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William Shipley

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Pre-Cheyenne *y

Ives Goddard

0. It is clear from Wayne Leman's highly persuasive account of Cheyenne pitch accent that Cheyenne phonology is now well understood and well controlled both synchronically and diachronically (Leman 1981, and references cited there). One residual problem pointed out by Leman (1980a), the correspondence of PA **k* to Ch *n* in a number of morphemes, has been resolved independently by Proulx (1982) and Picard (1984). The Ch *n* in such cases does not directly reflect the PA **k* (which drops with no direct reflex) but rather a following intermediate-stage, pre-Cheyenne (pCh) **y*, which is either the reflex of PA **y* or **w*, or inserted after PA **k* before a following PA **e* or **e*•.¹ What follows is a discussion of these and other Proto-Algonquian sources and Cheyenne reflexes of pCh **y*.

1. To provide the necessary background information for this discussion, the ordinary Cheyenne reflexes of Proto-Algonquian vowels, consonants, and consonant clusters will first be reviewed. The Proto-Algonquian vowel system of four vowel qualities, each short and long, evolved into the Cheyenne system of three qualities with an underlying contrast of high and low tone.² The basic vowel reflexes are given in Table 1.

Table 1: Cheyenne reflexes of Proto-Algonquian vowels.

PA * <i>i</i> , * <i>e</i> -, * <i>o</i> , and * <i>we</i> > Ch /e/	PA * <i>i</i> • and * <i>o</i> • > Ch /é/
PA * <i>e</i> (except as above) > Ch /a/	PA * <i>e</i> • > Ch /á/
PA * <i>a</i> > Ch /o/	PA * <i>a</i> • > Ch /ó/

Underlying high tone is the reflex of Proto-Algonquian vowel length, but complex rules operate on the underlying tones to produce the surface-phonemic tones; these have been described by Leman (1981). The

falling together of word-initial PA **e-* with PA **i* and the falling together of PA **we* with PA **o* are innovations found throughout the Central and Plains Algonquian languages. The falling together of **o* (< PA **o*, **we*) with **i* (< PA **i*, **e-*) and of **o·* with **i·* is shared by Cheyenne and Arapahoan (Goddard 1974:104; Pentland 1979b:104, 106). The deviance of the vowel values produced by the Cheyenne vowel shift (*i > e > a > o*) is somewhat exaggerated by the choice of symbols. Ch *e* is little if any lower than the reflexes of PA **i(·)* in, for example, Menominee (written *e[·]*) and Munsee (*i[·]*), and Ch *o* is within the range of the reflexes of PA **a(·)* in several languages (notably Arapaho *o[·]*).

The Proto-Algonquian consonants are displayed in Table 2, together with the underlying Cheyenne reflexes they normally have (when not in clusters), given in the same relative positions. The Cheyenne reflex of each Proto-Algonquian consonant cluster is given in Table 3 at the intersection of the row for the first member and the column for the second member; the bracketed reflexes are predictable but not exemplified. For example, the reflex of PA **ʔs* is Ch /ʔh/; the reflex of PA **nt* is Ch /ht/.

Table 2: Cheyenne reflexes of Proto-Algonquian consonants.

Proto-Algonquian				Cheyenne (underlying)			
1	2	3	4	1	2	3	4
<i>*p</i>	<i>*t</i>	<i>*ʃ</i>	<i>*k</i>	(-h)p-	~ Ø	(-h)t-	s -hk- ~ Ø
	<i>*s</i>	<i>*ʒ</i>	<i>*h</i>			h	x h
<i>*m</i>	<i>*n</i>			m		n	
	<i>*θ</i>					t	
	<i>*l</i>					t	
<i>*w</i>		<i>*y</i>		v		t	

Table 3: Cheyenne reflexes of Proto-Algonquian consonant clusters.

