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The Historical Linguistics of Uto-Aztec Agriculture

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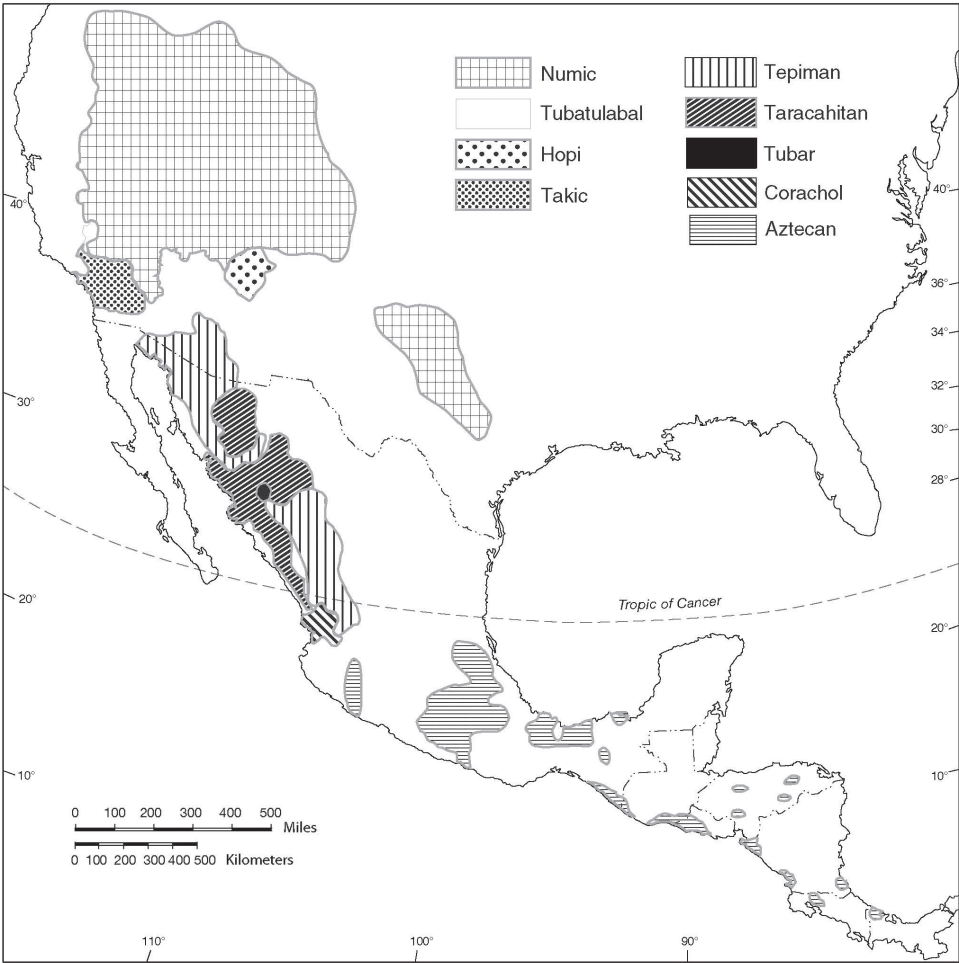
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Abstract. The Uto-Aztec language family figures prominently in research on early agriculture in western North America. A central issue is the role that the members of the Proto-Uto-Aztec speech community might have played in the diffusion of maize agriculture from Mesoamerica to the southwestern United States. Key to addressing this issue is determining whether an agricultural lexicon can be reconstructed for Proto-Uto-Aztec, but despite several comparative studies of the agricultural lexica of the Uto-Aztec languages, consensus remains elusive. A detailed reanalysis of these lexica indicates that an agriculture-related vocabulary can be reconstructed only for Proto-Southern Uto-Aztec, supporting the conclusion that maize agriculture entered the Uto-Aztec world after the division of the Proto-Uto-Aztec speech community into southern and northern branches. Additional lexical and biogeographical data suggest that the Proto-Southern Uto-Aztec speech community was located near the modern Arizona-Sonora border when its members began cultivating maize, a development that may have occurred around four thousand years ago, when the earliest evidence of maize agriculture appears in the archaeological record of the North American Southwest.

1. Introduction. The transition from food collecting to food production began on the North American continent some ten thousand years ago with the domestication of the pepo squash (*Cucurbita pepo*), followed at about four-thousand-year intervals first by the domestication of maize (*Zea mays*) and then the common bean (*Phaseolus vulgaris*) (Smith 1997a, 2001a; Kaplan and Lynch 1999; Piperno 2011; Brown 2006, 2010a). The earliest evidence for the cultivation of these plants comes from archeological sites in southern and central Mexico. Data from sites in northeastern Mexico and the southwestern United States indicate that the northward diffusion of these tropical cultigens took place separately and gradually over the course of several millennia. Pepo squash is first documented in northeastern Mexico, just south of the Tropic of Cancer, around 6300 BP, with maize appearing around 4400 BP and the common bean around 1300 BP (Smith 1997b:373–74; Kaplan and Lynch 1999: 269).¹ The earliest archaeological records of these domesticated plants north of the Tropic of Cancer come from Arizona and New Mexico. Multiple radiocarbon dates on samples of maize indicate that it was present in the American Southwest at least by 4100 BP, while pepo squash arrived at approximately 3150 BP and common beans around 2300 BP (Merrill et al. 2009: table S3).

The archaeological sites that document the inception of agriculture in the southwestern United States are located more than a thousand kilometers

north of the Tropic of Cancer and about double that distance from the early agricultural sites in southern and central Mexico. The routes and timing of the diffusion of domesticated plants across the intervening area remain a mystery because no archaeological sites from the period when this diffusion would have occurred have been excavated there. However, a number of scholars have speculated that the ancestors of speakers of Uto-Aztecan languages may have been involved in the process, based primarily on the fact that at European contact these languages were spoken from Mesoamerica to what is today the western United States (Matson 1991:319–20; Bellwood 1993, 2001; Fowler 1994:453; Hill 2001a, 2001b, 2002a; Carpenter, Sánchez de Carpenter, and Mabry 2001; Carpenter, Sánchez, and Villalpando 2002, 2005; Diamond and Bellwood 2003; Bellwood and Oxenham 2008; LeBlanc 2008; Mabry, Carpenter, and Sanchez 2008; Wilcox et al. 2008) (see map 1).



Map 1. The distribution of the Uto-Aztecan subfamilies at initial European contacts.

Evaluating the role that Uto-Aztecs might have played in the diffusion of agriculture from Mesoamerica to the Southwest requires as an initial step establishing the place of agriculture in Uto-Aztec cultural history. Several scholars have addressed the issue of whether members of the Proto-Uto-Aztec (PUA) speech community were farmers by applying the methods of historical linguistics to an analysis of the agriculture-related vocabularies documented for the Uto-Aztec languages. The most significant studies are by Romney (1957), Miller (1966), Fowler (1994), and Hill (2001b), but no consensus has been reached: Romney and Hill concluded that an agricultural lexicon could be reconstructed for PUA, while Miller and Fowler concluded that it could not.²

The majority of recent research on the cultural history of Uto-Aztec agriculture has been undertaken by Hill, who presented her results in a series of studies published from 2001 on (see References). Basing her interpretations on a broader set of terms than had been considered previously, Hill identified a subset of these terms, all with maize-related meanings in some Uto-Aztec languages, as reflexes of PUA etyma and concluded that “it is highly likely that maize cultivation was present in the PUA community” (2001b:922). She (2001b:916–17, 2012:65) further proposed that this ancestral community was located in the northwest quadrant of Mesomerica when its members first adopted agriculture. Building upon Bellwood’s (1997, 2001) perspectives linking the dispersal of Uto-Aztec languages to the expansion of early agricultural populations, Hill (2001b:913, 2002b, 2006) argued that the northward migration of Uto-Aztec farmers was responsible for both the introduction of maize agriculture to the southwestern United States and the formation of a chain of Uto-Aztec dialects and languages that extended between Mesoamerica and the American Southwest.³

Despite the insights that Hill’s contributions provide, the debate continues on whether the members of the PUA speech community were farmers. Campbell (2002) and Kaufman and Justeson (2009) have questioned Hill’s reconstructions of some etyma in her proposed PUA maize vocabulary, as well as her identification of agriculture-related meanings as their original referents. Colleagues and I (Merrill et al. 2009, 2010; cf. Hill 2010 and Brown 2010b) have reiterated these concerns and have challenged her postulation of migrating farmers, Uto-Aztec or not, as the mechanism for the diffusion of maize from Mesoamerica to the Southwest.

The purpose of this article is to present the results of my analysis of the historical relationships among the Uto-Aztec words that have been considered in previous studies and to offer my perspectives on the place of agriculture in Uto-Aztec cultural history. In the next section, I provide a brief overview of the Uto-Aztec language family and the distribution of farming and foraging strategies among speakers of its languages. In section 3, I argue that an agricultural lexicon definitely can be reconstructed for Proto-Southern

Uto-Aztecan (PSUA), discussing in separate subsections each of the eight etyma that constitute this lexicon, as well as a few other PSUA etyma whose reflexes have maize-related referents in at least some Southern Uto-Aztecan (SUA) languages. Although maize is the only cultigen for which a PSUA etymon is reconstructible, SUA terms for cucurbits and the common bean and the insights that they offer into the development of the agricultural lexica of the SUA languages are considered in sections 4 and 5.

In section 6, I compare the various agriculture-related lexica recorded for the Northern Uto-Aztecan (NUA) languages, interpreting their diversity as an indication of the absence of a Proto-Northern Uto-Aztecan (PNUA) agricultural lexicon. In section 7, I focus on one NUA language, Hopi. Several words in the Hopi agricultural lexicon clearly are cognate with words in the SUA languages, but cognates are not attested in any other NUA language. I consider both linguistic and historical evidence to evaluate the hypothesis that some ancestors of the modern Hopi originated in Mexico and spoke a language or languages affiliated with the southern branch of the language family.

The data and analyses presented in first seven sections of the essay support the conclusion that members of the Proto-Southern Uto-Aztecan speech community were the first Uto-Aztecan farmers. I suggest in section 8 that when they initially adopted maize agriculture, PSUA speakers were living in the modern Arizona-Sonora borderlands, near where some of the oldest maize in the American Southwest has been recovered, and that the dispersal of the SUA languages probably began from there, making this area a likely candidate for the SUA homeland. I conclude the essay by offering four generalizations about the place of farming in Uto-Aztecan cultural history and by proposing that some of the speakers of NUA languages may have shifted between foraging and mixed foraging-farming strategies at different points in their histories.⁴

2. The Uto-Aztecan language family. The Uto-Aztecan language family comprises thirty languages organized into two major branches, Northern Uto-Aztecan and Southern Uto-Aztecan (see table 1 and map 1) (Miller 1983b; Campbell 1997:133–38; Caballero 2011; Merrill forthcoming).⁵ The NUA subfamilies—Numic, Tubatulabal, Takic, and Hopi—are all located in the western United States. The northernmost of the SUA subfamilies, Tepiman, is found in both the southwestern United States and Mexico. The Taracahitan subfamily is situated in northwestern Mexico, the Corachol subfamily in western Mexico, and the Aztecan subfamily in western, central, and southern Mexico, with outliers in Central America. The Tubar language, spoken in northwestern Mexico until the early twentieth century, is treated here as the sole member of a fifth subfamily of the SUA branch, but it is poorly documented and its classification is, in Stubbs's words, "enigmatic" (Stubbs 2003:6; cf. Stubbs 2000, Hill 2011).

Table 1. The Uto-Aztecan Language Family

NORTHERN UTO-AZTECAN

- Numic
 - Western Numic
 - Northern Paiute
 - Mono
 - Central Numic
 - Timbisha Shoshone
 - Shoshone
 - Comanche
 - Southern Numic
 - Kawaiisu
 - Colorado River Numic (Southern Paiute, Chemehuevi, Ute)
- Tubatulabal
- Hopi
- Takic
 - Cupan
 - Cahuilla
 - Cupeño
 - Luiseno
 - Gabrielino-Fernandeño
 - Serrano
 - Kitanemuk
 - Serrano

SOUTHERN UTO-AZTECAN

- Tepiman
 - Upper Pima (Tohono O’odham, Akimel O’odham, and other dialects)
 - Lower Pima (Néovome, Yepachi Pima, and other dialects)
 - Northern Tepehuan
 - Southern Tepehuan
 - Tarahitan
 - Cahitan
 - Yaqui-Mayo
 - Ópatan
 - Eudeve
 - Ópata
 - Tarahumaran
 - Rarámuri
 - Warihó
 - Tubar
 - Corachol
 - Cora
 - Huichol
 - Aztecan
 - Pochutec
 - General Aztecan
 - Nahuatl
 - Pipil
-

At the time of initial European contacts, Uto-Aztecan societies varied dramatically in subsistence strategies, settlement patterns, and levels of social complexity.⁶ At one extreme were the small-scale, highly mobile egalitarian bands of Numic speakers who relied exclusively on the wild resources of the Great Basin for their survival. At the other were the urbanized state societies of Aztec speakers in Mesoamerica, who practiced various forms of intensive agriculture that supported populations estimated to have numbered in the millions. In between were foraging and mixed foraging-farming societies that included both sedentary foragers and mobile agriculturalists and ranged in population size from hundreds to hundreds of thousands of people. The distribution of these diverse foraging and farming strategies tended to coincide with the two principal branches of the language family: all of the Southern Uto-Aztecs were farmers while the majority of the Northern Uto-Aztecs were foragers.

3. The Southern Uto-Aztecan agricultural lexicon. The integration of farming into preexisting foraging economies obviously involves the creation or borrowing of terminology for the plants that are cultivated, the practices that are associated with their cultivation and processing, and related items of material culture. There is no evidence that the agricultural lexicon of any Southern Uto-Aztecan language was borrowed entirely from another language, Uto-Aztecan or otherwise. Instead, the lexicon of each language combines reflexes of Proto-Uto-Aztecan and Proto-Southern Uto-Aztecan etyma with loanwords from other Uto-Aztecan languages or external sources, as well as innovations attested only in that language.

Table 2. The Proto-Southern Uto-Aztecan Agricultural Lexicon

PSUA ETYMA	TEP	TRC	CRC	AZT	SET
1. <i>*suhunu</i> ‘maize (generic)’	+	+	–	+	#17
2. <i>*sita</i> ‘immature maize ear’	–	+	+	+	#15
3. <i>*hora</i> ~ <i>*hori</i> ‘to shell maize’	+	+	+	+	#3
4. <i>*saki</i> ‘parched maize kernels’	+	+	+	+	#14
5. <i>*tima</i> ‘tamale’	+	+	+	+	–
6. <i>*ica</i> ‘to plant, to sow’	+	+	+	–	#4
7. <i>*wasa</i> ‘field for cultivation’	+	+	+	–	#21
8. <i>*wika</i> ‘planting stick’	+	+	+	+	#22

NOTE: TEP = Tepiman; TRC = Tarachitan; CRC = Corachol; AZT = Aztec; + = cognate present; – = cognate absent.

An agricultural lexicon comprising eight etyma can be reconstructed for Proto-Southern Uto-Aztecan. These terms appear in table 2, which also indicates the presence or absence of reflexes in four of the five SUA subfamilies and the numbers of the associated cognate sets in appendix 2 (for **tima*, see section 3.5). The Tubar subfamily is not included in the table because Tubar

words were recorded for only three of the referents ('maize', 'parched maize kernels', 'to plant, to sow') and these words are not cognate with the reflexes of the PSUA etyma having these referents in the other SUA languages.

The first etymon in table 2 is a generic label for 'maize'. The next designates one stage in the development of the maize ear. It is followed by three etyma related to the processing of maize for consumption. The final three etyma are associated with agriculture in general rather than with maize cultivation specifically. Each of these etyma is discussed in a separate subsection (3.1–3.8). The following five subsections (3.9–3.13) are devoted to PSUA etyma whose reconstructed referents extend beyond the domain of agriculture but have reflexes that are associated with maize. The final subsection (3.14) explores the possibility of reconstructing PSUA **kopi* as an etymon that originally labeled a wild plant but whose reflexes acquired maize-related meanings in some SUA languages.

3.1. **suhunu* 'maize'. The generic label for 'maize' in PSUA usually is reconstructed as **sunu* (Miller 1966:96; Fowler 1994:449–53; Hill 2004:65–68), but the reconstruction of **suhunu* is indicated by the identical vowel sequences in the initial syllables of the Rarámuri and Tepiman cognates, the occurrence of high tone on both vowels in this sequence in the Northern Tepehuan cognate, and the medial *-?u-* in the River Warihó cognate, as shown in (1).

- (1) RR *suunú*
 UP *húuñĩ*
 LP *húun*
 NT *úúnui*
 ST *húun*
 WR-R *su?unú*

No Corachol or Tubar reflexes of **suhunu* are reported in the available sources. The generic terms for 'maize' in these languages are Cora *yuuri*, Huichol *ikú*, and Tubar *koít*. Given that Huichol *u* reflects **o*, the Huichol and Tubar terms could be related, with metathesis having occurred in one language or the other (see section 3.13). A reflex of **suhunu* also is lacking in Yaqui but is attested in Mayo *súnnu*, the meaning of which has shifted to 'maize field'. The generic terms for 'maize' in both Yaqui and Mayo reflect PSUA **paci* 'seed' (see section 3.10).

