Precolumbian use of chili peppers in the Valley of Oaxaca, Mexico

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Excavations at Guilá Naquitz and Silvia's Cave, two dry rockshelters near Mitla, Oaxaca, Mexico, yielded the remains of 122 chili peppers dating to the period A.D. 600–1521. The chilies can be assigned to at least 10 cultivars, all belonging to the species *Capsicum annuum* or *Capsicum frutescens*. The specimens are well enough preserved to permit an evaluation of the criteria used to separate wild and domestic chilies and to distinguish among cultivated races. In addition, they provide the opportunity to assess the reliability of starch grains for documenting the presence of chilies in archaeological sites where no macrobotanical remains are preserved.

Capsicum | Guilá Naquitz | Zapotec | Mitla

Chili peppers have been collected, cultivated, and consumed in Mexico for thousands of years. The remains of wild chili peppers recovered from several levels at Coxcatlán Cave in the Tehuacán Valley of Mexico are the earliest evidence for what would later become an important domesticate (1). The analysis of pepper remains from the entire cave revealed what is believed to be wild chili harvesting beginning ≈8,000 years ago, followed by cultivation and eventual domestication of the pungent fruits of *Capsicum annuum* by ≈6,000 years ago (1).

The Valley of Oaxaca, 150 km to the south of Coxcatlán Cave, may have been on the margins of this early pepper use. Guilá Naquitz Cave in the arid eastern valley (2) yielded only two specimens tentatively identified as chili stems in levels dating to 8,000 years ago (3). The stronger evidence from Tehuacán reinforces recent data from archaeology, phytogeography, karyotyping, and enzymatic analyses, all of which have led to the conclusion that *C. annuum*, which is the most common modern species of chili pepper in Mexico, was initially domesticated in the upland areas of Mexico's central-eastern states (4, 5).

Modern survey and genetic analyses have added to our understanding of the five species of chili peppers known to have been domesticated in the Americas. These species include *C. annuum*, *Capsicum baccatum*, *Capsicum chinense*, *Capsicum frutescens*, and *Capsicum pubescens*. Four of these five species are currently cultivated in Mexico. Both domesticated and wild forms of *C. annuum* occur throughout Mexico (5, 6). This species includes well known cultivars such as the *jalapeño*, *serrano*, and *ancho* peppers. *C. pubescens*, the species designation for the modern *rocoto* pepper, has been documented in some high-altitude areas (5, 6). This pepper is thought to have been domesticated originally in the mid-altitude Andes, where it is still cultivated today (7). *C. chinense*, whose cultivars include the *habanero* and the Scotch bonnet, is used today in Yucatán, whereas *C. frutescens* is found only in the southern Mexican states of Oaxaca, Chiapas, and most notably Tabasco, the state for which the most famous cultivar of this species is named (5, 6).

Despite the fact that these data are derived from modern phytogeography, they are also of use in archaeological contexts because they provide indications of which cultivars may flourish in different environments, including the Mitla region of the eastern Valley of Oaxaca, where the archaeological sites of Guilá Naquitz and Silvia's Cave are located (8).

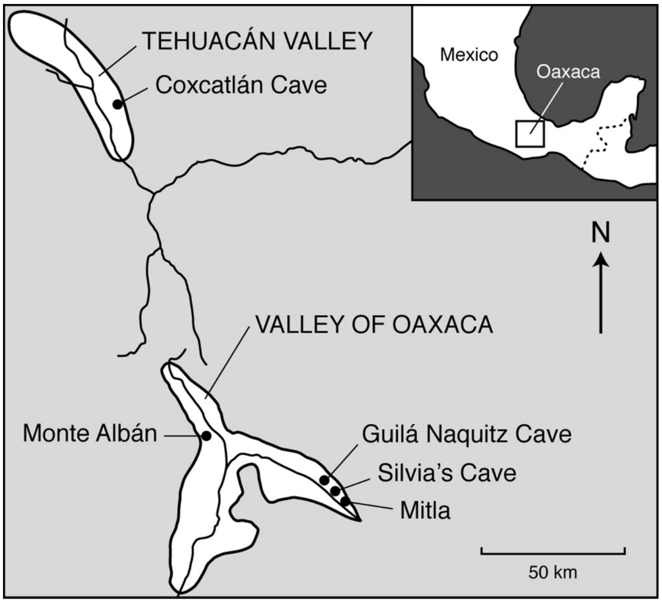

Fig. 1. Map of Oaxaca showing the locations of Guilá Naquitz and Silvia's Cave in the Valley of Oaxaca and the location of the Tehuacán Valley.

