle Horizon, a difficult period of population growth due to competition for arable land resources, agricultural intensification, and incipient social stratification (Jennings and Álvarez 2015b; Tung 2012).

Intermittent occupation of Tenahaha is supported through relatively low macrobotanical counts as compared to other Middle Horizon macrobotanical studies at Conchopata and Cerro Baúl (Sayre et al. 2012). Low macrobotanical counts also may be an effect of poor botanical preservation at Tenahaha. Yet, the lack of lithic debris often associated with stone tool use and food processing seems to show that Tenahaha was not continually occupied. The absence of the daily manufacture of textile artifacts also seems to indicate sporadic use of the site as the reason for the absence of these common daily activities at Tenahaha (Jennings and Álvarez 2015). Large heavy implements were kept on site for occasional use in the production of feasts or rituals, which is evident from the grinding stones that were kept in place such as in Area 18 (Jennings and Álvarez 2015).

The macrobotanical remains recovered at Tenahaha reflect dietary traditions in Peru from the ancient past that continue into the present. The people who came to Tenahaha ate a typical regional diet that included quinoa (*Chenopodium quinoa*), tubers (*Solanum* sp., potentially among others), amaranth (*Amaranthus* sp.), beans (*Phaseolus* sp.), maize (*Zea mays*), and some wild fruits such as cactus fruits