Similar words exist in two NUA languages, Hopi and the Gosiute dialect of Western Shoshone, but they appear to reflect **suŋu* rather than **suhunu* (NUA *-ŋ-* regularly corresponds with SUA *-n-*).⁷ The Hopi term is *soŋowĩ* (PUA **u > Hopi o*), which labels the giant sandreed (*Calamovilfa gigantea*), a tall wild grass whose reedlike stems are used by the Hopis as a raw material (Whiting 1966:65). The third syllable, *-wĩ*, probably derives from the PUA augmentative suffix **-wĩ*, suggesting that the Hopi word should be glossed as 'big

soŋo’ or ‘tall *soŋo*’. However, it is impossible to identify what this “*soŋo*” might have been because *soŋo*, without the suffix, is not attested in the extensive literature on the Hopi language and ethnobotany (Hopi Dictionary Project 1998; Whiting 1966).

The Gosiute term *suŋ* ~ *suno* was recorded by the early ethnobotanist Ralph Chamberlin (1911:52–53) as alternate forms of the label for *Atriplex confertifolia*, commonly known as ‘shadscale’ and ‘spiny saltbrush’. Linguistic research indicates that PUA **-ŋ-* is reflected in Gosiute and other Western Shoshone dialects as the consonant cluster [-ŋg-] and the geminate [-nn-], which are in free variation, and further that **-ŋ-* is the only PUA consonant to have such alternating reflexes (Miller 1972:16; Merrill forthcoming).⁸ Presumably Chamberlin simply failed to note the phonetic details, but his recording of both *-ŋ-* and *-n-* in the Gosiute word confirms that it is cognate with the Hopi term.

Chamberlin reported that this and other species of *Atriplex* were “one of the most important sources of seed food” (1911:52) for the Gosiute, and Steward (1938:22) documented the dietary significance of the seeds of another saltbrush species, *Atriplex argentea*, among other Western Shoshone bands located in north central Nevada. Steward recorded *sunu*, *suuna*, and *sinu?u* as the labels for this plant in different bands and commented that *Atriplex argentea* probably was the species of *Atriplex* “that was frequently sown broadcast” by their members. Although [-ŋg-] ~ [-nn-] does not appear in any of Steward’s terms, the phonological similarities and shared referent of *Atriplex* suggest that they are cognate with Gosiute *suŋ* ~ *suno*.⁹

Because different plants are labeled by the Hopi and Numic cognates, the original referent of PNUA **suŋu* cannot be determined. As a member of the grass family, the giant sandreed more closely resembles maize than saltbrush, a member of the chenopod family, but both saltbrush and maize are valued sources of seed food. In either case, the similarity of PNUA **suŋu* and PSUA **suhunu* raises the possibility that PSUA speakers adopted the name for a wild plant as their term for ‘maize’ (Campbell 2002:52–53; Hill 2004).

3.2. **sita* ‘immature maize ear’. The reconstruction of PSUA **sita* ‘immature maize ear’ is based on cognates in the Taracahitan and Corachol subfamilies, for example, Rarámuri *sitá* and Huichol *šúita*. No term for ‘immature maize ear’ was recorded for Tubar, and only one Tepiman term that specifically designates the maize ear in its early stages of development is attested: the Névome word *tutunopa* ‘tender maize ear before it forms kernels’, which is not a reflex of **sita* and contrasts with *tunibo* ‘mature fresh maize ear’.

I suspect that **sita* may also have existed in Proto-Aztecan, but the evidence is equivocal. The Proto-General Aztecan term for ‘immature maize ear’ can be reconstructed as **šiiloo-*, the first syllable of which is the expected

reflex of PSUA **si-*. However, the second syllable **-loo-* cannot derive from **-ta*. The *-loo-* element is attested in the Aztecan languages in a large number of terms for plants and animals, including two others associated with the maize ear specifically, **eelloo-* ‘mature fresh maize ear’ and **ooloo-* ‘maize cob’.¹⁰ Dakin (2001a:107–11) suggests that **-loo* is attached to morphemes that designate features possessed by the entity being labeled and thus is a derivational suffix conveying the sense of ‘possession of feature’.

3.3. **hora ~ *hori* ‘to shell maize’. Reflexes of the etymon **hora ~ *hori* ‘to shell maize’ are attested in the Taracahitan, Corachol, and Aztecan subfamilies. An initial **h* is reconstructed based on Eudeve *horan*. Reflexes of PSUA **h-* were lost in the ancestral languages of the Tepiman, Corachol, and Aztecan subfamilies while ancestral Taracahitan and Tubar apparently retained **h-*. Although *h-* often disappears in Rarámuri and Sierra Warihó and sometimes in the other Taracahitan languages, it also is encountered as a regular correspondence in these languages, as well as Tubar.

The original referent of PSUA **hora ~ *hori* probably was ‘to shell maize’, which in some SUA languages was extended to include the shelling of the seeds of other plants. For example, the cognate in Classical Nahuatl, *ooya*, is glossed ‘to shell something (corn, peas, etc.)’, but the term for ‘shelled and dried maize kernels’ is *tlaoalli*. The first syllable, *tla-*, is an indefinite object prefix that can be translated as ‘something’. The second syllable is the verb stem *-oo-* ‘to shell’, which is followed by the nominalizing suffix *-l-* and the absolutive suffix *-li* (Campbell and Langacker 1978:#33). The word means literally ‘something that is shelled’, but that ‘something’ in this case is always maize.

3.4. **saki* ‘parched maize kernels’. PSUA **saki* ‘parched maize kernels’ is reflected in words in languages belonging to all SUA subfamilies except Tubar, where the equivalent concept is labeled with *kumalít*, probably derived from the verb *kumi-* ‘to eat small or ground up things’ (see section 3.13). That **saki* also was a deverbal noun is suggested by the Cora reflex *šašćeri* ‘toasted maize’, derived from the verb *ša?šće* ‘to toast maize’ by the addition of the nominalizing suffix *-ri*.¹¹ However, in some other SUA languages, the nouns and verbs are homophones or differ only in showing final nominal or verbal markers, as in (2).

- (2) RR *sakí* ‘to parch maize kernels’; *sakí* ‘parched maize kernels’
 ED *saké-n* ‘to toast maize’; *sakí-t* ‘toasted maize’

The nominal and verbal reflexes of **saki* in all the SUA languages are invariably associated with maize, but in the Tepiman subfamily they also are linked to the parching of other grains and seeds. For the Akimel O’odham, Rea notes, “Many kinds of seeds were prepared by being parched with live coals

(*haak*), then ground into flour (*chuʔi*)” (1997:69), mentioning that amaranths, chia (*Salvia columbariae*), and wheat following its introduction by Europeans were among the plants whose seeds were processed in this fashion.

Evidence from the NUA languages Tubatulabal and Luiseño indicate that **saki* can be reconstructed for PUA, forming part of a suite of verbs in both NUA and SUA languages that begin with **sa-* and denote boiling, melting, and parching (Stubbs 2011:#266, #267, #524). The Tubatulabal verb *ʔašag-(it) ~ šaak* ‘to roast it’ may have designated ‘to roast’ in general, but it clearly applied to the roasting of wild seeds. Erminie Voegelin recorded the deverbal noun *šaagišt* as the term for ‘parching tray’, “used for parching small seeds, such as chia, with live embers” (1938:31). An association of reflexes of **saki* with tray parching also is seen in the Tohono O’odham verb *haak ~ haaki ~ hahakī* ‘to roast grain with coals in a basket’.

The Luiseño cognate is *šáax-iš* ‘grain, wheat’.¹² The final syllable *-iš* is a deverbalizer, and *sáax-* ‘to toast’ is anticipated but not attested as the source verb. Harrington collected *šáaša* as the Luiseño verb ‘to toast’, but this word was not encountered in subsequent research by Elliott (1999:830, 1015), who recorded only *wáalki ~ wálki* ‘to toast seeds, wheat’.

3.5. **tīma* ‘tamale’. The consumption of maize in a form resembling a tamale by members of the PSUA speech community is suggested by the fact that reflexes of PSUA **tīma* ‘tamale’ are attested in all SUA subfamilies except Tubar, for which no term for ‘tamale’ was recorded.¹³ It is likely that **tīma* is a deverbal noun, deriving originally from a verb that denoted a particular way of preparing maize, probably by roasting or baking small cakes of ground maize under ashes or in pit ovens. In most cases, terms for pit-roasting in Tepiman, Taracahitan, and Corachol languages closely resemble the reflexes of **tīma*. These verbs are listed in (3), along with the reflexes of **tīma* if they are attested.

(3) To *čuama* ‘to roast in ashes’; *čīmait* ‘a tortilla’

NV *tuamaha* ‘to pit-roast things other than agave, like squash or pumpkins (“calabazas”); *tuamahi* ‘something pit-roasted’; *tumaita* ‘cake’ (?) (attested in *vivac tumaita*, glossed as “pan de piciete,” which perhaps can be translated as ‘tobacco cake’)

ED *temóson* ‘pit-roast’; cf. Op *temâi* ‘to make bread or tortillas’.

WR-S *wehtemáe-na* ‘to pit-roast food’; *teméi* ‘tortilla’

CR *téʔim^wa* ‘to pit-roast’; *tem^wa* ‘tamal’

Assuming that these verbs are cognate, evidence from Névome suggests that the PSUA form of which they are reflexes was composed of two morphemes: NV *maha* ‘to pit-roast agave’ contrasts with *tua-maha* ‘to pit-roast things other than agave’. The glottal stop in presumed cognates from the three NUA languages in (4) also may indicate that two separate morphemes were involved.¹⁴

- (4) KW *tí?ma* ~ *tu?ma* ‘to roast, bake’
 SP *tí?ma-* ‘to roast under ashes’
 KT *tí?* ‘to roast’; *tí?a-c* ‘roasting pit’

However, the significance of the initial *tí-* and the comparable elements in the SUA verbs (*čua-*, *tua-*, and *te-*) is unknown.

Although some of the reflexes of PSUA **tīma* label ‘tortilla’ or both ‘tamale’ and ‘tortilla’, ‘tamale’ is assumed to be its original referent because this sense is encountered in all languages in the Aztecan and Corachol subfamilies and also in Rarámuri in the Taracahitan subfamily.¹⁵ In addition, in SUA languages where distinct terms for ‘tamale’ and ‘tortilla’ exist and neither is clearly a loanword, such as those in (5), the terms for ‘tamale’ consistently derive from **tīma*, while those for ‘tortilla’ lack cognates in the other SUA languages.

- (5) CR *tem^wa* ‘tamale’; *hamui?i* ‘tortilla’
 HC *temá* ‘tamale of beans and salt’; *paapá* ‘tortilla’
 NA-CL *tamalli* ‘tamale’; *laškali* ‘tortilla’¹⁶

The Nahuatl term for ‘tortilla’, *laškali* or in some dialects *taškali*, does appear in Tepiman and Taracahitan languages, such as those in (6), but it presumably was borrowed during the Spanish colonial period directly from Nahuatl speakers who were involved in the colonization of the northern portions of New Spain (West 1949:49–52; Griffen 1969:134; Cramaussel 1998:24–25, 33).

- (6) PYP *taskori*; *timit* ‘tortilla’; *nohica* ‘tamale’
 NT(R) *taskali*
 YQ *tahkaim*; *nóhim* ‘tamale’
 MY *tahkari*; *nóhchim* ‘tamales’
 ED *taskari*
 WR-R *takari* ~ *tahkari*
 TBR *tasekalit* ~ *tasikalit*

It seems that the Nahuatl loanwords replaced the reflexes of **tīma* in all of these languages except the Yepachi dialect of Lower Pima, in which terms derived from both sources are attested, *taskori* and *timit*, both glossed as ‘tortilla’. Also, excluding modern loans of Spanish *tamal*, terms for ‘tamale’ are not reported for any of these languages except Yepachi Pima, Yaqui, and Mayo. These words clearly do not reflect PSUA **tīma*, but they may derive from a distinct PUA verb meaning ‘to roast, to bake’ that is attested only in NUA languages, for example, Northern Paiute *noho/-*¹⁷ ‘to prepare in earthen oven on ashes, to roast, to bake’ (for additional NUA cognates, see Stubbs 2011:#523).

3.6. **ica* ‘to plant, to sow’. Reflexes of the verb **ica* ‘to plant, to sow’ are attested in the Tepiman, Taracahitan, and Corachol subfamilies. The expected reflex in Tubar is *eca* or *ica* but *sa-* is attested instead. Perhaps the Tubar form is the result of interaction with Tepiman speakers. The shift of PSUA **c* to **s* occurred in Proto-Tepiman (Bascom 1965:13) and is seen in the Tepiman reflexes of **ica*, for example, Yepachi Pima *isa*. Reflexes of **ica* are absent in the Aztecan languages, where the verb ‘to plant’, reconstructed for Proto-Aztecan as ***tooka* (Dakin 1982:#288), also means ‘to bury’. That the semantic scope of **tooka* was expanded from ‘to bury’ to include ‘to plant’ is suggested by the Rarámuri cognate *tó*, which designates ‘to bury’ only.

PSUA **ica* is identical to the form of this verb that can be reconstructed for Proto-Uto-Aztecan. PUA **ica* shifted to **iya* in Proto-Northern Uto-Aztecan as part of general shift of medial *-*c*- to *-*y*- (Manaster Ramer 1992). Reflexes of PNUA **iya* are encountered in Hopi and most Numic languages but are absent in Tubatulabal and the Takic languages (see section 6.4). PUA ***ica* probably was originally associated with the broadcast sowing of wild seeds rather than the cultivation of domesticated crops (Fowler 1972a:221).¹⁸ This interpretation is supported by the fact that in Northern Paiute and Western Shoshone, nouns derived from ***ica* label various species of *Chenopodium* whose seeds were valued as food and broadcast sown (Chamberlin 1911:55; Steward 1938:23; Liljeblad, Fowler, and Powell 2012:84–85) (see appendix 2, set 4).

3.7. **was*a ‘field for cultivation’. Cognates in the Tepiman, Taracahitan, and Corachol subfamilies—for example, those in (7)—indicate the reconstruction of **was*a as the PSUA label for ‘field for cultivation’.

- (7) PYP *gaha* (from **was*a)
 RR *wasá*
 HC *waša*

The *g* and *h* in the Yepachi Pima cognate are the expected reflexes of PSUA **w* and **s*. No Tubar word for this referent was recorded. The Aztecan languages lack cognates, labeling this referent with terms derived from the Proto-Aztecan innovation **miil-* (Campbell and Langacker 1978:#36). Similar NUA words with ‘field for cultivation’ as their referent are Hopi *paasa* and Chemehuevi *pasa*, but SUA *w* : NUA *p* is not a regular correspondence (see section 6.4).

3.8. **wika* ‘planting stick’. The final PSUA etymon in table 2 is **wika* ‘planting stick’. No term for this concept is reported for Tubar, but reflexes are attested in the other four SUA subfamilies. Although most indicate that **wika* should be reconstructed for PSUA, there are anomalies in the Taracahitan reflexes in (8).¹⁹

- (8) MY *wiʔika*
 YQ-AZ *wiʔiki*
 WR-S *wika*
 RR(H) *wika*

Medial glottal stops in Yaqui or Mayo terms that reflect PSUA etyma usually are attested in the Sierra Warihó cognates, and the initial stress reported for Sierra Warihó and one dialect of Rarámuri is unexpected. A possible explanation is that the initial syllable of the antecedent form of these cognates was reduplicated as **wiwika*. The medial glottal stop in Mayo and Yaqui could indicate the loss of medial *-w-* and the Warihó and Rarámuri cognates could result from the loss of the initial syllable and the retention of the antecedent stress placement.

The most intriguing aspect of this cognate set is that Hopi *wiikʼa*, which labels ‘ancient wooden hoe’ rather than ‘planting stick’, clearly is a reflex of PSUA **wika*. Hopi is the only NUA language in which a cognate for the SUA reflexes of PSUA **wika* is attested, and Hopi *wiikʼa* does not appear to be a loan from any of the Tepiman languages, the SUA languages located in closest proximity to northeastern Arizona where the modern Hopi live. Although PUA ***wika* could be reconstructed based on the Hopi and SUA cognates, a consideration of both linguistic and historical evidence raises the alternative possibility, which I explore in section 7, that some ancestors of the modern Hopi were speakers of a SUA language or languages.

3.9. **murayawa* ‘inflorescence’. ‘Maize tassel’ is the referent of the reflexes of the PSUA etymon **murayawa* in all of the SUA subfamilies except Tubar, for which a reflex was not recorded. However, most designate the flowering or fruiting heads of other plants as well, suggesting that the PSUA etymon originally labeled the inflorescences of grasses and other kinds of wild plants that did not resemble blossoms and then was extended to the maize tassel following the introduction of this cultigen.

