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Calibrated weighted permutation test detects ancient language connections in the Circumpolar area (Chukotian-Nivkh and Yukaghir-Samoyedic)

# Supplement: text

## Contents

# 1. Consonant classes

We use the same technique of consonant coding as described in Kassian, Starostin & Zhivlov 2015a.

All linguistic data in the present article are encoded in the unified transcription system of the *Global Lexicostatistical Database* project, which is generally based on the IPA alphabet, with several specific discrepancies, e.g., we use traditional *c č* for IPA $\widehat{ts}$ $\widehat{t\!f}$. See Section 8 "Transcription system" in the present file or http://starling.rinet.ru/new100/UTS.htm for the phonetic chart.

Further each proto-root is encoded according to its constituent consonant classes, that is, any given root is represented as a bi-consonantal skeleton with the shape *CC*. Since each consonant class was designed to include phonemes which mutate more frequently into each other during language evolution than into phonemes of other classes, two forms from the compared wordlists with identical *CC*-transcriptions have a higher chance to be historical cognates than forms whose *CC*-transcriptions differ. Our algorithm marks any pair of forms with the same *CC*-transcription as a *CC*-match, and other pairs as non-matching.

We rely specifically upon the first two consonants of the root (*CC*), since the most common root pattern in the world's languages, particularly in the domain of basic lexicon, is *CVC(V)* (monoconsonantal structures *CV* and *VC* may formally be regarded as variants with zero-class consonant in the first or second position: *CH* and *HC* respectively). Vowels are omitted due to their instability and lability (e.g., there are more than 220 rows of regular vowel correspondences between such recognizably related languages as Modern English and Modern German, Dybo & Starostin 2008: 145–147).

The method of consonant classes is thus, on one hand, a crude variation on the measurement of Levenshtein distances and, on the other hand, is close to modeling the preliminary stage of real comparative-historical research, at least as far as criteria for eliciting potential etymological lexical matches between two languages are concerned.

We use the following consonant classes: Table S1.

Table S1. Consonant classes. The full list is available in the xls-format as Suppl. Table 4

| | |
|---|---|
| P-class (labials) | p b ɓ β f v… |
| T-class (dentals) | t d ɗ θ ð ɖ ʈ … |
| S-class (sibilant fricatives) | s z š ž… |
| Ʒ-class (sibilant affricates) | c ʒ č ǯ… |
| Y-class (palatal glides) | y… |
| W-class (labial glides) | w ʍ… |
| M-class (labial nasals) | m ɱ… |
| N-class (non-labial nasals) | n ɳ ɲ ŋ… |
| Q-class (lateral affricates) | ƛ … |
| R-class | r ɾ… |
| L-class | l ɭ ɬ ɫ… |
| K-class (velars & uvulars) | k g x ɣ q χ ʁ… |
| zero-class or H-class | ħ ʕ ʜ ʢ ʔ h ɦ ʔ and any vowels |

This proposed transcription system (*P T S Ʒ Y W M N Q R L K H*) is sufficient for encoding all wordforms or morphemes of any natural language that is included into comparison.

Elements of the *H*/zero-class and such features as coarticulation, prosody, phonation are notably deleted from the structure, with the exception of word-initial and word-final vowels and laryngeals which are coded as *H*.

Non-initial *Y* and *W* (weak glides) are treated as *H*, i.e., they are deleted in the medial position and coded as *H* in the final position.

As noted above, for the present study we use *CC*-transcription, reducing each wordform to its two first consonants.

Examples of how the consonant class encoding actually works are given in Table S2.

Table S2. Examples of transcription of consonant classes (hypothetical wordforms).

| Wordform | Full consonant classes transcription | *CC*-transcription |
|---|---|---|
| *tasam* | *TSM* | *TS* |
| *dʰüzo* | *TSH* | *TS* |
| *alaq* | *HLK* | *HL* |
| *ʔäʎx* | *HLK* | *HL* |
| *na* | *NH* | *NH* |
| *ŋoʔ* | *NH* | *NH* |
| *pkʰot* | *PKT* | *PK* |
| *baqʼaƛ* | *PKQ* | *PK* |
| *wahat* | *WT* | *WT* |
| *ʍad* | *WT* | *WT* |
| *ka* | *KH* | *KH* |
| *kay* | *KH* | *KH* |
| *kawa* | *KH* | *KH* |
| *kat* | *KT* | *KT* |
| *kayat* | *KT* | *KT* |

## 2. Weighted permutation test

When two isomorphic wordlists (with roots transcribed into *CC*-shapes) are compared with each other, one of the lists is randomly reshuffled, and the number of *CC*-matches is recorded for each new configuration. In the traditional (i.e., unweighted) permutation test, if the number of observed *CC*-matches between two wordlists is *X*, the number of random trials with *X* or more *CC*-matches divided by the total number of trials produces the probability *p* of getting *X* or more matches between the original wordlists by chance. The key publications on the unweighted permutation test are Oswalt 1970; Baxter & Manaster Ramer 2000; see McMahon & McMahon 2005: 66–68 for a short description. Other important experiments with the unweighted permutation test applied to various languages families are: Oswalt 1998; Kessler & Lehtonen 2006; Kessler 2007; Kassian, Starostin & Zhivlov 2015a; 2015b (Indo-European–Uralic); Dunn & Terrill 2012 (Central Solomons Papuan family); Kassian 2014 (Hurro-Urartian–Sumerian); Ceolin 2019; Kassian et al. 2021 (Altaic family); Peust 2020 (Na-Dene family); Turchin, Peiros & Gell-Mann 2010; Kilani 2015; Ceolin et al. 2021 (various families of Eurasia); the list does not pretend to be exhaustive. For an overview of some of the aforementioned experiments with the unweighted permutation test, Kassian, Starostin & Zhivlov 2015a; Kassian et al. 2021.

*CC*-comparison, as has been proposed by our team or, independently, by Kilani (2015), shares two principal advantages over other automated approaches. First, as stated above and elsewhere (e.g., Kassian, Starostin & Zhivlov 2015b: 379–380; Kassian et al. 2021), it models real comparative-historical research. Second, our experiments on lexical data from various world languages (see our collection of 110-item wordlists at the *Global Lexicostatistical Database* project https://starling.rinet.ru/cgi-bin/main.cgi?root=new100) show that the *CC*-comparison usually has a low false positive rate (type-1 errors), sometimes amounting to zero. E.g., for the Indo-European–Uralic comparison, our algorithm detects those and only those pairs which are treated as cognates under the Nostratic hypothesis (Kassian, Starostin & Zhivlov 2015a: 320); all the Modern Greek-English pairs detected by the algorithm are true etymological cognates (Kassian, Starostin & Zhivlov 2015b: 380); and so on. Definitely unrelated languages pass the current version of the permutation test only in exceptional cases which is statistically expected (Kassian 2014: 16). But false negative rate (type-2 errors) can be high in some cases (e.g., Kassian et al. 2021). In other words, our automated method mostly treats as positive the same pairs of forms which are already thought to be cognate by historical linguists.

In order to enhance the signal, we developed a weighted permutation procedure, where each Swadesh concept is assigned its own weight (or cost) in accordance with its typological stability.