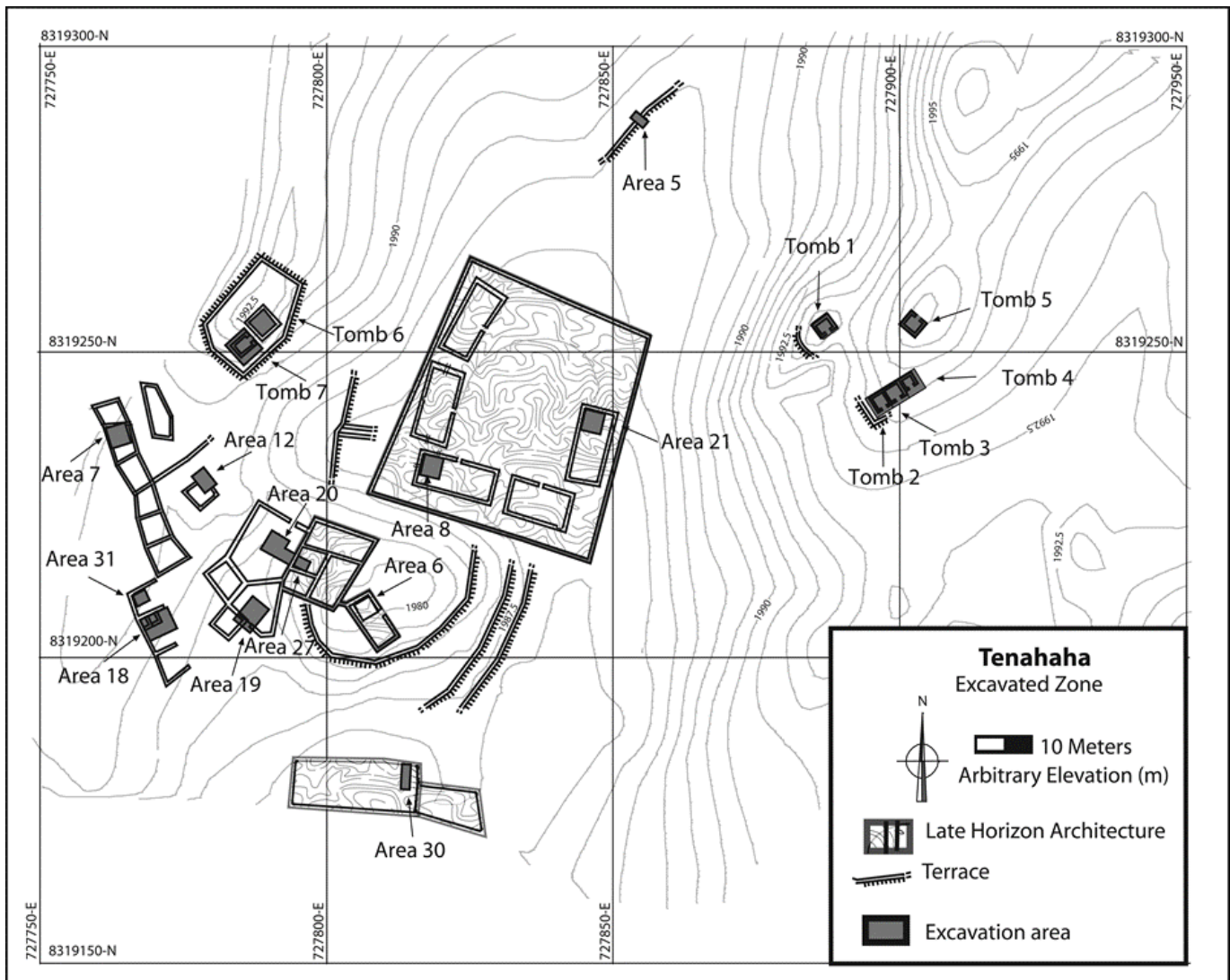


Figure 2 Tenahaha site map.

(*Opuntia* sp.), bramble berries (*Rubus* sp.), and Peruvian peppertree, or molle, fruit (*Schinus molle*) (Jennings 2015:74; Sayre et al. 2012). Preliminary work shows maize, quinoa, bean, tubers, and molle played prominent roles in Wari foodways in the Ayacucho homeland, and these foods accompanied Wari colonists when they traveled to new locales to construct their outposts (Cook and Parrish 2005; Finucane 2008; Finucane et al. 2006; Goldstein et al. 2009; Moseley et al. 2005; Sayre et al. 2012). At Tenahaha, food consumption differs from these known studies in comparison to other Middle Horizon sites. Site use in regards to macrobotanical remains seems to indicate sporadic site occupation and observance at this funerary location. This study expands our understanding of past culinary practice in the Middle Horizon period.

Analysis

Excavators used “blanket sampling” across the site (adapted from Pearsall 2000), recovering 8-liter, when possible, soil samples from multiple contexts within each excavation area (levels, features, burials, etc.). Samples were processed using a motorized flotation system (a modified SMAP machine), with all light fraction residues bagged, labeled, and weighed. The heavy fraction was passed through a series of 2 mm, 1 mm, and 0.5 mm geologic sieves. Botanical remains were taken from each sieve, with a low power stereoscopic microscope (6–25x) lit by a fiber optic light source used to help identify botanical remains. All wood > 2 mm was sorted, as well as seeds, parenchyma, and small pellet shaped dung > 0.5 mm (see Pearsall 2000:107–108). The botanicals were all

Table 1 Ubiquity of macrobotanical remains from 61 samples.

Botanical Remain	Within Site Ubiquity (%)
Quinoa	46
Maize kernels	16
Maize sprout	5
Maize cupule	11
Parenchyma	34
Solanaceae	20
Molle	20
Echinocactus	57
Small dung	23
Wood	75

charred and no desiccated materials were observed during sorting other than modern roots.

The Andean macrobotanical species were analyzed with comparative botanical collections from the University of South Dakota, W. H. Over Museum, USDA comparative seed material, online botanical databases, and the authors' personal Andean collection. Low macrobotanical counts seem to show sporadic site use with a count of $n = 6470$ recovered from the site. We report the results of analysis on the 61 flotation samples that were collected from Middle Horizon contexts at Tenahaha.