	*p	*k	*t	*ʃ	*s	*ʒ	*θ	*l
*ʔ	—	—	ʔt	ʔs	ʔh	ʔx	ʔh	ʔh
*h	(?) ³	hk ~ Ø	ht	s	h	x	h	(?)
*m/n	hp ~ Ø	hk ~ Ø	ht	s	h	x	(?)	h
*x	ʔp ~ ʔ	ʔk ~ ʔ						
*ʒ	[ʔp] ~ ʔ	ʔk ~ ʔ						
*θ	[ʔp ~ ʔ]	ʔk ~ ʔ						
*ç	—	ʔk ~ ʔ						

Some details should be noted to aid in interpreting and using these tables. Underlying Ch /hC/ is realized as hC, except that /eht/ is *est* and /ehk/ is *ešk*. For the segments given in the tables as underlying /x/, the realization is ʃ when the only flanking vowel, or both flanking vowels (with or without an intervening ʔ), are *e*-quality; the reflex is *s* before /ó/.⁴ Underlying /te/ is *tse*.

The major unresolved question in the history of the consonants is the conditioning of the loss and retention of word-initial PA *p and word-medial PA *p and *k. One clear pattern is the tendency in the case of doublets for the variant with retention to have a diminutive meaning in contrast to the variant with loss (Goddard 1978:75–76).⁵ In the present discussion it will simply be taken as given that initial PA *p and medial PA *p and *k are optionally lost or retained in Cheyenne; a resulting post-vocalic *p* or *k* prefixes *h*. The loss of word-initial PA *p or *k gives rise to word-initial Cheyenne vowels; these contrast with the reflexes of word-initial Proto-Algonquian vowels (and *we), which add Ch *h*-. The reflex of PA *t patterns like that of retained *p: /t/ word-initially and after a ʔ, and /ht/ after a vowel.⁶

Final syllables are lost if they begin with a PA *p, *k, *s, *h, *m, *n, or *w whose reflex in Cheyenne would have followed a vowel, or if they would have begun with Ch *h* reflecting a cluster; disyllables are not affected and certain other words either retain or restore the final syllable. A sequence Vʔ is inserted between the last two (or only two) vowels in what otherwise would be a word-final string of vowels; the inserted vowel copies the word-final vowel unless it is Ch *e*, in which case the penultimate vowel is copied (Goddard 1978:79, n. 14).⁷

2. Most cases of pCh *y arise where Proto-Algonquian has a post-consonantal *w or *y, or a *k before an *e-quality vowel.

Post-consonantal PA *w and *y become pCh *y.⁸ Additionally, pCh *y is inserted between a PA *k and a following *e or *e·. This inserted *y is treated in some of its subsequent developments as an independent segment and hence differs fundamentally from an added feature of palatalization; the insertion of *y will accordingly be referred to as yodation. All cases of pCh *y occur in what would be post-consonantal position in Proto-Algonquian; it thus contrasts with post-vocalic PA *y (> Ch *t*).⁹ After pCh *y, PA *e and *e· are not shifted to Ch /a/ and /á/ but remain as Ch /e/ and /é/.

If the PA *p or *k (or cluster with these) preceding a pCh *y is lost, the pCh *y is retained and reflected as Ch *n*; if the preceding consonant or cluster has a consonantal reflex, the pCh *y is lost. Examples of these treatments follow.¹⁰

PA *w, *y > pCh *y > Ch *n*.¹¹

- (1) PA ***pye·mi·nkwe·wa* > pCh **pyémékyé* > Ch (é)*néméne* 'he has a crooked face'.
- (2) PA **tekwe·siwa*¹² > pCh **takyéhe* > Ch (é)*tanèhe* 'he is bashful'.