It is commonly acknowledged that Swadesh concepts possess different average degrees of stability: some concepts are typologically more stable, i.e., words that designate these concepts usually last longer in the language, while other concepts are less stable, and the corresponding words disappear or change their meanings more frequently in the course of language evolution. Based on S. Starostin's (2007a) typological survey of language families of the Old World, we calculated the degree of stability for each concepts and used them as multiplication factors to increase the cost of *CC*-matches, so that a *CC*-match for a more stable concept is more expensive than a *CC*-match for a less stable concept (since the latter has a higher probability to represent a chance coincidence due to its general instability).

S. Starostin (2007a) offers statistical data on lexical stability of 110 Swadesh concepts in some families of the Old World: 132 Sino-Tibetan lects, 99 Austro-Asiatic lects, 54 Altaic lects, 94 Austronesian lects, 36 Australian lects, 26 Khoisan lects, 33 North Caucasian lects, 21 Dravidian lects, 97 Indo-European lects, 7 Kartvelian lects, 69 Afroasiatic lects, 47 Tai-Kadai lects, 17 Uralic lects, 14 Yeniseian lects. In total, S. Starostin's sample consists of 737 languages belonging to 14 language families. We prefer S. Starostin's statistics to ASJP statistics (Holman et al. 2008), since the latter are based on a smaller set of languages and produce some intuitively

unexpected results, e.g., 'louse' is (allegedly) the most stable concept in the world's languages; see Kassian, Starostin & Zhivlov 2015b: 377–378 for further details.

S. Starostin (2007a) himself proposed a relatively complex and not intuitively transparent calculation of the stability index. Instead of this approach, we prefer to follow a simpler and more straightforward way proposed by Pozdniakov (2014). First, the "stability index" of each Swadesh item for each family is defined as $M/L$, where $L$ = the number of languages in the family and $M$ = the maximum number of languages within the group that use reflexes of the same root for the respective Swadesh meaning (e.g., the Slavic stability index for 'belly' is 0.38, since 5 out of 13 languages preserve reflexes of the same Proto-Slavic root *$bryo:x$-); this part of the procedure is the same as in S. Starostin's original article. At the next step, for each Swadesh concept we take the arithmetic mean of its stability indexes in individual language families. The obtained number is the stability index of the given concept:

| | |
|---|---|
| 'I' | 0.805 |
| 'thou' | 0.797 |
| 'two' | 0.769 |
| 'eye' | 0.738 |
| 'we' | 0.725 |
| ... etc. | |

We present a spreadsheet showing stability indexes of Swadesh concepts as Suppl. Table 1 (see xls-file). Our ranking is almost identical with Table 10 from Pozdniakov 2014 (minor rearrangements are due to rounding).

These indexes were further used as weights of individual Swadesh concepts. When two wordlists are compared, the sum of weights of all concepts with positive pairs (*CC*-matches in our cases) constitutes the total weight of that comparison. When the same slot is occupied by several synonyms (a normal situation in our study), we compare all possible pairs between two languages: if there is at least one matching pair, that pair is treated as positive.

For instance, the following positive pairs (CC-matches) were observed for the Haida and Nivkh wordlists: Table S3.

Table S3. Positive pairs (*CC*-matches) between the Haida and Nivkh 110-item wordlists.

| concept | weight | Haida | Nivkh | CC-transcription |
|---|---|---|---|---|
| dog | 0.628 | *χa* | *ɢa* | *KH* |
| dry | 0.442 | *k'a:* | *qaw* | *KH* |
| sleep | 0.430 | *q'a* | *qo* | *KH* |
| that | 0.339 | *hu:* | *hu* | *HH* |

The total weight of matching pairs in the original non-reshuffled lists is 184 (multiplied by 100 and rounded for the sake of convenience).

The permutation test begins by randomly reshuffling concepts in one of the two lists (the Nivkh one in our case), checking the total weight for each new configuration. We routinely used 1.000.000 pseudo-random trials, but if all trials returned a smaller total weight than observed for the original lists, we reran the analysis with 10.000.000 trials. When the same slot (i.e., concept) is occupied by several synonyms (or several equiprobable phonetic variations of the same reconstruction), we compare all possible pairs between two languages: if there is at least one matching pair, the whole slot is treated as positive.

If $s$ is the weight of the original wordlist comparison ($s$ = 184 in the Haida-Nivkh example), the probability $p_1$ of getting the same or higher weight by chance is the number of trials with weight ≥ $s$ divided by the total number of trials.

The outcome of the Haida-Nivkh weighted permutation test looks as follows ($s$ is the weight):

```
s = 0:      47801 trial(s)
s = 22:     915 trial(s)
s = 23:     928 trial(s)
...
s = 184:    3177 trial(s)
s = 185:    3082 trial(s)
s = 186:    3014 trial(s)
...
s = 550:    1 trial(s)
s = 590:    1 trial(s)
s = 652:    1 trial(s)
```

It can also be depicted as a plot (Fig. S1).
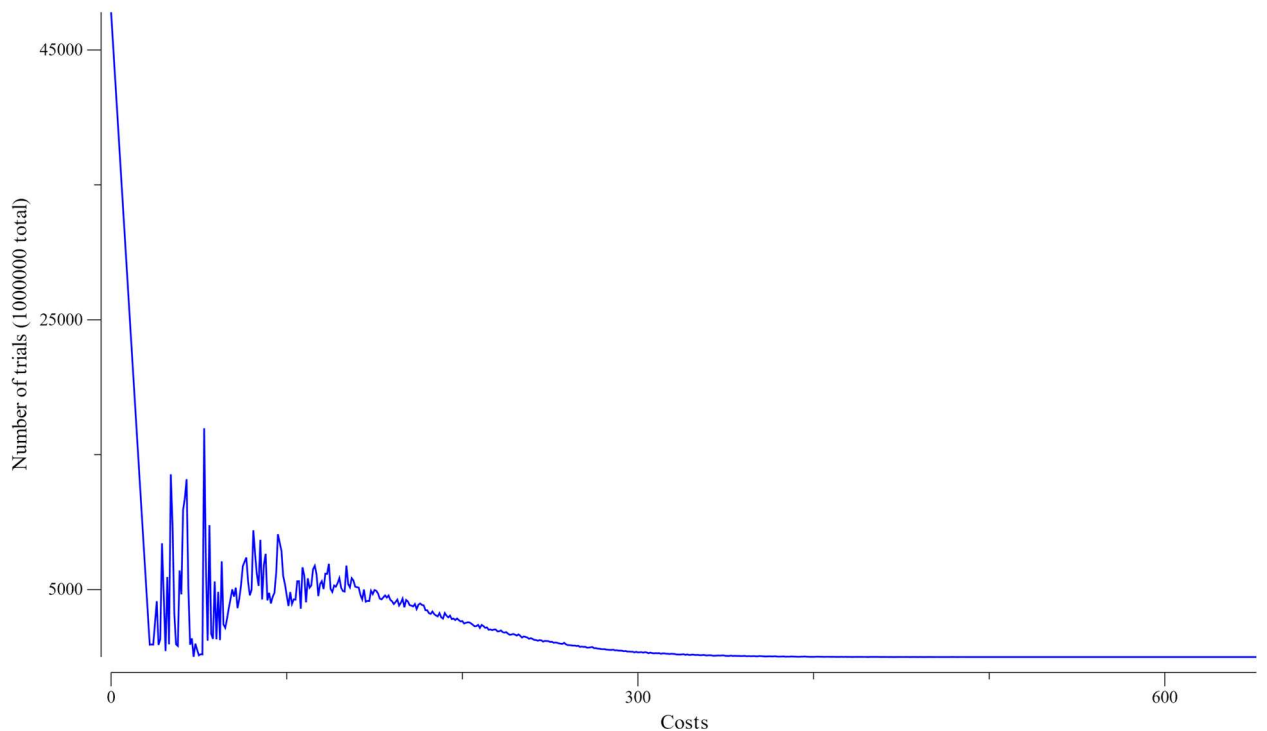


Fig. S1. Haida-Nivkh weighted permutation test (the Nivkh list is being reshuffled).