Density and Ubiquity Analysis of Macrobotanical Samples

The volume of soil that was processed through flotation varied from 3 liters to 10 liters. The overall Tenahaha site botanical count was $n = 6470$ from 347 liters of soil which equals a site average density of

18.64 macrobotanical remains/liter. The density of botanicals ranged from 0.1 to 197.33 macrobotanical remains per liter. The highest density of 197.33 is from sample 43 in Area 19 with a quinoa count of 864. The second highest density was 165.33 from sample 3 in Area 1, a tomb or funerary space with 1132 *Echinocactus* seeds. The third highest density (101.25) was recovered from sample 18 in Area 18. This was due to a high count of wood > 2 mm: 392 fragments. Wood was the most ubiquitous taxon at 75% followed by *Echinocactus* at 57%; quinoa was present in about half of the samples at 46% (Table 1; see Table 2 for count of finds by area).

Crops and Other Botanical Remains

Quinoa

Some of the most abundant plant remains at Tenahaha are the charred seeds of quinoa. Culinary and agricultural practices in the Central Andes changed from the Formative Period (1800 BC–AD 200) into the Middle Horizon (AD 600–1050) (Nash 2012). Studies from the Lake Titicaca basin—which follows a different chronology—suggest that this transition of practices selected for more staples, such as quinoa, long before the rise of Wari and Tiwanaku (Bruno 2014; Whitehead and Bruno 2003). The high ubiquity of quinoa at Tenahaha seems to support this idea. There were 1286 quinoa seeds recovered at Tenahaha. The highest count for quinoa (863) came from a single sample, no. 43 in Area 19, which was a ceremonial context from level V (Middle Horizon). The next highest count was 65 from sample no. 46 in a storage context in Area 18, adjacent to Area 19. Of the 28 samples from Tenahaha with quinoa, 12 came

Table 2 Macrobotanical counts by area.

Taxon	5T (34l)	24T (46l)	6D (13l)	7D (<1l)	8D (10l)	12D (5l)	21D (26.5l)	30D (4l)	18S (73l)	19C (49l)	20C (16l)	27C (8l)	Tomb 1 (17l)	Tomb 2 (10l)	Tomb 3 (34l)
Quinoa	5	-	63	-	-	-	1	3	218	995	-	-	-	-	1
Maize kernel	-	-	3	-	-	-	-	-	8	4	1	16	-	-	1
Maize sprout	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-
Maize cupule	-	-	-	-	-	-	-	-	69	23	-	-	-	1	-
Parenchyma	3	5	82	-	1	-	26	3	12	3	-	5	7	-	3
Solanaceae	-	-	11	-	-	-	-	1	1	243	-	-	-	-	2
Molle	-	-	-	-	-	-	-	-	96	11	1	-	-	-	2
Echinocactus	26	23	65	-	93	6	28	8	20	91	68	65	1143	-	18
Dung	-	54	30	-	131	-	20	-	26	38	4	18	8	-	2
Wood	-	14	140	-	2	264	4	1	1233	317	33	10	21	-	53

Notes: Columns are Area numbers, followed by a letter that designates use type (T=Terrace, D=Domestic, S=Storage, C=Ceremonial). This information is followed by the number of liters recovered in the sample.

from Area 18 with a count of $n = 218$ or 17% of the total quinoa. Another 10 samples came from Area 19 led to a total count from Area 19 of $n = 995$, or 77% of quinoa recovered from the Tenahaha site.

Maize

Three sprouted maize kernels were identified in the botanical remains from Tenahaha. Two of them were recovered from Area 19 and one from Area 18. Sprouted maize provides evidence for the production of *chicha* during the Middle Horizon. *Chicha de maizę* is made by germinating the kernels and then grinding them into flour and fermenting the liquid (Moore 1989; Jennings and Chatfield 2009:207). *Chicha* can be created to utilize and preserve the nutritional value of harvested grains (Sayre et al. 2012). These drinks also often serve a social function, with the beverage being consumed in large quantities at weddings, funerals, work parties, and other events (Goldstein and Coleman 2004; Jennings and Bowser 2009; Jennings and Chatfield 2009; Moseley 2005; Sayre et al. 2012).