Yodation of PA *k > pCh *y > Ch *n*:

- (3) PA **meketekw-* > pCh **makyehtaky-* > Ch *manEstāne* 'knee' (end restored).
- (4) PA ***mesanike·wa* > pCh **mahonekyé* > Ch (é)*mAhonēne* 'he has all his teeth'.
- (5) PA **keliwa* 'golden eagle' > pCh **kyete* > Ch *netse* 'eagle'.¹³
- (6) PA **welake·θkwi*¹⁴ > pCh *(*h*)*etokyé?kye* > Ch *hetonè?ke* 'bark (of tree)'.
- (7) PA **ke-* > pCh **kye-* > Ch *ne-* (second-person prefix on nouns).¹⁵

PA *w, *y > pCh *y > Ch Ø:

- (8) PA **eθkwe·wa* > pCh *(*h*)*e?kyé* > Ch *hē?e* 'woman'
- (9) PA **mye·neθki*¹⁶ > pCh **myéna?ke* > Ch *ména?e* 'breastwork'.

Yodation of PA *k > pCh *y > Ch Ø:

- (10) PA **maxkeseni* > pCh **mo?kyeha*, **mo?kyeha* > Ch *mo?keha*, *mo?eha* 'shoe'.

(11) PA **mexkena·hkwa* 'snapping turtle' > pCh **maʔkyenó* > Ch *maʔēno* 'turtle'.

3. In morpheme-final position the distribution of Ch *n* from pCh **y* has been disturbed by morphological analogy in some cases. This is particularly evident in the formation of noun plurals; in general, some noun plurals are inherited directly and some are analogical to inherited singular-plural pairs:

Singular and plural directly reflecting Proto-Algonquian:

(12) PA **meʔtekwa·pyi*, pl. **meʔtekwa·pye·li* > Ch *maʔtāno* 'bowstring', pl. *maʔtanónEstse*.

(13) PA *nekikwa*, pl. **nekikwaki* > Ch *náaʔe* 'otter', pl. *naeno*.¹⁷

(14) PA ***wa·pitečya·hkwa*, pl. ***wa·pitečya·hkwaki* > Ch *vóestāso* 'crane',¹⁸ pl. *vóestasòno*.

(15) PA **aθemwa*, pl. **aθemo·ki* > Ch *hótame* 'dog', pl. *hotāme*.

Plural an analogical creation within Cheyenne:

(16) PA **meški·nšekwi*, pl. **meški·nšeko·li* > Ch *maʔèxa* 'eye', pl. *maʔéxánEstse*.

(17) PA **šeka·kwa*, pl. **šeka·kwaki* > Ch *xāōʔo* 'skunk', pl. *xaóne*.

In plurals like that in (16) the *n* has been inserted analogically on the model of inherited singular-plural pairs like that in (12). In cases like (17), the animate plural ending /-é/, inherited in forms like (15), has replaced Ch /-o/ (< PA *-aki). Once it is recognized that the *n* in analogically created plurals cannot be equated directly to anything in Proto-Algonquian, a number of problems posed by the equations in the earlier accounts are resolved.¹⁹

4. The discussion so far has attempted to provide a unified historical explanation for features of Cheyenne that have, in some measure, received treatment previously. It remains to treat some other aspects of pCh **y* that have not received attention.

The statement in §2, above, that pCh *y was lost after retained consonants must be modified in one respect. This segment is retained as Ch *n* word-initially, post-vocally, and also after pCh *h; pCh *h remains as Ch *h* everywhere (pCh *hy > Ch *hn*), except that pCh *ʔhy gives Ch ʔn:²⁰

(18) PA **wemaško·sw-aʔθemw-a 'elk-dog' > Ch *moʔéhnoʔha* 'horse'.²¹

(19) PA *wa·ʔsw- 'light' > Ch *vóʔn-* (e.g., *évóʔneotse* 'it became light').

As a consequence of the retention of pCh *y in such cases, there are alternations between morpheme-final *h* and *hn*, and ʔ*h* and ʔ*n*. These alternations arise in morphemes that had morphological variants with and without a final PA *w, or that lost a PA *w as a consequence of sound change. Morphemes with this pattern of morphological variation are exemplified by the numeral stems:

(20a) PA **nyi·šwa·-tahθenwi 'seven times' > Ch *nésOhtoha*.