The number of trials that yielded $s \geq 184$ is $3{,}177 + 3{,}082 + ... + 1 + 1 = 187{,}330$, thus non-calibrated $p_1 = 0.187$ (rounded).

Then we repeat the permutation procedure, keeping the second list untouched whilst the first one (Haida in our case) is being reshuffled. This produces another probability estimate, $p_2$ (note that $p_1$ and $p_2$ are usually close to each other, but are not expected to be equal). In the Haida-Nivkh case, non-calibrated $p_2 = 0.232$.

The statistic $S$ of the weighted permutation test is defined as the maximum of the two probabilities: $S = \max(p_1, p_2)$. In the Haida-Nivkh example, non-calibrated $S = \max(0.187, 0.232) = 0.232$. The values of $S$ were further used for obtaining $p$-values by a calibration procedure (see the next section).

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# 3. Negative control and calibration of permutation test outcomes

## 3.1. Negative control dataset

We compiled a negative control dataset consisting of 110-item wordlists for 38 languages from 38 families all around the world. The families were selected in such a way that mutual relationship between them is expected to be too distant to be detectable by superficial similarity. For our arbitrary threshold we are cautious enough to accept the Indo-European–Uralic pair (Kassian, Starostin & Zhivlov 2015a); keeping in mind the possibility that these two families may indeed be related, based both on existing etymological research and on the results of the permutation test, we only include one single language from the IE and Uralic families in the negative control dataset (Modern Greek). The same concern is relevant for, e.g., the North Caucasian family and Basque, whose potential relationship could be on approximately the same level as IE and Uralic, if not closer: consequently, we only accept one representative for both families (namely, the Bezhta language).

Wordlists are mostly taken from the Global Lexicostatistical Database. The following languages are included in the negative control dataset:

**Eurasia**
1. Indo-European family > Modern Demotic Greek (Aleksandra Evdokimova)
2. Korean family > Middle Korean (Ekaterina Logunova)
3. Dravidian family > Konda (George Starostin)
4. Kartvelian family > Georgian (Alexei Kassian)
5. North Caucasian family > Bezhta (Alexei Kassian)
6. Yeniseian family > Ket (George Starostin)
7. Hmong-Mien family > Qiandong (George Starostin)
8. Sino-Tibetan family > Atong (George Starostin)

**Africa**
9. Cushitic family > Aasax (George Starostin)
10. Omotic family > Ari (George Starostin)
11. Shabo family > Shabo (George Starostin)
12. Komuz family > Kwama (George Starostin)
13. Krongo-Kadugli family > Kadugli (George Starostin)
14. Benue-Congo family > Nilamba (George Starostin)
15. East Sudanic family > Nara (George Starostin)
16. Songhay family > Zarma (George Starostin)
17. Hadza family > Hadza (George Starostin)

**America**
18. Haida family > Haida (Alexei Kassian)
19. Na-Dene family > Hupa (Alexei Kassian)
20. Salishan family > Upriver Halkomelem (Elena Barreiro)
21. Chumashan family > Ineseño (Mikhail Zhivlov)
22. Hokan family > Chimariko (Mikhail Zhivlov)
23. Iroquoian family > Seneca (Mikhail Zhivlov)
24. Uto-Aztecan family > Cahuilla (Mikhail Zhivlov)
25. Utian family > Lake Miwok (Mikhail Zhivlov)
26. Arawakan family > Lokono (André Nikulin)
27. Cahuapanan family > Shiwilu (André Nikulin)
28. Macro-Je family > Krenak (André Nikulin)

29. Nadahup family > Daw (André Nikulin)
30. Pano-Tacanan family > Poyanawa (André Nikulin)


**Oceania & Australia**
31. Austronesian family > 'Are'are Ma'asupa (George Starostin)
32. West Trans-New Guinea family > Abui (Alexei Kassian)
33. Sepik-Ramu family > Abau (George Starostin)
34. Bulaka River family > Makléw (Timothy Usher)
35. Digul River family > Kovojab (Timothy Usher)
36. North Bougainville family > Rotokas (Artem Trofimov)
37. Skou family > Skou (Artem Trofimov)
38. Pama-Nyungan family > Dieri (Ilya Egorov)

In total, 38 languages yield 703 pairwise comparisons.


## 3.2. Calibration of *p*-values

As stated in the main text, the weighted permutation test applied to the negative control group (Suppl. Table 3, see xls-file) systematically produces lower *p*-values than one could expect. E.g., there are 59 pairs (8.5% of 703) with $p < 0.05$, 20 pairs (2.8% of 703) with $p < 0.01$, etc.

This effect is caused by the fact that some of the Swadesh concepts tend to share similar phonological structures among the world's languages. First of all, this concerns personal pronouns ('I', 'thou', 'we'), which, on one hand, usually have the shape *CV* (i.e., *CH* in our consonant transcription), and, on the other hand, are at the top of the stability index list (Suppl. Table 1, see xls-file). In other words, phonemes are not evenly distributed for some of the most expensive Swadesh items. Further studies should clarify details.

To override the effect of underestimated *p*-values and of the weighted permutation test outcome $S > 0.1$, we use data from the 703 negative control pairs: we set calibrated *p*-value to be equal to the fraction of pairs from the negative control that have their permutation test statistic less or equal to *S*. E.g., the weighted permutation test between Proto-Yeniseian and Haida yields $S = 0.221$; there are 262 pairs with $S \leq 0.221$ out of 703 negative control pairs (Suppl. Table 3, see xls-file). Thus, the calibrated *P* of getting at least the same weight as between the Proto-Yeniseian and Haida lists is $262/703 = 0.372$.

For the weighted permutation test outcome $S \leq 0.1$, the available negative control data (703 pairs) have density too low to be used as direct evidence. For example, if $S < 0.0002$, then the procedure described above would give $p = 0$, which is not realistic. For $S = 0.01$ the numerator in the above formula for *p* is only 20, which makes it unstable, since changing this number by 1 would change *p* by 5%. For this reason, we obtain the calibrated *P*-value using extrapolation with the help of the formula:

$$P = 2.59\,S - 5.89\,S^2 \qquad (1)$$

E.g., the weighted permutation test between Proto-Samoyedic and Proto-Yukaghir yields non-calibrated $S = 0.000475$. Thus, the calibrated *p*-value of getting at least the same weight as between the Proto-Samoyedic and Proto-Yukaghir lists is $2.59*0.000475 - 5.89*0.000475^2 = 0,001229$.

The calibration formula (1) was obtained by extrapolation in the following way:

(1) The table of density of *S*-scores in the negative control for values from 0.005 to 0.095 with a step of 0.01 was created, see Table S4. For each *X* in the top row, the bottom row

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contains the number $Y$ of language pairs in the negative control set having $S$ in the range $X - 0.005 \le S < X + 0.005$.

