NORTHERN UTO-AZTECAN AND KIOWA-TANOAN: EVIDENCE OF CONTACT BETWEEN THE PROTO-LANGUAGES?

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Proto-Northern-Uto-Aztecan (PNUA) and Proto-Kiowa-Tanoan (PKT) may have exchanged loanwords. It is suggested that this exchange of loan vocabulary is the linguistic aspect of an episode of contact identified archaeologically by Matson (1991) between immigrant maize cultivators, the Western Basketmaker II, perhaps speakers of PNUA, and autochthonous hunter-gatherers, the Eastern Basketmaker II, perhaps speakers of PKT. A case is made for seven items of vocabulary, including vocabulary for maize, as loans from PNUA into PKT. Resemblant words for maize cannot date to "Azteco-Tanoan," since maize dates only to about 4,000 years ago in the U.S. Southwest. A second suite of ten resemblant vocabulary items, including words for economically important wild plants and game animals, are suggested as loans from PKT into PNUA. The syllabic shapes in this suite of proposed loans may give clues about the elusive shape of pre-PKT stems.

[KEYWORDS: Uto-Aztecan, Kiowa-Tanoan, language contact, loanwords]

1. Introduction. Whorf and Trager's (W&T) (1937) proposal for Azteco-Tanoan (AT), among many other problems,[1] includes a word for 'corn', their (21), AT ***kʰəʔo*, ***kʰəʔ* 'corn'. Davis (1989:369), although critical of the W&T proposal, adds another AT resemblant set in this semantic domain, his (17), Proto-Uto-Aztecan (PUA) **paci* 'corn, fresh corn' and Proto-Kiowa-Tanoan (PKT) **pʼəa* 'fresh corn'. These forms are almost certainly anachronisms. *Zea mays*, domesticated in the central and southern Mexican highlands by about 6,000 years ago (Piperno and Flannery 2001), does not grow without human intervention and did not appear in the U.S. Southwest until about 4,000 years ago. Since PUA is estimated by most scholars to be at least 5,000 years old (Miller 1983 and Fowler 1983), any AT common ancestor for PUA and PKT would have to date from a period when communities of maize cultivators existed only in central and southern Mexico. A southern Mexico homeland for AT seems unlikely, so any resemblances between UA and KT words for maize are probably due to chance or contact, not descent from a common ancestor. This paper, building on a suggestion by Shaul (1985), proposes that these maize words are loans from

[1] Campbell (1997) carefully assesses the W&T proposal and concludes that only five out of their 102 reconstructions survive methodological criticisms. Thus it is unlikely that Azteco-Tanoan is a valid genetic unit.

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Proto-Northern-Uto-Aztecan (PNUA) into PKT. I examine 21 cases of resemblances between NUA and KT, some identified by W&T (1937) and Davis (1989), and some the result of my own searches. Four of these (words for 'stand', 'Indian hemp', 'juniper', and 'buffalo') are probably chance resemblances, but the remaining 17 (six items of cultivation vocabulary, a word for 'boy', words for 'pinyon', 'oak', 'wild onion', 'yamp', sego lily', 'rabbitbrush', 'elk', 'pronghorn', 'mountain sheep', and 'squirrel/chipmunk') deserve further research. Possible loans from PNUA into PKT, including cultivation vocabulary, are presented in **4.1**, and those from PKT into PNUA, including words for economically important wild plants and game animals of the Colorado Plateau, are discussed in **4.2.1** and **4.2.2**.[2] In **4.3**, I briefly discuss the four rejected sets. In **5**, I discuss hints derived from these discussions for the reconstruction of an early stage of PKT.

Fowler (1983) argued that PUA was spoken by archaic hunter-gatherers in the uplands of the U.S. Southwest and northwestern Mexico, and this view of UA prehistory continues to be widely accepted. However, following work by Romney (1957) and Bellwood (1997), I argued (Hill 2001) that PUA speakers were early maize cultivators living in the northwest quadrant of Mesoamerica. Under this hypothesis, the hunter-gatherer ways of life of most NUA groups result from "agricultural regression" (Balée 1994), the abandonment of cultivation in favor of hunting and gathering. These hypotheses about UA prehistory require testing with additional evidence, and the present paper attempts a part of this task.[3]

2. The archaeological context. Berry (1982) and Berry and Berry (1986) suggested that the earliest cultivators on the Colorado Plateau were immigrants from southern Arizona who brought maize with them. Matson (1991; 2002) identified a zone of contact between these immigrants and autochthonous hunter-gatherers in the Four Corners region of the Colorado Plateau, dating to between about 3,000 and 2,500 years ago. In this paper, following LeBlanc (2004), I refer to the immigrant cultivators as the Western Basketmaker II (WBMII) and the autochthonous hunter-gatherers as the Eastern Basketmaker II (EBMII). Matson argued that diverse cultural practices of the EBMII linked them to a long history in the region, while those of the WBMII displayed no such continuity. EBMII hunter-gatherers adopted maize cultivation about 2,500 years ago, presumably under stimulus from WBMII practices.

[2] An initial proposal for such a loanword set, with ten items, was made in Hill (2002).

[3] Hill (2003) presented ethnographic and historical evidence for a process of agricultural regression in the NUA languages.

Matson (1991) proposed that the WBMII were Uto-Aztecans, while the EBMII were Kiowa-Tanoan or Keresan.[4] Glottochronological dates for NUA and KT are a reasonable fit with this idea. Fowler (1983:239) estimates "3000 plus years ago" as the period of formation of the PNUA speech community. Hale's (1958) separation dates for NUA languages range from 3,878 to 2,229 glottochronological years ago. Evidence for cultivation appears in EBMII sites by 2,500 years ago; Hale and Harris (1979) dated PKT to 3,000–2,500 years ago.

Radiocarbon dates on maize in the Southwest accord with these glottochronological dates for NUA and KT. Maize dates to 4,100 years ago (Howell 2006) in the Tucson Basin. Maize from more than 4,000 years ago has also been identified at McEuen Cave in the cliffs of the Mogollon Rim[5] near Safford, Arizona (B. Huckell 2005). Faunal remains from McEuen Cave include elk (Schmidt 2005), which could only have been hunted above the Rim on the Colorado Plateau. On the Colorado Plateau in the Four Corners region, the earliest maize has been dated to about 3,500 years ago (Wills 1995).

The variety of maize found in the early Tucson Basin sites yielded very small crops (Diehl 2005); on the Colorado Plateau, with its lower summer rainfall and shorter growing season, pioneer cultivators must have experienced even poorer yields. WBMII migrants on the Colorado Plateau would have depended heavily on wild plants and game. Many of these resources would have been new to migrants from the Sonoran Desert. The EBMII, with whom Matson (1991) has shown that the migrants were in contact, would have been a source of information about these resources.

Matson's idea, that the WBMII are UA and the EBMII are KT, predicts that we might find loan vocabulary between PNUA and PKT dating to this period of contact. Since early loans often involve terms for culturally exotic items, such loan vocabulary would be especially likely to appear in the two domains in which WBMII and EBMII cultures were most distinct: that of cultivation, where the WBMII were cultivators and the EBMII were not, and that of wild economic resources found on the Colorado Plateau but not in the deserts, well known to the EBMII but not to the WBMII. Most of the possible loan items reviewed here fall into these two domains. They are consistent with a scenario in which PNUA speakers learned about the useful

[4] While Keresan may indeed be an ancient southwestern language family, the divisions within Keresan that can be observed today are very shallow, so we cannot reconstruct to the date required by Matson's proposals.

[5] The Mogollon Rim is the geographic feature that divides the Sonoran Desert and Colorado Plateau biogeographic provinces.

fauna and flora of the Colorado Plateau from the PKT, and PKT speakers learned maize cultivation from the PNUA. This exchange must have especially involved PKT women, who would have been the foremost experts on local plant resources. Their knowledge and skills must have been critical to the survival of the migrant cultivators.

3. Arguments for Northern Uto-Aztecan and Kiowa-Tanoan. The hypothesis of a prehistoric episode of contact between PNUA and PKT depends on a second hypothesis, that the NUA languages (Hopi, Tübatulabal, Numic, and Takic) share a single common ancestor, PNUA. Miller (1983) did not support this idea, instead seeing the NUA languages as diversely conservative. In Miller and Silver (1997), he argued for a reconstruction of PUA ****n*, which remained ***n* in NUA but became ***l/r* in the southern languages, and PUA ****ŋ*, which remains in NUA but became ***n* in the southern languages. Most Uto-Aztecanists have not accepted this proposal, since it leaves PUA without a liquid. Thus Campbell and Langacker (1978), Dakin (2001), and Manaster Ramer (1993) argue for the opposite position, where PUA ****l/r* > PNUA ***n* and PUA ****n* > PNUA ***ŋ*. In this view, NUA languages share the two phonological innovations. Manaster Ramer (1992) demonstrates the presence of another shared innovation, PUA ****c* > NUA ***y* intervocalically. Heath (1977; 1978; 1985) argues for shared NUA innovations in verb morphology. Finally, Fowler (1983) shows a split in the UA biosystematic vocabularies, with many items found widely in NUA but only there. In summary, while much work remains to be done in building and testing the case for NUA, the evidence in favor of the subgroup is substantial.

Developing suggestions by Miller (1959), Hale (1962; 1967) demonstrated the relationship between Kiowa and Tanoan, recognizing the three Tanoan subgroups and Kiowa as four branches of KT. Tanoan languages today include Towa (the language of Jemez Pueblo), Tiwa (Northern Tiwa at Taos and Picuris Pueblos, and Southern Tiwa at Sandia Pueblo, Isleta Pueblo, and Isleta del Sur), and Tewa (the language of several Rio Grande pueblos, including San Juan, San Ildefonso, Santa Clara, Pojoaque, Nambe, and Tesuque, and in Arizona at Hano on First Mesa among the so-called Hopi Tewa or Arizona Tewa). The Kiowa today live in Oklahoma but trace their origin to the northern plains, perhaps Montana.