The reconstruction of the PSUA etymon as a polysyllabic is based on the reflexes documented for two Tepiman languages, Upper Pima *muḍaḍag* and Névome *muṛadaga*. These words show the shift of **y* to **d* and **w* to **g* that occurred in Proto-Tepiman and the shift of Proto-Tepiman **r* and **d* to Upper Pima *ḍ* and *ḍ* (Bascom 1965). Phonological and morphological changes in the reflexes of this etymon also occurred in the ancestral languages of the other SUA subfamilies. The final two syllables were lost in the Proto-Taracahitan reflex **mura*, while Proto-Corachol **mīayī* shows the loss of the final syllable and medial **-r-*, as well as the shift of **u* to Proto-Corachol **ī* (the final **ī* is unexpected). The interpretation of the changes that resulted in the Proto-Aztec reflex **miyawa* is complicated by the fact that PSUA **-r-* sometimes but not always is replaced by Proto-Aztec **-y-* and the reflexes of both PSUA **-r-* and **-y-* can also be lost.²⁰

3.10. **paci* ‘seed’. All SUA subfamilies have reflexes of the PSUA etymon **paci* ‘seed’ except Tepiman, where the word for ‘seed’ is reconstructed for Proto-Tepiman as **kai*- (Bascom 1965:#93). However, in most Taracahitan languages, reflexes of **paci* or words derived from these reflexes have acquired associations with maize or squash, as in (9).²¹

- (9) YQ *báči* ‘maize’
 MY *bátči* ‘maize’
 ED *bacit* ‘squash seed’
 OP(P) *vači* ‘maize with formed kernels’
 WR-S *ihpací* ‘mature fresh maize ear’²²
 RR *pačí* ‘mature fresh maize ear’; *bačí* ‘squash’; *bačíra* ‘squash seed’

Rarámuri *bačíra* ‘squash seed’ could be a reflex of PSUA **pacira*, which, as shown in (10), is attested as the antecedent form for the words for ‘seed’ in River Warihó, Yaqui, Mayo, and Tubar.

- (10) WR-R *pahcíra*
 YQ *báčia*
 MY *báčia*
 TBR *wacirán*

The function of the final syllable *-ra*, reduced to *-a* in Yaqui and Mayo through the common *r*-deletion process, is unknown but presumably it is a suffix. Suffixes with the form *-ra* have a variety of grammatical functions in all four languages, which are not entirely understood and in fact differ among these languages (Miller 1996:249–59; Dedrick and Casad 1999:124–25, 136; Lionnet 1978:32). Given that cognates are attested only in Tubar and some Taracahitan languages, **pacira* may not be a PSUA etymon at all, but rather an innovation in one of these languages that diffused to the other three.

Hill (2001b:920, 2012:58) proposes that the Tubatulabal and Hopi words presented in (11) are cognate with the reflexes of PSUA **paci*.

- (11) TB *pacaah-* ~ *apacaah* ‘to hull’; *pacaahil* ‘hulled pine nuts’ (glosses are Hill’s)
 HP *paacama* ‘hominy’

She (2012:58) reconstructs ***pa?ci* ~ ***pa?ca* as the antecedent PUA etymon, to which she assigns the gloss ‘ear of corn, kernel of corn’, but her analysis can be questioned on both phonological and semantic grounds. The reconstruction of the medial glottal stop is required to account for the retention of medial *-c-* in the NUA words because **-c-* should otherwise have shifted to **-y-* in PNUA (see section 3.6), but it is not attested in any of the SUA reflexes of **paci*, including Sierra Warihó, which tends to retain preconsonantal glottal stops in reflexes of PUA etyma. The lengthened vowel in the first syllable of Hopi *paacama* also is problematical.²³ In reflexes of PUA etyma, Mayo

normally has a long vowel in initial syllables where Hopi does, but a lengthened vowel is absent in both Mayo *bátči* ‘maize’ and Mayo *báčia* ‘seed’. In addition, the most likely referent of PSUA **paci* is ‘seed’, with the maize-related referents that are associated exclusively with Taracahitan reflexes being secondary developments.

3.11. **sona* ‘body, stalk’. Reflexes of this PSUA etymon are attested in the Tepiman, Taracahitan, and Tubar subfamilies but absent in the Corachol and Aztecan subfamilies.

The Proto-Tepiman reflex is **hona*, showing the expected shift of PSUA **s* to PTEP **h*. As illustrated in (12), all Tepiman reflexes of PTEP **hona* include ‘body’ among their referents.

- (12) To *hon* ‘the body (excluding the head)’
 PYP *hona* ‘the body, stalk, trunk of a plant’
 NT(R) *honna* ‘the body’

Reflexes of PTEP **hona* also serve as the stems of terms for ‘rib(s)’ in several Tepiman languages. As seen in (13), the same morphology is encountered in Yaqui and Mayo words for ‘ribs’, but the Yaqui-Mayo reflex of PSUA **sona* is *sána-*, which shows vowel harmonization.

- (13) PYP *hona-mar*
 To *hoʔonma* (from *hoʔhon-ma*)
 YQ *sánaʔim*
 MY *sánaʔarim*

An association between reflexes of **sona* and the maize plant, presented in (14), is encountered only in the Taracahitan languages and perhaps Tubar. The Tubar and Mayo cognates are glossed only as “*caña*,” which can be translated as ‘cane’ or ‘stalk’; no word for ‘maize stalk’ specifically is attested in either language. Vowel harmonization also has occurred in the Tubar, Eudeve, Sierra Warihó, and Rarámuri reflexes, but in this case from **sona* to *sono*.

- (14) YQ *sánaba* ‘corn husk’
 YQ-AZ *sana* ‘sugarcane’²⁴
 MY *sánaba* ‘corn husk’; *sánna* ‘cane’ or ‘stalk’
 ED *sonó* ‘corn husk or maize leaf’ (the gloss in the original source is “hoja de maíz”)
 RR *sonó* ‘maize stalk’
 WR-S *sonó* ‘corn stubble’
 TBR *sono-* ‘cane’ or ‘stalk’²⁵

Hill (2012:58) identifies Hopi *sööñö* ‘corn cob’ as cognate with the SUA reflexes of **sona*, on the basis of which she reconstructs PUA ***sono* ‘parts of the maize plant not eaten by human beings’. However, the medial **-n-* in

PSUA **sona* and the medial *-ŋ-* in Hopi *söŋö* ‘corncob’ both reflect PUA ***ŋ-*, not ***n-* (Kaufman and Justeson 2009:225; Merrill forthcoming). The only possible NUA cognate that I have encountered for Hopi *söŋö* is Luiseño *šéenja* ‘bedrock’. All segments of these words except the final vowels are regular correspondences and, if the words are cognate, they reflect PNUA **sooŋa*.²⁶

It is unlikely that PSUA **sona* reflects PUA ***sooŋa*. The expected Mayo reflex of PUA ***sooŋa* is *soóna* or, with vowel harmonization, *saána*, but *sánna* is attested instead. The geminate *-nn-* indicates the absence of vowel length in the first syllable of the antecedent PSUA etymon.

If such irregular correspondences are ignored and PUA ***soŋa* or ***sooŋa* is reconstructed, then vowel lengthening in PNUA or vowel shortening in PSUA must have occurred. If either secondary development took place, the divergent referents of the Hopi and Luiseño words, as well as the diversity of referents of the SUA reflexes of PSUA **sona*, suggest that the original referent of the PUA etymon was something on the order of ‘foundation’ or ‘supporting structure’.

The Tepiman referents of ‘body’ and ‘rib(s)’ are consistent with these concepts, as are the referents of ‘stalk’, ‘maize stalk’, ‘cane’, and ‘stubble’ in the other SUA languages. Only the Yaqui-Mayo referents of ‘corn husk’ and the Eudeve referent ‘corn husk or maize leaf’ seem out of place. The Luiseño referent ‘bedrock’ also fits with the concept of ‘foundation’, and the Hopi referent ‘corncob’ is understandable in light of the association of ‘maize cob’ with ‘stalk’ or ‘trunk’ in other SUA and NUA languages, such as those in (15).

- (15) NV *vaoka* ‘maize cob, maize stalk’
 CM *haniwo?ora* ‘maize cob’

The Comanche word combines *hani* ‘maize’ with *wo?ora*, which is identical to Timbisha Shoshone [wo?ora] ‘tree trunk’ and, except for the absence of the glottal stop, Goshiute [woora] ‘tree trunk, waist’. These cognates, from the three subdivisions of Central Numic, indicate that **wo?ota* ‘tree trunk’ can be reconstructed for Proto-Central Numic (Stubbs 2011:#2157).²⁷

Hill (2012:58) offers a different analysis of *-wo?ora* in Comanche *haniwo?ora*. She regards it as a reflex of a PUA etymon that she reconstructs as **o?ra ~ *o?ri*, to which she assigns the referent ‘ear of corn, corn cob’. In addition to the Comanche word, she lists six words, three from NUA languages and three from SUA languages, as definite cognates that support this reconstruction. These words are presented in (16) with the referents reported in the original sources.

- (16) KW *ono-ci* ‘hooked stick used to pull down pinyon cones’
 TSH *onno-cci* ‘pine cone hook’
 HP *qaa?ö* ‘maize, dry husked ear of maize’
 WR-S *wo?ná* ‘maize cob’
 RR *ooná ~ kooná* ‘maize cob’; RR(H) *ko?ná* ‘maize cob’
 NA-CL *ooloo-tl* ‘maize cob’

These words do not constitute a valid cognate set. The Kawaiisu and Timbisha words are cognate with one another but with none of the other terms. The Hopi word is a reflex of PNUA **kaaʔo* ‘pine cone’ (see section 6.1). Dakin (1982:#60, #229a) interprets the Nahuatl word as deriving from PUA ***oho ~ **ʔo* ‘bone’. The analysis of the Warihó and Rarámuri words is a bit more complicated, but, as seen in (17), the River Warihó cognate, also with the referent ‘maize cob’, shows features that allow the reconstruction of their antecedent form as **ʔoʔna* or **ʔoʔona*.

- (17) WR-R *hóʔoná* ‘maize cob’
WR-S *woʔná* ‘maize cob’
RR *ooná ~ kooná* ‘maize cob’; RR(H) *koʔná* ‘maize cob’

The three words in (17) obviously are cognate, but the River Warihó cognate indicates that the initial consonants in the Sierra Warihó and Rarámuri cognates are epenthetic. A consonant, usually *k* or *w*, often occurs in Rarámuri words that have initial vowels in their first syllables, and alternate forms like *ooná ~ kooná* are common. Also, if the antecedent form had initial **w-*, *w-* would be expected in the River Warihó cognate. PSUA word-initial **w-* is reflected in both Sierra and River Warihó as *w-*, which is not lost in their reflexes of PSUA or PUA etyma with word-initial **w-* (Merrill 2007). The initial *h-* in River Warihó *hóʔoná* is the reflex of PSUA word-initial **ʔ-*, which is reconstructed before first-syllable vowels.²⁸

The reconstruction of **ʔoʔna* or **ʔoʔona* reflects the fact that either form is possible because River Warihó sometimes inserts *-ʔV-* to create *-V₁ʔV₁-* sequences.²⁹ As seen in table 3, such insertion has occurred in its word for ‘salt’, *hoʔoná*, which reflects PSUA **ʔoona*.

Table 3. Words for ‘Salt’, ‘Maize Cob’, and ‘Bone’

	‘salt’	‘maize cob’	‘bone’
PSUA	<i>*ʔoona</i>	—	<i>*ho</i>
River Warihó	<i>hoʔoná</i>	<i>hóʔoná</i>	<i>hóʔowa</i>
Sierra Warihó	<i>woná</i>	<i>woʔná</i>	<i>oʔá</i>
Rarámuri	<i>oná ~ koná</i>	<i>ooná ~ kooná</i>	<i>oʔčí</i>
Eudeve	<i>onát</i>	<i>néhro</i>	<i>hóg^wa</i>
Sonoran Yaqui	<i>oóna</i>	<i>naáo</i>	<i>óta</i>
Mayo	<i>oóna</i>	<i>naág^wo</i>	<i>ótta</i>
Timbisha Shoshone	<i>oŋ^wapi</i>	—	<i>cuhmippih ~ cuhnippih</i>
Kawaiisu	<i>owa-vi</i>	—	<i>oho-vi</i>

Also seen in table 3 is initial *h-* in the Eudeve and River Warihó words for ‘bone’ but not the Eudeve word for ‘salt’. These correspondences indicate that initial **h-* should not be reconstructed in the etymon reflected in the Warihó and Rarámuri words for ‘maize cob’, and thus eliminate PSUA **ho* ‘bone’ as

their antecedent form. Further, these Warihó and Rarámuri words cannot be cognate with the Timbisha and Kawaiisu words for ‘pine cone hook’ because *-n-* in Warihó and Rarámuri regularly corresponds with Timbisha *-ŋ^w-* and Kawaiisu *-w-* following reflexes of PUA ***o*. This correspondence is documented in the words for ‘salt’ in these languages, as seen in table 3.

3.12. **tusi* ‘something ground up’. The PSUA noun **tusi* ‘something ground up’ derives from the verb **tusa* ‘to grind’. Both the nominal and verbal etyma are reflected in all five SUA subfamilies, and cognates in all NUA subfamilies indicate that PUA ***tusi* and ***tusa* should be reconstructed (appendix 2, sets 19 and 20).

As seen in (18), the deverbal nouns in a few SUA languages are associated primarily if not exclusively with maize.

- (18) ED *tusít* ‘ground parched maize’,
 WR-R *tusí* ~ *tuusi* ‘ground parched maize, maize dough’
 PP *tiš-ti* ‘dough, corn dough’

In most SUA languages, however, the nominal forms have the general sense of ‘something that is ground up’, with more specific, maize-related senses created by prefixing a morpheme linked to maize. These morphemes vary considerably, as illustrated by the four examples in (19), all glossed in the sources as “pinole” (‘ground parched maize’).³⁰

- (19) MY *sák tússi*
 TBR *ma-tusít*
 CR(V) *m^wa-tüsiš*
 RR *kobi-rusi*

Mayo *sák* comes from *saáki* ‘parched maize kernels’, with *sák tússi* literally meaning ‘ground parched maize kernels’. Tubar *ma-* and Cora *m^wa-* may represent the initial syllables of their terms for ‘metate’, which reflect PUA ***mata* (appendix 2, set 9). The source of Rarámuri *kobi-* is discussed in section 3.14.

3.13. **kumi* ‘to nibble, to chew’. Reflexes of this PSUA verb are encountered in all SUA subfamilies except Aztecan.³¹ The glosses assigned to these reflexes suggest that the PSUA etymon designated a form of eating that involved nibbling or chewing foods that were small in size and hard or crunchy (see appendix 2, set 8). Examples given of these foods include fresh, parched, or dried maize kernels and other grains, as well as squash seeds, hard fruits, and pieces of candy.

Although **kumi* probably did not refer to the consumption of maize exclusively, a specific association with maize is found in nouns derived from reflexes of **kumi* in the Tubar and Tepiman subfamilies. Lionnet (1978:59) identifies

Tubar *kumalít* ‘parched maize kernels’ as deriving from the verb *kumi-* ‘to eat small or ground up things’.³² In the majority of Tepiman languages, a related deverbal noun labels ‘maize cob’. In Tohono O’odham, the form of this noun is *kuumikuḍ*, which Mathiot (1973, 2:15) glosses as ‘something on which one chews’. She indicates that ‘corn cob (without kernels)’ is created by the addition of the term for ‘maize’ (*huuñ-kuumikuḍ*), which corresponds to the form recorded for Akimel O’odham by Rea (1997:352). Other sources on the Tepiman languages report that ‘maize cob’ is labeled by *kuumikuḍ* and related forms alone, without the maize term (Saxton, Saxton, and Enos 1983:35; Valiñas Coalla 2000:198).

The verb **kumi* ‘to nibble, to chew’ appears to be a PSUA innovation. I do not reconstruct ***kumi* as a PUA etymon because verbs cognate with the reflexes of PSUA **kumi* are not attested in any of the NUA languages. However, several scholars have noted that some NUA societies cultivated a variety of maize labeled with terms that closely resemble **kumi* (Voegelin, Voegelin, and Hale 1962:#88; Fowler 1994:454 n. 5; Hill 2001b:918, 922, 2012:58) (see section 6.1).

Several additional maize-related words in SUA languages include *ku-* in their stems. This element represents the second syllable of the Corachol words for ‘mature fresh maize ear’: Cora *ikiiri* and Huichol *hiikiri* (Corachol *i* is the reflex of PSUA **u*). In Warihó and Rarámuri, similar terms label ‘roasted corn on the cob’: *ihkusúri* in Sierra Warihó, *kusíri* and *kúsari* in Rarámuri. The Rarámuri nouns derive from the verb *kúsa* ‘to pit-roast, mainly corn on the cob’, which contrasts with the verb *mihí*, used primarily in reference to the pit-roasting of agave (Stubbs 2011:#4, #324). The Warihó cognate for the latter is *mahi-ná* ‘to bury, to cook something in the ground’, but a distinct verb denoting the pit-roasting of maize ears is not reported for Warihó.