Sixteen maize kernels were identified; seven were recovered from Area 18 and three from Area 19. There was a much higher count of cupules than kernels recovered at Tenahaha ($n = 78$). Fifty-four (69%) of the cupules came from Area 18 and twenty-three (29%) from Area 19. The kernel to cupule ratio was 1:4.87. Maize was sometimes kept on the cob for transport between occupational areas and the frequent presence of cupules at Tenahaha demonstrates that maize was likely transported on the cob, and then the cob remains were used as fuel.

Solanaceae

The Solanaceae family is a particularly important plant family in South America. The iconic crops of potatoes, chili peppers, tomatoes, and tobacco are just some of the crucial crops that were important sources of food and social comforts in this region. Potatoes are commonly planted from clones but many other economic plants in the family are planted from seed. The diversity of this family is not always represented in the macrobotanical remains as tubers may be identified as parenchyma. As we demonstrate below the large number of Solanaceae seed remains recovered at Tenahaha represent the importance of some of the lesser known species in this family.

Areas 18 and 19 had significant amounts of Solanaceae. One of the largest samples from Area 19, sample no. 43, was principally composed of seeds from the *aguaymanto* fruit (*Physalis peruviana*). However,

many of the remains from this family are not identifiable to the genus level. Solanaceae seeds recovered were preserved by charring. From this determination, we cannot rule out wind-blown seeds or entry through bioturbation, and the carbonization of these remains through the burning of dung is a possibility as well.

Area 18 and especially Area 19 had significant amounts of Solanaceae. Most areas that contained Solanaceae seeds also contained quinoa. Maize occurred less than *Echinocactus* or quinoa in the presence of Solanaceae.

Molle

Ethnographic studies in the Peruvian Andes documented the use of *molle* drupes to brew a form of *chicha* called *chicha de molle* (Goldstein and Coleman 2004). At the site of Cerro Baúl, near modern town of Moquegua, thousands of *molle* seeds entered the archaeological record because of the mass production of *chicha de molle* for ritual feasting purposes during the Middle Horizon (Moseley et al. 2005; Sayre et al. 2012).

The existence of *molle* seeds at Tenahaha is intriguing and it is possible that *chicha de molle* was being produced there. Eighty of the 118 *molle* were fragmentary but > 50% whole. However, only two *molle* seeds had a partial oily sheen of residue left upon them. This may be further evidence of the boiling process used to produce *chicha* that would have removed the oils (Biber and VanDerwarker 2015:28). The ethnographic and ethnohistoric records indicate that the seeds might have been saved for other use after *chicha* production (Goldstein and Coleman 2004:525). The highest concentration of *molle* (52) comes from sample 46, in Area 18. In addition to the high *molle* counts in Area 18 a kernel of sprouted maize was recovered from sample no. 35, also in Area 18. This may be a further line of evidence of *chicha* production in this area, whether *chicha de molle* or including *molle* as an ingredient in *chicha de maizę*.

Echinocactus

Echinocactus was the most commonly recovered seed from Tenahaha ($n = 1748$). It is not uncommon at archaeological sites for the ratio of wild plants to domesticated plants to be high and there are various modes of entry whereby seeds can enter a site (Van der Veen 2007). Although no dung containing *Echinocactus* seeds was observed, windblown entry and invasive weeds may be a possible means whereby

these seeds entered the archaeological record. The seed testa was dull and many seeds were separated and these were charred. It is possible that some *Echinocactus* seeds may have arrived in context due to windborne entry yet no other uncarbonized taxa were observed in this manner. In the laboratory, *Echinocactus* seeds appeared charred and were cut open to make sure they were not modern. At higher elevations in the Andes Mountains trees do not grow well, wood becomes scarce, and llama dung is often sought and collected for fuel. Burned dung is one mode of entry for extra-local seeds to enter the archaeological record. This cactus fruit is also known to be eaten by people (Pearsall 2014).

