

**A COMPARATIVE ANALYSIS OF BODY-PART TERMINOLOGY IN
NA-DENE AND YENISEIAN LANGUAGES**

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ABSTRACT

This study investigates what reconstructed proto-forms for body-part terminology can reveal about the potential genetic connection between Dene and Yeniseian languages. The research examines whether consistent phonological correspondences and cognate patterns across both families indicate a shared linguistic ancestry. Anatomical vocabulary was chosen because of its resistance to borrowing and semantic stability over time (Pattillo 2021; Snoek 2015). Using the comparative method, proto-forms are reconstructed through successive historical stages: from regional proto-languages such as Proto-Apachean, Proto-Pacific-Coast-Dene, and Proto-Alaska-Dene to higher levels including Proto-Dene, Proto-Dene-Eyak, Proto-Na-Dene, and ultimately Proto-Dene-Yeniseian. The study builds on Vajda's (2010) Dene-Yeniseian hypothesis and the updated Dene classification by Snoek, Stang & Rice (2022), expanding previous comparative work to include Yeniseian data from Ket as well as Proto-Yeniseian forms proposed by Vajda and Werner (2022). The findings contribute to ongoing discussions of long-range linguistic relationship and human prehistory across Siberia and North America.

USE OF GENERATIVE AI

The use of generative AI for this thesis is restricted to only a single instance: generating the image titled *Figure 2. Proposed Dene-Yeniseian language tree* in the Introduction (Section 1) on Page 15.

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1 Introduction

Na-Dene is a major Indigenous language family of North America, while Yeniseian is a much smaller language family historically spoken in Central Siberia. Despite their geographic separation, a genetic relationship between the two families has been proposed under the Dene-Yeniseian hypothesis. Establishing such a relationship would have important implications for the linguistic prehistory of both North America and Siberia, but the considerable time depth and limited surviving Yeniseian evidence make the hypothesis difficult to evaluate. This study contributes to that discussion by examining whether body-part terminology preserves lexical and phonological correspondences that can be reconstructed across the two families.

The study investigates lexical and phonological correspondences in a subset of Na-Dene and Yeniseian languages to assess potential cognates for selected body-part terms. The Na-Dene sample includes Tlingit, Eyak, and more than fifty languages belonging to the Dene¹ branch, with representatives from each major Dene subgroup, including Navajo (Apachean), Hupa (Pacific Coast), Northern Tutchone (Yukon), Koyukon (Alaska), Carrier (British Columbia), and Dene Sų́líné (Interior Canada). The Yeniseian evidence is drawn primarily from Ket and from Proto-Yeniseian reconstructions proposed by Vajda and Werner (2022), which provide the wider comparative framework for evaluating possible connections between the two families.

The Dene languages were not selected merely on the basis of geographic distribution, but in accordance with the internal subgroupings established through the phylogenetic analysis of

¹ In earlier literature, this branch of the family is most commonly referred to as “Athabaskan / Athapaskan / Athabascan”. In this paper, the branch will be referred to as the “Dene” languages instead. This is because the term “Athabaskan” has, in recent years, been increasingly replaced by “Dene,” a term originating within the languages themselves and meaning ‘person’ or ‘people.’ This shift aligns with community preferences to use terminology reflecting their own cultural identities and linguistic heritage (Alaska Native Language Center 2025).

Snoek et al. (2022). Their classification moves beyond traditional geographic groupings and identifies well-supported clusters based on shared lexical innovations and historical developments. The sampled languages represent distinct branches identified in that study and provide a diverse but linguistically coherent dataset suitable for comparative reconstruction. By applying the Comparative Method, this research identifies systematic sound correspondences and evaluates whether shared lexical items can be traced to common ancestral forms. Ultimately, the goal is to reconstruct a set of body-part terms through successive historical levels and to determine which, if any, can plausibly be reconstructed as far back as Proto-Dene-Yeniseian.

The geographical distribution of the languages included in the study is shown in Figure 1, while Figure 2 presents the genealogical relationships among the Na-Dene and Yeniseian languages and the reconstruction levels used throughout the analysis. These figures provide a reference for both the geographic extent of the dataset and the hierarchical structure followed in the comparative reconstruction.

Figure 1. Geographic Distribution of Na-Dene (left) and Yeniseian (right) languages
(CCA Noaheditis 2020 Remixed; CCA Himemiya M. 2009 Remixed; CCA Vajda 2020 Remixed)

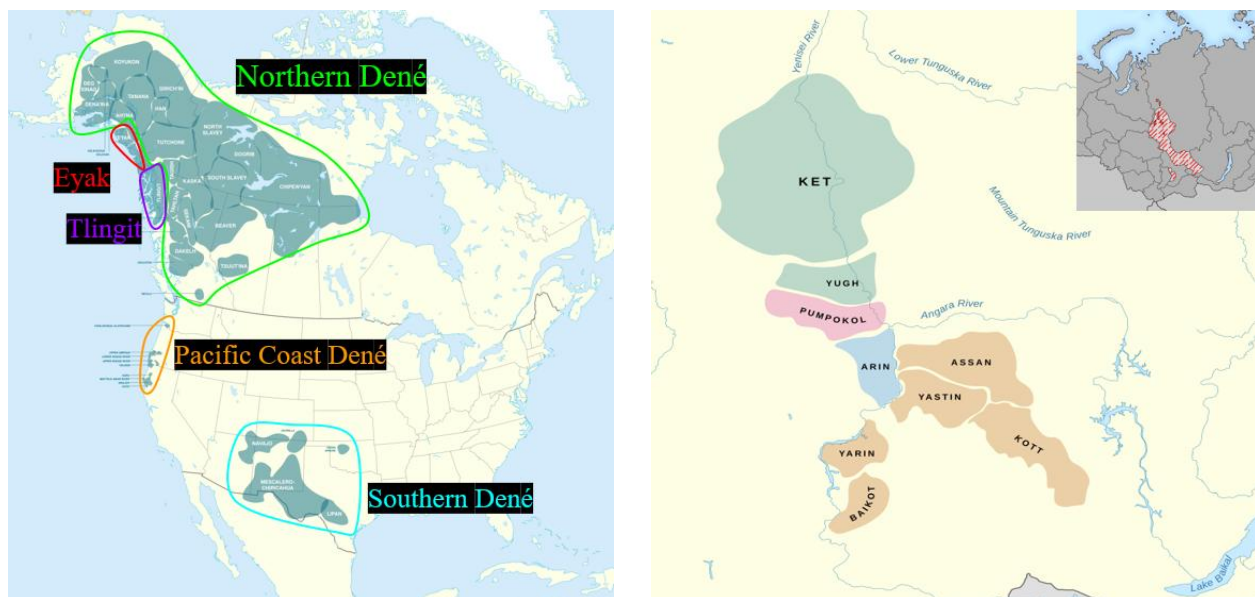
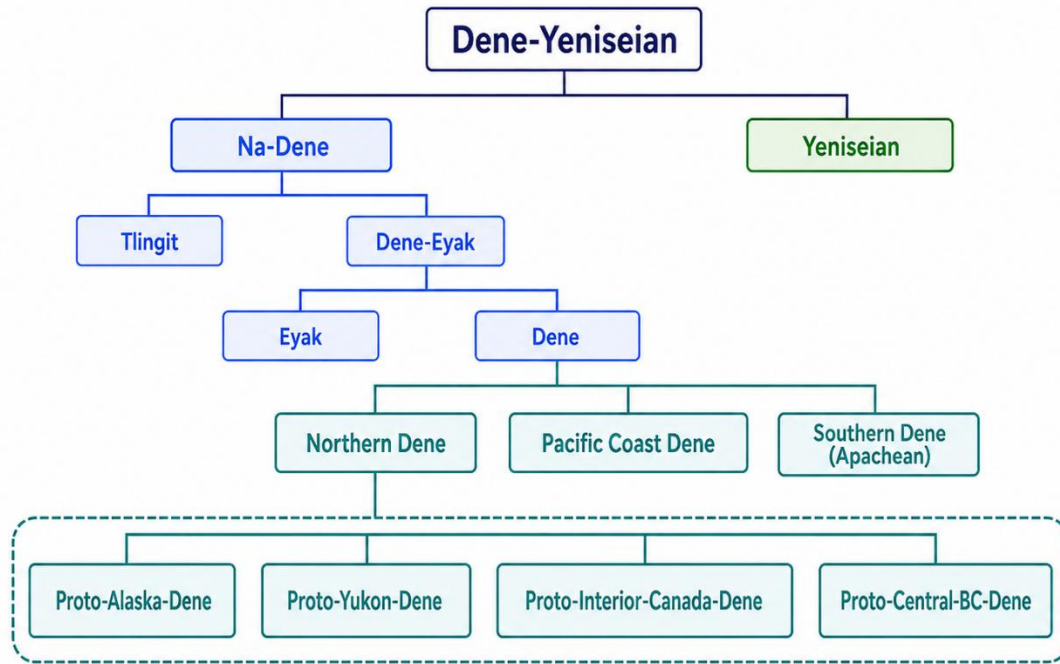


Figure 2. Proposed Dene-Yeniseian language tree, including Snoek et al. 2022 phylogenetic analysis



The Na-Dene language family is one of the largest Indigenous language families in North America in terms of the number of languages, number of speakers, and by territory, spanning from Alaska and the Canadian Northwest to the American Southwest. It encompasses several branches and subdivisions, most notably Tlingit, Eyak, and the Dene languages. These languages are not only linguistically diverse but also culturally rich, with distinct vocabularies reflecting the material and social realities of their speakers (Jaker et al. 2020: 1-3). Historical linguistics has played a central role in the study of the Na-Dene language family, offering valuable insights into prehistoric migration, language contact, and the processes of linguistic evolution over thousands of years (Krauss & Golla 1986).

The Yeniseian language family is a small and geographically isolated family, historically spoken along the Yenisei River in Central Siberia. It consisted of approximately 8 languages, most

of which are now extinct, with Ket being the only surviving member. The Yeniseian language family is of significant interest in historical linguistics due to its potential relationship to the Na-Dene languages of North America. Such a relationship would suggest a linguistic connection spanning thousands of kilometers at a time depth of over 10,000 years (Vajda 2015). Notably, the Yeniseian languages' typological features, such as prefixing verb morphology, complex aspectual systems, and certain phonological patterns, show intriguing parallels with Na-Dene languages. Vajda also discusses non-linguistic evidence, including genetic patterns that may point to older population connections between Yeniseian-speaking groups and Indigenous peoples of North America. In particular, he notes the distribution of the Q1 Y-chromosomal haplogroup subclade, which is widespread among populations of Indigenous peoples of North America, and also highly represented among the Ket, while being rare elsewhere in Eurasia outside groups with known historical contact with the Ket (Vajda 2010). These similarities have formed the foundation of the Dene-Yeniseian hypothesis, which remains controversial and will be discussed in more detail in section 2.3.3. The proposed relationship has attracted both support and criticism, particularly because of the considerable time depth involved, the limited surviving Yeniseian evidence, and disagreement over whether the proposed lexical and phonological correspondences are sufficient to demonstrate common ancestry. As with any historical linguistic comparison, distinguishing inherited features from independent innovations and borrowings from nearby, unrelated language families remains a critical challenge. Ket, as the only living representative of Yeniseian, plays a crucial role in comparative work and serves as a key reference point for reconstructing Proto-Dene-Yeniseian and evaluating potential links to Na-Dene.

The Comparative Method is the fundamental tool of historical linguistics used to establish genetic relationships between languages and to reconstruct proto-languages. By systematically

comparing cognates, words with a shared origin in different languages, linguists identify regular sound correspondences and reconstruct earlier phonological, morphological, and lexical forms. This method has been instrumental in classifying language families worldwide, including Indo-European, Afro-Asiatic, Austronesian, etc. (Campbell 2011: 311-313), and is therefore, central to evaluating the Dene-Yeniseian hypothesis. In the context of this study, the Comparative Method is applied to a specific subset of vocabulary: body-part terms. These terms are particularly useful for linguistic reconstruction because they tend to be among the most stable elements of vocabulary, less prone to borrowing compared to cultural or technological terms (Patillo 2021: 370). By examining phonological correspondences and morphological structures across Ket, Tlingit, Eyak, and the Dene languages, this study seeks to identify systematic patterns that could indicate common ancestral forms. If consistent correspondences emerge across the examined languages, this would strengthen the case for a shared origin. Conversely, a lack of regularity would suggest alternative explanations, such as areal contact or typological coincidence.

The relationship between the Na-Dene and Yeniseian language families represents a significant question in historical linguistics and beyond. While the two families are separated by vast geography, linguistic evidence such as exhibiting structural and lexical similarities suggests potential connections that warrant deeper analysis. By focusing on body-part terms, this study aims to provide a thorough analysis that contributes to broader discussions of language classification and historical migration.

The remainder of this thesis is organized as follows. Chapter 2 provides the linguistic and historical background for the study, introducing the Na-Dene and Yeniseian language families, reviewing earlier long-range comparison and the development and criticism of the Dene-Yeniseian hypothesis, and outlining relevant structural similarities and the history of documentation in both

families. Chapter 3 presents the methodology, including the Comparative Method, the reconstruction procedure used in this study, the theoretical relevance of body-part terminology, and the collection and organization of the dataset. Chapter 4 contains the main comparative analysis, reconstructing individual body-part terms across successive proto-language levels and organizing them into general body and structural tissues, head and face, limbs and extremities, torso and internal organs, and effluvia. Finally, Chapter 5 summarizes the results, discusses the principal limitations of the study, and identifies directions for future research.

2 Background

This chapter discusses the linguistic background necessary to contextualize the comparative study of Na-Dene and Yeniseian languages, providing an overview of each language family, their geographic distributions, and significant previous research. Lastly, a structural comparison between the two language families is presented, highlighting phonological and morphological similarities that support the Dene-Yeniseian hypothesis and provide linguistic evidence for investigating a possible historical relationship between these geographically distant language groups.

2.1 Na-Dene

The Na-Dene language family is one of the largest in North America. The Na-Dene languages exhibit a range of phonological, morphological, and syntactic features that set them apart from other North American Indigenous language families (Jaker et al. 2020: 1-3). Within the family, the languages demonstrate much variation in lexicon, reflecting their vast geographic distribution

and the significant time depth of over 10,000 years since their divergence (Vajda 2015). Despite the differences, they maintain many identifiable linguistic connections that point to a shared ancestral origin.

The Na-Dene family is split into the major branches Dene-Eyak and Tlingit. An isolated but integral member, Tlingit is theorized to have been the first to split off from the main family, and is spoken mostly in southeastern Alaska. Dene-Eyak is further divided into Dene and Eyak, another integral but divergent language that forms a branch of its own within the family, and is native to the Copper River Delta in Alaska (Snoek 2015: 22-25). Although it became extinct as a native language in 2008 with the death of its last native speaker (BBC 2008), there is a revitalization effort underway (Carlson 2022: 2). Lastly, the Dene branch has traditionally been divided geographically into Southern, Pacific Coast, and Northern regions. Recent phylogenetic research has refined this picture, especially within the large Northern Dene grouping (Snoek et al. 2022). The older Pacific Coast division remains largely intact, while the Southern division corresponds to what is now generally treated as the Apachean subgroup. The most substantial internal differentiation is found within Northern Dene, where lexical phylogenetic work has identified a number of more specific subgroups. According to the classification proposed by Snoek et al. (2022), the Dene languages examined in this study represent distinct lineages within the family. Some examples from each of the subgroups include Navajo, which belongs to the Apachean subgroup, a clearly defined branch located in the southwestern United States. Hupa represents the Pacific Coast Dene subgroup, which is geographically concentrated in northwestern California and Oregon. Northern Tutchone is part of the Yukon subgroup, which includes languages native to the Yukon Territory. Dene Sų́líné falls within the Interior Canada subgroup, a set of languages spoken across central and northern Canada. Carrier is classified within the Central

British Columbia subgroup, reflecting its distribution in the interior plateau region of the province. Koyukon belongs to the Central Alaska subgroup, comprising closely related languages spoken in Interior Alaska. These classifications offer a more detailed and linguistically grounded understanding of internal Dene relationships while still building on the broader traditional division between Apachean, Pacific Coast, and Northern Dene. The adoption of this phylogenetic model enables a more systematic and representative sampling strategy for comparative reconstruction, strengthening the foundation for exploring deeper genetic links between Dene, Eyak, Tlingit, and Yeniseian.

2.2 Yeniseian

The Yeniseian language family comprises a group of languages historically spoken along the Yenisei River in Central Siberia. This family includes several languages, such as Yugh, Kott, Arin, Assan and Pumpokol. However, all of these have unfortunately become extinct over the past few centuries. The Ket language is the only one that remains spoken today. For much of its recorded history, the Yeniseian language family was considered an isolate, with no clear connections to any other language group. There have been many attempts to link it to other families around the world, suggesting possible relationships with North Caucasian, Burushaski, Sino-Tibetan, Basque, and many more (Georg 2007: 19-20). These hypotheses were mostly based on surface similarities in sound patterns or grammar, but none of them held up to closer scrutiny. It wasn't until more recent research into the Dene-Yeniseian hypothesis, and particularly work by Edward Vajda (Vajda 2010; Vajda 2013b; Vajda 2015), that a more plausible linguistic connection began to take shape, linking Ket and its extinct relatives to the Na-Dene languages of North America.

The Yeniseian languages are characterized by their complex morphological and phonological systems, features that have set them apart from the other languages in the same region, such as Nenets and Selkup (Samoyedic, Uralic), Khanty (Ob-Ugric, Uralic) and Evenki (Tungusic) (Vajda 2008: 89). Verbs in Yeniseian languages often consist of multiple morphemes that encode various grammatical categories, such as subject and object agreement, tense, aspect, and mood. Additionally, Ket exhibits a rich consonant inventory and employs tonal distinctions to differentiate meaning, a trait unique among Siberian languages. The language utilizes both level and contour tones (Georg 2007: 47). A more detailed explanation will be provided in section 2.4 on the structural overview of similarities between Na-Dene and Yeniseian languages. Nevertheless, this morphological and phonological complexity present in the Yeniseian languages parallels certain aspects of the Na-Dene languages.

The sociolinguistic context of Ket is marked by language endangerment. According to the Russian government census from 2020, there were 153 native speakers of the Ket language (Rosstat 2020). However, according to Yulia Galyamina, a researcher who participated in several expeditions to the Ket homeland in 2010, there were only 19 people who claimed to be fluent in Ket. It is likely that the number is even smaller today. Efforts have been made to document and revitalize the language. These initiatives include compiling dictionaries, recording native speakers, and developing educational materials to support language learning among younger community members (Galyamina 2018).

2.3 Foundational work and previous research

This chapter reviews the principal lines of research that provide the historical and methodological background for the present study. It begins with early attempts at long-range linguistic comparison

and the major methodological criticisms directed at such work. It then introduces the Dene-Yeniseian hypothesis itself and the evidence that has been proposed in support of a genetic relationship between Na-Dene and Yeniseian. The final sections outline the history of documentation and comparative research on the Na-Dene and Yeniseian language families, establishing the linguistic sources and reconstructions on which the present analysis is based.

2.3.1 Early Long-Range Comparison Attempts

Scholars have long attempted to discern deep genetic relationships among the world's languages, often by proposing expansive macro-family groupings that unite multiple established families. In the early 20th century, Alfredo Trombetti speculated about remote links between the Na-Dene languages of North America and the Yeniseian languages of Siberia (Trombetti 1923, as cited in Vajda 2010: 1-2). Separately, V. M. Illich-Svitych laid the foundation to the proposed “Nostratic” super-family (term coined by linguist Holger Pedersen), which included Indo-European, and also Uralic, Altaic, among others (Tokaeva & Abdulvakhabova 2023). Such early long-range comparisons were driven by the idea that many of the world's languages might ultimately share common origins beyond the well-established families.

In the following decades, many more classification proposals emerged. Joseph Greenberg, in particular, became known for his ambitious linguistic groupings. In his classification of African languages (Greenberg 1963) and later of Papuan and other languages, Greenberg pioneered a method of “mass comparison”, examining superficial resemblances across dozens of languages simultaneously. His most controversial proposal was “Amerind”, a macro-family grouping the vast majority of Indigenous languages of the Americas into one genetic unit (Greenberg 1987). Greenberg claimed that by surveying a broad array of languages, genuine deep relationships and

sound correspondences would become visible. Many long-range comparison approaches differ from the standard Comparative Method used in historical linguistics, which places greater emphasis on regular sound correspondences and the reconstruction of proto-forms.

Not all early macro-family proposals were received skeptically. Greenberg's earlier work on African languages, for instance, helped refine African language classification, although many details were later revised. However, most proposals positing extreme time-depth groupings remained highly contentious. The proposed Nostratic family exemplified the challenges of early long-range comparison. While a number of linguists embraced Nostratic and even produced extensive comparative lists and reconstructed proto-forms (Dolgopolsky 2008), many others were largely unconvinced. These ideas made little headway in mainstream linguistics, as scholars questioned whether such distant relationships could be demonstrated with the evidence available (Campbell 1998: 311; Trask 1996: 226-227). By the late 20th century, the field had effectively split into so-called "lumpers" and "splitters" - those who lump languages into giant macro-families, and those insisting on strict standards and often preferring to split languages into smaller proven families. As Michael Fortescue notes:

I have attempted throughout to find a middle way between the cavalier optimism of 'lumpers' and the pessimism of orthodox 'splitters' on matters of deep genetic relationship between the continents.

(Fortescue 1998: 1)

His comment reflects how early long-range comparisons were often marked by excitement about big ideas, but also met with concern over the lack of solid methods.

2.3.2 Critiques of Long-Range Comparison

The ambitious early attempts at long-range comparison prompted significant criticism from historical linguists committed to the Comparative Method. Methodological concerns were at the forefront of these critiques. Traditional comparative-historical linguistics requires evidence of systematic sound correspondences, regular sound changes, and where possible, reconstruction of proto-forms (Campbell 1998: 112-123). By contrast, many macro-family proposals relied on mass comparison or loose lists of look-alike words without establishing regular correspondences. Without regular sound correspondences, lexical resemblances alone cannot reliably distinguish inherited cognates from chance similarities. Apparent cognates in long-range comparisons may therefore reflect coincidence rather than a genuine genetic relationship.

Beyond the risk of coincidental resemblances, data quality and accuracy have been recurring issues. Additionally, long-range hypotheses generally failed to provide independent morphological evidence. Genetic relationships are more convincingly demonstrated when we find not only similar-sounding vocabulary, but also shared morphological paradigms or grammatical constructions that are unlikely to be borrowed. Early macro-family proposals, Greenberg's Amerind being a prime example, offered very little in the way of shared morphology or grammatical derivational and inflectional patterning. This absence made critics even more skeptical, since purely lexical comparisons over great time depths are notoriously unreliable given the rapid turnover of basic vocabulary over millennia. It is generally held that beyond roughly 6,000-8,000 years of separation is the edge at which traces of a common origin in vocabulary is possible to see. Anything beyond 10,000 and most linguists become increasingly more pessimistic (Trask 1996: 191-195). Thus, many linguists viewed the long-range comparativists' claims as effectively unprovable under accepted scientific standards (Trask 1996: 203-209). By the 1990s,

the mainstream consensus was that most proposed macro-families remained speculative at best.

Campbell and Poser conclude that:

The classification of Indo-European languages was accomplished by the techniques advocated by the critics of *Language in the Americas* and other similar work, namely sound correspondences between items of basic vocabulary and grammatical correspondences, especially those involving submerged morphology. The methods used bear no resemblance to Greenberg's; in the rare cases in which such methods were used, they led to serious error.

(Campbell & Poser 2008: 232-233)

Campbell also wrote a review article of Greenberg's *Language in the Americas*, which he begins by stating:

Greenberg's *Language in the Americas* [...] has a detrimental impact on the field; its classification should not be accepted; the record should be set straight. This is a strongly negative evaluation, but necessary.

(Campbell 1998: 1)

In general, critiques of long-range comparison centered on its departure from the Comparative Method, the unreliability of long-range lexical resemblances, and the lack of rigorous evidence. These critiques set a high bar that any new hypotheses of deep genetic relationship would have to meet in order to gain acceptance.

2.3.3 The Dene-Yeniseian Hypothesis

Against this backdrop of skepticism, the Dene-Yeniseian hypothesis has emerged in recent decades as a notable example of a long-range proposal receiving measured but genuine scholarly interest. The hypothesis proposes a genetic relationship between the Na-Dene languages of North America (comprising Tlingit, Eyak, and the Dene languages) and the Yeniseian languages of central Siberia (of which only Ket survives today). Throughout the 20th century, several linguists noted

typological parallels between the two families, including complex verb prefixation, tonal distinctions, and inalienable possession patterns, though not all of them presented favourable views initially (Georg 2007: 19-20; Fortescue 1998: 213-215). It was not until the 1990s and 2000s that the hypothesis gained traction through more sustained and methodologically rigorous investigation. The need for more evidence became apparent as comparative historical linguists demanded systematic sound correspondences, reconstructed proto-forms, and non-trivial morphological parallels before entertaining claims of deep genetic relationships. It was within this context that Edward Vajda's research offered a more robust framework grounded in the Comparative Method. His findings would mark the first proper attempt to establish the Dene-Yeniseian link using traditional historical linguistic principles (Vajda 2010).

After more than a decade of research, Vajda presented his findings at a 2008 symposium in Alaska, titled "A Siberian Link with Na-Dene Languages" (Vajda 2010). Vajda's contribution was significant in that it applied the Comparative Method and drew on morphological evidence in addition to lexical data. He compared reconstructions of Proto-Yeniseian with those of Proto-Na-Dene, identifying proposed cognate morphemes (including basic vocabulary and grammatical affixes) alongside a set of consistent sound correspondences. A defining strength of the Dene-Yeniseian hypothesis lies in its detailed morphological and phonological correspondences. Rather than relying solely on lexical matches, Vajda systematically compared the complex verbal prefix structures characteristic of both Na-Dene and Yeniseian. He demonstrated that these languages exhibit an unusually high number of prefixed verb slots, up to ten in both families, with highly constrained linear orderings. Both Na-Dene and Yeniseian languages exhibit a highly prefixing verbal morphology, with verbal stems preceded by multiple affixes in rigid position classes. Vajda

demonstrates that the Na-Dene verb template, exemplified in languages like Navajo, contains up to ten distinct prefix slots (Figure 3), and that a similarly templatic system exists in Ket (Figure 4).

Figure 3. Position classes in Modern Navajo verb (Vajda 2010: 38)

(for published descriptions, with right-to-left numbering, cf. Young & Morgan 1987:37-8, and Young 2000:18-26)

10	9	8	7	6	5	4	3	+	2	1	0
"outer objects" (incorporated postpositional construction, indirect obj. reciprocal, etc.)	iter- ative prefix	outer lexical prefixes	distrib- utive plural /da/ (more than 2)	direct object	3 rd person subject	inner prefixes (shape prefixes, etc.)	"conjugation" prefix relating to tense/mood/ aspect (<i>si, ni, yi</i>)		1 st , 2 nd subject	"classifier" (=valence change prefix) ɬ, d l, Ø	verb stem = set of root + suffix allomorphs expressing tense, mood, aspect
disjunct prefixes				conjunct prefixes		conjugation+subject			classifier + stem		

Figure 4. Position classes in Modern Ket verb (Vajda 2010: 36)

P8	P7	P6	P5	P4	P3	P2	P1	P0	suffix
new subj. person agr clitic	incor- porated noun or adj. root, or new verb base	obj agr.	thematic con- sonants	tense/mood marker (<i>s</i> or <i>ya</i>)	inanimate marker <i>b</i>	tense/mood/ aspect consonant (<i>l</i> or <i>n</i>)	old 1p, 2p subject agr	verb base	animate subject plural

Although not identical, the two systems share typologically rare features such as pronominal affixes, aspect-modifying prefixes, incorporated noun roots, and directional or locational markers. Particularly notable is the presence of corresponding pronominal prefixes in both families. Vajda presents preliminary evidence suggesting possible homology between elements of the Yeniseian and Na-Dene pronominal systems, including proposed correspondences in first- and second-person forms, although he emphasizes considerable uncertainty in their reconstruction (Vajda 2010: 50).

The reception of Vajda's Dene-Yeniseian proposal has been notably more positive than that of previous macro-family claims, though it still does have its fair share of scrutiny. Experts from various subfields offered peer commentary on Vajda's findings. Bernard Comrie calls Dene-Yeniseian:

The first demonstration of a genealogical link between Old World and New World language families that meets the standards of traditional comparative-historical linguistics.

(Comrie 2008)

This was high praise, suggesting that for the first time a trans-Beringian linguistic connection had been argued on grounds acceptable to Comparative Method practitioners. Other linguists characterized Vajda's case as promising but not yet proven. For example, George Starostin gave a critical assessment in which he deemed Dene-Yeniseian "plausible" and "exciting," but cautioned that the evidence was still short of conclusive proof (Starostin 2012: 137-138). Perhaps most significantly, Lyle Campbell, one of the harshest critics of Greenberg's Amerind, acknowledged Vajda's hard work, even as he remained unconvinced of the conclusion. In a 2011 review, Campbell noted that:

While all of the authors of this section agree that the evidence for the Dene-Yeniseian hypothesis is high quality and that the hypothesis should be taken seriously, there is not unanimous agreement that it has been decisively proven.

(Campbell 2011: 430)

In his response, Vajda agreed that more work was needed, committing to address outstanding problems and gather additional evidence. This collegial back-and-forth illustrates that, unlike earlier grand hypotheses which were often dismissed outright, Dene-Yeniseian is being engaged with as a testable hypothesis within the scholarly community (Vajda 2012).

One reason Dene-Yeniseian has received more favorable attention is its limited scope and solid methodology. By focusing on two language families that, while geographically distant, share certain typological features and are separated by a time depth of 10,000 years, the hypothesis stays within a realm where linguistic comparison is challenging but not entirely impossible. Vajda's approach drew on reconstructed proto-forms and well-attested sound correspondences, rather than

the mass comparison style. Moreover, the inclusion of morphological evidence (such as verb structure and affixes) addressed a key demand of skeptics for non-lexical similarities. This is in contrast to proposals like Amerind or Nostratic, which tried to encompass far larger sets of languages with far less rigorous evidence. As a result, Dene-Yeniseian has been taken seriously as a working hypothesis, and it gave start to further original research, including interdisciplinary efforts. For example, archaeological research has considered prehistoric migration scenarios relevant to a possible Dene-Yeniseian connection (Ives 2010), while genetic studies have examined the population history of Beringia and movements between Siberia and North America (Tamm et al. 2007). Sicoli and Holton (2014), by contrast, approached the question linguistically, using typological data and computational phylogenetic methods to compare alternative dispersal models. Assuming the validity of the Dene-Yeniseian relationship, their analysis favored a scenario involving an early expansion from Beringia and subsequent westward migration into Siberia over a unidirectional migration from central or western Asia into North America. While these studies extend beyond the original linguistic argument, they reflect the extent to which the Dene-Yeniseian hypothesis has been taken seriously enough to motivate further research across several disciplines.

The historiography of long-range comparison in historical linguistics is characterized by bold hypotheses and equally strong backlash, with the field gradually refining what standards of evidence are required to demonstrate ancient linguistic connections. Early attempts like Greenberg's Amerind and Nostratic stretched the limits of the Comparative Method and met with justifiable skepticism due to methodological errors and insufficient evidence. The Dene-Yeniseian hypothesis, by contrast, represents a more measured approach, one that acknowledges those criticisms. This balance has led to a noticeably warmer reception, as researchers weigh the

compelling prefixes, cognates, and sound correspondences that Vajda and colleagues have brought to light. Nevertheless, this is still an ongoing investigation, as even proponents agree that the hypothesis is not definitively proven. Still, the discourse surrounding it demonstrates how long-range comparison can reach broader acceptance by adhering to the core principles of historical linguistics and by transparently addressing critiques. This historiographical perspective sets the stage for the present thesis, which builds on the foundation of Dene-Yeniseian research and contributes additional evidence through a focused comparative study of body-part terminology.

2.3.4 Documentation of Na-Dene

Systematic linguistic studies of Dene languages commenced in the late 19th and early 20th centuries. Early foundational work was carried out by linguists like Franz Boas and Edward Sapir, who conducted fieldwork among various Dene-speaking communities, establishing a framework for subsequent documentation and comparative research. Edward Sapir, notably, published extensive comparative analyses and contributed significantly to the historical linguistic reconstruction of the family, laying essential groundwork for future studies (Snoek 2015: 12-13).

The mid-20th century saw further advances by linguists such as Harry Hoijer, who provided extensive descriptions of Dene languages and contributed foundational work in lexical semantics and grammatical structure. Hoijer established a systematic approach for analyzing the intricate verb morphology characteristic of Dene languages, greatly influencing subsequent linguistic methodology (Hoijer 1962). In the later decades of the 20th century, Michael E. Krauss significantly expanded upon earlier linguistic documentation, emphasizing language preservation and revitalization efforts. Krauss's meticulous work in Alaska resulted in an invaluable collection of linguistic materials that remain crucial for contemporary Dene research (Krauss 1980).

Another prominent figure, Jeff Leer, provided groundbreaking analyses of phonological and morphological aspects of Dene languages, most notably Tlingit. Krauss and Leer's detailed reconstructions of proto-languages within the Dene family significantly refined earlier comparative models and established robust frameworks for analyzing historical linguistic relationships (Krauss & Leer 1981). Further developments in linguistic theory and historical linguistics methodologies were reflected in research by Keren Rice, whose detailed grammar and phonological descriptions of Slavey became a benchmark for descriptive and theoretical studies within the family (Rice 1999).

Initially, Haida was included within the Na-Dene family due to apparent typological similarities. However, subsequent analyses conducted primarily by Campbell (1997), Krauss (1976) and Marianne Mithun (1999) demonstrated insufficient lexical and morphological evidence for a genetic affiliation, leading to Haida's eventual exclusion from the Na-Dene classification. Today, Haida is generally recognized as a linguistic isolate (Snoek 2015: 21-24).

Recent decades have seen increased collaboration between linguists and Indigenous communities, emphasizing the integration of community perspectives and Indigenous epistemologies into linguistic research. This approach has enriched both descriptive and theoretical understandings of Dene languages, ensuring that contemporary research aligns with community priorities and language revitalization efforts (Hatcher et al: 2009).

2.3.5 Documentation of Yeniseian

The earliest documentation of the Yeniseian languages began with explorers passing through Siberia in the 17th and 18th centuries, recording limited data on the region's indigenous peoples (Vajda 2013b: 1-3). More systematic linguistic studies began with Finnish linguist Matthias Castrén, who conducted fieldwork among the Ket, Yugh, and Kott in the 1840s. His materials

provided the first extensive grammatical descriptions and lexical data on Yeniseian languages (Georg 2007: 16-17). During the early Soviet period, Nestor Konstantinovich Karger developed the first Latin-based Ket alphabet and compiled pedagogical materials in the 1930s before his arrest and disappearance during the Second World War (Kistova & Pimenova 2018). Later, Heinrich Werner contributed significantly to Yeniseian studies from the 1970s onward, refining phonological reconstructions and comparative analyses, and publishing many studies and articles on various aspects of the linguistics of Ket, such as one of his more substantial works, *Die ketische Sprache* [The Ket Language], published in 1997 (Georg 2007: 327).

In the early 2000s, Edward Vajda built upon Werner's research to develop a comparative framework linking Yeniseian and Na-Dene. Conducting extensive fieldwork with fluent speakers of Ket, Vajda meticulously analyzed its verbal morphology, phonological correspondences, and lexical parallels with Na-Dene languages. His 2010 publication, *A Siberian Link with Na-Dene Languages*, was the first major peer-reviewed study to argue for a genetic relationship between these two language families. Vajda identified over 110 potential cognate morphemes and demonstrated systematic correspondences in verb structure, including parallel morphological slots and shared prefixal morphology (Vajda 2010). Vajda's work has been widely discussed and evaluated within the linguistic community. In the publication *The Dene-Yeniseian Connection*, edited by James Kari and Ben A. Potter (2010), several linguists in the field such as Bernard Comrie, Johanna Nichols, Michael E. Krauss, Jeff Leer, among others, noted that Vajda's morphological comparisons provide strong evidence for a historical relationship.

Another significant study worth mentioning is Stefan Georg's *A Descriptive Grammar of Ket (Yenisei-Ostyak)* (2007), which provides one of the most detailed and comprehensive

descriptions of the Ket language to date. The work examines Ket phonetics, morphology, and syntax, offering in-depth analysis of all aspects of the language.

The study of Dene-Yeniseian remains an active field, with researchers working to expand comparative datasets and refine phonological reconstructions. The research conducted over the past several decades, particularly by Werner, Vajda, and their contemporaries, has laid the foundation for continued exploration into the historical connections between these two language families.

2.4 Structural overview and similarities of Na-Dene and Yeniseian languages

The structural similarities between Na-Dene and Yeniseian languages serve as a key foundation for the Dene-Yeniseian hypothesis. While these two families developed independently for thousands of years, they share striking similarities in several structural features such as possessive morphology, postpositional constructions, directional systems, demonstrative structures, phonological correspondences, and more (Vajda 2010; Vajda 2013a). These form the basis for the Dene-Yeniseian hypothesis, which attempts to establish a linguistic and genealogical relationship between the two language families, and provide a strong linguistic foundation for further historical comparative analysis. This section outlines some of these shared features, highlighting how morphosyntactic and phonological patterns in both families provide evidence for a possible common ancestry.

One of the most immediately noticeable similarities between the Na-Dene and Yeniseian language families is their strongly prefixing verbal morphology. This is typologically significant because prefixation is cross-linguistically less common than suffixation, making the shared

reliance on extensive prefixing morphology a comparatively unusual structural feature rather than simply a general morphological resemblance (Grossman & Polis 2019). Unlike most languages in their respective regions, which tend to exhibit suffixation, both Na-Dene and Yeniseian verbs are built around a complex system of prefixes that encode a variety of grammatical categories (Vajda 2010: 36). In Na-Dene languages, the verb template has multiple slots for prefixes that mark tense, mood, aspect, subject agreement, and other grammatical features. The subject pronouns generally appear as prefixes, as do spatial markers and certain lexical elements. While some verb components may appear as suffixes in certain languages, the core structure remains prefixing. This is considered one of the defining features of the family. Similarly, Yeniseian languages, including modern Ket, exhibit a highly prefixing verbal system. The oldest layer of Yeniseian verb morphology closely mirrors Na-Dene in its reliance on prefixes rather than suffixes (Vajda 2010: 38-39). Like Na-Dene, Yeniseian verbs place subject agreement markers, spatial prefixes (some derived from body-part terms), and tense/mood/aspect markers before the root. While modern Ket has developed some suffixing tendencies, likely due to contact with neighboring Uralic and Turkic languages, as well as Russian, the fundamental structure of Proto-Yeniseian verbs was prefixing, with many of these core morphemes aligning with those in Na-Dene (Vajda 2010: 40). The fact that both families independently retained a prefix-heavy verbal structure over thousands of years, despite geographical separation, points to a common origin rather than typological coincidence. Their shared reliance on prefixes and rigid verb templates makes this one of the strongest structural arguments supporting the Dene-Yeniseian hypothesis.

One area of proposed structural correspondence between Na-Dene and Yeniseian concerns vestiges of possessive morphology. In Dene languages such as Slavey, certain inalienably possessed nouns require nasal-class forms of the possessive prefixes. In *sɪ-lá* ‘my hand’ and *nɪ-lá*

‘your hand’, the nasal element is realized as nasalization of the prefix vowel, contrasting with the non-nasal possessive prefixes *se-* ‘my’ and *ne-* ‘your’ found with other nouns (Vajda 2013a: 80). Ket likewise uses preposed pronominal markers to express possession, as in *b-ki*’s ‘my leg’ and *k-ti*’ ‘your (sg.) head’, although this general use of possessive prefixes does not by itself constitute a specific parallel with the Dene nasal-class system. More relevant to Vajda’s comparison is the occurrence of [ŋ] in several Ket oblique case forms built on possessive bases. For example, *tiš-di-ŋten* ‘at the stone’, *tiš-di-ŋal* ‘from the stone’, and *tiš-di-ŋa* ‘to the stone’ contain a nasal element between the possessive base and the respective case endings. Vajda analyzes this [ŋ] as a possible remnant of an earlier generic possessive connector and proposes that it may be cognate with the Dene nasal-class element (Vajda 2013a: 82). The comparison therefore concerns not simply the presence of prefixing possession in both families, but the possible survival of related possessive morphology in otherwise different constructions.

Directional morphology also provides compelling structural parallels. Both language families have developed rich directional systems that encode movement in relation to geographical features, especially bodies of water. In Ket, directional stems incorporate possessive elements and appear in complex predicates, such as *d-igda-bes* ‘passing downland from it’ and *d-aged-bes* ‘passing upland from it.’ Similarly, Na-Dene languages contain directional morphemes that mark spatial relationships, with reconstructed Proto-Dene forms such as **yəχ* ‘down’ and **dəq* ‘up.’ What is particularly notable about this is the way both families associate ‘down’ with ‘toward water’ and ‘up’ with ‘away from water’, a rare typological pattern that strengthens the case for a historical connection. Additionally, both families incorporate these directional elements into motion verbs, allowing speakers to express complex spatial relationships through verb morphology (Vajda 2013a: 86-87).

Phonological correspondences between Na-Dene and Yeniseian provide the strongest kind of evidence of potential historical links. Some of the proposed phonological correspondences involve differences in syllable prosody, particularly the relationship between Yeniseian tone and earlier consonantal features. A key feature in Yeniseian is tonogenesis, a process through which tonal distinctions developed from earlier phonemic contrasts (Vajda 2010: 64). For example, a high-even tone on a half-long vowel in Ket may correspond to a glottalized obstruent in Na-Dene, as in Ket *tī̃k* ‘fallen snow’ and Proto-Na-Dene *t’iki* ‘ice, frozen snow’. Similarly, abrupt tone in Ket, marked by laryngealization or glottal closure, often corresponds to glottalized stops in Proto-Na-Dene, as seen in Ket *-tʰq* ‘finger’ and Proto-Dene **-ts’oG* ‘finger’ (Vajda 2010: 65). The same example of ‘finger’ demonstrates the fact that unexpected lateral onsets occur in cognates in certain Na-Dene languages, particularly Tlingit. Some Tlingit body-part nouns do not align with expected Proto-Na-Dene reconstructions. For example, Proto-Dene *-ts’oG* ‘finger’ corresponds to Tlingit *-tʰ’iq* ‘finger’, while Proto-Dene *-ts’u* ‘breast’ corresponds to Tlingit *-t’à* ‘breast’, both showing an unexpected lateral articulation in the Tlingit onset. No nasal possessive prefix is synchronically visible in these Tlingit forms. Rather, Vajda proposes that an earlier possessive connector, reconstructed approximately as *[*ŋʷ]*, may have fused with the original Pre-Tlingit onset *[*ts’]*, altering its fricative component and producing the lateral articulation preserved in modern Tlingit (Vajda 2013a: 89)-90. A possible Yeniseian example is Ket *lanad* ‘hand’, which Vajda tentatively analyzes as containing a remnant of the same possessive connector. He relates *la-* to Proto-Athabaskan *-la* ‘point, end’ and analyzes *-ad* as a body-part element deriving from Ket *aʔd* ‘bone’, leaving the intervening *[ŋ]* as a possible vestige of earlier possessive morphology. This interpretation remains speculative, however, since other Ket nouns containing *-ad*, such as *kilad* ‘thigh’ and *qobad* ‘back’, do not contain a corresponding nasal element (Vajda 2013a: 89-90).

Another proposed regular correspondence involves the reduction of affricates to continuants in Yeniseian coda position. Proto-Na-Dene [**tʃ*] corresponds to Ket [l], as seen in Ket *hā-l* ‘bend’ compared with Proto-Dene *wa-tʃ* ‘hang suspended’. Similarly, Proto-Na-Dene [**ts*] corresponds to Ket [s], as seen in Ket *hā-s* ‘round shape, shaman’s tambourine, disc (of full moon)’ and Proto-Dene *wa-ts* ‘round shape’ (Vajda 2010: 67). These examples illustrate the broader pattern of coda affricates being reflected as continuants on the Yeniseian side.

Taken together, these shared morphological and phonological patterns strengthen the case for a historical relationship between Na-Dene and Yeniseian. While each family has undergone independent development, the preference of prefixes over suffixes, persistence of possessive morphology in noun phrases, directional systems, and phonological correspondences point to deep-rooted similarities, which are more than just typological coincidences. These features provide a strong linguistic foundation for further comparative research.

3 Methodology

This research is both feasible and valuable for historical linguistics, Na-Dene and Yeniseian linguistics, and Indigenous language documentation. The Comparative Method has been successfully applied in numerous language families worldwide, and its use in examining Dene-Yeniseian relationships aligns with established methodologies. By focusing on body-part terminology, this study selects a semantic domain that is highly resistant to borrowing, increasing the likelihood that identified correspondences reflect true genetic inheritance rather than instances of borrowing. The selection of languages - Ket, Tlingit, Eyak, over 50 Dene varieties, and Proto-Yeniseian reconstruction (Vajda & Werner 2022) ensures a well-balanced dataset that represents all angles of the Dene-Yeniseian connection. The availability of lexical resources for these

languages, combined with existing research on their historical development, supports the viability of this study. Finally, this research contributes to broader discussions on language classification, migration history, and linguistic prehistory in North America and Siberia. By systematically analyzing body-part terminology, this study aims to produce meaningful insights into the linguistic ties between Dene-Yeniseian languages and refine our understanding of their historical development.

3.1. The Comparative Method

The Comparative Method is a core technique in historical linguistics used to establish genetic relationships between languages and reconstruct their common ancestors. This method operates by systematically identifying correspondences in phonology, morphology, and lexicon among languages suspected to share a common origin. Through the Comparative Method, linguists establish sets of cognates, words in different languages that derive from a shared ancestral form, and analyze systematic changes in both sound and meaning, in order to reconstruct proto-forms (Campbell 1998: 111-112).

In this study, the Comparative Method will be applied to body-part terminology in Dene-Yeniseian languages. The dataset includes terms from Proto-Yeniseian, Ket, Tlingit, Eyak, and over 50 Dene languages, allowing for a detailed analysis of shared features and systematic correspondences. By identifying recurring patterns in phonetic changes across these languages, this research aims to reconstruct probable proto-forms for body-part terms in Proto-Dene-Yeniseian. This method will also help determine whether observed similarities result from inheritance rather than contact or chance resemblance.

The analysis will follow standard procedures in comparative linguistics, including establishing cognate sets, formulating sound correspondences, and applying reconstruction principles such as regularity of sound change and checking the plausibility of the reconstructed sound from the perspective of linguistic universals and typological expectations (Campbell, 1998: 130). This involves considering whether a reconstructed sound can plausibly develop into the attested reflexes through commonly observed types of sound change. For example, a correspondence between stops and fricatives may be reconstructed with an earlier stop if the distribution can reasonably be explained through lenition, whereby a stop develops into a fricative in particular branches or phonological environments.

3.2. Linguistic reconstruction and process

Linguistic reconstruction is crucial for understanding the historical development of languages. Comparative reconstruction works across two or more related languages by identifying systematic correspondences among cognate forms and using these correspondences to reconstruct an ancestral form. For example, if one branch regularly preserves a stop where another shows a corresponding fricative, comparison across a larger set of cognates may allow the earlier consonant to be reconstructed and the direction of the sound change to be inferred. Internal reconstruction, by contrast, works within a single language, using irregularities or alternations within its own phonological or morphological system to infer an earlier, more regular stage. For example, recurring alternation between two consonants in different forms of the same morpheme may preserve evidence of an earlier uniform form and the sound change that produced the alternation. Together, these techniques provide a framework for hypothesizing ancestral word forms (Campbell 1998: 112-114).

To achieve the reconstruction of selected body-part terminology within the Dene-Yeniseian family, this research employs a bottom-up comparative reconstruction approach, gradually moving through successive levels of proto-languages. This method begins by reconstructing intermediate proto-languages from lexical data available in well-documented modern languages, incrementally combining these forms at higher nodes on the language family tree. The reconstruction process involves collecting body-part terms from each relevant language and organizing them into cognate sets. Each cognate set will be analyzed for regular sound correspondences, which will serve as the foundation for proposing initial proto-forms. At this early stage, reconstructions will remain tentative and open to revision as additional correspondences emerge. Subsequently, this approach proceeds systematically through the genetically supported Dene subgroupings identified in Snoek et al. (2022). Within Northern Dene, lower-level reconstructions are first established for Proto-Alaska-Dene, Proto-Yukon-Dene, Proto-Interior-Canada-Dene, and Proto-Central-BC-Dene, which are then compared to reconstruct Proto-Northern-Dene. Proto-Northern-Dene is subsequently compared with Proto-Pacific-Coast-Dene and Proto-Apachean-Dene to reconstruct Proto-Dene. At the next level, Proto-Dene reconstructions are compared with lexical data from Eyak in order to reconstruct Proto-Dene-Eyak. The resulting Proto-Dene-Eyak forms are further compared with corresponding Tlingit lexical items to reconstruct Proto-Na-Dene (Proto-Dene-Eyak-Tlingit). On the Yeniseian side, the analysis relies primarily on the Proto-Yeniseian reconstructions of Vajda and Werner (2022), rather than reconstructing Proto-Yeniseian directly from modern Ket. Ket, as the only surviving Yeniseian language, is retained as supplementary evidence in order to observe how the reconstructed forms are reflected in the modern language and to assist in evaluating individual comparisons where necessary. Ultimately, the reconstructed Proto-Na-Dene forms and the

established Proto-Yeniseian reconstructions will be compared to evaluate possible Proto-Dene-Yeniseian body-part terms, representing the oldest recoverable stage of linguistic ancestry within this family.

Throughout this multi-stage process, proposed reconstructions will be compared with previously established reconstructions, sound correspondences, and historical analyses in earlier comparative work, particularly that of Krauss, Leer, Vajda, and other scholars working on the Na-Dene and Yeniseian families. Proposed reconstructions will also be assessed for compatibility with known phonological and morphological structures in Dene-Yeniseian languages, confirming alignment with plausible historical linguistic developments. Challenges in this process include distinguishing true cognates from loanwords, addressing irregular sound changes, and managing gaps in the historical linguistic record. However, by rigorously applying established comparative techniques, maintaining systematic verification at each intermediate stage, and cross-referencing multiple linguistic sources, this study aims to produce well-supported reconstructions of body-part terminology in Proto-Dene-Yeniseian.

Nevertheless, it is important to note that not every term in the dataset produces an equally successful reconstruction. Some terms can be reconstructed securely to Proto-Dene but not beyond it, while others may extend to Proto-Dene-Eyak, Proto-Na-Dene, or Proto-Dene-Yeniseian only tentatively. These less secure cases are nevertheless retained in the analysis because they help refine the limits of the comparison. Even when a term cannot be reconstructed to Proto-Na-Dene or Proto-Dene-Yeniseian, its discussion is useful for showing where the evidence weakens, where semantic or phonological problems arise, and where further data would be needed. Additionally, in some cases, a single anatomical concept is represented by more than one cognate set. The relative stability of body-part vocabulary does not mean that the meanings of individual terms

remain entirely unchanged. As discussed by Snoek (2015), body-part terminology can develop along semantic pathways in which a term extends from one anatomical region to a neighboring or functionally related body-part. Lexical stability can therefore coexist with semantic extension and shifts in anatomical reference. Such developments may result in several historically related lexical pathways within the same broad semantic domain. For this reason, the analysis does not assume that each body-part necessarily corresponds to a single inherited form. Where multiple cognate sets occur, they are treated separately before their historical relationship is evaluated.

3.3 Theoretical Relevance of Body-Part Terms in Historical and Comparative Linguistics

Body-part terms hold a special status in historical and comparative linguistics as part of the core vocabulary that all human languages share. The words for basic body-parts (e.g. head, hand, eye, foot) are universally present, and they tend to be lexically stable, semantically transparent, and highly resistant to borrowing across languages (Tadmor 2009: 65). These properties make anatomical terminology particularly useful in linguistic reconstruction and long-range comparison. This section explores why body-part terms are theoretically important for the Comparative Method. In particular, it illustrates how the stability of body-part vocabulary supports reconstructions across great time depth.

3.3.1 Lexical Stability

A key reason body-part terms are valuable for historical linguists is their lexical stability over time. Lexical stability means that these words are replaced by new words at a relatively slow rate in the

evolution of languages (Vejdemo 2010: 85-86). Research by Morris Swadesh identified body-part terms as part of the “basic” 100-word list of concepts that tend to persist over millennia. Swadesh’s 100-word list (and later both a 200-word list and many condensed versions) includes a multitude of human body-parts (such as eye, ear, hand, heart, tooth, tongue, etc.), reflecting the intuition that these are culturally universal and stable meanings (Swadesh 1971: 283-284). Cross-linguistic quantitative studies have confirmed that many body-part words rank among the most stable lexemes. For example, Holman et al. (2008: 11) found that in a broad survey of European and Asian languages, concepts like ear, eye, hand, tooth, bone, tongue were among the top 23 most stable words across languages.

Several factors demonstrate the stability of body-part vocabulary. One is high frequency of use: people refer to body-parts constantly in everyday speech, and high-frequency words generally resist replacement. Another factor is early acquisition in childhood - children learn words like hand, eye, mouth very early, and psycholinguistic research suggests that words acquired early tend to remain stable in the lexicon (Monaghan 2014: 3). Additionally, body-part terms often belong to a relatively restricted part of the lexicon, with meanings such as ‘head’ or ‘foot’ typically expressed by a small number of conventional lexical items, which may contribute to their relative stability over time. Cognitive salience and concreteness also play a role - because body-parts are tangible and salient parts of the human experience, their names are deeply entrenched in usage (Vejdemo & Hörberg 2016: 3). Overall, these factors converge to make body-part terms highly conservative over time. When linguists compare languages, finding similar-sounding words for the same body-parts in different languages is often a strong hint of common origin, since those words are unlikely to be chance similarities or recent innovations.

It is important to note that “stable” does not mean absolutely unchanging. Body-part terms can and do get replaced or altered in some cases, but at a lower rate than most other semantic domains. Historical linguists have documented a few exceptions where even major body-part terms were replaced within a family (for instance, the Proto-Indo-European word for “head” did not survive intact across all Indo-European branches, which instead were innovated in daughter languages as various new terms (4 main ones) (Mallory & Adams 2006: 173-176). Nevertheless, as a class, anatomical terms show remarkable retention. For example, the word for heart can be traced to a common root in most Indo-European languages (Latin *cor*, English *heart*, Sanskrit *hṛd-* all reflect PIE **kér*) (Mallory & Adams 2006: 185).

3.3.2 Semantic Transparency

Basic body-part terms are also characterized by semantic transparency, which enhances their value for comparative analysis. Semantic transparency means that the core meaning of these words is concrete, salient, and relatively resistant to semantic drift. A word like ‘hand’ or ‘eye’ directly refers to a physical part of the human body, a meaning that remains stable across contexts and over time (Wierzbicka 2007: 15). These terms do not easily acquire radically different meanings, except for predictable metaphorical extensions, such as ‘head of the company’ or ‘foot of a mountain’, which do not erase the original anatomical sense. Because the literal meanings are so basic to human experience, there is less ambiguity in what these words denote across different languages. This stability of concepts means that when linguists compare, for example, a word for “eye” in dozens of languages, we can be certain that each word indeed refers to the same concept (the organ) without confusion. In historical reconstruction, having a clear one-to-one correspondence of meaning greatly aids in identifying true cognates.

Another aspect of transparency is how readily body-parts can be identified and elicited. Field linguists and early word collectors often begin by pointing to body-parts to obtain vocabulary from speakers of new languages. Because every culture recognizes the human body, one can gesture to a hand, foot, or nose and get the native term, minimizing the risk of mistranslation. This universality of reference ensures that comparative lists of basic vocabulary are reliably aligned on the same meanings. In contrast, more culturally dependent concepts (like ‘bed’ or ‘table’) might not exist or mean different things in some societies, complicating comparisons. Body-part concepts are present in all languages - there are no cultures without the concept of ‘head’ or ‘eye’. Wierzbicka even argued that certain body-part terms (e.g. head, hand, eyes) are likely universal semantic primes, irreducible core concepts of human cognition found in every language. Even if languages differ in how they lexicalize the body (for example, some languages use the same word for ‘hand’ and ‘arm’), those differences are themselves systematic and can be analyzed. The underlying presence of the concept (the human upper limb, the lower limb, etc.) is a given (Wierzbicka 2007: 27-28). Thus, from a comparative standpoint, body-part terms provide a nearly universal set of reference points.

In historical linguistics, semantic transparency of body terms also means they tend to retain their original meaning over time, which is crucial for the Comparative Method’s assumption of consistent sound-meaning correspondences. When a word is inherited from a proto-language, we expect it to keep roughly the same meaning in the daughter languages. Body-part words fulfill this expectation strongly - for example, the Proto-Austronesian **mata* ‘eye’, and its derivatives still mean ‘eye’ in countless languages across Indonesia and Polynesia (Blust 2009: 180). This straightforward retention of meaning makes it easier to argue that similar forms are true cognates (rather than false friends due to meaning shift). In general, the clarity and universality of what

body-part terms denote allow linguists to compare them across languages with confidence that they are indeed part of the same semantic category, an essential condition for reliable reconstruction.

3.3.3 Resistance to Borrowing

Another critical property of basic body-part terms is their resistance to borrowing from other languages. Historical linguists have observed that “core vocabulary” (which includes body-parts, kinship terms, basic verbs, pronouns, low numerals, etc.) is only very rarely replaced by loanwords. Usually, languages have no need to import a foreign word for ‘hand’ or ‘eye’, since these concepts are already well represented in the native lexicon of even the smallest speech communities. In quantitative terms, cross-linguistic research by Haspelmath and Tadmor (2009) found that body-part terms occupy a prominent place in basic vocabulary. Their Loanword Typology project, a comparative study of lexical borrowing across 41 languages using a standardized list of 1,460 meanings, found body-part vocabulary to be particularly resistant to borrowing. Although body-part terms represent only about 10% of the full meaning list, they constitute approximately one-quarter of the Leipzig-Jakarta list, a 100-item list developed from the same cross-linguistic data to identify meanings that are especially resistant to borrowing and lexical replacement (Tadmor 2009: 68-72). This concentration further demonstrates the relative stability of body-part vocabulary across genetically and geographically diverse languages. In the World Loanword Database, body-part terms likewise show very low rates of borrowing across the sample, reinforcing their usefulness as a source of inherited lexical material. Tadmor notes:

The semantic fields at the other extreme, comprising those least amenable to borrowing, are no less interesting. They consist of concepts that are universal and shared by most human societies. Practically every language can be expected to have indigenous words for such concepts, and therefore has no need to borrow them. These fields consist of Sense perception, Spatial relations, The body, and Kinship, which have a borrowing rate of just 10%-15%.

(Tadmor 2009: 65)

Similarly, Haspelmath (2009: 35-36) generalizes that core vocabulary is “very rarely (or never) borrowed.” The stability of form due to low borrowing risk means that any similarities between body-part terms in different languages are more likely due to common origin rather than borrowing. This makes them particularly reliable evidence of genetic relationships.