Guilá Naquitz and Silvia's Cave are dry rockshelters in a volcanic tuff cliff ≈5 km northwest of Mitla, situated at an elevation of ≈1,900 m above sea level (Fig. 1). During the period of Archaic hunting and gathering and incipient agriculture (8000–5000 B.C.), Guilá Naquitz was occupied seasonally by small family-sized groups. Once maize, beans, squash, chilies, and avocados had all been domesticated, agricultural villages sprang up throughout the valley, and cave use changed. From that point on, both in the Valley of Oaxaca and the Valley of Tehuacán, caves were used mainly as short-term camping places for work groups who were too far from their village or town to return that day. Such work groups included deer hunters, farmers planting or harvesting piedmont fields, or collectors of useful wild plants such as agaves, cactus fruits, honey mesquite, and so forth.

Between A.D. 600 and 1000, during the period known in Oaxaca as Monte Albán IIIb–IV, ancient Mitla was a major town on the river of the same name. So large was its population that its agricultural needs exceeded the area of Mitla River alluvium. Cultivation appears to have extended out 4–5 km from the town, and included the slopes and humid arroyos of the piedmont

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Table 1. Distribution of cultivars at Guilá Naquitz and Silvia's Cave

	Cultivar														
Location	1	2	3	4	5	6	7	8	9	10	NC	CF	Total	P	S
Guilá Naquitz															
Square C8	1	3									5		**9**	X	39
Square C10			1										**1**	X	
Square C12			1										**1**	X	
Square D6											1		**1**		
Square D9											1		**1**		
Square D11		3									2	1	**5**	X	1
Square D12		4		3									**7**	X	
Square E5				2							4		**6**		
Square E9	1										4		**5**		
Square E11				3							1		**4**		
Square E12		15		23							9		**47**	X	6
Square G4					1						1		**2**		
Square G10											1		**1**		
Feature 1	1	6				1	1				6		**15**	X	27
Feature 9		1									2		**3**		
Feature 12	1										2		**3**	X	1
Feature 13		2									1		**3**	X	
Feature 16											2		**2**		
Totals	**4**	**34**	**2**	**31**	**1**	**1**	**1**	**0**	**0**	**0**	**42**	**1**	**116**		**74**
Silvia's Cave															
Square 2										1	2		**3**		
Feature 1								1	1		1	2	**3**		
Totals	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**3**	**2**	**6**		**0**
Grand total	**4**	**34**	**2**	**31**	**1**	**1**	**1**	**1**	**1**	**1**	**45**	**3**	**122**		**74**

Because it is unclear whether pericarp fragments correspond to peppers other than those that are represented by the peduncles, only peduncles and entire fruits with intact peduncles were used in the count. NC indicates specimens that were identifiable as chilies, but were not assignable to any cultivar. CF indicates probable chili remains. P and S indicate whether pericarp tissue or seeds occurred in the sample.

below Guilá Naquitz and Silvia's Cave. These caves, and others nearby, became convenient places to camp while planting, harvesting, hunting, roasting agave hearts in earth ovens, or constructing grass-lined pits as temporary storage features for harvested plants. Eventually, the stored plants were carried back to Mitla. These activities continued into the period known as Monte Albán V (A.D. 1000–1521), especially in the case of agave roasting in earth ovens.