The locality with the highest concentration of *Echinocactus* seeds in the samples was inside Area 1 or Tomb 1 (1132 or 65% of the *Echinocactus* seeds recovered from Tenahaha). It is currently not known why so many seeds were in this sample, perhaps the fruit was given as an offering or another mode of entry is possible. It is known that tombs were periodically opened in pre-conquest times and that the possibility of windblown deposition exists. More academic inquiry, research, and discussion into the high rate of the presence of *Echinocactus* in the archaeological record in the southern Andes is necessary.

Spatial Comparison of Macrobotanical Remains

Domestic Space

Area 7 was a domestic structure containing grinding stones, cookware, hearths, lithic debris, and garbage (Jennings and Alvarez 2015:59, 83). Area 21 was a domestic area located near Area 8 and the four flotation samples from these areas showed evidence of small dung, *Echinocactus*, wood, and parenchyma. Parenchyma is plant storage tissue, in these cases charred, and is thought to be associated with the production and consumption of tubers (Pearsall 2000; Hastorf and Wright 1998). Area 30 was a domestic area with an intermixing of materials from the Middle to Late Horizon; plant foods recovered from flotation samples include quinoa, Chenopodiaceae, Solanaceae, *Echinocactus*, and parenchyma.

Storage Area

Area 18 is a storage area from the Middle Horizon. Eleven samples were analyzed and large quantities of botanical material was recovered, suggesting that this area may have been an important place for the production and storage of food and it could have

been closely associated with the ceremonial Area 19. Plant foods were highly represented in comparison with other areas. Quinoa, maize (kernels), maize cupules, parenchyma, and *molle* were found in Area 18.

Ceremonial Space

Area 19 was a Middle Horizon ceremonial space that was in close vicinity to Area 18. The high quantities of botanicals associated with food and drink from Area 18 may have been a product of serving people located in Area 19 in ritual celebrations of the Tenahaha necropolis.

Solanaceae seeds were also recovered in large quantities (243) from this area. Interestingly, maize also was recovered from this area, with four kernels and 23 cupules, and the unique find of two sprouted maize kernels. These sprouts seem to suggest that the production and/or consumption of *chicha de maiz*e (Moore 1989) and possibly *chicha de molle* in this ceremonial area.

Interpretations

The excavations at Tenahaha revealed a lack of house middens, patio groups, irrigation canals, and other features routinely associated with villages of this era. The site was instead organized around communal features, such as large storage facilities and open-air semi-subterranean enclosures. The paleoethnobotanical data presented here support this distinction; the areas with more evidence of food and drink remains are public rather than private locations.

The distinctive nature of the site is perhaps most clearly demonstrated using the macrobotanical remains found in one of the storerooms (Areas 18) and semi-subterranean enclosures (Area 19). These two areas, with the highest concentrations of remains, appear to have been more closely associated with culinary practices than the two houses (Areas 7 and 12) where few remains were found. In general, non-food remains such as *Echinocactus*, dung, and parenchyma were recovered in higher densities across space than were other seed food plants such as maize, *molle*, quinoa, and some members of the Solanaceae family. The low density of food plants in domestic spaces is further evidence for the communal production of food and drink by those visiting Tenahaha.

Conclusion

Although Andean tombs are places where considerable food and drink could be consumed

(Benson and Cook 2001; Dillehay 1995), the paleoethnobotanical data from Tenahaha suggest that most food was consumed in the communal areas downhill from these tombs, where alcoholic beverages were also likely produced and served. Some food was brought into the tombs and some of this food was likely burned. Yet for the most part, engagement with the dead consisted of the placing of individuals and offerings, and their movement between tombs (Yépez Álvarez et al. 2015:119–121).

Tenahaha was a Middle Horizon site dedicated to the celebration and internment of the dead. The tombs were closed at the end of the Middle Horizon, and the Late Horizon reoccupation was light with little paleoethnobotanical evidence for food consumption or plant processing activities. The evidence for Middle Horizon food production and consumption at Tenahaha suggests that people brought most, if not all, of their food with them from their villages. They came together in a novel way to store, process, and serve a variety of dishes and drinks before or during mortuary ceremonies. For at least a few days at a time, villagers came together to create a larger community of the living and dead.

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