Furthermore, body-part terms in many languages belong to an “inalienable” core vocabulary that is tightly integrated into grammar (possessive morphology), making them harder to replace. For example, in Dene languages, basic body-part nouns take special possessive prefixes and rarely occur as free forms. Such words are structurally embedded in the language, which poses an additional barrier to adopting foreign equivalents. Keren Rice notes that lexical borrowing in Dene languages is generally rare, and that their inventories of body-part terms remain overwhelmingly native (Rice 2012: 1). Overall, the conservative nature of body-part lexicon across the world’s languages provides a dependable foundation for historical comparison, and much more so than less stable domains like cultural vocabulary, which are frequently exchanged between languages.

3.3.4 Body-Part Terminology in Reconstruction and Long-Range Comparison

Given their universality, stability, and low borrowability, it is no surprise that body-part terms feature prominently in linguistic reconstruction efforts. The Comparative Method, which

reconstructs proto-languages by finding systematic sound correspondences in cognate words, relies heavily on basic vocabulary. Terms for body-parts are prime candidates for cognates because of the reasons discussed: they are likely to have been preserved from the proto-language in multiple descendants. For example, in Indo-European, classical comparative studies noted correspondences such as Latin *dent* : English *tooth* : Sanskrit *dantá*, or Latin *ped*: English *foot* : Sanskrit *pād*, which established these as inherited from Proto-Indo-European (Swadesh 1971: 135-136). Because such words change slowly, even after thousands of years, the cognate sets remain recognizable. Body-part terms thus act as anchor points in proto-language reconstruction, often yielding some of the clearest evidence for genetic relatedness.

Beyond well-established families, body-part vocabulary is also pivotal in long-range comparisons and hypotheses about deep genetic links. When linguists attempt to test or propose relationships between language families at great time depths, they often focus on a small core of basic words, again including body-parts. The logic is that if anything has survived from a remote common ancestor, it will be words like *mother*, *father* or *head*, *eye*, etc.

In addition to lexical comparisons, body-part terms sometimes carry morphological clues useful in reconstruction. As mentioned, in some language groups, including Dene, many languages treat body-parts as inalienably possessed, and comparing such patterns can reveal ancient grammatical features. The same is true of Yeniseian languages, which use prefixes on body-part nouns to mark possessors, and some of these prefixes might be historically cognate with those found in Na-Dene languages, and reflect an archaic system (Vajda 2010: 39-42). Thus, body-part terminology can shed light not only the lexicon but also deeper structural properties of proto-languages.

In summary, body-part terms serve as a crucial comparative resource due to their stability, clarity, ubiquity, and retention in the face of language contact. They form a core part of the evidence in reconstructing proto-languages and in arguing for long-range relationships. Because humans everywhere have bodies and need to talk about them, these words are a common inheritance that often endures through centuries of linguistic change. Their theoretical relevance lies in being conservative lexical markers of genetic similarity: shared body-part terms can strongly indicate common origin, while their absence or replacement can signal divergence. Thus, historical linguists will continue to rely on anatomical vocabulary as an essential tool for linguistic reconstruction and the exploration of language history.

3.4 Data collection

The primary data for this study will come from a combination of lexical databases, published dictionaries, historical linguistic studies, and fieldwork documentation. Although Snoek's (2015) dataset contains a larger inventory of anatomical terms (68 in total), the present study focuses on 40 of the terms. Several terms were excluded either because the available data were too limited, because the forms did not provide enough comparative evidence for reconstruction, or because their analysis would fall beyond the scope of the present project. The selected terms therefore represent a focused subset of the broader anatomical dataset, chosen for their potential relevance to Dene, Na-Dene, and Dene-Yeniseian comparison.

Because body-part terms in Dene are generally inalienably possessed, the forms discussed here are bound stems and would normally be represented with a hyphen marking the relevant bound edge. For simplicity and consistency across tables, these hyphens are not included unless they are analytically necessary, as the bound status of the stems is assumed throughout. The same

convention applies to individual phonemes cited in the analysis, where hyphens are omitted unless the position of the segment is directly relevant.

Key sources include:

1) Ket and Yeniseian data: The most reliable resources include *A descriptive grammar of Ket (Yenisei-Ostyak)* (Georg 2007), *Ket-Russian and Russian-Ket Dictionary* (Werner 2002), and *Comparative-historical Yeniseian Dictionary* (Vajda & Werner 2022).

2) Tlingit data: *Dictionary of Tlingit* (Edwards 2009)

3) Eyak data: *Eyak Dictionary* (Krauss 2012)

4) Dene data: Data from Northern, Pacific Coast, and Southern Dene languages are sourced from *The lexical semantics of Athapaskan anatomical terms: historical-comparative study* (Snoek 2015), and cross-references with dictionaries of each relevant language.

The dataset will include the following elements:

- **Concept:** A clearly defined semantic category for each body-part term.
- **Branch:** The subgroup or lineage to which each language belongs, following the phylogenetic classification proposed by Snoek et al. (2022).
- **Language:** The individual language or dialectal variety from which each form is drawn.
- **Gloss:** A standardized English translation or equivalent for each body-part term, drawn from Snoek's (2015) dataset.
- **Form:** The linguistic realization of each concept in the individual languages, in IPA form.

A sample of the data collection process may be seen in Appendix 1 at the end of the paper. This structured dataset will facilitate systematic comparison and reconstruction efforts, ensuring transparency and repeatability in analysis.

4 Reconstruction by term

4.1 General body and structural tissues

4.1.1 Body

The semantic term ‘body’ is represented here by three unrelated cognate sets rather than by a single inherited stem. For that reason, the forms cannot be merged into one reconstruction. Each cognate set must instead be treated separately, with its own dataset table and phonological analysis.

4.1.1.1 Cognate Set 1: BODY₁

This cognate set is distributed across Alaska, Interior Canada, and Central BC. It includes Kaska, several Alaska Dene languages, and Central Carrier. It is glossed as BODY₁.

Table 1. BODY₁

Branch	Language	Form
Alaska	Den Xinag	zɪk
Alaska	Koyukon	sək
Alaska	Dena'ina (Inland)	ʒekʰ
Alaska	Ahtna	zɪʔ
Alaska	Gwich'in (Teetl'it)	ʒin
Alaska	Gwich'in (Gwichya)	ʒin
Alaska	Hän	ʒəŋ
Alaska	Upper Tanana	ʒin̩
Alaska	Upper Kuskokwim	ʒeʔ
Alaska	Tanacross	jɛŋ

Interior Canada	Kaska (FL)	ziʔ
Interior Canada	Kaska (GHL)	ziʔ
Interior Canada	Kaska (HL)	ziʔ
Interior Canada	Kaska (LL)	ziʔ
Interior Canada	Kaska (P)	ziʔ
Interior Canada	Kaska (RR)	ziʔ
Central BC	Central Carrier	zi

4.1.1.1.1 Initial Consonant

The initial consonant points most consistently to a sibilant fricative series. Most forms begin with [ʒ], [z], or [ʒ], while Koyukon has [s] and Tanacross has [j]. Since [ʒ] is the most common reflex across distinct languages in the set, the proto-initial is best reconstructed as [*ʒ]. Koyukon [s] represents a voiceless reflex of the same general series, while Tanacross [j] reflects a more divergent but still plausible development within the set.

4.1.1.1.2 Vowel

Kaska, Central Carrier, Den Xinag, Gwich'in and Upper Tanana have [i], Ahtna has [ɪ], while Dena'ina and Upper Kuskokwim show [e], Koyukon and Hän show [ə], and Tanacross has [ɛ]. The most frequent reflex is clearly a front high vowel, with [e], [ɪ], [ə], and [ɛ] interpretable as additional reflexes or reductions. On that basis, [*i] is the strongest contender for the vowel in the Proto-Dene hypothesis.

4.1.1.1.3 Final Consonant

The final consonant is the least stable feature of this set. Kaska, Ahtna, and Upper Kuskokwim show [ʔ], Deg Xinag and Koyukon show [k], Dena'ina has [k'], Gwich'in, Hän, Upper Tanana, and Tanacross show [n] or [ŋ], and Central Carrier lacks an overt coda. The reflexes therefore do

not produce a straightforward correspondence. Krauss (2005: 130) reconstructs the Proto-Athabaskan form as **-žʷəkʰ*, with an ejective front velar stop as the final consonant. His original notation additionally marks constriction on the vowel and the front-velar articulation of the stop, which are not reproduced here. Following Krauss, the final consonant can therefore be reconstructed as [**kʰ*]. The nasal finals found in several northern languages are not accounted for by this reconstruction, however, and the available evidence does not provide a clear phonological explanation for their development. They are therefore treated here as an unresolved feature of the cognate set rather than as evidence for an alternative nasal proto-coda.

4.1.1.1.4 Discussion

This cognate set appears to reflect an inherited Dene stem. The initial consonant is best reconstructed as [**ʒ*], and the vowel as [**i*]. The main uncertainty lies in the final consonant, but the two most viable possibilities are [**k*] and [**n*]. However, Krauss (2005: 130) reconstructs the Proto-Athabaskan form as *-žwəkʰ*, providing an established reconstruction against which the forms examined here can be evaluated. The principal irregularity within the present dataset is the occurrence of nasal finals in Gwich'in, Hän, Upper Tanana, and Tanacross, which cannot presently be reconciled with the reconstructed final [**kʰ*] through a regular correspondence. The reconstruction **-žʷəkʰ* is therefore retained here, while the source of the nasal reflexes remains unresolved. Additionally, because the available cognate evidence is limited to part of the northern Dene branch and lacks supporting data from the other Na-Dene languages or from Yeniseian, this term can only be reconstructed securely at a restricted northern-branch level.

4.1.1.2 Cognate Set 2: BODY₂

This cognate set includes only Apachean languages plus Tsuut'ina. That distribution is interesting because the Apachean languages form a tight southern cluster, while Tsuut'ina stands alone much farther north, yet it still shows a clearly related form.

Table 2. BODY₂

Branch	Language	Form
BranchIsolate3	Tsuut'ina	ts'ít ^h à
Apachean	Navajo	ts'í:s
Apachean	Western A.	ts'ĩ
Apachean	S. Carlos A.	ts'íh
Apachean	Jicarilla A.	ts'is
Apachean	Kiowa A.	ts'í:s

4.1.1.2.1 Initial Consonant

The initial consonant is extremely stable. Every form begins with [ts'], including Tsuut'ina. This is the clearest and strongest shared feature in the set. Any reconstruction for this cognate set must therefore begin with [*ts'].

4.1.1.2.2 Vowel

The vowel is also highly consistent. The Apachean forms show [i], sometimes long [i:] and sometimes nasalized [ĩ], and Tsuut'ina also has [i]. The tone and nasalization vary, but the basic quality remains stable throughout the set. The most cautious reconstruction is therefore [*i], without forcing proto-tone or proto-nasalization.

4.1.1.2.3 Final Consonant

The final is less stable than the onset and vowel. Navajo, Jicarilla Apache, and Kiowa Apache preserve [s], San Carlos Apache has [h], Western Apache has no overt final consonant, and Tsuut'ina ends in [tʰà]. Within Apachean itself, the best-supported final consonant is clearly [s]. Tsuut'ina supports the cognacy of the stem through the shared onset and vowel, but the final portion is too different to support an unproblematic higher reconstruction on the present evidence. One possible hypothesis is that the earlier coda may have been something like [*ts] rather than simple [s]. Under that interpretation, the Apachean forms would reflect reduction from [ts] to [s], with further weakening to [h] and then zero in some languages, while Tsuut'ina may preserve the stop element of that older cluster in a different development.

4.1.1.2.4 Discussion

This cognate set supports a strong Proto-Apachean-Dene reconstruction. The onset [*ts'] and vowel [*i] are secure, and a final [*s] is also well supported within Apachean proper. The Tsuut'ina form is important because it shows that the cognate is not confined to Apachean, but its divergent final sequence means that the broader Dene level remains less certain. Accordingly, the strongest reconstruction here is Proto-Dene **ts'is*, with the long vowel in some daughter languages treated as secondary. Like Cognate Set 1, this set is also quite restricted in how far back it can be reconstructed, since it lacks clear supporting evidence beyond Apachean and Tsuut'ina.

4.1.1.3 Cognate Set 3: BODY₃

This cognate set is shared between Pacific Coast languages and Dena'ina in Alaska. That distribution is noteworthy because the set links Pacific Coast forms with a single Alaska branch, suggesting a possible older inherited stem preserved discontinuously.

Table 3. BODY₃

Branch	Language	Form
Alaska	Dena'ina (OCI)	nest'a
Alaska	Dena'ina (UCI)	nest'a
PacificCoast	Hupa	nɪst'
PacificCoast	Galice	tast'
PacificCoast	Kato	nəst'

4.1.1.3.1 Initial Consonant

Most forms begin with [n]: Hupa, Kato, and both Dena'ina varieties. Galice alone has [t]. Since the majority pattern strongly favors [n], that is the best candidate for the proto-onset. Galice [t] is most cautiously treated as a divergent reflex within the set rather than as the basis for reconstruction. The safest proto-initial is therefore [*n].

4.1.1.3.2 Vowel

The vowel varies between [ɪ], [ə], [e], and Galice [ɑ]. The non-Galice forms cluster in the front-central to central range, while Galice again stands apart. Because Hupa [ɪ], Kato [ə], and Dena'ina [e] all remain relatively close compared with Galice [ɑ], the most cautious reconstruction is a central vowel, best written as [*ə]. That avoids giving too much weight to the single Galice form.

4.1.1.3.3 Final Consonant

The final consonant is the most stable feature of this set. Hupa, Galice, and Kato all preserve [st'], and Dena'ina has [st'a], which maintains the same consonantal sequence with an added final vowel. This distribution strongly supports a final cluster [*st']. The Dena'ina final vowel is best treated as an extension rather than evidence for a different underlying coda.

4.1.1.3.4 Discussion

This set supports a stem of the shape **nəst'*. The onset [*n] and final cluster [*st'] are both well supported, while the vowel is somewhat less stable but still most plausibly reconstructible as a central vowel. The distribution is limited, so the evidence is not broad enough for confident reconstruction above Proto-Dene. Still, the agreement between Pacific Coast and Dena'ina is strong enough to support a proto-form, and Proto-Pacific-Coast-Dene can be reconstructed the same way on the present evidence.

4.1.1.4 Beyond Dene: Eyak, Tlingit & Yeniseian

Table 4. *Non-Dene BODY*

Branch / Language	Form
Eyak	qe't'
Tlingit	dà
Proto-Yeniseian	*kitip ^h ɬl

Taken together, the term 'body' does not point to a single inherited lexical item across Dene. Instead, it is represented by at least three unrelated stems. Additionally, looking beyond Dene, the languages at the higher levels complicate things even further. Eyak *qe't'*, Tlingit *dà*, and Proto-Yeniseian **kitip^hɬl* (Ket *kīt* / *kitpel*) seem to stand outside the three Dene cognate sets discussed above. Tlingit *dà* is the clearest outlier, since it does not look obviously close to any of the others.

Eyak *qe't'* is more interesting in relation to Ket *kīt* / *kitpel* (and by extension Proto-Yeniseian **kitpʰl*), because Eyak [q] and Yeniseian [k] are comparable as velar onsets, the vowels [e] and [i] are not far apart either, and they both share the same final consonant [t] (ejective in Eyak [t'], though Yeniseian languages lost ejectivity in consonants (Vajda 2010: 28)). The most suggestive part of the Yeniseian evidence is that the Yeniseian forms appear to contain an initial *kit-* element that may be the actual 'body' term, while the second element (Ket *-pel*, Proto-Yeniseian **-pʰl*) looks like an added morpheme, without a clear meaning. The comparison should focus primarily on Eyak *qe't'* and Yeniseian **kit-* rather than on the full longer forms. While that does not produce a neat equation, it does make Eyak and Yeniseian look closer to one another than either does to Tlingit or to any of the three Dene sets. A reasonable speculation, then, is that this semantic domain underwent substantial lexical replacement across the branches: Dene split into several unrelated stems, Tlingit innovated a completely different form, and Eyak may have retained something that is at least more comparable to the Yeniseian material than to the Dene evidence.

4.1.2 Flesh

Table 5. *FLESH*₁

Branch	Language	Form
Alaska	Deg Xinag	tθiŋ?
Alaska	Dena'ina (Iliamna)	ts ^h ən
Alaska	Dena'ina (Inland)	ts ^h ən
Alaska	Dena'ina (OCI)	ts ^h ən
Alaska	Dena'ina (UCI)	ts ^h ən
Alaska	Ahtna	ts ^h en?
Alaska	Holikachuk	tθin?
Alaska	Gwich'in (Teetl'it)	tθ ^h āi?
Alaska	Gwich'in (Gwichya)	tθ ^h ai?
Alaska	Hän	tθ ^h i?
Alaska	Upper Kuskokwim	tsin
Alaska	Upper Tanana	tθi:?
Alaska	Tanacross	tθi?
Yukon	Northern Tutchone	tθ ^h án?
Yukon	Southern Tutchone	tθ ^h ən
BranchIsolate2	Ts'ets'aut	ts ^h xa'
Interior Canada	Kaska (DL)	ts ^h én
Interior Canada	Kaska (FL)	ts ^h én
Interior Canada	Kaska (GHL)	ts ^h én
Interior Canada	Kaska (L)	ts ^h án
Interior Canada	Kaska (LL)	ts ^h án
Interior Canada	Kaska (P)	ts ^h én
Interior Canada	Kaska (RR)	ts ^h én
Interior Canada	Hare	fě
Interior Canada	Mountain	pé?
Interior Canada	Bearlake	k ^{wh} ě
Interior Canada	Tłchq	k ^w ō
Interior Canada	South Slavey	tθě
Interior Canada	Dene Słliné	tθón
Interior Canada	Dene Dháh	tθén
Interior Canada	Beaver	ts ^h Λn
Interior Canada	Sekani	ts ^h àn
Central BC	Carrier	ts̥Λŋ
Central BC	Witsuwit'en	tsəj
Central BC	Chilcotin	ǎéǎ
Pacific Coast	Hupa	tsiŋ?

Pacific Coast	Galice	sanʔ
Pacific Coast	Kato	sʌnʔ
Pacific Coast	Kwa-Clat	tsún
Apachean	Navajo	ts ^h ĩ
Apachean	Jicarilla A.	tsĩ

Table 6. Non-Dene FLESH

Branch / Language	Form
Eyak	tse'
Tlingit	tsìní
Proto-Yeniseian	*ki:t

4.1.2.1 Initial Consonant

The overwhelming majority of forms exhibit an initial alveolar consonant involving affrication or frication, most commonly [ts] and [tθ], with secondary reflexes including [s] and a few other standalone innovations. This distribution is geographically broad and structurally coherent, strongly supporting inheritance from a shared proto-form.

The alternation between [ts] and [tθ] is systematic across major branches. Apachean languages preserve [ts] or aspirated [ts^h] (e.g. Navajo *ts^hĩ*, Jicarilla *tsĩ*), while much of Alaska and Interior Canada shows interdental realizations [tθ] or [tθ^h] (e.g. Deg Xinag *tθiŋʔ*, Gwich'in *tθ^háĩʔ*, Dene Sų́líné *tθán*). This pattern is best interpreted as branch-level phonetic differentiation of a single inherited alveolar affricate. The Interior Canada forms *k^whě́* (Bearlake) and *k^wó̃* (Tłı́chọ) are also divergent but align with a known correspondence pattern, wherein labialized velars [k^w] correspond to alveolar affricates or interdental clusters such as [ts] and [tθ] (Krauss 1964: 119-121).

Forms with initial [s] in Pacific Coast languages (Galice *sanʔ*, Kato *sʌnʔ*) plausibly reflect deaffrication or lenition of an earlier alveolar affricate. These reflexes remain phonologically aligned with the dominant pattern.

The Chilcotin form $\delta\acute{e}\delta$ is highly divergent but can still be accommodated within this framework. A plausible pathway is $[ts] > \text{loss of the fricative element} > [t] > \text{voicing to } [d] > \text{spirantization to } [\delta]$, though it is speculative.

The Hare $f\acute{e}$ and Mountain $p\acute{e}\text{?}$ forms are anomalous in initial consonant shape but are closely related to each other. The most economical interpretation is that Mountain preserves an earlier $[p]$, with Hare reflecting a subsequent lenition $[p] > [f]$. Given their restricted distribution and internal coherence, these forms are best treated as branch-specific innovations rather than proto-level evidence.

Taken together, the data support reconstruction of a single proto-initial alveolar affricate, tentatively represented as $[*ts]$, with later interdentalization, deaffrication and lenition occurring independently in different branches.

The Proto-Yeniseian data lacks a distinct term for ‘flesh’ cognate with the Dene data. The form $*k\bar{i}t$, discussed in the previous section on ‘body’, does not align straightforwardly with the dominant pattern and instead reflects the Yeniseian divergence.

4.1.2.2 Vowel

The vowel evidence for ‘flesh’ is complex and reflects several overlapping developments rather than a single clean correspondence. Across a few branches, we see a high front vowel $[i]$, often nasalized, is dominant: Navajo $ts^h\bar{i}$, Jicarilla $ts\bar{i}$, Hän $t\theta^h\bar{i}\text{?}$, Upper Tanana $t\theta\bar{i}:\text{?}$, Tanacross $t\theta\bar{i}\text{?}$. Nasalization is readily explained by the frequent presence of nasal codas and does not require reconstruction of contrastive vowel nasality.

Interior Canada and some Central BC languages show systematic lowering or centralization, with [e], [ẽ], [ə], and [ʌ] appearing in forms such as Kaska *ts^hén*, South Slavey *tθé̃*, Dene Sų́liné *tθán*, Beaver *ts^hʌn*, and Carrier *tsʌŋ*.

Galice *sanʔ* shows backing to [ɑ], while Kato *sʌnʔ* reflects centralization to [ʌ], contrasting with Hupa *tsɪŋʔ*, which preserves a near-high front vowel. This internal diversity suggests that Pacific Coast Dene underwent substantial local vowel reorganization, and these vowels are best treated as secondary developments rather than direct reflections of the proto-nucleus.

More divergent vowels, including [õ] in Tłıchǝ *k^wõ̃*, are limited in distribution and can plausibly be treated as secondary outcomes, such as nasal assimilation in the vowel with deletion of the proto-nasal final. The nasalization of the Diphthongization and length, as seen in Gwich'in *tθ^hāĩʔ* and Upper Tanana *tθĩ:ʔ*, likewise appear to be branch-specific prosodic developments.

Overall, the comparative evidence supports reconstructing the proto-vowel as [*ə]. This is probably the safest option at the higher levels, since the attested vowels vary considerably across the daughter languages and do not point consistently to a single full vowel, especially given the Eyak [e] and Tlingit [i] evidence.

4.1.2.3 Final Consonant

Final consonants cluster around nasal codas, most commonly [n], [ŋ], or palatalized [ɲ], often followed by glottal stop [ʔ] or showing nasalization of the preceding vowel. Examples include Deg Xinag *tθiŋʔ*, Hupa *tsɪŋʔ*, Kato *sʌnʔ*, and Tlingit *tsɪnĩ*.

The variation between alveolar [n] and velar [ŋ] is widespread. The glottal stop [ʔ] seen in many Alaska and Pacific Coast forms plausibly reflects coda weakening.

A proto-final [*n], with later velarization, palatalization, or loss in individual branches, provides the most economical explanation for the observed reflexes.

4.1.2.4 Discussion

The comparative evidence supports reconstructing a single inherited form for ‘flesh’ at the Proto-Na-Dene level, with an alveolar affricate initial, a high front vowel, and a nasal coda. The Dene evidence is broadly coherent, and the comparison can be extended to Eyak and Tlingit. However, the highest secure reconstructible level is Proto-Na-Dene rather than Proto-Dene-Yeniseian, since there is no clear Yeniseian cognate available for comparison. As a result, the form cannot presently be projected beyond Na-Dene without additional corroborating Yeniseian evidence.

Table 7. Reconstruction of FLESH₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*ki:t
Proto-Na-Dene	*tsən
Proto-Dene-Eyak	*tsən
Proto-Dene	*tsən
Proto-Northern-Dene	*tθin
Proto-Alaska-Dene	*tsinʔ
Proto-Yukon-Dene	*tθ ^h an
Proto-Interior-Canada-Dene	*ts ^h en
Proto-Central-BC-Dene	*tsɛŋ
Proto-Pacific-Coast-Dene	*tsinʔ
Proto-Apachean-Dene	*tsĩ

4.1.3 Skin

Table 7. *SKIN*₁

Branch	Language	Form
Alaska	Koyukon	ləl
Alaska	Dena'ina (Iliamna)	jes
Alaska	Dena'ina (Inland)	jes
Alaska	Dena'ina (OCI)	jes
Alaska	Dena'ina (UCI)	jes
Alaska	Ahtna	zəs
Alaska	Gwich'in (Teetl'it)	ðòh
Alaska	Gwich'in (Gwichya)	ðòh
Alaska	Hän	ðòh
Alaska	Lower Tanana	ðeθ
Alaska	Upper Kuskokwim	zis
Alaska	Upper Tanana	θùh
Alaska	Tanacross	ðeθ
Yukon	Northern Tutchone	ðó
Yukon	Southern Tutchone	ði
Yukon	Tahltan	ʒeθ
Interior Canada	Kaska (FL)	zés
Interior Canada	Kaska (GHL)	zés
Interior Canada	Kaska (L)	zás
Interior Canada	Kaska (LL)	zás
Interior Canada	Kaska (P)	zés
Interior Canada	Mountain	vé?
Interior Canada	Tł̥chq̣	wò
Interior Canada	South Slavey	ðéh
Interior Canada	Dene Sł̥líné	ðáθ
Interior Canada	Dene Dháh	ðé
Interior Canada	Beaver	zis
Interior Canada	Sekani	zàs
Central BC	Carrier	ʒ^ʒ
Central BC	Witsuwit'en	zəz
Central BC	Chilcotin	ðéð
BranchIsolate3	Tsuut'ina	jisdł
Pacific Coast	Hupa	sɪts'
Pacific Coast	Kato	sɔts
Pacific Coast	Tututni	səʔs
Pacific Coast	Mattole	ts ^h eʔs / tá:s

Pacific Coast	Galice	sa:s / ʃi:
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Table 8. Non-Dene SKIN

Branch / Language	Form
Eyak	tah
Tlingit	dùk
Proto-Yeniseian	*sa ^h s _Λ (‘reindeer legskin’)

4.1.3.1 Initial Consonant

The Dene dataset for ‘skin’ exhibits a wide but structured range of dental and alveolar onsets, dominated by interdental fricatives [ð], sibilants [z] and [s], and, in several branches, strengthened or reanalyzed material such as affricates or laterals. Despite surface diversity, these outcomes are best understood as reflexes of a single inherited onset, subject to extensive branch-level phonological innovations.

A large and geographically widespread subset preserves interdental fricative onsets: Gwich’in *ðòh*, Hän *ðòh*, Lower Tanana *ðeθ*, Tanacross *ðeθ*, Northern and Southern Tutchone *ðó* / *ðì*, South Slavey *ðéh*, Dene Sųłiné *ðáθ*, Dene Dháh *ðé*, and Chilcotin *ðéð*. The consistency of this series across Alaska, Yukon, Interior Canada, and Central BC strongly supports an inherited dental or alveolar fricative.

Parallel to this is a large voiced sibilant series: Ahtna *zəs*, Upper Kuskokwim *zis*, Kaska *zés* / *zás*, Beaver *zis*, Sekani *zàs*, Carrier *z̥ʌz̥*, Witsuwit’en *zəz*, and Tahltan *ʒeθ*. Rather than implying a distinct root, these forms are best interpreted as sibilant outcomes of the same inherited consonant, reflecting regional shifts from interdental to alveolar or postalveolar articulation. The [ð] ~ [z] alternation is typologically and internally plausible.

Pacific Coast Dene continues this broader sibilant pattern. Hupa *sɪts*’, Kato *sɪts*, Tututni *səʔs*, Mattole *ts^heʔs* / *tá:s*, and Galice *sa:s* / *ʃi:* show [s], [ts], or [ʃ]-type reflexes comparable to the

[z], [ʒ], and [ʒ] outcomes found elsewhere in Dene. These forms are therefore better treated as additional sibilant outcomes.

More divergent onsets such as Koyukon *ləl*, Mountain *véʔ*, Tłı̨chǫ *wò*, Dena'ina *jes*, and Tsuut'ina *jisdl* contribute less directly to the reconstruction and appear to reflect greater restructuring within individual branches.

Eyak *tah* can be compared with the broader dental and alveolar series, with its initial voiceless alveolar stop [t] providing a possible stop counterpart to the Dene interdental fricatives, alveolar sibilants, and alveolar affricates. Tlingit *dùk* may also belong to this set. Its initial voiced alveolar stop [d] is particularly relevant when considered alongside Eyak [t] and the numerous dental and alveolar onsets in Dene, although the Tlingit comparison remains less secure than the Dene-Eyak evidence.

Proto-Yeniseian **saʰsa* ‘reindeer legskin’ provides an important additional comparison. Its initial alveolar fricative [s] corresponds closely in place and manner of articulation to the extensive sibilant series preserved across Dene. Taken together, the Dene [s, z, ts, ʃ, θ], Eyak [t], Tlingit [d], and Proto-Yeniseian [s] forms raise the possibility of a higher-level alveolar affricate onset, perhaps [**ts*]. Under such an interpretation, the fricative and stop reflexes would represent different developments of an earlier affricate. This reconstruction remains tentative, but it provides a possible way of unifying the otherwise diverse dental and alveolar onsets across the two families.

4.1.3.2 Vowel

The vowels in the Dene data are mostly front, with regular branch-level shifts in quality. Many Northern and Interior forms show [e], [ə], or [ɛ]: Lower Tanana *ðeθ*, Tanacross *ðeθ*, South Slavey *ðéh*, Dene Sų́líné *ðáθ*, Tahltan *ʒeθ*, Chilcotin *ðéð*. This points to a front or central vowel at the Proto-Dene level.

Other branches display systematic shifts away from this center. Northern varieties such as Gwich'in *ðòh* and Hän *ðòh* show rounding and backing, while Tutchone *ðó* / *ðì* suggests vowel raising or centralized outcomes. The sibilant-initial series frequently shows [i], [e], or [a]: Upper Kuskokwim *zis*, Kaska *zés* / *zás*, Beaver *zis*, Sekani *zàs*, Carrier *ḡḡḡ*.

Pacific Coast forms display a similarly broad range, including *sits*ʹ, *sats*, *səʔs*, and *tá:s*. The amount of vowel variation throughout Dene makes the precise Proto-Dene vowel difficult to establish, although a reduced central vowel such as [**ə*] remains a reasonable possibility.

The higher-level evidence introduces an additional possibility. Eyak *tah* and Proto-Yeniseian **sa^hsA* both contain [a], while Tlingit *dùk* contains [u]. The agreement between Eyak and Proto-Yeniseian [a] makes a low vowel a plausible candidate at an earlier stage, with subsequent reduction or alteration within Dene. Tlingit [u] would require a separate development if the form is cognate. The vowel therefore remains less secure than the consonantal correspondences, but the new Proto-Yeniseian evidence makes [**a*] a stronger higher-level possibility than the Dene data alone would suggest.

4.1.3.3 Final Consonant

Final consonants show a striking and informative split between laryngeal/interdental outcomes and sibilant outcomes. Many Northern and Interior Dene varieties preserve [h] or [θ]: Gwich'in *ðòh*, Hän *ðòh*, Upper Tanana *θùh*, South Slavey *ðéh*, Northern Tutchone *ðó* / *ðì*, Lower Tanana *ðeθ*, Tanacross *ðeθ*, Dene Sų́líné *ðáθ*, Tahltan *ʒeθ*, Chilcotin *ðéð*.

In contrast, the sibilant series frequently exhibits [s], [z], or [ts]: Ahtna *zəs*, Upper Kuskokwim *zis*, Kaska *zés* / *zás*, Beaver *zis*, Sekani *zàs*, Carrier and Witsuwit'en *ḡḡḡ* / *zəz*, as well as Pacific Coast *səʔs*, *ts^həʔs*, *sits*ʹ, and *sats*. These forms are compatible with an earlier alveolar

fricative or affricate that underwent different degrees of weakening across the Dene branches. Eyak *tah* also fits well with the [h]-type series.

Proto-Yeniseian **sa^hsa* provides further support for an alveolar sibilant element in this position. Although its structure is not identical to the predominantly monosyllabic Na-Dene forms, the [**s*] in the latter part of the Proto-Yeniseian form closely resembles the [s], [z], and [ts]-type material found throughout Dene. However, the additional [**h*] and final vowel in the Proto-Yeniseian form mean that its precise morphological and phonological relationship to the Na-Dene forms remains to be established.

Tlingit *dùk* presents the greatest difficulty, since its final voiceless velar stop [k] is not an immediate match for the Dene-Eyak fricative and affricate series. However, this difference does not necessarily exclude the comparison. Elsewhere in the dataset, the correspondence pattern identified by Snoek and discussed in section 4.4.2 involves [k^h], [t^h], and [ts^h] as corresponding outcomes within a larger cognate set. This provides an independent example in which a velar stop corresponds to postalveolar and alveolar affricates. It does not establish a direct correspondence between Tlingit [k] and Dene [s], [z], or [ts] in ‘skin’, but it provides a precedent for considering the Tlingit final as potentially related rather than automatically excluding the form. If Tlingit *dùk* is cognate, one possibility is therefore that an earlier alveolar affricate, perhaps [**ts*], developed into fricative and affricate finals in Dene and Proto-Yeniseian while undergoing a separate development to a velar stop in Tlingit. This interpretation remains tentative.

4.1.3.4 Discussion

The Dene evidence for ‘skin’ points to an inherited form with a dental or alveolar onset and a fricative or affricate final, reflected in the widespread [ð], [θ], [z], [s], and [ts] forms. Eyak *tah* extends the comparison beyond Dene through its alveolar onset and [h] final.

Proto-Yeniseian **sa^hsΛ* ‘reindeer legskin’ substantially strengthens the possibility of a deeper comparison. The semantic difference can be interpreted as narrowing from ‘skin’ to a specific type of skin, while its [s] elements correspond well with the widespread alveolar fricative and affricate material in Dene.

Tlingit *dùk* remains more tentative. Initial [d] can be compared with Eyak [t] and the dental and alveolar Dene onsets, while final [k] is more difficult. However, the independently identified correspondence involving [k^h], [tʃ^h], and [ts^h] provides some precedent for a relationship between a velar stop and alveolar or postalveolar affricates. Taken together, the evidence makes ‘skin’ a tentative Proto-Dene-Yeniseian candidate, possibly reflecting an earlier shape approximately [*tsVts], although the Tlingit final and the additional material in Proto-Yeniseian *sa^hsΛ* remain unresolved.

Table 9. Reconstruction of SKIN₁

Proto-Language	Form
Proto-Dene-Yeniseian	*tsats ?
Proto-Yeniseian	*sa ^h sΛ
Proto-Na-Dene	*tats ~ *tat ?
Proto-Dene-Eyak	*taθ ~ *tat
Proto-Dene	*ðeθ ~ *ðets
Proto-Northern-Dene	*ðeθ
Proto-Alaska-Dene	*ðeθ ~ *ðoθ
Proto-Yukon-Dene	*ðeθ
Proto-Interior-Canada-Dene	*ðeθ
Proto-Central-BC-Dene	*ðəz
Proto-Pacific-Coast-Dene	*tses ~ *tsats ~ *tsəʔts
Proto-Apachean-Dene	-

4.1.4 Bone

Table 10. BONE₁

Branch	Language	Form
Alaska	Deg Xinag	tθ'ɪn
Alaska	Koyukon	tɪ'ən
Alaska	Dena'ina (UCI)	ts'ən
Alaska	Ahtna	ts'ɛn
Alaska	Holikachuk	tθ'an
Alaska	Gwich'in (Teetl'it)	tθ'an
Alaska	Gwich'in (Gwichya)	tθ'əŋ
Alaska	Hän	ts'ɛn
Alaska	Lower Tanana	tθ'ɛŋ
Alaska	Upper Kuskokwim	ts'iŋ
Alaska	Upper Tanana	tθ'ən
Alaska	Tanacross	tθ'ɛn
Yukon	Northern Tutchone	tθ'án
Yukon	Southern Tutchone	tθ'ən
Yukon	Tahltan	tθ'ɛŋ
BranchIsolate1	Tagish	ʃ'ɪn
BranchIsolate2	Ts'ets'aut	ts'ən
Interior Canada	Kaska (DL)	ts'ɛn
Interior Canada	Kaska (FL)	ts'ɛn
Interior Canada	Kaska (GHL)	ts'an
Interior Canada	Kaska (L)	ts'ɛn
Interior Canada	Kaska (LL)	ts'an
Interior Canada	Kaska (P)	ts'an
Interior Canada	Kaska (RR)	ts'ɛn
Interior Canada	Hare	w'én
Interior Canada	Mountain	p'ɛn
Interior Canada	Bearlake	k ^w 'ɛn
Interior Canada	Tłıchǫ	k ^w 'õ:
Interior Canada	South Slavey	tθ'ɛn
Interior Canada	Dene Sųłiné	tθ'ɛn
Interior Canada	Dene Dháh	tθ'ɛn
Interior Canada	Beaver	ts'ʌn
Interior Canada	Sekani	ts'ǎ
Central BC	Carrier	ts'ʌn
Central BC	Witsuwit'en	ts'ən
BranchIsolate3	Tsuut'ina	ts'ɪn

Pacific Coast	Hupa	ts'ɪŋ
Pacific Coast	Galice	ts'ʔ
Pacific Coast	Tututni	ts'ən
Pacific Coast	Mattole	ts'in
Pacific Coast	Wailaki	ts'in
Pacific Coast	Kwa-Clat	ts ^h ún
Apachean	Navajo	ts'in
Apachean	Western A.	ts'in
Apachean	S. Carlos A.	ts'in
Apachean	Jicarilla A.	ts'in
Apachean	Kiowa A.	ts'ĩ:
Apachean	Mescalero A.	ts'in
Apachean	Lipan A.	ts ^h æ

Table 11. Non-Dene BONE

Branch / Language	Form
Eyak	ts'al
Tlingit	s'əq ^h
Proto-Yeniseian	*a'd

4.1.4.1 Initial Consonant

Across the Dene languages, the word for ‘bone’ consistently begins with an ejective alveolar fricative consonant. The most frequent realizations are [ts'] and [tθ'], both of which are well represented across the northern branches. Alaska Dene languages show [ts'] in forms such as Dena'ina *ts'an*, Ahtna *ts'en*, and Upper Kuskokwim *ts'in̥*, while [tθ'] appears in Holikachuk *tθ'an*, Gwich'in *tθ'an*, Gwich'in *tθ'àn̥*, Lower Tanana *tθ'en̥*, Upper Tanana *tθ'àn*, and Tanacross *tθ'en*. British Columbia and Interior Canada likewise preserve [tθ'] prominently, as seen in Northern Tutchone *tθ'án*, Southern Tutchone *tθ'an*, and Tahltan *tθ'en̥*. The recurrence of [tθ'] across geographically and genealogically separated northern varieties further shows that this is not an isolated innovation but part of the inherited ejective series.

The alternation between [ts'] and [tθ'] is best interpreted as internal differentiation within a single ejective affricate-fricative. This interpretation follows Krauss's analysis of Proto-Dene

obstruents, in which interdental and alveolar realizations are treated as branch-level developments from a single proto-series rather than as distinct inherited phonemes. Within this same system, several languages show more divergent ejective onsets while still preserving ejectivity. Koyukon *tł'ən* reflects lateralization, while Tagish *ʃ'ín* shows palatalization to an ejective affricate [tʃ']. Hare *w'én*, Mountain *p'en*, and Bearlake *kʷ'en* exhibit labialized or velar ejective stops. Although these forms differ significantly from [ts'] and [tθ'], they are unified by retention of ejective articulation, suggesting secondary restructuring of place or manner rather than loss of the ejective feature itself. As discussed in section 4.1.2 'Flesh', [kʷ] ~ [ts'] ~ [tθ'] is a known correspondence across Dene languages (Krauss 1964: 119-121). Additionally, correspondences between dental and alveolar affricates and velar or labialized stops are well attested within Northern Dene obstruent systems, where chain shifts and series mergers can produce substantial surface divergence while preserving underlying contrasts (Alderete et al. 2017: 3-5). In this light, forms such as Bearlake *kʷ'en*, Tłıchǫ *kʷ'ò:*, Tagish *ʃ'ín*, and Koyukon *tł'ən* are not anomalies but fall within the expected range of reflexes for an inherited ejective onset in Proto-Dene. Eyak *ts'al* preserves an ejective affricate [ts'], directly matching the dominant Dene pattern and supporting reconstruction of an ejective affricate onset at the Proto-Dene-Eyak level.

Tlingit *s'ąqʰ* is also compatible with the wider Na-Dene comparison based on the initial consonant. Leer specifically notes a correspondence between Tlingit ejective [s'] and Dene [ts'], which supports treating the Tlingit initial as part of the same inherited ejective alveolar pattern rather than as a separate or irregular development (Leer 2008: 1-2). The issue with Tlingit, however, arises within the final consonant, which is discussed below.

Proto-Yeniseian **a'd* lacks any visible ejective onset and shows no clear formal correspondence with the Na-Dene forms. On present evidence, it cannot be treated as cognate. For

this item, the safest conclusion is simply that no demonstrable Proto-Dene-Yeniseian correspondence can be established.

4.1.4.2 Vowel

The vowel in the Dene forms for ‘bone’ is relatively stable across branches. Most languages show a central or mid vowel, typically [ə] or [e], as in *ts’an*, *ts’en*, *tθ’an*, and *tθ’en* across Alaska, Interior Canada, and British Columbia. These vowels occur in otherwise identical consonantal environments, suggesting that they reflect regular reflexes of a single proto-vowel rather than multiple inherited vowels.

Lowered variants [a] are attested in forms such as *tθ’an* (Holikachuk, Gwich’in) and *ts’an* in several Kaska varieties. These lowered vowels alternate directly with [ə] and [e] in closely related languages and dialects.

Raised variants [i] appear in Upper Kuskokwim *ts’in* and consistently throughout Apachean *ts’in*. These forms preserve the same consonantal structure as their [ə]/[e] counterparts, differing only in vowel height. Krauss notes that Proto-Dene vowels show regular raising and lowering conditioned by phonological environment and branch-specific developments, and that [i], [e], [ə], and [a] frequently participate in such alternations.

Centralized vowels [ʌ] in Beaver and Carrier *ts’an*, likewise preserve the same segmental frame. These reflexes are best interpreted as regional phonetic developments within the same vowel correspondence set, rather than as reflexes of a separate proto-phoneme.

Pacific Coast forms show additional divergence. Hupa *ts’iŋ* displays vowel raising, while Galice *ts’ʒʔ* shows lowering, vowel nasalization, and glottalization. Despite these developments, the vowel remains the nucleus between the same ejective onset and a nasal coda, keeping these forms aligned with the broader Dene pattern.

[a]-type vowels are found across several Dene branches, and both Eyak *ts'al* and Tlingit *s'əq^h* also preserve [a]. Since this pattern is not limited to Dene alone, it may reflect the older vowel rather than a set of independent later developments. For that reason, [*a] is a reasonable candidate for the higher-level reconstruction, with later Dene branch-level developments producing the lowered, raised, or centralized vowels found elsewhere in the set.

Proto-Yeniseian **aʔd* also contains [a], but since the form is not otherwise demonstrably cognate, this vowel similarity cannot be given comparative weight.

4.1.4.3 Final Consonant

Most Dene languages retain a final nasal [n] in the word for ‘bone’, as seen in *ts'ən*, *ts'en*, *tθ'an*, *ts'in*, and *ts'an*. This pattern is widespread across Alaska, Interior Canada, British Columbia, Pacific Coast, and Apachean branches, supporting the reconstruction of a nasal coda.

The Pacific Coast forms show some divergence from this pattern. Hupa *ts'ɪŋ* preserves a nasal final but with velar rather than alveolar place of articulation, while Galice *ts'ʔʔ* preserves nasality on the vowel together with a final glottal stop. These forms are less direct reflexes of the reconstructed coda, but they do not outweigh the much broader distribution of final [n] elsewhere in Dene. The final consonant can therefore be reconstructed as [*n], with the Hupa and Galice forms treated as later branch-specific developments.

Dene languages retain a final nasal [n] in the word for ‘bone’, as seen in *ts'ən*, *ts'en*, *tθ'an*, *ts'in*, and *ts'an*. This pattern is widespread across Alaska, Interior Canada, British Columbia, Pacific Coast, and Apachean branches, indicating that a nasal coda is inherited.

Pacific Coast languages show additional divergence. Hupa *ts'ɪŋ* reflects assimilation of the nasal to a velar place, while Galice *ts'ʔʔ* shows nasalization with glottalization replacing the nasal

consonant. These outcomes are consistent with broader Dene patterns, rather than being considered unrelated developments.

Eyak *ts'al* and Tlingit *s'əqʰ* lack the final nasal found across much of the Dene evidence. This is difficult to explain directly, especially since the final material in both forms does not align neatly with the dominant Dene nasal coda, or with each other. At the same time, the initial consonant and vowel correspond well enough to keep both forms within the comparison. The absence of the nasal may therefore reflect separate developments in Eyak and Tlingit, whether through some sort of restructuring of the final syllable, or some other language-specific outcome. Since the Dene evidence for a final nasal is much stronger, the nasal should still be reconstructed for the Dene side of the comparison, while the Eyak and Tlingit finals remain less certain.

Proto-Yeniseian **aʔd* ends in [**d*], but since the form is not demonstrably cognate, this difference cannot be evaluated comparatively.

4.1.4.4 Discussion

The Na-Dene evidence for ‘bone’ supports a proto-form with an ejective affricate onset, a central vowel, and a nasal coda. Variation in place of articulation among ejectives reflects secondary developments, while ejectivity itself remains stable. Loss of final [n] is at times accompanied by compensatory vowel nasalization, reinforcing its presence at the proto-level. Eyak *ts'al* and Tlingit *s'əqʰ* both support the wider Na-Dene comparison, especially in the initial consonant and vowel. Their final material, however, does not match the Dene nasal pattern as clearly, and more evidence is needed to determine whether this reflects separate developments in Eyak and Tlingit, or an older pattern not preserved in the same way within Dene. Proto-Yeniseian does not show visible cognacy for this item and is best excluded from the reconstruction. However, it is worth briefly noting that

when looking at a comparison of personal pronouns in Yeniseian and Na-Dene languages, the 1st person singular, Ket *ad* and Pumpokol *ad*, correspond to Proto-Dene **ʃi* (**ʃ ~ *s*) (Vajda 2010: 16). This does not directly resolve the present comparison for ‘bone’, but it shows that a Yeniseian alveolar stop [d] may correspond to a Proto-Dene sibilant or sibilant-like initial in at least one established comparison. Consequently, it does offer a possible avenue in which the Proto-Yeniseian **aʔd* could in a similar way correspond to the Proto-Dene **tsʼən*, though this is highly tentative and would require additional evidence to establish cognacy.

Table 12. Reconstruction of BONE₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	<i>*aʔd</i>
Proto-Na-Dene	<i>*tsʼən ?</i>
Proto-Dene-Eyak	<i>*tsʼən ?</i>
Proto-Dene	<i>*tsʼən</i>
Proto-Northern-Dene	<i>*tθʼən</i>
Proto-Alaska-Dene	<i>*tsʼən ~ *tθʼən</i>
Proto-Yukon-Dene	<i>*tθʼən</i>
Proto-Interior-Canada-Dene	<i>*tsʼən</i>
Proto-Central-BC-Dene	<i>*tsʼΛn</i>
Proto-Pacific-Coast-Dene	<i>*tsʼən</i>
Proto-Apachean-Dene	<i>*tsʼin</i>

4.1.5 Fat

Table 13. *FAT₁*

Branch	Language	Form
Alaska	Deg Xinag	q'ux
Alaska	Koyukon	q'əχ
Alaska	Dena'ina (Iliamna)	q'əχ
Alaska	Dena'ina (Inland)	q'əh
Alaska	Dena'ina (OCI)	q'əh
Alaska	Dena'ina (UCI)	q'əh
Alaska	Ahtna	k'αχ
Alaska	Gwich'in (Teetl'it)	k'eh
Alaska	Gwich'in (Gwichya)	k'eh
Alaska	Hän	k'ah
Alaska	Lower Tanana	k'ox
Alaska	Upper Kuskokwim	k'uh
Alaska	Upper Tanana	k'ah
Alaska	Tanacross	k'e
Yukon	Northern Tutchone	k'α
Yukon	Southern Tutchone	k'eh
Yukon	Tahltan	k'ah
Interior Canada	Kaska (FL)	k'ah
Interior Canada	Kaska (GHL)	k'ah
Interior Canada	Kaska (L)	k'ah
Interior Canada	Kaska (LL)	k'ah
Interior Canada	Kaska (P)	k'ah
Interior Canada	Kaska (RR)	k'ah
Interior Canada	Hare	k'a
Interior Canada	Bearlake	k'a
Interior Canada	Tł̥chq̣	k'a
Interior Canada	South Slavey	k'a
Interior Canada	Dene Sł̥liné	k'a
Interior Canada	Dene Dháh	k'á
Interior Canada	Beaver	k'a
Interior Canada	Sekani	k'a
Central BC	Carrier	k'o
Central BC	Witsuwit'en	q'ay, q'a
Central BC	Chilcotin	-k'á (łek'á)
BranchIsolate3	Tsuut'ina	k'ó
Pacific Coast	Hupa	q'ah

Pacific Coast	Galice	k'ah
Pacific Coast	Kwa-Clat	kuh
Apachean	Navajo	k'ah
Apachean	Western A.	k'ah
Apachean	S. Carlos A.	-k'aʔ (ʔik'a:ʔ)
Apachean	Jicarilla A.	k'əh, k'ə
Apachean	Kiowa A.	k'ah

Table 14. *Non-Dene FAT*

Branch / Language	Form
Eyak	q'aχ
Tlingit	təy
Proto-Yeniseian	*kîr

4.1.5.1 Initial Consonant

Across the Dene languages, the word for ‘fat’ overwhelmingly begins with an ejective that is either velar or uvular. Alaska and Interior branches show forms such as Deg Xinag *q'ux*, Koyukon *q'əχ*, Dena'ina *q'əχ* / *q'əh*, and Hän *k'ah*. In the Yukon and British Columbia area, similar reflexes recur: Upper Tanana *k'ah*, Tanacross *k'e*, Northern and Southern Tutchone *k'a* / *k'eh*, and Tahltan *k'ah*. Further south and west, Pacific Coast languages again show comparable onsets (Hupa *q'ah*, Galice *k'ah*), and Apachean languages preserve [k'] (Navajo *k'ah*, Western Apache *k'ah*, Jicarilla *k'əh*).

Uvular [q'] is represented in the lower nodes of the tree, particularly in Alaska (Deg Xinag *q'ux*, Koyukon *q'əχ*, Dena'ina *q'əχ* / *q'əh*), as well as Central BC Witsuwit'en *q'aγ*, *q'a*, Pacific Coast Hupa *q'ah*, and is also reflected in Eyak *q'aχ*. By contrast, velar [k'] dominates in many Interior and southern branches. This asymmetry suggests that uvular [*q'] is the more plausible proto-segment, with later fronting or de-uvularization yielding [k'] in a large subset of Dene languages. While Dene-internal evidence alone does not force this conclusion, reconstructing a uvular source requires fewer historical assumptions than reconstructing a velar source: uvular

consonants are typologically less common than velars, and loss or fronting of uvulars to velars is independently attested both cross-linguistically and within Na-Dene historical phonology (Maddieson 2013, ch. 6; Alderete, Blenkiron & Edősdi 2021: 95-96)

Tlingit presents a markedly different form: *tày*. The initial alveolar stop does not correspond regularly to the velar/uvular ejectives found throughout Dene, nor does it align in any transparent way with the Eyak or Proto-Yeniseian onsets. On present evidence, therefore, the Tlingit form must be treated as divergent.

The Proto-Yeniseian form **kîr* begins with a plain velar stop [**k*], which aligns only partially with the Na-Dene reconstruction. This correspondence is nevertheless compatible at a high level, since Yeniseian languages lack ejective consonants, and a Proto-Dene-Yeniseian uvular ejective [**q'*] would plausibly surface as a plain [**k*] on the Yeniseian side.

4.1.5.2 Vowel

Within Dene, the vowel of ‘fat’ is, for the most part, low. Most languages show [a] or a closely related central or slightly backed vowel (*k’ah*, *k’ah*, *k’a*). In some cases the vowel is fronted or reduced (Tanacross *k’e*, Dena’ina *q’əχ*), but these variants are predictable correspondences. Length and tone vary by branch, which is expected given the independent development of prosodic systems in Dene languages.

Eyak *q’aχ* contains a low vowel as well. Since all branches that can plausibly be compared share a low vowel, [**a*] is the least controversial reconstruction for the proto-vowel, at least at the Dene-Eyak level. Proto-Yeniseian has [**i*], which is plausibly an independent development, under the presumption that this term is indeed cognate with the Dene set.

4.1.5.3 Final Consonant

The Dene languages show a range of velar/uvular codas in ‘fat’: fricatives such as [χ], [ɣ] or [h] in Deg Xinag *q’ux*, Koyukon *q’ɔχ*, Hupa *q’ah* and Witsuwit’en *q’ay*, and complete loss or reduction in some varieties such as Northern Tutchone *k’a* and Tsuut’ina *k’ó*. Eyak *q’aχ*, likewise ends with a uvular fricative, and is directly comparable with the Dene set.

The most plausible reconstruction is therefore a final uvular fricative, likely [χ]. This is supported by the predominance of fricative and weakened codas across Dene, by the match with Eyak, and by the absence of any clear final stop reflex in the dataset. The reduced or zero-final forms are best treated as later loss of this fricative rather than as evidence against reconstructing a coda. Proto-Yeniseian [*r] is also not a direct match for the Na-Dene coda. However, it may be possible to explain it as a later Yeniseian development from an earlier velar or uvular fricative, especially if the fricative weakened and was then reanalyzed or rhoticized in final position. This comparison should therefore remain cautious: the initial consonant and semantic match make the Yeniseian form worth considering, but the final [*r] is not straightforward evidence for the same proto-coda.

Table 15. Reconstruction of FAT₁

Proto-Language	Form
Proto-Dene-Yeniseian	*q’aχ ~ *q’arχ
Proto-Yeniseian	*kîr
Proto-Na-Dene	*q’aχ ?
Proto-Dene-Eyak	*q’aχ
Proto-Dene	*q’aχ
Proto-Northern-Dene	*k’a ~ *k’ah
Proto-Alaska-Dene	*q’əχ ~ *q’əh
Proto-Yukon-Dene	*k’ah
Proto-Interior-Canada-Dene	*k’a
Proto-Central-BC-Dene	*k’ay
Proto-Pacific-Coast-Dene	*k’ah
Proto-Apachean-Dene	*k’ah

4.1.6 Tendon

Table 16. *TENDON*₁

Branch	Language	Form
Alaska	Dena'ina (Iliamna)	ts'aq'
Alaska	Gwich'in (Teetl'it)	ʃ'at
Alaska	Gwich'in (Gwichya)	ʃ'at
Alaska	Hän	ʃ'ət
Yukon	Northern Tutchone	ʃ'át
Yukon	Southern Tutchone	ʃ'ət
Interior Canada	Kaska (FL)	ʃ'ét
Interior Canada	Kaska (GHL)	ʃ'et
Interior Canada	Kaska (L)	ʃ'et
Interior Canada	Kaska (P)	ʃ'ét
Interior Canada	Kaska (RR)	ʃ'ét
Interior Canada	Hare	ʃ'ít
Interior Canada	Mountain	ʃ'ír
Interior Canada	Bearlake	ʃ'i:
Interior Canada	Tłchq	ʃ'ít
Interior Canada	South Slavey	ʃ'ər
Interior Canada	Dene Słliné	tθ'éh
Interior Canada	Dene Dháh	ʃ'ít
Central BC	Carrier	ts'eh
Central BC	Witsuwit'en	ts'eχ
BranchIsolate3	Tsuut'ina	ʃ'h'ít
Pacific Coast	Galice	ʃ'o:k'
Apachean	Kiowa A.	ʃ'ít

Table 17. *Non-Dene TENDON*

Branch / Language	Form
Eyak	k'u't'
Tlingit	teet'
Proto-Yeniseian	*daʔl

4.1.6.1 Initial Consonant

The dominant onset across the Dene data is an ejective palato-alveolar affricate. This is reflected by forms such as ʃ'at, ʃ'ət, ʃ'et, and ʃ'it across Alaska, Interior Canada, and Apachean. This

distribution is wide and internally consistent enough to support an ejective palato-alveolar affricate as the Proto-Dene initial consonant for this lexical item, most likely [**tʃ*].

There is, however, systematic variation in how that affricate is realized. Central BC shows alveolar ejective affricates, as seen in Carrier *tʃ*'*eh* and Witsuwit'en *ts*'*eχ*. Importantly, the same type of ejective affricate also appears in Alaska Dena'ina *ts*'*aq*'. This demonstrates that [ts']-type reflexes are not confined to Central BC. Instead, the data are consistent with a single ejective affricate at the Proto-Dene level, with branch-specific variation between more dental/alveolar and more postalveolar realizations.

Dene Sųliné *tθ*'*éh* is best treated as an innovation. The onset remains ejective and affricate, and the most economical interpretation is that the inherited onset was restructured in this variety into a stop plus interdental frication, yielding [tθ'] as a language-specific outcome while preserving the same ejective articulation.

Tlingit *tît*' begins with a plain alveolar stop rather than an ejective affricate. While this aligns in place of articulation with the Dene forms and is compatible with an alveolar/dental affricate onset at the Na-Dene level, it does not support reconstruction of an ejective affricate outside Dene. Eyak *k'u't'* does not align in place of articulation with the Dene or Tlingit forms and provides no support for reconstructing a specific initial consonant at higher levels. Proto-Yeniseian **daʔ* likewise diverges entirely in both place and manner and cannot be integrated into a coherent initial-consonant correspondence for this item.

4.1.6.1 Vowel

Most Dene forms show a front vowel or a reduced central vowel: [i] and [e] dominate (*tʃ*'*it*, *tʃ*'*et*), with [ə] also well-attested (*tʃ*'*ət*). The Northern Tutchone form *tʃ*'*át* and the Gwich'in forms *tʃ*'*at*

suggest [a] as a regional or branch-level development, plausibly from a reduced nucleus in some environments. The Pacific Coast form *fʷo:kʷ* (Galice) has [o:], which, again, may be the result of a specific innovation. For that reason, a Proto-Dene vowel like [*ə] or [*e] remain the most plausible.

4.1.6.3 Final Consonant

A final alveolar stop is the majority outcome in Dene: many languages show final [t] (*fʷat*, *fʷət*, *fʷet*, *fʷit*). A few Interior Canada varieties show [r] (*fʷir*, *fʷər*), and Bearlake *fʷi:* shows loss of the final consonant with compensatory lengthening. This pattern is compatible with weakening, rhoticization, or loss in some branches.

Central BC shows a different surface outcome: Carrier *t͡sʰeh* ends in [h], and Witsuwitʼen *tsʰeχ* ends in [χ]. The most straightforward interpretation is that these reflect branch-level innovations affecting the final consonant in Central BC, rather than direct retention of an older fricative coda. Given the dominance of final [t] elsewhere in Dene, there is no need to posit a different proto-coda on the basis of the Central BC data alone, and these forms are best treated as innovative developments within that branch.