The fact that languages belonging to two SUA subfamilies have maize-related words that share the element *-ku-* raises the possibility that this element existed with the same association in PSUA. Given its presence in NUA words for both wild and cultivated plants that yield edible seeds, it can be speculated that ***ku-* may have been a PUA stem linked to the concept of ‘valued seed plant’ (see section 6.1).

3.14. **kopi*. The only maize-related word in a SUA language that could reflect PSUA **kopi* is the Rarámuri term for ‘ground parched maize kernels’. This word was recorded in the eighteenth century as *kuvirusi* (Steffel 1809:356) and in the twentieth as *kobirusi* ~ *kobísi* (Brambila 1976:257). It can be analyzed as combining *kobi-* ‘parched maize’ and *-rusi* ‘something that is ground up’, the latter reflecting PSUA **tusi* (see section 3.12).

The element *kobi-* is not attested in other Rarámuri words, but the second syllable of Huichol *ikú* ‘maize’ reflects an antecedent **-ko* and *ko-* is the first syllable of Tubar *koít* ‘maize, maize kernel’. An apparent cognate is Akimel

O'odham *kovi*, which probably labeled the domesticated *Chenopodium berlandieri* spp. *nuttalliae*, cultivated in the southwestern United States by around 1000 BP but no longer an Akimel O'odham crop (Rea 1997:297–98; Gasser and Kwiatkowski 1991).

NUA cognates may exist in the names for various wild species of *Chenopodium* valued as sources of edible seeds and greens, for example, Southern Paiute *kovi*, identified as the label for *C. fremontii* (see appendix 2, set 5). The NUA words, attested in both Numic and Takic languages, support reconstructing PNUA **ko* with '*Chenopodium*' as its referent. If Akimel O'odham *kovi* is not a loanword, PUA ***ko-* perhaps can also be reconstructed with the same referent, which later acquired maize-related meanings in some of the SUA languages.

4. Squash, pumpkins, and gourds in Southern Uto-Aztecan. Generic terms for 'domesticated squash' or 'domesticated gourd' cannot be reconstructed for PSUA, but PSUA **hari* 'wild squash' probably can be reconstructed. Identifying the cognates that support this reconstruction is difficult because of the permutations that the reflexes of this etymon underwent during the diversification of the PSUA languages and the derivation of new terms from these reflexes to provide labels for domesticated squash, pumpkins, and gourds and for utensils made from them. Further complicating the analysis is the fact that the reflexes of PSUA initial **h-* are lost in most SUA languages and the reflexes of PSUA medial **-r-* are either lost or undergo sound shifts in some.

To illustrate these phonological and semantic changes, I provide in (20)–(22) a sample of the reflexes of PSUA **hari*, organized into three groups by phonological similarity. The complete set of cognates is found in appendix 2 (set 1).

(20) **hari* > *haari* ~ *ari* ~ *ara* ~ *aʀabi*

WR-R *haari* 'gourd canteen, gourd dipper'

RR *ari* 'gourd, bottle gourd'

PYP(R) *ara* 'wild squash'

NV *aʀabi* 'wild squash'

(21) **hari* > *halipa* ~ *alapa* ~ *laba*

TBR *halipa-t* 'a kind of gourd, gourd dipper'

WR-S *alapa* 'gourd, gourd dipper'

RR *laba* 'gourd dipper cut breadthwise'

(22) **hari* > **hari?-wī* > *hara-we* ~ *aya?a-wi* ~ *ayo?-*

WR-R *harawe* 'squash or pumpkin'

YQ *aya?awim* 'squash, pumpkin (*Cucurbita moschata*)'

NA-CL *ayo?-tli* 'squash, pumpkin, gourd'

The **-wi* that appears in (22) is interpreted as reflecting the PUA augmentative suffix **-wi*, suggesting that the term for ‘domesticated cucurbit’ may have literally meant ‘big wild squash’ (see section 6.2). This set shows three phonological changes that occur in both Yaqui-Mayo and the Aztecan languages: optional *r*-deletion, optional *y*-insertion to separate the resulting vowel cluster, and *h*-deletion, which is optional in Yaqui-Mayo, but a sound change that occurred in Proto-Aztecan (Dakin 1982:65–67). The *-wi* suffix is absent in the Nahuatl cognate, but its former presence is indicated by the shift in the sound of the preceding vowel (presumably **a*) to *o* and the retention of the glottal stop at the morpheme boundary (Kaufman 1981:225–26; Dakin 2001a:108).

The Tepiman, Taracahitan, Tubar, and Aztecan subfamilies are represented in (20)–(22). I have encountered only one possible Corachol reflex of **hari*, Huichol *iari*, identified by Grimes (1980:272) as the name for a domesticated squash variety (*Cucurbita pepo* var. *ovifera*) and by Kindl (2000:37) as the name for the domesticated bottle gourd (*Lagenaria siceraria*). Huichol *iari* is cognate with Tubar *huali* ‘a kind of gourd used as a canteen’, which show regular correspondences in all segments, including the loss in Huichol of the initial *h*. The first syllable, reflecting **hu-*, suggests that the original etymon was a compound, but it is unexplained.

No generic term for ‘domesticated squash’ can be reconstructed for the Taracahitan or Aztecan subfamilies. The generic term for ‘domesticated squash’ in Corachol is **suci*, presumably a loan from an Aztecan language. It shows regular correspondences with the terms for ‘flower’ in the Aztecan languages, reconstructed for Proto-Aztecan as **šooči* (Campbell and Langacker 1978:#63). Tubar *vipót* ~ *wipót* is glossed in the source only as “*calabaza*” (‘squash’ or ‘pumpkin’) and could have labeled a specific variety of “*calabaza*” rather than serving as a general label.

Bascom (1965:#311) reconstructs **imai* as the Proto-Tepiman generic for ‘squash’ based on cognates in Northern and Southern Tepehuan and Lower Pima. The Upper Pimans have a different term, *haal*, which probably derives from PSUA **hari* but entered Upper Piman as a loan from another SUA language, like Eudeve or River Warihó, that usually retained *h-* as the reflex of initial **h-* (see section 3.3). The identification of *haal* as a loanword is based on the fact that initial *h-* in the Tepiman languages is the reflex of PSUA **s-*, not **h-*, which shifted to the glottal stop in Proto-Tepiman (Bascom 1965:13). If this interpretation is correct, Upper Piman retained a term derived from PSUA **hari* to label ‘wild squash’ while borrowing another word derived from the same PSUA etymon as the generic for domesticated ‘squash’ and ‘pumpkin’.

5. The common bean in Southern Uto-Aztecan languages. The third major domesticate cultivated by the members of SUA societies is the common

bean (*Phaseolus vulgaris*). The diversity of generic terms for 'bean(s)' indicates that this cultigen entered the agricultural complexes of the SUA societies after the emergence of the five subfamilies.

The Taracahitan labels for different varieties of the common bean all reflect **muni* (see appendix 2, set 11). This etymon can be identified as a loanword from a non-Uto-Aztecan source that presumably was integrated into the Taracahitan agricultural lexicon while the Proto-Taracahitan speech community was still intact. Similar terms for beans are attested in several different languages families in North America, as well as in the NUA languages Hopi and Colorado River Numic (Wolff 1950:175; Hill 2001b:923–24; Rankin 2006:571–72). The Colorado River Numic terms likely derive from a term having the form *muri*, which in Hopi has become *mori* (see section 6.3). These terms do not display the regular correspondence of NUA **-ŋ-* with SUA **-n-* and thus cannot be reflexes of a PUA etymon.

In the Corachol languages, the labels for 'bean' are Cora *muhume* and Huichol *muume*. Although these words and Taracahitan **muni* share the initial syllable *mu-*, separate introductions of the common bean to Corachol and Taracahitan speakers are likely. These terms cannot be reflexes of the same PSUA etymon because Corachol *u* regularly corresponds with Taracahitan *o*. This correspondence reflects a sequence of sound changes in which a shift of PSUA **u* to Proto-Corachol **i* was followed by a shift of PSUA **o* to Proto-Corachol **u*. These sound changes presumably had already taken place before Corachol speakers acquired the common bean.

The Proto-Tepiman generic label for 'bean(s)' appears to have been **bavi*, which may have originally labeled the tepary bean (*Phaseolus acutifolius*) (Nabhan and Felger 1978; Rea 1997:321–25; Muñoz et al. 2006). Reflexes of **bavi* are attested in all four Tepiman divisions (Bascom 1965:#4a). In Tohono O'odham, this reflex labels 'tepary bean' specifically while *muuni* is the generic term for 'bean(s)' (Saxton, Saxton, and Enos 1983:43). In the Yepachi dialect of Lower Pima, both *bavi* and *müna* (presumably derived from *muuni*) are glossed as the generic 'bean(s)' (Shaul 1994:319, 332). No terms resembling *muuni* are attested in any of the other Tepiman languages, suggesting that the Tohono O'odham and Yepachi Pima terms represent separate loans from Taracahitan sources that occurred after the breakup of the Proto-Tepiman speech community.

Like PTEP **bavi*, the terms for 'common bean(s)' in the Tubar and Aztecan subfamilies appear to be innovations. Tubar *vupusí-t* may be related to PSUA **pusi* 'eye', but it is not derived from the Tubar term for 'eye', recorded as *tulú-r* ~ *tilú-r*. The Proto-Aztecan term for 'common bean' likely was **e-* or **ee-*, based on Classical Nahuatl *e-tl* and Pipil *ee-t*, but this form can be reconstructed only for Proto-General Aztecan. No term for 'bean' was recorded for the other branch of the subfamily, Pochutec, before it became extinct (Boas 1917).

6. The Northern Uto-Aztecan agricultural lexica. The NUA societies whose members engaged in farming included the Hopi, the Cahuilla, the Timbisha Shoshone, some Western Shoshone bands, one Southern Ute band, and most Southern Paiute bands, including the Chemehuevi (Bradfield 1971; Lawton and Bean 1968; Steward 1938, 1941; Stewart 1942; Fowler and Fowler 1981; Stewart 1968).

Agriculture was a major component of the Hopi economic strategy (Forde 1931; Hack 1942). It also appears to have been significant among Southern Paiutes living in the Virgin River drainage of southwestern Utah and southeastern Nevada, who are reported to have cultivated maize and other crops in irrigated fields (Stoffle and Dobyns 1983:50–55; Fowler 1995:110–12). Farming definitely was secondary to foraging elsewhere and appears to have been entirely absent among all other NUA societies (Bean 1978; Bean and Shippek 1978; Bean and Smith 1978a, 1978b, 1978c; Blackburn and Bean 1978; Smith 1978; Zigmond 1978; Fowler 1986; Kelly and Fowler 1986:370–71).

One possible exception is the Comanches. They are known to have acquired agricultural products through trading and raiding but are not reported to have farmed themselves (Kavanagh 2001:889–91). Nonetheless, as Hill (2002a:338) notes, the Comanche agricultural lexicon is sufficiently extensive to suggest that, before European contact, farming may have formed part of their economic strategy. The Comanches acquired horses in the early eighteenth century and may have abandoned farming to become specialized bison hunters and horse pastoralists like several other post-European contact Plains societies (Shimkin 1986:517; Oliver 1962).

The Hopi agricultural lexicon is exceptionally well documented, while those recorded for other NUA languages are full of gaps. Nonetheless, sufficient data exist to conclude that an agricultural lexicon cannot be reconstructed for PNUA. Instead, as seen in the comparison of the agricultural lexica of Hopi, Southern Paiute, Comanche, and Cahuilla presented in table 4, each of these languages has a distinct agricultural lexicon that appears to have developed independently of the others, although some borrowing has occurred.

Table 4. Northern Uto-Aztecan Agriculture-Related Words

	HOPÍ	SOUTHERN PAIUTE	COMANCHE	CAHUILLA
1. ‘maize (generic)’	<i>qaaʔö</i>	<i>hawivĩ, kumi</i>	<i>haniibi</i>	<i>mays</i>
2. ‘pumpkin or squash’	<i>patŋa</i>	<i>paraŋʷara</i>	<i>nakʷisiʔ</i>	<i>nehwet</i>
3. ‘beans’	<i>mori</i>	<i>muri</i>	<i>pihuraa</i>	<i>xuulʰ</i>
4. ‘to shell maize’	<i>hüimi</i>	—	—	<i>čilʰay</i>
5. ‘parched maize kernels’	<i>kitiki</i>	—	<i>kukĩmepĩ</i>	—
6. ‘tortilla’	<i>piqaviki</i>	—	—	<i>sawiš</i>
7. ‘to sow, to plant’	<i>ĩya</i>	<i>ĩa</i>	<i>tahnaari</i>	<i>weš</i>
8. ‘field for cultivation’	<i>paasa</i>	<i>pasa</i>	—	<i>pawisisual</i>
9. ‘planting or digging stick’	<i>sooya</i>	<i>poroc</i>	—	—

NOTE: — = no data.

6.1. 'Maize' in Northern Uto-Aztecan languages. The generic labels for 'maize' presented in table 4 include four different native terms and Cahuilla *mays*, derived from Spanish *maíz*.

The Hopi term *qaaʔö* 'maize, dry husked ear of maize' is cognate with terms for 'pine cone' in Southern Paiute (*kaʔo*) and Kitanemuk (*-kaʔ*), and 'pine cone' presumably was its original referent. Hill (2002a:338, 2008:161) reports that in Hopi the possessed form *qaaʔö-at* has the secondary meaning of 'green cone of pine' or literally 'its corn ear'. This association is reversed in the Chemehuevi term for 'maize cob', *hawí kaʔó* (Lawlor 1995:523), the literal gloss of which is 'maize pine cone'.

The two Southern Paiute terms for 'maize' appear to have been the names for distinct varieties of maize. Kelly (1964:39) reports that in the Kaibab dialect of Southern Paiute, *hawiví* labeled an earlier short-eared variety while *kumi* labeled an introduced, long-eared variety. Both terms also are recorded for the Shivwits dialect, but other Southern Paiute dialects apparently included only one term or the other, *hawiví* in the more westerly dialects (Moapa and Chemehuevi) and *kumi* in the more easterly San Juan dialect, as well as in Southern Ute (Fowler and Fowler 1981:134, 136).³³

No data exist regarding the source of the introduced maize variety or its label *kumi*. The obvious similarities to PSUA **kumi* 'to nibble, to chew' suggest diffusion from the south, perhaps from the Upper Pima (Fowler 1994:454 n. 5). Except for Tubar *kumalít* 'parched maize kernels', the Tepiman terms for 'maize cob', reconstructed for Proto-Tepiman as **kumikur*, are the only SUA nouns with a maize-related meaning that are phonologically similar to Southern Paiute *kumi* (see section 3.13). Diffusion from the east or southeast also is a possibility. A similar term is found in the Comanche word for 'popcorn', *kuhmitoʔaiʔ*, for which Robinson and Armagost (1990:30) offer the literal translation of 'heated turns inside out'.

The word *kumi* also could be a Southern Paiute innovation. It has the same three initial segments as *kumutí*, the Southern Paiute label for cultivated and wild amaranth species (*Amaranthus caudatus*, *A. palmeri*) (Bunte and Franklin 1987:25, 28). The presumed Hopi cognate of *kumutí* is *komo* (from **kumu*), the name for a cultivated amaranth (*Amaranthus cruentus*). Hopi *komo* may have been the source of the term *kokoma* (from **kukuma*) 'dark red, almost purple maize', the link between them being their shared use as a red food coloring (Whiting 1966:15; Hopi Dictionary Project 1998:146, 148).

These words provide additional support for the possibility, mentioned in section 3.13, that PUA ***ku-* served as a stem in the creation of names for valued seed plants. Other examples are the names for various species of *Mentzelia* (blazing star), labeled *kuʔu* in the San Juan dialect of Southern Paiute (see appendix 2, set 7). Zigmond (1941:212–23) and Steward (1933:243, 1938:104) report that *Mentzelia* seeds were an important staple for several Numic-speaking societies and were broadcast sown by some Central Numic bands in the Great Basin.

The final generic term for ‘maize’ in table 4 is Comanche *haniibi*. The only related words attested in other Numic languages are Northern Shoshone *ha?niibi* and Northern Paiute *hanibi*. This uneven distribution suggests that it was a loanword, either from one of these Numic languages to the others or from an external source.

Hill (2002a:336) notes a similarity between Comanche *hani-*, the combining form of *haniibi*, and the Hopi word *haani* ‘maize flour ground to the desired consistency’, but whether a loan occurred and, if so, in which direction cannot be determined. The possibility exists that both words derive from the same maize-related morpheme. The initial syllable *ha-* also is encountered in Southern Paiute *hawivi* ‘maize’, and Fowler (1994:#1.11) reports that terms for ‘corn, grain’ and ‘parched corn’ in Zia, a Keresan language, have *h’a-* as their initial syllable.

Hill (2002a:336) also points out a resemblance between Hopi *hooma* ‘ceremonial corn meal’ and Comanche *homopi* ‘powder, flour’. Because Hopi *o* reflects PNUA **u* and Comanche *o* reflects PNUA **o*, the two terms cannot be cognates, but they could be the result of a loan, perhaps from Central Numic into Hopi. Comanche *homopi* reflects Proto-Central Numic **hoŋopi* ‘powder, flour’. Medial *-m-* is the expected Comanche reflex of **-ŋ-* in the context *o__o*, as seen in the Comanche term for ‘lungs’, *soomo*, which derives from **soŋo*.