4. Evidence for a PNUA–PKT loanword exchange. In the following sections, resemblances that may be loans from PNUA into PKT are discussed in **4.1**, while possible loans from PKT into PNUA are discussed in **4.2**. Major problems and questions regarding each set are reviewed. Each set is pre-

sented in an array that shows the reconstruction for PNUA[6] and any PKT reconstructions proposed by W&T (1937) or by Davis (1989). Where the KT resemblant forms permit, a PKT reconstruction is suggested following the system of phonological representations for PKT proposed by Hale (1967). Where Hale himself proposed a reconstruction, the specific reference is given.[7]

4.1. Resemblant sets proposed as loans from PNUA into PPKT.

4.1.1. PNUA 'to plant' > PKT 'corn'?

(1) PNUA **ɨya* 'to plant'
PKT (W&T) —
PKT (Davis) **ʔia* 'corn' (1989:363, no. 99)
PKT (Hale) **$ʔV_8$*

The NUA cognates are shown in (2)

(2) PNUA **ɨya* 'to plant' (< PUA ***ɨca* [Manaster Ramer 1993]: Northern Paiute *ɨappɨ*, Shoshone *ɨʔapɨ* '*Chenopodium* spp.' (Fowler 1972:188), Tümpisa Shoshone *ɨah* 'to plant', Kawaiisu *ʔɨʔa* 'to plant', Southern Paiute *ɨa* 'to plant', Ute *ʔɨáy* 'to plant', Hopi *ɨ:ya* 'to plant'[8]

[6] Except where otherwise noted, the sources for forms in NUA languages are as follows: Tübatulabal (Voegelin 1958); Mono and Northern Paiute (Fowler 1972; since this source is not organized as a dictionary, page numbers are given); Kawaiisu (Zigmond, Booth, and Munro 1990); Tümpisa Shoshone (Dayley 1989); Comanche (Robinson and Armagost 1990); Chemehuevi (Press 1979); Southern Paiute (Sapir 1931); Ute (Ute Dictionary 1979 [the "Givón" dictionary]); Hopi (Hopi Dictionary Project 1998); Kitanemuk (Anderton 1988); Serrano (Kenneth C. Hill, personal communication); Gabrielino (J. P. Harrington's Gabrielino field notes, copy in possession of Kenneth C. Hill); Cupan, including Proto-Cupan, Cahuilla, Luiseño, and Cupeño (Munro 1990). Most of the KT forms cited were provided by Laurel Watkins, who very kindly filled in missing forms and corrected antiquated transcriptions that I had gleaned from literature from the first half of the twentieth century. When KT cognate sets are from her files, this is noted.

[7] The vowels reconstructed by Hale (1967) appear with the symbol *V* followed by a subscript number. Hale reconstructed two series of vowels, plain and nasal. Given the complexities of Kiowa-Tanoan vocalism, he did not consider it prudent to propose any phonetic qualities for the vowels but instead assigned to them subscript numbers. The lower the number, the greater the confidence in the correspondence (Laurel Watkins, personal communication).

[8] PUA intervocalic ***c* lenites to **y* in NUA (Manaster Ramer 1992), with further change to *ʔ* and loss as seen in some of the forms in (2). While the southern Uto-Aztecan languages do have forms of this verb where the reflex of ***c* disappears, as in the O'odham perfective *ʔɨi* 'planted' (a grammatically truncated form; cf. the imperfective *ʔɨṣa-* ~ *ʔɨsi-*, with *ṣ* ~ *s* being the O'odham reflex of PUA ***c*), the NUA reflex, where **c* regularly lenites to **y*, is the most likely source for the Kiowa-Tanoan forms if they are indeed borrowings.

The Northern Paiute and Shoshone words mean literally 'something planted'; in Shoshone this may reflect the broadcasting of seeds of *Chenopodium* in some areas (Fowler 1972:221). The word means 'corn' in some Southern Paiute dialects (Kelly and Fowler 1986:371).

The KT forms are shown in (3).

(3) PKT *$ʔV_8$ (Davis's *$ʔia$ 'corn'): Northern Tiwa *ʔia* and Southern Tiwa *ʔie*; cf. Taos *ʔia-ʔane* 'corn' (from *ʔia-ʔia-ne*, where *-ne* is a noun class suffix [Trager 1946:204]), Southern Tiwa *ie-mapa-ru* (corn-ear.of. corn-noun.class) 'cotton-wrapped corn ear bundle', *ie-tainin* 'corn people' (Parsons 1928:602, 605); Kiowa *ʔé:* 'corn', e.g., (*a*) *ʔé:* 'duoplural' of the following two forms, *ʔé:-gɔ́* 'fruit, seed' (singular) and *ʔé:-bɔ́* 'fruit, vegetable, edible seed, loaf of bread, bread' (with variant inverse suffix); (*b*) *ʔé:-t^háttɔ* 'grain of corn' (singular), *ʔé:-t^hâl* 'grain of corn, ear of corn, plant of corn' (duoplural); (*c*) *ʔé:-góp* 'corn plant, corn stalk'; (*d*) *ʔé:-k'óp* 'to plant' (Harrington 1928)[9]

No cognate appears in the exhaustive treatment of Tewa ethnobotany by Robbins, Harrington, and Freire-Marreco (RHFM) (1916), so I assume that no reflex survives in that branch.

In Hale's (1967) system, the PKT vowel is *V_8, where Taos *ia* corresponds to Kiowa *e*. The high number assigned by Hale to this correspondence reflects a high level of uncertainty. This shaky vowel correspondence in KT is the first difficulty with this set. The other problems are that the forms are short, increasing the likelihood of a chance resemblance, and the semantic correspondence, between a PNUA verb and a PKT noun, is imperfect.

4.1.2. PNUA 'corn', PKT 'corn'?

(4)

PNUA	**kuma* 'corn'
PKT (W&T)	PT *$*k^hə$* (1937:621, no. 21)
PKT (Davis)	*$*k^hu̯$, *$*k^hə$* 'corn, seed' (1989:370)
PKT (Hale)	—

The NUA cognates are given in (5).

(5) PNUA **kuma* 'corn' (< PUA ***kumi/a* 'to nibble food that comes in small bits, especially corn and popcorn; corn' [Hill 2001]):[10] Southern Paiute *qumia* 'old Indian name for corn, rarely used now'; San Juan Paiute *kumwi* '*Zea mays*', *kumut* '*Amaranthus caudatus*'

[9] I thank Laurel Watkins for her retranscriptions of forms from Harrington (1928) and for providing clarifying interpretations of Harrington's entries.

[10] **kuma* seems to be the main NUA word for 'maize'. PUA ***sunu* 'corn', found throughout the southern languages, appears in NUA with a meaning within the maize domain only in Gabrielino (see 7*a* below).

(Franklin and Bunte 1987:28); Southern Ute *kɨmɬ́y* 'corn'; Kaibab Paiute *kó-mi* 'corn' (Fowler and Fowler 1971:129, from Powell's recordings), Ute *ku-mi-up* 'corn', *ku-ma* 'corn', *kūm-wi* 'seed of corn', *ku-muʔ-i-vai-a* 'corncob' (Fowler and Fowler 1971:173, from Powell); Comanche *kukɨ̱me-pɨ̱* 'parched corn, toasted maize'; Hopi *kokoma* 'dark red, almost purple corn', *komo* '*Amaranthus cruentus*' (a dye plant)[11]

An anonymous referee points out that this set may reflect a Hopi loan into Southern Paiute, thence into Ute, and ultimately into Comanche. One argument against this point is that the Numic languages (except in Powell's form from Kaibab Paiute, the Southern Numic group closest to the Hopi) show *u*, the regular reflex of the PUA vowel ***u*. If the form is borrowed from Hopi, it must date before the Hopi vowel shift (PUA ***o* > Hopi *ö*, ***u* > Hopi *o*). A second argument in favor of the independent development of the Comanche word from PNUA is that other Comanche words resemble Hopi maize vocabulary but are not attested in Ute (Hill 2003).[12]

Both W&T and Davis linked these PKT forms to Hopi *qa:ʔö* 'dried ear of corn, pinecone'[13] and Southern Paiute *qaʔo* 'pinecone'. W&T reconstructed PUA **kaʔo*. This form is not valid in PUA, since reflexes are attested only in Hopi and adjacent Southern Paiute.[14] PNUA **kuma* is a better source for the KT forms.

[11] Howell (2006) points out that the husks of dark purple corn contain enough pigment that they stain hands and clothes, and might be usable as a dye source. This may explain the semantic range that includes both maize and *Amaranthus cruentus* and *A. caudatus*, plants used as a source of red dye.

[12] Hopi *ha:ni* 'corn flour ground fine', Comanche *haniíbi* 'maize' (the combining form, *hani-*, appears in many compound expressions); Hopi *ho:ma* 'ceremonial cornmeal', Comanche *homopɨ* 'powder, flour'. Note also Comanche *hani-wo'ora* 'corncob'; cf. PUA ***oʔra* ~ ***oʔri* 'corn, cob' (Hill 2001).

An anonymous referee suggests an alternative origin of the Hopi and Numic forms: PNUA **kuhma*, attested in Tümpisa Shoshone *kuhwa* 'seeds to eat from *Mentzelia*' (Dayley 1989). But the semantic and phonological correspondences of the Hopi form are better with PUA ***kumi/a*. Shoshone *Vh* should correspond to *V:* in Hopi; cf. Tümpisa Shoshone *kuhma* 'husband', Hopi *ko:ngya-*; Tümpisa Shoshone *nahpakan* ~ *napakan* 'half', Hopi *na:save* 'at the midpoint'. Another reflex of Shoshone *Vh* is Hopi exceptional stress, e.g., Tümpisa Shoshone *tahma* 'spring (the season)', Hopi *támöŋʷɨ́y* 'spring'. Unmarked stress in Hopi is on the syllable containing the second mora so long as that syllable is not the final syllable; *támöŋʷɨ́y* shows stress on an initial short (single-mora) syllable.

[13] The meaning 'pinecone' does not appear in the Hopi Dictionary but is provided by Emory Sekaquaptew (personal communication).

[14] If there is a PUA source, it might be something like ***ka-ʔo*, literally 'dried.hard-small.round.object'; cf. PUA ***ka* 'dry, dried' (Dakin and Wichmann 2000); and PUA ***o-* 'small round object', widely attested in words for 'gravel' and related concepts, and as an instrumental prefix (see Sapir 1931:173).

The KT words for this set are shown in (6). The first form, with *u̧*, is found only in Tewa. The forms in (6*b*), with nonback, nonnasal vowels, do not match any of Hale's correspondence sets.