The people who visited Guilá Naquitz brought along jars of drinking water, which they set into the floor of the cave. They brought some food with them, and collected additional food in the thorn forest near the cave. They made campfires, prepared beds of oak leaves for sleeping, excavated storage pits, dug earth ovens, and even conducted a ceremony that involved burning incense and drinking *pulque* (fermented agave sap) in bat claw-effigy vessels. Visitors to Silvia's Cave behaved in similar ways, but on a smaller scale.

Preservation of plant remains in both caves was excellent; it proved challenging, however, to determine which plants had been brought to the cave from the visitors' homes, which had been harvested from fields in the area, which were from wild stands near the cave, and which were stray plants left behind when the storage pits were emptied and their contents carried to Mitla. The dried chili peppers mentioned below, for example, might have been brought from home as seasoning for meals to be cooked in the cave; the more abundant fresh-looking peppers may have been harvested from piedmont fields nearby.

Virtually all cobs of maize (*Zea mays*) in the cave had been thoroughly shelled, and appeared to be the debris from meals; there were, however, leaves, stalks, and roots of maize, suggesting that the plants had been harvested nearby. The same was true of some small bush beans (*Phaseolus vulgaris*) that had been pulled up by the roots, and some specimens of cotton (*Gossypium hirsutum*) that were still in the boll. On the other hand, there were shelled jackbeans (*Canavalia* sp.), white zapote fruits (*Casimiroa edulis*), and avocados (*Persea americana*) that were probably brought from elsewhere.

Both caves had earth ovens and remains of roasted agave (*Agave potatorum*), which grows wild near the caves. Other wild plants collected nearby included acorns (*Quercus* spp.), hackberries (*Celtis* sp.), prickly pear pads and fruits (*Opuntia* sp.), pods of mesquite (*Prosopis juliflora*) and other leguminous trees (*Conzatia* sp., *Leucaena* sp.), and wild onions (*Allium* sp.). As abundant as these plants were, their numbers were miniscule compared with the bushels of goods that would have fit into the caves' storage pits, all of which had been long since emptied and filled in with debris by the time they were found.

Results and Discussion

Some 122 chili peduncles were recovered from both Guilá Naquitz and Silvia's Cave (Table 1). The analysis of these specimens has added new dimensions to our understanding of agriculture, subsistence, and cuisine at both sites, and many previously established interpretations of cave use have been upheld. In addition, the data allowed L.P. to reexamine the criteria used in the past to document domestication in chili peppers.

Before proceeding to the species and cultivar designations of the chilies, let us consider the archaeological proveniences of the specimens recorded in Table 1. Guilá Naquitz was the more extensively excavated of the two caves. It was gridded into 64 1 × 1 m squares, numbered from B7 to I10, all of which were excavated (see figure 5.3 in ref. 2). Most chilies were recovered from the stratum called zone A, a thick layer of ash, organic debris, and Monte Albán IIIb–IV pottery, which produced uncalibrated ^{14}C dates of A.D. 620 ± 130 (M-2096) and A.D.

740 ± 40 (SI-514). The largest single concentration of chilies was in square E12, near the north wall, which (because the cave faces east) would have been on the extreme right as one entered. Chilies were also recovered from debris left in features 1, 9, 12, and 13, all former storage pits that were later filled with trash.

Overlying zone A was the much less extensive stratum "SuperA," which featured Monte Albán V pottery. SuperA consisted mainly of an earth oven (feature 7) for roasting agave, and a few oak leaf beds where the users of the oven had slept. Feature 7 produced a ^{14}C date of A.D. 1270 ± 80 (SI-513), and one of the beds (feature 16) yielded two chilies.

Silvia's Cave was tested, but only a few 1 × 1 m squares were excavated because the deposits were very shallow. Its major stratum, zone A, dated to Monte Albán IIIb–IV, and produced three chilies, all from test square 2. At a later date, during Monte Albán V, Silvia's Cave had been the scene of agave roasting in an earth oven, feature 1. Three chilies were found in the refuse that had filled the oven after its abandonment (Table 1).