(2) Linear regression was applied to the 10 pairs ($X$, $Y$). The regression gives the formula $Y(X) = 18.78 * X - 97.58$

(3) The result of regression was recalculated to density: $D(X) = Y(X)/703$. Here 703 is the total number of pairs in the negative control.

(4) The estimation of $p$ for the given $S$ is the integral from 0 to $S$ of the density $D$, which gives $\hat{P}(S) = 2.67 * S - 6.94 * S^2$. Figure S2 shows the graph of $\hat{P}$ in comparison with empirical distribution of $S$ on the negative control set. At the point $S = 0.1$ these two values are almost the same, thus it seems reasonable to use the empirical values for $S > 0.1$ and $\hat{P}(S)$ for $S \le 0.1$, as $p$-values for a given statistic $S$.

Table S4. Numbers of S-scores (Y) in ranges [X – 0.05, X + 0.05) in the negative control set of 703 language pairs.

| $X$ | 0.005 | 0.015 | 0.025 | 0.035 | 0.045 | 0.055 | 0.065 | 0.075 | 0.085 | 0.095 |
|---|---|---|---|---|---|---|---|---|---|---|
| $Y$ | 20 | 18 | 12 | 16 | 13 | 15 | 13 | 12 | 14 | 6 |



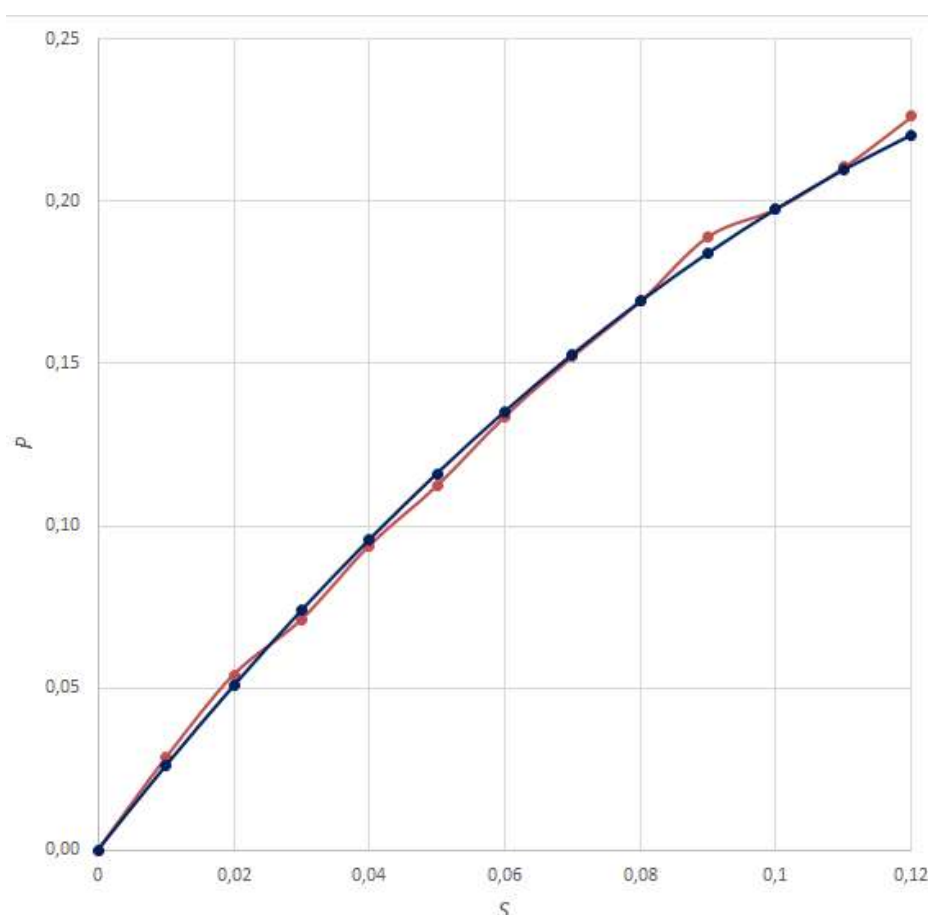Fig. S2. Comparison of estimated $p$-values ($\hat{P}(S)$, blue) and the empirical distribution (fraction of $S$-scores in the negative control less than the given $S$, red) in the range [0, 0.12]

The software package used in the present study for the weighted permutation test is available at https://github.com/dmkrylov/starling-permutation-test (Andrei Zavgorodnii in collaboration with Dmitri A. Krylov).

# 4. Pairwise comparison between Yeniseian, Burushaski and all the Na-Dene wordlists

Tab. S5. Probabilities of phonetic matches between Yeniseian, Burushaski and the (proto-)languages that constitute the Na-Dene family obtained by the weighted permutation test, calibrated values. Statistically significant values are shadowed in <mark>yellow</mark> ($\alpha=0.05$).

|  | Tlingit | Eyak | Proto-Athabaskan | Proto-Athabaskan-Eyak | Proto-Athabaskan-Eyak + Tlingit | Proto-Burushaski |
|---|---|---|---|---|---|---|
| **Proto-Yeniseian** | 0.677 | 0.056 | 0.014 | 0.002 | 0.006 | 0.023 |
| **Proto-Burushaski** | 0.531 | 0.875 | 0.146 | 0.232 | 0.225 | — |

Note the insignificant result between Proto-Yeniseian and modern Na-Dene lists (Tlingit and Eyak), although comparison between Yeniseian and the reconstructed Na-Dene lists (Proto-Athabaskan, Proto-Athabaskan-Eyak, Proto-Athabaskan-Eyak + Tlingit) as well as the Proto-Burushaski list yields $p < 0.05$ or even $< 0.01$.

# 5. *CC*-matches in statistically significant pairs (Chukotian-Itelmen, Nivkh, Samoyed, Yukaghir, Yeniseian, Na-Dene, Burushaski)

Table S6. Positive pairs (*CC*-matches) between the "Proto-Chukotko-Kamchatkan" (cumulative Proto-Chukotian + Proto-Itelmen) and Proto-Nivkh 110-item wordlists.

| concept | "Proto-Chukotko-Kamchatkan" | Proto-Nivkh | CC-transcription |
|---|---|---|---|
| big | pul- | bil- | *PL* |
| eat | nu- | ɲi- | *NH* |
| leaf | palʔa- | plaŋq | *PL* |
| meat | tərɣe-tər | dur | *TR* |
| new | tur- | t̪ur- | *TR* |
| not | -kä | qaw- | *KH* |
| sit | təva- | tiv- | *TP* |
| smoke | t'i- | taw-laŋ | *TH* |
| star | äŋär | uɲiɣr | *HN* |
| this | tiʔ- | du- | *TH* |
| we | mur- | mir-n | *MR* |
| what | ðə-n- | V=du-nt | *TH* |

Table S7. Positive pairs (*CC*-matches) between the Proto-Samoyed and Proto-Yukaghir 110-item wordlists.

| concept | Proto-Samoyed | Proto-Yukaghir | CC-transcription |
|---|---|---|---|
| feather | tuə | tiw-il | *TH* |
| hair | əptə | abdə | *HP* |
| I | mə-n | mə-t | *MH* |
| mouth | aŋ | aŋa | *HN* |
| say | mɒn | mon- | *MN* |
| that | ta- | teː-ŋ | *TH* |
| this | tə- | tu-ŋ | *TH* |
| thou | tə-n | tə-t | *TH* |
| we | me- | mi-t | *MH* |