The Pacific Coast Galice *fʷo:kʷ* and Alaska Denaʼina *tsʰaqʷ* have velar and uvular codas respectively, followed by a glottal stop. They do not align neatly with the dominant [t] pattern. These are best treated as independent innovations or as the result of secondary morphological material. Given the otherwise consistent final [t] across much of Alaska and Interior Canada, the most cautious working reconstruction is Proto-Dene with a coda [*t], while treating the ejective codas as uncertain with respect to cognacy and/or segmentation. Nevertheless, given the fact that Tlingit has an ejective [tʰ] is noteworthy, as it may suggest a connection here as well, although that may also be simply the result of a coincidence.

4.1.6.4 Discussion

Within Dene, the shared pattern is an ejective palato-alveolar onset followed by a front or reduced vowel and a alveolar coda, yielding a working Proto-Dene shape $*\text{ʃ}^{\text{v}}Vt$.

At the Na-Dene level, Tlingit *tít'* aligns in overall shape with the Dene forms in showing an alveolar onset and final [t'] despite lacking an ejective in the onset. Eyak *k'u't'* does not align in place of articulation and provides no clear support for extending the reconstruction upward. In the absence of independent evidence for a regular correspondence linking these forms, Proto-Na-Dene should remain unresolved for this lexical item. Proto-Yeniseian $*daʔl$ is too divergent in both onset and coda to motivate a Proto-Dene-Yeniseian reconstruction for *tendon* on the basis of this dataset alone. The most methodologically consistent outcome is to leave Proto-Dene-Yeniseian unresolved here.

Table 18. Reconstruction of *TENDON*₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	$*daʔl$
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	$*\text{ʃ}^{\text{v}}\text{ət} \sim \text{ʃ}^{\text{v}}\text{it}$
Proto-Northern-Dene	$*\text{ʃ}^{\text{v}}\text{ət} \sim * \text{ʃ}^{\text{v}}\text{et} \sim * \text{ʃ}^{\text{v}}\text{it}$
Proto-Alaska-Dene	$*\text{ʃ}^{\text{v}}\text{ət} \sim * \text{ʃ}^{\text{v}}\text{at}$
Proto-Yukon-Dene	$*\text{ʃ}^{\text{v}}\acute{\text{a}}\text{t}$
Proto-Interior-Canada-Dene	$*\text{ʃ}^{\text{v}}\text{it} \sim * \text{ʃ}^{\text{v}}\text{et}$
Proto-Central-BC-Dene	$*ts'e\chi \sim *ts'eh$
Proto-Pacific-Coast-Dene	$*\text{ʃ}^{\text{v}}\text{o:k' ?}$
Proto-Apachean-Dene	-

4.1.7. Sinew

Table 19. *SINEW*₁

Branch	Language	Form
Alaska	Deg Xinag	tθ'ax
Alaska	Koyukon	tl'ah
Alaska	Dena'ina (Iliamna)	ts'ah
Alaska	Dena'ina (Inland)	ts'ah
Alaska	Dena'ina (OCI)	ts'ah
Alaska	Dena'ina (UCI)	ts'ah
Alaska	Ahtna	ts'aχ
Alaska	Holikachuk	ʃ'eh
Alaska	Gwich'in (Teetl'it)	ʃ'ih
Alaska	Gwich'in (Gwichya)	tθ'èh
Alaska	Hän	tθ'ax
Alaska	Lower Tanana	ts'ah
Alaska	Upper Kuskokwim	tθ'ê:
Alaska	Upper Tanana	tθ'eγ
Alaska	Tanacross	tθ'ax
BranchIsolate2	Ts'ets'aut	ts'in
Interior Canada	Kaska (FL)	ts'éh
Interior Canada	Kaska (L)	ts'éh
Interior Canada	Kaska (P)	ts'éh
Interior Canada	Kaska (RR)	ts'éh
Interior Canada	Hare	w'ié?
Interior Canada	Mountain	k ^w 'è
Interior Canada	South Slavey	tθ'éh
Interior Canada	Dene Słliné	tθ'é
Interior Canada	Dene Dháh	tθ'eh
Interior Canada	Beaver	ts'eh
Interior Canada	Sekani	ts'èh
Central BC	Carrier	ts'eh
Central BC	Chilcotin	tθ'áx
BranchIsolate3	Tsuut'ina	ts'àx
Pacific Coast	Hupa	ki'ots
Pacific Coast	Galice	ts'eh
Pacific Coast	Kwa-Clat	ts'êx
Apachean	Navajo	ts'it
Apachean	Western A.	ts'it
Apachean	Jicarilla A.	ts'e:

Table 20. Non-Dene SINEW

Branch / Language	Form
Eyak	k'u't'
Tlingit	tási / tési
Proto-Yeniseian	*daʔl

4.1.7.1 Initial consonant

The alternation between [ts'] and [tθ'] in the Dene forms for 'sinew' is best interpreted as internal differentiation within a single ejective series, rather than as evidence for multiple proto-onsets. Forms such as *tθ'ax*, *tθ'eh*, *tθ'ey*, alongside *ts'ah* and *ts'eh*, are widely distributed across Alaska, Interior Canada, Central British Columbia, and the Pacific Coast.

Following Krauss's analysis of Proto-Dene obstruents, interdental and alveolar realizations are treated as branch-level developments from a unified proto-series rather than as distinct inherited phonemes (Krauss 1964: 119-121). Within that system, the [ts'] ~ [tθ'] alternation observed in the 'sinew' forms is expected and does not require positing separate proto-segments. The same may be said about the more visibly-divergent languages (as described in sections 4.1.4 'Bone' and 4.4.6 'Intestines'). Koyukon *tl'ah* shows a lateral ejective onset [tɬ'], while Holikachuk *ʃ'eh* and Gwich'in *ʃ'ih* show palatal ejective onsets [tʃ']. Mountain *kʷ'è* has a labialized velar ejective [kʷ'], Hupa *k'i'ots* has a palatalized velar ejective [kʲ'-], and Hare *w'ieʔ* is more divergent, with [w']. They show that the cognate set contains a range of ejective or glottalized realizations across different branches. The main point is that [ts'], [tθ'], [tɬ'], [tʃ'], [kʷ'], [kʲ'], and [w'] can be discussed as part of the same broader correspondence pattern.

Eyak *k'u't'* also preserves ejectivity, and its initial [k'] matches some of the ejective reflexes found in Dene, though without the labialization or palatalization seen in forms such as Mountain *kʷ'è* or Hupa *k'i'ots'*. This does not rule out comparison with the Dene forms, but it does make the exact higher-level reconstruction less straightforward. Tlingit *tási / tési* is more problematic

because it lacks ejectives, which is unexpected if it belongs to the same inherited set. Proto-Yeniseian **daʔl* likewise lacks an ejective onset, although this is not surprising, given the absence of ejective consonants in Yeniseian. At the same time, the Tlingit [t] and Proto-Yeniseian [**d*] may still be relevant as a possible correspondence, though this remains speculative. For now, the best supported reconstruction is at the Proto-Dene level, where the evidence supports an inherited ejective onset, while any extension to Proto-Na-Dene or Proto-Dene-Yeniseian remains tentative.

4.1.7.2 Vowel

The most conservative-looking cluster is the low vowel [a], widely reflected in forms such as *tθ'ax*, *ts'ah*, *ts'àx*, and *tθ'áx*. This [a] is especially prominent in Alaska.

A second cluster involves front vowels, especially [e], visible across much of Interior Canada and parts of BC in forms such as *ts'éh*, *ts'èh*, *tθ'éh*, *tθ'eh*, and *tθ'ê*. This fronting is widespread enough that it cannot be dismissed as sporadic, but the dataset does not by itself tell us whether [e] reflects an inherited alternation or a later shift from [a]. The fact that [a] is slightly more common and geographically broad suggests that [e] is more plausibly secondary, but the dataset alone cannot prove a single direction of change in every branch.

A third pattern is Apachean raising to [i], as in *ts'it*. Because this [i] occurs in a tight subgroup and contrasts with [a]/[e] elsewhere, the most economical interpretation is that [i] is a branch-level innovation. Importantly, the vowel picture still aligns with a conservative reconstruction of a non-high vowel in the proto system.

The non-Dene comparanda may support this further, but only cautiously. Tlingit *tási* / *tési* show [a] ~ [e], Proto-Yeniseian **daʔl* has [a], and Eyak *k'u't'* contains a non-high vowel. These vowels are broadly compatible with the Dene pattern, but they cannot be used as strong evidence

on their own, since the inclusion of the Tlingit and Proto-Yeniseian forms remains uncertain at the level of the initial consonant.

On the dataset alone, then, the vowel reconstruction that requires the fewest assumptions is a proto [*a], with branch-level developments yielding [e] in many northern varieties and [i] in Apachean.

4.1.7.3 Final consonant

The distribution of final consonants in the Dene forms strongly supports reconstruction of a velar fricative coda in the proto-form, most plausibly a segment like [x]. Across the dataset, this element is reflected consistently, most commonly as [x], [ɣ], or [h]. Conservative forms such as *tθ'ax* preserve [x] directly, while forms such as *tθ'eɣ* reflect voicing or lenition to [ɣ]. In many other branches, the same element appears further weakened to [h], as in *ts'ah* and *ts'eh*. This pattern is both widespread and geographically diverse.

Taken together, these correspondences point to a clear and economical historical trajectory: an inherited velar fricative coda [x] undergoing progressive weakening in different branches. Along this path, [x] may lenite to [ɣ] through voicing, and then weaken further to [h]. Such developments are typologically unremarkable and align well with known lenition pathways affecting velar fricatives in coda position.

Further along this same trajectory, some branches appear to have weakened the coda even more drastically. In Hare *w'ieʔ*, the original fricative is no longer present as an oral consonant and instead corresponds to a glottal stop [ʔ]. This can be plausibly interpreted as the endpoint of weakening, where the original velar fricative no longer surfaces segmentally and is replaced by glottal closure. Other varieties show complete loss of the coda, consistent with the same general weakening pathway.

The Apachean forms *ts'it* do not reflect a fricative coda, but instead end in a stop [t]. This is unusual against the wider Dene evidence, where velar fricatives and weakened reflexes dominate. However, the Apachean outcome is not completely isolated, since Pacific Coast Hupa *k'i'ots'* also contains a final alveolar affricate, and Eyak *k'u't'* may point in a similar direction, though without a directly matching Dene-style final pattern. These forms raise the possibility that a final [t] or [ts] element may have belonged to an older stage of the set and was retained only in a small number of branches, while most Dene languages developed the velar fricative and weakened-coda pattern seen elsewhere.

At the same time, the exact interpretation of this coda remains difficult. It is technically possible that Apachean *ts'it* and Hupa *k'i'ots'* developed similar final stop or affricate-like outcomes independently, but that explanation is not very satisfying, since the same unusual pattern would have to arise separately in two distant branches, with Eyak *k'u't'* possibly showing a comparable final as well. A retention scenario is therefore worth considering: the coda may preserve an older element that was lost or transformed elsewhere in Dene, where the dominant outcome became a velar fricative or weakened coda. However, because the evidence for this older alveolar coda is limited to only a small number of forms, it cannot be treated as secure.

Tlingit *tási / tési* does not support a final [t] or [ts], and it also lacks the Dene velar fricative coda. Proto-Yeniseian **daʔl* likewise does not match the Dene final directly, since it ends in a lateral fricative [ɭ]. Still, both Tlingit and Proto-Yeniseian preserve fricative-type final material rather than a simple stop, which keeps the comparison open but unresolved. On dataset-internal grounds, the safest reconstruction remains a Proto-Dene form with a velar fricative coda, best represented as [x] or [χ], while the possibility of an older alveolar final can only be treated as tentative pending further evidence.

Table 21. Reconstruction of *SINEW*₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*daʔl
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*ts'ax ~ *ts'ats
Proto-Northern-Dene	*ts'ax ~ *tθ'ax
Proto-Alaska-Dene	*ts'ax ~ *tθ'ax
Proto-Interior-Canada-Dene	*ts'eh ~ *tθ'eh
Proto-Central-BC-Dene	*ts'eh
Proto-Pacific-Coast-Dene	*ts'ex ~ *ts'ets
Proto-Apachean-Dene	*ts'it

4.1.8 Blood vessel

The meaning ‘blood vessel’ is represented here by a widespread Dene cognate set extending across Alaska, Yukon, Interior Canada, and Apachean. Although forms such as Koyukon *k’utl* and Ahtna *k’u:z* initially look rather different from the more common Northern and Apachean reflexes, Snoek explicitly includes Koyukon in the same set as Navajo *ts’o:s*, drawing on the correspondence patterns established by Hoijer 1963 (2015: 84). More specifically, Snoek notes that the stem-initial consonants reflect Hoijer’s correspondence set in which an earlier palatalized velar ejective yields Apachean [ts’] but Koyukon [k’], and he further suggests that the final consonants belong to the same historical series, with Apachean [s] corresponding to Koyukon [ɬ]. Ahtna can be understood as another reflex of this same pattern, despite its different final segment [z], which fits more closely with the original Apachean [s]. The Lipan form is also best retained in the set, since its lack of ejectivity is likely a problem of older documentation rather than true lexical non-cognacy. Eyak also has an initial ejective [k’], as well as a final ejective [t’], which seems to match well with some Alaska languages. Tlingit lacks initial ejective, but does retain a final ejective [t’]. Proto-Yeniseian does not appear to contribute a convincing cognate here: **suʔa:ŋʌ* is probably a compound built from **su:l* ‘blood’ and **aʔŋ* ‘rope’, and it does not resemble the Dene forms closely enough to be included.

Table 22. *TUBE₁*

Branch	Language	Form
Alaska	Koyukon	k'utł
Alaska	Ahtna	k'u:z
Alaska	Dena'ina (OCI)	k'ət'
Alaska	Dena'ina (Iliamna)	k'ət'
Alaska	Gwich'in (Teetl'it)	ʃ̥ũ:
Alaska	Gwich'in (Gwichya)	ʃ̥ù:
Alaska	Hän	ʃ̥iiʔ
Alaska	Upper Tanana	ʃ̥ĩũʔ
Alaska	Tanacross	ʃ̥ũðʔ
Yukon	Northern Tutchone	ʃ̥úʔ
Interior Canada	Bearlake	ʃ̥u
Interior Canada	Dene Sųłiné	ʃ̥uð
Apachean	Navajo	ts'o:s
Apachean	Western Apache	ts'o:s
Apachean	S. Carlos Apache	ts'õ:s
Apachean	Kiowa Apache	ts'õ̃s
Apachean	Mescalero Apache	ts'u:s
Apachean	Lipan Apache	tso:s

Table 23. *Non-Dene BLOOD VESSEL*

Branch / Language	Form
Eyak	k'u't'
Tlingit	teet'
Proto-Yeniseian	*sula:ŋʌ

4.1.8.1 Initial Consonant

The initial consonant is one of the strongest arguments for the unity of this set. Koyukon and Ahtna show [k'], most of the Northern Dene languages show [ʃ̥], and the Apachean forms show [ts'], with Lipan [ts] lacking ejectives in the documentation. Taken in isolation, these could look like unrelated initials, but Snoek's discussion makes clear that they are compatible within an established correspondence set. In particular, the contrast between *k'utł* and *ts'o:s* is not accidental,

but reflects the pattern in which an earlier palatalized velar ejective gives velar reflexes in some branches and alveolar/palato-alveolar affricates in others (2015: 84-86). For that reason, the best reconstruction is not a simple [k'] or a simple [ts'], but a palatalized ejective velar, something of the type [*kʲ] (Hargus 2010a).

4.1.8.2 Vowel

The vowel pattern is less uniform than the onset, but a general shape is still visible. Many languages point to a back rounded vowel: Koyukon [u], Ahtna [u:], both Gwich'in forms [u], Tanacross [ũ], Northern Tutchone [u], Bearlake [u], Dene Sų́liné [u], and most Apachean forms [o:] or [u:]. The main deviations are Hän [i:] and Upper Tanana [iũ], which suggest local developments rather than a different proto-vowel. Since the majority of the forms point toward a rounded back nucleus, the safest reconstruction is a vowel of the [*u] type, with later variation in height, length, and nasalization in the daughter languages.

4.1.8.3 Final Consonant

The final consonant is the least stable part of the stem. Koyukon ends in [tɬ], Ahtna in [z], several Northern languages show zero, [ʔ], or [ð], and Apachean consistently preserves [s]. Even so, a recurring coronal final element is visible across the set. Snoek's comparison is especially important here, since he explicitly suggests that the Navajo final [s] and Koyukon [ɬ] belong to the same cognate pattern (2015: 84). That makes it possible to interpret the different endings not as independent lexical items, but as divergent reflexes of an older coronal final sequence. The safest reconstruction is therefore a final sibilant or affricate element, rather than any specific daughter-language segment such as [s], [ɬ], or [ð] alone. Because Koyukon preserves the complex ending

[tɬ], one possible hypothesis is that the older form had a more complex coda, which was simplified differently in the various branches, but the available evidence does not allow that to be stated with certainty, especially given the fact that some show ejectives, while others do not.

Table 24. Reconstruction of BLOOD VESSEL

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*suɬa:ŋʌ
Proto-Na-Dene	-
Proto-Dene-Eyak	*kʲu'tɬ' ?
Proto-Dene	*kʲus ~ *kʲutɬ
Proto-Northern-Dene	*ʃʷuð ~ *kʲutɬ
Proto-Alaska-Dene	*ʃʷuð ~ *kʲutɬ
Proto-Yukon-Dene	*ʃʷúʔ
Proto-Interior-Canada-Dene	*ʃʷuð
Proto-Central-BC-Dene	-
Proto-Pacific-Coast-Dene	-
Proto-Apachean-Dene	*ts'os

4.2 Head and face

4.2.1 Head

Table 25. Reconstruction of *HEAD*₁

Branch	Language	Form
Alaska	Deg Xinag	tθe?
Alaska	Koyukon	tʰi
Alaska	Dena'ina (Iliamna)	ts ^h i
Alaska	Dena'ina (Inland)	ts ^h i
Alaska	Ahtna	ts ^h ə?
Alaska	Gwich'in (Teetl'it)	ʃ ^h i?
Alaska	Gwich'in (Gwichya)	ʃ ^h i?
Alaska	Hän	tθ ^h i?
Alaska	Upper Kuskokwim	ts ^{he} ?
Alaska	Upper Tanana	tθi?
Alaska	Tanacross	tθi?
Yukon	Northern Tutchone	tθ ^h i?
Yukon	Southern Tutchone	θi
Yukon	Tahltan	ts ^h i
BranchIsolate1	Tagish	ʃi
BranchIsolate2	Ts'ets'aut	ts ^{hé} :
Interior Canada	Kaska (FL)	ts ^h i?
Interior Canada	Kaska (GHL)	ts ^h i?
Interior Canada	Kaska (L)	ts ^h i?
Interior Canada	Kaska (LL)	ts ^h i?
Interior Canada	Kaska (P)	ts ^h i?
Interior Canada	Kaska (RR)	ts ^h i?
Interior Canada	Hare	fi
Interior Canada	Mountain	pi?
Interior Canada	Bearlake	k ^{wh} i
Interior Canada	T̥chq̣	k ^w i
Interior Canada	South Slavey	tθ ^h i
Interior Canada	Dene S̥łiné	tθi
Interior Canada	Dene Dháh	tθi
Interior Canada	Beaver	ts ^h i
Interior Canada	Sekani	ts ^h i?
Central BC	Carrier	ts̥ ^h i
Central BC	Witsuwit'en	tsi

Central BC	Chilcotin	tθi
BranchIsolate3	Tsuut'ina	ts ^h i
Pacific Coast	Hupa	tseʔ
Pacific Coast	Galice	siʔ
Pacific Coast	Kato	siʔ
Pacific Coast	Tolowa	siʔs
Pacific Coast	Tututni	siʔ
Pacific Coast	Mattole	ts ^h iʔ
Pacific Coast	Kwa-Clat	tsíe
Apachean	Navajo	ts ^h i:ʔ
Apachean	Kiowa A.	tsì:h
Apachean	Lipan A.	tʃ ^h e

Table 26. Non-Dene HEAD

Branch / Language	Form
Eyak	sha:w
Tlingit	shá
Proto-Yeniseian	*tí'

4.2.1.1 Initial Consonant

Across the Dene branches, the reflexes consistently point to an inherited onset in the coronal consonant range. This onset appears as affricates, aspirated affricates, alveolar or dental fricatives, lateral affricates, and occasionally palatal affricates. The Alaska languages show several related reflexes, including [ts^h], [tθ], [tʃ], and, in a few cases, [tʃ^h]. For example, Deg Xinag *tθeʔ*, Koyukon *tʃi*, Dena'ina *ts^hi*, Gwich'in *tʃ^hiʔ*, Hän *tθ^hiʔ*, and Upper Tanana *tθiʔ*. British Columbia and Interior Canada continue the same pattern: Northern Tutchone *tθ^hiʔ*, Southern Tutchone *θi*, Kaska *ts^hiʔ*, Tahltan *ts^hi*, Carrier *tʃ^hi*, Witsuwit'en *tsi*, and Sekani *ts^hiʔ*. Pacific Coast Dene have [s] and [ts]-type reflexes such as Hupa *tseʔ*, Galice *siʔ*, Kato *siʔ*, Tolowa *siʔs*, and Mattole *ts^hiʔ*. Apachean languages likewise reflect the same series: Navajo *ts^hi:ʔ*, Kiowa Apache *tsì:h*, Lipan Apache *tʃ^he*. These patterns collectively show that Proto-Dene had a front alveolar affricate.

The non-Dene evidence is especially important here because Eyak *sha:w* and Tlingit *shá* both show a [ʃ]-initial reflex. This pattern fits the correspondence discussed by Vajda, following Leer, in which the Proto-Dene alveolar affricate onset corresponds not only to Tlingit [ts], but also to Tlingit [ʃ] in certain lexical sets (Vajda 2010: 42; Leer 2008: 14-15). The word for ‘head’ is a classic example used in Leer’s analysis: Proto-Dene **tsi* ‘head’ parallels Tlingit *shá*. This same TS to sh correspondence also appears in the ‘stone’ / ‘rock’ set (Proto-Dene *tse:* ‘, Eyak *tsa:*, Tlingit *shà*).

Proto-Yeniseian provides additional supporting evidence. The Proto-Yeniseian reconstruction provided by Vajda & Werner is **tʃuʔ*. The palatalized stop [**tʃ*] corresponds naturally to a front alveolar affricate in Dene. This produces a consistent set of correspondences:

Proto-Dene-Yeniseian [**ts*]

→ Proto-Yeniseian [**tʃ*]

→ Proto-Na-Dene [**ts*]

→ Tlingit [ʃ]

→ Eyak [ts] (later [ʃ])

→ Proto-Dene [**ts*] → [ts] / [tθ] / [tɬ] / [tʃ]

This is the exact alignment that Leer’s discovery illuminated and that Vajda later used to strengthen the Dene-Yeniseian hypothesis. It also explains why the Tlingit reflex is [ʃ] rather than [ts], and why the Yeniseian reflex is [**tʃ*]. The comparative picture therefore points to a alveolar affricate for Proto-Na-Dene (and Proto-Dene-Yeniseian), most likely [**ts*].

4.2.1.2 Vowel

Across Dene, the vowel in ‘head’ is quite consistent: nearly all branches show [i] or [e] in a high-front environment. Alaska languages show [i] or [e] depending on the language (*tθeʔ*, *tsʰi*, *tθiʔ*, *ʃʰiʔ*). British Columbia and Interior Canada overwhelmingly show [i] (*tθʰiʔ*, *θi*, *tsʰiʔ*, *tsi*, etc.). Pacific Coast Dene show [i] with occasional slight lowering (*siʔ*, *sɪʔ*). Apachean likewise shows a high front vowel (*tsʰi:ʔ*, *tsi:h*, *tʃʰe*).

Eyak *sha:w* and Tlingit *shá* both show low-vowel reflexes. These forms can be reconciled with the Dene evidence if the low vowel developed through later lowering, possibly accompanied by lengthening in Eyak. However, the non-Dene forms also leave open the possibility that a low vowel was already present at a higher level. Proto-Yeniseian **tʲuʷ* contains the high central unrounded vowel [u]. There is evidence that Proto-Na-Dene high front or high central vowel regularly corresponds to Proto-Yeniseian [**u*]. This same correspondence appears in several other cross-family sets (Vajda 2010: 41).

The convergence of evidence points to a high front or high central proto-vowel, most likely [**i*] or [**ɪ*]. Because Dene reflexes overwhelmingly show [i], while Yeniseian points toward a central position, a safe reconstruction is Proto-Na-Dene [**i*] with possible centralization [**ɪ*] in Proto-Dene-Yeniseian.

4.2.1.3 Final Consonant

The final consonant of ‘head’ is largely lost or reduced in Dene languages, but the retention of final glottalization and occasional frication reveals a consistent pattern. Many Alaska and Interior Canada languages have a final [ʔ], such as Deg Xinag *tθeʔ*, Gwich’in *ʃʰiʔ*, Upper Tanana *tθiʔ*, Kaska *tsʰiʔ*, and Sekani *tsʰiʔ*. Others have [Ø], such as Koyukon *tʰi* or Southern Tutchone *θi*. Pacific

Coast Dene preserve final glottal stops or sibilants, for example Hupa *tseʔ* and Tolowa *siʔs*. Apachean often has [ʔ] or [h] (*tsʰi:ʔ*, *tsi:h*).

Eyak *sha:w* preserves a final glide [w], while Tlingit *shá* is vowel-final. Much of the Dene evidence, by contrast, points to a final laryngeal or weakened coda. Eyak may preserve a reduced or secondary glide where Dene preserves traces of a laryngeal/coda. The Eyak and Tlingit forms can be interpreted either as later reductions of an earlier coda or as evidence that the final consonant was not preserved uniformly across Na-Dene.

Proto-Yeniseian **tʃuʔ* is important because it preserves final glottalization. This matches the Dene evidence better than a purely vowel-final reconstruction, since Dene also shows reflexes with [ʔ], [h], or zero coda.

For that reason, the most economical higher-level reconstruction is an alveolar affricate onset with a high or central vowel and final glottalization, approximately **tsiʔ* or **tsiʔ*. The exact vowel quality remains somewhat open, but the final [**ʔ*] is preferable to a simple vowel-final reconstruction because it accounts for both the Dene laryngeal reflexes and Proto-Yeniseian **tʃuʔ*.

Table 27. Reconstruction of *HEAD*₁

Proto-Language	Form
Proto-Dene-Yeniseian	<i>*tsiʔ ~ *tsiʔ</i>
Proto-Yeniseian	<i>*tʃuʔ</i>
Proto-Na-Dene	<i>*tsiʔ</i>
Proto-Dene-Eyak	<i>*tsiʔ ~ *tsa:</i>
Proto-Dene	<i>*tsiʔ</i>
Proto-Northern-Dene	<i>*tsʰiʔ</i>
Proto-Alaska-Dene	<i>*tsʰiʔ ~ *tθiʔ</i>
Proto-Yukon-Dene	<i>*tsʰi</i>
Proto-Interior-Canada-Dene	<i>*tsʰiʔ</i>
Proto-Pacific-Coast-Dene	<i>*tsʰiʔ ~ siʔ</i>
Proto-Apachean-Dene	<i>*tsʰiʔ</i>

4.2.2 Neck

Table 28. NECK.OUTER₁

Branch	Language	Form
Alaska	Deg Xinag	q'uθ
Alaska	Koyukon	q'ol
Alaska	Dena'ina (Iliamna)	q'əs
Alaska	Ahtna	k'os
Alaska	Holikachuk	k'oh
Alaska	Gwich'in (Teetl'it)	k'oh
Alaska	Gwich'in (Gwichya)	k'oh
Alaska	Hän	k'oh
Alaska	Lower Tanana	k'wθ?
Alaska	Upper Kuskokwim	k'os
Alaska	Tanacross	k'oθ
Yukon	Northern Tutchone	k'o
Yukon	Southern Tutchone	k'u
InteriorCanada	Kaska (GHL)	k'os
InteriorCanada	Kaska (L)	k'os
InteriorCanada	Kaska (LL)	k'os
InteriorCanada	Kaska (P)	k'os
InteriorCanada	Kaska (RR)	k'os
BranchIsolate1	Tagish	k'uf
Yukon	Tahltan	k'oθ
BranchIsolate3	Tsuut'ina	k'ūs
InteriorCanada	Hare	k'o
InteriorCanada	Mountain	k'os
InteriorCanada	Bearlake	k'o
InteriorCanada	Tłchq	k'oh
InteriorCanada	South Slavey	k'o
InteriorCanada	Dene Słliné	k'ođ
InteriorCanada	Dene Dháh	k'oh
InteriorCanada	Beaver	k'ous
InteriorCanada	Sekani	k'wos
BranchIsolate2	Ts'ets'aut	k'ɔ? / k ^w 'ɔ?
CentralBC	Chilcotin	k'ɔθ
PacificCoast	Hupa	q'os
PacificCoast	Galice	k ^{wh} as
PacificCoast	Tolowa	k'wəs
PacificCoast	Tututni	k'wəs

PacificCoast	Mattole	k'ós
PacificCoast	Kwa-Clat	k ^w us
Apachean	S. Carlos A.	k'os
Apachean	Jicarilla A.	k ^h ós
Apachean	Kiowa A.	k'òs
Apachean	Mescalero A.	k'us

Table 29. Non-Dene NECK

Branch / Language	Form
Eyak	tsiŋ'də
Tlingit	la
Proto-Yeniseian	*kəqtə

4.2.2.1 Initial Consonant

Across Dene, the initial consonant shows a high degree of stability, consisting of an ejective velar stop with a predictable branch-level variation between velar and uvular articulation. Alaska varieties preserve both uvular (*q'uθ*, *q'ot*, *q'əs*) and velar (*k'os*, *k'oh*) realizations. Only one other language shows this variation, Hupa of the Pacific Coast branch (*q'os*).

Labialization is rather widespread across several branches, especially in Pacific Coast, Interior Canada, and Apachean (*k'wəs*, *k^wus*, *k'ous*). This distribution aligns closely with the vocalic pattern of the term: the dominance of back and central vowels plausibly favors secondary rounding of the onset, rather than indicating a contrastive labiovelar series in the proto-language. The ejective feature itself is consistently preserved across branches.

At the Proto-Dene level, the most economical reconstruction is therefore [**k'*], with uvular realization and labialization treated as secondary developments.

Eyak *tsiŋ'-də* is unrelated in both structure and segmental content and offers no support for higher-level reconstruction. Tlingit has three distinct terms: *la* 'neck', *sé* 'lower neck' and *lidíx* 'upper neck', but they are likewise seemingly non-cognate and fall outside the Dene pattern.

Proto-Yeniseian **kəqtə* differs substantially in overall shape. While the initial [**k*] is compatible given the lack of ejectives in Yeniseian, the presence of a following uvular stop and the bisyllabic structure prevent any confident alignment on initial consonant evidence alone.

4.2.2.2 Vowel

The vowel in Dene forms clusters around a back or central vowel, most commonly [o], with predictable variation to [u], [ʊ], or [ɔ] across branches. Alaska and Interior Canada consistently show [o] (*k'os*, *k'oh*, *k'o*), while Pacific Coast and Apachean forms alternate between [o] and [u], often in environments with labialized onsets.

More complex forms such as *k'ous* or *k'wos* are best interpreted as branch-level developments involving vowel rounding or glide insertion. Front vowels are absent across the dataset, and reduced vowels appear only sporadically. [ə] appears only in Dena'ina of the Alaska branch, as well as in Tolowa and Tututni within the Pacific Coast branch, while Galice is the sole language to show a back vowel [ɑ] distinct from [o], and these isolated outcomes do not motivate reconstructing additional Proto-Dene vocalic contrasts.

The most conservative Proto-Dene reconstruction is therefore [**o*], with the observed variation arising through predictable phonetic conditioning.

4.2.2.3 Final Consonant

Final consonant reflexes are diverse in surface form but coherent in manner of articulation. The dominant outcome across Dene is a sibilant [s], preserved directly in many Interior Canada, Pacific Coast, and Apachean varieties (*k'os*, *k'us*, *k'ūs*). Other branches show fricative or lateral reflexes [h], [ʃ], [θ], [ð], [ɬ], which maintain fricative manner while varying in place or voicing.

These alternations are consistent with weakening or rearticulation of an inherited sibilant rather than independent innovations. Glottal stops appear in a small number of forms (*k'wθʔ*, *k'ɔʔ*) and fit well with a common Dene pattern in which final consonants weaken through glottalization. Zero-coda forms (*k'o*, *k'u*) can be understood as a further step along the same reduction pathway, with complete loss of the weakened coda.

The most conservative Proto-Dene reconstruction is therefore a final [**s*], with systematic fricative weakening accounting for the observed variations across all of the Dene branches.

4.2.2.4 Discussion

The Dene data for ‘neck’ support a well-defined Proto-Dene form **k'os*, characterized by an ejective velar onset, a back vowel [**o*], and a final sibilant [**s*]. Variation across branches is regular and phonologically interpretable, requiring no multiplication of proto-forms.

Eyak and Tlingit are clearly non-cognate for this lexeme and should be excluded from higher-level reconstruction. Proto-Yeniseian **kəqtə* remains formally divergent in structure and segmental composition. While the absence of ejectives in Yeniseian means that initial [**k*] is not inherently incompatible, the lack of alignment in syllable structure and final consonant requires that any Dene-Yeniseian connection for ‘neck’ remain unresolved.

Table 30. Reconstruction of NECK

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*kəqtə
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*k'os
Proto-Pacific-Coast-Dene	*k'wos
Proto-Apachean-Dene	*k'os
Proto-Northern-Dene	*k'os
Proto-Alaska-Dene	*k'os
Proto-Interior-Canada-Dene	*k'os
Proto-Central-BC-Dene	*k'ʊθ

4.2.3 Hair

Table 31. HAIR₁

Branch	Language	Form
Alaska	Deg Xinag	yo?
Alaska	Koyukon	ɤo?
Alaska	Dena'ina (Inland)	ɤu
Alaska	Dena'ina (UCI)	ɤu
Alaska	Ahtna	ɤa?
Alaska	Holikachuk	yo?
Alaska	Gwich'in (Teetl'it)	ye?
Alaska	Gwich'in (Gwichya)	ye?
Alaska	Hän	ya?
Alaska	Upper Kuskokwim	yo?
Alaska	Upper Tanana	ya?
Alaska	Tanacross	ya?
Yukon	Northern Tutchone	je?
Yukon	Southern Tutchone	ya
BranchIsolate1	Tagish	ra?
BranchIsolate2	Ts'ets'aut	xa
Interior Canada	Kaska (FL)	ya?
Interior Canada	Kaska (GHL)	ya?
Interior Canada	Kaska (L)	ya?
Interior Canada	Kaska (LL)	ya?
Interior Canada	Kaska (P)	ya?
Interior Canada	Kaska (RR)	ya?
Interior Canada	Hare	ya?
Interior Canada	Mountain	ya?
Interior Canada	Bearlake	ya
Interior Canada	Tłchq	ya
Interior Canada	South Slavey	ya
Interior Canada	Dene Słliné	ya
Interior Canada	Dene Dháh	ya
Interior Canada	Beaver	ya?
Interior Canada	Sekani	ya?
Central BC	Carrier	ya?
Central BC	Witsuwit'en	ye
Central BC	Chilcotin	ya
BranchIsolate3	Tsuut'ina	ya
Pacific Coast	Hupa	wa?

Pacific Coast	Galice	kaʔ
Pacific Coast	Kato	kaʔ
Pacific Coast	Mattole	ya
Pacific Coast	Wailaki	yaʔ
Pacific Coast	Kwa-Clat	ra
Apachean	Navajo	yaʔ
Apachean	Western A.	ya:ʔ
Apachean	S. Carlos A.	ya:ʔ
Apachean	Lipan A.	ra

Table 32. Non-Dene HAIR

Branch / Language	Form
Eyak	χu'
Tlingit	χàwú
Proto-Yeniseian	*qāʔde (Vajda, PC)

4.2.3.1 Initial Consonant

The initial consonant pattern in Dene is dominated by the voiced velar fricative [ɣ], which occurs across nearly all major branches and therefore provides the strongest basis for reconstructing Proto-Dene [*ɣ]. A smaller group of Alaska forms show the voiced uvular fricative [ʁ], including Koyukon *ʁvʔ*, Dena'ina *ʁu*, and Ahtna *kaʔ*.

Other Dene onsets are more limited in distribution. The [r]-initial forms in Tagish *ráʔ*, Kwa-Clat *rá*, and Lipan Apache *ra* can be treated as later rhotic developments, while Galice and Kato *kaʔ* show a voiceless velar stop that may result from fortition of an earlier fricative. Ts'ets'at *xá* likewise preserves a voiceless velar fricative.

Eyak *χu'* and Tlingit *χàwú* both begin with the voiceless uvular fricative [χ]. Their agreement suggests that the deeper Na-Dene onset was probably further back and voiceless than the [*ɣ] reconstructed for Proto-Dene. A Proto-Na-Dene onset [*χ] is therefore plausible, with later voicing and fronting producing [*ɣ] throughout most of Dene.

Proto-Yeniseian **qa'de* ‘body hair, wool, fur’ (Vajda, PC) provides a significant higher-level comparison. The form consists of the lexical element *qa'-* ‘fur’ followed by the collective suffix *-de*, meaning that *qa'-* is the relevant portion for comparison. Its initial [**q*], a voiceless uvular stop, corresponds closely in place of articulation to the uvular fricative [*χ*] found in Eyak and Tlingit. Additionally, the development of the Proto-Yeniseian stop into a fricative is reflected within Yeniseian itself: modern Ket *xáde* has an initial voiceless velar fricative [*x*], while Yugh *χā't* has a voiceless uvular fricative [*χ*]. These forms demonstrate that fricativization of the earlier uvular stop occurred within the Yeniseian branch as well.

This correspondence makes an initial voiceless uvular stop [**q*] a strong candidate at the Proto-Dene-Yeniseian level. Under this interpretation, Proto-Dene-Yeniseian [**q*] was retained as a stop in Proto-Yeniseian, while on the Na-Dene side it underwent fricativization to [**χ*]. Eyak and Tlingit preserve this voiceless uvular fricative, while Dene subsequently developed predominantly voiced velar [**ɣ*]. The exact timing of the fricativization cannot be established from this term alone, but the overall progression [**q*] > [*χ*] > [*ɣ*] provides a coherent account of the major reflexes.

4.2.3.2 Vowel

The Dene vowel pattern is centered primarily on a low vowel [*a*] or [*ɑ*], especially throughout Interior Canada, Central British Columbia, Pacific Coast, and Apachean. Alaska languages show greater variation through backing and rounding, producing forms such as Deg Xinag *yoʔ*, Koyukon *ɸoʔ*, and Dena'ina *ɸu*. Eyak *χu'* contains [*u*], while Tlingit *χàwú* contains a low vowel [*a*].

Proto-Yeniseian **qa'-* contains [**a*], agreeing directly with the dominant low vowel found throughout Dene. This correspondence considerably strengthens the reconstruction of [**a*] at the higher level. The rounded vowels several Alaska Dene languages can therefore be treated as later

developments from an earlier low vowel. A Proto-Dene-Yeniseian vowel [*a] is consequently well supported.

4.2.3.3 Final Consonant

The final consonant is one of the most stable features of the Dene dataset. A glottal stop [ʔ] occurs widely across Alaska, Yukon, Interior Canada, Central British Columbia, Pacific Coast, and Apachean, as seen in forms such as *yoʔ*, *ɛvʔ*, *yaʔ*, *ráʔ*, *kaʔ*, and *ya:ʔ*. Forms lacking an overt coda can plausibly reflect later loss of the glottal stop.

Eyak *χu'* also contains a final glottal element, providing direct support for extending this feature beyond Dene. Tlingit *χàwú* does not preserve an equivalent final consonant and is therefore less informative for this part of the reconstruction.

Proto-Yeniseian **qa'de* 'body hair, wool, fur' provides particularly important evidence here. The form consists of the lexical element **qa'-* 'fur' followed by the collective suffix **-de*. The glottal element therefore occurs at the end of the lexical root **qa'-*, even though it is not word-final in the complete Proto-Yeniseian form. This root-final glottal element corresponds closely with the widespread Dene [ʔ] and the glottal element in Eyak *χu'*. A final [*ʔ] can consequently be considered a strong candidate for reconstruction in the lexical root at the Proto-Dene-Yeniseian level.

4.2.3.4 Discussion

The Dene evidence for 'hair' supports a Proto-Dene form with initial [*χ], a low vowel [*a], and final [*ʔ]. Eyak *χu'* and Tlingit *χàwú* indicate that the earlier Na-Dene onset was probably a voiceless uvular fricative [*χ], which later became voiced and shifted forward to [γ] throughout much of Dene.

Proto-Yeniseian **qa'de* ‘body hair, wool, fur’, specifically its lexical element *qa'* ‘fur’, substantially strengthens the higher-level comparison. Its initial voiceless uvular stop [q] corresponds naturally with Na-Dene [**χ*], while modern Yeniseian reflexes such as Ket *xáde* and Yugh *χā't* independently show the development of the earlier stop into velar or uvular fricatives. The low vowel [a] and final glottal element also correspond closely with the dominant Dene pattern and Eyak *χu'*.

Taken together, the evidence supports a tentative Proto-Dene-Yeniseian reconstruction approximately **qaʔ* ‘hair, fur’. A plausible development is Proto-Dene-Yeniseian [**q*] > Proto-Na-Dene [**χ*], followed by further voicing and fronting to Proto-Dene [**ɣ*], while Proto-Yeniseian retained [**q*] and several later Yeniseian languages independently show fricative reflexes. The exact chronology of the initial consonant changes remains uncertain, but the agreement in onset, vowel, final glottal element, and meaning makes this a strong Proto-Dene-Yeniseian candidate.

Table 33. Reconstruction of HAIR₁

Proto-Language	Form
Proto-Dene-Yeniseian	<i>*qaʔ</i> (-de?)
Proto-Yeniseian	<i>*qaʔ</i> (-de)
Proto-Na-Dene	<i>*χaʔ</i> ~ <i>*qaʔ</i>
Proto-Dene-Eyak	<i>*ɣaʔ</i> ~ <i>*χuʔ</i>
Proto-Dene	<i>*ɣaʔ</i> ~ <i>*ɣuʔ</i>
Proto-Northern-Dene	<i>*ɣàʔ</i> ~ <i>*ɣuʔ</i>
Proto-Alaska-Dene	<i>*ɣàʔ</i> ~ <i>*ɣuʔ</i>
Proto-Yukon-Dene	<i>*ɣà</i>
Proto-Interior-Canada-Dene	<i>*ɣáʔ</i>
Proto-Central-BC-Dene	<i>*ɣaʔ</i>
Proto-Pacific-Coast-Dene	<i>*ɣaʔ</i>
Proto-Apachean-Dene	<i>*ɣaʔ</i>

4.2.4 Eye

Initially, the reconstruction of ‘eye’ in Proto-Na-Dene was based on two separate cognate sets proposed by Snoek (2015). The most widespread pattern appears in cognate set 1, where Dene languages show [n] or prenasalized [ʰd] Koyukon *nɔχ*, Dena’ina *nɔχ*, Upper Tanana *nâ:k*, South Slavey *ⁿda:*, and Tutchone *ⁿdá:k*. Cognate set 2 shows a related alveolar stop series: [d] and [t] (Beaver *daiʔ*, Kaska *tăʔ* / *ta:k*, Tanacross *ta:yʔ*, Gwich’in *tè:ʔ*). This revised analysis treats both cognate sets as reflexes of a single ancestral form. The two groups are nevertheless presented in separate tables below in order to preserve Snoek’s original division and to make the internal contrast in the data visible before the sets are brought together in the reconstruction (2015: 102-103). The non-Dene evidence from Eyak, Tlingit, and Yeniseian is presented separately after the two Dene tables, so that these forms are not assigned to either subgroup when the analysis ultimately treats both Dene groups as part of the same cognate set.

Table 34. *EYE*₁

Branch	Language	Form
Alaska	Koyukon	<i>nɔχ</i>
Alaska	Dena’ina (Inland)	<i>nɔχ</i>
Alaska	Dena’ina (UCI)	<i>nɔχ</i>
Alaska	Ahtna	<i>naq</i>
Alaska	Lower Tanana	<i>nax</i>
Alaska	Upper Kuskokwim	<i>naɣ</i>
Alaska	Upper Tanana	<i>nâ:k</i>
Yukon	Northern Tutchone	<i>ⁿdá:k</i>
Yukon	Southern Tutchone	<i>nəj</i>
BranchIsolate1	Tagish	<i>ⁿdá</i>
BranchIsolate3	Tsuut’ina	<i>nax</i>
InteriorCanada	South Slavey	<i>ⁿda:</i>
InteriorCanada	Dene Sųliné	<i>nɔx</i>
CentralBC	Carrier	<i>na</i>
CentralBC	Witsuwit’en	<i>neɣ</i>
CentralBC	Chilcotin	<i>naɣ</i>

PacificCoast	Hupa	na:ʔ
PacificCoast	Kato	naʔ
PacificCoast	Tolowa	na:x
PacificCoast	Tututni	nəx
PacificCoast	Mattole	ná:k
PacificCoast	Kwa-Clat	náχ
Apachean	Navajo	ná:ʔ
Apachean	S. Carlos A.	nā:ʔ
Apachean	Mescalero A.	ⁿ da:
Apachean	Lipan A.	ⁿ da
InteriorCanada	Tłchq	ⁿ dā:
InteriorCanada	Dene Dháh	ⁿ da:
Apachean	Jicarilla A.	ná

Table 35. *EYE*₂

Branch	Language	Form
Alaska	Gwich'in (Teetl'it)	tè:ʔ
Alaska	Gwich'in (Gwichya)	tè:ʔ
Alaska	Tanacross	ta:yʔ
InteriorCanada	Kaska (DL)	tǎʔ
InteriorCanada	Kaska (FL)	tǎʔ
InteriorCanada	Kaska (GHL)	ta:k
InteriorCanada	Kaska (L)	tǎʔ
InteriorCanada	Kaska (LL)	tǎʔ
InteriorCanada	Kaska (P)	ta:k
InteriorCanada	Kaska (RR)	tǎʔ
Yukon	Tahltan	ta:ʔ
InteriorCanada	Hare	táʔ
InteriorCanada	Mountain	tǎʔ
InteriorCanada	Bearlake	tá:
InteriorCanada	Beaver	daiʔ
InteriorCanada	Sekani	tǎʔ
BranchIsolate2	Ts'ets'aut	txa:'ə
PacificCoast	Galice	ta:i
Apachean	Western A.	tá:ʔ
Apachean	Kiowa A.	tà:h
InteriorCanada	Tłchq	tà:
InteriorCanada	Dene Dháh	te:
Apachean	Jicarilla A.	tá:

Table 36. *None-Dene EYE₁₋₂*

Branch	Language	Form
Eyak	Eyak	la:χ
Tlingit	Tlingit	wàq ^h
Yeniseian	Ket	des'

4.2.4.1 Initial consonant

Across both cognate sets, the word for ‘eye’ begins with an oral or nasal alveolar stop, but the distribution is split by region. In cognate set 1, Dene languages show an initial nasal [n] or a prenasalized [ⁿd] (e.g. Koyukon *nɔχ*, Dena’ina *nɔχ*, Tutchone *ⁿdák*, South Slavey *ⁿda:*). Those in cognate set 2 have a plain alveolar [d] or voiceless [t] (e.g. Beaver *daɪ?*, Kaska *tǎ?*, Tanacross *ta:ɣ?*, Gwich’in *tè:?*). Eyak *la:χ* has [l] and Tlingit *wàq^h* has [w].

The alternation [n] ~ [ⁿd] ~ [d] ~ [t] ~ [l] ~ [w] observed across the Na-Dene branches is not random but reflects regular morphological correspondences in the family’s possessive system. Krauss first noted that Dene stems beginning with [n]/[d] often alternate morphophonemically, implying a prefixal origin (1964: 124). Leer (as summarized in Rice 2000) reconstructed a Proto-Dene nasal-class prefix [*n] that surfaces as prenasalized [ⁿd] before alveolar stems; subsequent loss of nasalization or devoicing yields plain [d] and [t] in some dialects. Eyak displays [l] in the same morphological slot, and Tlingit [w] or [y]. Nikolaev confirms that Proto-Na-Dene [*n], [*l], and [*ŋ] alternate freely in corresponding environments, demonstrating that these onsets are functionally equivalent reflexes of an inherited prefix zone (2014: 106-108). Collectively, these sources support interpreting the [n]/[d]/[t]/[l]/[w] variation as outcomes of devoicing, and lateralization of an earlier prefixal [n] or [d] connector historically associated with inalienably possessed nouns. Additionally, as illustrated by Vajda, Dene “nasal-class” prefixes [n] correspond

to Eyak lateral qualifiers [l] and Tlingit glide or zero onset [w] / [y] before body-part stems (2013: 88).

Further evidence that the initial [n] in ‘eye’ originated as a prefix comes from the internal structure of Dene morphology itself. Rice describes a series of “n-qualifier” prefixes that occupy fixed positions in the verb template and appear before inalienably possessed or body-part stems. In Witsuwit’en, for example, there are several functional [n] prefixes (labeled n_1 - n_3) whose surface realization depends on position and adjacent material: they may surface as [n], [ʔd], or [t] depending on templatic and phonological environment (2000: 123, 332-341). This confirms that alternations such as [n] ~ [ʔd] ~ [d] ~ [t] are regular outcomes of prefixal fortition and devoicing rather than independent lexical differences. Further phonetic support for the historical fortition of the Proto-Na-Dene nasal prefix comes from Tanacross. Holton describes that the alveolar sonorant [n] in Tanacross may surface as a prenasalized alveolar stop [ʔd] when it occurs at the beginning of a stem and is not followed by another nasal segment. In this environment, [n] is “regularly realized as a prenasalized alveolar stop, consisting of a nasal onset followed by a fully voiced stop,” a single segment distinct from a plain stop because it remains fully voiced (2000: 56). Combined with Krauss (1964), Nikolaev (2014) and Vajda (2013), all of the above supports interpreting the variable onset in the ‘eye’ cognate set as a reflex of a single inherited possessive connector rather than distinct roots.

The Proto-Yeniseian form, with initial [*d], can be interpreted within the same broader correspondence chain. Since the Na-Dene evidence already shows a regular alternation between nasal, prenasalized, voiced alveolar stop, voiceless alveolar stop lateral, and glide onsets in this morphological position, Proto-Yeniseian [*d] does not stand outside the comparison. This supports including Proto-Yeniseian in the wider comparison, while still keeping the precise higher-level

reconstruction cautious. Additional evidence for the relatedness of this term is discussed in the final consonant section.

4.2.4.2 Vowel

All languages show a low or central vowel. The majority of Dene forms have a (*nax*, *naq*, *ná:k*, *naɣ*, etc.), and even where the vowel is slightly fronted or reduced (e.g. Tututni *nəx*, Witsuwit'en *ney*), the quality remains in the low-mid range. The second cognate set shows the same vowel: Kaska *taʔ* / *ta:k*, Tahltan *ta:ʔ*, Tanacross *ta:yʔ*, Hare *táʔ*, Beaver *daiʔ*, Western Apache *tá:ʔ*. Vowel length varies freely, seemingly regardless of loss of a final consonant (e.g. Upper Tanana *ná:k* vs Navajo *ná:ʔ*). Tone likewise differs across branches, consistent with Athabaskan/Dene tonogenesis, in which earlier coda glottalization or final glottal stop was suprasegmentalized onto the preceding vowel, producing tone after the loss or weakening of the original coda laryngeal feature. In some languages this constriction developed as high tone, as in Dene Sų́líné and Slavey, while in others it developed as low tone, as in Tł̥ch̥q and Sekani (Alderete 2005: 192-193).

Eyak and Tlingit similarly also show the same vowel [a], albeit with lengthening and tone respectively.

Since all major branches, and the vast majority of languages within them agree on vowel quality, [a:] is a rather straightforward proposition for the proto-form.

4.2.4.3 Final Consonant

The coda of 'eye' shows a consistent velar/uvular articulation across the Na-Dene languages, though its surface forms vary by branch. Across Dene, Tlingit, and Eyak alike, we find a range of reflexes: velar or uvular fricatives ([χ], [x], [ɣ] as in Koyukon *nɔχ*, Upper Kuskokwim *naɣ*, Tututni *nəx*), voiceless stops ([q], [k] as in Ahtna *naq*, Mattole *ná:k*, Upper Tanana *ná:k*), and glottal or

zero codas (Navajo *ná:ʔ*, Hupa *na:ʔ*, Kato *naʔ*, Bearlake *tá:*). Tlingit contributes an additional reflex: uvular aspirated stop [q^h] in *wàq^h*. Taken together, these forms align with the well-established Dene and Na-Dene coda lenition pathway [k]/[q] > [x] > [ʔ] > [Ø], a chain seen in numerous inherited roots throughout the family. Rather than representing separate cognate sets, these reflexes form a single, coherent pattern of evolution from a common obstruent.

Due to the fact that Na-Dene and Yeniseian reflexes include both fricatives and stops in final position, the final consonant of ‘eye’ allows for two plausible reconstructions (A & B), and choosing between them depends on how one interprets the comparative pattern as a whole.

A) [*χ] as the proto-segment (with later fortition)

As referenced by Vajda, one interpretation follows Krauss and Leer (1981: 199) which posits the reconstruction of a uvular fricative [*χ] for ‘eye’ in Proto-Dene-Eyak (2010: 38). This matches the fricatives seen directly in Eyak *la:χ* and a large number of Dene languages (*nvχ*, *naγ*, *nəx*). Under this model, the few Dene stops (Ahtna [q], Mattole [k], Upper Tanana [k]) represent fortition: an innovation where certain branches hardened [*x] to [*k] or [*χ] to [*q]. This explanation avoids requiring Tlingit to preserve an original stop; instead, one would treat Tlingit [q^h] as the result of a separate late fortition process unique to that branch, parallel to other cases where Tlingit fortifies velar codas. However, there is tentative evidence for that, and it is more challenging to justify.

Under this view, the most conservative reflexes are the fricatives [χ], [γ] found in Eyak and numerous Dene languages, which jointly preserve the earlier stage. The stops would be later hardenings in isolated branches.

B) [***k**] or [***q**] as the proto-segment (with later lenition)

A different interpretation comes from the analysis of the Tlingit form *wàq^h*, whose coda is a full uvular aspirated stop [q^h] rather than a fricative. If Tlingit preserves a genuine stop, then the proto-segment may have been [***q**] or [***k**], which subsequently lenited to [***χ**] in Eyak and across much of Dene. Ahtna *naq* and Mattole *ná:k* then appear not as hardenings but as direct retentions of an earlier stop stage. The pattern becomes:

- Tlingit *wàq^h* = conservative retention
- Ahtna *naq*, Mattole *ná:k* = partial retentions
- Koyukon *nvχ*, Upper Kuskokwim *naγ* = regular lenition
- Navajo *ná:ʔ*, Apache *tá:ʔ* = advanced lenition
- Bearlake *tá:* = full deletion

This interpretation aligns well with general Na-Dene historical tendencies: Tlingit frequently retains uvular stops, while Dene tends toward lenition in final position. Under this model, both cognate sets converge neatly on a proto-stop that underwent gradual weakening in most branches. Both theories explain the data, and both have historical precedent. Krauss and Leer reconstructed [***χ**] in final position in Proto-Dene-Eyak. The analysis of Tlingit [q^h] introduces genuine evidence for an underlying stop at the proto-stage. Dene displays both fricatives and stops, which can be treated either as hardenings or as partial retentions, depending on which proto-segment is chosen. The most neutral position is to reconstruct the coda as a velar/uvular obstruent that could surface as either stop or fricative, written either as [***χ**] or [***k**](*[q]*), acknowledging that the direction of

change may have differed by branch. Given the number of fricative reflexes and the traditional Krauss-Leer reconstruction, [$*\chi$] remains a defensible Proto-Na-Dene reconstruction, but [$*q$] / [$*k$] must now be considered viable alternatives due to the Tlingit evidence.

The Yeniseian evidence provides an external check on the Na-Dene reconstruction and strongly supports the presence of a such an onset. Specifically, one that behaved as a back fricative at the Proto-Dene-Yeniseian stage. Vajda explains that Ket *des* ‘eye’ reflects Proto-Yeniseian **de-s*, where the final [$*s$] in this particular word does not descend from an original alveolar fricative but instead from the fronting of a velar/uvular fricative ([$*x$], [$*x^w$], or [$*\chi$]) inherited from Proto-Yeniseian. His discussion emphasizes that Yeniseian shows a systematic distinction between true inherited [$*s$] and [$*s$] that arose from fronted fricatives. Forms deriving from original [$*\chi$] behave differently morphologically from those with true [$*s$], and ‘eye’ belongs to the class whose final consonant originates in a back fricative. Vajda explicitly cites Proto-Dene **ne* > χ ‘eye’ alongside Ket **de* > *s*, showing that both families preserve reflexes of the same uvular coda (2010: 30). Taken together, the structural and morphological correspondences make it highly likely that the Na-Dene and Yeniseian terms for ‘eye’ descend from a single Proto-Dene-Yeniseian root.

Table 37. Reconstruction of EYE

Proto-Language	Form
Proto-Dene-Yeniseian	$*na:\chi \sim *na:k \sim *na:q$
Proto-Yeniseian	$*des \sim *de:s$
Proto-Na-Dene	$*na:\chi \sim *na:k \sim *na:q$
Proto-Dene-Eyak	$*na:\chi$
Proto-Dene	$*na:\chi$
Proto-Northern-Dene	$*na:x \sim *na:k$
Proto-Alaska-Dene	$*na:\chi \sim *nda:\chi \sim *nda:k$
Proto-Yukon-Dene	$*na:k \sim *na:$
Proto-Interior-Canada-Dene	$*nay$
Proto-Central-BC-Dene	$*nda:k$
Proto-Pacific-Coast-Dene	$*na:\chi \sim *na:x$
Proto-Apachean-Dene	$*na:?$

4.2.5 Face

Table 38. *FACE₁*

Branch	Language	Form
Alaska	Deg Xinag	naŋ
Alaska	Koyukon	nan
Alaska	Dena'ina (Iliamna)	nan
Alaska	Dena'ina (Inland)	nan
Alaska	Dena'ina (OCI)	nan
Alaska	Dena'ina (UCI)	nan
Alaska	Ahtna	nan
Alaska	Holikachuk	nìn?
Alaska	Gwich'in (Teetl'it)	nìn?
Alaska	Gwich'in (Gwichya)	nĩ?
Alaska	Hän	naŋ
Alaska	Upper Kuskokwim	nan?
Alaska	Upper Tanana	nĩ:?
Alaska	Tanacross	nẽ?
Yukon	Northern Tutchone	nín?
Yukon	Southern Tutchone	nì
BranchIsolate1	Tagish	nĩ?
BranchIsolate2	Ts'ets'aut	ne:n
Interior Canada	Kaska (FL)	nĩ?
Interior Canada	Kaska (GHL)	nĩ?
Interior Canada	Kaska (L)	nĩ?
Interior Canada	Kaska (LL)	né?
Interior Canada	Kaska (P)	nĩ?
Interior Canada	Kaska (RR)	nĩ?
Interior Canada	Hare	nĩ?
Interior Canada	Mountain	nĩ?
Interior Canada	Bearlake	nĩ?
Interior Canada	Tłı̨chǫ	nì
Interior Canada	South Slavey	ní
Interior Canada	Dene Słı̨né	né
Interior Canada	Dene Dháh	ní
Interior Canada	Beaver	nì
Interior Canada	Sekani	nẽ?
Central BC	Carrier	nin
Central BC	Witsuwit'en	nin
Central BC	Chilcotin	nín

BranchIsolate3	Tsuut'ina	nì
Pacific Coast	Hupa	niŋʔ
Pacific Coast	Galice	niʔ
Pacific Coast	Tolowa	ninʔ
Pacific Coast	Tututni	niʔ
Pacific Coast	Mattole	niʔ
Pacific Coast	Kwa-Clat	ne:n
Apachean	Navajo	ni:ʔ
Apachean	Western A.	ni:ʔ
Apachean	S. Carlos A.	ni:
Apachean	Jicarilla A.	ni:
Apachean	Kiowa A.	nĩ:
Apachean	Lipan A.	næ

Table 39. Non-Dene FACE

Branch / Language	Form
Eyak	da:ʔ
Tlingit	yá
Proto-Yeniseian	*ba:t

The Dene forms for ‘face’ form a highly coherent lexical set. Across Alaska, British Columbia, Interior Canada, the Pacific Coast, and Apachean, the stem begins with [n] and contains a short front or low vowel, often followed by a nasal coda, glottalization, vowel nasalization, or vowel length. The basic Dene shape can therefore be represented as $nV(n/?)$, with the strongest internal evidence pointing to an initial [$*n$] and a nasal final at the Proto-Dene level.