6.2. ‘Squash’ and ‘pumpkin’ in Northern Uto-Aztecan languages. The generic label for ‘squash’ and ‘pumpkin’ in Hopi is *patŋa*, although Whiting (1966:93) reported that this term labeled a single species, the domesticated *Cucurbita moschata*. The label combines two morphemes, *pa-* ‘water’ and *-taŋa* ‘thing(s) in a container’, suggesting considerable antiquity for the use of cucurbits as water containers. The Hopi word for ‘wild squash’ (*Cucurbita foetidissima*) is *mösiptaŋa*, a compound of *mösi* ‘food packet’ and *-ptaŋa*, one of the combining forms of *patŋa* (Hopi Dictionary Project 1998:257). The bottle gourd (*Lagenaria siceraria*) is labeled with a completely different term, *tawiya*, for which I have found no cognates in other Uto-Aztecan languages.³⁴

It is unclear if the first Southern Paiute term for ‘squash’ or ‘pumpkin’ in table 4 is a generic term or labeled a specific species or variety of ‘squash’ or ‘pumpkin’, but there is no question that it is a Hopi loan. The forms attested in different Southern Paiute dialects are [paraŋwara] and [paraŋara] (Fowler and Fowler 1981:136). The phonemic representation of the first is /patanwata/. This word corresponds to the Hopi word *patanawta*, which can be glossed as ‘water is inside’.

A second Southern Paiute term for ‘squash or pumpkin’, reported only from the San Juan band, was recorded as *naxiris* by Bunte and Franklin (1987:28) and as *na?gitis* by Kelly (1964:170). These alternate forms suggest that the antecedent form was **nakitis*, which resembles Comanche *nakʷisi?* ‘squash’. A loan may be involved but the original source of the term is unclear.

Cahuilla *nehwet* ‘pumpkin’ reflects an antecedent **nihwit* and appears to be a Cahuilla innovation, derived from the Cahuilla word *nekhiš* ‘wild squash’ (*Cucurbita foetidissima*).³⁵ It combines the stem *neh-* ‘wild squash’ with the augmentative suffix *-wet*, literally meaning ‘big wild squash’. The same etymology is proposed in section 4 for the generic word for ‘squash, pumpkin’ in some SUA languages, also formed with reflexes of the PUA augmentative suffix ***wi* but with an unrelated stem.

6.3. The Northern Uto-Aztec bean vocabulary. The terms for ‘beans’ in the four lexica represented in table 4 derive from sources external to the Uto-Aztec language family. The Comanche and Cahuilla labels are distinct transformations of the Spanish word *frijol* ‘bean(s)’, while the original source of Hopi *mori* and Colorado River Numic *muri* is unknown (see section 5). The *o* in the Hopi word may indicate that it was introduced before the general shift of PNUA **u* to Hopi *o*, but it could also have been introduced after this shift occurred. Because *o* is the only back rounded vowel in Hopi, Hopi speakers may simply have integrated the loanword *muri* as *mori*, just as they replaced an original *u* by *o* in the word *moola* ‘mule’, from Spanish *mula*.

A medial *-r-* also is found in the Yuman term for bean, which has the basic form of *marik* (Jöel 1978:83–86), but the difference in the vowels in the initial syllable precludes concluding that the Hopis and Southern Paiutes acquired the common bean and their terms for it from Yuman speakers. Jöel (1978:86–87) identified the Yuman term as a likely loan from Hopi. She eliminated Colorado River Numic as a possible source because she assumed that the medial consonant in the Colorado River Numic term was [t] rather than [r], based on the “phonemic” form /muutii/ presented by Miller (1967:#29) rather than [muuriil], the “phonetic” realization recorded by Sapir (1931:574), which presumably represents the form of the word when it was loaned into Colorado River Numic. If the Yuman term was a loan from a Northern Uto-Aztec language, the Chemehuevi dialect of Southern Paiute is the most likely source because the Chemehuevis were in close contact with the Yuman-speaking Mohaves. It is possible, however, that the loan occurred in the opposite direction. Chemehuevi terms for ‘pumpkin’, ‘muskmelon’, ‘cotton’ and ‘wheat’ are all Mohave loans (Stewart 1968; Fowler and Fowler 1981:136–37).

6.4. Other agricultural terms. The absence of documented terms in Southern Paiute, Comanche, and Cahuilla for many of the remaining six referents in table 4 obviously precludes an evaluation of the relationships among them. However, the forms that are attested in these languages are unrelated to the Hopi terms with the same referents, with two exceptions.

The first involves the Hopi and Southern Paiute words for ‘to plant, to sow’. These terms reflect PNUA **iya* and, as discussed in section 3.6, derive ultimately from PUA ***ica*, which likely had the broadcast sowing of wild

seeds as its original referent. In addition to Hopi and Southern Paiute, reflexes of PNUA **i̥ya* with the meaning ‘to plant’ or ‘to sow’ are attested in Southern Ute and Kawaiisu (Southern Numic) and in Timbisha Shoshone (Central Numic). Nouns derived from the reflexes of **i̥ya* but not the verbal reflexes themselves are attested in Western Shoshoni (Central Numic) and Northern Paiute (Western Numic), where they label *Chenopodium* species that were broadcast sown (Steward 1938:23; Kelly and Fowler 1986:371) (see appendix 2, set 4).

The absence of reflexes of PNUA **i̥ya* in Comanche and Cahuilla is unexpected. Because other Central Numic languages retain reflexes, the Comanche reflex may have been lost late in the diversification of the Central Numic subdivision. In contrast, terms deriving from ***i̥ca* are not recorded for any of the Takic languages, suggesting that the loss of the reflex predated the emergence of Cahuilla as a distinct language.

The second exception is *paasa* or *pasa*, shared by Hopi and Chemehuevi as the term for ‘field for cultivation’. Lowie (1924:200) recorded the similar word “*passāu* ^{‘u’}” as the Shivwits Southern Paiute label for an implement used to dig irrigation ditches. The initial *pa-* in this word and its association with irrigation suggests that the initial syllables in the Hopi and Chemehuevi words for ‘field for cultivation’ are the combining forms of their terms for ‘water’, *paa-* in Hopi, *pa-* in Chemehuevi. The same morpheme may appear in the equivalent Cahuilla term *pawisusal*, glossed as ‘place where you can plant things’ (Bean and Saubel 1972:206). Seiler and Hioki (1979:139, 143) recorded *pa-* ‘water’ and *paw-* ‘to get water’ as the combining forms of these Cahuilla words, but *pawisusal* does not appear in their work.

The relationship between the Hopi and Chemehuevi terms cannot be determined, in part because terms for ‘field for cultivation’ are not reported for any other Southern Paiute dialects. However, if a loan was involved, a loan from Hopi to Chemehuevi is suggested by the existence of an alternative Southern Numic term for the same referent, derived from PNUA **i̥ya* ‘to plant, to sow’ and recorded in Southern Ute as *i̥ap̃i* and in Kawaiisu as *i̥?ap̃i*.

7. A Hopi link to Southern Uto-Aztecan. In section 3.8, I noted that Hopi is the only NUA language with a cognate for the SUA terms reflecting PSUA **wika* ‘planting stick’. Drawing on Stubbs’s (2011) extensive compilation of Uto-Aztecan cognate and resemblant sets, I have compiled a list of ten other words from SUA languages for which possible cognates exist only in Hopi or, if cognates or resemblants are attested in other NUA languages, only the SUA and Hopi words share referents.

All eleven words are presented in table 5. The first five have cognates in more than one SUA subfamily, which allow PSUA etyma to be reconstructed. I include these etyma and the Hopi cognates in table 5, together with the numbers of the sets in appendix 2 where the cognates in the SUA languages are listed. PSUA etyma cannot be reconstructed for the other six words. For them,

I present in table 5 the SUA words that most closely resemble the Hopi words. The numbers preceded by “S-” correspond to the numbers of the sets compiled by Stubbs (2011) in which these words appear. (His set numbers for the first six items in table 5 appear with those sets in appendix 2.) Stubbs does not have cognate or resemblant sets for the words in items 6 and 8, but he (2011:402) provides a list of the words for ‘wolf’ in all of the Uto-Aztecan subfamilies.

Table 5. Hopi and Southern Uto-Aztecan Cognates and Resemblants

	HOPÍ FORM	SUA FORMS
1.	<i>wiik'a</i> ‘wooden hoe’	* <i>wika</i> ‘planting stick’ (#22)
2.	<i>maalama</i> ‘to clear an area for a new field’	* <i>maawe</i> ‘to prepare land for cultivation’ (#10)
3.	<i>yooyoki</i> ‘to be raining’	* <i>yuki</i> ‘to rain’ (#24)
4.	<i>yaqa</i> ‘nose’	* <i>yaka</i> ‘nose’ (#23)
5.	<i>k'aro</i> ‘parrot’	* <i>haro</i> ‘macaw’ (#2)
6.	<i>k'ewi</i> ‘wolf’	NA-CL <i>k'etlaač-tli</i> ‘wolf’
7.	<i>k'āapi(?at)</i> ‘neck’	TBR <i>k'āi-r</i> ‘neck’ (S-1510)
8.	<i>paalölöqanq'</i> ‘Water Serpent, the deity of water’	RR <i>walúluwi</i> ‘malevolent water deity’
9.	<i>püik'a(?at)</i> ‘immature maize ear’	CR <i>iküri</i> , HC <i>hiikiri</i> ‘mature fresh maize ear’ (from * <i>pikuri</i>) (S-545)
10.	<i>yoowi(?at)</i> ‘corn silk’ (from * <i>yuuwi</i>)	CR <i>yuuri</i> ‘maize, mature maize ear’ (from * <i>yoori</i>) (S-549)
11.	<i>pööca</i> ‘fuzzy caterpillar or worm’	NA-CL <i>poočoo-tl</i> ‘silk-cotton tree’ (S-557)

Definite cognates in NUA languages other than Hopi exist only for set 4, ‘nose’. Reflexes of **yaka-* are attested in Tubatulabal *yahaawit* ~ *yahaawil* ‘summit, point’ and in Southern Numic words for ‘side, edge’ (Stubbs 2011: #1546), but only the Hopi and SUA words share the referent ‘nose’. Takic words for ‘snow’, which reflect Proto-Takic **yuyi*, perhaps are related to the Hopi and SUA words that reflect **yuku* ‘to rain’, but again the referents are different (Stubbs 2011: #1763, #2076).

Four of the sets in table 5 are associated with agriculture or maize. Set 1, ‘planting stick’, has cognates in all the SUA subfamilies except Tubar, while cognates for set 2, ‘to prepare land for cultivation’, are attested in the Tarachitan, Corachol, and Aztecan subfamilies. For the two maize-related sets (sets 9 and 10), only Hopi and Corachol words have been found. The Hopi and Cora correspondences in set 10 are irregular, but the initial syllable of the postulated antecedent form for each is the form attested in the other language.

The similarities between the Hopi and Cora words in set 5, ‘macaw’, are intriguing. Reflexes of PSUA **haro* are found in all five SUA subfamilies, with the initial **h-* lost in most and replaced by another consonant in some, for example, Tubar *walo* (see appendix 2, set 2). Only in Hopi and Cora does an initial *k-* appear instead: HP *k'aro* and CR *kara*. The final *a* in the Cora word is due to vowel harmonization, and the Hopi word shows the palatalization of *k*

expected before *a* and *e* (Hopi Dictionary Project 1998:866). In neither language is *k* the reflex of **h*. This shared irregularity makes the two words exact phonological cognates with one another but not with the other SUA words for ‘macaw’.

Given the geographical proximity of Hopi and Tepiman speakers, the loan of SUA words from Tepiman to Hopi cannot be discounted, but in the case of the three words in (23), the loans would have had to have taken place before PSUA **w* and **y* shifted to Proto-Tepiman **g* and **d* (Bascom 1965: 13).³⁶

- (23) **wika* ‘planting stick’ > PTEP **giika*
**yuki* ‘to rain’ > PTEP **duuki*
**yaka* ‘nose’ > PTEP **daaka*

Shaul and Hill estimate that these Proto-Tepiman phonological innovations occurred “early in the first millennium A.D.” (1998:380), indicating considerable antiquity for the loans if the Hopi words are from Tepiman.

An alternative possibility consistent with modern Hopi perspectives is that some of their ancestors spoke a language or languages affiliated with the southern branch of the Uto-Aztecan language family.³⁷ Ferguson and Colwell-Chanthaphonh report that “Some Hopis suggest the Tsu’u (Snake Dance) and Powamuy (Bean Dance) ceremonies have linguistic associations with languages spoken in the southern Uto-Aztecan area” (2006:115). In addition, according to Hopi history (summarized by Ferguson and Colwell-Chanthaphonh [2006:95–149]), their ancestors included some people who originated far to the south and later migrated northward to a place or region named *Palatk^wapi*. After residing there for awhile, they resumed their migrations until they reached the Hopi mesas in northeastern Arizona.

A growing body of archaeological and ethnographic evidence indicates that some Hopi ancestors participated in the cultural traditions like Hohokam and Salado that developed in the first and second millennia AD south of the Mogollon Rim, in central and southern Arizona (Ferguson and Colwell-Chanthaphonh 2006:120–48; Teague 1993; Webster and Loma’omvaya 2004; Hays-Gilpen 2008:74–76). This area may correspond to the location of *Palatk^wapi*, and it may have been during this period in their history that they acquired the wooden hoe labeled with the reflex of PSUA **wika* ‘planting stick’. (The shift in referent to ‘wooden hoe’ also occurred in Akimel O’odham; see appendix 2, set 22.) Remains of these hoes were recovered from the ruins of Casa Grande, a major Hohokam center constructed around AD 1300 (Fewkes 1912:146; Crown 1991:150–52).³⁸

Following their arrival at the Hopi mesas, the Hopis’ southern ancestors introduced new agricultural and religious practices, including some associated particularly with water and rain. Given these associations, the fact that Hopi cognates or resemblants exist for four sets in table 5 related to agriculture (sets 1, 2, 9, 10), as well as set 3, ‘to rain’, appears less than coincidental. Moreover,

the similarities between the Hopi and Rarámuri words for ‘water deity’ suggests some interaction in the past between speakers of these languages.³⁹ Hopi ceremonies linked to the Hopi deity *paalölöqanq^w* are also linked to the Water Clan, one of the Hopi clans that migrated from the south. Two other southern clans are the Parrot Clan, *kʷar-ŋʷam*, and the Young Corn Clan, *pìikʷas-ŋʷam*. The stem of the name of the first clan is the combining form of the Hopi reflex of the PSUA etymon that I have glossed as ‘macaw’ (set 5). The stem of the second is the combining form of the word for which Corachol resemblants exist (set 9).

Cora cognates or resemblants are attested for five of the eleven sets in table 5 (sets 1, 2, 5, 9, and 10). If the Hopis’ southern ancestors originated in the interior of Mexico, they might have been in contact with the ancestral Cora, and their language or languages could have been related to those of the Corachol subfamily.⁴⁰ The Coras have lived in west-central Mexico from the time of European contact and presumably were located in the same area for centuries before (Weigand 1992:182–88; cf. Weigand and García de Weigand 2000). The northward migrations of the Hopis’ southern ancestors might have begun from wherever the ancestral Coras were living at the time of their departure, either where the Coras currently reside or somewhere between there and the southwestern United States. Such a long-distance migration is not entirely far-fetched given the fact that speakers of Tepiman languages expanded across the same area, from southern Arizona to near the current Cora territory, at some point prior to European contact (Shaul and Hill 1998:388–89; Wilcox et al. 2008). In this scenario, the ancestral Hopi would have come in contact with speakers of languages belonging to at least some of the other SUA subfamilies.

On the other hand, except for the agriculture-related terms discussed here, there is little evidence of SUA influence in the Hopi agricultural lexicon. The Hopi and PSUA lexica are quite different, as demonstrated in table 6, where the PSUA terms presented in table 2 and the Hopi terms with the same referents are juxtaposed. The only Hopi word in this table that might be of SUA origin is *pìikʷa* ‘immature maize ear’, which, as noted above, could be cognate with Corachol words for ‘mature fresh maize ear’.