Table S8. Positive pairs (*CC*-matches) between the Proto-Yeniseian and "Proto-Na-Dene" (cumulative Proto-Athabaskan-Eyak + Tlingit) 110-item wordlists.

| concept | Proto-Yeniseian | "Proto-Na-Dene" | CC-transcription |
|---|---|---|---|
| ashes | qol | kʰéɬʼ | *KL* |
| big | qeʔ | ke: | *KH* |
| fingernail | xi:ɲe | χanc | *KN* |
| dry | qɔɢ | xu:k | *KK* |
| give | o | ʔa | *HH* |
| kill | xe:y | χe: | *KH* |
| liver | seŋ | sVntʼ | *SN* |
| louse | xə:ke | kVks | *KK* |
| moon | suy | šʷa: | *SH* |
| mouth | qowe | χʼé | *KH* |
| see | ɔŋ | ʔV:n | *HN* |
| stone | ciʔ | cʰV: | *CH* |
| that | ʔu | ʔVw | *HH* |
| go | hey | ha: | *HH* |
| short | tuk | tikʼ | *TK* |
| worm | koy | qu: | *KH* |

Table S9. Positive pairs (*CC*-matches) between the Proto-Yeniseian and Proto-Burushaski 110-item wordlists.

| concept | Proto-Yeniseian | Proto-Burushaski | CC-transcription |
|---|---|---|---|
| dry | qɔɢ | qaq | *KK* |
| eat | si: | ṣi | *SH* |
| give | o | u | *HH* |
| kill | xe:y | qa | *KH* |
| name | ʔiɢ | ek | *HK* |
| that | ʔu | i | *HH* |

# 6. Basic information on the language families and groups

**Yeniseian (George Starostin)**

The Yeniseian family (Vajda 2001; Anderson 2004) consists of several languages, out of which only Ket is currently surviving, with approximately 200 remaining speakers in several villages located in the Middle Yenisei basin; however, several other members of the Yeniseian group have been attested as early as the 18th century, and evidence from history and toponymics suggests that the original extent of the family was much larger, reaching South Siberia and stretching almost to Lake Baikal. Besides Ket, abundant linguistic data have been preserved on Yugh (Sym), a language that was very closely related to Ket before its extinction at the end of the 20th century; somewhat less well described (primarily due to the research of M. Castrén) is Kott, extinct in the middle of the 19th century; and even scarcer and less reliable (though still historically priceless) data have been preserved on Arin and Pumpokol, two languages spoken further to the south and presumably extinct by the beginning of the 19th century.

Despite the fact that the majority of Yeniseian languages became extinct before their data could be captured by means of modern day linguistic fieldwork practices, data from the late 18th century survey sources on Arin and Pumpokol and particularly the data on Kott, collected by Castrén, permit proper comparative-historical research to be applied to the Yeniseian languages, and a detailed formal reconstruction of Proto-Yeniseian phonology and lexicon was laid out by Sergei Starostin (2007b [1982]), followed by a brief etymological dictionary of the reconstructed Proto-Yeniseian (Starostin 1995). Since then, a slightly amended alternative model for Proto-Yeniseian has been offered by Heinrich Werner (2002), who is currently working on an even more in-depth reconstruction in collaboration with Edward Vajda. Many of Werner's reconstructions are significantly different from S. Starostin's and have occasionally been criticized by the latter in his 2003–2004 notes in the database (Starostin 2005a).

The Yeniseian family as a whole is not too divergent, with much of the basic lexicon, root structure peculiarities, and overall phonological features of the proto-language well preserved in all of its daughter languages; however, the grammatical structure of Proto-Yeniseian is significantly harder to reconstruct due to its notorious complexity and lack of reliable data on such extinct languages as Arin and Pumpokol. Our glottochronological calculations, performed on carefully assembled 100-item Swadesh wordlists of the basic lexicon for the five Yeniseian languages, yield an approximate date of 700–500 BC for the disintegration of Proto-Yeniseian, and a tripartite structure of the family, with indisputable Ket-Yugh and Kott-Arin branches, and a questionable status for Pumpokol (probably somewhat closer to Ket-Yugh than to Kott-Arin, although this is questionable in light of numerous Yugh words formerly mislabeled as Pumpokol in older sources). Cf. the identical Yeniseian tree in Georg 2008.

Our protolanguage wordlist takes S. Starostin's phonological reconstruction as its starting point; however, Werner's alterations to the reconstructions are considered on a regular basis, and some modifications to the etymologies have also been suggested by G. Starostin (all such modifications are stated and justified in the notes section).

The present attempt at the reconstruction of a Swadesh wordlist for Proto-Yeniseian generally coincides with Starostin 2013a (several emendations are explicitly discussed below, most of them consist of an extra synonym added to the comparison in situations when two roots are found to have almost even chances of having expressed the required Swadesh meaning on the proto-level: 'breast', 'cold', 'to come', 'hand', 'to know', 'moon', 'round', 'short').

Seven Swadesh items are not reconstructible for Proto-Yeniseian (due to insufficient attestation or presence of new formations in the majority of lects): 'belly', 'to bite', 'green', 'seed', 'skin', 'yellow', 'snake'.

## Na-Dene (Proto-Athabaskan, Eyak, Proto-Athabaskan-Eyak, Tlingit) (Alexei S. Kassian)

The general expert consensus on the Na-Dene family is that it consists of one large group, the Athabaskan languages (chronologically the Athabaskan group is probably slightly deeper than, for instance, the Germanic languages) and two outlier languages: Eyak and Tlingit. Out of these two, Eyak is definitely closer to Athabaskan than Tlingit (e.g., Krauss 1976; Kari 2010: 208), and the Athabaskan-Eyak relationship is visible to the naked eye. Tlingit, on the other hand, is much more distant, and since there are numerous points of uncertainty in phonological and morphological comparison of Tlingit with other Na-Dene languages, it is impossible to propose a reliable Proto-Athabaskan-Eyak-Tlingit phonological and semantic reconstruction at the current stage of research.

Thus, the Na-Dene section of our study consists of 4 Swadesh wordlists: a reconstructed list for Proto-Athabaskan, a synchronic list for Eyak, a reconstructed list for Proto-Athabaskan-Eyak, and a synchronic list for Tlingit.

Lexical data are taken from the GLD database: Athabaskan (Kassian 2011a, ongoing project), Eyak (Kassian 2011b), Tlingit (Kassian 2011c).

We proceed from the conservative model with a three-way division of Athabaskan: Pacific Coast (PCA), Apachean a.k.a. Southern, and Northern (e.g., Cook & Rice 1989: 2–4; Kari 2010: 208). It is clear that the Northern group represents a complex tree with several subgroups and may even be polyphyletic. Nevertheless, such a rough three-way classification is enough for semantic reconstruction of the overwhelming majority of the Swadesh concepts.

Our phonological reconstruction of Proto-Athabaskan (PA) and Proto-Athabaskan-Eyak (PAE) forms generally follows previous studies: first of all Jeff Leer's (1996) *Comparative Athabaskan Lexicon*, further Krauss & Leer 1981; Leer 2008a; Leer 2008b; Leer 2010, and so on, as well as some proposals in Nikolaev 2014. We intentionally do not take into account some marginal sound correspondences between Proto-Athabaskan and Eyak, since these require additional investigation.