(20b) PA **nyi·šwa·-tahθw- 'seven' (initial) > Ch *nésOhtohnóʔe* 'seventy'.

(21a) PA *neʔθenwi 'three times' > Ch *naʔha*.

(21b) PA *neʔθw- 'three' (initial) > Ch *naʔnóʔe* 'thirty'.

The variant of the numerals used in the formation of the time enumerators shows the regular developments Ch *h* < PA *hθ and Ch ʔ*h* < PA *ʔθ (20a, 21a). The variant used as initials in the formation of the decades ends in an added PA *w, and Cheyenne has *hn* < PA *hθw and ʔ*n* < PA *ʔθw (20b, 21b).

The same pattern of alternation arises in the paradigms of transitive animate verbs with stems ending in PA *hw or *sw as a result of the loss of the *w in some forms by the sound changes PA *we > *o (> Ch *e*) and PA *Cwi > *Ci (> Ch *Ce*):²²

(22a) PA *-ahwa·wa '(I/you)--him (by tool)' > Ch /-ohnó/ (e.g., *nápoʔōhno* 'I break him off by tool').

(22b) PA *-ehθaʔswa·wa '(I/you)--him (by burning)' > Ch /-ahoʔnó/ (e.g., *návonAhōʔno* 'I destroy him by burning').

(23a) PA *-ahwekwa 'he--(me/you) (by tool)' > Ch /-ohe/ (e.g., *nápoʔohe* 'he breaks me off by tool').

- (23b) PA *-ehθaʔswekwa 'he--(me/you) (by burning)' > Ch /-ahoʔhe/ (e.g., *návonAhoʔhe* 'he destroys me by burning').
- (24a) PA *-ahwi 'you--me (by tool)' > Ch /-ohe/ (e.g., *népoʔohe* 'you break me off by tool').
- (24b) PA *-ehθaʔswi 'you--me (by burning)' > Ch /-ahoʔhe/ (e.g., *névonAhoʔhe* 'you destroy me by burning').

As the examples show, the *n* in such stems only shows up in forms that were not subject to a rule that removed PA *w (22a, b).²³

5. Even when pCh *y is lost after a retained consonant it may affect the consonant before disappearing. In this environment PA *ʃ, *θ, and *t give Ch *s*.²⁴

- (25) PA *nyi·šw- 'two' (initial) > Ch *nésóʔe* 'twenty' (cf. PA *nyi·šenwi 'twice' > Ch *nèxa*).²⁵
- (26) PA *kešya·kamy- 'hot liquid' > Ch /nesóom-/ (e.g., *énesóomēʔta* 'it (liquid) is warm').
- (27) PA *pi·ntaθwa·na > Ch *éstóso* '(a) quiver'.
- (28) PA **nekwetwa·-tahθwi > Ch *naesòhto* 'six'.

6. A number of attractive etymologies of Cheyenne words and elements can be proposed if it is recognized that PA *θ was subject to yodation before PA *e·; the inserted pCh *y is treated the same as pCh *y of other origins and has the same effects on the reflexes of the PA *θ and *e·. When the PA *θ is not in a cluster, PA *θe· > pCh *tyé > Ch /sé/:

- (29) PA *temikweθe·wa > Ch (é)*tameēse* 'he has a stubby nose'.²⁶
- (30) PA *-eθe·- 'burn, blaze' (inanimate intransitive final)²⁷ > Ch /-asé/ (e.g., *éohāse* 'it is on fire').

When the PA *θ is in a cluster it undergoes yodation before shifting to pCh *h (see Table 3), which then develops as before other cases of pCh *y (see 20b, 21b):

- (31) PA **mo·hθe·wa* 'worm' > Ch *méhne* 'water monster', (as second member of compound) 'worm'.
 (32) PA **pemohθe·wa* > Ch (*é*)*amēhne* 'he walks by'.
 (33) PA ***neʔθe·hs-ehs-a* > Ch *naʔnèha* 'my older brother'.²⁸
 (34) PA **θeʔθe·ma·wa* (reshaped as if with **-a·kan-a*) > Ch *tseʔnémooʔo* 'tobacco'.