The non-Dene forms are more difficult, but they should not all be treated in the same way. Eyak *da:ʔ* and Tlingit *yá* do not preserve the Dene [n]-initial shape directly, but their onsets are not necessarily incompatible with the Dene evidence. As discussed in Section 4.2.4 for ‘eye’, Dene [n], [nd], [d], [t], Eyak lateral reflexes, and Tlingit glide-type reflexes [w]/[y] may all belong to the same broader prefixal correspondence zone in body-part terminology. This makes the Eyak [d] and Tlingit [y] forms possible higher-level comparanda, although the comparison is less direct than the Dene-internal reconstruction. At the same time, Eyak *da:ʔ*, Tlingit *yá*, and Proto-Yeniseian

ba all contain a low [a]-type vowel, which sets them apart from the dominant [i]/[e]-type reflexes in much of Dene and may preserve an older vocalic value. The dataset therefore presents two overlapping patterns: Dene shows strong internal unity in its [n]-initial shape, while the external forms diverge in onset but partly converge in vowel quality. Proto-Yeniseian **ba:t*, however, remains too different in its consonantal shape to be used as evidence for reconstructing this item to Proto-Dene-Yeniseian.

4.2.5.1 Initial Consonant

Across Dene, the onset is uniformly [n]. This is found in every branch, from Alaska forms such as Koyukon *nan* and Gwich'in *nìʔ*, to Interior and BC forms such as Kaska *níʔ*, Tłı̨chǫ *nì*, Carrier *nin*, and Chilcotin *nín*, Pacific Coast forms such as Hupa *nɪʔ* and Tolowa *ninʔ*, and Apachean forms such as Navajo *ni:ʔ* and Jicarilla *ni:*.

The onset is too consistent within Dene to be treated as secondary at the Proto-Dene level, but its deeper status may still be morphological rather than purely lexical. The comparison with ‘eye’ in Section 4.2.4 is relevant here: in that term, Dene [n], [n̥d], [d], and [t] participate in a broader possessive or prefixal correspondence zone, with Eyak and Tlingit showing different reflexes in the same morphological position. Eyak *da:*’ is therefore not automatically excluded by its initial [d]. In the ‘eye’ set, Dene [n] and [d]-type outcomes belong to the same broader correspondence pattern, especially where older nasal material is strengthened or reanalyzed as an alveolar stop. On that basis, Eyak [d] in *da:*’ may represent an alveolar reflex corresponding to the Dene [n] element, rather than an unrelated onset.

Tlingit *yá* is more distant from the Dene pattern, but its glide onset may still belong to the same broader correspondence zone. Nikolaev’s sonorant correspondence table is relevant here, since Tlingit [y-] is listed as corresponding to Proto-Dene [*n-] or [n]/zero in this environment

(Nikolaev 2014: 107). If this correspondence applies to ‘face’, then Tlingit *yá* may preserve a glide reflex of the same prefixal or connective element represented by Dene [n]. Nevertheless, this is based solely on the onset pattern, and the vowel quality and coda must also be considered for this to be treated as a true correspondence.

Proto-Yeniseian **ba:t* does not fit this initial-consonant pattern. Its [*b] onset does not align directly with Dene [n], Eyak [d], or Tlingit [y], and there is no clear phonological pathway in this item that would connect [*b] to the Na-Dene correspondence chain. For this reason, Proto-Yeniseian is not treated as cognate here and does not support a Proto-Dene-Yeniseian reconstruction for ‘face’.

4.2.5.2 Vowel

Alaska preserves both low-vowel forms, especially *nan*, and front-vowel forms such as *nìnʔ*, *nĩʔ*, *nĩ̃ʔ*, and *nẽʔ*. A similar split appears elsewhere: Kaska, Hare, Mountain, Tłı̨chǫ, South Slavey, Dene Dháh, Beaver, Carrier, Witsuwit’en, Chilcotin, Pacific Coast, and Apachean mainly point to [i], [ɪ], [e], [ɛ], or lengthened reflexes, while several Alaska forms preserve [a]. The nasalized vowels found in forms such as Gwich’in *nĩʔ*, Upper Tanana *nĩ̃ʔ*, Tanacross *nẽʔ*, and Kiowa Apache *nĩ̃̃* are best interpreted as secondary reflexes of a weakened or lost final nasal.

The Dene-internal evidence therefore supports a front or fronted vowel for many branches, but the low-vowel forms are too well represented to ignore. A reasonable interpretation is that Proto-Dene had a non-high vowel, probably [*a] or [*ə], which was later fronted or raised to [i]/[e] in many branches. This accounts for the contrast between Alaska *nan*-type forms and the widespread *ni/ne*-type reflexes without requiring two separate Dene roots.

Eyak *da:*’ and Tlingit *yá* both contain a low vowel [a], which supports the possibility that the older vowel was low or central rather than originally high front. This fits the Dene-internal evidence from *nan*-type forms and makes [*a] a plausible higher-level value.

Proto-Yeniseian **ba:t* also contains a low vowel, but this agreement is not enough to establish cognacy. Since the initial consonant and final consonant do not align with the Na-Dene forms, the Yeniseian vowel may be coincidental or reflect only a very weak resemblance. It is therefore not used as a basis for reconstructing the vowel at the Proto-Dene-Yeniseian level.

For Proto-Dene, the safest reconstruction is a non-high vowel, probably [*a] or [*ə], with later fronting to [i]/[e] in much of the family. If Eyak and Tlingit are included, [*a] becomes more plausible at the Proto-Na-Dene level, but the comparison remains less secure than the Dene-internal reconstruction.

4.2.5.3 Final Consonant

The Dene final consonant evidence points mainly to a nasal coda, though it is often weakened, glottalized, or lost. Many forms preserve final [n], including Koyukon *nan*, Dena’ina *nan*, Ahtna *nan*, Carrier *nin*, Witsuwit’en *nin*, Ts’ets’aut *ne:n*, Chilcotin *nín*, Tolowa *nin?*, and Kwa-Clat *ne:n*. Other forms show a glottal stop after the vowel, as in Holikachuk *nìn?*, Gwich’in *nì?*, Upper Kuskokwim *nan?*, Northern Tutchone *nín?*, Kaska *ní?* / *né?*, Hare *ní?*, Mountain *ní?*, Sekani *ně?*, Galice *ni?*, Tututni *ni?*, Mattole *ni?*, Navajo *ni:?*, and Western Apache *ni:?*. Forms without an oral coda, such as Southern Tutchone *nì*, Tłıchǫ *nì*, South Slavey *ní*, Dene Słı́né *né*, Dene Dháh *ní*, Beaver *ni*, San Carlos Apache *ni:*, Jicarilla *ni:*, and Lipan *nae*, can be interpreted as reflecting loss of the final consonant, often with compensatory lengthening or vowel nasalization.

The external evidence is less consistent. Eyak *da:*’ ends in a glottal stop and Tlingit *yá* is vowel-final. These forms do not preserve the Dene nasal coda directly. If they are cognate, they

would have to reflect loss or restructuring of the final nasal outside Dene. This is possible, but not enough to reconstruct the coda securely beyond Proto-Dene.

Proto-Yeniseian **ba:t* ends in [**t*], which does not match the Dene nasal coda or the Eyak/Tlingit outcomes. Since the Yeniseian form also has a divergent initial consonant, the final [**t*] further weakens the case for including this item in a Proto-Dene-Yeniseian reconstruction.

Table 40. Reconstruction of FACE₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*ba:t
Proto-Na-Dene	*nan ~ *nin ?
Proto-Dene-Eyak	*nan ~ *nin ?
Proto-Dene	*nan ~ *nin
Proto-Northern-Dene	*nin?
Proto-Alaska-Dene	*nan ~ *nin?
Proto-Yukon-Dene	*nin?
Proto-Interior-Canada-Dene	*nin? ~ *nen?
Proto-Central-BC-Dene	*nin
Proto-Pacific-Coast-Dene	*nin?
Proto-Apachean-Dene	*ni:?

4.2.6 Ear

The Dene evidence for ‘ear’ separates into two related cognate sets, one referring to the inner ear and the other to the outer ear. Some languages preserve both cognate sets as a lexical pair, while others preserve only one. Several languages also preserve compounds in which an EAR.INNER or EAR.OUTER stem is followed by an additional morpheme meaning ‘inside’ or ‘edge’. The data are therefore organized below into four tables: the basic EAR.INNER set, additional evidence built on EAR.INNER, the basic EAR.OUTER set, and additional evidence built on EAR.OUTER.

Table 41. EAR.INNER

Branch	Language	Form
Alaska	Deg Xinag	tse
Alaska	Gwich'in (Teetl'it)	dzi:ʔ
Alaska	Hän	dzit
Alaska	Upper Kuskokwim	dzej
Yukon	Southern Tutchone	zəj
BranchIsolate2	Ts'ets'aut	dze:
Interior Canada	Kaska (FL)	dzi:k
Interior Canada	Kaska (GHL)	dzi:k
Interior Canada	Kaska (L)	dzi:k
Interior Canada	Kaska (LL)	dzi:ʔ
Interior Canada	Kaska (RR)	dzi:k
Interior Canada	Hare	dzi:ʔ
Interior Canada	Bearlake	dzi:
Interior Canada	Tłıchǫ	dzi:
Interior Canada	South Slavey	dzié
Interior Canada	Dene Dháh	dziéʔ
Interior Canada	Beaver	tʃʰakʔ
Interior Canada	Sekani	dzi
Central BC	Carrier	tse
BranchIsolate3	Tsuut'ina	dzak

Table 42. Additional data for *EAR.INNER*

Branch	Language	Form	Gloss
Alaska	Dena'ina (Inland)	tʃi-jiq'	EAR.INNER-inside
Alaska	Dena'ina (OCI)	tʃi-jiq'	EAR.INNER-inside
Alaska	Dena'ina (UCI)	tʃi-q'ə	EAR.INNER-inside
Alaska	Lower Tanana	dzi-jit	EAR.INNER-inside
BranchIsolate1	Tagish	tʃi-f-mbəl	EAR.INNER-inside
Interior Canada	South Slavey	dzié-zih	EAR.INNER-edge

Table 43. *EAR.OUTER*

Branch	Language	Form
Alaska	Deg Xinag	dziγ
Alaska	Koyukon	dzəγ
Alaska	Dena'ina (Iliamna)	tʃəɤ
Alaska	Dena'ina (OCI)	tʃəɤ
Alaska	Ahtna	tsəɤ
Alaska	Gwich'in (Teetl'it)	tsè:ʔ
Alaska	Gwich'in (Gwichya)	dzè:ʔ
Alaska	Hän	dzàjʔ
Alaska	Lower Tanana	dzhej
Alaska	Upper Kuskokwim	dziγ
Alaska	Upper Tanana	dzak
Alaska	Tanacross	dza:γʔ
Yukon	Northern Tutchone	dzák
Interior Canada	Kaska (LL)	dzak
Interior Canada	Hare	dze
Interior Canada	Dene Sųłiné	dzaγ
Interior Canada	Beaver	tʃʰʌγ
Interior Canada	Sekani	dzaγ
Central BC	Carrier	dzo
Central BC	Witsuwit'en	dzəq
BranchIsolate3	Tsuut'ina	dzaγ
Pacific Coast	Kato	tʃʔk
Pacific Coast	Tutuni	sreγ
Pacific Coast	Mattole	tʃi:γ
Pacific Coast	Wailaki	dziγ
Pacific Coast	Kwa-Clat	tsax
Apachean	Western A.	tʃa:ʔ
Apachean	S. Carlos A.	tʃa:ʔ

Apachean	Jicarilla A.	tʃa:
Apachean	Kiowa A.	dʒàx
Apachean	Lipan A.	tʃa
Apachean	Navajo	tʃa:ʔ

Table 44. Additional data for EAR.OUTER

Branch	Language	Form	Gloss
Interior Canada	Kaska (FL)	tʃa:-jiʔ	EAR.OUTER-inside
Interior Canada	Mountain	tʃâ:-je:	EAR.OUTER-inside
Interior Canada	Bearlake	dzas-ba:l	EAR.OUTER-edge
Interior Canada	Tłıchǫ	dzih-bă	EAR.OUTER-edge
Apachean	Navajo	dʒí-par	EAR.OUTER-edge
Apachean	Mescalero A.	dzè:-bà:	EAR.OUTER-edge

Table 45. Non-Dene EAR.INNER/EAR.OUTER

Branch / Language	Form	Gloss
Eyak	tʃehχ / tʃəχə	ear
Tlingit	gúk; gukdaa; gukyík	ear; ear.outside; ear.inside
Proto-Yeniseian	*oq; *oqtʌ / *ogdʌ	ear

4.2.6.1 Discussion

Snoek identifies the inner/outer distinction through a recurring contrast in vowel quality and final consonant. The inner-ear terms are usually associated with high or mid front vowels, especially [i] and [e], and with finals such as [k], [ʔ], [t], [j], or zero. The outer-ear terms more often show lower, central, or back vowels, including [a], [ɑ], [ə], [ʌ], and [o], together with final velar or post-velar fricatives such as [χ], [ʁ], and [x], although [k], [q], [ʔ], [j], and zero also occur. This contrast appears clearly in pairs such as Kaska *dzi:k* ‘inner ear’ beside *dzak* ‘outer ear’, Gwich’in *dzi:ʔ* beside *dzè:ʔ*, Hän *dzit* beside *dzàjʔ*, and Navajo *tʃé:-* beside *tʃa:ʔ*. The distinction can therefore be reconstructed for Proto-Dene as a lexical contrast between an inner-ear stem and an outer-ear stem (2015: 97-99).

The two Dene sets are nevertheless best treated as historically connected. Their initial consonants belong to the same broad affricate pattern, with [dz], [ts], [tʃ], [dʒ], and related reflexes

appearing in both sets. The between the two groups is concentrated in the vowel and final consonant rather than in the initial. This suggests that Proto-Dene had already lexicalized two related stems, but that these stems may go back to an earlier single ‘ear’ root which became differentiated through added relational material such as terms for ‘inside’ and ‘outside’ / ‘around’. The non-Dene evidence supports this interpretation. Eyak has a single form *tʃəχə* ‘ear’. Tlingit has a single central ear morpheme, *gúk*, and specifies inner and outer reference through transparent formations: *gukyík* ‘inner ear’, with *yík* ‘inside’, and *gukdaa* ‘outer ear’, with *-daa* ‘around’ or ‘outside’. Proto-Yeniseian has **oq* ‘ear’, along with **oqtɬ* and **ogdɬ*, also glossed as ‘ear’. The latter forms may preserve an added element **-tɬ* or **-dɬ*, which could be compared with Tlingit *-daa* if it represents an outer, surrounding, or external element. Under this interpretation, Tlingit and possibly Proto-Yeniseian preserve a more transparent stage in which a general ear term could be expanded by relational material.

The formal correspondences also fit this hypothesis. Dene forms generally begin with [dz] or [tʃ], while Eyak *tʃəχə* begins with [tʃ]. Tlingit *gúk* begins with [g], which may correspond to Proto-Dene [*dz] (Leer 2008: 1-2). Proto-Yeniseian **oq* lacks the initial consonant, but preserves a final [q], which aligns well with the velar or post-velar final found in Tlingit *gúk* and reflected in different ways across the Dene material. The higher-level comparison therefore points to a single earlier ear stem with an initial corresponding to Dene [dz], Eyak [tʃ], and Tlingit [g], and with a final velar or uvular consonant.

The proposed development is that the higher-level cognate complex originally contained one general word for ‘ear’. Inner and outer reference could then be specified by adding relational elements meaning ‘inside’ and ‘around’ or ‘outside’. Tlingit preserves this pattern directly in *gukyík* and *gukdaa*. Proto-Yeniseian **oqtɬ* or **ogdɬ* may preserve a comparable outer-type

formation. In Dene, the corresponding formations appear to have become lexicalized as separate stems: an inner-ear stem with front-vowel quality and a stop or glottal-type final, and an outer-ear stem with lower or central vowel quality and a velar/uvular fricative-type final.

The compound evidence in Dene shows a later layer of the same type of morphology. Dena'ina *tʃi-jiq'*, Lower Tanana *dzi-jit*, and South Slavey *dzié-zih* contain an EAR INNER stem followed by an inside element. Navajo *tʃa:-jiʔ* and Mescalero Apache *tʃâ:-je:* contain an EAR OUTER stem followed by an inside element. Kaska *dzas-ba:l*, Mountain *dzih-bă*, Bearlake *dʒi-par*, and Tłıchǫ *dzè:-bà:* contain an EAR OUTER stem followed by an edge element. These forms suggest that after the inner and outer stems had become lexicalized, they could still be used as bases for further compounds.

In summary, taken together, the evidence supports reconstructing a single inherited ‘ear’ root behind the later inner/outer distinction. At the Proto-Dene level, the initial consonant can be reconstructed as [**dz*], with the same value also recoverable for Proto-Dene-Eyak on the basis of the Dene affricate pattern and Eyak *tʃəχə*. The final consonant is best reconstructed as velar or post-velar, either [**k*] or [**q*], since this accounts for the velar and uvular finals in the Dene outer-ear set, Eyak [*χ*], Tlingit [*k*] and Proto-Yeniseian [**q*]. The vowel is less direct because the Dene inner/outer split appears to have been shaped by added relational material, with [*i*]/[*e*] mostly associated with inner reference and [*a*]/[*ə*] mostly associated with outer reference. Since Eyak also has [*e*], the safest Proto-Dene and Proto-Dene-Eyak vocalism is probably [**e*] or [**ə*], rather than treating the Dene inner/outer vowel contrast as original to the root itself.

At the Proto-Na-Dene level, the Tlingit evidence changes the reconstruction of the initial consonant. If Tlingit *gúk* belongs to the same set, then Leer's correspondence between Dene [**dz*], Eyak [*tʃ*], and Tlingit [*g*] supports reconstructing a palatalized velar initial, [**gy*], for Proto-Na-

Dene. The Proto-Dene and Proto-Dene-Eyak [**dz*] would then represent the Dene-Eyak reflex of this earlier consonant. With Proto-Yeniseian **oq*, the initial consonant is no longer preserved, but the final [**q*] aligns with the same velar/uvular final seen in the Na-Dene material. A possible Proto-Dene-Yeniseian reconstruction is therefore something like **gyuq*, with later loss of the initial consonant in Yeniseian and lexicalization of inner/outer formations within Dene. The proposed historical pathway is summarized visually in Figure 5 below, which shows the development from a single higher-level ‘ear’ root into the later inner/outer formations and their Dene lexicalized reflexes.

Figure 5. Proposed reconstruction pathway of ‘Ear’

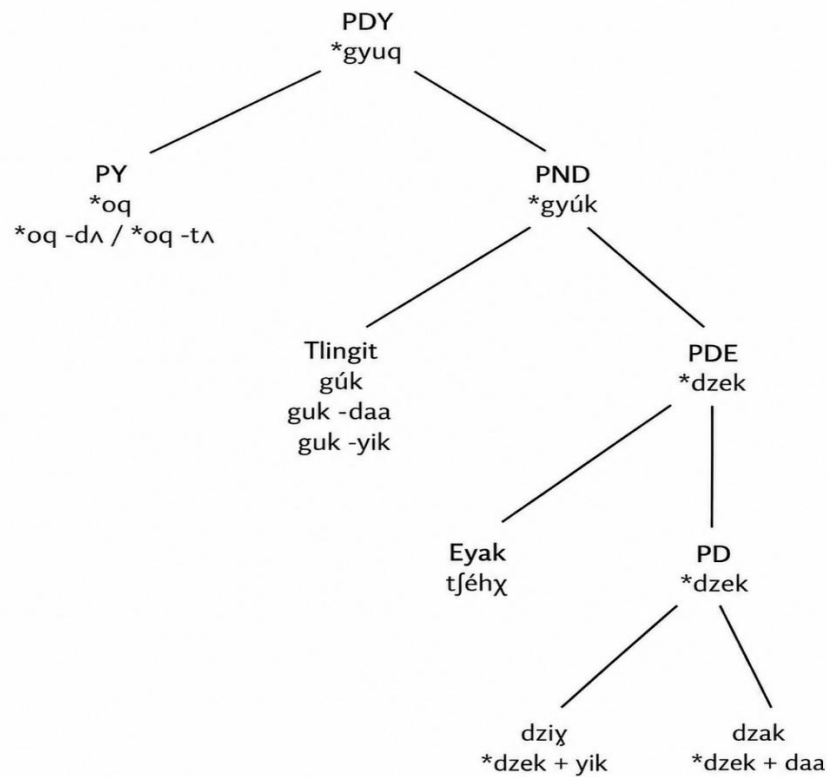


Table 46. Reconstruction of *EAR*

Proto-Language	Form
Proto-Dene-Yeniseian	*gyuq
Proto-Yeniseian	*oq
Proto-Na-Dene	*gyək ~ *gyuk ~ *gyuq
Proto-Dene-Eyak	*dzek ~ *dzeq ~ *dzəq
Proto-Dene	*dzek ~ *dzeq ~ *dzəq
Proto-Northern-Dene	*dzak / *ɖəɣ ~ *dzaq / *dziq
Proto-Alaska-Dene	*dzak / *ɖəɣ
Proto-Yukon-Dene	*ɖəq ~ *dzaq
Proto-Interior-Canada-Dene	*ɖay / *ɖiy
Proto-Central-BC-Dene	*dzak / *ɖəɣ
Proto-Pacific-Coast-Dene	*tsek ~ *ɬik
Proto-Apachean-Dene	*tsax ~ *ɬaːx

4.2.7 Nose

The Dene data for ‘nose’ contain at least two historical layers. The first consists of two closely related patterns that are treated here as belonging to a single broader cognate complex, while the second is represented by a clearly distinct [yõ]-type stem restricted to part of the Interior Canadian area. Although Snoek (2015) separates the first two patterns, he also notes that they are closely related, and the dataset supports combining them analytically. Both patterns share the same basic phonological core: an alveolar or post-alveolar affricate or affricate-like onset, usually [ts^h] or [tʃ^h], followed by a front vowel, most often [i], with frequent nasalization. The main difference is structural rather than lexical. One pattern preserves an additional nasal element before the root, often as [ən], [n], or [nts^h]-type material, while the other shows a shorter stem without that fuller pre-root material. This makes it more economical to analyze them as reflexes of a single broader root complex with different degrees of morphological preservation, rather than as fully separate lexical items. Snoek further notes the possibility that the [ən] or [n] material may go back to a former gender marker, following Kari (1990: 390), which provides a plausible explanation for why some languages preserve a fuller stem while others show a reduced one (2015: 106-107). Cognate Set 3, on the other hand, is treated entirely separately because its [y]-initial stem does not align phonologically or structurally with the alveolar/post-alveolar affricate complex represented by Sets 1 and 2.

The first broader cognate complex is widely distributed across the Dene family. The fuller forms with initial [ən], [n], or [nts^h]-type material are concentrated in Alaska, some Pacific Coast languages, and specifically Carrier from the Central BC group, while the shorter forms without that material are geographically widespread and represent the most common pattern overall. This distribution is important because it suggests that the shorter forms are not an unrelated root, but

rather a reduced reflex of the same historical origin. The two subpatterns are therefore listed separately in the table below for descriptive clarity, but as members of one larger cognate set.

4.2.7.1 Cognate Sets 1 & 2: NOSE₁, NOSE₂

Table 47. NOSE₁

Branch	Language	Form
Alaska	Deg Xinag	aŋts ^{he}
Alaska	Koyukon	ənts ^{hex}
Alaska	Dena'ina (Iliamna)	ŋʃ ^{hix}
Alaska	Dena'ina (Inland)	ŋʃ ^{hif}
Alaska	Dena'ina (OCI)	ŋʃ ^{hif}
Alaska	Dena'ina (UCI)	ŋʃ ^{hif}
Alaska	Ahtna	ənts ^{hi:s}
Alaska	Gwich'in (Teetl'it)	nts ^{hih}
Alaska	Gwich'in (Gwichya)	nts ^{hih}
Alaska	Hän	nts ^{hãj}
Alaska	Lower Tanana	nts ^{heʔ}
Alaska	Upper Kuskokwim	nts ^{hef}
Alaska	Tanacross	nts ^{hih}
CentralBC	Carrier	nits ^{his}
PacificCoast	Hupa	ŋʃ ^{wɪɬ}
PacificCoast	Mattole	ŋʃ ^{xix}
PacificCoast	Kwa-Clat	íntsus
PacificCoast	Kato	ʌŋʃ

Table 48. NOSE₂

Branch	Language	Form
Alaska	Upper Tanana	ts ^{hĩ:}
Yukon	Northern Tutchone	ts ^{hin}
Yukon	Southern Tutchone	sĩ
Yukon	Tahltan	ts ^{hih}
BranchIsolate1	Tagish	ʃĩ
BranchIsolate2	Ts'ets'aut	ts ^{hé'}
Interior Canada	Dene Sų́líné	ts ^{hĩ}
Interior Canada	Kaska (GHL)	ts ^{hĩh}
Central BC	Chilcotin	tsĩx
BranchIsolate3	Tsuut'ina	ts ^{hi}
Apachean	Navajo	ʃ ^{hĩ:}

Apachean	Western A.	ʧ ^h ɪh
Apachean	S. Carlos A.	ʧ ^h ɪ'
Apachean	Jicarilla A.	ʧ ^h ɪʃ
Apachean	Kiowa A.	ʧ ^h ɪ:ʃ
Apachean	Lipan A.	ʧ ^h ish

4.2.7.1.1 Initial Consonant

The initial consonant evidence supports reconstructing a nasal plus affricate sequence for this cognate complex, not a simple affricate alone. The fuller forms show this most clearly: Deg Xinag *ən̥ts^he*, Koyukon *ən̥ts^hex*, Ahtna *ən̥ts^hi:s*, Gwich'in *nts^hih*, Hän *nts^hāj*, Lower Tanana *nts^heʝ*, Upper Kuskokwim *nts^hef*, Tanacross *nts^hih*, Carrier *nits^his*, Hupa *nʧ^wɪm*, Mattole *nʧ^xix*, Kwa-Clat *intsus*, and Kato *ənʃ* all preserve a nasal element before the affricate. This distribution is too broad to be treated as a secondary innovation confined to one small corner of the family. It is more economical to assume that the nasal was present earlier and was later reduced or lost in part of the daughter languages, producing the shorter forms such as Upper Tanana *ts^hɪ̃*, Northern Tutchone *ts^hin*, Tahltan *ts^hih*, Tsuut'ina *ts^hi*, Dene Sų́liné *ts^hĩ*, and the Apachean forms in ʧ^h-.

The affricate itself remains stable across both subtypes, though its exact reflex varies within the expected affricate range: [ts^h], [ts], [ʧ^h], [ʧ], and in one case [s] in Southern Tutchone *sĩ*, although that is clearly an isolated reduced reflex. The most cautious reconstruction for the onset of the broader complex is therefore something like [*nts^h] ~ [*nʧ^h], or more abstractly a nasal plus affricate sequence. That formulation fits both the fuller stems, where the sequence is preserved overtly, and the shorter stems, where the nasal element appears to have been lost.

4.2.7.1.2 Vowel

The vowel evidence points most strongly to a high front vowel, reconstructible as [i] for this cognate complex. Most forms in both structural subtypes support this directly: Dena'ina *nʃ^hix*, *nʃ^hij*; Ahtna *ənts^{hi}:s*; Gwich'in *nts^{hi}h*; Tanacross *nts^{hi}h*; Carrier *nits^{hi}s*; Upper Tanana *ts^hĩ*; Northern Tutchone *ts^hin*; Tagish *ʃĩ*; Tahltan *ts^{hi}h*; Tsuut'ina *ts^{hi}i*; Dene Sųliné *ts^hĩ*; Navajo *ʃ^hĩ*; Western Apache *ʃ^hĩh*; Jicarilla Apache *ʃ^hĩ*; Kiowa Apache *ʃĩ:f*; Lipan Apache *ʃ^hish*; and Kaska *ts^hĩh*.

A smaller number of forms show [e]-like reflexes, as in Deg Xinag *ənts^{he}*, Koyukon *ənts^{he}ex*, Lower Tanana *nts^{he}j*, Upper Kuskokwim *nts^{he}f*, and Ts'ets'aut *ts^{he}'*. Hän *nts^hǣj* is more divergent still. These forms are important, but they do not outweigh the broad distribution of [i]. The most economical interpretation is therefore that [i] was the earlier vowel, with some daughter languages later shifting it toward [e] or another reflex in specific phonological environments. Nasalization is frequent in the shorter subtype and also occurs in some fuller forms such as Hän *nts^hǣj*.

4.2.7.1.3 Final Consonant

Across both subtypes, the most common finals belong to a single broad fricative or weakened-fricative domain: [s], [ʃ], [h], [x], and in some cases zero or glottal stop. In the fuller subtype, Ahtna *ənts^{hi}:s*, Carrier *nits^{hi}s*, and perhaps Kwa-Clat *intsus* point to a sibilant final, while Dena'ina *nʃ^hij*, Upper Kuskokwim *nts^{he}f* show reflexes that remain close to that same general series. Gwich'in *nts^{hi}h* and Tanacross *nts^{hi}h* suggest further weakening to [h]. The [x] found in forms such as Koyukon *ənts^{he}ex*, Dena'ina (Iliamna) *nʃ^hix*, Mattole *nʃ^hix*, and Chilcotin *tsĩx* may also be interpreted as a strengthened reflex of earlier [h], which would allow [h] and [x] to be treated not

as separate coda types, but as different outcomes within the same weakening-fortition range. In the shorter subtype, Tahltan *ts^hih*, Kaska *ts^hih*, Western Apache *tʃ^hih*, Jicarilla Apache *tʃ^hif*, Lipan Apache *tʃ^hish*, San Carlos Apache *tʃ^hi'*, Ts'ets'aut *ts^hé'*, and Chilcotin *tsĩx* continue that same pattern of fricative weakening, reduction, or glottalization. The forms in [j], especially Hän *nts^hāj* and Lower Tanana *nts^hej̥*, may reflect vocalization or weakening of an earlier final consonant. Hupa *nʃ^hɪM* is the most divergent final in the set and should be treated as a unique divergent reflex. Even so, the dominant comparative pattern across the family remains the fricative series. A plausible reconstruction for the coda is therefore [^hs], with later reflexes in [ʃ], [h], [x], [ʔ], [j], and zero. At the same time, the frequent nasalization of the vowel in the shorter subtype raises another possibility: in at least some branches, nasalization may reflect the loss of an earlier nasal element in the rhyme, whether as a final [n] or as part of a nasalized segmental sequence.

4.2.7.1.4 Discussion

The evidence supports treating these two subpatterns as one broader cognate complex. The strongest argument is the shared stem structure: both are built around an alveolar or post-alveolar affricate followed by a predominantly front high vowel, and both show related coda reflexes in the sibilant to weakened-fricative range. The main difference is that one subtype preserves an additional nasal element before the affricate, while the other often lacks it. Since the nasal plus affricate sequence is distributed widely across Alaska, Central British Columbia, and Pacific Coast, it is more economical to reconstruct that fuller structure and derive the shorter forms through loss or reduction of the nasal material than to assume repeated secondary addition of a nasal across multiple branches.

The most cautious provisional reconstruction for the broader complex is therefore a stem beginning in something like *n-ts^hi-(n)s, with variation in the daughter languages reflecting later

reduction of the initial nasal, shifts between [ts^h] and [tʃ^h]-type reflexes, and weakening of the final sibilant to [ʃ], [h], [x], [ʔ], [j], or zero. On present evidence, the safest conclusion is that the fuller [n + affricate] forms and the shorter affricate-initial forms are not separate lexical items, but different reflexes of the same inherited complex.

4.2.7.2 Cognate Set 3: NOSE₃

Table 49. NOSE₃

Branch	Language	Form
InteriorCanada	Kaska (L)	γóʔ
InteriorCanada	Kaska (LL)	γóʔ
InteriorCanada	Kaska (P)	γóʔ
InteriorCanada	Kaska (RR)	γóʔ
InteriorCanada	Hare	γóʔ
InteriorCanada	Mountain	γóʔ
InteriorCanada	Bearlake	γó
InteriorCanada	Tłchq	γó
InteriorCanada	South Slavey	γó
InteriorCanada	Dene Dháh	γon
InteriorCanada	Sekani	γóʔ
InteriorCanada	Kaska (GHL)	γóʔ

The third cognate set is much narrower in distribution and is confined to Interior Canadian languages. It does not fit the alveolar/post-alveolar affricate complex described above. Instead, it reflects a separate stem with a voiced velar fricative onset and a rounded nasalized vowel, probably representing an unrelated lexical replacement for ‘nose’ in part of the family.

4.2.7.2.1 Initial Consonant

The onset is highly stable across this set: all forms begin with [γ]. The consistency of [γ] across Kaska, Hare, Mountain, Bearlake, Tłchq, South Slavey, Dene Dháh, and Sekani supports its reconstruction as is for this set.

4.2.7.2.2 Vowel

The vowel is highly stable across the set and points clearly to a back rounded vowel, best reconstructed as [o]. In all but one language this vowel is nasalized: Kaska $y\acute{o}ʔ$, Hare $y\acute{o}ʔ$, Mountain $y\acute{o}ʔ$, Bearlake $y\acute{o}$, Tłıchǫ $y\acute{o}$, South Slavey $y\acute{o}$, and Sekani $y\acute{o}ʔ$. Dene Dháh *yon* differs in preserving a non-nasalized [o] followed by overt [n]. Taken together, these forms strongly suggest that the nasalization seen across the rest of the set is a secondary reflex of an earlier final nasal consonant.

4.2.7.2.3 Final Consonant

The final consonant is best reconstructed as [n]. Although Dene Dháh *yon* is the only form that preserves [n] overtly, the broader distribution strongly supports this analysis: every other language shows a nasalized vowel, which is most economically explained as the reflex of an earlier final nasal. The glottal stop found in many forms, as in Kaska $y\acute{o}ʔ$, Hare $y\acute{o}ʔ$, Mountain $y\acute{o}ʔ$, and Sekani $y\acute{o}ʔ$, is therefore better understood as a later development after loss of the original nasal. Languages with zero final consonant, such as Bearlake $y\acute{o}$, Tłıchǫ $y\acute{o}$, and South Slavey $y\acute{o}$, represent a further stage in the same general direction.

4.2.7.2.4 Discussion

This set is clearly unrelated to the broader affricate cognate complex. Its voiced velar fricative onset and rounded nasalized vowel distinguish it from the widespread forms, and its restriction to Interior Canadian languages suggests that it represents a regional lexical innovation rather than an inherited Proto-Dene term for ‘nose’. In this sense, the set may be an important lexical isogloss

within the Interior Canadian area. On the present evidence, the internal development is best analyzed as *yon* > *yõʔ* > *yõ*, with Dene Dháh preserving the most conservative final segment.

4.2.7.3 Beyond Dene: Eyak, Tlingit & Yeniseian

Table 50. *None-Dene NOSE*

Branch / Language	Language
Eyak	<i>ni:k'</i>
Tlingit	<i>hú</i>
Proto-Yeniseian	<i>*aŋ / *haŋ</i>

Eyak, Tlingit, and Proto-Yeniseian do not presently clarify the reconstruction of ‘nose’ at a higher level. Eyak *ni:k'*, Tlingit *hú*, and Proto-Yeniseian **aŋ / *haŋ* are all phonologically distant not only from the main Dene alveolar/post-alveolar affricate complex, but also from one another. Eyak *ni:k'* shows an initial nasal, but its lack of an initial affricate cluster and final ejective stop do not align clearly with the widespread Dene [n-ts^hi-s]-type complex or with the Interior Canadian set. Tlingit *hú* is also difficult to connect securely with the Dene material, though the only set it even loosely resembles is the Interior Canadian affricate stem, since both are short stems built around a fricative-like onset and a back vowel. Even there, however, the similarity is very limited and does not go beyond this broad structural resemblance. Proto-Yeniseian **aŋ / *haŋ*, and especially the possible extended form **angon*, likewise remain difficult to interpret in this context. Although the nasal element in **aŋ* is superficially reminiscent of some Dene forms, the rest of the stem does not match closely enough to support a direct comparison on the present evidence. Either way, according to Vajda & Werner, the possible analysis of **angon* as **aŋ* plus the dual form of **ku* ‘opening’ is interesting semantically, but it does not resolve the phonological mismatch. For now, the most cautious conclusion is that the evidence is insufficient to connect any of these forms confidently either with the main Dene cognate complex or with each other, so higher-level reconstruction for ‘nose’ should remain unresolved.

4.2.8 Teeth

Table 51. *TEETH*

Branch	Language	Form
Alaska	Deg Xinag	ye?
Alaska	Koyukon	ku?
Alaska	Dena'ina (Inland)	ki
Alaska	Ahtna	ku?
Alaska	Gwich'in (Teetl'it)	yò?
Alaska	Hän	yò?
Alaska	Upper Kuskokwim	yu?
Alaska	Upper Tanana	yù?
Alaska	Tanacross	yu?
Yukon	Northern Tutchone	yú?
Yukon	Southern Tutchone	jù
Yukon	Tahltan	yu?
BranchIsolate1	Tagish	yù
BranchIsolate2	Ts'ets'aut	xo:
Interior Canada	Kaska (FL)	jú?
Interior Canada	Kaska (GHL)	yú?
Interior Canada	Kaska (L)	yú?
Interior Canada	Kaska (LL)	yú?
Interior Canada	Kaska (P)	jú?
Interior Canada	Kaska (RR)	jú?
Interior Canada	Hare	yú?
Interior Canada	Bearlake	yú
Interior Canada	Tłchq	yò:
Interior Canada	South Slavey	yú
Interior Canada	Dene Słliné	yú
Interior Canada	Dene Dháh	wú
Interior Canada	Beaver	wou?
Interior Canada	Sekani	yù?
Central BC	Carrier	yu
Central BC	Witsuwit'en	yu
Central BC	Chilcotin	y ^w ó
BranchIsolate3	Tsuut'ina	wu
Pacific Coast	Hupa	wo?
Pacific Coast	Galice	ku?
Pacific Coast	Kato	wou?
Pacific Coast	Tolowa	yu?

Pacific Coast	Tututni	ɣ ^w uʔ
Pacific Coast	Mattole	ɣ ^w oʔ
Pacific Coast	Wailaki	ɣ ^w oʔ
Pacific Coast	Kwa-Clat	ɣu / wo
Apachean	Navajo	wo:ʔ
Apachean	Western A.	ɣo:ʔ
Apachean	Jicarilla A.	wo:
Apachean	Kiowa A.	ɣò:

Table 52. *Non-Dene TEETH*

Branch / Language	Form
Eyak	χu:n
Tlingit	ùχ
Proto-Yeniseian	*i:teŋ

4.2.8.1 Initial Consonant

The most widespread reflex across Dene is a voiced velar fricative, usually [ɣ], with some uvular outcomes such as [ɣ̥] and a smaller number of divergent onsets. This includes Alaska forms such as Deg Xinag *yeʔ*, Gwich'in *ɣòʔ*, Hän *ɣòʔ*, Upper Kuskokwim *ɣuʔ*, Upper Tanana *ɣùʔ*, and Tanacross *ɣuʔ*, as well as Interior Canada and BC forms such as Tahltan *ɣuʔ*, Hare *ɣúʔ*, Bearlake *ɣú*, Tłchq *ɣò:*, Carrier *ɣu*, and Witsuwit'en *ɣu*. These forms support reconstructing a plain voiced velar fricative as the core inherited onset at the Proto-Dene level.

Koyukon *kuʔ* and Ahtna *kuʔ* differ mainly in uvular place, not in manner or voicing. Their alignment with [ɣ]-initial forms elsewhere supports treating [ɣ̥] as a place-adjusted reflex of the same fricative rather than as evidence for a separate inherited consonant.

A few languages show overt labialization on the fricative, including Chilcotin *ɣ^wó* in Central BC and Tututni *ɣ^wuʔ*, Mattole *ɣ^woʔ*, and Wailaki *ɣ^woʔ* in the Pacific Coast branch. Since these forms occur in non-adjacent branches, the labialization does not need to be reconstructed for Proto-Dene. A more economical explanation is that labialization developed secondarily under the influence of the following back rounded vowel. In other words, earlier *ɣu* or *ɣo* could have

produced [ɣ^wu] or [ɣ^wo] through anticipatory rounding. This also fits the broader dataset: many languages with the same basic stem lack labialization, so [ɣ^w] is better treated as a secondary development than as the inherited onset.

The [w]-initial forms, such as Tsuut'ina *wu*, Denesúliné *wí*, Beaver *wouʔ*, Navajo *wo:ʔ*, and Jicarilla *wo:*, represent a further stage in the same general phonetic pathway. A velar or uvular fricative before a back rounded vowel could weaken first toward a labialized fricative and then toward a glide. They are best interpreted as lenited reflexes of the same fricative in a rounded vocalic environment.

Palatal glide outcomes such as Southern Tutchone *jù* and some Kaska varieties *júʔ* should be kept separate from the [w]-type developments. These forms likely reflect fronting or palatal coarticulation and remain peripheral to the main correspondence set.

Eyak *χu:n* preserves a voiceless uvular fricative [χ]. This does not match the voiced [ɣ] that dominates Dene, but it still fits the same velar/uvular fricative correspondence at a higher level. The Eyak form may preserve an older voiceless uvular value, while Dene reflects voicing and fronting to [ɣ]. Tlingit *ùχ* is more structurally difficult, but it also contains a uvular fricative [χ]. If the Tlingit form is cognate, it may reflect metathesis, with the vowel and consonantal material appearing in the reverse order relative to Dene and Eyak. Because of this structural difference, Tlingit should be treated as probable but more tentative than Eyak.

Taken together, the Dene evidence supports reconstructing a plain velar fricative for Proto-Dene, most conservatively [^{*}ɣ], without inherent labialization. At the Proto-Dene-Eyak level, Eyak [χ] allows the possibility of an earlier voiceless uvular fricative [^{*}χ], later voiced and fronted in Dene. Tlingit may support the same higher-level value, but only tentatively because of the apparent metathesis.

Proto-Yeniseian **i:teŋ* is too different in its initial consonant and overall shape to support treating it as cognate, so this item cannot be reconstructed securely to Proto-Dene-Yeniseian.

4.2.8.2 Vowel

The vowel evidence is one of the clearest parts of this set. Most Dene languages reflect a back rounded vowel, usually [u] or [o], with occasional lengthening. This pattern is seen across Alaska, Interior Canada, BC, Pacific Coast, and Apachean forms. The [u] ~ [o] variation is best treated as branch-level lowering or phonetic adjustment rather than as evidence for two separate inherited vowels.

The back rounded vowel also helps explain the secondary consonantal developments. In languages with [ɣ^w], the labialization can be understood as rounding transferred from the following [u]- or [o]-like vowel onto the preceding velar fricative. In languages with [w], the same rounded environment likely encouraged further weakening of [ɣ] or [ɣ^w] into a glide. This means that the vowel is not only stable in its own right, but also provides a phonetic explanation for the labialized and glide-like onsets found in several languages.

Eyak *χu:n* fits this pattern well, since it also contains a high back rounded vowel. This strengthens the Dene-Eyak comparison and supports reconstructing a back rounded vowel at least at the Proto-Dene-Eyak level. Tlingit *ùχ* also has a back rounded vowel, which may support the same higher-level vocalism if the form is cognate.

Proto-Dene is therefore best reconstructed with a simple back rounded vowel, [**u*]. The same vowel can probably be projected to Proto-Dene-Eyak, and possibly to Proto-Na-Dene if Tlingit *ùχ* is accepted as cognate.

4.2.8.3 Final Consonant

The final consonant pattern across Dene is relatively uniform. With the exception of Eyak and Proto-Yeniseian, the languages in the dataset either show a final glottal stop or lack a lexical coda altogether, often with vowel lengthening. These outcomes can be interpreted as related reflexes of a weakened final segment: the glottal stop may represent retention or secondary reinforcement, while vowel lengthening reflects loss without replacement.

Eyak $\chi u:n$ is the only Na-Dene form in the dataset that preserves a final nasal. This does not motivate reconstructing a nasal coda at the Proto-Dene level, but it raises the possibility that an earlier final segment may have been preserved in Eyak and lost or restructured in Dene. The Eyak nasal is therefore relevant for higher-level comparison, but it should not override the Dene-internal evidence.

Proto-Yeniseian $*i:teŋ$ also contains a final nasal. The parallel with Eyak is worth noting, but it remains too isolated to support a Proto-Dene-Yeniseian reconstruction on its own. It may reflect a deeper connection, but it may also be coincidental.

From a Dene-internal perspective, the most economical reconstruction is a final glottal stop at the Proto-Dene level. Alternative scenarios involving an earlier nasal remain possible at a deeper level, especially in light of Eyak.

4.2.8.4 Discussion

The reconstruction of ‘teeth’ is well supported at the Proto-Dene level. The initial consonant evidence points to a plain velar fricative, with labialization developing secondarily under the influence of a following back rounded vowel. The vowel evidence is especially consistent and supports reconstructing $[*u]$ for Proto-Dene.

Eyak $\chi u:n$ strengthens the higher-level comparison, although its initial $[\chi]$ suggests that the older Dene-Eyak onset may have been voiceless and uvular before being voiced and fronted in Dene. Tlingit $\dot{u}\chi$ may belong to the same set because it also contains $[\chi]$ and a back rounded vowel, but the apparent metathesis makes this comparison more tentative. Proto-Dene-Yeniseian remains unresolved: the Eyak and Proto-Yeniseian final nasals are suggestive, but not sufficient for a secure reconstruction.

Table 53. Reconstruction of TEETH

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	* $\bar{\imath}te\eta$
Proto-Na-Dene	* $\chi u:?$ ~ * $\chi u:n$?
Proto-Dene-Eyak	* $\gamma u?$ ~ * $\chi u:?$ ~ * $\chi u:n$?
Proto-Dene	* $\gamma u?$ ~ * $\gamma o?$
Proto-Northern-Dene	* $\gamma u?$ ~ * $\gamma o?$
Proto-Alaska-Dene	* $\gamma u?$ ~ * $\gamma o?$
Proto-Yukon-Dene	* $\gamma u?$
Proto-Interior-Canada-Dene	* $\gamma u?$ ~ * $\gamma^wu?$
Proto-Central-BC-Dene	* γu ~ * γo
Proto-Pacific-Coast-Dene	* $\gamma^wu?$ ~ * $\gamma^wo?$
Proto-Apachean-Dene	* $\gamma o?$ ~ * $\gamma^wo?$

4.3 Limbs and extremities

4.3.1 Arm

Table 54. *ARM*

Branch	Language	Form
Alaska	Deg Xinag	qon
Alaska	Koyukon	qɒn
Alaska	Dena'ina (Iliamna)	qun
Alaska	Ahtna	qɑ:n
Alaska	Gwich'in (Teetl'it)	k'in
Alaska	Gwich'in (Gwichya)	k'in
Alaska	Hän	kàn?
Alaska	Lower Tanana	kàn?
Alaska	Upper Kuskokwim	kàn?
Alaska	Upper Tanana	kâ:n?
Alaska	Tanacross	kàn?
Yukon	Northern Tutchone	ká:n?
Yukon	Southern Tutchone	kàn
Yukon	Tahltan	gʌ:n
BranchIsolate1	Tagish	kʰàn
BranchIsolate2	Ts'ets'aut	gá:?
Interior Canada	Kaska (DL)	ká:n
Interior Canada	Kaska (FL)	kó:n
Interior Canada	Kaska (GHL)	kó:n
Interior Canada	Kaska (L)	kó:n
Interior Canada	Kaska (LL)	kó:n
Interior Canada	Kaska (P)	ká:n
Interior Canada	Kaska (RR)	ká:n
Interior Canada	Hare	kón
Interior Canada	Mountain	kón
Interior Canada	Bearlake	kón
Interior Canada	Tłchq	gõ:
Interior Canada	South Slavey	kó
Interior Canada	Dene Dháh	kón
Interior Canada	Sekani	kòn
Central BC	Carrier	kan
Central BC	Chilcotin	gæn
BranchIsolate3	Tsuut'ina	kʰòn
Pacific Coast	Galice	ka:n
Pacific Coast	Kato	kʷan
Pacific Coast	Tolowa	kʷ'a:n
Pacific Coast	Tututni	kan
Pacific Coast	Mattole	ká:n
Pacific Coast	Kwa-Clat	kʰa:n

Apachean	Navajo	ka:n
Apachean	Western A.	kan
Apachean	S. Carlos A.	kan
Apachean	Jicarilla A.	kǝn
Apachean	Kiowa A.	kǎ:
Apachean	Mescalero A.	kan

Table 55. *Non-Dene ARM*

Branch / Language	Form
Eyak	tʃʰalih
Tlingit	χèk
Proto-Yeniseian	*kʌg

4.3.1.1 Initial Consonant

The initial consonant across the Dene forms is overwhelmingly a velar stop. Alaska begins with a particularly important split: Deg Xinag, Koyukon, Dena'ina, and Ahtna show a uvular stop [q], while many other branches show [k]-type reflexes. This makes a uvular reconstruction worth considering, especially because the Alaska evidence is internally coherent rather than isolated to a single language. At the same time, outside Alaska the ordinary reflex is much more often [k], with additional branch-specific variants such as [kʰ], [kʷ], and [g].

The Pacific Coast forms *kʷan* and *kʷa:n* point to secondary labialization in at least part of that branch. Likewise, forms such as Tahltan *ga:n*, Tłıchǝ *gǝ:*, Ts'ets'aut *gá:ʔ*, and Chilcotin *gén* show voicing in some branches, but this does not amount to good evidence for a proto-voiced stop. The broadest shared feature is a dorsal onset.

The main question is therefore whether Proto-Dene had [q] or [k]. Because the uvular reflexes are concentrated in a substantial Alaska subset and not merely in one outlying language, a reconstruction with [q] is plausible. That interpretation is also supported by the Proto-Dene reconstruction **qaneʔ* for 'arm', mentioned in Vajda 2010: 54, which aligns well with the Alaska [q]-forms and strengthens the case that the uvular consonant may be archaic rather than secondary.

The non-Dene comparanda do not make the higher-level reconstruction straightforward, but they help define the possible sound changes. If the Dene [q] reconstruction is correct, then most non-Alaska Dene branches can be explained by fronting of [*q] to [k], with later branch-specific developments producing [k^h], [k^w], and [g]. Tlingit *χèk* could then represent a related post-velar outcome, with [χ] reflecting spirantization of an earlier uvular or post-velar stop. Proto-Yeniseian **k_Λg* would require a different development, namely fronting of an earlier uvular stop to [*k]. Under this interpretation, Dene preserves the clearest evidence for [*q], while Tlingit and Proto-Yeniseian may or may not belong to the same inherited set. The comparison therefore remains tentative, especially because Tlingit and Proto-Yeniseian also share a final velar stop rather than the nasal ending that dominates across Dene. There is, however, another important possibility involving a similar cognate term, ‘hand’, and that broader issue will be discussed further in the discussion section.

4.3.1.2 Vowel

The vowel pattern is comparatively stable in general shape, though not in exact quality. Much of the family shows a low or back vowel: [ɑ], [a], [ɒ], [o], [ʌ], and nasalized counterparts. This points to a proto-vowel in the low-to-back region rather than a front vowel. The Alaska [q]-forms themselves vary between *qon*, *qvn*, *qun*, and *qa:n*, which already shows that the exact vowel quality had begun to diverge even within that subset.

Across Interior Canada and adjacent branches, back rounded vowels are especially common: Kaska *kō:n*, Hare *kón*, Mountain *kón*, Dene Dháh *kón*, and Sekani *kòn*. Other branches preserve low unrounded vowels, as in Southern Tutchone *kàn*, Carrier *kan*, Galice *ka:n*, Navajo *ka:n*, and several Apachean forms. The simplest interpretation is that Proto-Dene had a low

unrounded vowel, probably [a], which in many branches shifted toward a mid/back rounded vowel or developed nasalized reflexes under the influence of the final nasal element.

The nasalized vowels of Bearlake *kón*, South Slavey *kó̃*, Jicarilla *kǎn*, and Kiowa Apache *kǎ̃*, together with Tłchq *gǎ̃*, fit well with this theory, in which an earlier nasal coda conditioned vowel nasalization and was then weakened or lost in some languages.

4.3.1.3 Final Consonant

The final consonant is one of the most consistent features of the Dene set. Most forms end in a nasal element: [n], [nʔ], [ṇʔ], nasalized vowel plus loss of the nasal, or a closely related reflex. This is visible across the family: Deg Xinag *qon*, Ahtna *qa:n*, Southern Tutchone *kàn*, Kaska *kǎ̃:n* / *kó̃̃:n*, Hare *kón*, Carrier *kan*, Galice *ka:n*, Navajo *ka:n*, and many others. Even where the nasal is no longer overt, as in Tłchq *gǎ̃* and South Slavey *kó̃*, the nasalized vowel strongly suggests an earlier nasal coda.

Several languages preserve a glottal element after the nasal: Hän *kàṇʔ*, Lower Tanana *kàṇʔ*, Upper Kuskokwim *kàṇʔ*, Upper Tanana *kâ:nʔ*, Tanacross *kàṇʔ*, and Northern Tutchone *ká:nʔ*. Ts'ets'aut *gá:ʔ* may reflect further reduction of an earlier nasal-plus-glottal sequence, though that remains less certain. These forms suggest that at least some branches developed or preserved a final glottal element in addition to the nasal. The evidence therefore points to a reconstructed final [*n].

4.3.1.4 Discussion

Across a very wide geographical range, the stem consistently shows a dorsal initial consonant, a low-to-back vowel, and a final nasal element. The best-supported Proto-Dene reconstruction is therefore something like **qan* or **kan*, with the main uncertainty lying in the initial consonant.

The Alaska evidence, together with the reconstructed Proto-Dene **qaneʔ*, makes **qan* a plausible hypothesis, while the wider distribution of [k]-type reflexes elsewhere in the family suggests velar fronting. Below Proto-Dene, several subgroup-level reconstructions are more straightforward. Proto-Alaska is especially compatible with **qan*, while many Interior Canadian and more southern forms point toward **kan* or **kon*.

The non-Dene evidence does not support a straightforward projection of this exact stem to the higher levels for now. Eyak *tʃʼalih* is too different in both onset and coda to fit the main Dene pattern directly. Tlingit *χèk* also differs too much in overall shape to count as a direct continuation of the same stem. Proto-Yeniseian **kag* is somewhat closer in its velar onset and vowel, but the final consonant does not align closely enough with the Dene material to make the comparison secure.

At the same time, there is another important possibility that may help explain why some of the non-Dene material looks suggestive without matching the main Dene ‘arm’ stem directly. In Vajda’s Proto-Yeniseian reconstruction, alongside **kag* ‘arm’, there is also **pʰaŋn* ‘hand’, reflected in modern Ket as *haŋn*. This form provides a stronger possible comparison with the Dene material than **kag*: it contains a nasal final element, its vowel quality is the same, and its modern Ket initial [h] creates a possible point of comparison with the Tlingit fricative onset. From there, one possible hypothesis is that the Dene and Yeniseian material may preserve related body-part stems that were not semantically identical across the families, but instead shifted between meanings such as ‘arm’ and ‘hand’. Even so, that broader comparison remains tentative.

Table 56. Reconstruction of *ARM*

Proto-Level	Reconstruction
Proto-Dene-Yeniseian	*qʌŋ
Proto-Yeniseian	*kʌg
Proto-Na-Dene	*qan ~ *χaq ?
Proto-Dene-Eyak	-
Proto-Dene	*qan ~ *qanʔ
Proto-Northern-Dene	*qanʔ ~ *kanʔ
Proto-Alaska-Dene	*qanʔ
Proto-Yukon-Dene	*kán
Proto-Interior-Canada-Dene	*kón
Proto-Central-BC-Dene	*kán
Proto-Pacific-Coast-Dene	*kan ~ *ka:n
Proto-Apachean-Dene	*kan

4.3.2 Forearm

This lexical set is considerably smaller than most others in the dataset, which limits the strength of the reconstruction. There is no material from Apachean or Central BC languages, only a single Pacific Coast entry (Hupa), and no attested Tlingit form available for comparison. As a result, the analysis relies heavily on Alaska and Interior Canada evidence, with Yukon represented only by two Tutchone varieties, and conclusions at higher proto-levels must remain correspondingly cautious.

Table 57. *FOREARM*₁

Branch	Language	Form
Alaska	Koyukon	tʰ'il
Alaska	Dena'ina (Iliamna)	ts'il
Alaska	Dena'ina (Inland)	ts'il
Alaska	Dena'ina (OCI)	ts'il
Alaska	Dena'ina (UCI)	ts'il
Alaska	Ahtna	tʰ'i:l
Alaska	Lower Tanana	tθ'il
Yukon	Northern Tutchone	tθi'án?
Yukon	Southern Tutchone	tθ'en
Interior Canada	Kaska (DL)	ts'íntlé?
Interior Canada	Kaska (FL)	ts'íntlé?
Interior Canada	Kaska (GHL)	ts'íntlé?
Interior Canada	Kaska (L)	ts'íntlé?
Interior Canada	Kaska (LL)	ts'íl
Pacific Coast	Hupa	ts'e:l?

Table 58. *Non-Dene FOREARM*

Branch / Language	Form
Eyak	tʃ'əlih
Tlingit	-
Proto-Yeniseian	*qAltɪu?

4.3.2.1 Initial Consonant

The Dene evidence is tightly clustered around an ejective affricate category. Alaska forms show [tʃ'] in Koyukon *tʃ'il* and Ahtna *tʃ'i:l*, [ts'] in Dena'ina *ts'il*, and [tθ'] in Lower Tanana *tθ'il*. British Columbia continues the interdental reflex in Northern and Southern Tutchone (*tθ'ánʔ*, *tθ'èn*), while Interior Canada Kaska shows [ts'] in *ts'íntléʔ* and *ts'íl*. Pacific Coast Hupa has [ts'] in *ts'e:lʔ*.