(6*a*) **k^{h}u̧* 'corn, corncob' (Davis 1989:370): Arizona Tewa (AZT) *k^{h}u̧lu̧ŋ* 'corn', Rio Grande Tewa (RGT) *k^{h}u̧(ŋ)* 'corn, corncob' (both from RHFM 1916:78); the incremented *lV* in AZT is a regular feature of this language (see correspondence sets in Kroskrity 1993:229–36)

(6*b*) **k^{h}ə* 'corn, grain, corn grain, seed' (Davis 1989:370): Taos *xə* (W&T 1937:621, given without gloss); Picuris *xəʔene* 'seed' (Parsons 1939:214); RGT *k^{h}e* 'grains'; AZT *k^{h}ili* 'grain, corn grain' (both from RHRM 1916:16)[15]

Why do KT languages show two words here? One possibility is that W&T's and Davis's **k^{h}ə* might be related to **k^{h}u̧* by sound symbolism. Tewa shows quite regular alternations of the type *buʔu* 'large corner', *beʔe* 'small corner' (Harrington 1916:50). Note that the KT forms with nonback vowels mean 'corn off the cob, seed, grain', appropriate to a diminutive, while the forms with back vowels mean 'corn in general, corncob'.

The difficulties with this resemblant pair are, first, the doubtful status of **kuma* as a genuinely PNUA word. Second is the fact that the KT *u̧*, which is the closest resemblance to the sequence *um* in NUA, is attested only in the Tewa forms. Third is the irregular correspondence in the vowels in the KT forms with nonback vowels. Fourth is the fact that the initial consonant in KT is aspirated in both forms, while according to the patterns suggested in **5.3** below, we should expect a plain stop. Finally, the argument that (6*a*) and (6*b*) are related by sound symbolism, derived only from Tewa examples, is of course speculative.

4.1.3. PNUA 'corn kernel, hominy', PKT 'corn, fresh corn'.

(7) PNUA **paʔca* 'corn kernel, hominy'
PKT (W&T) —
PKT (Davis) **p'əa* 'fresh corn' (1989:369, no. 17)
PKT (Hale) **p'V$_5$*

This UA word is found everywhere in the southern UA languages but appears in NUA only in Tübatulabal and Hopi, as shown in (8).

[15] Laurel Watkins (personal communication) points out that resemblant Jemez *k^{hy}í* 'seed, grain', *k^{hy}íɲi̧hɨ* 'corn (kernels, as in chicken feed)' (Yumitani 1998:11, 253, 261) are not regular correspondences, since Jemez should show initial *h* from PKT **k^h*.

(8) PNUA **paʔca* 'corn kernel, hominy' (< PUA ***paʔci* 'ear of corn, corn kernel, seed' [Campbell and Langacker 1978:278–79, no. 313 and Hill 2001]): Tübatulabal *paca:h- ~ apaca:h* 'to shell it', *paca:hil* 'shelled pine nuts'; Hopi *pa:cama* 'hominy'

The semantic correspondence in (8) is parallel to other correspondences that relate maize vocabulary and pine nut vocabulary in NUA, such as Hopi *qa:ʔö* 'dried ear of corn, pinecone' and Southern Paiute *qaʔo* 'pinecone', mentioned above. Another example is PUA ***oʔra* ~ ***oʔri* 'to shell corn, corn, corncob', seen in Tarahumara *oʔna* ~ *koʔná* 'corncob', Guarijio *wohna* 'corncob'; Nahuatl *o:lo:-λ* 'corncob' (all these refer to the cob with kernels removed), reflected in NUA in Kawaiisu *ono-ci* 'hooked stick used to pull down pinyon cones' and Tümpisa Shoshoni *onno-ttsi* 'pinecone harvesting hook'.

The KT forms appear in (9).

(9) PKT **p'V*$_5$ (**p'əa* 'fresh corn' [Davis 1989:369, no. 17]): Taos (Northern Tiwa) *p'ɨa* 'corn'; Picuris (Northern Tiwa) *p'ù-* 'corn in field'; Isleta (Southern Tiwa) *p'ɬa* 'fresh corn', *p'ɨ* 'green corn (on cob)'; Jemez *p'ò:* 'green corn, corn on cob'; RGT *p'è:* 'fresh corn'; Kiowa *p'ɔ́:gyá* 'young, immature, green' (cognate set provided by Laurel Watkins)

Other resemblant forms are not KT cognates. RGT *pɑ̨-ri* 'hominy' (RHFM 1916:92) has noncorresponding nasal vowel and a plain stop. Another possibility shows aspirated initial consonant and Hale's **V*$_2$ or **V*$_6$: Taos *p*^{h}*ɥ́-t*^{h}*ɬa* 'cornmeal' (Laurel Watkins, personal communication) is cognate with Jemez *φǫ́:* 'cooked corn' (Yumitani 1998:96).

The three different lexical sets in KT, with different consonants and vowels, constitute an important obstacle to clarifying the relationship between PNUA and PKT in this case.

4.1.4. PNUA 'corn, corncob, grass', PKT 'grass, grass seed'.

(10)	PNUA	**suŋu* 'corn'? or **soŋo* 'corn by-products'?
	PKT (W&T)	—
	PKT (Davis)	—
	PKT (Hale)	**sV* 'grass, grass seed'

PNUA shows reflexes of a pair of widely attested PUA maize words: ***sunu*, the word for the cob with kernels in many of the southern languages, and ***sono* 'corn by-products (e.g., cobs, stalks, stubble)'. The NUA reflexes are given in (11).

(11*a*) PNUA **suŋu* 'corn (< PUA ***sunu* 'corn' [Hill 2001]): Hopi *soŋowɨ* 'sand grass (*Calamovilfa gigantea*)'; Gabrielino *ṣoŋ-á:xe-y* 'tortilla' (literally, corn-put.in.mouth-non.possessed.noun. suffix)

(11*b*) PNUA **soŋo* 'grass, tinder/hay, corn cob' (< PUA ***sono* 'corn by-products [e.g., cobs, stalks, stubble]'): Mono *sona* 'hay' (Fowler 1972:326 comments "may be borrowing"); Tümpisa Shoshone *soni* 'grass' (archaic); Owyhee Shoshone *soni-pɨ* 'grass', *soni-pi* 'rye grass' (Fowler 1972:83); Comanche *soni* 'grass'; Southern Paiute *šoni* 'tinder'; Hopi *sö:ŋö* 'corncob'

The resemblant KT forms are given in (12):

(12) PKT **sV̨-*: Taos (*p'ǫ̀n*)*-ɬi* 'pasture grass'; Isleta *ɬi* 'grass, hay', *ɬi̱-*(*ta*) 'wheat'; Jemez *tʸi̱:* 'grass'; Kiowa *són* 'grass' (cognate set provided by Laurel Watkins)

Hale (1962:4) observes that in this set the vowel in the Taos form is wrong. Tewa does not have a corresponding form; it exhibits *tá:* 'grass, hay', corresponding to the second part of the Isleta form meaning 'wheat'.

The UA cognates in the southern languages for (11*a*) and (11*b*) uniformly have to do with corn (Hill 2001). However, in NUA these words often designate grass or grass products (for 11*a* in Hopi; for 11*b* in Numic). The grass denoted in the Hopi form in (11*a*) is a large grass with thick stalks and showy tassels. The Comanche word is also extendable to large grasses, since it appears in the word for 'sugarcane'. In (11*b*), Mono 'hay' and Southern Paiute 'tinder' are reasonable derivations from a form that in the southern languages refers broadly to corn by-products.

4.1.5. PUA 'carry, take', Taos 'take, get, pick up'? This set was noted by W&T; the relevant pair is shown in (13).

(13) PNUA **kʷɨsɨ* 'to carry, take', resemblant of Taos *xʷia* 'take, get, pick up' (W&T 1937:621, no. 27)

I include this pair because while the NUA words seen in (13) have no obvious association with cultivation, their cognates in the southern languages often do, as in O'odham *bɨhɨ* 'to grab, get, pick, as of cotton' (Mathiot 1973); Tarahumara *wí/wi'-* 'to harvest' (cited by W&T; confirmed in Lionnet 1972:91).

(14) PNUA **kʷɨsɨ* 'to carry, take' (from PUA **kʷɨsɨC* [Manaster Ramer 1990]): Northern Paiute *kʷɨsi* 'to catch',[16] Hopi *kʷɨsɨ* 'to receive,

[16] The Northern Paiute form was suggested by an anonymous referee, as was the second 'catch' set.

get, take, accept', Luiseño *kuṣáni* 'take, bring, grab, catch' (Elliott 1999)[17]

Another NUA set, perhaps related somehow to the first, provides a second possible source; again, the words are not specific to cultivation.

(15) Tübatulabal *wɨk(-ɨt)* ~ *ʔiwɨk* 'to grab it'; Proto-Numic **k^{w}ɨha* (Iannucci 1972); Luiseño *k^{w}í:k^{w}in* 'to catch, a high word used only in songs' (Elliott 1999)

Since meanings within the domain of "cultivation" appear for the UA form only in southern UA languages, and because the KT word is attested only in Taos (and without a gloss, although evidently thought semantically similar to UA by W&T), it is a particularly weak case. However, given the possible affiliation with cultivation vocabulary, it is worth a closer look.

4.1.6. Hopi 'digging stick', Taos 'hoe'? W&T (1937:623, no. 59) cite PUA **wika* 'planting stick, dibble' and compare it with a Taos word for 'hoe' (16). The UA word is widely attested in the southern languages but appears only in Hopi in NUA. In KT it is attested only in Taos. Thus the form cannot be reconstructed for either PNUA or PKT.

(16) Hopi *wihk^{y}a* 'digging stick'; Taos *x^{w}ia-d-* 'hoe' (W&T 1937:623, no. 59)

Not only are these words attested in only one language in each family, they do not transparently resemble one another phonologically. Again, I include them because of the link to the domain of cultivation.

4.1.7. PNUA 'boy', PKT 'man'. The last item in the list of possible loans from PNUA into PKT does not involve cultivation. While the presence of loans in the domain of cultivation vocabulary discussed above is predicted by a model of cultural exchange based on the archaeological evidence, no similar model predicts this form. Thus the possibility of chance resemblance rises sharply. But the form is well attested in both NUA and KT, and is resemblant in both form and meaning. The reconstructions are shown in (17).

(17) PNUA **tuhi* 'boy'
PKT (W&T) —
PKT (Davis) **t'oi* 'person' (1989:370, no. 36)
PKT (Hale) **c^{h}V$_{5}$* 'man'

[17] This is from *kuṣ-* with stressed *-an* increment (see the discussion for Cupeño in Hill 2005:145–46).

Davis (1989) compared his KT **t'oi* 'person' to a PUA form **tɨho*, ***tɨ-*. This etymon has no cognates in the NUA languages. If we are restricted to PNUA, the appropriate comparison is with the word in (18).