Unlike the case with the yodation of PA **k*, PA **θ* does not undergo yodation before PA **e* (see 15, 18, 20, 21, 34).

7. Given the yodation of PA **θ*, the question naturally arises of whether or not the other segments that normally have the reflex /t/ in Cheyenne also underwent yodation. Yodation does occur with PA **y*:

- (35) PA **-ye·kwe* 'you (pl.)' (conjunct order ending after vowels) > Ch /-sé/; e.g. PA **apiye·kwe* 'you (pl.) are (there)' > Ch (*tsé*)*hoēse* 'you who are here'.

PA **l* probably underwent yodation just like PA **θ*,²⁹ but yodation of PA **t* does not occur. It would appear, then, that first PA **y* fell together with PA **θ* (and probably **l*) to a segment that was neither [y] nor [t], and then this segment underwent yodation, before shifting to Ch /t/. The assibilation of /(*h*)t/ (27, 28) could have occurred after this shift to /t/.

8. A sound change reminiscent of yodation affects some cases of PA short **e* that undergo lengthening. The general process that is involved lengthens any short vowel (including **o* from PA **we*) before a nasal cluster in the second syllable of a word if the first syllable also has a short vowel (36, 37, 38, 39), and in the first syllable of a Proto-Algonquian disyllable (40, 41). These lengthened vowels are ordinarily treated exactly like the corresponding Proto-Algonquian long vowels:

- (36) PA **wetempi* 'his brain; animal brain' > Ch *hestàhpe* (/hehtáhpe/) 'brain'.

- (37) PA **apanšwiya* > Ch *hoóxeʔe* 'lodgepole' (end reshaped).
 (38) PA ***matempwehke·wa* 'he makes a house frame'³⁰ > Ch
 (*é*)*mOhtáéne* 'he staked out a campsite'.
 (39) PA **mekwenta·kani* > Ch *maéstooʔo* 'throat'.
 (40) PA **penkwi* > Ch *pààʔe* 'ashes, dust' (/páe/).
 (41) PA **wenči* > Ch *hése-* 'from, because of'.³¹

When a PA **e* that is lengthened by this rule follows a **θ*, it gives Ch /*é*/ rather than /*á*/:

- (42) PA **meθenkwiyi*, reshaped as if ***meθenkwan* > Ch *matsèno* 'armpit'
 (/maténo(n-)/).
 (43) PA **neθenkwaθehsa* > Ch *natsénota* 'my cross-nephew'.

There is some evidence that the development of PA **še* and **še·* paralleled that of **θe* and **θe·*, though the supporting etymologies are not as solid or as numerous; this parallelism would support the generalization that a lengthened PA **e* gives Ch /*é*/, without the effects of yodation, after consonants that are subject to yodation before PA **e·* but not before **e*. For the yodation of PA **še·* to pCh **šyé* (> Ch /*sé*/; see §5) note the following:

- (44) PA ***še·ya·pya*, diminutive ***še·ya·pihsa* > Ch *sétOhkeho* 'rope' (anim. pl.); cf. Arapaho *séénook* 'rope' (anim.).³²

There is no yodation of PA **š* before **e* (see 16, 17, 25), and none in the one example that shows the pre-nasal lengthening of PA **e* after **š* to Ch /*ó*/:

- (45) PA **šenta* 'evergreen sp.' > Ch /*xéht-*/, in *šéstótóʔe* 'pine'.³³

It is possible that a following environment of a pCh **y*, or (earlier) a cluster ending in **y*, played a role in some similar shifts of vowel quality:

- (46) PA **-enkwa·m* 'sleep' > Ch /-*énóme*/ (extended by /-*e*/; e.g., *éhehpénome* 'he overslept', with /*hehp-*/ 'beyond' < PA **wemp-* 'up').³⁴

But the fact that such a following environment was not a factor in (45) suggests that it need not be invoked to explain (42) and (43) either.