The distribution strongly supports a single inherited ejective affricate at the Proto-Dene level. The alternation between [ts'], [tʃ'], and [tθ'] is best treated as branch-level realization within a unified ejective affricate series.

Eyak *tʃ'əlih* begins with [tʃ'], which matches the defining feature of the Dene forms: an ejective affricate-type onset. Given the limited dataset, the most cautious reconstruction at the Proto-Dene-Eyak level is an ejective palato-alveolar affricate.

The only Yeniseian form available for comparison is Proto-Ket-Yugh **qAltʰuʔ*. This form is analyzable as **qAl-* (gloss unknown) plus **-tʰuʔ* 'head', indicating a morphologically complex compound rather than a simple body-part root. Given both its internal structure and its phonological divergence from the Dene-Eyak set, it cannot presently be integrated into the reconstruction and must be treated as an independent formation pending further investigation.

4.3.2.2 Vowel

Most Dene forms display a high front vowel [i]: Koyukon *tʃ'il*, Dena'ina *ts'il*, Lower Tanana *tθ'il*, Ahtna *tʃ'i:l*, and Kaska *ts'íntléʔ* and *ts'íl*. Length appears in Ahtna [i:], and nasalization appears in Kaska. Hupa shows [e:] in *ts'e:lʔ*, and the Tutchone forms show [e] or [a] in forms that also contain additional nasal material.

Because several branches show expanded or morphologically complex forms, especially in Kaska and Tutchone, the safest reconstruction is a high front nucleus [*i] at the Proto-Dene level. The [e] vowel in Hupa and Southern Tutchone can be treated as branch-level development.

The relevant comparison is between Eyak *tʃ'əl-* and the Dene forms, rather than the full Eyak form *tʃ'əlih*. The Dene evidence is predominantly monosyllabic, while Eyak appears to preserve additional final material in *-ih*. On this interpretation, the first-syllable vowel of Eyak [ə] aligns with the central/lowered vowel quality visible in forms such as Hupa *ts'e:lʔ*, while the second syllable should not be treated as part of the inherited lexical core.

4.3.2.3 Final Consonant

The final portion of the forms is more complex and varies across branches. In Alaska, Koyukon *tʃ'il*, Ahtna *tʃ'i:l*, and Lower Tanana *tθ'il* all end in a lateral fricative [ɬ], while Dena'ina shows a plain lateral [l] in *ts'il*. Hupa likewise has [l], with an added glottal stop in *ts'e:lʔ*. This establishes a recurring lateral element [ɬ] or [l] as the clearest shared component in the simpler Alaska and Pacific Coast forms.

Interior Canada Kaska forms are considerably more elaborate, with *ts'íntléʔ* showing an [n] segment followed by a [tɬ] sequence and a final glottal stop, alongside a shorter form *ts'íl* in Kaska (LL) that preserves only the lateral. The British Columbia Tutchone forms likewise depart from the simple lateral ending, instead showing nasal finals in *tθ'ánʔ* and *tθ'èn*, sometimes combined with a glottal stop.

The co-occurrence of laterals ([ɬ], [l]) and nasals [n] in this position may point to instability within the coronal sonorant zone rather than to clearly separate inherited codas. Since laterals and [n] share a broadly similar place of articulation, the alternation could reflect later reshaping, assimilation, or reinterpretation of a more complex earlier coda. On this interpretation, a lateral-

based core remains possible, but the nasal reflexes show that the final consonant cannot be reconstructed with complete confidence.

Eyak *tʃʰəlih* contains a lateral segment [l] in the comparable portion *tʃʰəl-*, which brings it into closer alignment with the Dene lateral pattern seen in forms such as Koyukon *tlʰil*, Ahtna *tlʰi:l*, Lower Tanana *tθʰil*, and Hupa *tsʰe:lʔ*. The final [h] belongs to the additional *-ih* material and therefore should not be weighed directly against the Dene final lateral.

4.3.2.4 Discussion

Despite the small dataset, the Dene dataset does provide some compelling evidence for a shared cognate set, though still, it does not provide a clean reconstructed proto-form. The dominant pattern is an ejective alveolar/post-alveolar affricate onset plus a lateral-type coda with a high front vowel nucleus.

Eyak aligns with the Dene set not only at the onset level through [tʃʰ], but also through the lateral segment in *tʃʰəl-*. The remaining uncertainty concerns the status of final *-ih*, which is best treated as additional material rather than as part of the inherited forearm stem.

Tlingit is absent from the dataset and therefore cannot be evaluated here. Proto-Yeniseian **qʌltʰuʷ* differs in onset type, vowel system, and final structure, and on present evidence is best treated as unrelated to the Dene-Eyak set for this term.

Table 59. Reconstruction of *FOREARM*₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*q ^h l ^h t ^h u ^h ?
Proto-Na-Dene	-
Proto-Dene-Eyak	*ts'il ~ tʃ'il ?
Proto-Dene	*tθ'il ~ *ts'il ?
Proto-Northern-Dene	*tθ'èn ~ *ts'il ~ *tɬ'il ?
Proto-Alaska-Dene	*ts'il ~ *tɬ'il ~ *tθ'il
Proto-Yukon-Dene	*tθi'án? ~ *tθ'èn
Proto-Interior-Canada-Dene	*ts'íntlé?
Proto-Central-BC-Dene	-
Proto-Pacific-Coast-Dene	*ts'e:l?
Proto-Apachean-Dene	-

4.3.3 Elbow

This cognate set is represented in a few instances across several branches of the Dene family: Alaska, Interior Canada, Pacific Coast, and the branch isolates Tsut'ina and Ts'ets'aut. Eyak also fits this set well and is clearly relevant for higher-level reconstruction. Tlingit is more divergent in form, but it is still plausible as a related reflex. Yeniseian, by contrast, does not appear to preserve a cognate member of this set. Three Yeniseian terms for 'elbow' are available, none of which fit within the cognate set cleanly, and these will be discussed briefly in the discussion section below. The overall distribution is therefore strong within Dene-Eyak, with Tlingit as a plausible but more reduced parallel, but without a convincing Yeniseian cognate.

Table 60. *ELBOW₁*

Branch	Language	Form
Alaska	Koyukon	ts'uts
Alaska	Dena'ina (Iliamna)	ʃʷəʃ
Alaska	Dena'ina (Inland)	ʃʷəʃ
Alaska	Dena'ina (OCI)	ʃʷəʃ
Alaska	Dena'ina (UCI)	ʃʷəʃ
Alaska	Ahtna	ts'os
Alaska	Gwich'in (Teetl'it)	ts'òh
Alaska	Gwich'in (Gwichya)	ts'òh
Alaska	Hän	ts'òh
Alaska	Lower Tanana	ts'es
Alaska	Upper Kuskokwim	ts'is
Alaska	Tanacross	ts'ɛs
BranchIsolate2	Ts'ets'aut	ts'éʔ
BranchIsolate3	Tsut'ina	ts'is
Pacific Coast	Hupa	ʃʷɪʃʷ

Table 61. *Non-Dene ELBOW*

Branch / Language	Form
Eyak	ʃʰɪʃ
Tlingit	t'iy
Proto-Yeniseian	*u:lɬat / *uligetʲ / *karampat

4.3.3.1 Initial Consonant

The initial consonant is one of the strongest parts of the comparison. Most Dene languages show an ejective affricate of the [tsʰ] or [tʃʰ] type: Koyukon *tsʰuts*, Ahtna *tsʰos*, Gwichʼin *tsʰòh*, Lower Tanana *tsʰes*, Upper Kuskokwim *tsʰis*, Tanacross *tsʰes*, Tsuutʼina *tsʰis*, and Denaʼina *tʃʰəf*. Hupa also preserves an ejective affricate in *tʃʰitʃʰ*. This distribution strongly supports reconstruction of an ejective alveolar or post-alveolar affricate at the Proto-Dene level.

Eyak strengthens that conclusion further. Eyak *tʃʰitʃʰ* remains clearly within the same affricate region, albeit with an aspirated onset, and preserves the same general stem shape. Since Eyak is securely related here, one plausible hypothesis is that Proto-Dene-Eyak already had an affricate-type onset, very likely something in the [tsʰ] or [tʃʰ]. The exact ejective or aspirated value across the higher levels is less certain, but the affricate character itself is strongly supported.

Tlingit *tʰiy* is more reduced and does not preserve an overt affricate. Even so, it does not necessarily stand outside the set. The simplest cautious interpretation is that Tlingit reflects reduction of an earlier affricate-like onset to an ejective stop. On the present evidence, the most secure reconstruction for Proto-Dene and Proto-Dene-Eyak is initial [tʃʰ], with Proto-Na-Dene also plausibly pointing to an ejective affricate, though that is tentative at present.

4.3.3.2 Vowel

The vowel shows moderate variation. Many Dene forms point to a front or central short vowel: Denaʼina *tʃʰəf*, Lower Tanana *tsʰes*, Upper Kuskokwim *tsʰis*, Tanacross *tsʰes*, Tsuutʼina *tsʰis*, Tsʼetsʼaut *tsʰéʔ*, Hupa *tʃʰitʃʰ*, and Eyak *tʃʰitʃʰ*. Other languages show a back rounded vowel: Koyukon *tsʰuts*, Ahtna *tsʰos*, Gwichʼin *tsʰòh*, and Hän *tsʰòh*. The overall picture is therefore one of a short vowel whose exact quality varies between front-central and rounded-back reflexes across the family.

Because both front-type and rounded-back vowels are well represented, the Proto-Dene vowel cannot be established with complete certainty from the present dataset alone. Still, the front-type reflexes are especially widespread outside the Gwich'in-Hän-Ahtna-Koyukon cluster, and they are also supported by Eyak and Hupa. That makes a front or central vowel the more economical starting point for Proto-Dene, with the rounded vowels in some northern languages possibly reflecting later branch-level developments. A tentative Proto-Dene vowel such as [**i*] is therefore somewhat easier to defend than [**o*].

Eyak again aligns best with the front-vowel side of the Dene pattern, and Tlingit *t'ìy* also contains [*i*], which may support the idea that an earlier high or front vowel stood in the ancestral form.

4.3.3.3 Final Consonant

The final consonant is also relatively stable, though it shows more overt variation than the onset. A large part of the Dene data ends in a fricative or affricate-like consonant: Koyukon *ts'òts*, Dena'ina *tʃ'əʃ*, Ahtna *ts'os*, Lower Tanana *ts'es*, Upper Kuskokwim *ts'is*, Tanacross *ts'es*, Tsuut'ina *ts'is*, Hupa *tʃ'ɪʃ'*, and Eyak *tʃ'h'itʃ*. Gwich'in and Hän instead show final *h*: *ts'òh*, *ts'òh*. Ts'ets'aut *ts'éʔ* has a glottal stop. Tlingit *t'ìy* ends in a glide. Even with these differences, the broad pattern is still consistent enough to suggest that the older coda belonged to the fricative-affricate region.

The most economical reconstruction is therefore a final [**ts*] or [**tʃ*]-type element. That better accommodates forms such as Dena'ina *tʃ'əʃ*, Hupa *tʃ'ɪʃ'*, and Eyak *tʃ'h'itʃ*, where the coda remains clearly more affricate-like or postalveolar. From such an earlier final consonant, reduction to [*s*] in much of Dene is easy to understand, and further weakening could then account for reflexes such as Gwich'in and Hän [*h*], Ts'ets'aut [*ʔ*], and Tlingit [*y*]. On that interpretation, the widespread

[s]-type forms are not the most conservative reflexes, but rather reduced outcomes of an earlier shared coda.

4.3.3.4 Discussion

The onset is especially secure: the family overwhelmingly points to an ejective alveolar or post-alveolar affricate, and Eyak supports extending an affricate-type onset at least to Proto-Dene-Eyak. The vowel is less stable, but front-vowel reflexes are common and are supported by both Eyak and Tlingit, making a front or central proto-vowel somewhat more plausible than a back rounded one. The final consonant is best reconstructed as an affricate-type coda such as [*ʧ]. That better accounts for forms like Dena'ina *ʃʷəʃ*, Hupa *ʃʷiʃ*, and Eyak *ʃʷʰiʃ*, while the widespread [s]-type reflexes can be understood as later reductions, followed in some branches by further weakening to [h], [ʔ], or possibly [y].

Tlingit is clearly the most divergent member of the set, but it is still plausible as a related form. Its initial ejective stop may reflect reduction from an earlier affricate, and its final glide may continue a more substantial older coda that was heavily reduced. That cannot be proved from this dataset alone, but it is a reasonable higher-level hypothesis given the general stem shape and the recurrent tendency of Tlingit to preserve related material in reduced form.

For Yeniseian, three forms can be mentioned, but none appears cognate with the Na-Dene set. The first is **u:ldat*, glossed as a compound meaning ‘arm + bone’. The second is **ulʲigetʲ*, glossed as ‘arm’ + **-gid* ‘bend’, where that second element can also independently mean ‘joint’ or ‘elbow’ on its own. The third is **karampat*, whose internal structure is less clear, though part of it may be related to the word for ‘knee’. These forms are important to mention because they show that Yeniseian does possess lexical material for this semantic domain, but they do not resemble the Na-Dene stem closely enough in either shape or structure to support a cognate

comparison here. For this term, then, the comparison appears to stop at Dene-Eyak, with Tlingit as a plausible but more reduced external parallel, and no convincing Yeniseian cognate presently identifiable.

Table 62. Reconstruction of ELBOW₁

Language	Reconstruction
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*u:ldat / *uligetʲ / *karampat
Proto-Na-Dene	*ts'its ~ *ts'ifʲ ?
Proto-Dene-Eyak	*ts'its ~ *ts'ifʲ
Proto-Dene	*ts'its ~ *ts'ifʲ
Proto-Northern-Dene	*ts'is
Proto-Alaska-Dene	*ts'its ~ *ts'ots
Proto-Yukon-Dene	-
Proto-Interior-Canada-Dene	-
Proto-Central-BC-Dene	-
Proto-Pacific-Coast-Dene	*ʃʲifʲ
Proto-Apachean-Dene	-

4.3.4 Knee

Table 63. *KNEE*₁

Branch	Language	Form
Alaska	Koyukon	qot
Alaska	Ahtna	qot'
Alaska	Gwich'in (Teetl'it)	g ^w at
Alaska	Gwich'in (Gwichya)	g ^w at
Alaska	Hän	kòt
Alaska	Lower Tanana	gɬt
Alaska	Upper Kuskokwim	gɬt'
Alaska	Upper Tanana	kòt
Alaska	Tanacross	kot
Yukon	Northern Tutchone	k ^w át
Yukon	Southern Tutchone	k ^w àt
Yukon	Tahltan	kot
BranchIsolate1	Tagish	k ^h ùt
BranchIsolate2	Ts'ets'aut	k ^w ó
Interior Canada	Kaska (FL)	kót
Interior Canada	Kaska (GHL)	kót
Interior Canada	Kaska (L)	kót
Interior Canada	Kaska (LL)	kót
Interior Canada	Kaska (P)	kót
Interior Canada	Kaska (RR)	kót
Interior Canada	Hare	gó?
Interior Canada	Mountain	kó?
Interior Canada	Bearlake	kó
Interior Canada	Tłıchǫ	ehgò
Interior Canada	South Slavey	kó
Interior Canada	Dene Dháh	kó
Interior Canada	Sekani	kòt
Central BC	Carrier	k ^w ɬt
Central BC	Witsuwit'en	k ^w ət
Central BC	Chilcotin	tsi- g ^w ét
Pacific Coast	Hupa	qot'
Pacific Coast	Galice	k ^w ai
Pacific Coast	Kato	qout'
Pacific Coast	Tolowa	k ^w 'et
Pacific Coast	Mattole	k ^w oʔl, k ^w ó:x ^w
Pacific Coast	Kwa-Clat	k ^w 'ît

Apachean	Navajo	kot
Apachean	Western A.	kot
Apachean	S. Carlos A.	kot
Apachean	Jicarilla A.	kõh
Apachean	Mescalero A.	kut

Table 64. Non-Dene KNEE

Branch / Language	Form
Eyak	qu(n)hd
Tlingit	kiy
Proto-Yeniseian	*bat

4.3.4.1 Initial Consonant

Across Dene, the dominant onset for ‘knee’ is a dorsal stop in the [k] ~ [q] range, with frequent voicing [g] and many instances of rounding [k^w], [g^w] in several subgroups. Alaska has clear [q]-initial reflexes in Koyukon *qot* and a Pacific Coast parallel in Hupa *qot*’, while many other Dene varieties show *kot* with [k]. We find rounding in Gwich’in *g^wat*, Northern and Southern Tutchone *k^wát* and *k^wàt*, Carrier *k^wat*, Witsuwit’en *k^wat*, Ts’ets’aut *k^wó*, and several Pacific Coast forms such as *k^w’et* and *k^w’it*. Taken at face value, the comparative picture is consistent with a dorsal proto-onset. Tłıchǵ stands out as the strongest outlier in the dataset, with *ehgò* diverging sharply from the widespread dorsal-initial *ko(t)* pattern found elsewhere in Dene. The sequence suggests substantial internal restructuring, potentially involving metathesis, or reordering of the velar segment and the vowel.

Eyak is important here because it preserves a uvular onset [q], supporting a higher-level proto-onset that includes uvulars. The Dene side also contains uvular reflexes in Koyukon and Hupa, making it reasonable to treat [q] as potentially inherited at the Proto-Na-Dene or Proto-Dene-Eyak level rather than as a purely local development. However, at the same time, Tlingit

complicates any straightforward “uvular at the top” inference: the Tlingit form *kìy* shows a plain velar [k] rather than [q].

Proto-Yeniseian **bat* is similar in overall shape to the Na-Dene forms, especially in its short CV(C) structure and final alveolar stop. The main difficulty is the initial [**b*], which does not directly match the [k] ~ [q] onset that dominates the Dene evidence. However, this mismatch does not automatically exclude the comparison. Vajda discusses a small number of possible cases in which Ket or Yeniseian labial reflexes may correspond to earlier Na-Dene velar/uvular material. For the velar series, he compares Proto-Dene-Eyak **gag* ‘mother’s brother’ with Ket *be’p* ‘brother- or sister-in-law’ and notes that Ket final [p] in this form appears to correlate with an original velar. For the uvular series, he gives Proto-Dene-Eyak **qaχ* ‘rabbit’, Tlingit *qaχ*, and Ket/Yugh *be’s* ‘rabbit’ as a possible example of the correspondence [**q*] ~ [b]. He also raises the possibility that a uvular fricative onset [**χ*] or [**χʷ*] may have yielded Ket [b] in forms such as Proto-Dene **χusʷ* ‘thorn’ beside Ket *bus* ‘stinger’ (2010: 52-54). In that light, Proto-Yeniseian **bat* can be treated as a possible external comparandum for the knee set, though the initial consonant remains the weakest part of the comparison.

4.3.4.2 Vowel

The nucleus is most often a mid back vowel or a closely related reduced or centralized variant: *qot*, *qot’*, *kòt*, *kot*, *kót*, *kõh*, *kut*. Alaska additionally shows centralization in Lower Tanana *gat* and Upper Kuskokwim *gat’*, while the Tutchone pair *kʷát* and *kʷàt* suggests that vowel quality can vary with prosodic or morphological factors even within a tight subgroup. Pacific Coast introduces further divergence in *kʷai* (Galice) and in the Mattole *kʷoʔl* versus *kʷó:xʷ*, which look like heavy reshaping of the same root.

Eyak adds another dimension to the vocalic pattern through the presence of an optional or variable nasal segment in *qu(n)hd*. This raises the possibility that a nasal element was present at a higher proto level and was subsequently lost in most Dene languages, while leaving traces in the form of vowel nasalization in languages such as Jicarilla *kōh*. Under this interpretation, nasalization in a small subset of reflexes may represent the phonetic residue of an earlier segment rather than an independent innovation in each language.

Given the density of [o]-like nuclei across Alaska, Interior Canada, Central BC, Pacific Coast, and Apachean, the safest proto statement is that the inherited vowel was [o] or [u]-adjacent, with predictable branch-level dispersion into [ʊ], [ʌ], [ə], and [u].

4.3.4.3 Final Consonant

Final [t] is the dominant Dene pattern across the dataset, appearing in the overwhelming majority of forms such as *qot*, *kòt*, *kot*, *kót*, *kʰùt*, and many others. Ejective [tʰ] is narrowly distributed, occurring in only four instances: two in Alaska (Ahtna *qotʰ* and Upper Kuskokwim *gatʰ*) and two in the Pacific Coast branch (Hupa *qotʰ* and Kato *qoʊtʰ*). This limited and distribution could potentially supports reconstruction of a plain alveolar stop at the proto level, with ejective realization treated as a localized branch-level outcomes rather than as part of the inherited core pattern. Alongside this, however, an alternative hypothesis can also be noted. It is potentially possible that the highest proto level already contained an ejective alveolar stop, with ejectivity subsequently lost across most of Dene and preserved only in two Alaska languages and two Pacific Coast languages. Under this view, the scattered modern distribution would reflect retention in a small number of conservative pockets rather than independent innovations. While the limited and discontinuous spread makes this scenario less economical, it remains a logical possibility that cannot be fully excluded on the present evidence.

Alongside this, there is a recurring reduction set in Interior Canada: Hare *góʔ*, Mountain *kóʔ*, and zero-coda forms such as Bearlake *kó*, South Slavey *kó*, and Dene Dháh *kó*. These fit a common pattern where a robust final consonant is weakened to a glottal stop in some varieties and then further reduced to zero in others, without needing to assign proto status to the glottal stop itself. Jicarilla *kõh* is another reduced-looking outcome, with nasalization and and aspiration [h] rather than a alveolar stop, and it should be treated as a branch-specific reflex. Eyak is unique in that it shows a voiced alveolar stop in final position, with *Gu(n)hd* ending in [d] rather than the [t] found throughout most of Dene.

Only two cases clearly fall outside what can be plausibly derived from reduction of a final alveolar stop. The Mattole forms *kʷoʔ* and *kʷó:xʷ* introduce additional consonantal material that does not align with weakening or loss of [t], and the Tlingit form *kìy* likewise shows a divergent coda with no clear connection to the dominant Dene pattern. These are best treated as substantial reshaping or possible lexical replacement rather than as straightforward reflexes of the inherited root.

Proto-Yeniseian **bat* is important for the final consonant because it preserves the same final alveolar stop seen in the dominant Dene pattern. Unlike the onset, the coda does not require a special correspondence: Proto-Yeniseian [**t*] aligns directly with the Dene [t] pattern. This makes the final consonant one of the strongest points of the external comparison.

4.3.4.4 Discussion

For the Dene set, the simplest comparative core is a dorsal onset plus an [o]-like vowel plus a final alveolar stop: approximately **Kot*, where [K] stands for a dorsal stop in the [k] ~ [q] range. The distribution of rounded dorsals across multiple distant branches is suggestive, but the dataset also contains many plain [k]-initial forms that are equally widespread. A conservative solution is

therefore to reconstruct a dorsal stop at Proto-Dene with the rounding feature being reconstructed at lower stages.

At the higher level, the presence of a uvular onset [q] in Eyak alongside [q] reflexes in Koyukon and Hupa supports including a uvular within the Proto-Dene-Eyak or even Proto-Na-Dene onset space. For Tlingit, one plausible hypothesis is that a higher-level proto onset included a uvular stop that was not preserved in Tlingit, yielding a plain velar [k] in *kìy*, while Eyak and a subset of Dene languages retained uvular realizations. Under this interpretation, Tlingit would reflect loss of uvularity rather than a separate lexical root, though this remains speculative in the absence of broader correspondence patterns.

Proto-Yeniseian **bat* should be included cautiously. Its final [t] matches the Dene final alveolar stop directly, and its short CV(C) shape is compatible with the Na-Dene forms. The initial [b] is the main obstacle, but it is not without precedent: Vajda discusses limited cases where Ket/Yeniseian labial reflexes may correspond to earlier an earlier Na-Dene velar or uvular (2010: 52-54). This makes a tentative Proto-Dene-Yeniseian comparison possible, though not secure. The highest-level reconstruction may therefore be represented cautiously as Proto-Dene-Yeniseian **Kot*, with the understanding that [K] represents an unresolved dorsal onset [**k*] ~ [**q*], and that Proto-Yeniseian [**b*] would potentially require a labial reflex of that older dorsal consonant.

Table 65. Reconstruction of *KNEE*₁

Proto-Language	Form
Proto-Dene-Yeniseian	*kot ~ *qot ?
Proto-Yeniseian	*bat
Proto-Na-Dene	*qu(n)t ~ qu(n)t' ?
Proto-Dene-Eyak	*qu(n)t ~ qu(n)t' ?
Proto-Dene	*qot' ~ *qot
Proto-Northern-Dene	*qot ~ *qot
Proto-Alaska-Dene	*qot ~ *qot
Proto-Yukon-Dene	*k ^w ət ~ *kot
Proto-Interior-Canada-Dene	*kòt
Proto-Central-BC-Dene	*k ^w ʌt ~ *k ^w ət
Proto-Pacific-Coast-Dene	*qot' ~ *qot
Proto-Apachean-Dene	*kot

4.3.5 Hip

Table 66. *V.SHAPE*

Branch	Language	Form
Alaska	Koyukon	q'əj
Alaska	Dena'ina (Iliamna)	q'əj
Alaska	Upper Tanana	k'ǎjʔ
Yukon	Northern Tutchone	k'ájʔ
Yukon	Tahltan	k'áj
Interior Canada	Kaska (DL)	k'áj
Interior Canada	Kaska (FL)	k'áj
Interior Canada	Kaska (GHL)	k'ǎj
Interior Canada	Kaska (L)	k'ǎj
Interior Canada	Kaska (LL)	k'áj
Interior Canada	Kaska (P)	k'áj
Interior Canada	Kaska (RR)	k'áj
Interior Canada	Mountain	k'àj
Interior Canada	Sekani	k'ǎj
Central BC	Carrier	k'i
Central BC	Witsuwit'en	q'əj
Pacific Coast	Hupa	q'ajʔ
Apachean	Navajo	k'aiʔ
Apachean	Western Apache	k'ai
Apachean	San Carlos Apache	k'ai
Apachean	Mescalero Apache	k'al

Table 67. *Non-Dene HIP*

Branch / Language	Form
Eyak	qe'
Tlingit	q ^h ǎf
Proto-Yeniseian	*kílat / *an / *dǐʔ

4.3.5.1 Initial Consonant

Across Dene, the onset is overwhelmingly an ejective dorsal stop, alternating between velar and uvular places: [k'] (Upper Tanana *k'ǎjʔ*, Northern Tutchone *k'ájʔ*, Kaska varieties *k'áj* and *k'ǎj*, Tahltan *k'áj*, Mountain *k'àj*, Sekani *k'ǎj*, Carrier *k'i*, Navajo *k'aiʔ*, Western Apache *k'ai*, San Carlos Apache *k'ai*, Mescalero Apache *k'al*) versus [q'] (Koyukon *q'əj*, Dena'ina *q'əj*,

Witsuwit'en *q'əj*). Hupa has a non-ejective [q] onset in *q'ajʔ*, which can be treated as a localized reflex within Pacific Coast Dene rather than a separate onset category, given the consistent ejective pattern elsewhere in Dene.

Eyak and Tlingit align well with the Dene pattern, but lack ejectivity. Eyak *qe'* shows a plain uvular stop [q], while Tlingit *q^həʔ* begins with an aspirated uvular stop [q^h]. In both cases, the place of articulation matches the Dene series, but the consonants differ in their phonation type from the ejective [k'] and [q'] that dominate across Dene. On the present evidence, the most that can be said is that a dorsal onset is present across all branches, while the ejective feature itself is securely established only within Dene and cannot be confidently extended beyond it on this dataset alone.

4.3.5.2 Vowel

Across Dene, the core pattern is a low vowel followed by a palatal glide [j], which in many languages is best understood phonetically as a diphthong rather than as a simple vowel plus consonant sequence. Most forms cluster around [a] or [ɑ] before [j]: *k'áj*, *k'ǎj*, *k'aj*, *k'əj*, *q'ajʔ*. In Apachean in particular, forms such as *k'aiʔ*, *k'ai* clearly reflect a diphthongal nucleus [ai].

Other branches show predictable variation around this basic shape. Koyukon *q'əj* has a rounded nucleus [ɔ] before [j], Dena'ina and Witsuwit'en *q'əj*, *q'əj* show centralized vowels, and several Interior Canada varieties display nasalization in *k'ǎj* and *k'ǎjʔ*. Carrier *k'i* is the most divergent form, lacking the glide and showing a high front vowel. Taken together, the most economical reconstruction compatible with the majority of Dene forms is a low vowel nucleus [*a] followed by a palatal glide, with centralized, rounded, nasalized, and monophthongal outcomes treated as later developments within individual branches.

Outside of Dene, Eyak *qe'* shows a simple mid-front vowel without a glide, but a glottal stop, and Tlingit *khâf'* has a low vowel followed by a fricative rather than a palatal element. Neither mirrors the diphthongal structure that dominates within Dene, which further supports treating the diphthong sequence as a Dene-internal pattern.

4.3.5.3 Final Consonant

Within Dene, the dominant ending is a palatal glide [j], which appears across Alaska (*q'ɔj*, *q'əj*), Interior Canada (*k'áj*, *k'ǎj*, *k'əj*), British Columbia (*k'aj*, *q'əj*), Pacific Coast (*q'ajʔ*), and much of Apachean (*k'aiʔ*, *k'ai*). Given how tightly this glide is integrated with the preceding vowel in many branches, especially in Apachean where it clearly forms a diphthongal nucleus [ai], it is difficult to determine whether [j] should be analyzed strictly as a final consonant or as part of the vowel sequence at the proto-level. Regardless of analysis, its broad distribution makes it the most consistent closing element within Dene for this term.

A secondary feature is the intermittent presence of a glottal stop [ʔ] following the glide in several branches, including Upper Tanana (*k'ǎjʔ*), Northern Tutchone (*k'ájʔ*), Hupa (*q'ajʔ*), and Navajo (*k'aiʔ*). Its occurrence across multiple, non-adjacent branches suggests a recurrent development within Dene rather than a purely local anomaly.

Two clear departures from the dominant pattern are geographically restricted. Mescalero Apache *k'al* replaces the expected palatal glide with a lateral [l], and Carrier *k'i* lacks the glide or glottal stop entirely. Neither outcome finds support elsewhere in the family, and both are best treated as localized innovations.

Outside of Dene, Eyak *qe'* ends in a glottal stop [ʔ], while Tlingit *q^hâf'* ends in a sibilant fricative [ʃ]. Neither aligns with the widespread Dene [j] pattern, and on the present evidence there is no straightforward basis for projecting the Dene coda beyond the family itself.

4.3.5.4 Discussion

Within Dene, this lexical set is relatively cohesive: a dorsal ejective onset ([k'] and [q'] in branch-specific distribution), a low vowel nucleus frequently forming a diphthong with a following palatal glide [j]. The recurring but non-uniform appearance of [ʔ] after the glide could suggest secondary developments in multiple branches. On present evidence, a working Proto-Dene form such as **k'aj* captures the dominant pattern without forcing the glottal stop or overcommitting to vowel quality beyond a low nucleus.

At higher levels, the picture is less stable. Eyak *qe'* begins with a plain [q], and Tlingit *q^hâf* begins with [q^h]. In both cases, the place of articulation is uvular rather than velar. This raises the possibility that a uvular stop may predate the Dene-internal distribution of [k'] and [q']. One tentative hypothesis is that a Proto-Na-Dene stage had a uvular onset [**q*], which was preserved as [q] or [q^h] in Eyak and Tlingit, but shifted toward [k] in most Dene branches, with some retaining uvular reflexes. On the present dataset, however, this remains speculative rather than a demonstrated correspondence pattern, since the internal Dene evidence overwhelmingly supports an ejective stop.

Finally, there are three forms proposed by Vajda & Werner (2022) for the meaning 'hip', and these are **kilat*, **an*, and **di[?]*. The form **kilat* is analyzed as a compound, consisting of **ki[?]l* 'thigh' and **a[?]t* 'bone', yielding the compositional meaning 'hip'. While this internal structure is transparent within Yeniseian, it does not correspond structurally to the Dene forms in the present dataset. The other two forms, **an* and **di[?]*, are shorter and do not display any obvious segmental or structural similarity to the Dene reflexes either. Aside from a very general resemblance in the velar onset of **kilat*, there are no consistent correspondences in onset type, vowel configuration,

or final elements. On this basis, these Yeniseian forms cannot be aligned with the Dene set here and do not provide support for a Proto-Dene-Yeniseian reconstruction for this term.

Table 68. Reconstruction of HIP

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*kílat / *an / *d̥iʔ
Proto-Na-Dene	*qaj ~ *q'aj
Proto-Dene-Eyak	*qaj ~ *q'aj
Proto-Dene	*k'aj ~ *q'aj
Proto-Northern-Dene	*q'ajʔ ~ *k'aj
Proto-Alaska-Dene	*q'əj ~ *k'aj
Proto-Yukon-Dene	*k'ájʔ ~ *k'aj
Proto-Interior-Canada-Dene	*k'ǎj ~ *k'aj
Proto-Central-BC-Dene	*q'əj ~ *k'ej
Proto-Pacific-Coast-Dene	*q'ajʔ
Proto-Apachean-Dene	*k'aiʔ ~ *k'ai

4.3.6 Buttocks

Table 69. BUTTOCKS

Branch	Language	Form
Alaska	Koyukon	tɬ'ɒʔ
Alaska	Dena'ina (Iliamna)	tɬ'u
Alaska	Dena'ina (Inland)	tɬ'u
Alaska	Dena'ina (OCI)	tɬ'u
Alaska	Dena'ina (UCI)	tɬ'u
Alaska	Ahtna	tɬ'ɑʔ
Alaska	Holikachuk	tɬ'oʔ
Alaska	Gwich'in (Teetl'it)	tɬ'eʔ
Alaska	Gwich'in (Gwichya)	tɬ'iʔ
Alaska	Hän	tɬ'àʔ
Alaska	Upper Tanana	tɬ'â:ʔ
Alaska	Tanacross	tɬ'aʔ
British Columbia	Northern Tutchone	tɬ'éʔ
British Columbia	Southern Tutchone	tɬ'à
Interior Canada	Kaska (FL)	tɬ'áʔ
Interior Canada	Kaska (GHL)	tɬ'áʔ
Interior Canada	Kaska (L)	tɬ'áʔ
Interior Canada	Kaska (LL)	tɬ'áʔ
Interior Canada	Kaska (P)	tɬ'áʔ
Interior Canada	Kaska (RR)	tɬ'áʔ
Branch Isolate	Tsuut'ina	tɬ'ò
Interior Canada	Hare	tɬ'a
Interior Canada	Mountain	tɬ'áʔ
Interior Canada	Bearlake	tɬ'á
Interior Canada	Tł̥ch̥q̥	tɬ'à
Interior Canada	South Slavey	tɬ'ah
Interior Canada	Dene Sł̥l̥né	tɬ'á
Interior Canada	Dene Dháh	tɬ'á
Central BC	Carrier	tɬ'ɑ
Central BC	Witsuwit'en	tɬ'a
Interior Canada	Sekani	tɬ'âʔ
Central BC	Chilcotin	tɬ'æ
Pacific Coast	Hupa	tɬ'aʔ
Pacific Coast	Kato	tɬ'ɑ
Pacific Coast	Tututni	tɬ'aʔ
Pacific Coast	Mattole	tɬ'áʔ

Apachean	Navajo	t ^h a:ʔ
Apachean	Western Apache	tɬ'a:
Apachean	San Carlos Apache	tɬ'a:ʔ
Apachean	Jicarilla Apache	tɬ'a:
Apachean	Kiowa Apache	tɬ'à:
Apachean	Mescalero Apache	tɬ'a:
Apachean	Lipan Apache	tɬ'a

Table 70. Non-Dene BUTTOCKS

Branch / Language	Form
Eyak	tɬ'A-qa'
Tlingit	qáts
Yeniseian – Ket	ko't
Proto-Yeniseian	*agdes

4.3.6.1 Initial Consonant

Across Dene, the onset is very stable: nearly all varieties show an ejective lateral affricate [tɬ']. This is consistent across all branches, with the main surface divergence being that Navajo has an aspirated lateral affricate [t^h] (*t^ha:ʔ*) rather than the more widespread ejective [tɬ']. Given the density and breadth of [tɬ']-initial forms, the most conservative reconstruction for Proto-Dene is an onset in [tɬ'], with Navajo's [t^h] treated as a branch-level outcome rather than a competing proto-onset.

Eyak aligns cleanly with this Dene onset in the first component of the form: *tɬ'A-*. The shared presence of a [tɬ']-type onset across Dene and Eyak supports reconstructing an ejective lateral affricate [tɬ'] at the Proto-Dene-Eyak level. The second Eyak element *-qa'* is excluded from the consonantal comparison here, as its function and historical relationship to the Dene material remain uncertain.

4.3.6.2 Vowel

The vocalic nucleus in Dene shows a lot more variation, but for the most part, is low and central to back, with the densest cluster around [a] and [ɑ]. This includes a broad run of *tł'a(?)* forms across Interior Canada (Kaska varieties, Hare, Mountain, Tłıchǫ, Dene Sųlíné, Dene Dháh), across Pacific Coast, and in much of Alaska (Tanacross, Upper Tanana, Hän, Ahtna). Several sub-branches also show rounding or raising in the vowel as a surface variant, including Alaska *tł'u* in multiple Dena'ina varieties and *tł'o?* in Holikachuk, alongside fronted realizations like Gwich'in *tł'e?* and *tł'i?*, Northern Tutchone *tł'é?*, and Chilcotin *tł'æ*. Taken together, the safest summary is that Proto-Dene had a low vowel nucleus, reconstructable as [a], with a range of daughter-language outcomes that include rounding, fronting, and backing depending on branch and variety.

4.3.6.3 Final Consonant

Within Dene, the most frequent coda pattern is a glottal stop [ʔ], especially in Alaska and Interior Canada (for example *tł'v?*, *tł'a?*, *tł'o?*, *tł'e?*, *tł'i?*, *tł'a?*), and it also appears in Pacific Coast and several Apachean forms (*tł^ha:?*, *tł'a:?*). At the same time, many languages show either no overt coda at all (*tł'a*, *tł'a*, *tł'ò*) or a final [h] (*tł'ah* in South Slavey). Additionally, particularly in the case of the Apachean branch, there are many instances of no coda, but lengthening of the vowel. The most conservative Proto-Dene coda reconstruction is [ʔ], with repeated later outcomes that include [h] and complete loss.

4.3.6.4 Discussion

The Dene evidence is very clean for this term: a stable onset [tł'], a predominantly low vowel nucleus centered on [a] (with predictable surface diversity), and a frequent glottal stop [ʔ] that alternates with [h] and zero-coda in ways that are typologically ordinary for Dene. Eyak supports

cognacy with Dene specifically in the first component *tl'A-*, and it is therefore appropriate to treat the Dene and Eyak stem material together in the reconstruction procedure. At the same time, the second element *-qa'* in Eyak is uncertain in meaning and function: it is present in a form glossed more broadly than 'buttocks' ('arse, cleft of buttocks, anus'), and at present it is safest to treat *-qa'* as an unanalyzed element appended to the Dene-cognate stem rather than as part of the inherited *tl'a?* material.

Tlingit *káts* and Ket *ko't*, together with Proto-Yeniseian **agdes*, appear to form a plausible comparative set at a higher level (also referenced by Vajda 2010: 18), but their relationship to the Dene-Eyak stem *tl'a(?)* cannot be demonstrated securely on the basis of the present forms. The segmental shape of the Dene-Eyak material differs substantially from the Tlingit-Yeniseian set, and no consistent correspondence pattern presently links the two. One possibility is that the second element of the Eyak form, *-qa'*, rather than the *tl'A-* stem, could be related to the Tlingit-Ket material, solely based on the similarity of the manner of articulation of the onset phonemes [g], [k] and [q]. In the absence of clear segmental alignments and internal analysis of the Eyak form, this connection must remain speculative. The most conservative interpretation is therefore that Dene together with Eyak *tl'A-* constitute a secure cognate set for reconstruction, while Tlingit and Yeniseian represent a separate, possibly cognate set.

Table 71. Reconstruction of BUTTOCKS

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*agdes
Proto-Na-Dene	-
Proto-Dene-Eyak	*tɬ'a(?)
Proto-Dene	*tɬ'aʔ
Proto-Pacific-Coast-Dene	*tɬ'aʔ ~ *tɬ'aʔ
Proto-Apachean-Dene	*tɬ'a:ʔ
Proto-Northern-Dene	*tɬ'aʔ
Proto-Alaska-Dene	*tɬ'aʔ
Proto-Interior-Canada-Dene	*tɬ'aʔ ~ tɬ'áʔ
Proto-BC-Dene	*tɬ'ǎ ~ *tɬ'éʔ
Proto-Central-BC-Dene	*tɬ'a

4.3.7 Thigh

The dataset presented here is more limited in coverage than for many other lexical items in this study, with several languages from a few branches lacking available or comparable forms for this term. Despite this reduced sampling, the attested material remains internally coherent and sufficient for cautious comparative analysis. In addition, a small number of related forms attested with neighboring meanings appear to belong to the same inherited root and are addressed in the Discussion section at the end. This term is glossed as *UPPER.LEG*.

Table 72. *UPPER.LEG*

Branch	Language	Form
Alaska	Deg Xinag	γuθ
Alaska	Koyukon	ɜʊɫ
Alaska	Holikachuk	γuθ
Interior Canada	Kaska (FL)	γos
Interior Canada	Kaska (GHL)	γos
Interior Canada	Kaska (L)	γos
Interior Canada	Kaska (LL)	γos
Interior Canada	Kaska (P)	γos
Interior Canada	Kaska (RR)	γos
Interior Canada	Hare	γoh
Interior Canada	Bearlake	γoh
Interior Canada	Tł̥chq̓	γo
Interior Canada	South Slavey	γoð
Interior Canada	Dene Sų́líné	wo
Interior Canada	Dene Dháh	wous
Interior Canada	Beaver	γoh
Central BC	Carrier	wʌz
Pacific Coast	Kwa-Clat	rús

Table 73. *Non-Dene THIGH*

Branch / Language	Form
Eyak	gʷədə (BUTTOCKS / RUMP)
Tlingit	qáts
Proto-Yeniseian	*ko'd (BUTTOCKS)

4.3.7.1 Initial Consonant

Across the Dene languages, the dominant onset is a voiced dorsal fricative. In Alaska, Deg Xinag *yuθ* and Holikachuk *yuθ* show [ɣ], while Koyukon *ʁʊʔ* reflects the same velar fricative category with a uvular realization [ʁ]. Most Interior Canada varieties also preserve [ɣ] in forms such as *ɣos*, *ɣoh*, *ɣo*, and *ɣoð*. Alongside these, several languages show [w] as the onset: Dene Sų́líné *wo*, Dene Dháh *wous*, and Carrier *waz*. Pacific Coast Kwa-Clat *rúʔs* is the main outlier with [r] in the onset.

Despite the surface diversity, these onsets behave like reflexes of a single inherited slot. They recur with the same general word shape and participate in the same coda patterns, which supports treating them as one cognate set rather than multiple unrelated roots. Tlingit *qáʔs* is important because its initial [q] adds direct support for a uvular or post-velar component in the higher-level comparison. This makes it possible that the Dene [ɣ] and [ʁ] reflexes continue an earlier uvular or post-velar that was later fricativized, while the [w]-initial Dene forms may reflect weakening of an earlier labialized consonant in which only the labial component was preserved.

A plausible higher-level proto-onset is therefore not simply [**ɣʷ*], but something like a labialized uvular or post-velar consonant, perhaps [**qʷ*]. This remains theoretical, but it accounts for the main pieces of the comparison: Tlingit [q], Eyak [*gʷ*] (which will be discussed in detail further in the discussion section below), Dene [ɣ] and [ʁ], and the [w]-initial Dene forms.

4.3.7.2 Vowel

The vowel quality clusters around back rounded vowels. Alaska shows [u] or [ʊ] in *yuθ* and *ʁʊʔ*. Interior Canada overwhelmingly shows [o] in *ɣos*, *ɣoh*, *ɣo*, and *ɣoð*, with Tł̥chq *ɣo* showing an overtly open syllable outcome. Dene Dháh *wous* continues a back rounded nucleus and adds [u] in the second syllable, while Carrier *waz* reflects a more centralized vowel quality. Kwa-Clat *rúʔs* again shows a high back rounded vowel, supporting the overall cohesion of the set.

Tlingit *qáts* differs in showing [a]. At this stage, the safest summary is simply that the Dene set supports a back rounded nucleus ([u] or [o]) with branch-level variation, while Tlingit shows a low vowel in the corresponding position.

4.3.7.3 Final Consonant

Coda behavior is dominated by fricatives, but with substantial place and voicing variation. Deg Xinag and Holikachuk end in [θ], Koyukon ends in [ɬ], Kaska consistently shows [s], Hare, Bearlake, and Beaver show [h], South Slavey has [ð], Carrier has [z], Dene Dháh has [s], and Tłıchǫ *yo* shows no overt coda. These forms point to an inherited fricative or affricate-like coda that was later weakened, voiced, or reduced in different branches.

Within Dene alone, the most conservative reconstruction is a final dental or alveolar fricative, without forcing a single narrow place specification. The recurring [θ], [s], [ð], and [z] outcomes suggest a dental or alveolar fricative, while [h] and zero-coda forms fit naturally as weakened reflexes of the same coda slot. Koyukon [ɬ] is atypical, but it still belongs to the broader fricative pattern and may reflect lateralization of an earlier coda.

Tlingit *qáts* adds an important possibility at the higher level, since its final [ts] preserves an affricate rather than a simple fricative. If the Tlingit form belongs with this set, then the higher-level coda may have been an alveolar affricate, with the Dene fricatives [θ], [s], [ð], and [z] reflecting later weakening or deaffrication. Under this interpretation, the Dene coda was not originally a simple fricative, but became fricative through regular reduction of an older affricate.

Proto-Yeniseian **ko'd* could be interpreted in a similar way if it is included in the broader cognate set. Its final [d] may represent a reduced or voiced reflex of an earlier alveolar affricate or stop-like coda, comparable in broad terms to the reduced [d] proposed for Eyak *gʷədə*. This would connect Tlingit [ts], Dene fricatives, and Eyak/Ket [d] as different outcomes of a higher-level

alveolar coda. However, this remains tentative, since the Dene evidence by itself points most directly to a fricative coda, while the affricate reconstruction depends on accepting the Tlingit and broader semantic comparisons.

4.3.7.4 Discussion

Synchronically, many Dene languages express ‘thigh’ with a compact stem shaped roughly like *yo* plus a final fricative, and the broad distribution of *yo(-s/-h/-ð/θ)*-type forms across Interior Canada supports that as the core of the cognate set. The Alaska forms *yuθ* and the Koyukon *ɣʊʈ* are consistent with the same stem, differing mainly in vowel height and in the specific fricative chosen for the coda.

Additionally, two other relevant Dene forms are discussed by Snoek, which were not part of the main dataset above because they are morphologically expanded expressions rather than simple stem reflexes. These are Tsut’ina *wūs* + *ʃʰū* and Sekani *ɣʷos* + *ʃʰow*, where only the first element corresponds to the inherited UPPER.LEG base and the second element is an added qualifier. Snoek’s analysis is that these languages lexicalize ‘thigh’ through the pattern UPPER.LEG-BIG, with BIG expressed by *ʃʰo:* or a cognate. He further proposes a specific motivation for this structure: the older UPPER.LEG cognates (*wūs*, *ɣʷos*) underwent a semantic shift away from specifically denoting ‘thigh’ and generalized toward ‘leg’, and the modifier BIG was then required to recover the meaning of ‘thigh’. In Sekani, *ɣʷos* no longer exists as an independent lexeme and ‘leg’ is instead encoded by BONE, which is interpreted as evidence of the relative ordering of semantic shifts in those languages (2015: 200).

These expanded forms are important because they show that the Dene evidence is not limited to the simple [*yo-*] forms in the main dataset. Tsut’ina *wūs* and Sekani *ɣʷos* preserve the same general lexical base but with different outcomes in the onset slot: Tsut’ina shows [*w*], while

Sekani preserves an explicitly labialized velar [ɣ^w]. This helps frame the main comparative problem. Within Dene, the inherited onset appears to have been dorsal, but its reflexes range from [ɣ] and [ɣ̥] to [w], with Kwa-Clat [r] as a more divergent outcome. A labialized dorsal source is therefore plausible within Dene itself, since it would explain why some forms preserve a fricative while others preserve mainly the labial component.

Eyak enters the discussion because in Vajda explicitly connects forms from this same semantic domain to higher-level reconstructions that are relevant for interpreting the Dene onset variation. The Eyak dictionary lists *la:n* 'for 'thigh', a form that does not obviously align with the Dene [ɣo-] stem. In addition to this, however, Vajda cites an Eyak form *g^wədə* meaning 'rump' and, in the same comparative framework, reconstructs a Proto-Dene form **g^wa:də* with the meaning 'lower leg, shin' (2010: 49). Considered together, these items place a labialized velar onset directly within the same lower-body semantic field as 'thigh'.

Tlingit *qáts* adds another piece to the comparison. Unlike the Dene forms with [ɣ], [ɣ̥], or [w], Tlingit preserves an initial uvular stop [q]. This does not by itself prove that the higher-level onset was uvular, but it does make a uvular or post-velar source more plausible. When combined with the labialized velar material in Sekani *ɣ^wos* and Eyak *g^wədə*, a possible interpretation could be that the higher-level onset was a labialized uvular or post-velar consonant, perhaps [**q^w*]. Under this hypothesis, Tlingit [q] would preserve the uvular component, Eyak [g^w] and Sekani [ɣ^w] would preserve labialized velar articulation, Dene [ɣ] and [ɣ̥] would reflect fricativized velar or uvular outcomes, and Dene [w] would reflect loss of the dorsal component with retention of labialization. This connects the uvular, labialized, fricative, and [w]-initial reflexes, rather than treating them as separate roots.

The comparison between Dene and Eyak already points toward a broader semantic instability in this lexical domain. The same material appears associated with meanings such as ‘thigh’, ‘upper leg’, ‘lower leg’, and ‘rump’, which suggests that a single inherited root may have been redistributed or reinterpreted differently across branches rather than replaced in each case. The Yeniseian evidence must be considered separately, because the primary Proto-Yeniseian reconstructions for ‘thigh’ do not resemble the Dene stem at all. The Vajda-Werner Comparative-Historical Yeniseian Dictionary gives three Proto-Yeniseian reconstructions for ‘thigh’: **an*, **kilaʔt*, and **pʰap*. None of these forms shows a dorsal-plus-rounded onset comparable to the Dene [ɣo]-set. On the surface, this suggests that the Dene stem has no direct formal match in Proto-Yeniseian under the meaning ‘thigh’.

However, Vajda also proposes that Proto-Yeniseian **koʔd* ‘buttocks’ is cognate with the Proto-Dene ‘lower leg, shin’ reconstruction **gʷa:də*. When this claim is placed alongside the Dene material and the Eyak *gʷədə* ‘rump’, a different possibility emerges (2010: 49). Rather than expecting Proto-Yeniseian ‘thigh’ to resemble the Dene stem, it may be that the relevant cognate in Yeniseian survives under a neighboring meaning within the same anatomical domain. In that case, a single higher-level root could have existed in the semantic field ‘upper leg / thigh / rump / buttocks’, with subsequent relexicalization occurring independently in different branches. Under such a hypothesis, Dene languages would have preserved the stem primarily with the meaning ‘thigh’, Eyak would show partial redistribution across ‘thigh’ and ‘rump’, and Yeniseian would retain a reflex with the meaning ‘buttocks’, while replacing the inherited item for ‘thigh’ with unrelated lexemes. If Proto-Yeniseian **koʔd* is included in the cognate set, its initial velar [k] can be interpreted as part of the same velar onset complex. It may reflect a weakened or fronted

outcome of an earlier uvular or post-velar onset, especially if the higher-level root had a labialized uvular shape such as [$*q^w$].

Table 74. Reconstruction of THIGH

Proto-Language	Form
Proto-Dene-Yeniseian	$*q^w a:d \sim *q^w a:ds \sim *q^w a:ts$
Proto-Yeniseian	$*ko'd$
Proto-Na-Dene	$*q^w a:də \sim *q^w a:ts$
Proto-Dene-Eyak	$*g^w a:də$
Proto-Dene	$*g^w a:də$
Proto-Northern-Dene	$*\gamma^w os \sim * \gamma^w o\delta$
Proto-Alaska-Dene	$*\gamma u\theta$
Proto-Yukon-Dene	-
Proto-Interior-Canada-Dene	$*\gamma o\delta \sim * \gamma^w o\delta \sim * \gamma^w os$
Proto-Central-BC-Dene	$*w\Lambda z$
Proto-Pacific-Coast-Dene	$*r\acute{u}s$
Proto-Apachean-Dene	-

4.3.8 Foot

Table 75. FOOT

Branch	Language	Form
Alaska	Deg Xinag	q ^h a?
Alaska	Koyukon	qa
Alaska	Dena'ina (Inland)	qa
Alaska	Dena'ina (UCI)	qa
Alaska	Ahtna	k'a?
Alaska	Holikachuk	q ^h a?
Alaska	Gwich'in (Teetl'it)	k ^h ai?
Alaska	Gwich'in (Gwichya)	k ^h ai?
Alaska	Hän	k ^h è?
Alaska	Lower Tanana	k ^h a?
Alaska	Upper Kuskokwim	k ^h a?
Alaska	Upper Tanana	k ^h è?
Alaska	Tanacross	k ^h e?
Yukon	Northern Tutchone	k ^h i?
Yukon	Southern Tutchone	k ^h è
Yukon	Tahltan	k ^h ε?
BranchIsolate1	Tagish	ki?
BranchIsolate2	Ts'ets'aut	kia
Interior Canada	Kaska (DL)	k ^h é?
Interior Canada	Kaska (FL)	k ^h é?
Interior Canada	Kaska (GHL)	k ^h é?
Interior Canada	Kaska (L)	k ^h é?
Interior Canada	Kaska (LL)	k ^h é?
Interior Canada	Kaska (P)	k ^h é?
Interior Canada	Kaska (RR)	k ^h é?
Interior Canada	Hare	kie
Interior Canada	Mountain	k ^h é?
Interior Canada	Bearlake	k ^h é:?
Interior Canada	T̥hçq̣	kè
Interior Canada	South Slavey	k ^h é
Interior Canada	Dene S̥łiné	k ^h e
Interior Canada	Dene Dháh	k ^h é
Interior Canada	Beaver	k ^h ε?
Interior Canada	Sekani	k ^h è?
Central BC	Carrier	k ^h e
Central BC	Witsuwit'en	q ^h e

Central BC	Chilcotin	ké
BranchIsolate3	Tsuut'ina	k ^h à
Pacific Coast	Hupa	xeʔ
Pacific Coast	Kato	k ^w εʔ
Pacific Coast	Tolowa	x ^w eʔ
Pacific Coast	Tututni	xeʔ
Pacific Coast	Mattole	k ^x εʔ
Pacific Coast	Wailaki	k ^h éh
Pacific Coast	Kwa-Clat	k ^w εʔ
Apachean	Navajo	k ^x e:ʔ
Apachean	Western A.	k ^h eeʔ
Apachean	S. Carlos A.	k ^h e:ʔ
Apachean	Jicarilla A.	k ^h ě, k ^h e:
Apachean	Kiowa A.	ʃè:
Apachean	Mescalero A.	k ^h e:
Apachean	Lipan A.	k ^h ε

Table 76. Non-Dene FOOT

Branch / Language	Form
Eyak	k'ahʃ
Tlingit	χ'ùs
Proto-Yeniseian	*ki's'

4.3.8.1 Initial Consonant

Across all branches, the word for ‘foot’ begins with a dorsal consonant, though its exact articulation varies by branch. In Northern Dene (Alaska, Yukon, British Columbia, etc.), we typically see aspirated velars or uvulars, as in Gwich'in *k^haiʔ*, Tanacross *k^heʔ*, and the uvular *q^haʔ* in Deg Xinag and Holikachuk. This alternation between velar and uvular stops aligns with vowel conditioning: front vowels favor velarization [k^he], while low or back vowels support uvulars [q^ha]. Pacific Coast Dene presents a different picture, with some languages showing velar fricatives (Hupa *xeʔ*, Tututni *xeʔ*) and others preserving a labialized velar stop (Kato *k^wεʔ*, Kwa-Clat *k^wεʔ*) or even a labialized velar fricative (Tolowa *x^weʔ*). These Pacific Coast forms are important because they reflect rounding on the consonant. This is a feature that is not present in most interior Dene

languages, and their geographic separation strongly suggests that labialization is a retention rather than a series of independent innovations. The Eyak and Tlingit data provide crucial evidence for glottalization. Eyak *k'ahf* contains an ejective stop, however, Krauss also notes that there exists an earlier form *k'wahš*, which shows labialization and ejective articulation together (Krauss 1970: 1249; Krauss 1970a: 697). Tlingit *χ'ùs* contains an ejective fricative onset and thus also points to a glottalized proto-initial consonant that subsequently fricativized. This converging evidence indicates that Proto-Dene-Eyak and Proto-Na-Dene likely had a glottalized uvular stop, probably an ejective uvular [q'] or ejective labialized uvular [qʷ']. The presence of ejectives in Tlingit and Eyak contrasts with the aspirated reflexes in Dene, but this contrast is expected, as there is evidence of deglottalization in initial position in Dene languages (Nikolaev 2014: 111). Additionally, such deglottalization is known to produce tone contrasts. Many Dene reflexes of 'foot' exhibit tonal traces of an earlier ejective (e.g., Hän *kʰè?*, Southern Tutchone *kʰè* with low tone, versus Chilcotin *ké* or South Slavey *kʰé* with high tone). This distribution fits the standard tonogenetic consequences of lost ejectives (Rice & Hargus 2005: 8-10). Finally, the uvular vs. velar alternation across the family suggests that the proto-consonant was likely uvular, with later fronting in some branches. Because labialization appears both in Pacific Coast Dene and in early Eyak, two widely separated lineages, the simplest reconstruction is that Proto-Na-Dene had a labialized ejective uvular: [*qʷ']. Interior Dene languages subsequently lost the labialization ([qʷ'] > [q'] > [qʰ] / [kʰ]), while Eyak retained it for some period, Pacific Coast preserved it overtly, and Tlingit absorbed the rounding into the following vowel.