We do not go into details concerning exact phonological shapes of the reconstructed forms unless it could affect transcription of consonant classes. In particular, we often write simple *$V$* when it is difficult to reconstruct the appropriate vowel with any precision. However, we use the phonological transcription $t$ $t^h$ $t'$ for the traditional orthographic triad ⟨d t t'⟩. The Proto-Athabaskan palatalized velar row *$k^y$ $k^{yh}$ $k^y$' $x^y$ $ŋ^y$* is to be reinterpreted as the plain velars *$k$ $k^h$ $k'$ $x$ $ŋ$* (which are opposed to the uvular row *$q$ $q^h$ $q'$ $χ$*).

We follow Leer 2010 and interpret the Proto-Athabaskan labialized hushing phonemes (*$č^w$ *$č^{wh}$ *$č^w$'*) as retroflex (*$č_ι$ *$č_ι^h$ *$č_ι$'*). Note that Proto-Athabaskan merges Pre-Proto-Athabaskan *$š$ and *$š_ι$ in a single fricative sibilant (Leer 2010: 171; similarly Krauss 1977), whose attested Athabaskan reflexes resemble rather $š_ι$ than $š$, but for the sake of convenience we reconstruct it as Proto-Athabaskan *$š$/*$ž$, thus no fricatives in the retroflex row. For Proto-Athabaskan-Eyak, we reconstruct this row as *$k^w$ *$k^{wh}$ *$k^w$' *$x^w$.

The traditional Proto-Athabaskan vowel reconstruction with four "full" vowels *$i(·)$ *$e(·)$ *$a(·)$ *$u(·)$ and three "reduced" vowels *$ə$ *$ɑ$ *$ʊ$ should rather be formulated as the routine opposition in length in the following way:

- four long "full" vowels: *$i:$ *$e:$ *$a:$ *$u:$
- three short "reduced" vowels: *$i$ (or *$ə$ for the sake of compatibility) *$a$ *$u$

Especially note that italic "ɑ" visually coincides with "a" in most modern computer fonts.

For the distribution of the "constricted" vowel phonation $V'$ (or creaky voice $\underline{V}$ in our transcription), see Rice & Hargus 2005: 9; Kingston 2005: 146. We do not mark creaky voice (constriction) for the short vowels, *$ə$, *$a$, *$u$, since this phonation is fully automatic for Proto-Athabaskan short vowels depending on the following consonant, glottalized or not (an exception is long vowels which shorten in some secondary morphological positions having retained the "constricted" phonation).

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A crucial thing for our computational procedure is the reconstruction of Proto-Athabaskan-Eyak clusters with nasals, *nC. Leer (2008a) proposed that the PAE sequence *VN yielded the aspirated vowel phonation in Eyak, i.e., PAE *VN# > Eyak Ṽʰ~Vʰ, *VNC > Eyak ṼʰC~VʰC, and that the old nasalization is correspondingly the main source of the aspirated vowel in Eyak. E.g., Eyak t=kʰĩʰ 'stick, wood' / PA *tə=kʰən 'stick, tree, wood'. Note that synchronous Eyak variations Ṽ~V (e.g., =quht ~ =qũht 'knee'), the absence of nasalized e and many cases when PA nasals corresponds to Eyak plain vowels (Krauss & Leer 1981: 140) suggest that Eyak was documented at the moment when vowels began to lose the nasal coarticulation. In order to explain non-nasalized reflexes in Eyak, Leer (2008a) additionally hypothesizes about rare non-homorganic clusters, PAE *VɲC or *VmC, but such a solution seems superfluous; for the present paper we reconstruct the only PAE nasal *n before a consonant for all cases of the Eyak aspirated vowels.

The synchronous Eyak vowel system, Table S10, supports Leer's general idea. Eyak short vowels lack plain nasalized phonemes (**ã), whereas long vowels lack aspirated phonemes (**aːʰ, **ãːʰ). This may imply that Proto-Eyak short nasalized vowels yielded aspirated vowels *ã > ãʰ~aʰ (either nasalized or not in documented Eyak), whereas Proto-Eyak long nasalized vowels avoided aspiration (*ãː is retained as is or denasalized > aː).

Thus the first restriction for the Eyak vowel aspiration is the Proto-Eyak vowel length, i.e., aspiration does not affect Eyak vowels which retain PAE length. The second restriction is the Eyak vowel glottalization which prevented aspiration (ã' is retained as is or denasalized > a').

Table S10. Types of Eyak vowels (after Krauss 1965: 169).

|  | plain | aspirated | glottalized | nasalized | nasalized aspirated | nasalized glottalized |
|---|---|---|---|---|---|---|
| **short** | ə (< *a) | aʰ | a' | — | ãʰ | ã' |
| **long** | aː | — | aː' | ãː | — | ãː' |

Since sequences of the shape *CVNC are not reconstructible for Proto-Athabaskan (except for morpheme boundaries, e.g., as in 'nose'), an important implication of the Leer's idea is that, if the Proto-Athabaskan sequence *CVC corresponds to Eyak CṼʰC or simply CVʰC (with recent denasalization), the PAE form is to be reconstructed with a nasal cluster, *CVnC. E.g., Eyak łãʰt 'smoke' and PA *łət 'smoke' should go back to PAE *łant, or Eyak =saʰt 'liver' and PA *=zət' 'liver' should go back to PAE *sant'. Additionally, as noted by Leer (2008a) the Eyak verbal paradigm does not allow to discriminate between verbal roots of the shapes *=CVːN and *=CV(ː) due to leveled TMA suffixes such as imperfective/perfective -h (< *n, Krauss & Leer 1981: 38-39), imperative -ʔ etc.

The second and more technical thing about the Proto-Athabaskan reconstruction of nasal consonants. There are at least two nasals reliably reconstructed for Proto-Athabaskan. The first one was likely *n, but the phonetic nature of the second is debatable. The second nasal is traditionally interpreted as velar *ŋ or *ŋʸ (e.g., Krauss & Leer 1981), but later it was proposed to reinterpret it as palatal *ɲ (e.g., Leer 2010). The choice between ŋ and ɲ is irrelevant for our computational procedure (ŋ and ɲ fall in the same consonant class), but the palatal interpretation *ɲ seems slightly more apt in the light of internal and external comparison (Leer 2010: 172). In such a case, it is natural to interpret the third PA nasal, Krauss & Leer's (Krauss & Leer 1981: 14-15; Leer 2010: 172) *ŋ₂, as *ŋ since the shift ŋ > m (as in Pacific Coast Athabaskan) is normal cross-linguistically.

## Haida (Alexei S. Kassian)

Haida is a language isolate with two dialects: Southern and Northern. Our wordlist was adapted from Kassian 2011d; it is based on Southern forms since the Southern dialect is more archaic phonetically than the Northern one (Enrico 2005: viii). There is no need to define a reconstructed protolanguage level for a family with such small time depth. Instead, in those several cases where there are lexical discrepancies between the two dialects, we either use the more archaic

term (if there are internal indications on the direction of semantic development) or use both words as synonyms. In order to accommodate the Haida data to the automated consonant classes analysis we write simple *a* for the specific Southern Haida lateralized vowel which is an allophone of /a/.