(18) PNUA (?) **tuhi-* 'boy': Tübatulabal *tu:ʔilam* 'the boy'; Tümpisa Shoshone *tuinu-ppɨ* 'preadolescent boy'; *tui-ttsi* 'teenage boy'; Hopi *tiyo* 'boy', plural *to:tim*

Hopi *ti*, as in *tiyo* 'boy', is always evidence for a lost PUA vowel, since PUA did not have the initial sequence *ti*. The plural form in Hopi attests to this lost vowel; the underlying form is something like *toi-* (the *-yo* in the singular is probably a suffix). By internal reconstruction, then, pre-Hopi would have *toi* 'boy', a regular correspondence with PNUA **tuhi*. The Hopi plural is from **to-toi-m*, the long vowel in the plural *to:tim* being a noun classifier ubiquitous in Hopi plurals of nouns for types of human beings (Hill and Hill 2000).

The KT forms are shown in (19).

(19) PKT **c^hV_5* 'man': Taos *səonena* 'man, husband', Isleta *səoni-* (from Miller 1959:103), Tewa *sen* 'man' (Kroskrity 1993:232), Jemez *šó:* 'boy' (Yumitani 1998:18); Kiowa *t^hól* 'coitus' or perhaps *t^hàlí:* 'boy' (Laurel Watkins, personal communication)[18]

Davis's (1989:370, no. 36) reconstruction, KT **t'oi* 'person', does not conform to Hale's (1967) reconstruction of PKT consonants, which gives **c^h* for the initial consonant of this very regular set. Furthermore, the word clearly refers to a male, not a general 'person'.

One problem with this pair is that the final **n* in the KT forms has a corresponding segment in NUA only in Tümpisa Shoshone *tuinu-ppɨ* 'preadolescent boy'. A second problem is that this is an item of basic vocabulary and thus unlikely to be borrowed.

4.2. Resemblant sets proposed as loans from PKT into PNUA. The resemblances considered in this section are possible ancient loans from PKT into PNUA. They include terms for economically important plants and game animals of the Colorado Plateau. In every case, the NUA forms are found only in that subfamily.

4.2.1. Possible loans for economically important wild plants from PKT into PNUA. The model based on archaeology predicts that loans from KT referring to important wild plants of the Colorado Plateau will be found

[18] In the Kiowa word for 'boy', *t^hàlí:*, *í:* is generally 'offspring, young (of species)'. The *à* is not the expected correspondence. It should have *o* to fit into Hale's **V_5*, the reconstruction suggested by the other forms; Laurel Watkins (personal communication) has suggested that the Kiowa word for 'coitus', given in (19), is a plausible cognate.

in NUA. The cases noted here include words for pinyon pine, oak, wild onion, yamp, sego lily, and rabbitbrush.

4.2.1.1. 'Pinyon pine, pinyon nut'.

(20) PNUA **tɬipat* 'pinyon pine, pinyon nut'
PKT (W&T) **t'ow* (1937:622, no. 50)
PKT (Davis) **t'ou* (1989:370, no. 35)
PKT (Hale) **t'V_2*

All of the NUA language groups exhibit this word (21) and the reflexes in the individual languages are very regular. This word has no cognates in the southern Uto-Aztecan languages, where each language has its own local term for 'pine nut' (Fowler 1983).[19]

(21) PNUA **tɬipat* 'pinyon pine, pinyon nut' (Manaster Ramer 1993): Numic **tɬipa´´* (Iannucci 1972), Hopi *tɬiva*, Tübatulabal *tɬiba-t*, Serrano *tɬivat*, Proto-Cupan **təvá't ~ təvé-t ~ tá:va-t*

The KT word appears in all languages except Kiowa, as seen in (22).

(22) PKT **t'V_2* 'pinyon pine, pinyon nut': Taos *t'ow-* (W&T 1937:622), RGT *t'o:* 'pinyon pine tree', *t'o* 'pinyon nut' (RHFM 1916:41), Jemez *t'â:* 'pinyon tree' (Yumitani 1998:109)

RHFM (1916:41) notes for the Tewa lands that "[p]iñon pine is the commonest tree on the lower mesas. It is much used as firewood." They report that pinyon resin is used as a glue and pinyon needles are brewed for tea. While pinyon nuts were secondary to crop plants as a food source among the Tewa, "[a]t Santa Clara *t'o:* is said to be the oldest tree, and its nuts the oldest food of the people" (RHFM 1916:41). Pinyon nuts were among the most important wild foods for NUA populations. While they were secondary to acorns for the Takic groups, the ethnonym of the other NUA group found only in California, "Tübatulabal," means 'pinyon nut picker'. Pinyon nuts were crucial to the economies of the Numic peoples of the Great Basin and are highly valued by the Hopis.

In summary, pinyon is a very important economic resource for both NUA and KT groups. While species of pinyon are found in the highlands of Mexico, *Pinus edulis* and *Pinus monophylla* are dominant trees on the Colorado Plateau and in the Great Basin respectively at elevations between about 4,000 and 7,000 feet, occurring mixed with juniper in large stands. Exploitation of pinyon nuts requires considerable skill, since the cones are

[19] Dakin and Wichmann (2000:61) suggested that the word might come from PUA ***tɬi^N-pa^N* 'rock-pod'. However, the NUA forms are irregular if derived from such a source. Furthermore, if this is the source, the absence of the word in the southern languages becomes mysterious.

usually harvested green and are carefully roasted to extract the tender nuts. In some areas, pinyon pine trees themselves are managed by regularly nipping back branch tips to encourage cone production.

The phonological resemblance between the two-syllable word in PNUA and the monosyllabic root of PKT is not obvious; I return to this point in **5** below. One difficulty with the set is the final ***t* in PNUA, which Manaster Ramer (1993) has proposed as a stem-final consonant, not a nonpossessed noun suffix (or "absolutive suffix" in traditional Uto-Aztecanist terminology). There is no source for this element in the KT forms.

4.2.1.2. PNUA 'oak, acorn', PKT 'oak, acorn'.

(23) PNUA **kʷinV- ~ kʷiyV* 'oak spp.'
PKT (W&T) **kʷe:* 'hard, metal, iron' (1937:621, no. 22)
PKT (Davis) **kʷę* 'oak, hard' (1989:371, nos. 53 and 54)
PKT (Hale) **kʷV̨₃* 'oak, hard material' (1967:116)

The NUA forms are given in (24). This word for 'oak' is found everywhere in the NUA languages but never in the southern UA languages (Fowler 1983). I give here forms in all daughter languages, because the set is slightly irregular.

(24) PNUA *kʷiyV- ~ *kʷinV-* 'oak spp.': Kawaiisu *kʷi:ya-vɨ* '*Quercus kelloggii* (the tree)', *kʷi:yara* '*Quercus kelloggii* acorn' (Zigmond 1981); Southern Paiute *qʷiya-vɨ* 'scrub oak'; Ute *kʷiá-vɨ* 'oak'; Hopi *kʷiŋvi* '*Quercus gambelli*' (with combining form *kʷiŋʸap-*); Tübatulabal *wiŋiya:-l* 'acorns in Green Horn mountain'; Kitanemuk *kʷɨya-č* 'oak sp. and its acorn'; Serrano *kʷi:h-ç* 'oak sp. and its acorn'; Proto-Cupan **kʷi:yi-la* (Luiseño *kʷí:-la* '*Quercus kelloggii* and its acorns' but Cahuilla and Cupeño *kʷíñi-lʸ* '*Quercus kelloggii* and its acorns')

The forms in (24) do not correspond perfectly: the nasals, i.e., the *ŋ/ŋʸ* of Hopi and the *ñ* of Cahuilla and Cupeño, are unexpected but interesting because they match the nasal vowel in the KT forms. However, until this irregularity is cleared up, this word cannot be reconstructed with absolute confidence to PNUA.

I suggest that the source of the NUA words for 'oak' in (24) is a KT form for which the correspondence sets are shown in (25).

(25) PKT **kʷV̨₃*[20] 'oak, hard material' (Hale 1967:116): Taos *kʷę-ɬo* 'hardwood' (Trager 1946:216); RGT *kʷę́:* (RHFM [1916] give RGT *kʷą́* '*Quercus utahensis*' (presumably *Quercus gambeli* [Fowler

[20] Hale writes *V̨₇* (1967:119); this seems to be a misprint for *V̨₃*.

1983]); Jemez *gɬ́* 'metal' (Laurel Watkins provides this form from Hale's handwritten cognate lists but observes that the vowel does not fit)

The ethnobotanical evidence is consistent with the hypothesis of a loan for 'oak' from PKT into PNUA. While acorn-bearing oaks do occur in the Sonoran Desert, they grow there only on "sky islands" above about 4,500 feet in altitude. Oak groves are much more widespread on the Colorado Plateau, where *Quercus gambelli* often forms a component of pinyon–juniper woodland. In prehistoric California, acorn-bearing oaks, especially *Quercus kelloggii* but also other species, were the single most important economic plant. Tanoan peoples also exploited oak trees and their products; RHFM (1916:44) report that acorns of *Q. gambelli* (their *utahensis*) were used for food among the Tewa, and that the wood was used for making digging-sticks, bows, and war-clubs, as well as other utensils.

4.2.1.3. PNUA, PKT 'wild onion'.

(26) PNUA **si:wi*
PKT (W&T) —
PKT (Davis) —
PKT (Hale) **sV$_9$(wV)*

The NUA reflexes of 'wild onion' are shown in (27). No cognates for this set have been identified in the southern Uto-Aztecan languages.[21]

(27) PNUA **si:wi* 'wild onion': Tübatulabal *ši:wil* 'wild onions'; Northern Paiute *siigi* '*Allium* sp.' (Fowler 1972:54); Southern Paiute *cii* 'onion' (Fowler 1972:92; on page 190 Fowler lists these in a table as *sii* and *ciʔi* respectively); Hopi *siiwi* 'onion'

The KT reflexes appear in (28). The medial labials in the Taos, Isleta, and Jemez words match the labials in the Tübatulabal and Hopi forms in (27).