A concise chain of developments explains most daughter reflexes:

- [$*q^w$] > lenited to [χ] in Tlingit
- [$*q^w$] > [k^h] / [q^h] in most Northern Dene and Southern Dene (loss of glottalization + partial fronting)
- [$*q^w$] > [k^w] / [x^w] in Pacific Coast Dene (labialization retained)
- [q^w] > [k^h] in Proto-Yeniseian (per Vajda's $*-k^hiʔs$: labialization and glottalization not preserved > aspiration)

4.3.8.2 Vowel

The vowels across the family show a relatively consistent front mid vowel [e] in most Dene languages ($k^heʔ$), a low or back vowel [a] in some Alaska branches ($q^haʔ$), [a] in Eyak ($k'ahf$), and a rounded back vowel [u] in Tlingit ($\chi'us$). These are not random differences. The widespread Dene [e] likely descends from a central proto-vowel [$*ə$] or [$*e$], while the Alaskan [a] reflexes reflect uvular conditioning, whereby uvulars trigger vowel lowering/backing. In Eyak, the vowel has shifted to [a]. The Tlingit [u] is especially revealing: Tlingit vowels are frequently reshaped by the presence of labialized consonants, and Nikolaev notes that neutral proto-vowels regularly become [u] under the influence of labialization in Tlingit, Eyak, and even some Dene languages (2014: 105). This makes the Tlingit vowel a predictable development from Proto-Na-Dene $q^w'as$, where [$ə$] was rounded to [u] after [q^w]. Because most interior Dene languages lost the [w]-feature early, their vowels reflect the unrounded form (k^he), whereas Tlingit retained the rounding effect on the vowel even as the consonant fricativized. Additionally, Hargus suggests that uvular consonants correlate with vowel lowering and backing, and that velar vs. uvular distinctions may be conditioned in part by vowel height or backness (2010: 51). The vowel correspondences across

Dene, Eyak, Tlingit all point back to a central proto-vowel [$*ə$] or [$*e$], which underwent lowering in uvular contexts, rounding in Tlingit due to [q^w]. Proto-Yeniseian $*-k^hiʔs$ represents the expected fronting of a central proto-vowel to [i]. Thus, the comparative evidence consistently points to a central proto-vowel [$*ə$] or [$*e$] subject to independent rounding, fronting, or lowering depending on the branch.

4.3.8.3 Final Consonant

The final consonant also shows a strong and revealing split between branches. Tlingit $\chi'ùs$ ends in [s], Eyak $k'ahf$ ends in [f], and Proto-Yeniseian $*-k^hiʔs$ ends in [s], while nearly all Dene languages have no audible final fricative: most end in a glottal stop ($k^heʔ$), a weak fricative ($k^héh$), or nothing at all ($k^hè$). Tlingit and Eyak preserve final consonants, whereas Proto-Dene eliminated many of them, especially fricatives, or replaced them with glottal stops. Nikolaev notes that Proto-Na-Dene roots are regularly CVC, but their Proto-Dene counterparts are often CV because of final consonant loss, especially when it comes to [$*s$]~[$*z$] type fricatives in final position (2014: 104-106). Under this interpretation, the final segments found in Tlingit, Eyak, and Proto-Yeniseian represent the conservative state, and the Dene glottal stops or zero reflect expected innovations from losing [s]. This accounts for Dene reflexes such as Tanacross $k^heʔ$ (glottal stop directly continuing older [s]), Wailaki $k^héh$ (weakened fricative before loss), and Southern Tutchone $k^hè$ (full loss with compensatory tone or length). The cross-family comparison therefore requires reconstructing a final [$*s$] for Proto-Na-Dene (and Proto-Dene-Yeniseian). The perfect alignment of Tlingit [s], Eyak [f], and Proto-Yeniseian [s] makes this reconstruction particularly strong, and the typologically common shift [s] > [$ʔ$] / [h] / [$\emptyset$] explains every Dene reflex.

4.3.8.4 Discussion

When we combine (1) the glottalized and often labialized dorsal onset, (2) the central proto-vowel that becomes fronted, lowered, or rounded depending on branch-specific conditions, and (3) the final [s], the comparative evidence converges neatly on a Proto-Na-Dene form $*q^{w'}\acute{a}s \sim *q^{w'}es$. This proto-form simultaneously accounts for Tlingit's rounded back vowel (from assimilation to [q^{w'}]), Eyak's glottalized velar and preserved fricative coda, Pacific Coast Dene's retention of labialization, and the Northern and Interior Dene pattern of aspirated velars with tonal traces of lost ejectives. Importantly, this same structure aligns well with Vajda's Proto-Yeniseian reconstruction $*-k^hi\eta s$, which preserves the features we would expect under a Dene-Yeniseian comparison: a velar stop, loss of ejective articulation (turning into aspiration), loss of labialization, predictable fronting of a central vowel ([ə] > [i]), and full retention of final [s]. Because the Proto-Yeniseian form independently preserves both the velar onset and the coda [s], yet lacks labialization, it naturally corresponds to a Proto-Dene-Yeniseian $*q^{w'}es \sim *q'es$, where the variant without [w] reflects the expected Yeniseian simplification and the variant with [w] reflects the conservative Na-Dene stage.

Table 77. Reconstruction of FOOT

Proto-Language	Form
Proto-Dene-Yeniseian	$*q^{w'}es \sim *q'es$
Proto-Yeniseian	$*k^hi\eta s$
Proto-Na-Dene	$*q^{w'}es$
Proto-Dene-Eyak	$*k^{w'}e\eta s \sim *q^{w'}es$
Proto-Dene	$*q^he\eta$
Proto-Northern-Dene	$*k^he\eta \sim *q^ha\eta$
Proto-Alaska-Dene	$*q^ha\eta$
Proto-Yukon-Dene	$*k^he\eta$
Proto-Interior-Canada-Dene	$*k^he\eta$
Proto-Central-BC-Dene	$*q^he\eta$
Proto-Pacific-Coast-Dene	$*k^we\eta$
Proto-Apachean-Dene	$*k^he:\eta$

4.4 Torso and internal organs

4.4.1 Stomach

The meaning ‘stomach’ is not lexically uniform across the Dene family. As Snoek notes, the lower portion of the upper body: the ‘belly’ or ‘stomach’, is lexicalized through several different terms, and in some languages a distinction is made between the ‘inner stomach’ and the ‘outer stomach’ (2015: 148). The present dataset concerns specifically the ‘outer stomach’, since that is the category for which the comparative evidence is much fuller.

Table 78. STOMACH.OUTER₁

Branch	Language	Form
Alaska	Deg Xinag	vit
Alaska	Koyukon	pət
Alaska	Dena’ina (Iliamna)	vet
Alaska	Dena’ina (Inland)	vet
Alaska	Dena’ina (OCI)	vet
Alaska	Dena’ina (UCI)	vet
Alaska	Ahtna	pət’
Alaska	Gwich’in (Teetl’it)	vat
Alaska	Hän	pət
Alaska	Lower Tanana	pet
Alaska	Upper Kuskokwim	mit’
Alaska	Tanacross	met
Yukon	Northern Tutchone	bát
Yukon	Southern Tutchone	mpət
Yukon	Tahltan	pət
BranchIsolate1	Tagish	mbət
BranchIsolate2	Ts’ets’aut	bɛ
Interior Canada	Kaska (DL)	bét
Interior Canada	Kaska (FL)	bét
Interior Canada	Kaska (GHL)	bát
Interior Canada	Kaska (L)	bát
Interior Canada	Kaska (LL)	bét
Interior Canada	Kaska (P)	bét

Interior Canada	Kaska (RR)	bát
Interior Canada	Hare	pé?
Interior Canada	Mountain	bé?
Interior Canada	Bearlake	pé
Interior Canada	Tłchq	bò, mbò
Interior Canada	South Slavey	mpé
Interior Canada	Dene Słłné	pér
Interior Canada	Dene Dháh	pé
Interior Canada	Beaver	bat
Interior Canada	Sekani	pàt
Central BC	Carrier	płt'
Central BC	Witsuwit'en	pət
Central BC	Chilcotin	bát
BranchIsolate3	Tsuut'ina	mí
Pacific Coast	Hupa	mit'
Pacific Coast	Galice	pai?
Pacific Coast	Kato	płt'
Apachean	Navajo	bit
Apachean	Western A.	pit
Apachean	S. Carlos A.	pit
Apachean	Jicarilla A.	bi
Apachean	Kiowa A.	bìt

Table 79. Non-Dene STOMACH

Branch / Language	Form
Eyak	wut'
Tlingit	hú
Proto-Yeniseian	*p ^h ūj

4.4.1.1 Initial Consonant

At first glance, the Dene data seem to favor reconstruction of a labial stop at the Proto-Dene level, since the great majority of the forms begin with [p], [b], [m], [mb], or [v]. On a purely surface reading of the Dene daughter languages, a reconstruction such as [*p] or [*b] would therefore appear natural. That impression is strengthened by the fact that Proto-Yeniseian *p^hūj also begins

with a labial stop, while Eyak *wut*’ and the Tlingit *hú* seem at first to stand apart from the dominant Dene pattern.

However, the comparative literature points in a different direction. Krauss and Leer reconstruct this stem with initial [**w*], and they explicitly note that Proto-Dene [**w*] shows a strong tendency toward occlusivization, especially to [*m*] and [*b*]. Stem-initial [*w*] only appears in Eyak and in two extinct Dene varieties (Kwalthioqua-Tlatskanai and the Seldovia dialect of Tanaina). They further note that in languages such as Tanacross, Northern Tutchone, Southern Tutchone, Tagish, Slavey, and Tłıchǫ, Proto-Dene [**w*] yields prenasalized and nasalized reflexes such as [*mb*], [*b^m*], and [*m^b*] (1981: 6). This observation is highly relevant here, because exactly those kinds of reflexes are prominent in the present dataset. With that in mind, the modern Dene initials do not have to be treated as evidence against an earlier [**w*]. On the contrary, much of the observed variation can be interpreted as the expected outcome of an inherited labial sonorant that became increasingly occlusive in many branches. Forms in [*m*], [*mb*], and [*b*] fit Krauss and Leer’s pathway directly, while [*v*] can be understood as another labial reflex within the same phonemic range. Under that interpretation, the widespread stop-like and nasal-like initials in the daughter languages do not require reconstruction of an original stop at Proto-Dene, but may instead reflect secondary developments from the earlier [**w*]. Eyak is particularly important because it preserves precisely the initial [*w*] that Krauss and Leer describe as otherwise largely lost stem-initially in Dene.

Vajda adds a further comparative dimension by connecting Dene-Eyak [**w*] with Tlingit [*h*] and Yeniseian reflexes. In his interpretation, Dene-Eyak [**w*] may reflect either an older sonorant [**w*] or the reduction of an earlier Proto-Na-Dene fricative [**h^w*] in cases where Tlingit shows [*h*], specifically including the word *hú* ‘stomach’ (2010: 19, 37). This is important because

it offers a way to relate the otherwise divergent Tlingit material to the Dene-Eyak forms without requiring Tlingit to preserve the same surface labial consonant.

Taken together, this evidence suggests a more complex but more persuasive pathway. At the deeper stage, there may have indeed been an initial labial stop or aspirated labial stop, as the Proto-Yeniseian form **p^hūj* might suggest. From there, an earlier Proto-Na-Dene stage may have developed a fricative or fricative-like labialized onset such as [**h^w*], as proposed by Vajda. In the Tlingit branch, that fricative could have remained [h], while in Dene-Eyak it may have reduced further to [**w*]. From that point, Eyak retained [w], whereas much of Dene shifted the [**w*] toward more occlusive reflexes such as [m], [mb], [b], [v], and [p]. Even if every step of that pathway cannot be proven conclusively from this dataset alone, it accounts for the total distribution much better than a simple Proto-Dene stop reconstruction.

4.4.1.2 Vowel

The vowel correspondences are relatively straightforward. Within Dene itself, the accepted reconstruction in both Vajda and Krauss and Leer is **wəɬ*’, so at the Proto-Dene level the vowel can be taken as [**ə*]. The modern Dene languages show a range of reflexes such as [ə], [e], [ɛ], [a], and [i], but these can be understood as later developments from that earlier central vowel. At the same time, the non-Dene comparanda point in a different direction at the higher levels. Eyak *wut*’ has [u], the Tlingit form cited by Vajda likewise has [u], and Proto-Yeniseian **p^hūj* also points to a close back or central high vowel. Since all three of those higher comparanda align in showing a [u]-like vowel, a plausible interpretation is that Proto-Dene-Eyak, Proto-Na-Dene, and possibly even Proto-Dene-Yeniseian had a high vowel such as [**u*] or [**ʉ*], which later became centralized to [**ə*] in Proto-Dene.

4.4.1.3 Final Consonant

The final consonant is one of the strongest pieces of evidence in the set. Across most of Dene, the stem ends in an alveolar stop: usually [t], and in some languages [t'], while a smaller number of forms show reduction or loss of that final segment. The broad distribution of *vit*, *pət*, *vet*, *vat*, *pət*, *pet*, *met*, *bát*, *bét*, *pet*, *bat*, *pət'*, *pət*, *bát*, *bit*, *pit*, and *bìt* strongly supports reconstruction of a final alveolar stop for Proto-Dene.

Some languages show reduced reflexes. Several languages show reduction or loss of the original final consonant. Hare *péʔ* and Mountain *béʔ* suggest weakening of an earlier coda, while Bearlake *pé*, South Slavey *mpé*, Dene Dháh *pé*, Jicarilla Apache *bi*, and Tsuut'ina *mí* no longer preserve an overt final consonant at all. Dene Sųliné *pár* is more divergent, but within the broader pattern it is easier to interpret as a secondary development than as evidence against an earlier final alveolar stop.

Ahtna *pət'*, Upper Kuskokwim *mit'*, Carrier *pət'*, Hupa *mit'*, and Kato *pət'* show that ejective articulation is present across more than one branch, and Eyak *wut'* is especially important because it preserves the same general ejective final as well. That distribution makes it quite plausible that the older form had an ejective alveolar stop, which was later reduced in many Dene languages to plain [t], further weakened to [ʔ], or lost altogether. Since de-ejectivization and coda reduction are both straightforward ways of accounting for the wider set of reflexes, this explanation is more persuasive than assuming several independent innovations of ejective [t'] in separate branches. On that basis, the final consonant can reasonably be reconstructed at least as a alveolar stop, with [t'] a strong possibility for the older stage, especially once Eyak is taken into account.

Proto-Yeniseian **p^hūj*, by contrast, does not match the Dene-Eyak final stop directly, since it ends in a glide-like element rather than an overt stop. Even so, that does not necessarily rule out

a deeper connection. Krauss and Leer’s reconstruction of Proto-Dene **wət*’ also points in the same direction, since it explicitly includes a final ejective stop. At first sight, Proto-Yeniseian **pʰūj* seems harder to reconcile with that pattern, because it ends in a glide rather than a stop. However, that mismatch need not be decisive. If the Yeniseian glide reflects reduction of an earlier final consonant, then Proto-Dene-Yeniseian may still have had a final stop, most plausibly [**t*’], which was preserved in Dene-Eyak but weakened on the Yeniseian side to a glide-like reflex by the Proto-Yeniseian stage. Under that interpretation, the Dene and Eyak forms preserve the older coda more directly, while Proto-Yeniseian reflects a later reduced outcome. This remains somewhat tentative, but it provides a coherent way of aligning the Dene-Eyak coda with the Yeniseian evidence rather than treating them as incompatible.

4.4.1.4 Additional remarks

A slight complication comes from the Tlingit evidence. Various Tlingit dictionaries list several forms with adjacent meanings such as ‘stomach’, ‘belly’, or ‘abdomen’: *yoowú* ‘stomach’, *yoowá* ‘abdomen, belly’, *dáali* ‘rumen, stomach, tripe’, and *χ’u:l* ‘belly’. None of these aligns convincingly with the cognate set under discussion. At the same time, Vajda explicitly cites a Tlingit form *hú* for ‘stomach’, and it is this form that underlies the higher-level comparison outlined above. That is clearly useful for the comparative argument, since it fits the proposed connection with Tlingit [h]. However, it also creates some uncertainty because this form has not been located in the modern dictionaries consulted here. For the sake of consistency, as well as considering the Dene, Eyak and Yeniseian evidence as a whole, the present discussion follows Vajda’s form, while noting that the lexical source of Tlingit *hú* remains unclear.

Table 80. Reconstruction of *STOMACH.OUTER*₁

Language	Form
Proto-Dene-Yeniseian	*p ^h ut' ~ *p ^{hw} ut'
Proto-Yeniseian	*p ^h ūj
Proto-Na-Dene	*h ^w ut'
Proto-Dene-Eyak	*wut'
Proto-Dene	*wət'
Proto-Northern-Dene	*pət
Proto-Alaska-Dene	*pət
Proto-Yukon-Dene	*bət ~ *pət
Proto-Interior-Canada-Dene	*pət
Proto-Central-BC-Dene	*pət'
Proto-Pacific-Coast-Dene	*mət' ~ *pət' ~ *mpət'
Proto-Apachean-Dene	*pit

4.4.2 Ribs

Snoek separates the material for ‘ribs’ into two main closely related cognate sets, distinguished not by the main lexical stem itself, but by the presence or absence of an additional final element. The first set is glossed as ABDOMINAL.VISCERA-ON. In this pattern, the term consists of a stem meaning ‘abdominal viscera’ followed by a postpositional element meaning ‘on’, as in Ahtna *kʰa:q*, which Kari analyzes as *kʰa:n* ‘viscera’ plus *-q* ‘on’. The second set is glossed simply as ABDOMINAL.VISCERA. In this pattern, the same abdominal-viscera stem directly encodes the referent ‘ribs’ through semantic extension, without the additional postpositional element (2015: 151-152). For the purposes of reconstruction, these two sets should therefore be treated as one cognate complex at the level of the main stem, while the extra final material in the first set must be treated separately as an attached postpositional element rather than as part of the inherited root. Eyak *dla:si:nd* and Proto-Yeniseian **ulet* are formally too different from the Dene abdominal-viscera stem to be relevant for reconstruction. Tlingit *s’ûkh* appears somewhat comparable at first glance, but the evidence is not clear enough to include it securely in the reconstruction.

Table 81. ABDOMINAL.VISCERA-ON

Branch	Language	Form
Alaska	Deg Xinag	ʃʰoq
Alaska	Koyukon	kʰɔqʰ
Alaska	Dena’ina (Iliamna)	kʰaqʰ
Alaska	Dena’ina (Inland)	kʰaqʰ
Alaska	Dena’ina (OCI)	kʰaqʰ
Alaska	Dena’ina (UCI)	kʰaqʰ
Alaska	Ahtna	kʰa:q
Alaska	Gwich’in (Teetl’it)	ʃʰik
Alaska	Gwich’in (Gwichya)	ʃʰik
Alaska	Lower Tanana	ʃʰok
Alaska	Upper Kuskokwim	ʃʰokʰ

Alaska	Upper Tanana	ʃ ^h ã:k
Yukon	Tahltan	ʃ ^h ɑ:k
BranchIsolate1	Tagish	ʃ ^h ãk
Interior Canada	Kaska (GHL)	ʃ ^h o:k
Interior Canada	Kaska (L)	ʃ ^h õ:k
Interior Canada	Kaska (LL)	ʃ ^h õ:w
Interior Canada	Kaska (P)	ʃ ^h ā:k
Interior Canada	Kaska (RR)	ʃ ^h ā:k
Interior Canada	Dene Dháh	ʃ ^h onk
Interior Canada	Beaver	ʃ ^h ouŋk
Interior Canada	Sekani	ʃ ^h ow
Central BC	Witsuwit'en	kiaq
BranchIsolate3	Tsuut'ina	ʃ ^h ak'
Pacific Coast	Galice	k ^h ã:k'ɑɪ?
Pacific Coast	Kato	k ^w ɑpk ^h ɛ
Pacific Coast	Tolowa	xak'e?
Pacific Coast	Kwa-Clat	tcā'.kɛ
Apachean	Navajo	ts ^h ã:?
Apachean	Western A.	ts ^h át
Apachean	S. Carlos A.	ts ^h át
Apachean	Jicarilla A.	ts ^h áké:
Apachean	Kiowa A.	ʃ ^h õ:k
Apachean	Lipan A.	ʃ ^h hõ

Table 82. ABDOMINAL, VISCERA

Branch	Language	Form
Yukon	Northern Tutchone	ʃ ^h á:n?
Yukon	Southern Tutchone	ʃɪ
BranchIsolate2	Ts'ets'aut	ʃ ^h á:?
Interior Canada	Hare	ʃ ^h õ?
Interior Canada	Mountain	ʃ ^h õ
Interior Canada	Tłchq	ʃ ^h õ:
Interior Canada	South Slavey	ʃ ^h õ:
Interior Canada	Dene Sųłiné	ʃ ^h õ
Central BC	Carrier	ʃ ^h ɑ
Central BC	Chilcotin	ʃ ^h ɛ
Pacific Coast	Tututni	ʃ ^h ɑ:'

Table 83. Non-Dene ABDOMINAL.VISCERA (RIBS)

Branch / Language	Form
Eyak	-
Tlingit	s'ûkh
Proto-Yeniseian	-

4.4.2.1 Initial Consonant

The Dene material shows three main types of initial consonants: aspirated velars such as Koyukon *kʰvqʼ*, Dena'ina *kʰaqʼ*, Ahtna *kʰa:q*, Galice *kʰã:k'aiʔ*; aspirated or voiced postalveolar affricates such as Deg Xinag *ʃʰoq*, Upper Kuskokwim *ʃʰokʼ*, Kaska *ʃʰo:k*, Tahltan *ʃʰa:k*, Dene Dháh *ʃʰonk*, Mountain *ʃʰõ*, and Tututni *ʃʰa:ʼ*; and alveolar affricates such as Navajo *tsʰã:ʔ*, Western Apache *tsʰát*, San Carlos Apache *tsʰát*, and Jicarilla Apache *tsʰáké:*. This is the correspondence pattern identified by Snoek as $[k^h] = [tʃ^h] = [ts^h]$ within the larger cognate set.

At the same time, the dataset is not limited to these three onset types, as several languages show additional or reduced reflexes. Witsuwit'en *kʰaq* has an palatalized voiced velar $[kʲ]$. Kato *kʷaŋkʰɛ* has a labialized voiced velar $[k^w]$. Tolowa *xak'eʔ* has a velar fricative $[x]$. Kwa-Clat *tcā'.ke* has an unaspirated affricate-like onset. Southern Tutchone *ʃĩ* and Hare *ʃõʔ* have fricative $[ʃ]$. In addition, some forms show non-aspirated counterparts of the more common onset types, such as Lower Tanana *ʃok*, Gwich'in *ʃik*, Kiowa Apache *ʃõ:k*, Tłıchǫ *ʃõ:*, Dene Sųlíné *ʃõ*, Chilcotin *ʃẽ*. These forms do not overturn the main correspondence pattern, but they show that the onset has undergone additional local developments.

Tlingit *s'ûkh* should not be used as secure evidence that the cognate complex extends beyond Dene. Its initial $[sʰ]$ is superficially comparable to the affricate and sibilant side of the Dene evidence, especially the $[ts^h]$ and $[tʃ^h]$ reflexes, but the match is not strong enough to carry the reconstruction. For this reason, the initial consonant is best reconstructed from the Dene

evidence alone, while the Tlingit form can only be mentioned as a possible but uncertain comparison.

At the Proto-Dene level, the most reasonable reconstruction is an aspirated affricate initial, probably [$*tʰ$]. This is not because every form directly preserves [$tʰ$], but because the affricate and affricate-derived reflexes are the most widely distributed across the dataset, including [$tʰ$], [$tʃ$], [$tsʰ$], [ts], [c], and [$ʃ$]. The velar forms in Alaska and Pacific Coast Dene must still be explained, but they are less widespread and can be treated as secondary reflexes within particular branches or languages. Tlingit *s'úkh* does not match the Dene affricate directly, but its ejective sibilant [s'] is nevertheless closer in articulatory type to [$tʰ$] than to [$kʰ$]. Therefore, the dataset supports Proto-Dene [$*tʰ$] more strongly than Proto-Dene [$*kʰ$].

4.4.2.2 Vowel

The vowel evidence shows a broad contrast between [a]-type and [o]-type reflexes, with some [i] and [e] forms as well. The [a]-type vowel appears in Dena'ina *kʰaq'*, Ahtna *kʰa:q*, Kaska *tʰā:k*, Tagish *tʰāk*, Tahltan *tʰa:k*, Tsut'ina *tʰak'*, Witsuwit'en *caq*, Galice *kʰā:k'ar?*, Kato *kʷaŋkʰε*, Navajo *tsʰā:?*, Western Apache *tsʰát*, Jicarilla Apache *tsʰáké:*, Carrier *tʰa*, Ts'ets'aut *tʰá:?*, and Tututni *tʰa:'*. The [o]-type vowel appears in Deg Xinag *tʰoq*, Lower Tanana *tʰok*, Upper Kuskokwim *tʰok'*, Kaska *tʰo:k*, Sekani *tʰow*, Dene Dháh *tʰonk*, Beaver *tʰouŋk*, Kiowa Apache *tʰō:k*, Hare *ʃō?*, Mountain *tʰō*, Tłıchǫ *tʰō:*, South Slavey *tʰō:*, and Dene Sųlíné *tʰō*. Gwich'in *tʰik*, Southern Tutchone *ʃĩ*, and Chilcotin *tʰẽ* show front-vowel reflexes.

The nasalized vowels remain especially important for the Proto-Dene reconstruction. Upper Tanana *tʰā:k*, Tagish *tʰāk*, Galice *kʰā:k'ar?*, Navajo *tsʰā:?*, Kiowa Apache *tʰō:k*, Lipan Apache *tʰhō*, Southern Tutchone *ʃĩ*, Hare *ʃō?*, Mountain *tʰō*, Tłıchǫ *tʰō:*, South Slavey *tʰō:*, Dene Sųlíné *tʰō*, and Chilcotin *tʰẽ* point to a nasal element in the rhyme. This is reinforced by languages

that preserve an overt nasal consonant before the final consonant: Dene Dháh *ʃʰonk*, Beaver *ʃʰounk*, Northern Tutchone *ʃʰá:nʔ*, and Kato *kʷaŋkʰɛ*. The most economical interpretation is that Proto-Dene contained a nasal element after the vowel. In some languages this nasal remained overt, in others it was lost while nasalizing the vowel, and in others both the nasal consonant and nasalization are no longer visible.

4.4.2.3 Final Consonant

The final consonant has to be divided into two layers: the final consonantal material of the abdominal-viscera stem itself, and the additional postpositional element reflected in the ABDOMINAL.VISCERA-ON forms. In the first subgroup, many forms end in a dorsal stop or related element: Deg Xinag *ʃʰoq*, Koyukon *kʰvqʹ*, Dena'ina *kʰaqʹ*, Ahtna *kʰa:q*, Gwich'in *ʃʰik*, Lower Tanana *ʃʰok*, Upper Kuskokwim *ʃʰokʹ*, Upper Tanana *ʃʰâ:k*, Kaska *ʃʰo:k*, Tagish *ʃʰâk*, Tahltan *ʃʰa:k*, Tsuut'ina *ʃʰakʹ*, Dene Dháh *ʃʰonk*, Beaver *ʃʰounk*, Witsuwit'en *caq*, Galice *kʰã:kʹaɪʔ*, Kato *kʷaŋkʰɛ*, Tolowa *xak'eʔ*, Jicarilla Apache *tsʰáké:*, and Kiowa Apache *ʃʰō:k*. However, this velar/uvular final cannot simply be treated as the inherited coda of the main stem, because the first subgroup is identified as a compound with an added postpositional element meaning 'on'.

The forms with an overt nasal before the final consonant are still the strongest evidence for the shape of the Dene stem. Dene Dháh *ʃʰonk*, Beaver *ʃʰounk*, and Kato *kʷaŋkʰɛ* preserve nasal plus velar/uvular stop sequences, while Northern Tutchone *ʃʰá:nʔ* preserves a nasal before a glottal element. These forms suggest that the main abdominal-viscera stem contained a nasal element, probably [**n*] or a nasal that could surface with different places of articulation before a following consonant. In the ABDOMINAL.VISCERA-ON subgroup, this nasal was followed by the added postpositional element, yielding nasal plus velar/uvular stop clusters in a few languages and nasalized vowels plus velar/uvular finals in others.

The second subgroup confirms that the nasal belongs to the stem rather than to the postpositional element. Northern Tutchone *ʃʰá:nʔ* preserves [n], while Southern Tutchone *ʃĩ*, Hare *ʃǝʔ*, Mountain *ʃʰǝ*, Tłıchǝ *ʃʰǝ̃*, South Slavey *ʃʰǝ̃*, Dene Sųlíné *ʃʰǝ̃*, and Chilcotin *ʃǝ̃* show nasalized vowels without an overt nasal consonant. This distribution supports reconstructing a nasal element at Proto-Dene for the stem. The added final [q], [qʰ], [k], [kʰ], [kʰ], or related material in the first subgroup should then be analyzed separately from the stem-final nasal.

Tlingit *s'úkh* appears somewhat comparable because it also ends in velar material, but it should not be used as secure evidence for the reconstruction. The problem is that the Dene velar/uvular final belongs, at least in many forms, to the ABDOMINAL.VISCERA-ON construction rather than necessarily to the inherited stem itself. Since the Dene evidence is morphologically layered, the Tlingit final [kh] cannot be straightforwardly matched either with the Dene stem-final nasal or with the added postpositional element. It may indeed be relevant, but the evidence is not clear enough to include it securely.

For this reason, the safest reconstruction remains internal to Dene. The main abdominal-viscera stem should be reconstructed with a nasal final, while the velar final in the ABDOMINAL.VISCERA-ON forms should be treated as additional postpositional material. Tlingit *s'úkh* can be mentioned as a possible comparison in the broader discussion, but it should not be used to reconstruct a Proto-Na-Dene root-final.

4.4.2.4 Discussion

This cognate complex is strong within Dene, but it remains morphologically layered. The main Dene stem refers to abdominal viscera and is extended in several languages to the meaning ‘ribs’. In many other languages, the same stem appears with an added postpositional element meaning ‘on’, producing the ABDOMINAL.VISCERA-ON pattern described by Snoek. The two subgroups should

therefore be reconstructed together for the core stem, while the extra final dorsal material in the first subgroup must be treated separately.

The initial consonant is the least secure part of the reconstruction. The Dene correspondence $[k^h] = [tʃ^h] = [ts]$ is well supported, but it does not yet justify a single precise Proto-Dene initial with full confidence. A tentative Proto-Dene $[*ʃ^h]$ remains possible because affricate reflexes are widespread, while $[*k^h]$ remains possible because velar reflexes are concentrated in some branches, particularly Alaska and Pacific Coast Dene.

The vowel and final consonant evidence point in different directions. Within Dene, $[a]$ and $[o]$ are both well represented, with some front-vowel reflexes as well. Since Tlingit *s'ûkh* is not securely included, its back rounded vowel should not determine the higher-level reconstruction. The most secure part of the Dene rhyme is the nasal element: Dene *Dháh*, Beaver, Northern Tutchone, and Kato preserve overt nasal consonants, while many other languages show vowel nasalization. This supports reconstructions at the lower level of the approximate shape $*ʃ^haN$, $*ʃ^hoN$, or $*k^haN$, with the nasal element belonging to the stem.

Tlingit *s'ûkh* can still be mentioned as a possible comparison, but it should not be treated as confirming a Proto-Na-Dene reconstruction. The main difficulty is that the Dene dorsal final often reflects the added 'on' element rather than the basic abdominal-viscera stem, while the core Dene stem is better supported with a nasal final. For that reason, the safest reconstruction remains at the Proto-Dene level, and any extension beyond Dene should remain tentative.

Table 84. Reconstruction of *ABDOMINAL.VISCERA (RIBS)*

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*ulet
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*ʃ ^h an ~ *k ^h an
Proto-Northern-Dene	*ʃ ^h on ~ *k ^h an
Proto-Alaska-Dene	*ʃ ^h on ~ *ʃ ^h an ~ *k ^h an
Proto-Yukon-Dene	*ʃ ^h an
Proto-Interior-Canada-Dene	*ʃ ^h on ~ *ʃ ^h o:n
Proto-Central-BC-Dene	*ʃ ^h an ~ *k ⁱ an
Proto-Pacific-Coast-Dene	*ʃ ^h an ~ *k ^h an
Proto-Apachean-Dene	*ts ^h ān ~ *ts ^h at

4.4.3 Breast

The meaning ‘breast’ is represented here by three unrelated cognate sets in Dene. These sets differ clearly in stem shape and distribution, and they should therefore be treated separately. The Yeniseian evidence is also split. Modern Ket actually has two words that are defined as ‘breast’: *ma'm*, which aligns with Cognate Set 1, and *təya* (reconstructed in Proto-Yeniseian as **tʰʌgʌ*), which aligns with Cognate Set 3. Of these three sets, Cognate Set 3 shows the strongest promise for higher reconstruction, because it is supported not only by a broad Dene distribution, but also by Eyak *ts'u*, Tlingit *l'à*, and Proto-Yeniseian **tʰʌgʌ*. Cognate Set 1 has a possible Yeniseian parallel only in modern Ket *ma'm*, while Cognate Set 2 presently remains confined to Dene.

4.4.3.1 Cognate Set 1: BREAST₁

This set is represented in Alaska and Apachean, with a shape centered on *mam*, *ma:ʔ*, and Apachean *beʔ* type forms. The distribution suggests an old Dene stem, but the internal variation is already substantial, especially in the onset. The same lexical material is also associated with the meaning ‘mother’s milk’. Snoek notes that in many Dene languages a form meaning ‘breast’ also extends to denote ‘mother’s milk’ through polysemy (2015: 243).

Table 85. *BREAST*₁

Branch	Language	Form
Alaska	Deg Xinag	mam
Alaska	Dena'ina (Iliamna)	mam
Alaska	Dena'ina (Inland)	mam
Alaska	Dena'ina (OCI)	mam
Alaska	Dena'ina (UCI)	mam
Alaska	Ahtna	pɑ:ʔ
Alaska	Holikachuk	mà:ʔ
Alaska	Gwich'in (Teetl'it)	mà:ʔ
Alaska	Gwich'in (Gwichya)	mam
Apachean	Navajo	beʔ
Apachean	S. Carlos A.	beʔ
Apachean	Jicarilla A.	bẽʔ
Apachean	Kiowa A.	bèʔ
Apachean	Mescalero A.	pe:

Table 86. *Non-Dene BONE*

Branch / Language	Form
Eyak	-
Tlingit	-
Ket	ma'm

4.4.3.1.1 Initial Consonant

The most common onset in this set is clearly [m]. Deg Xinag, all four Dena'ina varieties, Holikachuk, and Gwich'in (Gwichya) all preserve [m], and this gives the best direct support for a Proto-Dene nasal onset. Against that, Ahtna has [p], and the Apachean forms show [b] or [p]. That distribution suggests that in part of the family the original nasal onset was replaced by a labial stop or stop-like reflex, rather than that the stop series is primary, because the [m] forms are geographically widespread.

The Ket form *ma'm* is relevant here because it preserves the same shape as many other languages in the data set. It shows that Cognate Set 1 is not entirely isolated outside Dene. An additional theory could be that due to the fact that [m] and [p] and [b] are all bilabial consonants,

perhaps the original onset was something like [mp]~[mb], which got reduced in two different directions with [m] becoming the primary reflex in Northern Dene, while [b]~[p] becoming the primary reflex in Apachean. The fact that there is still one language in the north, Ahtna, which retains [p] could add some plausibility to this theory. At the same time, because there is no evidence from the Eyak and Tlingit side, and modern Ket has *ma'm*, it is difficult to say whether this theoretical change would have happened at the Dene-Yeniseian split and then again within Dene proper, or it was instead an isolated occurrence of the Apachean branch, and Ahtna specifically. At present, because of the lack of evidence, the safest option is to treat it as the latter.

4.4.3.1.2 Vowel

The vowel evidence centers on [a]. Deg Xinag and the Dena'ina forms have short [a], Holikachuk and Gwich'in (Teetl'it) have lengthened [a:], and Ahtna has [ɑ:]. The Apachean forms mostly show [e] or [ẽ], which is divergent in surface quality but still points to a fronted reflex of an earlier non-high vowel rather than to an entirely different stem. The nasalized vowel in Jicarilla A. could point to the fact that the final nasal consonant [m] as present in the majority of the cognate set was dropped entirely in Apachean, but is what nasalized the vowel itself.

The best-supported Proto-Dene vowel is therefore [*a]. Length appears secondary and unevenly distributed, while Apachean fronting is best treated as a later branch development. Ket *ma'm* again agrees broadly in showing a low vowel, but that alone is not enough to project the set beyond Dene with confidence.

4.4.3.1.3 Final Consonant

The final segment shows two main patterns: [m] and [ʔ]. Deg Xinag, Dena'ina, and Gwich'in (Gwichya) preserve final [m], while Holikachuk, Gwich'in (Teetl'it), Ahtna, Navajo, San Carlos Apache, Jicarilla Apache, and Kiowa Apache show [ʔ]. Mescalero lacks an overt final consonant.

The most economical interpretation is that final [m] is older within Dene, because it is retained in exactly those forms that also preserve the clearest *mam* shape. From that perspective, [ʔ] can be understood as the result of reduction of an earlier nasal coda, with Mescalero representing a further weakening of that final element.

4.4.3.1.4 Discussion

Cognate Set 1 is a real and probably old Dene lexical set for ‘breast’, but it is not the strongest candidate for reconstruction beyond Dene. Internally, the most plausible Proto-Dene form is something close to **mam*, with later developments producing stop onsets in Ahtna and Apachean and glottal or zero codas in several branches. The modern Ket form *ma’m* is clearly similar and may reflect an old parallel or deeper relationship, but on the present evidence that connection remains much weaker than the evidence for Cognate Set 3.

Table 87. Reconstruction of *BREAST*₁

Proto-Level	Reconstruction
Proto-Dene-Yeniseian	*mam ~ *mbam ~ *mpam ?
Proto-Yeniseian	*ma’m
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*mam ~ *mbam ~ *mpam
Proto-Northern-Dene	*mam
Proto-Alaska-Dene	*mam
Proto-Interior-Canada-Dene	-
Proto-Yukon-Dene	-
Proto-Central-BC-Dene	-
Proto-Pacific-Coast-Dene	-
Proto-Apachean-Dene	*beʔ ~ *bem

4.4.3.2 Cognate Set 2: SUCK

This set is glossed as ‘suck’ and is distributed across Alaska, Interior Canada, Northern British Columbia, and several branch isolates. Semantically, the shift from ‘suck’ to ‘breast’ is understandable, but phonologically this set is independent from the other two.

Table 88. *SUCK*

Branch	Language	Form
Alaska	Koyukon	t’ok
Alaska	Hän	t’ö:ʔ
Alaska	Upper Tanana	t’u:ʔ
Alaska	Tanacross	t’uʔ
Yukon	Northern Tutchone	t’ók
BranchIsolate1	Tagish	t’ú
BranchIsolate2	Ts’ets’aut	t’ɔ
Interior Canada	Kaska (P)	t’u
Interior Canada	Hare	t’öj
Interior Canada	Mountain	t’óʔ
Interior Canada	Bearlake	t’ó
Interior Canada	Tłchq	t’ò:
Interior Canada	South Slavey	t’ò:
Interior Canada	Sekani	t’òʃ
Eyak	Eyak	-
Tlingit	Tlingit	-
Yeniseian	Proto-Yeniseian	-

4.4.3.2.1 Initial Consonant

The onset is highly stable across the set: every form begins with [t’]. Because the onset remains so uniform from Alaska through Interior Canada and into the branch isolates, a Proto-Dene [*t’] is well supported. There is no external evidence from Eyak or Tlingit to push the reconstruction any higher, but within Dene the onset is straightforward.

4.4.3.2.2 Vowel

The vowel fluctuates mainly between [u]~[o]-type vowels, and a few languages have a long vowel. Upper Tanana, Tanacross, Kaska, and Tagish favor [u], while many Interior Canadian forms favor [o]. Koyukon has [ʊ], and Ts'ets'aut has [ɔ]. This pattern suggests a back rounded vowel as the common core, with branch-specific lowering or centralization.

The safest Proto-Dene reconstruction is therefore a back rounded vowel, most plausibly *[u]. The [o]-type forms can be understood as later lowering or retraction in several branches.

4.4.3.2.3 Final Consonant

The coda is less stable than the onset. Koyukon and Northern Tutchone preserve [k], Sekani has [ɣ], Hän, Upper Tanana, Tanacross, and Mountain have [ʔ], Hare has [j], while several languages have no overt coda at all. This distribution suggests that the final portion of the stem has been reduced or reshaped repeatedly across the family.

A tentative possibility is that the older coda was a velar stop, preserved directly in Koyukon and Northern Tutchone, as it is the most common, albeit only with 2 instances. If so, the glottal-stop and zero-final forms could reflect reduction of that coda, while Sekani [ɣ] and Hare [j] would represent more specialized branch developments.

4.4.3.2.4 Discussion

The strongest feature is the extremely stable ejective onset [t'], while the vowel points to a back rounded nucleus and the coda has clearly undergone widespread reduction and restructuring. A Proto-Dene form such as **t'uk* is a reasonable working hypothesis, especially because [k] survives in more than one branch, but the final consonant is much less secure than the onset. Since this set

lacks Eyak, Tlingit, and Yeniseian support, there is no good basis for reconstructing it beyond Dene.

Table 89. Reconstruction of SUCK

Proto-Level	Reconstruction
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*t'uk
Proto-Northern-Dene	*t'uk
Proto-Alaska-Dene	*t'uk
Proto-Yukon-Dene	*t'ók
Proto-Interior-Canada-Dene	*t'oʔ ~ *t'ok
Proto-Central-BC-Dene	-
Proto-Pacific-Coast-Dene	-
Proto-Apachean-Dene	-

4.4.3.3 Cognate Set 3: POINTED

This set is one of the stronger candidates for broader comparison, but its semantic range has to be treated carefully. Across the dataset, the relevant forms share a consistent phonological template consisting of an ejective affricate onset followed by a back rounded vowel and a variable final consonant. Within Dene, this pattern is represented across several Northern subbranches and in the Pacific Coast languages. It is also matched by Eyak *ts'u*, Tlingit *l'à*, and Proto-Yeniseian **tʰʌgʌ*, making this set one of the better candidates for reconstruction above Proto-Dene.

The same lexical material is also associated with the meaning ‘mother’s milk’. Snoek notes that in many Dene languages a form meaning ‘breast’ also extends to denote ‘mother’s milk’ through polysemy (2015: 243). Eyak provides a particularly clear parallel, since the dictionary lists two homonymous entries *ts'u*, one meaning ‘breast/teat’ and the other meaning ‘milk’. The same phonological shape also appears in verb stems meaning ‘to suck’, which suggests that the broader

lexical field centers on nursing, breast, and milk. However, the available evidence does not determine whether the nominal meaning developed from the verbal stem or whether the verb arose from the nominal root.

Table 90. *POINTED*

Branch	Language	Form
Yukon	Southern Tutchone	tʃʷu
Interior Canada	Dene Sų́líné	tθʷu
Central BC	Carrier	tsʷuʔ
Central BC	Witsuwitʼen	tsʷo
BranchIsolate3	Tsuutʼina	tsʷùw
Pacific Coast	Hupa	tsʷo:ʔ
Pacific Coast	Galice	tsʷaw
Pacific Coast	Tolowa	tsʷu:ʔ
Pacific Coast	Tututni	tsʷeyʷ
Pacific Coast	Mattole	tsʷo:ʔ

Table 91. *Non-Dene BREAST*

Branch / Language	Form
Eyak	tsʷu
Tlingit	lʷà
Ket	təʷa
Proto-Yeniseian	*tʰʷgʷ

4.4.3.3.1 Initial Consonant

The Dene evidence points very strongly to an ejective affricate or affricate-like onset. Tsuutʼina, Carrier, Witsuwitʼen, Hupa, Galice, Tolowa, Tututni, and Mattole all show [tsʷ]-type forms directly. Southern Tutchone [tʃʷ] and Dene Sų́líné [tθʷ] are close enough to belong to the same comparative zone, and Eyak *tsʷu* supports that interpretation clearly. On the Dene-Eyak level, the most plausible reconstruction is therefore an ejective affricate.

Tlingit *lʷà* is more unusual, but it should not be dismissed, because there are cases where Tlingit [tʰʷ] or [lʷ]-type initials correspond to Dene [tsʷ] (Vajda 2010: 42). That means the Tlingit

form can still be treated as belonging to this set, even though it does not preserve the affricate in the same surface shape. Proto-Yeniseian **tʰʌgʌ* is less exact, since [tʰ] is not the same as Dene-Eyak [tsʰ], but it still occupies the same broad articulation zone and keeps the comparison alive at the higher level, especially since Yeniseian languages lack ejectives. The best-supported reconstruction within Dene and Na-Dene is therefore [**tsʰ*], while any projection to Proto-Dene-Yeniseian must remain more tentative.

4.4.3.3.2 Vowel

The vowel is mostly a back rounded vowel in Dene: [u] in Southern Tutchone, Dene Sų́líné, Carrier, and Tolowa, [o] in Witsuwitʼen, Hupa, and Mattole, [ɑ] in Galice, and [e] in Tututni. Eyak *tsʰu* agrees closely with the [u]-type forms.

Tlingit *lʰà* is more divergent in vowel quality, and Proto-Yeniseian **tʰʌgʌ* also differs from the dominant Dene-Eyak [u ~ o] pattern. Even so, these differences do not destroy the comparison, because the main cross-family signal in this set lies less in exact vowel identity than in the recurrence of the same general stem with an ejective affricate onset and velar or weakened final element. Within Na-Dene, the most plausible vowel reconstruction is [**u*]. There are also plenty of [o]-type, but they are best understood as later developments from a back rounded vowel rather than as the original state.

4.4.3.3.3 Final Consonant

The final segment is the least stable part of the set, but it is still informative. Southern Tutchone and Dene Sų́líné show no overt coda. Tsuutʼina and Galice end in [w], Carrier, Hupa, Tolowa, and Mattole show [ʔ] or long vowel plus [ʔ], Witsuwitʼen has no final consonant, and Tututni preserves

a more substantial [ɣ^w]. Eyak *ts'u* also lacks an overt coda. This pattern suggests that the coda has undergone considerable weakening in much of Na-Dene.

The most interesting forms here are Tututni *ts'ey^w* and the Yeniseian forms **t^hagɑ* and Ket *təɣɑ*, all of which preserve a velar consonant after the vowel. That makes it plausible that an earlier velar final element once belonged to the stem and was later reduced in many Dene branches to [ʔ], [w], or zero. If that is correct, then the Dene vowel-final and glottal-final forms would be reduced reflexes, while Tututni would preserve something closer to the older consonantal shape. Additionally, if the Proto-Yeniseian form **t^hagɑ* is to be believed, then taken together with Ket *təɣɑ*, it demonstrates the clear fricativization of the coda from the proto-level to the modern language.

A possible higher-level hypothesis is that Proto-Dene, and perhaps already Proto-Dene-Eyak and Proto-Na-Dene, preserved a final velar element such as [ɣ^w] or [g]. This would fit the Yeniseian evidence well, since Proto-Yeniseian *t^hagɑ* ends in [g], and it would also fit Tututni *ts'ey^w*, which preserves an overt velar coda. From that perspective, Galice *ts'aw* and Tsuut'ina *ts'ùw* could reflect reduction of an earlier velar consonant to [w], while the many zero-final and glottal-final Dene forms would represent still further weakening or loss. Under such a view, the original strong velar final was lost relatively early on the Dene side, whereas the Yeniseian branch retained it more clearly. This remains hypothetical, but it offers a coherent way to connect the surviving Dene reflexes with the Proto-Yeniseian final [g].

4.4.3.3.4 Discussion

Within Dene, the stem is widespread and phonologically coherent: it consistently points to an ejective affricate onset and a back rounded vowel, while the final element appears to have weakened or disappeared in many branches. Eyak *ts'u* strengthens the Dene-Eyak comparison directly, and Tlingit *l'à* is unusual but still plausibly part of the same set, given known

correspondences between Tlingit lateral ejective-type initials and Dene [tsʰ]. The Yeniseian evidence is especially important: Proto-Yeniseian **tʰʌgʌ*, and by extension modern Ket *təya* preserve the same general lexical shape and, crucially, retain a velar final element that may explain the reduced codas in Dene. For that reason, this set is the best candidate not only for Proto-Dene and Proto-Na-Dene, but also for a cautious higher reconstruction reaching Proto-Dene-Yeniseian.

Table 92. Reconstruction of POINTED (BREAST)

Proto-Level	Reconstruction
Proto-Dene-Yeniseian	*tsʰʌg ~ *tʰʌg
Proto-Yeniseian	*tʰʌgʌ
Proto-Na-Dene	*tsʰʌgʷ
Proto-Dene-Eyak	*tsʰʌgʷ
Proto-Dene	*tsʰʌgʷ
Proto-Northern-Dene	*tsʰʌ?
Proto-Alaska-Dene	-
Proto-Yukon-Dene	*tʰʌ
Proto-Interior-Canada-Dene	*tʰʌ
Proto-Central-BC-Dene	*tsʰʌ?
Proto-Pacific-Coast-Dene	*tsʰʌgʷ
Proto-Apachean-Dene	-

4.4.4 Heart

Table 93. HEART₁

Branch	Language	Form
Alaska	Koyukon	tsaj
Alaska	Ahtna	tsaj
Alaska	Holikachuk	tsaj
Alaska	Gwich'in (Teetl'it)	dʔi:ʔ
Alaska	Gwich'in (Gwichya)	dʔi:ʔ
Alaska	Hän	dʔê:ʔ
Alaska	Lower Tanana	dʔaj
Alaska	Upper Kuskokwim	dʔaj
Alaska	Upper Tanana	dzêjʔ
Alaska	Tanacross	tsejʔ
Yukon	Northern Tutchone	tsíʔ
Yukon	Southern Tutchone	ze
Yukon	Tahltan	tse:ʔ
BranchIsolate1	Tagish	ʃé, dze
BranchIsolate2	Ts'ets'aut	bvé:ʔ
Interior Canada	Kaska (DL)	tsěʔ
Interior Canada	Kaska (FL)	tsěʔ
Interior Canada	Kaska (GHL)	tsěʔ
Interior Canada	Kaska (L)	tsěʔ
Interior Canada	Kaska (LL)	tsěʔ
Interior Canada	Kaska (P)	tsěʔ
Interior Canada	Kaska (RR)	tsěʔ
Interior Canada	Hare	tsi
Interior Canada	Bearlake	tsé:
Interior Canada	Tłchq	dzè:
Interior Canada	South Slavey	tse:
Interior Canada	Dene Słłiné	tsi
Interior Canada	Dene Dháh	tse:ʔ
Interior Canada	Beaver	ʃeʔ
Interior Canada	Sekani	tsěʔ
Central BC	Carrier	tsi
Central BC	Witsuwit'en	tsi
Central BC	Chilcotin	dzí
Pacific Coast	Galice	si:j
Pacific Coast	Kato	ʃi
Pacific Coast	Tolowa	sriʔ

Pacific Coast	Tututni	sreʔ
Pacific Coast	Mattole	ʃi:j
Pacific Coast	Kwa-Clat	tséi
Apachean	Navajo	ʃeí
Apachean	Western A.	ʃi:
Apachean	S. Carlos A.	ʃi:ʔ
Apachean	Jicarilla A.	ʃe:
Apachean	Kiowa A.	dʒè:
Apachean	Mescalero A.	ʃé
Apachean	Lipan A.	ʃ ^h i

Table 94. *Non-Dene HEART*

Branch / Language	Form
Eyak	uqł
Tlingit	têχʼ
Ket	*p ^h u

4.4.4.1 Initial Consonant

Across Dene, the dominant onset is an alveolar or palato-alveolar affricate or affricate-derived segment with voicing and place variation. Much of Alaska, British Columbia, and Interior Canada shows the [ts]-type onsets (for example *tsax*, *tsaj*, *tsěʔ*, *tse:ʔ*, *tsiʔ*), while other branches show systematic alternations that are plausibly outcomes of the same historical series expressed with different branch-level realizations. On this dataset, the safest Dene-internal generalization is therefore a shared affricate category whose reflexes include [ts], [dʒ], [ʃ], and [dʒ].

The Pacific Coast branch has a few languages with [s]-initial clusters. Given the broader Dene distribution, the most economical interpretation is that Pacific Coast [s]-initial outcomes (*si:j*, *sriʔ*, *sreʔ*) reflect reduction or simplification from an affricate source such as [ts] at the branch level, rather than an unrelated onset category.

A second point which is important to mention is the cluster shape. Pacific Coast has [sr]-type clusters (Tolowa *sriʔ*, Tututni *sreʔ*), which can look odd in isolation, but the dataset contains

a structurally comparable pattern in Alaska: several Alaska varieties show [d]-plus-rhotic material in the onset (Gwich'in *d'ì:ʔ*, *d'ì:ʔ*; Hän *d'ê:ʔ*; Lower Tanana *d'aj*; Upper Kuskokwim *d'aj*). These two facts should be kept conceptually linked in the analysis: both point to branch-level restructuring of an alveolar onset into an alveolar plus rhotic element, even though the surface realizations differ. This does not require committing to a single proto-cluster right away, but it does justify treating “alveolar + rhotic” patterning as an attested pathway in more than one branch. The remaining onset variation fits cleanly into the same overall category. Alaska includes [dz]-type outcomes (Upper Tanana *dzêjʔ*) and a clear [ts]-type outcome (Tanacross *tsejʔ*). Interior Canada has both [ts]-type and [dz]-type realizations (Kaska varieties *tsěʔ* versus Tłıchǫ *dzè:*). Apachean is dominated by [tʃ] (Navajo *tʃei*, Jicarilla *tʃe:*, Mescalero *tʃé*, Western Apache *tʃi:*, S. Carlos Apache *tʃi:ʔ*), with Kiowa Apache *dʒè:* as a voiced affricate outcome. Tagish (*tʃé*, *dze*) is consistent with this as well, since it falls within the affricate space attested elsewhere in Dene. Finally, Ts'ets'ut is the clear outlier: *bvé:ʔ* is the only form in the dataset with an initial [bv]. With no parallel [bv]-like initial material elsewhere here, the conservative decision would be to treat [bv] as an independent innovation in Ts'ets'ut, as a branch isolate that it is.

At higher levels, the non-Dene languages do not align in onset shape on this term. While, Tlingit *téχ'* begins with [t], which does not match the dominant Dene affricate category, it may theoretically be the case that [ts] got reduced to [t], but so far this is inconclusive. Eyak *uql* is not transparently comparable in onset to the Dene forms as presented. Proto-Yeniseian **pʰu* is initial [**pʰ*] and is also likely unrelated in initial consonant shape to the Dene series, providing no support for extending the reconstruction beyond Dene at the present stage.

4.4.4.2 Vowel

The core vowel generalization is actually straightforward at the broad level: across the dataset, the dominant vowel quality is front, concentrated in [e] and [i], and this holds across British Columbia, Interior Canada, Pacific Coast, and Apachean. The main complexity is not basic quality, but surface detail: length (for example [e:], [i:], [ɛ:]), tone marking in several sources, and branch-specific developments such as diphthongs.

Much of Alaska and Interior Canada shows front vowels with frequent length and frequent co-occurrence with final [ʔ]. Examples include Gwich'in *dʷi:ʔ*, Hän *dʷɛ:ʔ*, Upper Tanana *dzêjʔ*, Tanacross *tsejʔ*, Northern Tutchone *tsíʔ*, Kaska varieties *tsěʔ*, Tahltan *tsɛ:ʔ*, Dene Dháh *tse:ʔ*, Beaver *ʃɛʔ*, and Sekani *tsěʔ*. Within this large set, both [e]-type and [i]-type nuclei are well represented, so the safest Proto-Dene statement is that the inherited nucleus was front.

The one clear exception is the Alaska subgroup where [a] appears in forms that otherwise fit the Dene onset pattern: Koyukon *tsax*, *tsaj* and Lower Tanana and Upper Kuskokwim *dʷaj*. Given that front vowels [e] and [i] remain widely attested even within Alaska (for example *dzêjʔ*, *tsejʔ*, *tsíʔ*, and also Ahtna and Holikachuk *tsaj* with a front-like glide outcome), the simplest conservative interpretation is that [a] is best treated as a branch-level innovation within Alaska, rather than something that needs to be projected upward as Proto-Dene vowel quality.

Pacific Coast and Apachean are compatible with the same front-vowel baseline. Pacific Coast includes clear [i] outcomes (Kato *ʃi*, Mattole *ʃi:j*, Galice *si:j*) and [e] outcomes (Tututni *sreʔ*), as well as a front diphthong in Kwa-Clat *tséi*. Apachean is dominated by [e] and [i] with frequent length (for example *ʃe:*, *ʃɛ*, *ʃi:*, *ʃi:ʔ*), and Navajo *ʃeí* matches the [ei] pattern also seen in Kwa-Clat.

4.4.4.3 Final Consonant

A large portion of Alaska, British Columbia, and Interior Canada ends in [ʔ] (Gwich'in *dʷi:ʔ*, Hän *dʷe:ʔ*, Upper Tanana *dzêjʔ*, Tanacross *tsejʔ*, Northern Tutchone *tsiʔ*, Kaska varieties *tsěʔ*, Tahltan *tse:ʔ*, Dene Dháh *tse:ʔ*, Beaver *fɛʔ*, Sekani *tsěʔ*, Ts'ets'aut *bvé:ʔ*). This is dense enough to treat [ʔ] as a serious reconstructive candidate for several lower groupings, as it is well represented in several Northern sub-branches, as well as Pacific Coast and Apachean.

At the same time, multiple varieties show no overt coda (Southern Tutchone *ze*, Hare *tsi*, Dene Sųłiné *tsi*, Carrier *tsi*, Witsuwit'en *tsi*, Chilcotin *dzi*, Western Apache *fí:*, Jicarilla *fɛ:*, Kiowa Apache *dʒè:*, Mescalero *fɛ̀*). The dataset alone does not decide whether these reflect loss of inherited [ʔ], prosodic reinterpretation, or lexical differences not represented here. Because [ʔ] is widespread but not universal, the conservative Proto-Dene stance is to avoid asserting a mandatory coda at the Proto-Dene level, while still allowing [ʔ] to be reconstructed at subgroup levels where it is strongly represented.

A second recurring coda pattern is an offglide [j] or diphthongal [i] element. Koyukon has *tsaj*, Galice has *si:j*, Mattole has *fí:j*, and Alaska includes explicit [j] plus [ʔ] sequences (Upper Tanana *dzêjʔ*, Tanacross *tsejʔ*). Even so, it is not consistent enough to reconstruct as a Proto-Dene final consonant. The safest statement is that offglides are common branch-level developments associated with front nuclei, while [ʔ] is the most widely attested segmental coda candidate within Dene for this item.

4.4.4.4 Discussion

This lexical item supports a fairly strong Dene-internal reconstruction, while simultaneously providing no usable support for a Proto-Dene-Yeniseian reconstruction.

The dataset supports reconstructing Proto-Dene with an alveolar or palato-alveolar affricate onset. The large [ts] set across Alaska and Interior Canada, the [dz] outcomes in several varieties, and the consistent [tʃ] and occasional [dʒ] outcomes in Apachean are all compatible with a single inherited affricate category whose reflexes vary by branch. The Pacific Coast [s]-initial outcomes are best treated as reflexes of that same category via affricate reduction. The [sr] clusters in Pacific Coast also seem like less of an anomaly once they are considered alongside the [dʳ]-type onsets attested in Alaska.

The dominant inherited vowel quality is front. Across the dataset, [e] and [i] are the most widely represented nuclei. The Alaska [a] outcomes are most conservatively treated as a branch-level innovation in Alaska, since front vowels remain pervasive across the rest of the family and are also present within Alaska.

[ʔ] is widespread across all branches, so it can be reconstructed for lower subgroup levels with some confidence. Palatal offglides [j] and diphthongal [i] elements recur across branches, but they are not consistent enough to be reconstructed as a Proto-Dene coda consonant.

Tlingit *têχ*’ and Eyak *uql* do not supply a transparent alignment with the Dene pattern as given here, so Proto-Na-Dene and Proto-Dene-Eyak should remain unresolved on this dataset. Proto-Yeniseian **p^hu* is also mismatched in both onset and vowel, and therefore provides no support for a Proto-Dene-Yeniseian reconstruction for ‘heart’.