9. There are some doublets and exceptions in which the expected developments of pCh *y do not appear. It is assumed that these are due to morphological analogy or rebuilding:

(47) PA *wa·ken- (*wa·k- 'bent' + *-en- 'act on, render, by grasp') > Ch /vóhkan-/ (/vóhk-/ + /-an-/), e.g. *évóhkána* 'he bends it by hand' (presumably with recomposition of the elements).

10. Although the loss or shift of nasals before obstruents is found in the majority of Algonquian languages, this innovation in Cheyenne must have been relatively late, and independent of what was happening in the rest of the family. This is demonstrated by the lengthening of short vowels before nasal clusters (as discussed in §8), a shift unique to Cheyenne and one that necessarily preceded the loss or shift of the nasals. The most distinctive Cheyenne innovations, the loss of PA *p and *k³⁵ and the replacement of length by tone in the vowel system, were evidently later still.

Notes

1. Although Proulx and Picard have found the key to explaining this correspondence, both accounts are open to criticism on some points. Proulx fails to recognize that the explanation of such cases of Ch *n* is the same regardless of the length of the following PA vowel, instead postulating a preliminary shift of PA *e to *i (implausibly linked to a similar shift in far distant Shawnee), followed by palatalization (*y insertion) before *i and *e. Picard deals only with occurrences before PA *e.
2. Underlying Cheyenne forms are written between slashes, with high tone marked with an acute accent (/é/, /á/, /ó/) and low tone unmarked; surface forms (roughly Bloomfield's phonemic level) are italicized,

with high and raised high tones marked with an acute (*é, á, ó*), mid tone (raised low) with a macron (*ē, ā, ō*), lowered high with a grave (*è, à, ò*), and low (from underlying low or high) unmarked. Word-final vowels are voiceless; other voiceless vowels are written with capital letters (*E, A, O*). Cheyenne forms are mostly taken from the cited publications and Glenmore and Leman (1984). I am indebted to Wayne Leman for some additional forms and for the emendation of some tones.

3. In this table "(?)" indicates that the reflex is unknown. Ch *he[?]po* 'lung' reflects what is usually reconstructed as PA **wehpani* (> Cree *ohpan*), but Woods Cree *oθpan, ospan* 'his lung' (Pentland 1979a:65) and Arapaho *híikon* 'lung' cast doubt on the identity of the PA cluster.
4. E.g., Ch *šé[?]še* (underlying /xé[?]xé/) 'duck' < PA **ši·[?]ši·pa*; Ch *sóhpe-* 'through' (preverb) < PA **ša·pwi*. The *s* reflex can most easily be accounted for by assuming that a **w* was intercalated between **š* and **a·* (a relatively back vowel, subject to rounding in several languages, including Cheyenne): PA **ša·* > **šwa·* > **šya·* (§2) > Ch /sól/ (§5).
5. Defenders of the claim that the distinction is a dialectal one (Alford 1979; Proulx 1982:468) have not addressed the counterarguments that have been raised (Goddard 1978). Note, for example: (with PA **p* and **k* dropped) Ch *taa[?]e* 'night' < PA **tepexki*; (with **p* retained and **k* dropped) *pàà[?]e* 'ashes' (underlying /páe/) < **penkwi*; (with **p* dropped and **k* retained) *ahke* 'gum' < PA **pekiwa*; (with both retained) *pahke* 'ashes (smaller amount)' (archaic) (perhaps *pàhke*; see §8), with the same etymon as *pàà[?]e*. It is obvious that the postulation of two dialects, even if burdened with no other difficulties, would contribute little to accounting for these forms.
6. Note that, in contrast, the reflex of PA **θ, *l, and *y* is only plain Ch *t* (Leman 1981:300); hence the statements by Proulx (1982:470) and Picard (1984:117) that PA **y* (etc.) and **t* merge are not strictly correct.
7. Ch *V[?]* is also inserted between the last two vowels that precede a word-final *-Ce* in some forms; Leman and Rhodes (1978:11) analyze these as ending in */-C/*, with the *-e* added by rule. Considering the inserted *?* to be a reflex of PA **k*, as Proulx (1982:468) and Picard (1984:115, n. 12) do, is unnecessary and does not account for the inserted vowel or the cases in which the lost consonant was PA **p*.