Species Designations. All chilies from both caves were either *C. annuum* or *C. frutescens*, two species of peppers that are still cultivated in the state of Oaxaca. Field identifications of the remains were completed by the late C. Earle Smith, Jr., who tentatively placed most of the chilies within the species *C. annuum*. At the time of the excavations, the literature typically assigned the species designation *C. frutescens* to wild forms rather than domesticated peppers, owing in large part to the paucity of domesticated forms of *C. frutescens* in modern agriculture in the Americas (e.g., ref. 4). The taxonomy of this species has been further confused by the absence of a type specimen (9) and the fact that *C. frutescens* was, at one point, proposed as the wild progenitor of *C. chinense* (e.g., ref. 10), a proposal that has since been overturned (e.g., ref. 11). Because it is now accepted that *C. frutescens* was domesticated before European contact with the Americas, the more cautious identification is *C. annuum*, without excluding the possibility that peppers of *C. frutescens* may make up part of the assemblage. Caution is further indicated because of the location of the sites within the modern state of Oaxaca, where surveys of the genus *Capsicum* have documented that cultivars of *frutescens* can be successfully grown (5).

At least seven cultivars were recovered from the deposits in Guilá Naquitz, and three more were collected at Silvia's Cave. As shown in Fig. 2, preservation was exceptionally good at both sites. Pepper cultivars from zone A at Guilá Naquitz have been numbered C1–C7, and all intact calyces bear very small teeth or no teeth.

Cultivar 1 has a very thick, large peduncle and the calyx margin is nearly smooth. Cultivar 2 is characterized by a thick, flared peduncle and an intermediate calyx margin. Cultivar 3 has thin peduncles that do not flare over the junction with the calyx. Cultivar 4, like cultivar 2, has a thick, flared peduncle, but the calyx margin is nearly smooth. Cultivar 5 is represented by a single thick peduncle with a dentate calyx margin. Cultivar 6 is a single very thick, very large peduncle with a very dentate calyx margin. Cultivar 7, another single specimen, has a very thin peduncle that does not flare, a nearly smooth calyx margin, and no calyx teeth. The fruits of cultivars 2 and 4 are larger than those of cultivars 3 and 7.

Three peduncles from the 1 × 1 m square that yielded the largest concentration of pepper remains, square E12 of zone A in Guilá Naquitz cave, differ slightly from the morphology of cultivar 4 in that they are longer and thicker. The differences were not as marked among these samples as among others, and it is not known whether they represent yet another cultivar, or simply phenotypic variation within the population of cultivar 4.

Pepper cultivars from Silvia's Cave have been numbered C8–C10 and are all single specimens. Cultivar 8 is characterized by a very thick peduncle that does not flare above the calyx, and a nearly smooth calyx margin. Cultivar 9 has a thick peduncle that is flared above the calyx and a dentate margin. Cultivar 10 has a very thick, flared peduncle with a smooth calyx margin. Cultivar 9 is morphologically similar to cultivars 2 and 4 from Guilá Naquitz, but with a more dentate margin. Cultivar 10 is very much like cultivar 1, but has a smoother calyx margin.

Fig. 2. Desiccated specimens of chili peppers from Guilá Naquitz and Silvia's Cave. (*Top*) Left to right: Cultivar 1 from square C8 at Guilá Naquitz; cultivar 2 from square F1 at Guilá Naquitz; cultivar 3 from square C12 at Guilá Naquitz; cultivar 4 from square D12 at Guilá Naquitz; and cultivar 5 from square G4 at Guilá Naquitz. (*Middle*) Left to right: Cultivar 6 from square F1 at Guilá Naquitz; cultivar 7 from square F1 at Guilá Naquitz; cultivar 8 from feature 1 at Silvia's Cave; cultivar 9 from feature 1 at Silvia's Cave; and cultivar 10 from square 2 at Silvia's Cave. (*Bottom*) Seeds from square C8 at Guilá Naquitz.