Table 6. Proto–Southern Uto-Aztecan and Hopi Agricultural Lexica

REFERENT	PSUA	HOPi
1. ‘maize (generic)’	* <i>suhunu</i>	<i>qaaʔö</i>
2. ‘immature maize ear’	* <i>sita</i>	<i>pìikʷa</i>
3. ‘to shell maize’	* <i>hora</i> ~ * <i>hori</i>	<i>hümi</i>
4. ‘parched maize kernels’	* <i>saki</i>	<i>kitiki</i>
5. ‘tamale’	* <i>tima</i>	<i>somiviki</i>
6. ‘to plant, to sow’	* <i>ica</i>	<i>üya</i>
7. ‘field for cultivation’	* <i>wasá</i>	<i>paasa</i>
8. ‘planting stick’	* <i>wika</i>	<i>sooya</i>

8. Agriculture and the Proto–Southern Uto-Aztecan homeland. The linguistic evidence presented in section 3 indicates that the PSUA speech community was intact when its members adopted maize agriculture. Evaluating the degree to which they could have been involved in the initial diffusion of agriculture and specifically maize agriculture between Mesoamerica and the southwestern United States depends upon determining their location during the period when this diffusion occurred. A consideration of additional linguistic evidence and biogeographical data suggests that the PSUA speech community most likely was located in northeastern Sonora and southeastern Arizona when maize agriculture was introduced to the region.⁴¹

The identification of this area as the PSUA homeland is based on the geographical distribution of four wild plant and animal taxa labeled with etyma that are PSUA innovations: ‘wild chile’, two kinds of ‘palm’, and ‘macaw’ (see table 7). The ranges of these taxa overlap in northeastern Sonora and regions to the south. The wild chile (*Capsicum annuum* var. *glabriusculum*) is found in southern Arizona up to latitude 32° north (Tewksbury et al. 1999:99–100; Kraft 2009). Based on the botanical identifications of the palm species labeled by terms in SUA languages derived from PSUA **taku* and **soyawa* (see appendix 2, sets 16 and 18), the original referents of these terms likely were *Sabal uresana* and one or more species of *Brahea*, the ranges of which extend northward to near the thirty-first parallel (Joyal 1995:146; Felger and Joyal 1999:3). Macaws (*Ara militaris*) reach the northern limits of their distribution at about latitude 30° north (CONABIO n.d.; Íñigo-Elías 2000).⁴²

Table 7. Proto–Southern Uto-Aztecan Innovations in Names for Flora and Fauna

PROTO-SUA ETYMA	TEP	TRC	CRC	TBR	AZT
1. <i>*ko?ori</i> ‘wild chile’	+	+	+	+	–
2. <i>*taku</i> ‘palm’	+	+	+	+	–
3. <i>*soyawa</i> ‘palm’	–	+	–	+	+
4. <i>*haro</i> ‘macaw’	+	+	+	+	+

NOTE: TEP = Tepiman; TRC = Taracahitan; TBR = Tubar; CRC = Corachol; AZT = Aztecan; + = cognate present; – = cognate absent.

It thus can be argued that the PSUA foraging bands were exploiting the wild resources of an area that was located between the thirtieth and thirty-second parallels. Although wild chiles, palms, and macaws occur south of the thirtieth parallel, a more southerly location for the SUA homeland is unlikely. No PSUA terms can be reconstructed for any species associated exclusively with subtropical and tropical zones, including those encountered in the tropical deciduous forests that occur in Sonora as far north as the twenty-ninth parallel (Fowler 1983:234, 245–46; Hill 2001b:917; Búrquez et al. 1999:54, fig. 2.6; Robichaux and Yetman 2000).

If the PSUA speech community had been located farther south, a likely candidate for a label reconstructible to PSUA would be the 'silk-cotton tree' (*Ceiba* spp.), a morphologically quite distinctive and economically useful genus, distributed in tropical areas from Sonora to South America. However, the SUA terms for this tree are not cognates, even in SUA languages spoken in Sonora, where they label *Ceiba acuminata*; terms for this tree documented for these languages are shown in (24).

- (24) NV *aupukama*
 MY(Y) *baog^wa*
 ED *sávur*
 WR-R *wakapí* (Yetman and Felger 2002:185)

The location proposed for the SUA homeland includes the northern half of the Serrana region of northeastern Sonora, situated along the upper drainages of the Río Sonora and Río Yaqui and at the time of European contact one of the most productive agricultural zones in the entire region (Doolittle 1980, 1984a, 1984b, 1988). Given the proximity of this postulated SUA homeland to the early agricultural sites in southern Arizona, the inception of maize agriculture among PSUA speakers presumably would have occurred at roughly the same time, around 4100 BP (Merrill et al. 2009). If so, then it can be hypothesized that the PSUA speech community was intact at least until around four thousand years ago.

If the PSUA speech community was located north of the twenty-ninth parallel, it is doubtful that its members would have been responsible for diffusing maize agriculture across the thousand kilometers separating them from Mesoamerica. It is, of course, reasonable to suppose that they could have played a role in the introduction of maize agriculture to foraging societies farther north (Carpenter, Sánchez de Carpenter, and Mabry 2001; Carpenter, Sánchez, and Villalpando 2002). In addition, the movement of PSUA farmers into new areas suitable for farming presumably would have been one of the factors contributing to the dispersal of the PSUA speech community. Given the distribution of the SUA languages at the time of European contact, movements appear to have been primarily to the east, west, and south, where seasonal rainfall and temperature regimes were more amenable to maize agriculture than areas to the north. Expansion southward could have created a corridor through which domesticated cucurbits and beans later diffused northward.

9. Conclusions. Four generalizations about the place of agriculture in Uto-Aztecan cultural history can be proposed, based on the comparative analysis of the agricultural lexica of the Uto-Aztecan languages presented here.

First, the members of the Proto-Uto-Aztecan speech community were foragers who engaged in some forms of wild plant husbandry that included the broadcast sowing of wild seeds. They also developed vocabulary, practices, and

material culture linked to the procurement and processing of wild plants that were later applied to domesticated plants and their cultivation by speakers of both Southern and Northern Uto-Aztec languages.

Second, prior to the adoption of agriculture by any Uto-Aztec speakers, the PUA speech community divided into two separate speech communities, resulting in the emergence of the first-level daughter languages, Proto-Southern Uto-Aztec and Proto-Northern Uto-Aztec. Following this split, interaction between the speakers of these intermediate protolanguages was minimal, and their subsequent engagements with agriculture occurred for the most part independently of one another.

Third, the Proto-Southern Uto-Aztec speech community was intact when its members adopted maize agriculture. Their dispersal and the diversification of PSUA into distinct dialects and languages began before the introduction of domesticated cucurbits and was well advanced by the time that they integrated domesticated beans into their crop complexes. The interaction of Tepiman and Taracahitan speakers after the emergence of the ancestral languages of the SUA subfamilies is indicated by loans of agriculture-related terms between them. Proto-Corachol and Proto-Aztec speakers appear not to have formed part of this interaction sphere.

Finally, the members of the Proto-Northern Uto-Aztec speech community were foragers, not farmers, and foraging continued to be the sole or primary component of the economic strategies of most Northern Uto-Aztec societies. The shift from foraging to a mixed foraging-farming strategy occurred late in the diversification of the NUA branch of the language family and involved only some NUA societies.

The third generalization, regarding the cultural history of maize, cucurbits, and beans among the Southern Uto-Aztecs, corresponds to the perspective advocated by Hill (2001a:346), but the fourth, regarding the cultural history of agriculture among the Northern Uto-Aztecs, is quite different from the position that she has advocated. She (2001b:916–17, 2012:65) proposes that the members of the PUA speech community were farmers located within Mesoamerica. As demand for new arable land increased, some began spreading northward, leading to the emergence of a separate PNUA speech community whose members eventually reached the southwestern United States, where they introduced maize agriculture. To account for the absence of evidence for an agricultural lexicon reconstructible to PNUA, she (2001b:927, 2002a) suggests that reflexes of PNUA etyma related to agriculture existed in all of the ancestral languages of the NUA subfamilies but either were never recorded or were lost when some NUA societies ceased farming to rely exclusively on foraging for their survival.

Lexical loss or the failure to record agriculture-related words in some NUA languages definitely must have occurred in the case of the reflexes of the PUA verb ‘to plant, to sow’. This etymon can be reconstructed to PUA as **ica*, but reflexes of it are not attested in Tubatulabal or the Takic languages, nor in a

few of the Numic languages (see section 6.4). It also is likely that some of the NUA societies documented ethnohistorically or ethnographically as fulltime foragers practiced some farming earlier in their histories. However, I do not interpret the available evidence as supporting the conclusion that the members of the ancestral PNUA speech community as a whole were farmers.

From my perspective, the first NUA farmers likely were speakers of ancestral Hopi who could have integrated farming into their foraging economies during the period, roughly 3000–2150 BP, when maize agriculture was initially spreading across the American Southwest and into adjacent areas of the northern Colorado Plateau (Wilde and Newman 1989:714; Lyneis 1995:207–8; Madsen and Simms 1998:293; Matson 2002; Kohler and Glaude 2008:82–83). Later, speakers of other ancestral NUA languages could have developed mixed foraging-farming strategies, but some never adopted maize agriculture because they were located in areas, like southern California, where reliable wild food resources were abundant, or farther north, where local environmental conditions rendered maize production unreliable.

I also suspect that climatic fluctuations in western North America were responsible for shifts between foraging and mixed foraging-farming strategies that likely occurred on multiple occasions during the history of the region. Although a number of factors have been proposed to account for the disappearance of farming by around AD 1250 (700 BP) in areas of the Great Basin and Colorado Plateau associated with the Fremont archaeological tradition, increasing aridity during the maize growing season must have been involved (Madsen and Simms 1998:313–20). Similarly, decreasing temperatures during the Little Ice Age, dated for western North America to roughly AD 1400–1850 (550–100 BP), may be responsible for subsequent abandonment of farming in the same general area (Koerper, Killingley, and Taylor 1985; Matthews and Briffa 2005; Stine 2004:53–54).

In fact, I interpret reports from the nineteenth and early twentieth centuries that some Numic speakers who lived in the Great Basin and on the northern Colorado Plateau had recently “begun” small-scale farming as evidence that they were actually resuming a mixed foraging-farming strategy that they had abandoned during the Little Ice Age (Steward 1938:122, 137; Kelly and Fowler 1986:371; Fowler and Fowler 1981:132–38). The ensuing warming trend that began around AD 1800 (150 BP) allowed Numic farmer-foragers to expand northward into areas of the Great Basin that may have been farmed prior to AD 1400 (550 BP), but this expansion (or reexpansion) was cut short by the arrival of Euro-American settlers, who appropriated the best and in some cases only arable lands (Matthews and Briffa 2005:23; Stoffle and Dobyns 1983:49; Stoffle and Zedeño 2001). A mixed foraging-farming strategy persisted, however, in a few Numic communities located farther to the south, where ethnographers like Isabel Kelly (1964; Fowler 1995) were able to observe its pursuit in the 1930s.

Appendix 1: Language Abbreviations and Sources

AK = Akimel O'odham (Rea 1997)
 AZT = Aztecan
 CA = Cahuilla (Seiler and Hioko 1979)
 CA(B) = Cahuilla (Bean and Saubel 1972)
 CH = Chemehuevi (Press 1979)
 CM = Comanche (Robinson and Armagost 1990)
 CP = Cupeño (Hill and Nolasquez 1973)
 CR = Cora (McMahon and McMahon 1959)
 CR(O) = Cora (Ortega 1860)
 CR(P) = Cora (Preuss 1934)
 CR(V) = Cora (Valiñas Coalla 2000)
 CRC = Corachol
 ED = Eudeve (Pennington 1981)
 HC = Huichol (McIntosh and Grimes 1954)
 HC(G) = Huichol (Grimes et al. 1981)
 HC(GM) = Huichol (Gómez López 1999)
 HP = Hopi (Hopi Dictionary Project 1998)
 KT = Kitanemuk (Anderton 1988)
 KW = Kawaiisu (Zigmond, Booth, and Munro 1991)
 LP = Lower Pima (Bascom 1965)
 LS = Luiseño (Elliott 1999)
 LS(B) = Luiseño (Bright 1968)
 MY = Mayo (Collard and Collard 1962)
 MY(V) = Mayo (Valiñas Coalla 2000)
 MY(Y) = Mayo (Yetman and Van Devender 2002)
 NA-CL = Classical Nahuatl (Karttunen 1992)
 NA-CL(M) = Classical Nahuatl (Molina 1970)
 NP = Northern Paiute (Liljeblad, Fowler, and Powell 2012)
 NT = Northern Tepehuan (Bascom 1965)
 NT(R) = Northern Tepehuan (Rinaldini 1994)
 NUA = Northern Uto-Aztecan
 NV = Névome (Pennington 1979)
 OP = Ópata (Lombardo 1702)
 OP(P) = Ópata (Pimentel 1863)
 PNUA = Proto-Northern Uto-Aztecan
 PO = Pochutec (Boas 1917)
 PP = Pipil (Campbell 1985)
 PSUA = Proto-Southern Uto-Aztecan
 PTEP = Proto-Tepiman
 PUA = Proto-Uto-Aztecan
 PYP = Lower Pima (Yepachi dialect) (Shaul 1994)
 PYP(R) = Lower Pima (Yepachi dialect) (Rea 1997)
 RR = Rarámuri (Brambila 1976)
 RR(H) = Rarámuri (Hilton 1959)
 SP = Southern Paiute (Kaibab dialect) (Sapir 1931)
 SP-K = Southern Paiute (Kaibab dialect) (Kelly 1964)
 SP-SJ = Southern Paiute (San Juan dialect) (Kelly 1964)
 ST = Southern Tepehuan (Bascom 1965)
 SUA = Southern Uto-Aztecan
 SUt = Southern Ute (Givón 1979)

TB = Tubatulabal (Munro and Mace 1995)

TB(EV) = Tubatulabal (Voegelin 1938)

TBR = Tubar (Lionnet 1978)

TEP = Tepiman

TO = Tohono O'odham (Saxton, Saxton, and Enos 1983)

TO(M) = Tohono O'odham (Mathiot 1973)

TRC = Taracahitan

TSH = Timbisha Shoshone (Dayley 1989)

UP = Upper Pima (Bascom 1965)

WR-R = River Warihó (Medina Murillo 2002)

WR-S = Sierra Warihó (Miller 1996)

WSH-G = Western Shoshone (Gosiute dialect) (Miller 1972)

WSH-G(C) = Western Shoshone (Gosiute dialect) (Chamberlin 1911)

YQ = Yaqui, Sonora (Estrada Fernández et al. 2004)

YQ-AZ = Yaqui, Arizona (Molina, Valenzuela, and Shaul 1999)

Appendix 2: Cognate Sets

The cognate sets are organized in alphabetical order by the reconstructed etyma, which should be regarded as approximations. Many regular phonological correspondences among the Uto-Aztecan languages remain unidentified, especially in second-syllable vowels in reflexes of disyllabic etyma, where sound changes and loss are common. The numbers with the "S-" prefix correspond to those in Stubbs (2011), the most comprehensive compilation of Uto-Aztecan cognate and resemblant sets available.

The words included in each set show expected correspondences in the initial syllable plus the initial segment of the second syllable. Deviations relevant to the analysis are noted in the comments. The sets do not include cognates from all Uto-Aztecan languages and dialects. The principal source of data for each language is the first source listed in appendix 1. Data from the other sources are included only when cognates are not attested in the principal sources or sometimes when the attested forms in them differ from those of the principal source.

The cognates in each set are organized by subfamilies in the following order: (1) Numic, (2) Tubatulabal, (3) Hopi, (4) Takic, (5) Tepiman, (6) Taracahitan, (7) Tubar, (8) Corachol, and (9) Aztecan. Most sets lack cognates from several subfamilies, but the order and numbering are retained. The abbreviations for all of the languages are found in appendix 1. Glosses for individual cognates are presented only when they deviate from the referents assigned to the reconstructed terms. When a cognate has multiple referents and one corresponds to that of the reconstructed etyma, the other referents are not included.

1. PSUA **hari* 'wild squash' (S-2141). (5) TO *aḏawi* 'wild squash (*Cucurbita digitata*)', *haal* 'squash, pumpkin' (loanword); NV *aari* 'rainy-season squash or pumpkins' (probable loanword), *aṛabi* 'wild squash'; PYp(R) *ara* 'wild squash'; PYP *ara* 'small squash'. (6) YQ *aya?awim* 'squash, pumpkin (*Cucurbita moschata*)'; MY *aayau* (sg.), *ayá?awim* (pl.) 'squash, pumpkin'; ED *arí* 'gourd dipper', *haris* 'wild squash'; WR-R *haari* ~ *arí* 'gourd canteen, gourd dipper', *haláwe* ~ *haráwe* ~ *aláwe* ~ *aráwe* 'squash, pumpkin', *maharáwe* 'wild squash', *halapá* ~ *alapá* ~ *arapá* 'gourd, gourd dipper'; WR-S *arí* 'gourd canteen, gourd dipper', *aláwe* 'pepo squash (*Cucurbita pepo*)', *alapá* 'gourd, gourd dipper', *alóci* 'gourd, gourd dipper'; RR *arí* 'bottle gourd', *arisi* 'wild squash', *labá* 'gourd dipper cut breadthwise', *lóci* 'gourd dipper cut lengthwise'. (7) TBR *halipát* 'a kind of gourd, gourd dipper', *hualít* 'a kind of gourd used to transport water'. (8) HC *ĩari* 'calabash, bottle gourd'. (9) NA-CL *ayo?tli* 'gourd, squash, pumpkin'; PP

ayuh ‘a variety of squash or pumpkin’; PO *eyut* ‘squash or pumpkin’. COMMENT: Pennington (1963:45, 164) identifies Rarámuri *arí* and *arisi* as the labels for *Lagenaria siceraria* and *Cucurbita foetidissima* respectively.