Table 95. Reconstruction of *HEART*₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*p ^h u
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*tse:ʔ ~ *tsi:(ʔ)
Proto-Northern-Dene	*tse:ʔ ~ *tsej
Proto-Alaska-Dene	*tsaj ~ *tsejʔ ~ *dzej
Proto-Interior-Canada-Dene	*tse:ʔ ~ *tsi:
Proto-Central-BC-Dene	*tsi ~ *dzi
Proto-Pacific-Coast-Dene	*ʧi ~ *tseʔ
Proto-Apachean-Dene	*ʧi: ~ *ʧe:

4.4.5 Liver

Table 96. *LIVER*₁

Branch	Language	Form
Alaska	Dena'ina (Inland)	zət'
Alaska	Dena'ina (OCI)	zət'
Alaska	Dena'ina (UCI)	jət'
Alaska	Ahtna	zət'
Alaska	Gwich'in (Teetl'it)	ǫat
Alaska	Gwich'in (Gwichya)	ǫat
Alaska	Hän	ǫàt, ǫət
Alaska	Upper Kuskokwim	zit'
Alaska	Upper Tanana	ǫət
Alaska	Tanacross	ǫet
Yukon	Northern Tutchone	ǫát
Yukon	Southern Tutchone	ǫət
BranchIsolate1	Tagish	ʒit
BranchIsolate2	Ts'ets'aut	sre'
Interior Canada	Kaska (FL)	zét
Interior Canada	Kaska (P)	zét
Interior Canada	Kaska (RR)	zét
Interior Canada	Hare	wé?
Interior Canada	Bearlake	wé
Interior Canada	Tł̥chq̣	wò
Interior Canada	South Slavey	ǫé
Interior Canada	Dene Sł̥liné	tθár
Interior Canada	Dene Dháh	ǫé
Interior Canada	Beaver	zɛt'
Interior Canada	Sekani	zàt
Central BC	Carrier	ʒɛt
Central BC	Witsuwit'en	zət
Central BC	Chilcotin	zét
BranchIsolate3	Tsuut'ina	zí
Pacific Coast	Hupa	sit'
Apachean	Navajo	zit
Apachean	Western A.	zik
Apachean	S. Carlos A.	zit, ʒit
Apachean	Jicarilla A.	zi
Apachean	Mescalero A.	zit

Table 97. *Non-Dene LIVER*

Branch / Language	Form
Eyak	sahd
Tlingit	tl'ûkh
Ket	*sal / *sel / *se:ŋ

4.4.5.1 Initial Consonant

The Dene data show a complex but still internally structured set of initial consonant reflexes. The dominant pattern across Alaska, Interior Canada, Central BC, Pacific Coast, and Apachean is a fricative onset in the dental-palato-alveolar range, most frequently realized as [z] or [ð], with some branch-level variation.

Most Alaska languages preserve either [z] (Dena'ina, Upper Kuskokwim) or [ð] (Gwich'in, Hän, Upper Tanana, Tanacross), indicating a shared fricative source rather than unrelated initials. Central BC and Interior Canada likewise show [z]-type reflexes (Carrier, Witsuwit'en, Kaska, Sekani, Beaver), reinforcing the interpretation of a common inherited onset. The occasional postalveolar realizations [ʒ] in Tagish (Branch Isolate) and San Carlos Apache (Apachean) are best treated as secondary adjustments in articulation rather than independent innovations.

The three Interior Canada languages showing initial [w] (Hare *wé?*, Bearlake *wé*, Tł̥cḥo *wò*) stand apart clearly. Their restriction to a tight geographic and subgrouping cluster, combined with the absence of any [w]-initial reflex elsewhere in Dene, supports treating these as branch-level innovations, likely involving glide formation from an earlier vowel or secondary restructuring.

More divergent forms include Ts'ets'aut *sɛ*ʔ, which displays an onset cluster not otherwise attested in the dataset, and Dena'ina (UCI) *jæt*ʔ, which differs in initial consonant from the other Dena'ina varieties. The contrast of these two forms is likely best understood as reflecting different pathways of branch-internal innovation.

Eyak *sahd* aligns with the fricative pattern in its initial [s], despite its otherwise divergent phonological shape. Vajda's discussion, building on Leer's work, provides important context for interpreting the initial consonant in this root. Leer reconstructs a Proto-Na-Dene form **sənt'*, based on the Proto-Dene **sət'* and the Eyak form *sahd*. This proposal directly supports reconstructing an alveolar fricative onset [s] at the Proto-Dene level, from which the observed [z] and [ð] reflexes can be derived through regular voicing and lenition processes. Vajda does not posit any different initial consonant categories here: the variation seen across Dene is treated as surface divergence from a single inherited fricative rather than evidence for multiple proto-onsets. The Eyak initial [s] is especially significant, as it aligns well with the Dene fricative series and shows no indication of secondary innovation. On the Yeniseian side, **se:ŋ* preserves the same alveolar fricative onset, providing independent support for reconstructing [s] at a deeper comparative level. While this does not by itself establish a full Proto-Dene-Yeniseian correspondence, it strengthens the case for a shared fricative onset when the Na-Dene and Yeniseian evidence are considered together (2010: 29).

Tlingit *tl'ûkh*, by contrast, shows no convincing correspondence in initial consonant and is best excluded from the Dene set for this item at the initial consonant level.

Taken together, the Dene evidence supports reconstruction of an alveolar fricative onset, most plausibly [**s*] at the Proto-Dene level, with regular developments to [z] and [ð] across daughter branches.

4.4.5.2 Vowel

Vowel reflexes are highly variable across branches and are difficult to reconcile with each other. Short vowels dominate most Dene forms, with [ə], [a], [ɪ], [i], [ɛ], and [ʌ] all attested. Many Alaska

and Interior Canada forms favor central or reduced vowels ([ə], [a]), while Central BC and Apachean show front vowels ([ɪ], [i], [ɛ]) more consistently.

Vajda’s observation that Proto-Dene had a reduced vowel in this root aligns well with the widespread presence of [ə]-like nuclei. His citation of a Proto-Dene form **sət*’ is compatible with the Dene data when vowel lowering, fronting, and reduction are treated as branch-level outcomes rather than primary contrasts (2010: 40).

Proto-Yeniseian **se:ŋ* shows a front mid vowel [e:], which Vajda plausibly derives from an unrounded mid vowel realized as [e] after alveolars. This aligns with his broader reconstruction of a limited short-vowel inventory and does not require direct vowel correspondence between Dene and Yeniseian, only compatibility (2010: 41).

Given the evidence, Proto-Dene vowel quality is best reconstructed as [**ə*], with later branch-level fronting, lowering, or backing accounting for the observed diversity.

4.4.5.3 Final Consonant

A large portion of the dataset preserves a final alveolar stop, most commonly [t] or [t’], with ejective realization particularly well represented in Alaska, Central BC, Pacific Coast, and parts of Interior Canada. Many other languages retain a plain non-ejective [t], perhaps indicating neutralization of ejective contrast. More divergent outcomes include isolated replacement of the alveolar stop [t] by a velar [k] in Western Apache, loss of the final consonant altogether in Bearlake, Tłıchǫ, and some Apachean varieties, and substitution by a glottal stop as in Hare *wéʔ*. An additional outlier is Dene Sųlíné *tθár*, where the expected alveolar stop is replaced by [r], likely reflecting branch-specific restructuring.

Eyak *sahd* is crucial here. Vajda, following Leer, interprets the final [hd] sequence as the reflex of an earlier cluster involving a nasal plus obstruent cluster. The breathy quality preceding

the final stop is otherwise unexplained in Eyak and supports the reconstruction of a lost nasal segment. Proto-Yeniseian **se:ŋ* preserves a final nasal [ŋ] but lacks an overt following obstruent. Vajda's discussion of Yeniseian morphophonemic alternations, particularly plural forms such as **seŋn-iŋ*, provides indirect evidence that an additional consonant once followed the nasal and was later lost in the singular (2010: 29).

Taken together, the most cautious reconstruction posits a Proto-Na-Dene final cluster involving a nasal plus obstruent, simplified differently in Dene and Yeniseian. No modern Na-Dene language preserves the nasal segment itself, but multiple independent traces point to its former presence.

4.4.5.4 Discussion

Across Dene, the initial consonant evidence converges on an alveolar fricative source, with the small set of [w]-initial forms confined to Interior Canada and best interpreted as localized innovations. The vowel system, by contrast, shows wide and uneven variation across branches, with no single quality emerging unambiguously from the surface forms alone. While reduced and front vowels are common, their distribution is inconsistent and difficult to systematize purely on internal grounds. In this context, Vajda's proposal of a reduced Proto-Dene vowel provides a plausible framework that accommodates the observed diversity without forcing direct equivalence among the Dene reflexes. As for the final consonant, particularly when the Eyak and Ket evidence is considered together, offers the strongest support for reconstructing a lost nasal-obstruent cluster at higher proto-levels.

At the Proto-Dene-Yeniseian level, however, correspondence in the final obstruent remains indirect. While the nasal component is strongly supported, the precise identity of the following consonant cannot be securely reconstructed.

Table 98. Reconstruction of *LIVER*₁

Proto-Language	Form
Proto-Dene-Yeniseian	*səŋt' ~ *səŋt
Proto-Yeniseian	*se:ŋ
Proto-Na-Dene	*sənt'
Proto-Dene-Eyak	*sət'
Proto-Dene	*sət'
Proto-Northern-Dene	*zət' ~ *ǎat'
Proto-Alaska-Dene	*zət' ~ *ǎat'
Proto-Yukon-Dene	*ǎat ~ *ǎət
Proto-Interior-Canada-Dene	*ǎé ~ *zat
Proto-Central-BC-Dene	*zət
Proto-Pacific-Coast-Dene	*sit'
Proto-Apachean-Dene	*zit

4.4.6 Intestines

Table 99. *INTESTINES*₁

Branch	Language	Form
Alaska	Deg Xinag	ts'ek
Alaska	Koyukon	ts'ik
Alaska	Dena'ina (Iliamna)	ʃ'ik'
Alaska	Ahtna	ts'i:k
Alaska	Holikachuk	ts'ek
Alaska	Gwich'in (Teetl'it)	ts'ik
Alaska	Gwich'in (Gwichya)	ts'ik
Alaska	Hän	ts'û:ʔ
Alaska	Upper Tanana	ts'î:k
Alaska	Tanacross	ts'ikʔ
Yukon	Northern Tutchone	ts'ik
Yukon	Southern Tutchone	ts'i
BranchIsolate1	Tagish	ts'i
BranchIsolate2	Ts'ets'aut	ts'é:ʔ
Interior Canada	Kaska (DL)	ts'i
Interior Canada	Kaska (FL)	ts'i
Interior Canada	Kaska (GHL)	ts'i
Interior Canada	Kaska (L)	ts'i
Interior Canada	Kaska (LL)	ts'i
Interior Canada	Kaska (P)	ts'i
Interior Canada	Kaska (RR)	ts'i
Interior Canada	Hare	ts'i
Interior Canada	Mountain	ts'i
Interior Canada	South Slavey	ts'ɪ
Interior Canada	Dene Dháh	ts'íé
Central BC	Carrier	ts'i
Central BC	Witsuwit'en	ts'ec
Central BC	Chilcotin	ts'i
Pacific Coast	Hupa	ʃ'e:k'
Pacific Coast	Galice	ʃ'i:ʃ'
Pacific Coast	Tolowa	tr'i:k'
Pacific Coast	Tututni	tsr'ik'
Apachean	S. Carlos A.	ʃ'íʔ
Apachean	Jicarilla A.	ʃ'ě
Apachean	Mescalero A.	ʃ'ii

Table 100. Non-Dene *INTESTINES*

Branch / Language	Form
Eyak	'lahs
Tlingit	nàsí
Ket	* ^h utul / * ^h utûli

4.4.6.1 Initial consonant

Across the Dene data, the initial consonant is consistently an ejective affricate, realized primarily as [ts'] or [tʃ̥]. These two surface realizations are not independent or competing onsets. Rather, they reflect regular branch-level reflexes of a single inherited ejective, exactly in line with Krauss' treatment of alveolar and palato-alveolar obstruent correspondences. Under this analysis, alternations between alveolar [ts'] and palatal [tʃ̥] do not require positing multiple proto-segments and are expected outcomes of well-attested phonological developments within Dene (Krauss 1964: 119-121).

The distribution of these reflexes supports this interpretation. Many Alaska, Interior Canada, and BC languages preserve [ts'] in forms such as *ts'ik*, *ts'i:k*, and *ts'ek*, while Pacific Coast and Apachean languages regularly show [tʃ̥], as in *ʃ'e:k'*, *ʃ'iʔ*, and *ʃ'ii*. Importantly, ejectivity is maintained across all reflex types. Comparable behavior involving ejectives in onset position, is also observed in other lexical sets in the broader dataset, such as 'bone' (section 4.1.4) and 'sinew' (section 4.1.7).

A small number of forms introduce additional complexity without undermining the overall pattern. Tolowa *tr'i:k'* and Tututni *tsr'ik'* preserve ejectivity but include a rhotic element. These are best interpreted as secondary cluster developments or segmental reinterpretations built on the same affricate base. Hän *ts'û:ʔ* departs more noticeably in both vowel and coda, but its initial [ts'] still aligns it with the broader Dene pattern.

Eyak *'lahs* and Tlingit *nàsɪ* are formally divergent and lack an ejective affricate onset. With the dataset alone, there is no secure basis for determining whether these forms are related to the Dene set or represent independent lexical items. Accordingly, they are treated as unresolved outliers rather than forced into the same correspondence set.

Proto-Yeniseian **t^hutul* is also divergent in overall shape, but the initial consonant warrants cautious attention. Vajda's work indicates that plain or aspirated [t] in Yeniseian, particularly in Kott, can correspond to ejective affricates in Proto-Dene. While this does not establish cognacy for the entire word, it makes the initial [t]/[t^h-] in Proto-Yeniseian a potentially meaningful correspondence rather than a coincidental similarity (2010: 46).

4.4.6.2 Vowel

The vowel across the Dene set is overwhelmingly a high front vowel. Most languages show [i] or [i:], as in *ts'ik*, *ts'i:k*, *ʃ'ii*, and reduced *ts'i*. This strong consistency across geographically and genetically diverse branches supports reconstruction of a proto-vowel [**i*] for the Dene set.

Forms with [e] or [e:], such as *ts'ek*, *ts'ec*, and *ts'é:ʔ*, are best understood as regular vowel lowering or fronting adjustments at the branch level rather than evidence for a distinct proto-vowel. The alternation between [i] and [e] is limited and patterned, and it does not disrupt the overall cohesion of the dataset.

Apachean introduces additional vowel-side variation, including nasalization in Jicarilla *ʃ'ẽ* and lengthened or reduplicated in Mescalero *ʃ'ii*. These developments are plausibly tied to the loss of a final consonant and the resulting phonological rebalancing of syllable weight, rather than to inheritance of a different vowel nucleus.

4.4.6.3 Final consonant

A final velar consonant is common across much of the Dene dataset. Many Alaska, Pacific Coast, and Apachean languages show [k] or [k'], as in *ts'ik*, *ts'i:k*, *ʃ'e:k'*, *tr'i:k'*, and *tsr'ik'*. In contrast, a large Interior Canada block, along with some other Northern Dene languages, shows systematic reduction or complete loss of the final consonant, yielding forms like *ts'i*.

This distribution strongly suggests that the absence of a final consonant reflects secondary coda loss. The presence of a velar stop across multiple distant branches argues in favor of reconstructing a proto-coda [k] or [k'], with later deletion in specific subgroups.

What remains unclear is the original laryngeal specification of the coda. Pacific Coast forms consistently show ejective [k'], while much of Alaska shows plain [k], with the exception of Dena'ina *ʃ'ik'*. With only this dataset, it is not possible to determine decisively whether ejectivity is inherited and later lost in some branches, or innovated.

4.4.6.4 Discussion

The Dene forms for 'intestines' show strong internal cohesion, characterized by an inherited ejective affricate onset, a high front vowel [i], and an originally present velar coda that has been variably preserved or lost across branches. The [ts'] ~ [tʃ] alternation is fully consistent with established correspondence patterns. Vowel variation is limited and patterned, supporting reconstruction of a single proto-vowel with predictable branch-level adjustments.

Eyak and Tlingit remain formally divergent, and with the dataset alone, their relationship to the Dene forms cannot be securely established. Proto-Yeniseian **tʰutul* differs substantially in overall shape, but the initial [t]/[tʰ] aligns in an intriguing way with the Dene ejective affricate onset, in line with Vajda's observations. This correspondence is suggestive but limited to the initial consonant and should not be extended to the rest of the word without further evidence.

Overall, the safest conclusion is that ‘intestines’ represents a stable inherited root within Dene, with unresolved and cautiously framed external comparisons.

*Table 101. Reconstruction of *INTESTINES*₁*

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*t ^h utul
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*ts'ik
Proto-Northern-Dene	*ts'ik
Proto-Alaska-Dene	*ts'ik
Proto-Yukon-Dene	*ts'ik
Proto-Interior-Canada-Dene	*ts'i
Proto-Central-BC-Dene	*ts'i:
Proto-Pacific-Coast-Dene	*ɣ'ik'
Proto-Apachean-Dene	*ɣ'i

4.4.7 Gallbladder

For this term, most of the Dene languages appear to use the same lexical item for both ‘gall’ and ‘gallbladder’, rather than maintaining two clearly distinct stems. That is also true of Eyak and Tlingit, where no separate term for ‘gallbladder’ was identified in the material provided. This pattern is consistent with Snoek’s observation that many languages co-lexicalize ‘gallbladder’ with the same form used for ‘gall’, and that the more frequent or basic association is with ‘gall’, from which the ‘gallbladder’ meaning appears to have been secondarily extended (Snoek 2015: 174). The present set should therefore be interpreted with that semantic overlap in mind: the phonological comparison concerns a stem that often denotes both the substance and the organ.

Table 102. *GALL₁ (GALLBLADDER)*

Branch	Language	Form
Alaska	Koyukon	tl’əts
Alaska	Dena’ina (Iliamna)	tl’əŋʷ
Alaska	Dena’ina (Inland)	tl’əŋʷ
Alaska	Dena’ina (OCI)	tl’əŋʷ
Alaska	Dena’ina (UCI)	tl’əŋʷ
Alaska	Hän	tl’ôʔ
Alaska	Upper Kuskokwim	tl’its’
Yukon	Northern Tutchone	tl’óʔ
Yukon	Southern Tutchone	tl’ir
Interior Canada	Mountain	tl’óv
Interior Canada	Tłıchǫ	tl’ò:
Interior Canada	South Slavey	tʰl’éz
Interior Canada	Dene Dháh	tl’héts
Interior Canada	Sekani	tl’ats

Table 103. *Non-Dene GALLBLADDER*

Branch / Language	Form
Eyak	le’xtl’
Tlingit	tèyí
Ket	-

4.4.7.1 Initial Consonant

The Dene evidence is highly consistent in pointing to an initial ejective lateral affricate [tɬ']. This onset is found across the main Dene dataset, including Koyukon *tɬ'əts*, Dena'ina *tɬ'əʃ'*, Hän *tɬ'ôʔ*, Upper Kuskokwim *tɬ'its'*, Northern Tutchone *tɬ'óʔ*, Southern Tutchone *tɬ'ir*, Mountain *tɬ'óv*, Tłı̨chǫ *tɬ'ò:*, and Sekani *tɬ'ats*. South Slavey *tʰł'éz* and Dene Dháh *tʰéts* show aspirated lateral reflexes rather than the plain ejective pattern, but they still belong to the same lateral-affricate correspondence set.

Eyak *le'xtɬ'* should be included in the comparison. Its initial [ɬ] can be understood as corresponding to the lateral component of the Dene ejective lateral affricate onset, with loss of the initial stop component. The Dene forms consistently point to an onset of the shape [tɬ'] or a closely related lateral affricate, and Eyak therefore supports the same lateral onset pattern at the Proto-Dene-Eyak level, even if the stop element is not directly preserved in the Eyak reflex.

Tlingit *təyí* begins with [t] and lacks the lateral component entirely, so it should be treated as unrelated. No usable Yeniseian form was identified for this term. As a result, the Yeniseian side of the comparison remains unresolved, and the reconstruction cannot presently be extended beyond the Dene, or at most tentative Dene-Eyak, level.

4.4.7.2 Vowel

The vowel pattern is less uniform than the onset. Koyukon *tɬ'əts* and the Dena'ina forms *tɬ'əʃ'* show [ə], while Upper Kuskokwim *tɬ'its'* has [i]. Northern Tutchone *tɬ'óʔ*, Mountain *tɬ'óv*, and Tłı̨chǫ *tɬ'ò:* show [o]-type vowels, while Hän *tɬ'ôʔ* has [ö], Southern Tutchone *tɬ'ir* has [ɪ], South Slavey *tʰł'éz* and Dene Dháh *tʰéts* have [e], and Sekani *tɬ'ats* has [a]. This distribution points to a relatively unstable vowel, with reflexes ranging across central, front, and back qualities.

Because the vowel reflexes are so varied, the vowel cannot be reconstructed with the same confidence as the initial consonant. The strongest recurring values are centralized [ə], front [i/e], and back rounded [o]-type vowels. A cautious Proto-Dene reconstruction should therefore avoid forcing a single precise vowel. A reduced or central vowel such as [*ə] is a reasonable working option, but [*i] also remains possible if the front-vowel forms are treated as more conservative. The [o]-type forms are too widespread to ignore, especially in Tutchone and Interior languages, but they may reflect later branch-level developments. For this reason, the Proto-Dene vowel should remain tentative.

4.4.7.3 Final Consonant

The final consonant shows more variation than the onset, but the strongest recurring pattern is a sibilant or affricate-like element. Koyukon *tł'əts*, Dene Dháh *tł'héts*, and Sekani *tł'ats* end in [ts], while Upper Kuskokwim *tł'its'* preserves ejective [ts']. The Dena'ina forms *tł'əʃ'* end in ejective [ʃ̚], which still belongs to the same broader affricate pattern. South Slavey *tʰl'éz* shows [z], likely a reduced or voiced sibilant outcome. These forms suggest that the earlier stem contained a final sibilant or affricate, probably [ts]-type, with ejectivity preserved in some branches and lost or reduced in others.

Other languages show more divergent finals. Hän *tł'ôʔ* and Northern Tutchone *tł'óʔ* end in [ʔ], which may reflect reduction of an earlier final consonant. Tłı̨chq *tł'ò:* has no overt final consonant, suggesting further loss. Southern Tutchone *tł'ir* and Mountain *tł'óv* are less straightforward, since [r] and [v] do not fit the main ejective affricate pattern cleanly. They should be treated as language-specific developments.

Eyak *le'xtł'* also provides support at the final consonant level. Its final [tɬ'] is not an outlier, since the Dene forms show affricate-like final material in [ts], [ts'], [ʃ̚], and [z]. The Eyak final

preserves the lateral affricate quality, while Dene preserves a sibilant or palato-alveolar affricate outcome. This suggests that the wider Dene-Eyak comparison involves an older affricate-type final, with later branch-specific developments affecting its precise realization.

4.4.7.4 Discussion

The forms for ‘gallbladder’ and ‘gall’ should be treated as one lexical set, since the two datasets are virtually identical. The same Dene, Eyak, and Tlingit forms occur in both entries, and the separate ‘gall’ entry does not add independent evidence. This suggests that the distinction between ‘gall’ and ‘gallbladder’ is not consistently lexicalized in the comparative material, and that the same stem can cover both the organ and the substance associated with it.

Within Dene, the strongest reconstructible feature is the initial ejective lateral affricate [**tʰ*]. The final consonant probably contained a sibilant or affricate-like element, likely [**ts*] or [**tʰ*], considering Eyak. The vowel is the weakest part of the reconstruction and should be left tentative, with [**ə*] or [**i*] as possible working options.

A cautious Proto-Dene reconstruction can therefore still be represented as **tʰʔts* or **tʰʔts*, depending on how the vowel is interpreted. With Eyak *leʔxtʰ* included, the comparison can also be extended to Proto-Dene-Eyak at least for the lateral-affricate onset and affricate-type final structure, though the exact final consonant remains less specific at that level. Tlingit *təyí* is too different in both onset and final structure to be included. Since there is no usable Yeniseian evidence, the reconstruction should remain at the Proto-Dene-Eyak level.

Table 104. Reconstruction of *GALL*₁ (*GALLBLADDER*)

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	*tɬ'əts ~ *tɬ'ətɬ' ?
Proto-Dene	*tɬ'əts ~ *tɬ'its ~ *tɬ'əʃʷ
Proto-Northern-Dene	-
Proto-Alaska-Dene	*tɬ'əts ~ *tɬ'əʃʷ
Proto-Yukon-Dene	*tɬ'óʔ ~ *tɬ'ir
Proto-Interior-Canada-Dene	*tɬ'əts ~ *tɬ'ots
Proto-Central-BC-Dene	-
Proto-Pacific-Coast-Dene	-
Proto-Apachean-Dene	-

4.5 Effluvia

4.5.1 Blood

Table 105. BLOOD₁

Branch	Language	Form
Alaska	Deg Xinag	tił
Alaska	Dena'ina (UCI)	təl
Alaska	Ahtna	təl
Alaska	Holikachuk	tił
Alaska	Gwich'in (Teetl'it)	tah
Alaska	Gwich'in (Gwichya)	tah
Alaska	Hän	təw
Alaska	Upper Kuskokwim	dił
Alaska	Upper Tanana	dəɬ
Alaska	Tanacross	təl?
Yukon	Northern Tutchone	təl
Yukon	Southern Tutchone	tíli?
Yukon	Tahltan	dəl
BranchIsolate1	Tagish	tíl
BranchIsolate2	Ts'ets'aut	tól
Interior Canada	Kaska (DL)	tel
Interior Canada	Kaska (FL)	tel
Interior Canada	Kaska (GHL)	tal
Interior Canada	Kaska (L)	tal
Interior Canada	Kaska (LL)	tal
Interior Canada	Kaska (P)	tel
Interior Canada	Kaska (RR)	tel
Interior Canada	Hare	tél
Interior Canada	Mountain	tel
Interior Canada	Bearlake	tel
Interior Canada	Tłchq	do:
Interior Canada	South Slavey	tel
Interior Canada	Dene Słiné	tel
Interior Canada	Dene Dháh	tel
Interior Canada	Beaver	dəl
Interior Canada	Sekani	tal
Central BC	Chilcotin	dəl
BranchIsolate3	Tsuut'ina	tíł
Pacific Coast	Galice	tał
Pacific Coast	Tututni	təł
Pacific Coast	Kwa-Clat	tił
Apachean	Navajo	tił
Apachean	Western A.	tił
Apachean	S. Carlos A.	tił

Apachean	Jicarilla A.	tił
Apachean	Kiowa A.	dił
Apachean	Lipan A.	tel

Table 106. Non-Dene BLOOD

Branch / Language	Form
Eyak	dəł / dił
Tlingit	ʃé
Ket	*su:l

4.5.1.1 Initial Consonant

Across the Dene languages, the word for ‘blood’ begins overwhelmingly with an alveolar stop, either voiceless [t] or voiced [d]. This is true in every major branch. Alaska Dene shows consistent [t] or [d] reflexes, including Deg Xinag *tił*, Dena’ina *təl*, Ahtna *tel*, Holikachuk *tił*, Upper Kuskokwim *dił*, Upper Tanana *dəɬ*, Gwich’in *tah*, and Hän *təw*. The British Columbia and Interior Canada languages likewise display the same pattern: Northern Tutchone *təl*, Southern Tutchone *tlił*?, Kaska *tel* or *tal*, Tagish *tił*, Tahltan *dél*, and the BC isolates (e.g., Ts’ets’aut *təl*). Pacific Coast Dene continues this pattern with forms like Galice *tal*, Tututni *təl*, and Kwa-Clat *tił*. In the Apachean languages, the same onset is retained: Navajo *tił*, Jicarilla *tił*, Kiowa Apache *dił*, and Lipan *tel*. This consistency across every subbranch indicates a stable proto-initial alveolar stop.

Eyak also aligns with the dental series: *dəł* and *dił*. This points to a simple Proto-Dene-Eyak [*d]. Tlingit presents a different situation. The expected Na-Dene dental onset is not present, and instead, Tlingit has *ʃé* with a postalveolar fricative onset [ʃ]. This is, however, non-trivial and must be interpreted within known Tlingit sound changes and lexical replacement patterns. The transition from an alveolar stop to a fricative can be seen elsewhere in this paper, for example section 4.2.1 ‘Head’. The Tlingit postalveolar fricative onset [ʃ] is best understood as a branch-specific spirantization of the same proto-onset rather than an unrelated innovation. The simplest explanation is that Tlingit underwent an early fricativization of an inherited alveolar stop.

Proto-Yeniseian, as reconstructed by Vajda, **su:l*, begins with [**s*]. Its place of articulation matches Tlingit’s fricativized onset, and given that both Tlingit [*ʃ*] and Yeniseian [*s*] are palato-alveolar fricatives, while Eyak and Dene preserve stops, the most economical Proto-Dene-Yeniseian reconstruction is an initial [**d*], which got retained in Eyak and Dene (where it underwent devoicing in some languages), and underwent independent spirantization in Tlingit and Proto-Yeniseian. An additional piece of evidence comes from the Proto-Yeniseian record. In his reconstruction, Vajda notes the Proto-Dene reconstructed root **dət* ‘blood’. In Ket the fossilized compound *del-es* ‘blood-sky’ preserves this **del* root even though the modern term for ‘blood’ is *su:l*. This retention of **del* as a frozen lexical relic, clearly cognate with the majority of Dene languages’ [*t*]/[*d*] initial forms, strongly supports the hypothesis that the original Proto-Dene-Yeniseian root was [**d*], which later underwent spirantization in some branches (e.g. to [*s*] in Yeniseian) (2010: 44). Thus, the presence of this compound gives independent cross-family support for the alveolar stop onset of the ancestral ‘blood’ root, reinforcing its alignment with the widespread Dene forms, as well as Tlingit.

And so, the proto-initial consonant is reconstructed as [**d*] for Proto-Na-Dene and Proto-Dene-Yeniseian. Eyak and much of Dene retained it, Tlingit spirantized it to [*ʃ*], and Proto-Yeniseian shifted it to [*s*].

Table 107. Dene-Yeniseian onset correspondence BLOOD₁

Branch	Reflex of [<i>*t</i>]
Dene	[<i>t</i>] / [<i>d</i>]
Eyak	[<i>d</i>]
Tlingit	[<i>ʃ</i>]
Proto-Yeniseian	[<i>*s</i>]

4.5.1.2 Vowel

Most forms contain a mid-front vowel [e] as in Dena'ina *təl*, Ahtna *təl*, Kaska *tel*, Hare *tél*, South Slavey *tel*, and Dene Sų́liné *tel*, or a low-central variant [a] as in Gwich'in *tah*, Kaska *tal*, Sekani *tal*, and Galice *tal*. The variation between [e] and [a] could be explained by conditioning from adjacent consonants and predictable lowering or centralization in some Alaska, Interior, and Pacific Coast branches.

The forms in Southern Tutchone *tíliʔ* and Tagish *tíl* show high front [i], which could be explained as a branch-specific development. Apachean shows the same high-front pattern even more consistently, with Navajo *tíl*, Western Apache *tíl*, San Carlos Apache *tíl*, Jicarilla Apache *tíl*, and Kiowa Apache *díl*, while Lipan Apache *tel* preserves the mid-front vowel. The main outlier is Tłı̨chų *do:*, where the vowel has shifted to [o:]. This form still belongs to the broader cognate set because the consonantal frame remains comparable, but the rounded vowel is best treated as a language-specific development rather than as central to the reconstruction.

Eyak alternates between [ə] and [i] (*dəl*, *díl*). Tlingit *shé* contains a mid-front vowel [e]. This could suggest that Tlingit may preserve the general vowel height even if other aspects of the form, such as the onset, have undergone innovation.

Proto-Yeniseian **su:l* contains a long high-back vowel, which does not directly match the mid-front vowel reflected in the Dene forms. This weakens the vowel correspondence, but it does not eliminate the comparison. The stronger points of alignment are the onset and the lateral fricative coda, both of which match the broader shape of the set more closely than the vowel does. Taken together, the simplest proto-vowel for Proto-Na-Dene is [**ə*] or [**e*]. This central or mid-front vowel yields the Dene e-vowel directly, undergoes raising in the high-vowel reflexes [i], yields lowering in Pacific Coast and some Alaska branches, and shifts to [**u:*] in Proto-Yeniseian.

Therefore, the vowel is reconstructed as [$*ə$] for Proto-Dene-Yeniseian, with fronting, raising, lowering, or backing depending on branch-specific innovations.

4.5.1.3 Final Consonant

Many Dene languages preserve a lateral or lateral fricative-like coda: *tił* (Deg Xinag, Holikachuk, Navajo), *dił* (Upper Kuskokwim), *dəɫ* (Upper Tanana), *tił* (Kwa-Clat), *tał* (Galice), and similar forms such as *təl*, *tel*, *tal* in interior languages where the lateral has weakened or vocalized. Southern Tutchone *tiliʔ* and Tanacross *telʔ* preserve a glottal stop after the lateral. The presence of [ɭ], [ɮ], [l], and [ʔ] across the Dene branches reflects a common pattern of coda lenition and disappearance, particularly in the shift from earlier lateral or fricative codas toward vocalization or glottalization.

Eyak preserves the lateral fricative directly in *dəł* and *dił*. The presence of [ɭ] aligns Eyak with the most conservative Dene forms, indicating that the proto-coda must have been lateral and fricative.

Tlingit /*ǵ*/ ends in a vowel and lacks any lateral or fricative coda. This is not by itself problematic. Crippen notes that in Tlingit, historical consonantal or laryngeal material is not always preserved as an audible final consonant. In some cases, it is reflected indirectly through vowel length, tone, or glottalization. Tongass Tlingit, for example, preserves a conservative nontonal system of short, long, glottalized, and fading vowel nuclei, while other dialects show corresponding tonal reflexes. Several stem-variation suffixes are not segmentally realized in most dialects, but instead surface through changes in vowel length and tone (Crippen 2010: 122-124). The vowel-final shape of Tlingit /*ǵ*/ therefore does not by itself exclude comparison with forms that preserve a final consonant elsewhere.

The Proto-Yeniseian form **su:l* ends in [**ɭ*], which is crucial corroboration. The lateral fricative coda is preserved intact in Yeniseian. This precise match between Proto-Yeniseian and the conservative Eyak and Dene reflexes strongly supports reconstructing a lateral fricative [**ɭ*] at the Proto-Dene-Yeniseian level.

Within the Na-Dene family, the chain of coda developments is straightforward:

**ɭ* > ɭ in conservative branches (retention across several branches)

**ɭ* > ɮ in Upper Tanana

**ɭ* > l in many Canadian and BC branches

**ɭ* > ʔ or Ø in languages with coda loss or glottalization (Tanacross, Southern Tutchone, Tlingit)

Because both Eyak and Proto-Yeniseian preserve [**ɭ*] directly, and because every Dene reflex is compatible with expected loss or lenition from a lateral fricative, the coda must be reconstructed as [**ɭ*] for Proto-Na-Dene and Proto-Dene-Yeniseian.

Table 108. Reconstruction of BLOOD₁

Proto-Language	Form
Proto-Dene-Yeniseian	*dɔɭ
Proto-Yeniseian	*sū:ɭ
Proto-Na-Dene	*dɔɭ
Proto-Dene-Eyak	*dɔɭ
Proto-Dene	*dɔɭ ~ *tɔɭ
Proto-Northern-Dene	*tel
Proto-Alaska-Dene	*tɔɭ ~ *tɔɭ
Proto-Interior-Canada-Dene	*tel ~ *tal
Proto-BC-Dene	*tel
Proto-Central-BC-Dene	*tel
Proto-Pacific-Coast-Dene	*taɭ
Proto-Apachean-Dene	*tiɭ

4.5.2 Excrement

Table 109. EXCREMENT

Branch	Language	Form
Alaska	Deg Xinag	t ^{rh} on?
Alaska	Koyukon	tsɔn?
Alaska	Dena'ina (Iliamna)	ʃun
Alaska	Dena'ina (Inland)	ʃ ^h un
Alaska	Dena'ina (OCI)	ʃ ^h un
Alaska	Dena'ina (UCI)	ʃ ^h un
Alaska	Ahtna	ts ^h ɑ:n?
Alaska	Holikachuk	ts ^h on?
Alaska	Hän	trǎ?
Alaska	Upper Kuskokwim	t'on
Alaska	Upper Tanana	ts ^h â:n?
Alaska	Tanacross	ts ^h ã:?
Yukon	Northern Tutchone	ts ^h én?
Yukon	Southern Tutchone	sân
Interior Canada	Kaska (DL)	ts ^h ó̃:n
Interior Canada	Kaska (FL)	ts ^h ó̃:n
Interior Canada	Kaska (GHL)	ts ^h ó̃:n
Interior Canada	Kaska (L)	ts ^h ó̃:n
Interior Canada	Kaska (LL)	ts ^h ó̃:n
Interior Canada	Kaska (P)	ts ^h ó̃:n
Interior Canada	Kaska (RR)	ts ^h ó̃:n
Interior Canada	Hare	só?
Interior Canada	Bearlake	tsó
Interior Canada	Tłıchǫ	tsǒ
Interior Canada	South Slavey	ts ^h ō
Interior Canada	Dene Słı́né	ts ^h ã
Interior Canada	Dene Dháh	ts ^h on
Interior Canada	Sekani	ts ^h ō̃?
Central BC	Carrier	ts ^h an
Central BC	Witsuwit'en	ts ^h an
Central BC	Chilcotin	tsáen
BranchIsolate3	Tsuut'ina	ts ^h ò
Pacific Coast	Hupa	ʃ ^w ʌn?
Pacific Coast	Galice	ʃɑ:n
Pacific Coast	Mattole	txɑ:n
Apachean	Navajo	ʃ ^h á:?

Apachean	Jicarilla A.	tʃ ^h ã
Apachean	Mescalero A.	tʃ ^h ã:n

Table 110. Non-Dene EXCREMENT

Branch / Language	Form
Eyak	tʃ ^h e'
Tlingit	ł'íl' / háatl'
Ket	*p ^h oʔq

4.5.2.1 Initial Consonant

Across Dene, the dominant onset is an aspirated alveolar affricate, which is more often than not, aspirated [ts^h]: Koyukon *tsʷnʔ*, Ahtna *ts^ha:nʔ*, Holikachuk *ts^honʔ*, Upper Tanana *ts^hâ:nʔ*, Tanacross *ts^hã:ʔ*, Northern Tutchone *ts^hénʔ* and the broad Interior Canada set *ts^hô:n*, *ts^hô*, *ts^hã*, *ts^hon*, *ts^hôʔ*. In several Alaska varieties the affricate onset is accompanied by rhoticity or a rhotic segment: Deg Xinag *t^{rh}onʔ*, Upper Kuskokwim *t^{rh}on*, Hän *trãʔ*. These are best treated as cluster-like or rhoticized realizations within the same palato-alveolar affricate.

Palatal and postalveolar affricates also occur [tʃ^h]: Dena'ina has *tʃun* and *tʃ^hun* across dialects, while Pacific Coast and Apachean likewise show *tʃ^wʌnʔ* (Hupa) and *tʃ^hã:ʔ*, *tʃ^hã*, *tʃ^hã:n* (Apachean). Additional Pacific Coast reshaping includes Galice *ʃa:n* and Mattole *txa:n*. There are also two instances that reflect weakening of the inherited affricate into a simple fricative. Southern Tutchone *sàn* and Hare *sôʔ* lack a stop component entirely, indicating reduction from an earlier [ts]-type onset.

Eyak *tʃ^he'* shows a palatal affricate onset that aligns directly with the [tʃ]-type forms found in several Dene branches, indicating that palatal affricates are not isolated innovations within Dene but part of the broader onset space associated with this root.

Within Dene itself, alveolar affricates of the [ts]-type are by far the most widespread outcome across Alaska, Interior Canada, Central BC, Pacific Coast, and Apachean, while palatal

affricates appear in a smaller but recurrent subset of branches. Despite this distributional dominance of [ts], the presence of a palatal affricate in Eyak, together with its repeated appearance within Dene, supports the hypothesis that the higher-level inherited onset was palatal-affricate in character, with much of the Dene domain later realizing it as alveolar [ts], and a few languages continuing along a weakening path to simple fricatives [s].

Tlingit *ł'íl' / háatt'* does not align well with the Dene-Eyak set. Neither form preserves the expected affricate/fricative onset pattern or the nasal final pattern found across Dene, so Tlingit should not be used as evidence for extending this reconstruction to Proto-Na-Dene.

Proto-Yeniseian **p^ho[?]q*, likewise is formally too different from the Dene-Eyak material. Its initial [**p^h*] and final [**q*] do not match the main Dene pattern, and there is no clear basis for connecting it to Eyak *ʃ'e'*. As a result, the highest plausible level for this term is probably Proto-Dene-Eyak, while Proto-Na-Dene and Proto-Dene-Yeniseian remain unsupported.

4.5.2.2 Vowel

The nucleus is overwhelmingly back or low-back across the dataset, most often [o] or [ɑ], with length and nasalization varying by branch and by individual language. Alaska and much of Interior Canada strongly favor [o]-type vowels (for example *ts^hon?*, *ts^hō^ːn*, *ts^hon*), while [ɑ]-type vowels are also well represented in Alaska and become especially clear in several Central BC and Pacific Coast reflexes (for example Ahtna *ts^ha:n?*, Carrier *ts^han*, Witsuwit'en *ts^han*, Galice *ʃa:n*, Mattole *txa:n*). The [u]-type vowel in Dena'ina *ʃ^(h)un* and the reduced vowel in Hupa *ʃ^wʌn?* look like localized vowel outcomes within the same root.

Nasalization is frequent in Interior Canada and Apachean (for example Hare *sō?*, Bearlake *tsō*, South Slavey *ts^hō*, Dene Sųłiné *ts^hā*, Navajo *ʃⁿā^ː?*), and this distribution is compatible with a common pathway in which loss or weakening of a final nasal segment [n] leaves nasalization on

the vowel. The most cautious Proto-Dene statement is therefore a back or low-back nucleus [^{*}o] or [^{*}ɑ].

4.5.2.3 Final Consonant

Most Dene forms preserve a final nasal, usually [n], often paired with a glottal stop: Koyukon *tsʌnʔ*, Ahtna *tsʰa:nʔ*, Holikachuk *tsʰonʔ*, Deg Xinag *tʰonʔ*, Kaska *tsʰǝ:n*, Carrier *tsʰan*, Witsuwit'en *tsʰan*, Chilcotin *tsáen*, Mattole *txa:n*, Mescalero *ʃʰǎ:n*. Several Interior Canada forms suggest reduction away from an overt final [n], either to [ʔ] with nasalization remaining on the vowel (Hare *sǝʔ*, Sekani *tsʰǝʔ*) or to a zero-coda outcome (Tsuut'ina *tsʰò*) that can be aligned with the same reduction pathway. Proto-Dene can be reconstructed with a final nasal [^{*}n], reflected overtly in the majority of languages and indirectly in those varieties where the nasal is reduced to a glottal stop or lost with compensatory vowel nasalization.

4.5.2.4 Discussion

Eyak *ʃ'e'* aligns closely with the Dene root in its palatal affricate onset, supporting the interpretation that affricate material is inherited rather than a secondary development within Dene. The final glottal stop is compatible with the same coda reduction pattern seen widely in Dene, where a final nasal is preserved in many languages but is weakened to [ʔ] or lost in others, and Eyak can be treated as another outcome of that pathway without implying that nasalization must be present on the surface.

Tlingit *ł'íl'* / *háatl'* do not resemble the Dene palato-alveolar affricate set in either onset type or overall shape, and they provide no direct leverage for connecting this Dene root to a Tlingit cognate candidate without additional bridging evidence. Proto-Yeniseian **pʰoʔq* likewise does not align with the Dene onset pattern centered on [ts]-type affricates and offers no support for

extending the Dene reconstruction to the Proto-Dene-Yeniseian level on the basis of this item alone.

Table 111. Reconstruction of EXCREMENT

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	*p ^h oʔq
Proto-Na-Dene	-
Proto-Dene-Eyak	*ʃ ^h un ~ *ts ^h onʔ ~ *ʃ ^h en
Proto-Dene	*ʃ ^h un ~ *ts ^h onʔ
Proto-Northern-Dene	*ʃ ^h un ~ *ts ^h onʔ
Proto-Alaska-Dene	*ʃ ^h un ~ *ts ^h onʔ
Proto-Interior-Canada-Dene	*ts ^h ó:n
Proto-BC-Dene	*ts ^h énʔ
Proto-Central-BC-Dene	*ts ^h an ~ *ts ^h on
Proto-Pacific-Coast-Dene	*ʃ ^h a:n ~ *ʃ ^h Λ:n
Proto-Apachean-Dene	*ʃ ^h ã:n

4.5.3 Flatus

Table 112. *FLATUS_I*

Branch	Language	Form
Alaska	Deg Xinag	tʃ'it
Alaska	Koyukon	tʃ'ət
Alaska	Dena'ina (Inland)	tʃ'ət'
Alaska	Dena'ina (OCI)	tʃ'ət'
Alaska	Dena'ina (UCI)	tʃ'ət'
Alaska	Ahtna	tʃ'et'
Alaska	Hän	tʃ'it
Interior Canada	Kaska (DL)	tʃ'i:t
Interior Canada	Kaska (FL)	tʃ'i:t
Interior Canada	Kaska (GHL)	tʃ'i:t
Interior Canada	Kaska (L)	tʃ'i:t
Interior Canada	Kaska (LL)	tʃ'i:t
Interior Canada	Kaska (P)	tʃ'i:t
Interior Canada	Kaska (RR)	tʃ'i:t
Interior Canada	Hare	ʃir
Interior Canada	Dene Dháh	tʃ'i
Interior Canada	Sekani	tʃ'it
Central BC	Witsuwit'en	tʃ'ət
Apachean	Navajo	tʃ'it
Apachean	Jicarilla A.	tʃ'it

Table 113. *Non-Dene FLATUS*

Branch / Language	Form
Eyak	tʃ'inʔt'
Tlingit	qʷaʔ' / kutʃ'
Ket	kʌttij

4.5.3.1 Initial Consonant

The Dene forms strongly support an initial ejective lateral affricate [**tʃ'*]. This onset is found in Alaska forms such as Deg Xinag *tʃ'it*, Koyukon *tʃ'ət*, Dena'ina *tʃ'ət'*, Ahtna *tʃ'et'*, and Hän *tʃ'it*; in Interior and Central BC forms such as Kaska *tʃ'i*, Dene Dháh *tʃ'i*, Witsuwit'en *tʃ'ət*, and Sekani *tʃ'it*; and in Apachean forms such as Navajo *tʃ'it* and Jicarilla Apache *tʃ'it*. Hare *ʃir* is the only

Dene form that diverges clearly from the main [tɬ'] onset pattern. Since the rest of the form still fits the broader comparison, the initial [ʃ] is best treated as a language-specific development rather than as evidence for a separate root. No Pacific Coast forms are available in the present dataset, so this branch cannot be used in the reconstruction of this term.

The Eyak evidence is indirect but important. The ordinary lexical entry for 'flatus' was not available, but the Eyak form *qa: 'i:ntl'in't'*, meaning 'bee/bumblebee' is glossed as 'it farts on our face'. Within this form, the element *-tl'in?t'* contains initial [tɬ'], and matches in overall form with the Dene data very closely. The internal segmentation of the Eyak form is not fully clear, and the nasal [n] inside the form remains difficult to explain. Still, the presence of [tɬ'] in a form explicitly connected with 'flatus/fart' provides enough evidence to include Eyak in the comparison. On this basis, the initial consonant can probably be reconstructed at least to Proto-Dene-Eyak as [*tɬ'].

4.5.3.2 Vowel

The Dene vowel is most often high front [i]. This appears in Deg Xinag *tɬ'it*, Hän *tɬ'it*, Kaska *tɬ'i*, Sekani *tɬ'īt*, Navajo *tɬ'it*, and Jicarilla Apache *tɬ'it*. Several forms show centralized or lowered vowels, including Koyukon *tɬ'ət*, Dena'ina *tɬ'ət'*, Ahtna *tɬ'et'*, and Witsuwit'en *tɬ'ət*. These variants remain close enough to the dominant [i]-type pattern to be treated as later developments rather than evidence for a separate vowel.

Sekani *tɬ'īt* is the only Dene form in this set with vowel nasalization. This may be a language-specific development, but it is notable that the Sekani nasalized vowel corresponds to the otherwise unexplained nasal [n] in the Eyak element *-tl'in't'*. One tentative possibility is that an older nasal element was present at the Dene-Eyak level, retained directly in Eyak and reflected only as vowel nasalization in Sekani, while being lost elsewhere in Dene. This remains uncertain, but it may help explain why Sekani and Eyak both show nasal material in a set where all other

Dene forms do not. The Eyak element *-tl'in't'* also contains [i], which supports reconstructing a high front vowel [*i], at least for Proto-Dene and probably for Proto-Dene-Eyak as well.

4.5.3.3 Final Consonant

Most Dene forms preserve a final alveolar stop. Deg Xinag *tl'it*, Koyukon *tl'ət*, Hän *tl'it*, Kaska *tl'i*, Sekani *tl'it*, Witsuwit'en *tl'ət*, Navajo *tl'it*, and Jicarilla Apache *tl'it* all show final [t]. Dena'ina *tl'ət'* and Ahtna *tl'et'* show ejective [t'], which may either preserve an older ejective coda or reflect an Alaska-specific development. Dene Dháh *tl'i* lacks the final consonant, which is best treated as loss of the coda in that variety.

The Eyak element *-tl'in't'* also supports the reconstruction of a final alveolar stop, since it ends in ejective [t']. The unexplained nasal [n] complicates the internal structure of the form, but it does not obscure the basic match in final consonant type. Eyak therefore preserves the same final stop found across much of the Dene evidence, with the additional nasal material requiring separate explanation.

4.5.3.4 Discussion

The Dene evidence supports a reconstruction of the approximate shape *t'it or *t'it'. The onset is especially strong, with [t'] recurring across Alaska, Interior Canada, Central BC, and Apachean. The vowel is also fairly stable, with [i] as the most likely reconstruction. The final consonant was probably an alveolar stop, either [*t] or [*t'].

Eyak provides a cautious but important extension beyond Dene. Although no simple independent Eyak word for 'flatus' is available here, the form *qa:'i:ntl'in't'*, 'bee/bumblebee', glossed as 'it farts on our face', contains the element *-tl'in't'*. This element matches the Dene material closely in its [t'] onset, [i] vowel, and final [t']. The internal nasal [n] is still not fully

explained, but it may be relevant given Sekani *tl'īt*, the only Dene form in this set with vowel nasalization. One tentative possibility is that an older nasal element was present at the Dene-Eyak level, retained directly in Eyak and reflected only as vowel nasalization in Sekani, while being lost elsewhere in Dene.

Because of this, the term can probably be reconstructed to Proto-Dene-Eyak, but the Eyak evidence should be presented with caution. Tlingit *qʷal' / kutf'* does not align with the main Dene-Eyak pattern and should not be used for reconstruction. A Proto-Yeniseian cognate was not identified for this term, but the modern Ket form *kattij* ‘butt noise’ provides a possible point of comparison. It does not correspond closely enough to the Dene-Eyak forms to support a Proto-Dene-Yeniseian reconstruction, although its resemblance to Tlingit *kutf'* is noteworthy and may warrant separate investigation. For the purposes of the present analysis, both the Tlingit and Ket forms are therefore left unconnected to the main cognate set. As a result, the comparison cannot presently be extended beyond Proto-Dene-Eyak.

Table 114. Reconstruction of *FLATUS*₁

Proto-Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	*tɬ'it' ~ *tɬ'i(n)t'
Proto-Dene	*tɬ'it' ~ *tɬ'i(n)t'
Proto-Northern-Dene	*tɬ'it'
Proto-Alaska-Dene	*tɬ'ət' ~ *tɬ'it'
Proto-Interior-Canada-Dene	*tɬ'i:t
Proto-BC-Dene	-
Proto-Central-BC-Dene	*tɬ'ət
Proto-Pacific-Coast-Dene	-
Proto-Apachean-Dene	*tɬ'it

4.5.4 Pus

Table 115. Reconstruction of *PUS*₁

Branch	Language	Form
Alaska	Deg Xinag	xiθ
Alaska	Koyukon	xəɫ
Alaska	Dena'ina (Iliamna)	həz
Alaska	Dena'ina (Inland)	həz
Alaska	Dena'ina (OCI)	həj
Alaska	Dena'ina (UCI)	χəz
Alaska	Ahtna	xiθ
Alaska	Holikachuk	xaoh
Alaska	Gwich'in (Teetl'it)	xoh
Alaska	Gwich'in (Gwichya)	xiθ
Alaska	Hän	xöh
Alaska	Upper Kuskokwim	his
Alaska	Upper Tanana	γuɬ
Yukon	Northern Tutchone	xo
Yukon	Southern Tutchone	γî
Interior Canada	Kaska (FL)	hes
Interior Canada	Kaska (GHL)	hes
Interior Canada	Kaska (L)	hēs
Interior Canada	Kaska (LL)	hes
Interior Canada	Kaska (P)	hes
Interior Canada	Kaska (RR)	hes
Interior Canada	Hare	xewi
Interior Canada	Mountain	xevi
Interior Canada	Bearlake	heweh
Interior Canada	T̥hçq̣	xe
Interior Canada	Sekani	xũz
Central BC	Carrier	xʌʒ̥
Central BC	Witsuwit'en	χəz
Central BC	Chilcotin	xað
BranchIsolate3	Tsuut'ina	jĩz
Pacific Coast	Hupa	xɪs
Apachean	Navajo	his
Apachean	Western A.	his

Table 116. *Non-Dene PUS*

Branch / Language	Form
Eyak	$\chi\partial s$
Tlingit	-
Ket	do'ŋ

4.5.4.1 Initial Consonant

The initial consonant is the clearest part of the set. Most Dene forms begin with either a velar or uvular fricative: *xiθ*, *xəl*, *χəz*, *xaoh*, *xoh*, *xö̃h*, *xewi*, *xevi*, *xe*, *xʌz̥*, *χəz*, *xũz*, *xað*, and *xɪs*. A smaller group shows weakened or altered reflexes: *həz*, *həj*, *his*, *hes*, and *yuh*, *yɪ̃*. Eyak also preserves a uvular fricative in *χəs*. The Tsut'ina form *jĩz* begins with a voiced palatal stop [j], which differs substantially from the fricative pattern seen elsewhere in the dataset.

Taken together, the most economical starting point is a proto-dorsal fricative rather than a stop or affricate. The widespread Alaska, Interior Canada, Central BC, Pacific Coast, and Eyak reflexes all support that conclusion. The forms with [h] are best treated as weakened branch reflexes of that older velar/uvular onset, while [ɣ] in Upper Tanana and Southern Tutchone remains within the same velar fricative range. Tsut'ina therefore stands apart from the general pattern but does not outweigh the overall distribution of fricatives across the rest of the dataset. At the Proto-Dene level, [$*\chi$] may be the better reconstruction, even though [x]-type reflexes are more widely represented across the dataset. The uvular value is supported by Dena'ina (UCI) in the Alaska branch and Witsuwit'en in Central BC, and it also matches the Eyak evidence. Since [χ] occurs in more than one Dene branch and is further supported by Eyak, it is preferable to reconstruct a uvular fricative at least tentatively, with [$*x$] treated as a later velarized outcome in much of Dene. No usable Tlingit evidence is available for this term. The only Yeniseian evidence is the modern Ket form *do'ŋ* 'pus', which is unlikely to be cognate with the Dene forms and is therefore best left

unconnected for the present analysis. As a result, the reconstruction can only be extended securely to Proto-Dene-Eyak, while Proto-Na-Dene and Proto-Dene-Yeniseian remain unresolved.

4.5.4.2 Vowel

The vowel is less stable than the onset. High and reduced vowels dominate the set: *xiθ*, *xəɫ*, *həz*, *həj*, *his*, *yuh*, *yî*, *hes*, *jîz*, *xis*, and *his*. Alongside these are several rounded or lowered reflexes such as *xoh*, *xöh*, *xo*, and *xaoh*, plus a few central or backed variants like *xɛ̞* and *xûz*. The Eyak form *χəs* shows a non-high vowel and therefore does not align neatly with the most frequent Dene pattern.

Within Dene, the strongest pattern is [i], [ɪ], and [ə]. That distribution is broad: Alaska, Interior Canada, Central BC, Pacific Coast, and Apachean all preserve forms of that general type. The [o]-like vowels appear concentrated in part of the northern branches and are less widely distributed. On that basis, the safest Proto-Dene statement is that the inherited vowel was high or reduced, most plausibly [*i] or a closely related centralized vowel. Since the broadest support comes from forms with [i]-type nuclei, that is the better working reconstruction, though not beyond doubt.

4.5.4.3 Final Consonant

The final segmental material is highly variable, but most forms still point toward an original coronal fricative in the dental-palato-alveolar range. Several languages preserve a clear sibilant: *həz*, *χəz*, *xɛ̞*, *χəz*, *xûz*, *his*, *hes*, *jîz*, *xis*, and Eyak *χəs*. Other languages show interdental or similar dental reflexes: *xiθ*, *xiθ*, and *xað*. A further group has weaker endings such as *xoh*, *xaoh*, *xöh*, *yuh*, while some forms reduce the ending even more: *xo*, *xe* and *yî*. The longer Interior Canada forms

xewi, *xevi*, and *heweh* appear to contain additional material and are harder to align directly segment by segment with the shorter reflexes.

The best shared denominator is therefore not a stop, lateral, or nasal, but a final alveolar fricative. The repeated presence of [s] and [z]-type endings across widely separated branches, together with Eyak final [s], makes it the safest reconstruction at the Proto-Dene-Eyak level. The interdental reflexes can be treated as branch-level outcomes within the same broad fricative range, and the [h] or zero endings likely represent weaker later reflexes. The expanded forms in Hare, Mountain, and Bearlake are best left as secondary reshaped developments rather than used to define the proto-coda.

4.5.4.4 Discussion

The onset is consistently a velar/uvular fricative [x] and [χ] across most of Dene and Eyak, and the coda is most plausibly a fricative, especially [s]. The main instability lies in the vowel, where high and reduced nuclei dominate but coexist with several rounded northern forms and the less easily comparable Eyak vowel.

If all of the forms are taken as reflexes of a single inherited term, the most economical Proto-Dene (and probably Proto-Dene-Eyak) reconstruction is *χis. The reconstruction can only be extended securely to Proto-Dene-Eyak, while Proto-Na-Dene and Proto-Dene-Yeniseian remain unresolved.