8. Post-consonantal semivowels drop before PA **i(·)* (they did not occur before PA **o[·]*); this loss could have occurred after the shift of PA **w* to pre-Ch **y* as long as it preceded the vowel shift, since the vowel shift produced new sequences of pCh **yé*, in which the pCh **y* is not always lost without a trace (see below). PA **we* was shifted to **o* before other instances of post-consonantal PA **w* shifted to pCh **y*.
9. See Table 2 and note 6. Word-initial PA **y* would presumably be treated the same, but there are no examples of its reflex in Cheyenne.
10. An additional environment in which pCh **y* is retained as Ch *n* is discussed below (§4). In (1-11) the instances of PA **p* and **k* that are lost are indicated in the pre-Cheyenne transcriptions with an overstruck slash (**p̄*, **k̄*). Well established reconstructions will be given without supporting evidence; less well known forms are sometimes supported with brief references. For a few reconstructions, like that in (1), I can cite no other reflexes, though they combine widely reflected Proto-Algonquian elements; these will be given with a double asterisk. The third-person prefix Ch *é-* is obligatory; it is set off with parentheses to indicate that it does not reflect anything in the Proto-Algonquian reconstruction (see note 15).
11. For additional examples see (12, 13, 14, 42, 43, and 46).
12. Cf. Menominee *teki·sew* 'he is bashful, ashamed' and Shawnee *tekwe·θi* 'he is ashamed'.
13. Presumably Ch */néh-/* 'nurse' (< PA **no·nl-*; e.g. *éneho* 'she nurses him') and Ch */véh-/* 'name' (< PA **wi·nl-*; e.g. *évovèho* 'he praised him') establish Ch */h/* as the reflex of PA **nl*; hence Ch *netse* must reflect the variant PA **keliwa* rather than **kenliwa* (Goddard 1973:3). Perhaps, as in other such pairs showing variation in a nasal cluster (Hamp 1976), **keliwa*, the variant without the nasal, was originally the non-initial form, used as a noun final **-keliw*; another pattern is seen in the medials PA **(a·)ntep-* 'head' and **-i·nkeθ-* 'forehead' (cf. Goddard 1973:4, n. 6) beside the dependent nouns **-temp-* (36) and **-Xkenθ-*.
14. Cf. Kickapoo *onakeehkwi*.
15. The prefixes used on Cheyenne nouns in the inflection for possessor are first person */na-/*, second person */ne-/*, and third person */he-/*, which regularly reflect PA **ne-*, **ke-*, and **we-*. The prefixes used on verbs,

except before a future preverb, are /ná-/ , /né-/ , and /é-/ . This series of prefixes has been restructured to pattern like preverbs (cf. Leman 1980b:264-265). They have an otherwise unmotivated high tone (which is not present before the future preverbs and, like the tone in certain preverbs, stands aloof from the tone morphophonemics of the rest of the verb [Leman 1981:295, 306]), they show no reflex of the PA *t that was intercalated after the pronomial prefixes before vowels, and the distribution and phonology of the third person prefix are both inappropriate for PA *we-. All of these peculiarities can probably be explained by assuming that this series reflects fusion of the prefixes with an unidentified preverb.