(28) KT **sV$_9$(?)(wV?)* 'wild onion': Taos *ɬɬ́w-*; Isleta *ɬiw*; Rio Grande Tewa *si* 'wild onion, onion', Arizona Tewa *siʔu* '*Allium recurvatum*, wild onion' (both from RHFM 1916:53); Jemez *tʸíwé* 'onion' (Yumitani 1998:109); Kiowa *sôl* (singular), *sô:tɔ̀* (inverse) 'wild onion' (this and Taos and Isleta forms are from Laurel Watkins)

RHFM (1916:53) comment that the Arizona Tewa and the Hopi used this plant "gathered, washed, and eaten raw, usually with broken waferbread dipped in water." Fowler (1972:54, 92) lists this plant among "things that are

[21] Tohono O'odham *siwol* is a loan from Spanish *cebolla*. If it were from PUA and cognate with the NUA forms, we would expect initial *h* not *s*.

eaten" for the Northern Paiute and Southern Paiute. Of special interest is the geographical distribution of the plant: *Allium cernuum* var. *obtusum*, the modern designation of RHFM's *Allium recurvatum*, grows only on the Colorado Plateau in Arizona and does not grow in the Sonoran Desert. Thus this plant is among those that would have been exotic to WBMII migrants.

The difficulty with this set is that, although the forms are obviously resemblant in both families, in NUA the Numic forms are not in perfect correspondence with the Tübatulabal and Hopi attestations. In KT the vowel is noncorresponding in Kiowa (although Laurel Watkins [personal communication] states that she believes the Kiowa vowel reflects the labial seen in the Tiwa and Jemez forms).

4.2.1.4. PNUA 'yamp', Tewa 'yamp'? The three resemblant sets, for 'yamp', 'sego lily', and '*Chrysothamnus* (rabbitbrush)', are problematic because in each case the KT term is attested only in Tewa, the language for which we have the best ethnobotanical lexicon. Since no PKT protoforms can be reconstructed, I do not give tables of protoform resemblances. The interesting feature of all of these sets is that for KT plausible morphological analyses can be proposed, but in NUA the corresponding forms have no morphological analysis.

Yamp or Indian potato (*Carum gairdneri*), an important food plant in most parts of the NUA range, is labeled with NUA forms given in (29). The word is found only in NUA languages (Fowler 1983). The plant is not found south of the Colorado Plateau.

(29) PNUA **yampa* '*Carum gairdneri*' (Fowler 1983:238): Tübatulabal *yamba-l* 'wild carrots'; Proto-Numic **yampa* (Mono *ya?ap*, Northern Paiute *yapa*, Shoshoni *yamba*, Comanche *payaapw*,[22] all glossed as 'sweet potato' in Fowler 1972:192), cf. also Tümpisa Shoshone *yampa* 'wild carrot'; Kawaiisu *ya(m)barabɨ* 'yampah, Indian carrot, *Perideridia pringlei*' (Zigmond 1981:47)[23]

The KT resemblant form for PNUA **yampa* is attested only in Tewa.

(30) Tewa *namp^{h}u* 'potato' (RHFM 1916:113)

Tewa *nám* is a reflex of Hale's (1967) **dV$_4$m* 'earth, ground', with cognates in all the KT languages. The second syllable of the Tewa word comes from a whole family of words for entities with roundish shapes. The Tewa word in (30) exhibits *p^{h}u*, translated as 'swelling' by RHFM (1916:113). Other possible Tanoan sources for the second syllable of PNUA **yampa* are suggested by Tewa *p'e* 'egg, fruit', *pu* 'root', or *be* 'roundish fruit', all com-

[22] *payaape* ~ *payapi* 'aqueous, wild tuber' in Robinson and Armagost (1990).
[23] *Perideria* is the preferred genus name.

mon in Tewa plant names. Jemez has a cognate for the 'roundish fruit' word: *pɬ́:ʔlɬ* 'apple' (Yumitani 1998:30). Taos *p'oʔina* 'peach' and *pululuna* 'plum' may be related to this family of words, as may Kiowa *bo-t* 'belly'. Thus, I speculate that the source for the PNUA word was a bimorphemic PKT form composed of 'earth' and one of the KT words for a fruit or tuber. However, the NUA forms are unanalyzable.

While this form is solid for PNUA, in KT the relevant compound type is attested only in Tewa. A second difficulty is that the initial consonants of the PNUA form, **y*, and the possible PKT source, **d*, do not match.

4.2.1.5. PNUA 'sego lily', Tewa 'potato, (sego lily?)'? Sego lily is a small plant with white flowers (sometimes they are yellow or purplish) and sweet-tasting edible bulbs. It is a very important economic plant in its season; sego lily is the state flower of Utah, because the plant is said to have sustained the early Mormon pioneers through a famine. The NUA words for 'sego lily, mariposa lily' (*Calochortus* spp., usually *nuttalli* on the Colorado Plateau and in the Great Basin) are shown in (31).

(31) PNUA **siko* '*Calochortus* spp.': Tübatulabal *šiko:niš-t* 'plant tuber to roast gum in' (glossed as 'sego lily' by Fowler 1983:238), Proto-Numic **sigo* (Fowler 1983:238); cf. Mono and Northern Paiute *sigo* (Fowler 1972:191), Tümpisa Shoshone *sikoo*; Owyhee Shoshone *siigo* (Fowler 1972:77), Comanche *siiko ~ sikooʔ* 'wild hyacinth, *Camassia esculenta* (roots eaten raw)'; Southern Paiute *sigoʔo* (Fowler 1972:94)

The resemblant form in Tewa is given in (32).

(32) Tewa *sǫ̨gobe* 'domestic potato'? (RHFM 1916:73)

RHFM (1916) record this word as a questionable term for the cultivated potato. But they also observe, "It is said that *sǫ̨gobe* was originally applied to a white-flowered plant, native to this region, which bears small edible tubers similar to potatoes. These tubers likewise are called *sǫ̨gobe* and are still eaten by the Tewa." The "white-flowered plant with small edible tubers" description is appropriate to sego lily. However, this gloss is not secure.

RHFM state that *sǫ̨go* is "unexplained" (1916:73). They gloss *-be* as the word for 'roundish fruit'. The Tewa element *sę* (RHFM's *sǫ̨*) has a number of possible sources. The most likely is a word for 'tender' seen in RGT *sę* 'tender' (Harrington 1916:64).[24] The second element in Tewa may be related

[24] It is in cases like this that the absence of tone and length in the early transcriptions of Tewa becomes particularly exasperating. Kiowa *cèn-* 'tender, mud(dy)' (cf. *cènp'ɔ́* 'mud-creek' [Rainy Mountain Creek]), *cènt'ólɔ́:* 'tender-tasty' (from a Séndé story referring to meat that is falling-apart-tender) (Laurel Watkins, personal communication) are resemblant but not cognate according to the correspondences in Hale (1967).

to the word for 'plant', seen in Kiowa *go-p* 'plant, vine' and in Tewa *ko* 'to plant' (the consonant difference may be due to ablaut alternation; Hale's reconstruction is $*kV_1$ 'to plant' with plain *k*). I hypothesize that Tewa *-go* in *sa̧gobe* reflects 'plant' and suggest that the PNUA form may be a loan from a PKT compound of $*sV_3$- 'tender' and $*kV_1$- 'plant'. The NUA forms have no analysis.

4.2.1.6. PNUA 'rabbitbrush', Tewa '*Artemisia filifolia*'. The NUA word for 'rabbitbrush, *Chrysothamnus* spp.', with reflexes shown in (33), is again a form found only in the NUA languages, for a plant that is found very widely on the Colorado Plateau (and elsewhere) but not in the Sonoran Desert.

(33) PNUA **siban-pV* '*Chrysothamnus* spp.': Tübatulabal *siba-pul* (Fowler 1983:237; this form does not appear in Voegelin 1958 although Fowler cites that source), Numic **sibu^n*- 'rabbitbrush' (Fowler 1972:305); Kawaiisu *šivapɨ* (Zigmond 1981:20, 33; perhaps not *Chrysothamnus* but instead *Guttierrezia californica*, a similar yellow-flowered brushy plant), Tümpisa Shoshone *sippumpi* ~ *suppumpi*; Hopi *sivahpi*[25]

I reconstruct PNUA **siban* with final nasal following Manaster Ramer (1989). As noted by Fowler, the Numic forms attest to nasalizing transition, and Hopi shows corresponding *h*, which Manaster Ramer (1989) states is the regular Hopi reflex of such syllable-final consonants.

Tübatulabal and Hopi reflect an original compound. The second element of the compound is phonetically similar to the noun-class suffix seen in Kawaiisu and Tümpisa Shoshone and could have been reinterpreted as this element in Numic.

RHFM (1916:45) give Tewa *p^{h}ų* '*Chrysothamnus bigelovii* (rabbitbrush)'. However, the word that interests me is the Tewa word for *Artemisia filifolia* in (34). This is a shrub of about the same size as *Chrysothamnus* and often grows intermixed with it. Indeed, the so-called sagebrush vegetation type is usually a mixed *Artemisia–Chrysothamnus* landscape. The Tewa term is interesting mainly in that it gives us a clue about a possible form from which the PNUA form might have come.

(34) Tewa *sovok^{h}uwàp'e* '*Artemisia filifolia*' (RHFM 1916:44)

[25] A second form for *Chrysothamnus* spp. is attested in Numic, with medial consonant **k* instead of **b*: Mono and Northern Paiute *sigupi* (Fowler 1972:191), Tümpisa Shoshone *sikompippɨh* (Dayley 1989), Southern Paiute *sqúmpɨ* (Sapir 1931:657), Ute *sa̧kɨ́-pɨ* (Ute Dictionary 1979). Sapir suggests that the Southern Paiute form may be related to *siku*- 'squirrel'. (This word for 'squirrel' is discussed in **4.2.2**.)

This word is morphologically complex; *sovok^{h}uwà* means 'mist' and *p'e* is 'plant'. Tewa *sovok^{h}uwà* 'mist' (Harrington 1916:48) is a compound from *sov-* of uncertain meaning and *òxúwá* 'cloud'. This form should be compared to Kiowa *sép-p^{h}àn* 'rain-cloud', although the relationship RGT *sov-*, Kiowa *sép* 'rain' is not regular.[26]

The KT forms for the elements of the proposed compound are given in (35) and (36).

(35) PKT **sV-* 'rain': Taos *łùl-*, Isleta *łur* 'fall plural', Jemez *sɬ̨yɬ̨*, Kiowa *sép* (cognate set provided by Laurel Watkins) (the Tewa forms, RGT *k^{w}àn* and AZT *k^{hw}en*, are not cognate)

The vowels in (35) are not cognate; the Kiowa vowel is wrong for either Hale's (1967) oral **V$_{6}$*, suggested by the Taos vowel, or the nasal *Ṿ$_{2}$* suggested by the Jemez form. However, the initial consonants do correspond, suggesting PKT **sV-* 'rain'.