Some 116 chili peppers were recovered from zone A at Guilá Naquitz (Table 1). Of these, 74 were assignable to cultivar categories. Cultivar 1 is represented by peduncles only. The most commonly occurring cultivars are 2 and 4, the two that are also the most similar in morphology. Both cultivars 2 and 4 are present as peduncles and desiccated fruits. Two entire fruits of cultivar 3 were recovered. Cultivars 5–7 occur only as single specimens in one context each. Cultivar 7 appears very much like modern *C. frutescens*.

The remains of 6 chili peppers were recovered from Silvia's Cave. Three peduncles, each of which occurred as a single specimen, were distinctive enough to be identifiable as cultivars 8–10. Zone A (A.D. 600–1000) produced cultivar 10, while a later agave roasting pit called feature 1 (A.D. 1000–1521) contained cultivars 8 and 9. Given the small size of the collection from Silvia's Cave, we cannot be sure of the relationship between these cultivars and those from Guilá Naquitz.

Use Patterns. An archaeobotanical assemblage so large and well preserved encourages us to consider what behaviors might be represented by the plant remains. The assemblage contains both a large number of peduncles and a smaller number of complete but desiccated fruits. Experiments by L.P. with the processing of modern peppers resulted in peduncles with traits equivalent to those recovered in the excavations, leading to the following interpretation.

The archaeological peduncles are complete and have undamaged calyces. In all specimens, the point of fruit attachment is nearly to completely clean of pericarp tissue. This "clean break" can be replicated consistently with ripe, elongate fruits, much like the desiccated example of cultivar 2 from Guilá Naquitz. Unripe fruits and those with large "shoulders" (e.g., bell peppers) did not release their peduncles so easily during experiments. Tearing was common with peppers of these shapes. Dried peppers purchased by L.P. had peduncles that already exhibited damage, perhaps suffered during drying, packaging, or shipping. She was unable to pull the peduncles from dried peppers without notable fragmentation of the calyx.

When the results of the experiments are applied to the archaeological remains, it appears that the assemblage reflects two types of use. One involves fresh peppers pulled from their peduncles before processing in some fashion, and the other is the use of dried peppers. Cultivars 1, 5, 6, and 8–10 were present in the caves as peduncles only, suggesting that they may have been exclusively from fresh specimens harvested nearby. Cultivars 2 and 4, in contrast, were present both as peduncles and as desiccated fruits. These peppers may include both dried specimens brought to the cave to season meals and fresh specimens harvested nearby. Finally, cultivars 3 and 7 were present only as dried, complete fruits. They may, therefore, represent dried peppers brought to the cave. Recall that cultivar 7 most resembles *C. frutescens*; thus, this species might not have been grown near the caves. It goes without saying that the confirmation of these interpretations awaits additional discoveries in the Mitla region.

Determining Domestication. Owing to the relatively late prehistoric dates of the cave layers containing the chilies, it is extremely likely that all of the peppers were domesticated forms. This situation allowed L.P. to assess the reliability of different tests used in the past for domestication in peppers. Both traditional macrobotanical and newly developed microfossil methods were used.

One of the main criteria for distinguishing domesticated and wild peppers in the archaeological record has been the presence of a nondeciduous pericarp or fruit (10, 12). To facilitate dispersal by birds, wild peppers are typically loosely attached to the peduncle. However, while observing herbarium specimens encompassing five wild species of *Capsicum*, L.P. found fruits that were still attached to the peduncle even when the color of the pericarp was yellow or orange, indicating that the fruit was not unripe when harvested (for observed species, see ref. 13). Thus, it appears that the trait of deciduousness, at least in wild species of *Capsicum*, may depend on the degree of ripeness and, therefore, the time of harvest.

Recent research on Tabasco peppers has demonstrated that the same may be true in domesticated peppers. These studies found that abscission is under genetic control, and the traits are subject to human selection (see refs. 14 and 15). Thus, to facilitate the harvesting of peppers by making them easier to pick, humans can breed peppers for the deciduous character and are, in fact, doing so today.

These observations are relevant to the interpretation of domestication in whole archaeological fruits of chili peppers. Unless the fruit was completely ripe at harvest and the abscission had occurred between the peduncle and fruit, the character of deciduousness may be an unreliable indicator of domestication.