16. The reconstruction is based on Delaware and Menominee.
17. For the PA ending, see Goddard (1981:280-283). Of the several Cheyenne plurals given by modern speakers for this word, the one cited is the only one given by Petter (1915:781) and would appear to be the oldest. The tone on the singulars of (13) and (15) is secondary, as the plurals show.
18. The Proto-Algonquian form would have been 'white crane' (cf. for the simplex Siebert 1967:19), perhaps 'whooping crane'.
19. Such problems include the comparison of nouns of this type on the basis of abstract morphophonemic representations ending in /n/ (Leman 1980a:318), and incorrect plural reconstructions, which even so do not account for the Cheyenne forms (Proulx 1982:469).
20. Note the contrast with the treatment of pCh *ʔy, which gives Ch ʔ (e.g., 8, 10, 11).
21. The initial syllable is lost; exactly the same formation is found in Arapaho *hiwóxuuhóóx* ~ *wóxuuhóóx* 'horse'.
22. See note 8. The Cheyenne paradigms are given in full by Leman (1979:64, 66). The final PA *-ehθaʔsw 'act on by burning', which also has a reflex in Menominee, is presumably made up of PA *-sw 'act on by heat' and a prefinal consisting of the medial *-ehθak- 'wood' used as a classifier.
23. The synchronic alternation of ʔh and ʔn (23b and 24b vs. 22b) supports an analysis of Ch ʔn as underlying /ʔhn/; hence the alternations in (22-24) can be described as occurring in stems ending in underlying /hn/.

24. Examples are attested for PA *šw, *šy, *θw, and *tw. No examples have been found pointing to a pCh *ty that would reflect PA *ty or *lw; PA *θ and *t did not occur before *y, and PA *y did not occur before semivowels.
25. Cf. Leman (1980b:263, 267). The transitive animate stems showing an alternation between Ch /s/ (phonemic *s*) and /x/ (phonemic *š* and *x*) (Leman 1980b:267-268) reflect Proto-Algonquian stems in *-šw; unaffected PA *šw > pCh *šy > Ch /s/, while PA *š > Ch /x/ in the forms from which PA *w was removed by the rules operating in (23-24).
26. Cf. Cree *timikote·w* 'he has a short nose'; Cheyenne has many stems with /-(e)esé/ '...nose'.
27. Also reflected in Arapaho (-eθee), Delaware, and Menominee.
28. Cf. Cree *niste·s*; other languages show the same cluster but diminutive suffixes of various shapes.
29. Ch *heséóvó?e* 'sand' probably reflects PA *le·kaw- 'sand' + *-axky- 'earth', but the *he-* and the tones are unexplained; a possible variant *heséovo?e* has the expected tones.
30. Cf. PA *matempwi 'house frame' > Fox *matepwi* and derivatives in Menominee.
31. A preverb in Proto-Algonquian, and hence treated as an independent word, but accentually united with what follows in Cheyenne, and hence with tone kept high.
32. The Arapaho form would be the expected reflex of PA **še·ya·pya, consisting of PA *še-- (found in words for or referring to cordage; e.g. Cree *se·stak* 'yarn, twine, thread') + *-a·py 'string'; this may be the stem from which the well-established noun final PA *-e·ya·py is derived. The Cheyenne form is assumed to have diminutive /hk/ in place of expected /hp/, as also in *hóhkeehe* 'mouse' < PA *a·pikwehs-.
33. For Ch /x/ see §1 and note 4. The stem was extended by the abstract noun final PA *-ay, and then the noun final Ch /-ó?(e)/ (< PA *-a·xkw), found in other names of trees, was added.
34. Compare also, perhaps, the apparent raising of PA *e to Ch /e/ in the first syllable of (34).
35. Note that the existence of pCh *hy (> Ch *hn*) disproves the conjecture of Picard (1984:115, n. 12) that the shift of "PA" *ky to Ch *n* passed

through a stage *hy; [h] could not have been an intermediate stage in the loss of any instances of PA *k, since Cheyenne preserves /h/ ([h]) from PA *h.

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