(36) PKT **p^{h}Ṿ$_{3}$* 'cloud': Taos *p^{h}ɬ̨́-*, Isleta *fi̱:(-de)*; Jemez *fɬ̨̂:*; Kiowa *p^{h}àn-* (cognate set and transcription of the noncognate Tewa word, *òxúwá*, provided by Laurel Watkins)

These 'cloud' words are interesting because they contain nasal vowels, resemblant to the final nasal that can be reconstructed for the corresponding syllable in the NUA words.

Based on these forms, we can propose a possible PKT compound with the first element 'rain' as in (35), the second 'cloud' as in (36), and the last element a form like Tewa *p'e* 'plant' or even Tewa *p^{h}u̱* '*Chrysothamnus bigelovii*': **sV-p^{h}Ṿ$_{3}$-p^{h}V* 'rain-cloud-*Chrysothamnus*, rain-cloud-plant'. This proposed compound resembles PNUA **siban-pV* '*Chrysothamnus* spp.'

The chain of reasoning outlined obviously has a number of weak links. *Artemisia filifolia*, not *Chrysothamnus*, bears the name that might be reconstructed as 'rain-cloud plant' in Tewa. However, Fowler (1972:236) points out that the NUA for 'rabbitbrush' can function in Numic as an "intermediate" designator, meaning 'shrub, brush', so clearly there is some semantic drift possible in this "sagebrush" domain. The Tanoan words for 'rain' are not in regular sound correspondence, and the meaning 'rain' for the RGT element *sov-* in the word for '*Artemisia filifolia*' is a guess. Finally, since the

[26] Laurel Watkins (personal communication) comments that "Kiowa *sép* 'rain' looks suspiciously like *sô:*, *sép* (perfective) 'descend, fall'. Harrington (1928:156) thought so too, but the cognate sets are clearly different." The set for 'rain' is shown in (26); the set for 'descend' is as follows: Taos *ɬiw*, Isleta *ɬiaw*, Jemez *t^{y}ó*, Kiowa *sô:*, *sép*. (The Tewa words, RGT *x^{w}ɬ́* and AZT *k^{hw}ɬ́:yè*, are not cognate.)

name is attested only in Tewa, we cannot know that a similar compound plant name existed in PKT. However, the proposed compound is a plausible one. In contrast, no etymology exists for the NUA words in (33).

External evidence is consistent with the speculation that PNUA **siban-pV* '*Chrysothamnus*' may be a loan from a PKT compound meaning something like 'rain-cloud plant'. Most pertinent among many ethnobotanical details is a property of *Chrysothamnus* that would be of special interest to cultivators. A recent study of Hopi understandings of soil types has shown that dense stands of the plant are an indicator of a type of water-retaining soil structure that is especially favorable for cornfields (Dominguez and Kolm 2005). The relatively damp soils under stands of *Chrysothamnus* would be known to hunter-gatherers collecting seeds of grasses such as rice grass (*Achnetherum hymenoides*), which grow in association with it, and might well yield the idea that the plant attracts rain clouds or is somehow like rain clouds in bringing moisture.

The importance of the three resemblant sets for 'yamp', 'sego lily', and '*Chrysothamnus*' lies in the clues they may give to KT morphology that could yield appropriate compounds: 'earth-fruit' for 'yamp', 'tender-plant' for 'sego lily', and 'rain-cloud-plant' for '*Chrysothamnus*'. In NUA the names for these plants are longish words that have no morphological analysis. Furthermore, these three plants, along with pinyon, oak, and wild onion, are wild plants that are important to subsistence on the Colorado Plateau, a domain in which we can predict loan vocabulary into NUA from KT. None of these three plants are found in the Sonoran Desert. Thus the possibility is increased that these resemblances are not due to chance, but indeed are cases of loan vocabulary from PKT into PNUA. The sets for 'yamp', 'sego lily', and 'rabbitbrush' share the problem that we are speculating about possible PKT plant names by triangulating from the evidence of the NUA words and the evidence from Tewa only. Nonetheless, they are worth noting as targets for further research.

4.2.2. Possible loans for game animals from PKT into PNUA. In addition to at least two species of deer, four large game animals occur on the Colorado Plateau. These are the wapiti or American elk (*Cervus elaphus*), absent in the Sonoran Desert, the pronghorn (*Antilocapra americana*), with scattered populations in the desert but abundant on the plateau, the mountain sheep (*Ovis canadensis*), found both in the desert and on the plateau, and the American bison or buffalo (*Bison bison*), rare in the desert. W&T (1937) and Davis (1989) identified three UA–KT resemblants for large game animals, which they glossed as 'elk', 'deer', and 'buffalo'. These are discussed here, along with a word for 'pronghorn', which W&T and Davis did not recognize, and a word for 'squirrel, chipmunk'.

4.2.2.1. PNUA 'deer', PKT 'elk'.

(37) PNUA **tɬhɬ-* 'deer'
PKT (W&T **tə(x)* 'elk' (1937:622, no. 47)
PKT (Davis) **tə* 'elk' (1989:369, no. 22)
PKT (Hale)[27] **tV$_3$* 'elk'

The NUA set in (38) is restricted to that subfamily and is not cognate with any words in the southern UA languages (Fowler 1983).

(38) PNUA **tɬhɬ-* 'deer': Tübatulabal *tohi:l* 'deer', *tɬšib ~ ʔɬtɬši:p* 'to scrape deerskin' (Voegelin 1958:226); Numic **tɬhɬ* 'deer, horse' (Iannucci 1972) (Northern Paiute *paa-tɬhiddya*[28] 'elk'; Kawaiisu *tɬhɬya* 'deer'; Tümpisa Shoshone *tɬhɬya(n)* 'deer'; Southern Paiute *pa-tɬya* 'elk', *tɬγia* 'deer'; Ute *tɬíyi* 'deer')

The KT words for 'elk' are given in (39).

(39) PKT **tV$_3$* 'elk': Taos *tɬ̀-* 'elk'; Isleta *tɬ*; Tewa *tà-* 'elk'; Jemez *tôtʸā* 'buffalo' (cognate set provided by Laurel Watkins, who notes that Kiowa has noncognate *k'ókɔ́y* 'elk')[29]

The gloss 'elk' for PKT seems reasonable. However, 'elk' is clearly not a meaning that can be recovered from the PNUA forms, where it appears only when the word is compounded with *pa(a)-* (see n. 28). While a word for 'elk', an animal not found in the Sonoran Desert, is a likely target for a PNUA borrowing, the same species of deer (mule deer and white-tailed deer) found on the Colorado Plateau are also common in the Sonoran Desert. It is possible that the words for 'deer' and 'elk' in Numic and Tübatulabal underwent a marking reversal with the warming and drying of their environments after about A.D. 1200, which would have made elk increasingly rare. Nonetheless, this semantic difference between the KT and the NUA words is a difficulty with this resemblant pair.

4.2.2.2. PNUA, PKT 'pronghorn'. Neither W&T (1937) nor Davis (1989) recognized the resemblant set, for 'pronghorn', shown in (40).

[27] Laurel Watkins (personal communication) gives this as Hale's reconstruction, which she believes appears only in his handwritten cognate set.

[28] The first element, *paa-* in Northern Paiute and *pa-* in Southern Paiute, is usually glossed as 'water'. However, Kenneth C. Hill (personal communication) suggests that there is also an element *pa:-* meaning 'big, great'; cf. Cahuilla *pá-sukat* 'horse' ('big-deer', cf. *súkat* 'deer'), Gabrielino *pá-hunar* 'great bear' (cf. *húnar* 'bear'), Serrano *pa:-kihu:ç* 'whale' ('great-fish', cf. *kihu:ç* 'fish'). Compare Hopi *pa:kiw* 'fish', presumably from *pa:-* meaning 'water' + **kiyu* 'fish'; Hopi *pa:kiw* has no synchronic analysis.

[29] Henderson and Harrington (1914:15) record Taos *töünemâ* 'elk' (*t'ó-nèmò*).

(40) PNUA **tɬhɬnV-* 'pronghorn'
PKT (W&T) —
PKT (Davis) —
PKT (Hale) **t'V$_2$* 'pronghorn' (1962; 1967)

The NUA set appears in (41). The geminate *nn* in Northern Paiute and the long vowel in Cupan suggest the reconstruction **tɬhɬ* with medial **h*, which is exactly like the NUA form in (42). However, all these 'pronghorn' words have a nasal-initial increment; the source for this increment could be a PKT noun classifier like the Taos "gender" suffixes, which have initial *n* (Trager 1946:204–5).

(41) PNUA **tɬhɬnV-* 'pronghorn': Northern Paiute *tɬnná* 'antelope (pronghorn)' (Fowler 1972:65); Hopi *tɬ:ni* 'game animal obtained on a hunt, kill, prey, carcass'; Proto-Cupan ***tə́:ni-la* 'antelope (pronghorn)'

The PKT set for 'pronghorn' is highly regular and is shown in (42); forms in the individual languages are from Hale (1967).

(42) **t'V$_2$* 'pronghorn' (Hale 1962; 1967): Taos *t'ó*; Isleta *t'a*; Tewa *t'òn*; Jemez *t'âpē* 'pronghorn', Kiowa *t'ɔ:* (Hale 1962:2 notes also Kiowa *t'áp* 'deer'[30]) (cognate set provided by Laurel Watkins)

In these forms the semantic correspondence is good. The phonological resemblance is less good if the *p* in Jemez and Kiowa reconstructs to PKT. Only Tewa shows the nasal seen in the NUA set. However, in Taos a noun-classifying suffix, recorded by Trager (1946:116) as *-na ~ e/ina*, appears with words for animals, suggesting another possible source for the nasal.

4.2.2.3. NUA 'mountain sheep', PKT 'deer'?

(43) PNUA **pa:ʔa-t* 'mountain sheep'
PKT (W&T) —
PKT (Davis) **pę* (1989:368, no. 6)
PKT (Hale) **pV̨$_3$*

The NUA forms are given in (44). They appear only in NUA and are not found in the southern languages.[31]

[30] Laurel Watkins (personal communication) states that Jemez and Kiowa have tautomorphemic *p*, Jemez *t'âpē* and the Kiowa form *t'áp* given above. Hale (1967) does not give these consonants, although in Jemez they are apparently underlyingly present (see Yumitani 1998:24–25).