Seed size is another characteristic that has been suggested as differing between wild and domesticated peppers. Mean seed width from specimens of *C. baccatum* has been reported as 2.4 mm for wild fruits and 3.0 for domesticated fruits (Eshbaugh in ref. 12). However, in this study ranges of seed size were not provided, and measurements indicate that the variation in seed size can be quite high, so it is not known whether the ranges may overlap.

Although the seeds from the Oaxaca caves are not from *C. baccatum*, their mean sizes range from 2.81 to 3.16 mm, thus falling above the mean seed size suggested for wild peppers [supporting information (SI) Table 2]. It should be noted, however, that accurate measurement of the seeds was hampered by their morphology. Desiccated seeds were frequently distorted in such a way that parts of the seed were bent or folded. In these cases, it was difficult if not impossible to obtain an accurate measurement, so several seeds had to be excluded from the analysis. Fragmentary seeds were also not measurable. In the case of zone A at Guilá Naquitz, 20 seeds had to be excluded from square C8, 2 seeds from square E12, and 12 seeds from feature 1.

Another character, perhaps correlated with seed size, is fruit size, which has often been used to determine domestication (10). Wild fruits of *Capsicum* are typically $<$1 cm in both diameter and length; thus, larger fruits can be attributed to cultivation and the effects of human selection. Because large fruits have not been documented in wild populations of peppers, fruit size is likely a reliable indicator of cultivation and domestication.

In addition to the macromorphological methods described above, recent work with microfossils has revealed clear differences between the starch grains produced in the fruit pericarps of wild and domesticated peppers (13). A possible deterrent to using this method to determine domestication in archaeological specimens is that starch grains in the pericarps of domesticated peppers are few and far between. Thus, to ensure the recovery of such microfossils, a great deal of rare plant tissue would need to be destroyed. A solution to this problem lies within the nature of the starches in the tissues of wild species of *Capsicum*. Starches occur thickly throughout wild pepper fruits, and the maceration of only a very small quantity of pericarp is necessary to view these microfossils. If quantities of wild-type starches are not visible in a small sample of archaeological material, the peppers are very likely domesticated. Although there exists the possibility that the starches might have been damaged or destroyed via heating, this issue is also easily addressed. Sampling should be undertaken with care, and any signs of cooking should be noted. In the absence of heating damage, this method should be a reliable indicator of domestication.

The pepper assemblage from Guilá Naquitz is uniquely large and well preserved; thus, the best method for determining domestication (analysis via a combination of lines of evidence) was possible. Intact fruits were nondeciduous, all seeds were of domesticated size, fruit size was larger than that of wild specimens, no starch grains of wild peppers were recovered, and starch grains diagnostic of domesticated *Capsicum* were extracted from one sample. Therefore, as expected, the assemblage exemplifies cultivated, domesticated peppers.

Starch Studies. In an attempt to recover chili pepper starches that would assist in the understanding of domestication, 10 of the specimens were studied. The pericarp tissue of domesticated chili pepper fruits has been shown to contain diagnostic starch granules; seeds, on the other hand, have been found to contain proteins and lipids, but starches, if present, have not been detectable (16, 13). Thus, in the present study, pericarp tissue was sampled, whereas seeds were not.

Although the intent was to recover the starches of chili peppers and, in fact, two starch grains typical of domesticated chilies were found, microfossils from several other species of plants were unexpectedly recovered during the procedure (SI Table 3 and SI Fig. 3). These remains included residues of common beans, runner beans, maize, and a few unidentified and damaged starches. The bean assemblage was particularly interesting because there were many microfossils that were not clearly assignable to either of the two types mentioned above.

Previous archaeobotanical work at Guilá Naquitz (17) has revealed other, as yet unidentified species of *Phaseolus* beans that were harvested, but did not necessarily become important staples. This diversity of bean use is confirmed by the starch assemblage, which contained at least three distinct types of beans that L.P. was unable to identify, despite the fact that her comparative collection contains multiple varieties of the genus including tepary, scarlet runner, and common beans.