Table 117. Reconstruction of *PUS*₁

Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	*χ _{is} ~ *χ _{əs}
Proto-Dene	*χ _{is} ~ *χ _{əs}
Proto-Northern-Dene	*χ _{is} ~ *χ _{əs}
Proto-Alaska-Dene	*χ _{is} ~ *χ _{əs}
Proto-Interior-Canada-Dene	*x _{is} ~ *h _{es}
Proto-BC-Dene	*x _{əs} ~ *x _{is}
Proto-Central-BC-Dene	*χ _{əs}
Proto-Pacific-Coast-Dene	*x _{is}
Proto-Apachean-Dene	*h _{is}

4.5.5 Sweat

Table 118. *SWEAT*₁

Branch	Language	Form
Alaska	Dena'ina (Inland)	zil
Alaska	Dena'ina (OCI)	zil
Alaska	Dena'ina (UCI)	tʃil
Alaska	Ahtna	səl
Alaska	Upper Tanana	θi:lʔ
Yukon	Northern Tutchone	ðiáwʔ
Yukon	Southern Tutchone	ðəl
BranchIsolate2	Tahltan	θɛl
Interior Canada	Kaska (GHL)	zel
Interior Canada	Kaska (L)	zel
Interior Canada	Hare	wél
Interior Canada	South Slavey	ðel
Interior Canada	Dene Dháh	ðe:l
Interior Canada	Sekani	zal
Central BC	Witsuwit'en	zil
Apachean	Navajo	si:l

Table 119. *Non-Dene SWEAT*

Branch / Language	Form
Eyak	qu'
Tlingit	-
Proto-Yeniseian	-

4.5.5.1 Initial Consonant

The Dene material points to a coronal fricative or affricated onset in the dental-palato-alveolar range. Most forms show [z], [s], [ð], or [θ]: *zil*, *səl*, *θi:lʔ*, *ðəl*, *zel*, *θɛl*, *ðel*, *ðe:l*, *zal*, *si:l*. The UCI Dena'ina form *tʃil* has an affricate [tʃ], this form likely reflects a local affricated realization corresponding to the same broader series rather than evidence for a separate inherited onset. Hare *wél* is more divergent with its initial [w].

Taken together, the strongest shared pattern is not a single stable daughter-language segment, but a fricative onset reflected across branches as [s] ~ [z] ~ [ð] ~ [θ]. The safest

reconstruction at the Dene level is therefore an alveolar fricative series, most plausibly [**s*] or [**z*], with the exact onset left somewhat open by the present dataset. Because the Alaska, Interior Canada, Central BC, and Apachean forms all remain within this fricative range, the evidence still supports inheritance from a single proto-form.

Eyak *qu'* does not resemble the Dene forms in its onset and does not help narrow the reconstruction of the initial consonant. Additionally, there is no usable Tlingit or Yeniseian evidence is available for this term. As a result, the reconstruction can only be extended securely to Proto-Dene, while the higher levels remain unresolved.

4.5.5.2 Vowel

The most common vowel in the Dene material is a high or mid front nucleus: *zil*, *jil*, *θi:lʔ*, *zel*, *ðəl*, *ðel*, *ðe:l*, *si:l*. Ahtna *səl* shows reduction. Tahltan *θeł* remains close enough to the [e] range to fit the same general pattern. Northern Tutchone *ð'áwʔ* and Sekani *zal* are the clearest outliers in the set.

Given the concentration of [i] and [e]-like vowels across multiple branches, the safest statement is that the inherited nucleus was a front vowel, probably within an **i* ~ **e* range. The available forms do not allow the vowel to be narrowed with confidence beyond that. Navajo *si:l* and Upper Tanana *θi:lʔ* support a high front vowel as an important part of the pattern, while the Kaska, Tutchone, Slavey, and Tahltan forms show that a mid front realization is also widespread.

4.5.5.3 Final Consonant

The final consonant is the most stable part of the Dene set. Most forms end in [l]: *zil*, *jil*, *səl*, *ðəl*, *zel*, *wél*, *ðel*, *ðe:l*, *zil*, *zal*, *si:l*. A few add secondary material: Upper Tanana *θi:lʔ* has a glottal stop following the [l], Northern Tutchone *ð'áwʔ* has [wʔ], and Tahltan *θeł* has [ɬ]. Despite these

divergences, the repeated presence of a lateral coda across nearly all branches strongly supports reconstruction of final [*l] at the Proto-Dene level.

4.5.5.4 Discussion

The Dene evidence for ‘sweat’ is fairly coherent despite some branch-level variation. The onset consistently remains within a coronal fricative range, the vowel is usually front, and the final lateral is especially stable. The clearest inherited core of the root is therefore something like [*s] or [*z] plus a front vowel plus final [*l]. At the present stage, a Proto-Dene form such as *zil or *sel captures the main shape of the evidence, though the vowel cannot be fixed with complete confidence.

Eyak *qu’* is too dissimilar in both shape and segments to be securely combined with the Dene material on the basis of the present dataset alone. Because the Eyak form is highly divergent, and because corresponding evidence from Tlingit and Proto-Yeniseian is absent in the present dataset, the available material does not provide a reliable basis for reconstruction above the Proto-Dene level.

Table 120. Reconstruction of SWEAT₁

Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*zil ~ *sel
Proto-Northern-Dene	*zil ~ *sel
Proto-Alaska-Dene	*zil ~ *sel
Proto-Interior-Canada-Dene	*zel ~ *ðel
Proto-BC-Dene	*ðel ~ *θel
Proto-Central-BC-Dene	*zil
Proto-Pacific-Coast-Dene	-
Proto-Apachean-Dene	*si:l

4.5.6 Urine

Table 121. URINE₁

Branch	Language	Form
Alaska	Deg Xinag	litr
Alaska	Dena'ina (Iliamna)	ləʃ
Alaska	Ahtna	ləts
Alaska	Holikachuk	lits
Alaska	Gwich'in (Teetl'it)	lirh
Alaska	Gwich'in (Gwichya)	lirh
Alaska	Hän	lor
Alaska	Lower Tanana	letr
Alaska	Upper Kuskokwim	lit'
Alaska	Upper Tanana	luh
Alaska	Tanacross	lets
Yukon	Northern Tutchone	lro
Yukon	Southern Tutchone	lir
BranchIsolate2	Ts'ets'aut	kul
Interior Canada	Kaska (FL)	lets
Interior Canada	Kaska (GHL)	léts
Interior Canada	Kaska (L)	láts
Interior Canada	Kaska (P)	lets
Interior Canada	Kaska (RR)	lets
Interior Canada	Hare	lé?
Interior Canada	Bearlake	he:ʃ
Interior Canada	Tłchq	lo
Interior Canada	South Slavey	lez
Interior Canada	Dene Słliné	ləz
Interior Canada	Sekani	lats
Central BC	Carrier	lɔz
Central BC	Witsuwit'en	ləz
Central BC	Chilcotin	led
Pacific Coast	Hupa	lɪʃ
Pacific Coast	Mattole	lɔ?
Apachean	Navajo	liʒ
Apachean	Western A.	liʒ
Apachean	Jicarilla A.	liʃ, li:ʃ

Table 122. Non-Dene URINE

Branch / Language	Form
Eyak	kus
Tlingit	łûx'u
Proto-Yeniseian	*ʧaʃ

4.5.6.1 Initial Consonant

Many Dene forms across several branches begin with the lateral fricative [ɬ]: *litr*, *ləʃ*, *ləts*, *lits*, *lirh*, *lirh*, *luh*, *lets*, *tro*, *lir*, *lats*, *led*, *liʒ*, and *lif*. This distribution spans Alaska, Interior Canada, Central British Columbia, Pacific Coast, and Apachean branches, indicating that [ɬ] represents the most stable onset across the dataset.

Nevertheless, Several languages instead show the voiced alveolar lateral approximant [l], as in *lets*, *lez*, *ləz*, *laz*, *liʃ*, and *liʒ*. These forms remain closely aligned with the dominant lateral series and can be interpreted as outcomes involving voicing and loss of frication from an earlier [ɬ]. The widespread distribution of both [ɬ] and [l] therefore supports a Proto-Dene onset [*ɬ].

Tlingit *łûx'u* likewise begins with [ɬ], suggesting that the lateral onset predates Proto-Dene and may extend to Proto-Na-Dene. A second pattern, however, is represented by Eyak *kus* and Ts'ets'aut *kul*, both of which begin with the voiceless velar stop [k]. The occurrence of [k] in both Eyak and a Dene branch isolate is significant, since it suggests that the velar onset is not simply an isolated innovation in one language and may preserve information about an earlier stage of the consonant.

Proto-Yeniseian *ʧaʃ provides a third possible reflex, with an initial voiceless postalveolar affricate [*ʧ]. The relationship between [k] and [ʧ] is phonetically plausible, since velar stops commonly develop into postalveolar affricates through palatalization (Guion 1998). When Proto-Yeniseian [*ʧ] is considered together with Eyak and Ts'ets'aut [k], the possibility of an earlier stop or affricate onset becomes particularly relevant.

Three possible historical pathways can therefore be considered. First, Proto-Dene-Yeniseian may have had [*ɟ], retained in Proto-Yeniseian, with later development to [k] in Eyak and Ts'ets'aut and to [ɬ] throughout much of Dene and Tlingit. Second, Proto-Dene-Yeniseian may have had [*ɬ], retained widely in Na-Dene but developing independently into [*ɟ] in Proto-Yeniseian and [k] in Eyak and Ts'ets'aut. Third, the original consonant may instead have been [*k]. Under this interpretation, the velar stop would have been retained in Eyak and Ts'ets'aut, palatalized to [*ɟ] in Proto-Yeniseian, and developed into [ɬ] in most Dene languages and Tlingit. The [*k] hypothesis is of particular interest because it directly accounts for the otherwise unusual agreement between Eyak and Ts'ets'aut and provides a well-attested pathway from [*k] to [*ɟ] on the Yeniseian side. However, the development from [*k] to [ɬ] in the remaining Na-Dene languages would still require additional comparative support.

4.5.6.2 Vowel

The nucleus most commonly appears as a high or mid front vowel. Forms such as *lits*, *litr'*, *liɜ*, and *lif* show a clear [i] vowel. Similar front or centralized vowels appear in *lɔf*, *lɔts*, *letr*, *lir*, and *lɔz*.

Across Alaska, Interior Canada, and Apachean languages, however, the most consistent nucleus remains within the front or centralized range represented by [i], [ɨ], or [ə]. Because the front vowel appears repeatedly across geographically distant branches, the most economical interpretation is that the inherited vowel belonged to this general front or high-central region, at least at the Dene level.

Additionally, some languages, however, show back or rounded vowels, including Hän *lor*, Tłıchǫ *lo*, and Mattole *lɔʔ*. Ts'ets'aut *kul*, Eyak *kus* and Tlingit *lûx'u* likewise contain back rounded vowels [u]. Although these vowels differ from the predominant front pattern seen across much of the Dene dataset, their presence in several Dene languages indicates that back vowels are not

entirely outside the range of variation observed within the family. Proto-Yeniseian **ʃaʃ* contains [a], introducing another vowel quality at the highest comparative level. Because the Na-Dene forms already display considerable variation between front, central, and back vowels, the vowel correspondence is less secure than the consonantal evidence.

4.5.6.3 Final Consonant

The Dene coda shows substantial variation but falls into several recurring types. Many languages preserve alveolar or postalveolar affricates, as in *ləts*, *lits*, *lets*, *lats*, *ləʃ*, and *lif*. Closely related fricative outcomes occur in *lez*, *ləz*, *laz*, *ləz*, *liʒ*, *liz*, and *lif*. These repeated [ts], [ʃ], [s], [z], [ʒ], and [ʃ] finals provide strong evidence for an inherited alveolar or postalveolar fricative or affricate.

Other languages show more divergent developments, including rhotic finals in *litr*, *lirh*, *lro*, and *hir*, as well as reduction or loss in *lo* and *lɔʔ*. Eyak *kus* ends in [s], which fits well with the widespread Dene fricative and affricate series.

Proto-Yeniseian **ʃaʃ* strengthens this comparison. Its final voiceless postalveolar fricative [*ʃ] closely matches Jicarilla *lif* and is compatible with the broader Dene series containing [s], [z], [ʒ], [ts], and [ʃ]. The Proto-Yeniseian final is therefore considerably easier to relate to the Dene-Eyak evidence than the initial consonant.

Tlingit *lûx'u* is less transparent in this respect, since its final back fricative differs from the alveolar and postalveolar finals found elsewhere. This does not exclude cognacy, but it would require an independent Tlingit development and therefore provides little direct evidence for reconstructing the final consonant.

4.5.6.4 Discussion

Across the Dene branches, the dataset consistently points to a form with a lateral onset, a front or centralized vowel, and an alveolar or postalveolar final consonant. The voiceless alveolar lateral fricative [ɬ] is the most stable feature, appearing across Alaska, Interior Canada, Central British Columbia, Pacific Coast, and Apachean languages. Reflexes with [ɬ] remain closely aligned with this series and support reconstructing [*ɬ] at the Proto-Dene level. Tlingit *lûx 'u* also preserves [ɬ], suggesting that the lateral onset may extend to Proto-Na-Dene.

The vowel shows greater variation but still reveals a clear tendency. Many forms cluster around a front or centralized nucleus such as [i], [ɨ], or [ə] at the Proto-Dene level, as seen in *lits*, *lit'*, *lez*, *ləz*, *ɬz*, *liɜ*, and *lif*.

The final consonant also varies considerably but remains predominantly within the alveolar and postalveolar range. Affricates occur in forms such as *ləts*, *lits*, *lats*, *ɬəf*, and *lif*, while fricative outcomes appear in *lez*, *ləz*, *ɬz*, *liɜ*, *liɜ*, and *lif*. Eyak *kus* likewise ends in [s]. Proto-Yeniseian **ʃaʃ* strengthens this part of the comparison considerably, since its final [*ʃ] fits well with the widespread Dene and Eyak fricative and affricate series.

The initial consonant at the highest level is less certain. Eyak *kus* and Ts'ets'aut *kul* both preserve initial [k], providing a small but significant counterpattern to the otherwise widespread lateral onset, while Proto-Yeniseian **ʃaʃ* begins with [*ʃ]. Three possibilities can therefore be considered. Proto-Dene-Yeniseian may have had [*ʃ], with later development to [ɬ] in much of Na-Dene and [k] in Eyak and Ts'ets'aut. It may instead have had [*ɬ], preserved in Dene and Tlingit but altered elsewhere. Otherwise, the original consonant may have been [*k], retained in Eyak and Ts'ets'aut, palatalized to [*ʃ] in Proto-Yeniseian, and later lateralized to [ɬ] in most Dene languages and Tlingit. The last possibility is especially noteworthy because the development of

velar [*k] to postalveolar [*ʃ] through palatalization is cross-linguistically well attested, although the development from [*k] to [l] would still require further explanation.

Taken together, Proto-Yeniseian *ʃaʃ provides sufficient phonological similarity to treat ‘urine’ as a tentative Proto-Dene-Yeniseian cognate set. The final consonant correspondence is considerably stronger than the initial one, while the vowel and the precise Proto-Dene-Yeniseian onset remain unresolved.

Table 123. Reconstruction of URINE₁

Language	Form
Proto-Dene-Yeniseian	*ʃats ~ *ʎats ~ *kats ?
Proto-Yeniseian	*ʃaʃ
Proto-Na-Dene	*ʎux ~ ʎuts ?
Proto-Dene-Eyak	*ʎits ~ *kus
Proto-Dene	*ʎits ~ *ʎets
Proto-Northern-Dene	*ʎits ~ *ʎets
Proto-Alaska-Dene	*ʎitr ~ *ʎets
Proto-Interior-Canada-Dene	*ʎets ~ *ʎez
Proto-BC-Dene	*ʎro ~ *ʎer
Proto-Central-BC-Dene	*ʎəz ~ *ʎəz
Proto-Pacific-Coast-Dene	*ʎiʃ ~ *ʎoʔ
Proto-Apachean-Dene	*ʎiʒ ~ *ʎiʒ

4.5.7 Vomit

A few forms are formally longer than the rest because they contain an additional morpheme before the main stem: Western Apache *ná-k^hoi*, South Slavey *nats'e-k^hu*, Tłchq *naxae-ko*, and Upper Tanana *naʔif-koʔ*. These prefixed elements should be noted, since they show that the word may occur in morphologically complex shapes in some languages. For the purposes of reconstruction, however, they should not be given primary weight, because the comparable inherited material is the second element: *-k^hoi*, *-k^hu*, *-ko*, and *-koʔ*.

Table 124. *VOMIT*₁

Branch	Language	Form
Alaska	Deg Xinag	q ^h ij
Alaska	Koyukon	q ^h uʔ
Alaska	Ahtna	k ^h oj
Alaska	Holikachuk	q ^h uʔ
Alaska	Gwich'in (Teetl'it)	k ^w aih
Alaska	Gwich'in (Gwichya)	k ^w aih
Alaska	Hän	k ^h oj
Alaska	Upper Kuskokwim	kwɪ
Alaska	Upper Tanana	naʔif- koʔ
Alaska	Tanacross	k ^h oj
Yukon	Northern Tutchone	k ^h u
Yukon	Southern Tutchone	k ⁱ u
Interior Canada	Kaska (GHL)	k ^h uʔ
Interior Canada	Kaska (L)	k ^h uʔ
Interior Canada	Hare	kú
Interior Canada	Tłchq	naxae- ko
Interior Canada	South Slavey	nats'e- k ^h u
Interior Canada	Dene Sų́líné	k ^h úł
Interior Canada	Dene Dháh	k ^h uʔě
Central BC	Carrier	k ^h u
Central BC	Witsuwit'en	q ^h oj
BranchIsolate3	Tsuut'ina	k ^h ùy
Pacific Coast	Hupa	xoj
Apachean	Navajo	k ^w ih
Apachean	Western A.	ná- k ^h oi

Table 125. Non-Dene VOMIT

Branch / Language	Form
Eyak	wut'
Tlingit	hâs'
Ket	kʌ'ŋ

4.5.7.1 Initial Consonant

The Dene forms point to a velar or uvular onset as the most stable feature of this cognate set. Most languages show a reflex in the [k] ~ [kʰ] ~ [q] ~ [qʰ] range: *qʰij* in Deg Xinag, *qʰuj̥* in Koyukon and Holikachuk, *kʰoj* in Ahtna and Hän, *kʰoj̥* in Tanacross, *kʰu* across several Interior and BC languages, *qʰoj* in Witsuwit'en. This distribution strongly supports a velar or uvular onset at the Dene level.

Alaska and Witsuwit'en preserve uvular reflexes, while much of the Interior and related branches show velar [kʰ]. Hupa [x] is plausibly related to the same series, since it still preserves a velar fricative onset. On the present evidence, the safest conclusion is that Proto-Dene had a velar or uvular initial, probably aspirated, but whether it should be reconstructed specifically as [kʰ] or [qʰ] is less secure. Nevertheless, although [k]-type reflexes are more common across the full dataset, several other terms discussed elsewhere in this project have shown the same recurring tension between initial [q] and [k], with Alaskan languages often preserving the uvular reflex. In that broader comparative context, and because it is more common for [q] to weaken and become [k] than for [k] to become [q], the present distribution may cautiously point toward an earlier initial [*qʰ] rather than [*kʰ].

Labialization appears in only a subset of forms: Gwich'in *kʷaih*, Upper Kuskokwim *kʷf̥*, and Navajo *kʷih*. Because most of the dataset lacks labialization, this feature should not be projected to Proto-Dene. It is better treated as secondary or branch-specific. The prefixed forms do not alter this conclusion, since their added initial material belongs to separate morphemic elements and the stem itself still begins with velar [k]-type material: *-kʰoi*, *-kʰu*, *-ko*, *-koj̥*.

Eyak *wut'* and Tlingit *hâs'* do not support the Dene onset pattern. Eyak begins with [w], and Tlingit with [h] (which could theoretically be a weakened reflex of either $[\text{q}^{\text{h}}]$ or $[\text{k}^{\text{h}}]$, but the general shape differs too much from Dene), neither of which offers a convincing phonological match to the velar/uvular onset shared across the Dene forms. For this term, they should be treated as divergent and not used to support a higher reconstruction above Dene.

4.5.7.2 Vowel

A large Interior and BC group shows a back high vowel: Northern Tutchone *k^hu*, Southern Tutchone *kⁱu*, Kaska *k^huʔ*, South Slavey *-k^hu*, Dene Sų́liné *k^húl*, Dene Dháh *k^huʔě*, Hare *kú*, and Carrier *k^hu*. Tsuut'ina *k^hũy* also aligns well with this subset. At the same time, a significant Alaska and Pacific Coast subset shows [o] or a diphthongal sequence ending in [i]/[ai]: Ahtna *k^hoj*, Hän *k^hoj*, Tanacross *k^hoj̥*, Witsuwit'en *q^hoj*, Hupa *xoj*, Western Apache *-k^hoi*, and Tł̥chq̣ *-ko*. Deg Xinag *q^hij̥* and Koyukon/Holikachuk *q^huj̥* suggest additional variation in the vocalic nucleus even within Alaska. Navajo *k^wih* and Gwich'in *k^wai̯h* are more divergent in surface quality, but they still preserve a high or fronted reflex linked to the same stem.

The most cautious interpretation is therefore that Proto-Dene had a back vowel in this stem, but the exact quality remains uncertain between something in the $[\text{*u}]$ range and something in the $[\text{*o}]$ range. Since the [u]-type forms are more common in general, they provide the strongest direct support for a Proto-Dene $[\text{*u}]$.

4.5.7.3 Final Consonant

The final consonant is less stable than the onset, but the overall pattern is still coherent. In the Alaskan forms, final *j̥* usually reflects a $[\text{tj}] \sim [\text{dʒ}]$, as seen in *q^hij̥*, *q^huj̥*, *q^huj̥*, *k^hoj̥*, and *-koj̥*. Upper Kuskokwim *kwf* fits this general pattern well, since $[\text{f}]$ and $[\text{tj}] \sim [\text{dʒ}]$ both belong to the same

post-alveolar zone and can reasonably be treated as related reflexes. Taken together, these forms point toward an earlier post-alveolar final element, probably affricate-like in at least some branches. The other reflexes can be understood as later reductions or reshaped outcomes of that same final portion of the stem. Gwich'in has *-h*; Kaska and Dene Dháh have *-ʔ*; Dene Sų́liné has *-l̥*; Tsuut'ina has *-y*; and Northern Tutchone, Southern Tutchone, Hare, and Carrier show little or no strong final consonant.

The strongest cautious interpretation is therefore that Proto-Dene had a final post-alveolar consonant, most likely something in the [tʃ] range, even if that exact value cannot be projected with full certainty to every branch.

4.5.7.4 Discussion

This is a strong Dene cognate set with broad distribution across the family. The four longer forms, Western Apache *ná-k^hoi*, South Slavey *nats'e-k^hu*, Tłchq *naxae-ko*, and Upper Tanana *naʔif-koʔ*, contain additional prefixed material, but the inherited stem for reconstruction is the second element: *-k^hoi*, *-k^hu*, *-ko*, and *-koʔ*. Since there is no Yeniseian comparandum, and since Eyak and Tlingit do not align closely enough with the Dene material, the reconstruction remains internal to Dene.

The onset is the strongest part of the reconstruction. The widespread [k]- and [q]-type reflexes clearly point to a dorsal initial consonant, and in light of the recurring pattern seen in other terms, where Alaskan languages often preserve [q] while other branches show [k], an earlier [*q^h] remains a plausible possibility. The vowel points broadly to a back vowel, most often [u]. The final consonant also shows a recognizable pattern: Alaskan [tʃ] ~ [dʒ] and Upper Kuskokwim [ʃ] suggest that the stem originally ended in a post-alveolar consonant, which was preserved more clearly in some languages and reduced or reshaped in others.

Taken together, the evidence supports a Proto-Dene stem of roughly the shape **q^hutʃ* or **q^hotʃ*, with the dorsal onset most secure, the back vowel fairly well supported, and the post-alveolar final element plausible though somewhat less secure outside the conservative branches. The only Yeniseian evidence is the modern Ket form *kʌ'ŋ* ‘vomit’, which is unlikely to be cognate with the Dene forms and is therefore best left unconnected for the present analysis.

Table 126. Reconstruction of VOMIT₁

Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	<i>*q^hutʃ ~ *q^hotʃ</i>
Proto-Northern-Dene	<i>*k^hutʃ ~ *k^hotʃ</i>
Proto-Alaska-Dene	<i>*q^hutʃ ~ *q^hotʃ</i>
Proto-Interior-Canada-Dene	<i>*k^hu</i>
Proto-BC-Dene	<i>*k^hu ~ *q^hoj</i>
Proto-Central-BC-Dene	<i>*k^hu ~ *q^hoj</i>
Proto-Pacific-Coast-Dene	<i>*xoj</i>
Proto-Apachean-Dene	<i>*k^hoi</i>

4.5.8 Saliva

The meaning ‘saliva’ is represented here by two primary lexicalization patterns, glossed as SALIVA₁ and SALIVA₂ respectively. The first is a monomorphemic stem. The second is morphologically more complex: it contains an additional first morpheme followed by a second element that is directly cognate with the monomorphemic stem of cognate set 1. For that reason, the two patterns are best presented separately at the dataset level, but not treated as wholly independent in the reconstruction itself. The analysis below therefore focuses on the shared saliva stem: cognate set 1 is analyzed as it stands, while cognate set 2 is used only insofar as its second morpheme continues the same stem. This treatment also fits Snoek’s discussion of cognate set 2 (SALIVA₂): there is a recurring initial element /te:/ or /ta:/, but its meaning remains unclear, and it should not be assigned a specific semantics on the present evidence (2015: 255). Outside Dene, Eyak and Proto-Yeniseian show forms that may be relevant to the broader comparison, but the connection is uncertain. There is, however, an unlikely but interesting theory discussed below that attempts to reconcile the wider Dene set with Eyak and Proto-Yeniseian. Tlingit, by contrast, appears clearly unrelated here, since its term *χ’ahéeni*, analyzable as ‘mouth.water’ is too different in structure.

Table 127. SALIVA₁

Branch	Language	Form
Alaska	Deg Xinag	sraq
Alaska	Koyukon	saq
Alaska	Dena’ina (Iliamna)	ʃaq’
Alaska	Dena’ina (Inland)	ʒaq’
Alaska	Dena’ina (OCI)	ʒaq’
Alaska	Dena’ina (UCI)	jaq’
Alaska	Ahtna	saʔ
Alaska	Holikachuk	saq ^h
Alaska	Gwich’in (Teetl’it)	srik
Alaska	Gwich’in (Gwichya)	srik
Alaska	Hän	srik

Alaska	Upper Kuskokwim	srak'
Alaska	Tanacross	sek
Interior Canada	South Slavey	zεε
Interior Canada	Dene Sų́líné	zex
Central BC	Carrier	zo
Central BC	Witsuwit'en	soq
Central BC	Chilcotin	zi
BranchIsolate3	Tsuut'ina	zaj
Pacific Coast	Hupa	xeʔq'
Pacific Coast	Galice	sε:k'
Apachean	Navajo	ʒé:ʔ
Apachean	Western Apache	ʒít
Apachean	San Carlos Apache	ʒít
Apachean	Jicarilla Apache	zēk
Apachean	Kiowa Apache	zek

Table 128. *SALIVA*₂

Branch	Language	Form
Alaska	Upper Tanana	da:-ʒê:k
Yukon	Northern Tutchone	te-zja:k
Yukon	Southern Tutchone	ta-ʒe
Interior Canada	Kaska (GHL)	te:-zē:k
Interior Canada	Kaska (L)	te:-zē:k
Interior Canada	Kaska (P)	te:-zē:k
Interior Canada	Kaska (RR)	te:-zek
Interior Canada	Kaska (LL)	ta:-zéʔ
Interior Canada	Mountain	te-zéʔ
Interior Canada	Bearlake	wáε:-zé
Interior Canada	Tłchq	wa-zè:
Interior Canada	Dene Dháh	ta:-ze
Interior Canada	Sekani	ta-zēʔ

Table 129. *Non-Dene SALIVA*

Branch / Language	Form
Eyak	tux
Tlingit	χ'ahéeni (<i>MOUTH.WATER</i>)
Proto-Yeniseian	*duk

The shared stem in both cognate sets is very widely represented across Dene. Alaska, Interior Canada, Central British Columbia, Pacific Coast, and Apachean all contribute relevant forms, and cognate set 2 confirms that the stem remained productive enough in part of the family to occur inside a larger polymorphemic lexicalization. This distribution supports reconstructing the stem at the Proto-Dene level, even though individual branches show substantial reshaping in both onset and coda.

4.5.8.1 Initial Consonant

The initial consonant across the Dene material points most directly to an alveolar/palato-alveolar sibilant onset. Much of the family shows [s], [z], [ʃ], [ʒ], and these are readily interpretable as reflexes of the same broad fricative or affricate zone. Clear examples include Koyukon *saq*, Ahtna *saʔ*, Holikachuk *saq^h*, Tanacross *sek*, Witsuwit'en *soq*, Galice *sɛ:k'*, Jicarilla Apache *zēk*, Kiowa Apache *zek*, and the many forms of cognate set 2 whose second morpheme appears as *-ze-*, *-ʒe-*, or *-zja:-*. Taken together, these forms make a simple sibilant onset the most economical starting point for Proto-Dene.

The northern forms with initial [sr], such as Deg Xinag *sraq*, Gwich'in *srik*, Hän *srik*, and Upper Kuskokwim *sraʔ*, do not require reconstruction of an original cluster. Since much of the family lacks any comparable [r]-element, and since simple sibilant onsets are far more widespread, the most cautious interpretation is that the [r] developed secondarily in part of the northern area. It is therefore better treated as an innovation within a subset of languages than as a direct retention from Proto-Dene. The second morpheme of cognate set 2 is especially important here, because it repeatedly confirms the same stem shape under a more complex lexicalization pattern and shows that the onset remained identifiable even when preceded by an additional morpheme.

A more speculative possibility may also be noted. Eyak *tux* and Proto-Yeniseian **duk* resemble one another more closely than either resembles the dominant Dene onset pattern. One possible explanation is that the initial element seen in cognate set 2, most often *ta-* or *te-*, reflects an older morphological component that may once have existed at the Proto-Na-Dene or even the Proto-Dene-Yeniseian stage, and was eventually in a way assimilated or contracted to form a monomorphemic stem as seen in Eyak and Proto-Yeniseian. Under that interpretation, the [t] of Eyak and the voiced [d] of Proto-Yeniseian could be reflexes of the ancient initial morpheme, while the simplex Dene forms would reflect a later restructuring in which only the following saliva stem remained. This cannot be fully demonstrated on the present evidence, but it does offer one possible explanation for the relative similarity of Eyak and Proto-Yeniseian to one another, as well as the tentative similarity to the wider Dene dataset.

Even with that possibility in view, the Proto-Dene onset itself, regardless, is reconstructed from the Dene evidence alone. That evidence still points most strongly to an initial [**s*], or more cautiously to a closely related coronal sibilant, rather than to an inherited stop.

4.5.8.2 Vowel

The vowel evidence is less uniform than the onset, but it still shows a coherent center of gravity. Many forms point to a front or central vowel in at least part of the later history: Tanacross *sek*, Tsuut'ina *zaj*, South Slavey *zεε*, Dene Sųłiné *zex*, Galice *sε:k'*, Navajo *ʒé:ʔ*, Jicarilla Apache *zēk*, Kiowa Apache *zek*, and most of cognate set 2 with *ze-* all support a front-vowel outcome. This is a strong pattern and is especially important because cognate set 2 repeatedly preserves that same vocalism in the shared second morpheme.

At the same time, there are clear non-front reflexes elsewhere: Koyukon *saq*, Ahtna *saʔ*, Holikachuk *saq^h*, Upper Kuskokwim *sra:k'*, Witsuwit'en *soq*, Carrier *zo*, Chilcotin *zi*, and Hupa

xeʔq' show that vowel quality has not remained stable throughout the family. The evidence therefore does not support a completely straightforward reconstruction of one exact vowel.

Even so, the repeated *ze* / *zε* / *zi* / *ʒe* type across Interior Canada, Apachean, Tanacross, and the second morpheme of cognate set 2 makes a front vowel somewhat easier to project than [a] or [o]. The best cautious reconstruction is therefore a Proto-Dene vowel in the front-to-central range, perhaps [e], while recognizing that some branches have shifted it considerably. A more conservative wording would simply say that Proto-Dene probably had a non-rounded vowel that later diverged into [a], [e], [i], and [o]-type reflexes in different parts of the family.

Eyak *tux* and Proto-Yeniseian **duk* again remain difficult to integrate. Their back rounded vowel does not match the dominant Dene pattern closely. If they are related at all, then the higher-level vowel was possibly much less stable than the Proto-Dene one.

4.5.8.3 Final Consonant

The final consonant is one of the strongest features of this cognate complex. A large number of Dene forms preserve a velar or uvular-like coda: Deg Xinag *sraq*, Koyukon *saq*, Dena'ina *ʃaq'* / *ʒaq'* / *jaq'*, Holikachuk *saq^h*, Gwich'in *srik*, Hän *srik*, Upper Kuskokwim *srak'*, Tanacross *sek*, Dene Sųliné *zex*, Witsuwit'en *soq*, Hupa *xeʔq'*, Galice *sε:k'*, Jicarilla Apache *zēk*, Kiowa Apache *zek*, and many cognate-set-2 forms with final [k] or reflexes of it. The exact reflex differs from language to language, but the family-wide pattern strongly supports an earlier shared coda.

At the same time, a number of languages show reduced outcomes. Ahtna *saʔ*, Navajo *ʒé:ʔ*, Kaska (LL) *ta:-zéʔ*, Mountain *te-zéʔ*, and Sekani *ta-zēʔ* point to weakening of an earlier dorsal consonant, while South Slavey *zεε*, Carrier *zo*, Chilcotin *zi*, Bearlake *wáε:-zé*, Tłıchǫ *wa-zè:*, and Dene Dháh *ta:-ze* show zero reflexes. These are best understood as later reductions of a segment that remains well preserved elsewhere in the family.

Some forms also show strengthened or otherwise marked velar/uvular codas, especially Dena'ina [q'], Upper Kuskokwim [k'], Hupa [q'], Galice [k'], and Holikachuk [q^h]. These forms suggest that the coda remained phonologically salient long enough in some branches to receive reinforced or more marked realizations. At the same time, taken together with the many weaker outcomes elsewhere in the family, they also leave open the possibility that the original consonant was itself a uvular segment, more plausibly [q] than [k], since it is more common for [q] to weaken to [k], rather than the other way around. From a comparative point of view, it is easier to imagine an earlier uvular or otherwise back dorsal coda weakening to [k], [x], [ʔ], or zero in different branches than to assume that a weak original [k] was repeatedly strengthened independently. The most economical reconstruction therefore remains a dorsal stop, but with [*q] now somewhat preferable to [*k] as the Proto-Dene coda.

The Eyak and Yeniseian material is again suggestive of the theory mentioned in the initial consonant section. Eyak *tux* and Proto-Yeniseian **duk* both preserve a final velar stop, and this is the part of the broader comparison that aligns most easily with the Dene evidence. If the comparison is real, one possible interpretation is that the same coda was preserved quite directly in Yeniseian and much of Dene, while Eyak may reflect a more weakened continuation. It is also possible to imagine a development in which an earlier uvular-type coda was reduced in some branches, from [q] to [k] and then further to [x]. Even so, the coda remains the strongest point of resemblance between the Dene forms and the more tentative Eyak and Yeniseian comparanda.

4.5.8.4 Discussion

This is a strong and widespread Dene stem for 'saliva'. The main comparative weight lies in cognate set 1, but cognate set 2 is also important because its second morpheme clearly continues the same stem and shows that this lexical base remained productive within a larger polymorphemic

pattern. The additional first morpheme in cognate set 2 should therefore be kept separate from the actual stem reconstruction, even though it may matter for broader historical interpretation.

Within Dene, the onset is best reconstructed as an alveolar fricative, most plausibly [**s*]. The vowel is less stable, but the repeated *ze* / *zε* / *zi* type across much of the family makes a front or front-central vowel more plausible than a back rounded one. The final consonant most likely goes back to a uvular stop, probably [**q*], later weakened in some branches and then further glottalized, fricated, or lost entirely in others.

At the higher levels, the comparison becomes much more tentative. Eyak *tux* and Proto-Yeniseian **duk* are not close enough to be treated as secure cognates, but they are not irrelevant either. The strongest resemblance lies in the final dorsal stop, while the onset and vowel correspondences are much less straightforward. One speculative possibility is that the prefixed element seen in cognate set 2, usually *ta-* or *te-*, reflects an older morphological component that may once have been present at levels such as Proto-Na-Dene or even Proto-Dene-Yeniseian. Under that interpretation, the [*t*] of Eyak and the voiced [**d*] of Proto-Yeniseian could reflect that older initial segment, while the dominant simplex Dene forms would represent a later restructuring in which only the following saliva stem remained. In the same speculative framework, the dorsal coda may have been retained more directly in Yeniseian and in much of Dene, while Eyak could reflect a weakened continuation, perhaps through a pathway such as earlier [*q*] > [*k*] > [*x*]. This is far from certain, but it does offer a possible way to understand why Eyak and Proto-Yeniseian resemble one another more closely than either resembles the dominant simplex Dene pattern. Tlingit does not belong to this cognate complex. The term is *χ'ahéeni*, which is analyzable as ‘mouth.water’, and is best treated as an unrelated term.

Table 130. Reconstruction of SALIVA(1/2)

Language	Reconstruction
Proto-Dene-Yeniseian	*(tə-)sVq ~ *duq ~ *tuq ?
Proto-Yeniseian	*(tə-)sVq ~ *duk ?
Proto-Na-Dene	*(tə-)sVq ~ *tuq ?
Proto-Dene-Eyak	*(tə-)sVq ~ *tuq ?
Proto-Dene	*(te-)seq ?
Proto-Northern-Dene	*saq ~ *sek
Proto-Alaska-Dene	*saq ~ *ʒe:k
Proto-Interior-Canada-Dene	*(te-)ze:k
Proto-BC-Dene	*(te-/ta-)za:k
Proto-Central-BC-Dene	*soq
Proto-Pacific-Coast-Dene	*sɛ:k ~ *seq
Proto-Apachean-Dene	*zek ~ *ʒek

4.5.9 Scab

Table 131. SCAB₁

Branch	Language	Form
Alaska	Deg Xinag	let
Alaska	Koyukon	lut
Alaska	Ahtna	lu:t'
Alaska	Holikachuk	lo:t
Alaska	Gwich'in (Teetl'it)	lit
Alaska	Gwich'in (Gwichya)	let
Alaska	Hän	lut
Alaska	Upper Tanana	lu:t
Yukon	Northern Tutchone	ljat
Yukon	Southern Tutchone	ljet
Interior Canada	Kaska (FL)	lu:t
Interior Canada	Kaska (GHL)	lu:t
Interior Canada	Kaska (L)	lu:t
Interior Canada	Kaska (P)	lu:t
Interior Canada	Kaska (RR)	lu:t
Interior Canada	Hare	luh
Interior Canada	Bearlake	lur
Interior Canada	Tłchq	li:
Interior Canada	South Slavey	lút
Interior Canada	Dene Słliné	lur
Interior Canada	Dene Dháh	lut
Interior Canada	Sekani	lut
Central BC	Carrier	lut
Central BC	Witsuwit'en	lot
BranchIsolate3	Tsuut'ina	lúd
Pacific Coast	Hupa	loh

Table 132. Non-Dene SCAB

Branch / Language	Form
Eyak	k'ahkf
Tlingit	k ^h itʃ
Ket	ajgin

4.5.9.1 Initial Consonant

The dataset shows a highly stable lateral onset across nearly all branches. Most languages display a voiceless lateral fricative [ɬ]: *ɬet*, *ɬut*, *ɬu:t'*, *ɬo:t*, *ɬit*, *ɬet*, *ɬut*, *ɬu:t*, *ɬjət*, the Kaska series *ɬu:t*, *ɬur*, *ɬut*, *ɬot*, and *ɬoh*. This pattern spans Alaska, Interior Canada, Central British Columbia, and the Pacific Coast and clearly represents the dominant onset type in the dataset.

A smaller group of Interior Canadian languages shows a lateral approximant [l] instead: Tsuut'ina *lúd*, Hare *luh*, Bearlake *lur*, and Tłıchǫ *lì*. These forms retain the lateral articulation of the onset but lack the fricative component present in the majority of languages.

Given the overwhelming distribution of [ɬ] across the branches, the most conservative reconstruction for the Proto-Dene onset is the voiceless lateral fricative [*ɬ].

Eyak *k'ahkf* and Tlingit *k'itf* stand apart from the dominant Dene pattern. Both forms begin with a velar stop or ejective velar stop and contain a final sibilant/affricate-like element, so they may be related to each other at some level. However, they do not align well with the Dene *lut* pattern, where the initial lateral [ɬ] ~ [l] and final [t] are the most stable features. The Eyak and Tlingit forms should therefore be treated as a separate possible comparison rather than as secure evidence for extending the Dene reconstruction to Proto-Na-Dene.

4.5.9.2 Vowel

The vowel is less stable than the initial consonant, but the most widespread pattern is still a high back nucleus. A large part of the dataset shows [u] or [u:]: *ɬut*, *ɬu:t'*, *ɬut*, *ɬu:t*, the Kaska series *ɬu:t*, *lúd*, *luh*, *lur*, *lút*, *lut*, *ɬur*, *ɬut*, and *ɬut*. This distribution covers Alaska, Interior Canada, and Central British Columbia and forms the clearest recurrent vocalic pattern in the word.

Alongside this dominant [u] series, several languages show other vowels. Deg Xinag and Gwich'in (Gwichya) have *let*, Gwich'in (Teetl'it) has *lit*, Southern Tutchone has *ljet*, Northern

Tutchone has *tjat*, Tł̥chq̓ has *li:*, and Holikachuk, Witsuwit'en, and Hupa show *lo:t*, *lot*, and *loh*. These forms show that the vowel has a fairly broad surface range, including front, low, and mid back reflexes.

Even so, the concentration of [u] and [u:] forms across the majority of branches remains stronger than any other pattern. The most conservative Proto-Dene reconstruction is therefore [*u], while the non-[u] vowels are best treated as branch-level reflexes within the present dataset.

4.5.9.3 Final Consonant

The final consonant most commonly appears as [t]. This pattern occurs widely across Alaska, Interior Canada, and Central British Columbia: *let*, *lut*, *lo:t*, *lit*, *let*, *lut*, *lu:t*, *tjat*, *tjet*, the Kaska series *lu:t*, *lút*, *tut*, and *tut*.

Ahtna shows *lu:t'*, which shows ejective articulation on the final consonant. Several Interior Canadian languages show weakening or modification of the final segment: *luh* and *loh* have [h], while *lur* and *hur* show [r]. Tł̥chq̓ *li:* lacks an overt final consonant entirely.

Despite these divergences, the widespread presence of [t] across most branches supports reconstruction of a final [*t] at the Proto-Dene level.

4.5.9.4 Discussion

Across the dataset the structure of the root is remarkably consistent. Nearly all languages preserve a lateral onset, most often [ɬ], which is evident in its distribution across Alaska, Interior Canada, Central British Columbia, and the Pacific Coast, which ultimately supports reconstruction of [*ɬ] as the Proto-Dene initial consonant. Vowel variation remains limited despite some fronting and lowering in individual branches, and the large number of forms with [u] supports reconstruction of a high back vowel. The final consonant most commonly appears as [t], though some languages

show weakening or modification of the final segment. Taken together, the dataset supports a Proto-Dene reconstruction **lut* for the term ‘scab’.

Eyak *k'ahkf* and Tlingit *k'hitf* may be related to each other, but they do not align securely with the dominant Dene *lut* pattern. The only Yeniseian evidence is the modern Ket form *ajgin* ‘scab’, which is unlikely to be cognate with the Dene forms and is therefore best left unconnected for the present analysis.

Table 133. Reconstruction of SCAB₁

Language	Form
Proto-Dene-Yeniseian	-
Proto-Yeniseian	-
Proto-Na-Dene	-
Proto-Dene-Eyak	-
Proto-Dene	*lut
Proto-Northern-Dene	*lut
Proto-Alaska-Dene	*lut ~ *let
Proto-Interior-Canada-Dene	*lut
Proto-BC-Dene	*ljat ~ *ljet
Proto-Central-BC-Dene	*lut ~ *lot
Proto-Pacific-Coast-Dene	*loh
Proto-Apachean-Dene	-

5 Conclusion

This thesis set out to test how far a selected set of body-part terms could be reconstructed within Dene, Na-Dene, and Dene-Yeniseian. The starting point for the study was Snoek's broader inventory of 68 anatomical terms. Of these, 40 were examined in detail here. Each term was treated as a historical problem in its own right: the Dene evidence was first organized internally, then compared with Eyak and Tlingit where available, and finally evaluated against Yeniseian evidence where a plausible comparison could be made. The goal was not simply to collect possible lookalikes between Na-Dene and Yeniseian, but to determine which forms could be reconstructed at specific historical levels and which could not.

The results show a layered pattern. Some body-part terms can be reconstructed securely within Dene but do not extend beyond it. Others can be pushed to Proto-Dene-Eyak or Proto-Na-Dene, but lack sufficient Yeniseian support. The last group can be compared with Proto-Yeniseian and may plausibly reflect Proto-Dene-Yeniseian inheritance. This distribution is important because it shows both the strength and the limits of the body-part evidence. The dataset does not support the idea that every body-part term preserves a Dene-Yeniseian cognate. At the same time, the number of terms that do reach the Dene-Yeniseian level is significant, especially because many of them involve stable anatomical concepts such as 'head', 'eye', 'foot', and 'blood'.

The conclusion therefore has two main purposes. First, it summarizes what was actually recoverable from the dataset and identifies the highest reconstructible level for each group of terms. Second, it evaluates what these results contribute to the Dene-Yeniseian hypothesis. The evidence is strongest where the comparison is supported not only by semantic similarity, but also by recurring phonological correspondences across multiple terms. The value of these

reconstructions depends on whether they fit a larger pattern of sound correspondences and whether the semantic development required by the comparison is plausible.

5.1 Scope of the Results

The results of the reconstruction are summarized in Table 134 below. The table gives the highest level to which each term or cognate set could be reconstructed, beginning with Proto-Dene and ending with the proposed Proto-Dene-Yeniseian level. This distribution is one of the central findings of the thesis, since the body-part terms examined here do not all preserve evidence to the same historical depth.

Table 134. Summary of reconstruction results by historical level

Highest Reconstructable Level	# of terms	Terms
Proto-Dene-Yeniseian	17	fat, head, eye, ear, arm, knee, thigh, foot, stomach, skin, hair, urineliver, blood, saliva, breast, breast (pointed)
Proto-Na-Dene	6	flesh, bone, face, teeth, elbow, hip
Proto-Dene-Eyak	7	blood vessel, forearm, buttocks, gallbladder, excrement, flatus, pus
Proto-Dene	10	tendon, sinew, neck, ribs, heart, intestines, sweat, vomit, scab, breast (suck)

Dene-internal reconstruction is the most secure and the most widespread. This is expected, since the Dene languages provide the largest and most internally comparable portion of the dataset. Several terms can be reconstructed confidently within Dene, but the evidence weakens once Eyak, Tlingit, and Yeniseian are brought into comparison. These Proto-Dene only terms are still important, since they establish the internal Dene baseline against which deeper comparisons can be tested. Without a secure Proto-Dene reconstruction, proposed comparisons with Eyak, Tlingit, or Yeniseian would be much less reliable.

The Proto-Dene-Eyak and Proto-Na-Dene sets represent intermediate levels of reconstruction. In these cases, the Dene forms can be connected to Eyak or to both Eyak and

Tlingit, but the evidence does not extend securely to Yeniseian. These categories show that the reconstruction does not move directly from Dene to Dene-Yeniseian. Eyak and Tlingit play an important role in determining where a cognate set stops, where a higher-level reconstruction becomes possible, and where a proposed Dene-Yeniseian comparison remains too weak.

The Proto-Dene-Yeniseian candidates form the most important group for the broader argument of the thesis. 17 terms (cognate sets) provide enough phonological and semantic evidence to be considered in the Proto-Dene-Yeniseian comparison, though their individual strength varies. These cases are not all equally secure. Some preserve clearer phonological and semantic alignment, while others depend on more tentative correspondences or require additional semantic explanation. Nevertheless, the number itself is notable. Given the time depth usually assumed for Dene-Yeniseian, exceeding 10,000 years, it is significant that this many body-part terms preserve comparable form structure and can be placed within possible correspondence patterns between Na-Dene and Yeniseian. This does not prove the Dene-Yeniseian hypothesis on its own, but it does show that body-part terminology contains more than isolated accidental similarities.

The 40 terms analyzed in this thesis also do not behave as simple one-to-one matches between English glosses and inherited stems. Some are represented by a single widespread cognate set, while others are divided into several overlapping or unrelated sets. In several cases, the same anatomical meaning is lexicalized differently across branches, or a form originally referring to one anatomical concept appears to have been extended to another. This is especially clear in cases such as ‘ear’ (Section 4.2.6) and ‘breast’ (Section 4.4.3), where a single English gloss does not correspond neatly to a single inherited form. For this reason, the results must be understood in terms of cognate sets rather than only in terms of English glosses. The term ‘ear’, for example,

appears to reflect an older form that later split within Dene into separate inner-ear and outer-ear terms. The term ‘breast’ is even more complex, involving several distinct cognate sets, including one connected with ‘mother’s milk’, one connected with ‘suck’, and one connected with a ‘pointed’ meaning. These cases show why a simple one-term-one-reconstruction model is not sufficient for this dataset. Some of the strongest evidence may be hidden inside semantically complex terms.

The semantic distribution of the results is also uneven. Terms for major body structures and highly salient body-parts, such as ‘head’, ‘eye’, ‘foot’, ‘arm’, ‘liver’, and ‘blood’, are among the better candidates for deeper reconstruction. By contrast, terms for bodily substances and effluvia are much more difficult to reconstruct beyond Na-Dene. ‘Sweat’, ‘vomit’, and ‘scab’ are reconstructible only to Proto-Dene. ‘Excrement’, ‘flatus’, and ‘pus’ reach Proto-Dene-Eyak. Within this category, ‘saliva’ and ‘urine’ are the only two terms with any real merit as a Proto-Dene-Yeniseian candidates. This pattern suggests that effluvial vocabulary may be less stable than other parts of the anatomical lexicon in this dataset, possibly because of replacement, taboo-driven avoidance, semantic narrowing, or branch-specific innovation.

For the reasons outlined above, the next step is to isolate the sound correspondences that appear in the Proto-Dene-Yeniseian candidate sets. Table 135 below focuses specifically on initial consonants. Since many of these comparisons remain tentative, the table should not be read as a complete or definitive reconstruction of Dene-Yeniseian phonology. Rather, it summarizes the initial consonant patterns that recur in the material examined here and shows where possible correspondences can be observed across Proto-Yeniseian, Tlingit, Eyak, and the relevant Dene branches. Its purpose is therefore limited: it presents the patterns that emerged from this study as a basis for further testing, not as a final correspondence system for the family as a whole.

Table 135. Initial sound correspondences across all sub-branches of Dene-Yeniseian by term²

	PDY	PY	PND	PDE	PD	PNoD	PAD	PYD	PICD	PCBD	PPCD	PApD
Fat	*q' ~ *q	*k	*q'	*q'	*q'	*k'	*q'	*k'	*k'	*k'	*k'	*k'
Head	*ts	*tj	*ts	*ts	*ts	*ts ^h	*ts ^h	*ts ^h	*ts ^h	*ts ^h	*ts ^h	*ts ^h
Eye	*n	*d	*n	*n	*n	*n	*n ~ *n ^d	*n	*n	*n ^d	*n	*n
Ear	*gy	*Ø	*gy	*dz	*dz	*dz	*dz	*dz	*dz	*dz	*ts ~ *ʃ	*ts ~ *ʃ
Arm	*q	*k	*q	-	*q	*q	*q	*k	*k	*k	*k	*k
Knee	*q ~ *k	*b	*q	*q	*q	*k	*k	*k ^w	*k	*k ^w	*q	*k
Thigh	*q ^w	*k	*q ^w	*g ^w	*g ^w	*ɣ ^w	*ɣ	-	*ɣ ^w ~ *ɣ	*w	*r	-
Foot	*q ^w ~ *q'	*k ^h	*q ^w	*q ^w ~ *k ^w	*q ^h	*q ^h ~ *k ^h	*q ^h	*k ^h	*k ^h	*q ^h	*k ^w	*k ^h
Stomach	*p ^{hw} ~ *p ^h	*p ^h	*h ^w	*w	*w	*p	*p	*p ~ *b	*p	*p	*p ~ *mp ~ *m	*p
Liver	*s	*s	*s	*s	*s	*z ~ *ð	*z ~ *ð	*ð	*z ~ *ð	*z	*s	*z
Blood	*d	*s	*d	*d	*d ~ *t	*t	*t	*t	*t	*t	*t	*t
Saliva	*d ~ *t	*d	*t ~ *s	*t ~ *s	*s	*s	*s ~ *ʒ	*z	*z	*s	*s	*z ~ *ʒ
Breast	*m ~ *mp ~ *mb	*m	-	-	*m ~ *mp ~ *mb	*m	*m	-	-	-	-	*b
Breast (pointed)	*ts ^h ~ *t ^h	*t ^h	*ts'	*ts'	*ts'	*ts'	-	*ʃ	*tθ'	*ts'	*ts'	-

² Glossary of proto-language abbreviations:

PDY = Proto-Dene-Yeniseian; PY = Proto-Yeniseian; PND = Proto-Na-Dene; PDE = Proto-Dene-Eyak;
 PD = Proto-Dene; PNoD = Proto-Northern-Dene; PAD = Proto-Alaska-Dene; PYD = Proto-Yukon-Dene;
 PICD = Proto-Interior-Canada-Dene; PCBD = Proto-Central-BC-Dene; PPCD = Proto-Pacific-Coast-Dene;
 PApD = Proto-Apachean-Dene

5.2 Limitations of the Study

The results of this thesis must be understood within the limits of the dataset and the method used. Although Snoek's original anatomical dataset contains 68 terms, this study examined 40 of them in detail. The terms selected here provide a substantial sample of body-part vocabulary, but they do not represent the entire anatomical lexicon. As a result, the conclusions drawn from this study should be treated as a focused contribution to Dene, Na-Dene, and Dene-Yeniseian reconstruction rather than as a complete reconstruction of body-part terminology across the family.

A second limitation concerns the uneven availability of data. The Dene languages are represented by a broad sample, but the documentation is not equally detailed for every language or every anatomical term. Some forms are well attested across many branches, while others are preserved only in a few languages or are missing from major parts of the dataset. Eyak and Tlingit are especially important for higher-level reconstruction, but their evidence is sometimes absent, semantically divergent, or phonologically difficult to align with Dene. Yeniseian presents an additional difficulty because Ket is the only surviving member of the family, while the extinct Yeniseian languages are known through more limited documentation. This means that Proto-Yeniseian comparison often depends heavily on existing reconstructions rather than on a broad set of living daughter languages.

The status of many body-part terms as bound stems also creates methodological complications. In Dene and related languages, body-part nouns are generally inalienably possessed and do not always occur as simple independent forms. This means that the forms compared in this study often reflect stems embedded in possessive morphology, compounds, or other larger lexical structures. Although hyphens and possessive morphology were omitted in many tables for simplicity, the bound status of these forms remains important for analysis. In some cases, it is

difficult to determine whether a segment belongs to the inherited stem itself, to an old possessive element, or to a later compound structure.

5.3 Future Directions

Several areas of future research follow from the results of this study. The first is the completion of the remaining anatomical terms in Snoek's dataset. Since this thesis examined only 40 terms, a natural next step would be to apply the same method to the terms not treated here. This would make it possible to determine whether the reconstruction patterns identified in this study hold across the full anatomical lexicon. It would also clarify whether the proportion of Proto-Dene, Proto-Dene-Eyak, Proto-Na-Dene, and Proto-Dene-Yeniseian candidates remains similar when the entire dataset is considered.

A second direction would be a more systematic study of semantic extension in anatomical vocabulary. Several of the most interesting results in this thesis involve cases where one body-part term appears to have developed into another, or where a general anatomical shape, function, or location was lexicalized differently across branches.

Another important direction would be to test the proposed sound correspondences outside body-part terminology. Anatomical vocabulary is useful because it is generally stable and resistant to borrowing, but it represents only one semantic domain. Terms for basic actions, natural features, kinship, spatial orientation, and other stable areas of vocabulary should be examined to determine whether the same correspondence patterns recur elsewhere. If the correspondences identified in this study also appear in other domains, the case for inherited Dene-Yeniseian material would become stronger.

Finally, the Proto-Dene-Yeniseian candidates identified in this study should therefore be understood as supplementary evidence within the larger framework established by Vajda. Their value lies in whether they support, refine, or complicate the sound correspondences already proposed in earlier Dene-Yeniseian research. Some of the reconstructions offered here will likely require revision as more data are examined, but that is also part of their usefulness. The analysis provides a starting point for future work: individual cognate sets can be rechecked, the proposed correspondences can be tested against additional lexical domains, and the more tentative comparisons can either be strengthened or rejected. In this sense, the body-part evidence presented here is best treated not as a final demonstration of Dene-Yeniseian, but as a structured dataset for further historical comparison.

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Appendix 1 - Sample of the database.

1	Gloss	CogSet	Group	Language	Form	Position	SoundCorrespondence
4346	FOOT	1	InteriorCanada	Hare	kie	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4347	FOOT	1	InteriorCanada	Mountain	k ^h é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4348	FOOT	1	InteriorCanada	Bearlake	k ^h é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4349	FOOT	1	InteriorCanada	Tłı̨chʔ	kè	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4350	FOOT	1	InteriorCanada	South Slavey	k ^h é	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4351	FOOT	1	InteriorCanada	Dene Sųlíné	k ^h e	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4352	FOOT	1	InteriorCanada	Dene Dháh	k ^h é	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4353	FOOT	1	InteriorCanada	Beaver	k ^h é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4354	FOOT	1	CentralBC	Carrier	k ^h e	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4355	FOOT	1	CentralBC	Witsuwit'en	q ^h e	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4356	FOOT	1	InteriorCanada	Sekani	k ^h é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4357	FOOT	1	BranchIsolate2	Ts'ets'aut	kia	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4358	FOOT	1	CentralBC	Chilcotin	ké	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4359	FOOT	1	PacificCoast	Hupa	xé?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4360	FOOT	1	PacificCoast	Kato	k ^w é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4361	FOOT	1	PacificCoast	Tolowa	x ^w é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4362	FOOT	1	PacificCoast	Tututni	xé?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4363	FOOT	1	PacificCoast	Mattole	k ^w é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4364	FOOT	1	PacificCoast	Wailaki	k ^h éh	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4365	FOOT	1	PacificCoast	Kwa-Clat	k ^w é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4366	FOOT	1	Apachean	Navajo	k ^w é?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4367	FOOT	1	Apachean	Western A.	k ^h ee?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4368	FOOT	1	Apachean	S. Carlos A.	k ^h e?	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4369	FOOT	1	Apachean	Jicarilla A.	k ^h é, k ^h e:	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4370	FOOT	1	Apachean	Kiowa A.	tʃè:	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4371	FOOT	1	Apachean	Mescalero A.	k ^h e:	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4372	FOOT	1	Apachean	Lipan A.	k ^h e	initial	q ^h =q=k'=k ^h =k ⁱ =k ^w =x ^w =tʃ
4373	FOOT	?	Eyak	Eyak	k'ahsh	initial	
4374	FOOT	?	Tlingit	Tlingit	xh'ús	initial	
4375	FOOT	?	Yeniseian	Proto-Yeniseian	*ki's	initial	