## Eskimo-Aleut (Alexei S. Kassian)

The Eskimo sub-family consists of two main groups, Yupik and Inuit, within each of which there are several closely related languages. The recently extinct Sirenik language likely represents an outlier within the Yupik group.

Our Proto-Eskimo reconstruction is generally based on Fortescue et al.'s (2010) etymological dictionary and on a number of dictionaries and glossaries of individual languages such as Central Siberian Yupik (Menovshchikov 1988), Pacific Gulf Yupik (Leer 1979), Sirenik (Menovshchikov 1964), North Alaskan Inuit (MacLean 2014), Greenlandic Inuit (Fortescue 1984), and others.

The Aleut language consists of three primary dialects: Eastern, Atkan, and Attuan, which are close to each other. Our Proto-Aleut reconstruction is based on Bergsland's (1994; 1997) cumulative dictionary and grammar, as well as sources on individual dialects: Bergsland & Dirks 1978, Golovko 1994, Golovko, Vakhtin & Asinovskiy 2009.

Eskimo and Aleut are apparently genealogically related (Bergsland 1986; 1989; 1994; Fortescue 1998; Fortescue, Jacobson & Kaplan 2010), but. as plausibly advocated in Berge 2016; 2018, the genealogical relationship was later obscured by several waves of Eskimo-Aleut contacts which were accompanied by lexical loans in both directions. Our lexicostatistical analysis suggests that the Eskimo-Aleut relationship is so distant that it is essentially useless to reconstruct a joint Proto-Eskimo-Aleut wordlist for our current purposes.

## Chukotian and Itelmen (Chukotko-Kamchatkan) (Alexei S. Kassian)

The Chukotian sub-family consists of four languages, which are relatively closely related to each other: Chukchi (with dialectal diversity), Kerek (poorly documented and practically extinct), Koryak, and Alutor.

Our Proto-Chukotian reconstruction is based on Fortescue's (2005) etymological dictionary as well as on main lexicographic sources on synchronic Chukchi (Inenlikei 2005; Moll & Inenlikei 1957; Skorik 1961; 1977), Koryak (Zhukova 1967; 1972; 1990) and Alutor (Kibrik, Kodzasov & Muravyeva 2004; Nagayama 2003).

The Itelmen a.k.a. Kamchatkan sub-family consists of three closely related languages: Western (the only one spoken today; it consists of two dialects: Sedanka a.k.a Northern dialect and Napana a.k.a. Xajrjuzovo a.k.a. Kovran a.k.a. Southern dialect), Eastern, and Southern. Both Eastern and Southern are extinct; these have been described during the 18th-19th c., but not systematically. The Southern language is especially poorly documented. Additionally note that in all likelihood, the Itelmen portion of Pallas' dictionary (1787) is mostly based on Krasheninnikov's data collected in the 1730-1740-s; it implies that unfortunately Krasheninnikov and Pallas cannot be used as independent sources.

Phylogenetic structure of the Itelmen sub-family is not entirely clear. Some pieces of evidence suggest that the Itelmen tree might have the following shape: [Western, [Eastern, Southern]]. For examples, *eŋezi-* 'star' (directly corresponds to Proto-Chukotian. *äŋär* 'star'), for which Western Itelmen retains *eŋeze-*, whereas other languages show the consonant metathesis *ezeŋi-* (Eastern *ežeŋi-, ezeni-*, Southern *ašaŋi-, azani-*). Or the plain root *ičil* 'tongue' in Western Itelmen vs. partial reduplication with the occasional dissimilation *ničil* < *li-čil* in Eastern and Southern. Mudrak (2008: 4) also claims that Eastern and Southern are specifically close to each other.

Reconstruction of Proto-Itelmen is a non-trivial task, because 18th-19th century data on the extinct Eastern and Southern Itelmen languages are not very reliable and consistent. This problem concerns both phonology and, crucially for our purposes, semantic definitions. In particular, it means that the current Proto-Itelmen reconstruction is inevitably Western-biased, mostly relying

upon modern sources on Western Itelmen. We generally follow Mudrak's (2005; a preliminary version was published as Mudrak 2000; a more complex version is Mudrak 2008) reconstruction of Proto-Itelmen with some emendations and/or simplifications, if needed. The synchronic Itelmen data are taken from Volodin 2021; Volodin & Khaloimova 2001; Volodin 1976; Ono 2003; Stebnitsky 1934; Dybowski & Radliński's (1892; 1893a; 1893b) material, Mudrak 2008 (data from the 18th c. sources), as well as from Fortescue 2005.

Genetic relationship between Chukotian and Itelmen is generally accepted by experts (Skorik 1958; Fortescue 1998; 2003; 2005; Kurebito et al. 2001; Mudrak 2000; with hesitation Volodin 1976). The opposite opinion was expressed by Worth (1962) and Volodin (1997; Georg & Volodin 1999: 224–228), who supposed that the observed Chukotian-Itelmen matches, which cover not only basic vocabulary but also some main grammatical exponents (Fortescue 2003), are contact loans from one language group to another. Worth-Volodin's scenario, however, clearly contradicts the theory of language contacts which predicts that cultural vocabulary is always borrowed first, whereas basic vocabulary and main grammatical exponents are most protected from borrowing (Thomason & Kaufman 1988).

It could be reasonable to use a Proto-Chukotko-Kamchatkan (Proto-Chukotian-Itelmen) wordlist instead of two distinct lists for Proto-Chukotian and Proto-Itelmen respectively, but there are too many unsolved obstacles in the Chukotian-Itelmen comparison at the current stage of research, making reliable phonological reconstruction of a Proto-Chukotko-Kamchatkan wordlist impossible.

## Nivkh (Alexei S. Kassian)

The Nivkh family consists of four closely related languages, which are sometimes called dialects: Amur, East Sakhalin, South Sakhalin, and North Sakhalin (Gruzdeva 1998: 7; 2022; Fortescue 2016: 1). North Sakhalin is traditionally described as an intermediate lect between Amur and East Sakhalin that should imply contact influence on North Sakhalin on the part of either Amur or East Sakhalin (actually it is most likely that Amur and North Sakhalin form a distinct clade, but North Sakhalin was later influenced by the East Sakhalin language). The so-called West Sakhalin dialect is a recent offspring of the Amur dialect.

Our Proto-Nivkh reconstruction is generally based on Fortescue's (2016) comparative dictionary and the synchronic sources: Panfilov 1962; 1965; Peiros & Starostin 1986; Savelyeva & Taksami 1965; 1970; Taksami 1996; Shiraishi & Tangiku 2013; 2014; 2015 (Amur dialect); Tangiku, Tanzina & Nitkuk 2008 (East Sakhalin dialect); Hattori 1962a; 1962b; 1962c (South Sakhalin dialect), various Robert Austerlitz's papers. We reconstruct the Proto-Nivkh palatal obstruents as non-sibilant plosives *$\underset{.}{t}$ *$\underset{.}{d}$ (for Fortescue's *c *d'). In modern lects, they tend to shift into the sibilant affricate articulation such as č, but typologically the development *$\underset{.}{t}$ > č seems more natural than *vice versa*. We assume that clusters of the shape *rK can shift to sK in Amur and North Sakhalin, being retained with r~$\underset{.}{r}$ in East and/or South Sakhalin, whereas clusters of the shape *zK yield sK everywhere.