[31] Fowler (1972:257) observes that the word for 'mountain sheep' has largely been replaced in Numic by words probably derived from 'to kill', perhaps reflecting legends about the hunting prowess of the mountain sheep, and suggests the possibility that the forms in (44) are also derived from PUA verbs meaning 'to kill, hit, beat'. Such words with initial PUA **pa-* do exist, but they are not otherwise obviously similar to the 'mountain sheep' words.

(44) PNUA **pa:ʔat* 'mountain sheep' (Manaster Ramer 1989): Tübatulabal *pa:ʔa-t* 'the mountain sheep'; Hopi *paŋʷɨ* (from **pa:ʔa-ŋʷɨ*) 'mountain sheep'; Kitanemuk *paʔ-t* 'mountain sheep'; Serrano *pa:ʔ-t* 'mountain sheep'; Proto-Cupan **pá:ʔa-t* 'mountain sheep'

The PKT word is attested in all KT languages, as shown in (45).

(45) PKT **pV̨ʒ* 'deer, food': Taos *pę́*; Isleta *pį*-(*toa*) 'deer-meat'; RGT *pę́:*; Jemez *pę́:*; Kiowa *pį:-* 'food, eat' (cognate set provided by Laurel Watkins)

The vowel is wrong in the Kiowa form, although Hale (1962) gives it as cognate with the Jemez word.[32]

While this is a very tempting resemblance between PNUA and PKT, the comparison is problematic for two reasons. First is the semantic mismatch between PNUA 'mountain sheep' and PKT 'deer'. This is not a hopeless mismatch, since both fall in the "large game" domain, but a more serious problem is that mountain sheep would not be at all novel for immigrants from the Sonoran Desert to the Colorado Plateau. So the borrowing is not motivated by exoticism. Furthermore, on the formal side, the resemblance does not match any of the patterns discussed in **5** below; I return to this question there. Nonetheless, I tentatively include this term as a possible loan, rather than listing it among the rejects in **4.3**, because it fits into this set of large game animals.

4.2.2.4. PNUA, PKT (?) 'squirrel, chipmunk'? Words for 'squirrel, chipmunk' are interestingly resemblant between PNUA and some KT languages. W&T (1937:620, no. 6) compared Taos *c'uwala-* 'squirrel' and Tübatulabal *cawanɨn-t* 'grey squirrel'. However, there is a more interesting set of resemblances in PNUA, shown in (46). This set does not have cognates in any southern UA languages.

(46) PNUA **sɨ:ka* 'squirrel, chipmunk': Tübatulabal *ɨšɨʔɨga-l* 'blue squirrel' (Voegelin 1958:223), Southern Paiute *sɨkuci* 'grey squirrel' (Sapir 1931 and Fowler 1972:96), Hopi *sakɨna* 'grey squirrel, ferret', Serrano *hika:ɨt* 'chipmunk', Kitanemuk *hikaɨt* 'flying squirrel', Proto-Cupan **sVka:-wət* (Cahuilla *síka-wet* 'tree squirrel', Cupeño *səká-wət* 'chipmunk', Luiseño *ṣuká:-wut* 'tree squirrel')

These NUA forms are clearly resemblant but are slightly irregular even within Takic. They can be compared to the KT forms in (47).

[32] Laurel Watkins (personal communication) comments that "There are enough variants of the type *i* ~ *ya* ~ *a* (see Watkins 1984:18) that it is fairly likely that [Kiowa] *pį* was *pį́ą* or something like it."

(47) Taos *c'uwala-* 'squirrel' (Trager 1946:216), RGT *są́ʔwą́* 'squirrel' (Laurel Watkins provides this form from a dictionary of San Juan Tewa; Henderson and Harrington 1914:21–22 gloss their form also as 'ground squirrel')

The Taos and RGT forms are resemblant but are not cognates. Furthermore, the phonological similarity with the NUA words is not obvious. However, in **5** I argue that the resemblance may reflect a consistent pattern.

One interesting possibility here is that if the NUA words are loans from KT words with a structure like **cVkV-wV* (see the discussion in **5.4**), this would account for the curious presence of the apparent augmentative suffix **-wɨ* in the Cupan items in (46), in a word for a very small animal. The KT *-wV* could have been reinterpreted as the UA suffix.

Several caveats must be registered here. First, squirrels and chipmunks are ubiquitous throughout North America, and there is no special reason that PNUA migrants would have borrowed this word from PKT. Second, words for 'varmints' are common in the inventory of widespread *Wanderwörter*. Finally, words for 'squirrel, chipmunk' are likely to be onomatopoeic. Thus, the similarities here may represent broader patterns and not be specific to the proposed PNUA–PKT contact. Nonetheless, the resemblance is worth noting.

4.3. Resemblant forms that can be rejected as due to PNUA–PKT contact. In this section I take up four words that are worth discussing for several reasons but which can be rejected as PNUA–PKT loan vocabulary under criteria developed here.

4.3.1. 'Stand'.

(48) PNUA **wɨnɨ* 'to stand'
PKT (W&T) **gʷine* (1937:620, no. 12)
PKT (Davis) **gʷi- ~ kʷi-* 'to stand' (1989:371, no. 59)
PKT (Hale) **gʷVʔnV ~ kʷVʔnV* 'to stand' (1967:116)

W&T and Davis related their PKT reconstructions to **wɨnɨ*, which they took to be PUA. Shaul (1985) points out that **wɨnɨ* is a Northern Uto-Aztecan etymon, with PNUA **n* from PUA ***l/r* (see **3**). The form is very widely attested in the NUA languages and is also clearly good on the KT side. Campbell (1977:273) includes this pair among the five sets that survive his detailed critique of W&T (1937). However, I do not believe it belongs in the loan set. First, this is an item of basic vocabulary with low susceptibility to borrowing. Second, the resemblance between the PNUA and PKT forms, in both form and meaning, is so close that chance resemblance rather than ancient borrowing (or descent from a common AT ancestor) is a strong possibility (Laurel Watkins, personal communication). Third, the regularity

discussed in **5.2** would predict a PKT nasal vowel with loss of the tautomorphemic syllable *-*nV*, since a PNUA > PKT loan would have been interpreted as a single morpheme. The loan cannot be in the other direction, because the NUA form is a regular reflex of PUA ****wɨlɨC** (Manaster Ramer 1993).

4.3.2. 'Indian hemp' (*Apocynum cannabinum*). A resemblant set for *Apocynum cannabinum* or Indian hemp, an important source of fiber for cordage, is very attractive given the archaeological context. Haas (2003) and L. Huckell (2005) show that the earliest cultivators in the Sonoran Desert and the WBMII cultivators on the Colorado Plateau used *Yucca* almost exclusively for cordage. In contrast, LeBlanc (2004) observes that *Apocynum* was the preferred fiber plant of the EBMII. Furthermore, the resemblance of the first syllables, NUA **wi* in (50) and Taos *x*^{w}*i* in (49), parallels the case of Hopi *wi* and Tewa *x*^{w}*i* in 'digging stick' in **4.1.6**. However, the hypothesis of a loan from PKT into PNUA is falsified by the fact that the relevant PNUA morpheme is attested as well in southern UA languages and so cannot be a PKT loan into PNUA. It should not be a PNUA loan into PKT, because *Apocynum* was well known as a fiber plant to the EBMII, suggested here as the PKT.

(49) PKT **k*^{wh}*V*$_4$? 'fiber, string, rope': Tewa *x*^{w}*i* 'fiber' (RHFM 1916:24); perhaps Taos *x*^{w}*il-ena* 'bow' (if *x*^{w}*i-* is 'bowstring')

Fowler (1983:238, no. 38) states that Proto-Numic **wiha* and Proto-Cupan **wica*, with her gloss 'hemp', are found exclusively in NUA and are absent in SUA. Indeed, the forms in this meaning are found only in NUA. But the relevant NUA morpheme, **wi:-*, is a reflex of a well-established PUA form for 'string', for which a cognate set, including words in the southern languages Yaqui, Mayo, and Huichol, is given in (50). What seems to have happened in this case is a loan-shift to a meaning *Apocynum* in many of the NUA languages, perhaps under PKT influence, but the word is not a loan from PKT.

(50) PUA **wi:-* 'fiber, *Apocynum cannabinum*': Proto-Numic **wiha* 'hemp' (Fowler 1983:238): Northern Paiute *wiha* (Fowler 1972:192), Shoshoni *wiha* (Fowler 1972:192); Hopi *wi:-hɨ* 'burlap bag'; Proto-Cupan **wí:-ča* 'fiber plant' (note especially Luiseño *wí:-ča* '*Apocynum cannabinum*'); Serrano *wi:-ču?* 'to make string'; Mayo, Yaqui *wiʔi* 'thread' (Miller 1967); Huichol *wíta* 'thread', *-wíita* 'to spin yarn' (Miller 1967) (*-ta* in 'thread' is a nonpossessed noun suffix, while in 'to spin yarn' it is a suffix deriving denominal verbs)

4.3.3. Juniper. Another resemblance between NUA and KT that can be designated as chance, again for the reason that the NUA forms are reflexes of

a PUA word, appears in words for 'juniper, cedar'. This is an attractive set, because juniper is an extremely important plant on the Colorado Plateau, but in the Sonoran Desert is found only on sky island mountain ranges.

(51) PNUA **huC-* 'tree'
PKT (W&T) **hu̱* (1937:620, no. 14)
PKT (Davis) **hu̱* (1989:373, nos. 91, 97)
PKT (Hale) **hV*$_2$ 'juniper, cedar'

The KT forms appear in (52), the NUA words in (53).

(52) PKT **hV*$_2$ 'juniper, cedar': Taos *hú̱*; Isleta *hú̱-*(*łá*) 'pine, evergreen'; Tewa *hú̱:*; Jemez *ɦɬ̱*; possibly Kiowa (ɔ:)*hí̱:* (cognate set provided by Laurel Watkins)

(53) PNUA **huC-* 'tree': Tübatulabal *ʔuuʔu-t*; Proto-Numic **huu´´-* 'stick, wood, tree' (Fowler 1972:330), Hopi *hohɨ* 'juniper'

This set must be rejected as a loan from PKT into PNUA, because the NUA forms are almost certainly cognate with southern UA words like Tepiman **ʔuusi* 'stick, tree' and Cahitan *húya* 'tree'. It is unlikely to be a loan from PNUA into PKT, since *Juniperus* would certainly not be novel to the PKT community.