The presence of starchy deposits from other plants on the surfaces of the chili peppers is likely due to taphonomic processes. The plant remains at Guilá Naquitz cave were often deposited on camping surfaces where visitors to the site made beds of oak leaves. Over time, the plant remains left on these camping surfaces after abandonment compacted into strata where many plants were in contact with one another. At the request of C. Earle Smith, Jr., the ethnobotanist present during the excavation (3), the plants were not cleaned in any way, and deposits of residues that appeared to be soil and ash were visible on nearly all of the chilies. It is not surprising, therefore, that quantities of starches from other species of plants were recovered.

It is significant that the species recovered via starch grain analysis (namely domesticated chili peppers, common beans, runner beans, and maize) were also recovered in macrobotanical form. The redundancy of the two data sets both supports the accuracy of the identifications and allows for an evaluation of one of the basic tenets of microfossil analysis, the theory of uniformitarianism as applied to plant anatomy. The starches at Guilá Naquitz were derived from archaeological specimens rather than modern cultivars; however, their morphology was identical to that of modern specimens in L.P.'s comparative collections. Thus, when considered in combination with similar analyses from coastal Peru (18, 19), the data demonstrate that the use of modern cultivars as reference specimens for the identification of archaeological residues is a valid method. This study, therefore, reinforces the utility of starch analysis as an archaeobotanical tool.

Conclusions

All of the available data from A.D. 600–1521, including hieroglyphic texts, artifact styles, and those aspects of indigenous religion decipherable from ceramic sculpture, indicate that Zapotec-speaking people were dominant in the Valley of Oaxaca, including the eastern valley, at that time. Schmieder's (20) classic study of traditional Zapotec agriculture makes it clear that families dispersed their fields through several environmental zones (alluvium, piedmont, and mountains) to buffer risk.

Despite the fact that most Monte Albán IIIb–IV and V occupants of the cave area would have lived in or near urban Mitla, the evidence from Guilá Naquitz and Silvia's Cave suggests the same field dispersal noted by Schmieder. The plant assemblage appears to include both plants grown in piedmont fields near the caves, including fresh chilies, and plants brought from elsewhere, the latter possibly including dried chilies and tropical fruits. The remains also seem to confirm Messer's (21) observation that, although many Mitla Zapotec are fulltime farmers, they make frequent forays into the *quixi*, or "wilderness," to harvest useful wild plants (see also ref. 22). The evidence from Guilá Naquitz suggests that plants harvested near the cave were stored temporarily in grass-lined pits, then carried back to Mitla later in baskets or net bags, fragments of which were found in the caves.

In addition to the 10 different cultivars of chili peppers, suggesting a complex, spicy cuisine not unlike that of modern Mexico, the cave remains include multiple varieties of beans, not all of which would have been grown in the same fields. Along with the maize, squash, cotton, and other cultivars, the impression given is of an economy involving multiple crops in contrasting environments, and perhaps even tropical fruits from warmer parts of the valley, obtained in trade or market activity.

Materials and Methods

Desiccated specimens were identified to species via the following methods. The main trait used to identify *C. chinense* in archaeological assemblages, an annular constriction of the calyx, was absent in all specimens. None of the seed remains was black, and a single specimen thought by the excavators to be a thick chili pericarp was later determined via phytolith analysis to be a squash rind; thus, there is also no evidence for *C. pubescens* in the assemblage.

None of the specimens exhibited elongated calyx teeth, a trait typical of *C. baccatum* (the calyx teeth were examined with a hand lens to ensure that they had not been broken off). With the exception of the chilies we have designated cultivar 7, all specimens with intact calyces exhibit small teeth or bumps, traits that are typical of *C. annuum* and have also been observed in specimens of *C. frutescens*. No specimens bore any defining feature of the other three potential species.

Starch analyses were performed via mechanical macerations of the chili pepper pericarp tissue and examination of the resulting slurry via compound light microscopy. Methods are further detailed in the *SI Methods* and SI Table 4.

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