2. PSUA **haro* ‘macaw’ (S-217). (3) HP *k’aro*. (5) TO *aadho* ‘peafowl’; NV *aro*. (6) ED *háro*; WR-S *walá*; RR *walá* ~ *wará*. (7) TBR *waló*. (8) CR(P) *kara(s)*. (9) NA-CL(M) *alo*. COMMENT: The Classical Nahuatl reflex of **haro* clearly served as a generic label. Molina (1970:4r, 19v, 86r) glossed *alo* as ‘large parrot’, *k’aw alo* as ‘large green parrot’, and *čičiltik alo* as ‘large red parrot’.

3. PSUA **hora* ~ **hori* ‘to shell maize’ (S-552). (6) ED *hóran*; WR-S *ola-*; RR *orá* ~ *orí* ‘to shell (generic)’. (8) HC *urika*. (9) NA-CL *ooya* ‘to shell (generic)’; PP *uuya* ‘to shell (generic)’, *tauuya* ‘to shell maize’; PO *teyul* ‘maize’. COMMENT: Névome *hoṛa* ‘to harvest maize’ closely resembles Eudeve *hóran*, but *h* in the Tepiman languages is the reflex of PSUA **s*, not **h*. If Névome *hoṛa* and its Tohono O’odham cognate *ooʔoḍa* ~ *oḍ* ~ *oo* ‘to harvest, to gather fruit’ are linked to this set, they likely are loans.

4. PUA **ica* ‘to plant, to sow’ (S-1635). (1) NP *iapi* ‘pigweed’; TSH *iah*; WSH-G *iappih* ‘pigweed (?)’; KW *iʔa-*; SP *ia-*; CH *iga*; SUT *ia-*. (3) HP *iya*. (5) TO *iʔiša*. NV *isa*; PYP *isa*; NT *iši*; ST *iši*. (6) YQ *eéča*; MY *eéča*; ED *eca*; WR-S *eca-*; RR *ičí*. (8) CR(O) *aca*; HC *ecarika*.

5. PNUA **ko* ‘chenopod’ (S-1655). (1) WSH-G *kokax*; KW *koovü*; SP-K *kovi*. (4) CA(B) *kiʔawet*; CP *qit*; LS(B) *qet*; KT *kokt*. COMMENT: The referents of the Cupeño and Kitanemuk terms are given as “*Chenopodium* spp.” The species of *Chenopodium* associated with the other terms are: Kawaiisu: *C. album*, *C. humile*; Southern Paiute (Kaibab): *C. fremontii*; Cahuilla: *C. californicum*, *C. humile*, *C. fremontii*, *C. murale*; Luiseño: *C. album*.

6. PSUA **koʔkori* ‘(wild) chile’ (S-1597). (5) TO *koʔokol* ‘a chili pod; chili powder’; To *aʔal koʔokol* ~ *uʔus koʔokol* ‘wild chile’; NV *kokori*; PYP *kokoli* ~ *koʔokil*; NT *kóokoli*; ST *kóʔokolʔ*. (6) YQ *kóʔokoi*; WR-S *koʔkóri*; RR *kori*. (7) TBR *kokól*. (8) CR *kuʔukuri*; HC *kuukuri*. COMMENTS: (a) Except in Tohono O’odham, these cognates apparently serve as generic labels for both wild and domesticated chiles. (b) Classical Nahuatl *čilli* is an innovation and the source of the word ‘chile’. (c) Classical Nahuatl *kokoaa* ‘to be sick, to hurt; to hurt someone’ is a reflex of PSUA **koʔoko* ‘to be sick, to hurt’ from which the label for ‘chile’ is derived. Takic cognates are attested for the verb but not for the words for ‘chile’ (Stubbs 2011:#1597).

7. Proto-Numic **kuha* ‘blazing star (*Mentzelia* spp.)’; (1) NP *kuha* ‘blazing star seeds’; TSH *kuha* ‘blazing star (*Mentzelia* spp.)’, *kuhwa* ‘blazing star seeds’; WSH-G(C) *kuhwa* ‘*Mentzelia* spp.’; KW *kuʔuwü*; SP-SJ *kuʔu*. (2) TB(EV) *kuul*. COMMENTS: (a) Vowel harmonization and the loss of the medial *-h-* could account for the Kawaiisu, Southern Paiute, and Tubatulabal words, but they also could reflect an etymon or etyma distinct from **kuha*. (b) Zigmund (1941:213), Kelly (1964:42, 153, 179), and Lawlor (1995:483–85) provide additional labels for *Mentzelia* species from other Southern Paiute dialects. (c) The Hopi label for *Mentzelia* spp. is the innovation *sililitaqa*, formed from the root *sili-* ‘to crackle’ apparently in reference to the rattling sound made by the ripe seed pod (Whiting 1966:85; Hopi Dictionary Project 1998:502). The Havasupai word *selé*, which labels *Mentzelia albicaulis* (Smith 1973), presumably is a Hopi loan.

8. PSUA **kumi* ‘to chew, to crunch, to nibble’ (S-777). (5) TO *kuum* ‘to chew, to crunch’; To(M) *kuum* ‘to eat, chew on something that comes in little pieces, such as corn, popcorn, and pieces of candy’; PYP *kuum* ‘to chew’. (6) YQ *kuúme* ‘to chew’; MY *kuúme* ‘to chew’; WR-S *kuʔmi-* ‘to chew something hard and crunchy like parched maize kernels or squash seeds’; RR *kumí* ‘to eat maize kernels (parched, fresh, or dried)’. (7) TBR *kumi-* ‘to eat small or ground up things, to eat maize’. (8) HC(G) *kimi* ‘to nibble’. COMMENT: The medial glottal stop in the Warihó reflex and the correspondence of

identical vowel sequences in the Tepiman, Yaqui, and Mayo reflexes suggest that the PSUA etymon should be reconstructed as **kuhumi*.

9. PUA **mata* 'metate' (S-1082). (1) NP *mata*; KW *maraci*; SP *maraci*; SUT *maraci*. (2) TB *manaal*. (3) HP *mata*. (4) CA *malal*; CP *malal*; LS *malaal*. (5) TO *maččuđ*; PYP *maatur*; NT *mauturai*; ST *mattur*. (6) YQ *māta*; MY *mätta*; ED *matát*; WR-S *mahtá*; RR *ma?tá*. (7) TBR *matát*. (8) CR *m^waata*; HC *maataa*. (9) NA-CL *metlatl*; PP *metat*; PO *mot*. COMMENTS: (a) The medial *-r-* in the Southern Numic reflexes is the result of lenition of **-t-*. (b) Tubatulabal *-l-* rather than *-n-* would be expected.

10. PSUA **mawe* 'to prepare land for cultivation' (S-1639). (3) HP *maalama*. (6) YQ *máohte*; MY *mag^wohte*; ED *máwan* 'to plow'; WR-S *mawe-*; RR *mawé*. (8) CR *m^wa?ire*; HC *imayaari*. (9) NA-CL *sakamoa*; PP *meewa*. COMMENTS: (a) Hopi *-l-* is the expected reflex of **-w-* between low vowels (Voegelin, Voegelin, and Hale 1962:53). (b) The medial *-w-* has been lost in the Yaqui, Cora, Huichol, and Classical Nahuatl reflexes, and the Pipil reflex shows vowel metathesis.

11. *mu-* 'bean' (loanword) (S-131). (1) SP *muurii*; SP-SJ *muruis*. (3) HP *mori*. (5) TO *muuni*; PYP *miina*. (6) YQ *múni*; MY *muúnim* 'beans'; ED *mun*; WR-S *muní*; RR *muní*. (8) CR *muhume*; HC *muume*. COMMENTS: (a) In the PYP reflex, *-uu-* has shifted to the unrounded *-ü-*. (b) The identical vowel sequences seen in words from four of the five subfamilies suggest that the first two syllables of the loanword from which they derive may have been *muhu-*, as attested in the Cora word.

12. PSUA **murayawa* 'inflorescence' (S-536). (5) TO *muđađag*; NV *muradaga*; PYP *murat* 'maize spike'. (6) YQ *móa* 'wheat tassel'; MY *moug^wa* 'to produce spike(s)'; ED *murát*; WR-S *mulá* 'maize tassel'; RR *murá*. (8) HC *imiäye* 'to produce spike(s)'. (9) NA-CL *miyaawatl* 'maize tassel and flower'.

13. PSUA **paci* 'seed' (S-1916). (6) YQ *báči* 'maize'; MY *bátči* 'maize'; ED *suváci*; OP(P) *vači* 'maize with formed kernels'; WR-S *pahcí*; RR *pačí* 'mature fresh maize ear'. (7) TBR *wacirán*. (8) CR *haci*; HC *haci*. (9) NA-CL *ačtli*; PO *ást*. COMMENTS: (a) Words that derive from reflexes of **paci* are discussed in section 3.10. (b) The Ópata reflex is attested in Pimentel (1863:311), glossed as "el maiz ya granado." I have been unable to find this gloss in Lombardo (1702), Pimentel's principal source of Ópata lexical items. Lombardo (1702:151v) does include *vačit*, glossed as 'squash seeds or a similar thing' ("las pepitas de las calabazas o cosa semejante"), essentially the same gloss assigned to the Eudeve cognate, *bacit* 'squash seed'. This gloss does not appear anywhere in Pimentel's work, suggesting that he may have altered the original gloss. However, Pimentel's *vači* lacks the final *-t*, presumably the absolutive suffix, and Pimentel appears to include the absolutive suffix and other word-final consonants if they are attested in Lombardo's work. Perhaps two different words are involved. Valiñas Coalla (2000:197–98) glosses Ópata *paci* as both 'seed' and 'mature fresh maize ear'.

14. PSUA **saki* 'parched maize kernels' (S-524). (5) TO *haaki*; PYP *haahaki*; NT *ááki*; ST *haak*. (6) YQ-AZ *saakim*; MY *saáki*; ED *sakít*; WR-S *sakí*; RR *sakí*. (8) HC *šaki*. (9) NA-CL *iiskitl*; PP *iiseki* 'to toast'. COMMENT: The Tepiman terms label 'parched grains' in general.

15. PSUA **sita* 'immature maize ear' (S-538). (6) YQ-AZ *sita*; MY(V) *sitawa*; ED *sítven* 'to sprout an ear of maize'; WR-S *sitá* 'corn silk'; RR *sitá*. (8) CR(O) *sitati*; HC *šiita*. (9) NA-CL *šiilootl*; PP *šiilut*. COMMENTS: (a) Miller (1993:150) glosses Sierra Warihó *sitá* as 'immature maize ear'. (b) Tubar *solít* 'mature fresh maize ear' could be a Nahuatl loanword if vowel metathesis occurred.

16. PSUA **soyawa* 'a kind of palm' (S-1607). (6) WR-S *saó* '*Sabal uresana*'; RR *sowá*. (7) TBR *saywát*. (9) NA-CL *sooyaatl*. COMMENTS: (a) The PSUA etymon is reconstructed as

trisyllabic based primarily on Tubar *saywat*, which presumably lost a second-syllable vowel. (b) The reworking that is evidenced in all the reflexes includes vowel harmonization and the loss and metathesis of both vowels and consonants.

17. PSUA **suhunu* ‘maize (generic)’ (S-535). (5) To *huuni*; UP *huuñi*; NV *hunu*; PYP *huun* ~ *huuno*; NT *úúnu*; ST *huun*. (6) MY *súnnu* ‘maize field’; ED *sunút*; WR-S *sunú*; WR-R *su?unú*; RR *suunú*; RR(H) *sunú*. (9) NA-CL *sintli* ~ *sentli* ‘dried maize ear’; PP *sinti* ‘maize, dried maize ear’; PO *son* ‘dried maize ear’. COMMENT: Hill (2005:2, 2008:164, 2012:58) indicates that the Gabrielino term for ‘tortilla’ is *şoŋaaxey*, which she analyzes as *şoŋ-* ‘corn’ + *-aaxe-* ‘put in mouth’ + *-y* ‘nonpossessed noun suffix’, citing John P. Harrington’s unpublished fieldnotes as her source for the Gabrielino data (Hill 2008:159 n. 6). I did not encounter this word in my review of the microfilm of these fieldnotes. The notes do, however, include a similar word that Harrington transcribed and glossed as “şaŋahaj, bread” (Harrington 1981: reel 102, frame 0672). This word may derive from Proto-Takic **sawa* (Stubbs 2011:#266c) ‘to make tortillas or bread’, with the velar nasal resulting from a shift of **-w-* to **-ŋ-* that Munro (1973) reports for some words in Luiseño, another Takic language.

18. PSUA **taku* ‘a kind of palm’ (S-1606). (5) To *takui* ‘soaptree or soapweed yucca plant (*Yucca elata*)’. (6) YQ *táko* ‘*Washingtonia robusta*’; MY(Y) *ta?ako* ‘*Brahea aculeata*, *Sabal uresana*’; ED *takút*; WR-S *tahkú* ‘*Brahea aculeata*’; RR *rakú*. (7) TBR *takút*. (8) CR *takí*; HC(Gm) *takí*. COMMENT: The shift in the referent of Tohono O’odham *takui* presumably occurred because the palm taxa labeled with reflexes of **taku* in other SUA languages do not occur in the Upper Piman area, and the leaves of at least some of these taxa and *Yucca elata* are used in weaving (Rea 1997:284–85; cf. Joyal 1996a, 1996b).

19. PUA ***tusa* ‘to grind’ (S-1081). (1) NP *tusu*; TSH *tusu*; CM *tusurí*; KW *tusu*; SP *tusu*; SUT *tüsü*. (2) TB *tusut*. (3) HP *tosta*. (4) CA *tus*; LS *tuus-* ‘to crumble’; KT *tuh*. (5) TO *ču?a* ~ *čua* ~ *čua?i*; NV *tuha*; PYP *tu?ia*. (6) YQ *tuúse*; MY *tuúse*. ED *tusán*; WR-S *tusu-*; RR *rusú*. (7) TBR *tusi*. (8) CR *tí?isih*; HC *túšiya*. (9) NA-CL *tesi*; PP *tisi*; PO *toso*.

20. PUA ***tusi* ‘something ground up’. (1) NP *nadussupí* ‘meal’, *hanibinnadussupe* ‘ground maize kernels’; CM *tusupí* ‘pulverized or grated object’; CM *hanitusupí* ‘ground corn, cornmeal’; CH *tusupí* ‘flour, something ground up’; SUT *tisupí* ‘flour’. (3) HP *toosi* ‘roasted sweet corn that is dried and ground to a fine texture’. (4) CA *tus* ‘something ground up’. (5) TO *ču?i* ‘flour, ground food, pollen’; NV *tuhi* ~ *tusi* ‘anything ground up, ground parched maize’; PYP *tu?i* ‘meal, flour’; NT *túi* ‘flour’, *túšapi* ‘maize flour’; ST *tui* ‘flour’, *tuišep* ‘maize flour’. (6) YQ *saktúsi* ‘ground parched maize’; MY *sák tússi* ‘ground parched maize’, *tuúsi* ‘dough’; ED *tusít* ‘ground parched maize’; WR-R *tusi* ~ *tuusi* ‘ground parched maize, maize dough’; RR *rusí* ‘finely ground grain’, *kobírusi* ~ *kobísi* ‘ground parched maize’. (7) TBR *matusít* ‘ground parched maize’. (8) CR(V) *m^watüsiš* ‘ground parched maize’. (9) NA-CL *teštli* ‘flour, meal’; PP *tišti* ‘dough, maize dough’; PO *tošt* ‘dough’.

21. PSUA **wasá* ‘field for cultivation’ (S-1636). (5) To *gagka* ‘a clearing’, *gagkat* ‘to clear land’; NV *gaga*; PYP *gaha*. (6) YQ *waása*; ED *g^wasát*; WR-S *wasá*; RR *wasá*. (8) CR *wasti?i* ‘planted (adj.)’; HC *waša*. COMMENTS: (a) The initial syllable in the Tohono O’odham form, *gag-*, apparently involves reduplication, as seen in the Névome reflex. The Yepachi Pima cognate shows the expected Tepiman reflexes *g* and *h* of PSUA **w* and **s*. (b) Grimes (1980:272) reports that Huichol *waša* also designates ‘maize plant’.

22. PSUA **wika* ‘planting stick’ (S-672). (3) HP *wiik’a* ‘ancient wooden hoe’. (5) AK *giiki* ‘wooden hoe’; TO *giiki*; NV *gika*; PYP *giika* ‘plow (n.)’; NT *giikai*; ST *giik*. (6) MY *wí?ika*; WR-S *wika*; RR *wiká*; RR(H) *wika*. (8) CR(O) *vikati*; HC(G) *wika*. (9) NA-CL(M) *wiktli*.

23. PSUA **yaka* 'nose' (S-1546). (3) HP *yaqa*. (5) TO *ḍaak*; PYP *daaka*; NT *daáka*; ST *daak*. (6) ED *dakát*; YQ *yéka*; MY *yékka*; WR-S *yahká*; RR *aʔká*. (9) NA-CL *yakatl*; PP *yak*; PO *yeket*.