4.3.4. Buffalo.

(54) Numic *kuhcu*^{n}- 'buffalo'
PKT (W&T) **koʔo-n* (1937:620, no. 16)
PKT (Davis) **kon* (1989:370, no. 43)
PKT (Hale) —

This is potentially an attractive set, because 'buffalo' fits into the "large game" domain discussed in **4.2.2**. Furthermore, buffalo are only sparsely attested archaeologically in the Sonoran Desert (Deni Seymour, personal communication, November 2003); maps of the distribution of buffalo do not show them south and west of the Four Corners area. Thus buffalo might have been exotic to the PNUA population.

On the NUA side the word appears only in Numic (see 55), so it cannot be reconstructed to PNUA.

(55) Proto-Numic **kuhcu*^{n}- 'buffalo, cow' (Iannucci 1972): Northern Paiute *kucu* (Fowler 1972:193); Tümpisa Shoshone *kuittsun*; Comanche *kuhtsuʔ* 'cow'; Southern Paiute *kuču* (Fowler 1972:193)

The KT forms are given in (56); the San Juan Tewa form, with nasal vowels and glottal stop, does not correspond to the others.

(56) PKT *$kV_{l,2}l$ 'buffalo, bison': Taos *kòn-*; Tewa *kǫ́?*; Kiowa *kɔl* 'buffalo (cow), herd of buffalo' (cognate set provided by Laurel Watkins)

This word certainly represents some sort of areal spread. However, it cannot be reconstructed to PNUA or cleanly to PKT. Furthermore, the Numic–KT resemblance does not fit any of the phonological regularities proposed in **5** below. Campbell (1997:271), following Taylor (1976), notes that a similar form is found as far east and south as Atakapa *cokoñ*. I believe that Campbell is correct to assign this resemblance to a general spread of words for 'buffalo' that is not specific to UA–KT contacts.

5. Possible phonological regularities in the loan complex and the reconstruction of PKT. In this section, I speculate along the following lines: If the resemblances between these NUA and KT words are indeed the result of an exchange of loans, the NUA forms may preserve phonological information about an early stage of the evolution of KT, a "pre-PKT" (PPKT), since Hale's (1967) reconstructions represent PKT. Given the difficulties with the evidence presented in **4** above, the proposals here represent a leap of faith, but I present them in the hope of stimulating further investigation.

Several features of KT languages hint that ancestral word structure might have been rather different from word structure in the contemporary languages. For instance, the KT languages have up to four tones.[33] Tone is known to originate from the loss of consonants (Hombert, Ohala, and Ewen 1979); vowel tone can preserve traces of formant transitions to lost consonants. Furthermore, the KT languages exhibit both glottalized and aspirated stops. Such structures can result when one of a pair of adjacent consonants (perhaps together as the result of vowel syncope) weakens to become an onset or release features on the other member of the pair.

5.1. KT compounds. I suggested in **4.2.1** that several NUA words for plants might have originated as PKT compounds. (57) gives the PNUA form, along with the hypothesized PKT compounds. The word structures in PNUA and hypothesized PKT are very similar, suggesting that, if the PNUA forms reflect the PKT structures, then PPKT morphological boundaries blocked the kind of restructuring seen in PKT monomorphemic forms discussed below.

[33] Tone may be an areal feature in the Southwest; Keresan is a tone language, the Third Mesa dialect of Hopi has tone (mainly from loss of postvocalic *h*), and tonal features have developed in some varieties of Upper Piman. The Apachean languages also have tone, a feature that is widespread in the Athabascan family and probably of Proto-Athabascan origin.

(57) PNUA loans from PKT compounds?

PNUA	PKT (?—attested only in Tewa)
**yampa* 'yamp'	? **dV̨$_4$m-p'V$_{10}$* 'earth-fruit/tuber' (RGT *nam-p^{h}u* 'potato')
**siko* 'sego lily'	? **sV̨$_3$- kV$_1$-?* 'tender-plant-?' (RGT *sę̣go-be* 'potato, sego lily')
**siban-(pV)* '*Chrysothamnus*'	? **sV-pV̨$_3$-p'V* 'rain-cloud-plant' (RGT *sov(?)-òxúwá-p'e* '*Artemisia* [mist plant]')

5.2. KT intervocalic nasals. The second pattern involves the treatment of nasals. NUA has intervocalic nasals in three cases where PKT probably has nasal vowels. In a fourth case, PKT has an oral vowel, with the PKT nasal initial in a noun-classifying suffix rather than tautomorphemic with the vowel. These are shown in (58).

(58) PPKT medial tautomorphemic nasals become nasal vowels in PKT?

PNUA	PKT
**kuma* 'maize'	**k^{h}V̨$_2$* 'maize, seed'
**suŋu* 'corn'? **soŋo* 'corn by-products'?	**sV̨* 'grass, grass seed'
**k^{w}inha- ~ k^{w}iya* 'oak'	**k^{w}V̨$_3$* 'oak'
**tɨhɨnV* 'pronghorn'	**t'V$_2$-nV* 'pronghorn' (cf. Taos *t'ó-na*)

This pattern suggests that PPKT forms may have had the following structures: ***k^{h}VNV* 'maize, seed', ***sVNV* 'grass, grass seed', ***k^{w}VNV* 'oak', with a general rule of loss of final vowel and reduction of the nasal to nasalization on the remaining vowel.

5.3. KT glottalization and aspiration. There are several cases where the PNUA form has a medial consonant, but the PKT forms do not. I suggest the possibility that the reflex of a lost consonant appears as PKT glottalization or aspiration on the initial consonant.[34] The forms that bear on this possibility are shown in (59).

[34] Processes that could yield the proposed result are widely attested. Lenition of intervocalic stops and spirants to *ʔ* and *h*, respectively, yielding *VLV* (where *L* is laryngeal), is a well-known process. Metathesis in *VL* structures is common (Blevins and Garrett 1998) and can bring *L* and the preceding *C* into adjacency. Depending on stress placement, the *CL* structure could also be created by loss of the vowel in *CVL*. In the *CL* environment, however this originates, *L* can become a consonantal release. For instance, Donohue (2003) argues that ejectives in some Austronesian languages result from the change of prefixal *k* or *q* to *ʔ*, which then metathesizes with the following consonant to yield the ejective. In Korean, syllable-final *h* metathesizes with a following stop to yield aspirated release (Kim 1987).

(59) PPKT C_1VC_2V (C_2 is obstruent) > PKT C_1'/C_1^hV?

PNUA	PKT
**paʔca* ‘maize, kernel, seed’	**p'V_3* ‘green corn, ripe ear of corn’
**ṯipat* ‘pinyon pine/nut’	**t'V_2* ‘pinyon pine/nut’
**sɨ:ka-wɨ* ‘squirrel, chipmunk’	**c'$V_{1–2}$wa* ‘squirrel’
**k^wɨsɨ* ‘to bring’	**$k^{wh}V_3$* ‘to harvest’
**tuhi* ‘boy’	**c^hV_5* ‘person’

As noted in n. 34, we might expect that lenition of intervocalic stops would yield glottalization, while lenition of spirants would yield aspiration. But there are two exceptions to this proposal in these data: In PKT **t'V_2-nV* ‘pronghorn’ we see glottalization where NUA is **ṯihɨnV-* ‘pronghorn’ with medial *h*. Furthermore, NUA has medial *h* in **ṯihɨ-* ‘deer’, while PKT **tV_3* ‘elk’, which I have proposed as a possible source for the NUA word, has a smooth-release consonant, not the predicted aspiration. An NUA glottal stop and a PKT plain stop also correspond in resemblant sets for ‘mountain sheep’, PNUA **pa:ʔa-ta* and PKT **pV_3* with plain stop, where we would expect PKT glottalization. These deviations from the proposed pattern may be a reason to reject contact as a source for these resemblant sets.

It is certainly premature to propose that every PKT reconstruction of the shape *C'V-* or *C^hV-* derives from older structures with *CVCV*. Indeed, many loose ends are left hanging here besides those mentioned above. For instance, PNUA **paʔca* has a closed syllable but is listed in (59) with other PNUA *CVCV* structures with open syllables. However, the idea that many medial consonants were lost between PPKT and PKT may provide a strategy to approach not only the consonantal correspondences and syllable structures but also the mysteries of the quite irregular KT vocalism.

The possibility that many core-vocabulary PPKT words were more complex than PKT words has consequences for the Azteco-Tanoan hypothesis. Many tempting resemblant pairs attract those who, like W&T (1937) and Davis (1989), have pursued this idea. For instance, a well-known case is PUA ***pa* ‘water’ and PKT **p'V_1* ‘water’. However, if the PKT word for ‘water’ comes from PPKT ***pVCV*, the resemblance to the PUA form is considerably reduced. Compare another tempting set, PUA ***pi(ʔ)wi* ‘body hair, down’ and PKT **p^hV_2* ‘hair’. PKT ‘hair’ may reflect a PPKT form like **pVs/hV*. Again, this makes the similarity with PUA less attractive.

6. Conclusion. I have discussed here 21 sets of resemblances between NUA languages and KT languages. I have rejected four of these (‘to stand’, ‘*Apocynum*’, ‘juniper’, and ‘buffalo’) as probably due to chance. All the remaining cases are problematic in some way (and some of the problems are serious) for the hypothesis advanced here, that they are part of a suite

of PNUA–PKT loan vocabulary. However, the collective weight of the evidence, which includes several resemblances predicted from an archaeologically based model of the hypothesized PNUA–PKT contact—focused in the domain of cultivation for loans from NUA into KT and focused in the domain of wild plant and game resources for loans from KT into NUA—makes the most conservative claim, that all 17 of these forms are due to chance resemblances, more difficult to sustain. While the archaeological context as a form of external evidence is not as good as solid cognate sets widely attested in each family in every proposed case, I believe that it should be taken seriously.

If this linguistic case for PNUA–(P)PKT contact holds up, it has several interesting implications. First, the loans, if such they are, seem to go in both directions, with each group adopting terms for cultural novelties of the other. This suggests a scenario of cultural contact between immigrant cultivators and indigenous hunter-gatherers that was not entirely agonistic. Second, if these are loans, they add important new evidence in support of the proposal that the PNUA were cultivators, in spite of the fact that many of their modern descendants were hunter-gatherers in the eighteenth and nineteenth centuries. Third, if these resemblances turn out to be part of a loan complex, the PNUA homeland must lie in the Four Corners region of the Colorado Plateau, and not in the southern Sierra Nevada–Mojave Desert region as suggested by Fowler (1983) and Sutton (2000). The PKT homeland would also be in this region. Finally, if we can confirm some of these loans, and perhaps identify others, we may be able to use reconstructed PNUA vocabulary to provide new kinds of evidence for the reconstruction of the linguistic history of KT.

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