24. PSUA **yuki* 'to rain' (S-1763). (3) HP *yooyoki* 'to be raining'. (5) TO *juuk*; NT *duúki* 'rain (n.)'. (6) YQ *yúke*; MY *yúkke*; ED *dúkun*; WR-S *yuʔku-*; Rr *ukú*.

Notes

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Transcription and graphic conventions. My orthography corresponds in most respects to the Americanist phonetic notation; *c* represents the voiceless alveolar affricate, *č* the voiceless post-alveolar and alveopalatal affricates, and *š* the voiceless alveopalatal fricative; VV (where V stands for any vowel) denotes both vowel length and identical vowel sequences. The acute accent indicates high tone in Northern Tepehuan words and stress elsewhere. Falling tone in Hopi is marked by a grave accent.

I retain the modern technical orthographies developed for each of the languages considered with a few exceptions. I use *ʃ* to represent a voiceless retroflex sibilant and *ĩ* (instead of *i*) for a high, central or back unrounded vowel. In Southern Ute words, *ĩ* represents the high, central unrounded vowel, and *ü* the high back unrounded vowel. I have adopted *ɾ* for the Névome sound represented in the original source with the digraph (rh). For Tohono O'odham, I use *ɖ* for the retroflex apico-alveolar stop and *ɗ* for the lenis apico-dental stop. For Tubar, *o* represents the phoneme that Lionnet (1978) interpreted as *ɔ*, *u* the allophone of *u* that he interpreted as [o], and *l* corresponds to the graphemes ⟨l⟩ and ⟨l̥⟩ that represented the sounds that he interpreted as allophones of *r*.

I use the citation forms of the original sources, but I eliminate initial glottal stops before vowels except when they are relevant to the analysis. In appendix 2 and often in the main text, I also omit the hyphen used in some sources to separate noun stems from "absolute" suffixes, which typically mark nouns in a nonpossessed state in the Uto-Aztecan languages that have retained them. Etyma are marked with ** for Proto-Uto-Aztecan (PUA) and * for Proto-Northern Uto-Aztecan (PNUA), Proto-Southern Uto-Aztecan (PSUA), and the other intermediary protolanguages.

1. The BP ("before present") dates are calculated using 1950 as the point of reference for the "present."

2. Valiñas Coalla (2000) also is a major contribution that focuses on the Southern Uto-Aztecan languages.

3. Hill developed this scenario within the framework of the farming and language dispersal hypothesis, originally proposed by Renfrew (1987, 1992) and initially elaborated primarily by Renfrew and Bellwood (Bellwood 1993, 1997, 2001, 2005; Bellwood and Renfrew 2002; Diamond and Bellwood 2003; Bellwood and Oxenham 2008). The farming and language dispersal hypothesis has been examined in a large number of publications, some supportive of it, others critical. Samples of both perspectives are found in Renfrew et al. (1988) and Bellwood and Renfrew (2002); Hammarström (2010) offers a global-scale evaluation of the hypothesis. Studies that relate specifically to Hill's proposals for the place of agriculture in Uto-Aztecan cultural history include Wichmann (2002), Matson (2002), Carpenter, Sánchez, and Villalpando (2002), Mabry (2005),

Mabry, Carpenter, and Sanchez (2008), LeBlanc (2008), Wilcox et al. (2008), Brown (2010a), Wichmann, Müller, and Velupillai (2010), and Caballero (2011).

4. The abbreviations and sources of data for each of the Uto-Aztecan languages considered in this article are listed in appendix 1. My transcription and graphic conventions are discussed above, following the acknowledgments. Cognate sets not included in the main body of the essay are presented in appendix 2. In the introduction to the latter, I explain the criteria I have used in identifying cognates.

5. A number of additional languages, now extinct, may have belonged to the Uto-Aztecan language family, but their affiliation cannot be determined because they are undocumented (Miller 1983a; Campbell 1997:133–35).

6. No overview of Uto-Aztecan societies has been prepared. The simplest way to access basic information on these societies is through the Wikipedia page “Uto-Aztecan languages” (http://en.wikipedia.org/wiki/Uto-Aztecan_languages) and associated links.

7. Hill (2005:2, 2008:164, 2012:58) identifies Gabrielino *soŋ-* as cognate with Hopi *soŋowi* and the SUA terms for ‘maize’ (see appendix 2, cognate set 17). For a discussion of the regular correspondence of NUA *-ŋ-* and SUA *-n-*, see Merrill (forthcoming).

8. The square brackets around *[-ŋg-]* and *[-nn-]* indicate that these consonant clusters are the phonetic realizations of phonemic *nk* and *nn*.

9. Steward (1933:244, 1938:22) also encountered the use of *Atriplex argentea* among the Owens Valley Northern Paiute, reporting that they called this plant *sunuwa*. This term presumably is the same as *sunúpi* reported by Liljeblad, Fowler, and Powell (2012:470), who identify it as the name for ‘saltbrush (*Atriplex rosea*)’. Because Northern Paiute tends to retain *-ŋ-* as the reflex of PNUA **-ŋ-*, the *-n-* in these labels may indicate that the Western Shoshone labels for *Atriplex* species recorded by Steward are not cognate with Hopi *soŋowi*, unless the Northern Paiute terms are loans from Western Shoshone.

10. The reconstructions **ooloo-* and **šii-loo-* are from Dakin (1982:#229, #269). Terms for ‘immature maize ear’ and ‘maize cob’ probably existed in the Proto-Aztecan agricultural lexicon, but the reconstruction of Proto-Aztecan forms for them is precluded by the fact that Pochutec words with these referents were not recorded (Boas 1917).

11. Both terms are attested in the Cora vocabulary originally published in 1732 (Ortega 1860:588, 599). Cora *č* is a reflex of PSUA **k*. The final *-e*, which reflects **i*, is unexpected, although both *-i* and *-ĩ* are attested in alternate forms of the Tohono O’odham cognate *hahakĩ ~ haaki* ‘to roast grain with coals in a basket’ (*h* is the Tepiman reflex of PSUA **s*). The closed first syllable in *šaʔšče* is the result of reduplication of the initial syllable followed by the loss of the second-syllable vowel: **šače > *šaʔšače > šaʔšče*.

12. In a previous publication, colleagues and I (Merrill et al. 2010:E35) questioned Hill’s (2010:E33) identification of the Luiseño term for ‘grain, wheat’ as cognate with the SUA reflexes of **saki*, basing our view on the assumption that the *-i-* formed part of the Luiseño stem, as presented by Bright (1968:39): *šáaxi-š*. The correct form, *šáax-iš*, is reported by Elliott (1999:832; cf. Hill 2012:58).

13. The SUA cognates and some possible NUA cognates are presented in this section rather than in appendix 2. These words also appear in Stubbs (2011:#284, #527; cf. #285).

14. Hopi *tĩma* ‘the polished piki stone, the griddle for making piki’ may be cognate with the Numic terms in (4) and by extension the PSUA reflexes of **tĩma*. In a 2001 article, Hill (2001b:921–22) suggested that the word is cognate but later concluded that it is not, “since Hopi shows no reflex of the glottal stop” (Hill 2004:73–74). However, Hopi seldom retains an original preconsonantal glottal stop. In her most recent essay on the subject, she (2012:58) does not include the cognates in her “PUA maize vocabulary,” only the reconstructed form **tĩma*, which she glosses as ‘tortilla, tamale’ even though none of the potential NUA cognates has these referents.

15. In Rejogochi, the Rarámuri community where I have conducted most of my research, the word *remé* labels both ‘tortilla’ and ‘tamale’. Brambila (1976:464) and Hilton (1959:67) gloss this term only as ‘tortilla’.

16. In Pipil, no word for ‘tamale’ is attested, only a word for ‘meat tamale’, *nakatamal*, a compound of *naka* ‘meat’ and *tamal*. Pipil *taškal* designates a ‘tortilla made of younger, tender ears of corn’, while *tamal* is glossed as ‘tortilla’.

17. Liljeblad, Fowler, and Powell (2012) adopt the slash (/) to represent fortis consonant alternation, often called a “geminating final feature” and represented by a superscript “g” (^g) or by straight quotation marks (").

18. Downs (1966) and Winter and Hogan (1986) discuss the sowing of wild seeds and other ways in which Indigenous people in the Great Basin and on the northern Colorado Plateau manipulated wild plants to increase their productivity. Doolittle (2000) and Smith (2001b, 2011) provide general overviews of such practices.

19. The words for ‘planting stick’ reported for Eudeve and Ópata, both Taracahitan languages, are *naakát* and *nät*, respectively. They do not reflect PSUA **wika*, but they are cognate with terms in three NUA languages: Tubatulabal *nahat* ‘cane’, Luiseno *náaxut* ‘walking stick’, and Kitanemuk *nakat* ‘digging stick or any kind of stick’.

20. Proto-Aztecán **i* reflects both PSUA **u* and **i* (Campbell and Langacker 1978: 85). Dakin (2001b:328–33) and Stubbs (2011:29–30) discuss the loss of PSUA **-r-* or its replacement by *-y-* in the SUA languages.

21. Classical Nahuatl *āctli* and Pochutec *āšt* show the expected correspondences of **paci* and share the referent ‘seed’, but a Pipil cognate is not attested. Instead, the concept of ‘seed’, as well as ‘grain’, ‘pit’, ‘face’, and ‘eye’, is conveyed by *i:š*, the Pipil reflex of PSUA **pusi* ‘eye’. The same range of meanings is encountered in the cognates of *i:š* in NUA languages, but the reflexes of **pusi* in most SUA languages designate only ‘eye’ (Stubbs 2011:#824, #1917).

22. Sierra Warihó *ihpací* derives from *pahcí* ‘seed, pit’, which shows the expected phonological reflexes of PSUA **paci* and retains the referent reconstructed for this etymon. In fact, ‘maize kernels’ and ‘seeds for planting’ are two meanings excluded from the semantic scope of *pahcí*. These referents are conveyed by *sunú oríla* (combining *sunú* ‘maize’ with the deverbal noun *oríla*, derived from *olaní* ‘to shell corn’; see section 3.3) and *ihťari*, respectively. The prefix *ih-* is attested in *ihťari* and *ihkusúri* ‘roasted corn on the cob’, as well as a variety of other words not related to maize, but its significance is unclear (Miller 1996:273–74).

23. Kaufman and Justeson (2009:226) suggest that Hopi *paacama* might be analyzed as a compound of *paa-* ‘water’ and *-cama* ‘removed ashes’, ashes being one source of the lime that is used in the preparation of hominy. The Hopi word also could be related to Numic verbs for ‘to wash’, e.g., Northern Paiute *paca* ~ *baca* (Liljeblad, Fowler, and Powell 2012:363; see Stubbs 2011:#2487). The initial syllable *pa-* ~ *ba-* in the Numic verbs reflects the PUA etymon for ‘water’, as does Hopi *paa-*, the combining form of Hopi *paahí* ‘water’.

24. The Sonoran Yaqui word for ‘sugarcane’ is *yói-sana*, a compound of *yói* ~ *yóri* ‘mestizo’ and *sána* ‘cane’, literally, ‘mestizo cane’. The first word also appears in River Warihó *yóri-homá* ‘sugarcane’, but the second element in the compound reflects Proto-Taracahitan **?oma* ‘cane’ (Lionnet 1985:#15).

25. Tubar [hona-ki-t] ‘stubble’ is not cognate. It appears to be loan from a Tepiman language, most likely Mountain Pima, e.g., Yepachi Pima *hona* ‘stalk, trunk of a plant, body’.

26. Hill (2012:58) includes several Numic words for ‘hay’ or ‘grass’ in the same set as Hopi *söñö* and the reflexes of SUA **sona* (see Stubbs 2011:#1061), but these words reflect Proto-Numic **soni*, not PNUA **soonqa*.

27. The noncombining form of the Comanche word for ‘tree trunk’ is *owoora*, also without a medial glottal stop. It is possible that *hani-woʔora* ‘maize cob’ is a loan from another Numic language, but the data are insufficient to reach a conclusion. Timbisha is an unlikely source because its word for ‘maize’ is *maisi*, from Spanish *maíz*. No word for ‘maize cob’ is attested in Timbisha, nor in Northern Shoshone or Northern Paiute, the only Numic languages that have words for ‘maize’ that resemble Comanche *hani* ‘maize’ (see section 6.1).

28. Sierra Warihó and Rarámuri have both lost the glottal stop in word-initial position (Miller 1996:39; Burgess 1970:51; Caballero 2008:65, 80–83). I think that this loss either took place independently or resulted from the interaction of speakers of the two languages after the split of the Sierra and River dialects. However, the loss could have occurred in ancestral Rarámuri-Warihó, in which case the initial *h-* in the River Warihó form would be epenthetic, but the reconstruction of **ʔoʔna* or **ʔoʔona* would not be affected.

29. The Yaqui and Mayo words for ‘maize cob’, also presented in table 3, reflect antecedent **naáwo*, which could not be a reflex of either **ʔoʔna* or **ʔoʔona*. It could, however, derive by metathesis from *woʔná*, the form attested in Sierra Warihó. Although an initial **w* cannot be reconstructed for the antecedent form reflected in the Warihó and Rarámuri cognates, the word could have entered Cahitan as a loan from the dialect of Warihó that gave rise to Sierra Warihó. Eudeve *néhro* ‘maize cob’ could be a loan from Yaqui-Mayo, but only the initial *n* and final *o* are regular correspondences (Stubbs 2011:#540, #546).

30. The Spanish word *pinole* is a loanword derived from Classical Nahuatl *pinolli*, which apparently designated flour made from both maize and chia (Molina 1970:82r). The Nahuatl noun probably derives from the PUA verb **piŋa* ‘to pulverize’, but a reflex of the verb is not attested in Nahuatl (Stubbs 2011:#1080).

31. Dakin (1982:#174) suggests that Classical Nahuatl *kimičīn* ‘mouse, rat’ may be a deverbal noun deriving from **kumi*, but a verbal form is not documented for Nahuatl.

32. The exact form of the noun reported in Lionnet’s work is “koma-hí-t”. Lionnet (1978:19–20) analyzes Tubar [o] and [ɪ] as allophones of *u* and *r*, respectively. I change the vowel and remove the bar from [ɪ] because the phoneme could also be represented as *l*. In the Spanish-Tubar vocabulary list, he provides the gloss ‘to eat maize’ for *kumi-* (1978:73), which is attested only in its present tense form *kumi-nyá-t*.

33. Sapir (1931:641) gives *kummia* as the Kaibab Southern Paiute form of this word, which appears in Southern Ute as *kümüy* (Givón 1979:126). These attestations suggest that the antecedent form was trisyllabic, perhaps *kumiya*.

34. An exact phonological match for Hopi *tawiya* is Pipil *tawiya-l*, but the Pipil word labels ‘dried shelled maize kernels’. It derives from the verb *tawiya* ‘to shell maize’, a form not attested in Hopi.

35. Bean and Saubel (1972:57–58) provide the identification and the Cahuilla name *nekhiš*, which Seiler and Hioki (1979:127) recorded as *nexiš*.

36. The Proto-Tepiman reconstructions in (23) are from Bascom (1965:#11a, #27, #42), with two minor differences: he reconstructs stress on the initial syllables of all three etyma and **gūikai* ~ **gūki* as the etymon for ‘planting stick’.

37. Cultural similarities between the Hopi and SUA societies have long intrigued researchers. Recent studies focused on this theme are James (2000), Neurath (2005), Gutiérrez (2006), Secakuku (2006), Hays-Gilpin (2008), and Carot and Hers (2011).

38. A photograph of some of these hoes appears in Fewkes (1912: plate 76 [following p. 146]). Secakuku (2006) and Carot and Hers (2011; cf. Washburn 1995:20–22) propose that *Palatkʷapi* may have been the Mesoamerica metropolis Teotihuacan.

39. I collected the Rarámuri word in the community of Rejogochi, and although I heard it pronounced on numerous occasions, I never detected a medial glottal stop

(Merrill 1988:73). Brambila (1976:583), however, gives the form of this word as *waʔrúruwi* ~ *waʔrúruwa*, which he glosses as 'legendary being'.

40. For comparative analyses of Hopi, Cora, and Huichol cosmology and ritual, see Neurath (2005) and Gutiérrez (2006).

41. Relying on evidence distinct from that presented here, several scholars have proposed this same area as a possible location of the homeland of the Southern Uto-Aztecs and even the Uto-Aztecs as a whole (Romney 1957; Miller 1983b:123; Fowler 1972b:110; Fowler 1983:242; cf. Carpenter, Sánchez, and Villalpando 2002). Hill (2012: 65) mentions this possibility for the Proto-Uto-Aztecan speech community, but concludes that the available evidence indicates a Mesoamerican homeland instead.

42. The scarlet macaw (*Ara macao*), native to the tropical lowlands of eastern and southern Mexico and Central and South America, was imported into northern Mexico and the American Southwest, with the earliest evidence for its presence in the region dating to around AD 100 (1850 BP) (Somerville, Nelson, and Knudson 2010). Reflexes of the PSUA **haro* 'macaw' may have served as generic term for 'large parrot' in SUA languages whose speakers were familiar with both species, as was the case in Classical Nahuatl (see appendix 2, set 2).

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