## Samoyed (Mikhail Zhivlov)

Samoyed is the most lexically divergent branch of the Uralic language family. There is no consensus on the internal classification of Samoyed languages. Traditionally, the family is divided into a Northern Samoyed branch, including Tundra and Forest Nenets, extinct Old Eastern Yurak (sometimes erroneously called Yurats), Tundra and Forest Enets and Nganasan, and a Southern Samoyed branch, comprising Mator, Kamass, and Selkup. According to Helimski's classification, the so-called Southern Samoyed languages represent three independent branches of the Samoyed family (Helimski 1982). The genetic unity of Northern Samoyed is also under doubt, since there are important morphological isoglosses separating Nganasan from all other Samoyed languages. Regardless of which classification one accepts, it is clear that words attested only in Northern, or only in Southern languages can in principle result from a later areal development, so that attestation in at least one Northern and one Southern language is crucial for assuring that a word was present

in Proto-Samoyed. Of course, a word with good etymological parallels in other branches of Uralic must be reconstructed for Proto-Samoyed even if it is attested only in one Samoyed language.

Our Proto-Samoyed reconstruction follows Janhunen 1977 with important additions and corrections by Helimski (1997: 68–70; 2005). However, we do not distinguish in our transcription between front and back reduced vowels, since this distinction is morphophonemic rather than phonological.

A set of synchronic Samoyed Swadesh wordlists is offered in Koryakov 2018.

## Yukaghir (Mikhail Zhivlov)

Tundra and Kolyma Yukaghir are frequently called "dialects" of the Yukaghir "language". In fact, they are mutually incomprehensible; moreover, the percentage of common words in the Swadesh 100-word list between Tundra and Kolyma Yukaghir is approximately the same as between Russian and Latvian. On the other hand, extinct Chuvan and Omok, traditionally viewed as outliers in the Yukaghir family, are specifically (but not closely) related to Kolyma and Tundra languages respectively. Except for Omok and Chuvan, all old Yukaghir wordlists, recorded in the 18th and 19th centuries, represent varieties closely related or ancestral to modern Kolyma Yukaghir. The interesting exception is represented by the two lists abbreviated in Nikolaeva 2006 as MU and MK. These lists combine a number of words otherwise attested only in Tundra Yukaghir with characteristically Kolyma lexemes. See Zhivlov 2022a: 72 for an argument that these lists do not represent idioms intermediate between Kolyma and Tundra, but rather result from borrowing (or perhaps even code-switching). Words present only in these two lists and in Tundra Yukaghir should not be uncritically projected to the Proto-Yukaghir level.

Onomasiological reconstruction of the Proto-Yukaghir basic lexicon encounters serious obstacles. We can reconstruct the Proto-Yukaghir word for a given Swadesh meaning: (1) if the word is represented with the same meaning in both Southern (Kolyma-Chuvan) and Northern (Tundra-Omok) branches.; (2) if the word for this meaning in one of the branches is clearly secondary, e.g., it results from unidirectional semantic development like 'to put down' > 'to kill'. In most other cases, we are forced to list both Kolyma and Tundra words in Proto-Yukaghir phonological garb as technical synonyms. Due to the poor attestation of Chuvan and especially Omok, we do not list words attested only in one of these languages without external cognates.

Our phonological reconstruction of Proto-Yukaghir follows Zhivlov 2022b.

## Burushaski (George Starostin)

Burushaski (Berger 1998; Driem 2001) is essentially a single macro-language, spoken by approximately 87,000 people in northern Pakistan (the Gilgit-Baltistan region), with two very closely related and mutually intelligible dialects (Hunza and Nagar) and a third one (Yasin) that is significantly more divergent and allegedly harder to understand for Hunza and Nagar speakers, although Hunza and Yasin still share about 94% common lexicon on the Swadesh wordlist, indicating a period of divergence that is unlikely to exceed 1,000 years. The formal status of Burushaski as an "isolate" is most likely due to displacement and assimilation of the original speakers of this taxon in the area, mainly by speakers of various branches of Indo-Iranian, from Dardic to Eastern Iranian and Indo-Aryan (Urdu); the Burushaski language itself has numerous borrowings from these languages, although its basic lexical and grammatical structure still survives.

The close proximity of the dialects makes the special reconstruction of a "Proto-Burushaski" somewhat superfluous; nevertheless, due to a few phonetic shifts and some lexical replacements in daughter dialects it is technically possible, and a first attempt was carried out by S. Starostin (2005b), who also analyzed some peculiarities of Burushaski morphophonology, for instance, setting up a special Proto-Burushaski lateral cluster *$lt$ for stems containing a phoneme that is realized as $t$- in the word-initial position and as -$lt$- word-medially (e. g. *$ltap$ 'leaf' → Yasin $tap$, but $du=ltap-i$- 'to wither'; *$lten$ 'bone' → Hunza $tin$, but =$ltin$ with possessive prefixes).

Considering that root-initial clusters in Burushaski are otherwise strictly prohibited, we reinterpret this cluster as a monophonemic lateral affricate *ƛ.

The Burushaski database (Starostin 2013b) consists of two closely related lects: Yasin and Hunza. The Proto-Burushaski (scil. Proto-Yasin-Hunza) reconstruction is self-evident for the majority of Swadesh items, the problematic cases being: 'dry', 'feather', 'fish', 'name', 'to swim', 'tail', 'to go', 'salt', see individual notes on these concepts. Eight Swadesh items are not reconstructible for Proto-Burushaski, since they are either not documented or replaced with recent borrowings: 'all', 'bark', 'good', 'round', 'tree'.

# 7. Linguistic comments on individual Swadesh forms

All linguistic data in the present article are encoded in the unified transcription system of the *Global Lexicostatistical Database* project, which is generally based on the IPA alphabet, with several specific discrepancies, e.g., we use traditional *c č* for IPA $\widehat{ts}$ $\widehat{tʃ}$. See Section 8 "Transcription system" in the present file or http://starling.rinet.ru/new100/UTS.htm for the phonetic chart.

1. 'all (*omnis*)'.

**Proto-Yeniseian**. *\*bɨʌ́-* (S. Starostin 1995: 211), not very reliable, since the form is properly reconstructible only on the Ket-Yugh level.

**Proto-Athabaskan**. An unstable item; the match Kato *łe-neʔ-haʔ* 'all' / Tanaina *łu-q'u* 'all' provides us with a possible candidate: *\*łV-*, which is supported by the Eyak cognate (*łi-ʔq'* 'all').

**Eyak**. *łi-ʔq'*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*łV-* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*tama-ʁ* (Fortescue et al. 2010: 358) is retained in both branches.

**Proto-Aleut**. *\*huzu-* (Bergsland 1994: 452; Golovko 1994: 193) is retained in Eastern and Atkan as 'all (*omnis*) / all (*totus*)'. In Attuan, superseded with *čimika-χ*, whose Common Aleut meaning is 'whole' (Bergsland 1994: 143).

**Proto-Chukotian**. *\*əmə-* (Fortescue 2005: 342), meaning 'all (*omnis*) / all (*totus*)'. Retained in all languages except for Alutor. Perhaps cognate to the Itelmen term.

**Proto-Itelmen**. *\*mini-ł* (Volodin 2021: 172; Volodin, Khaloimova 2001: 140; Fortescue 2005: 342; Mudrak 2008: 135), meaning 'all (*omnis*) / all (*totus*)'. Western and Eastern (*bide-ʌ̀*). Perhaps cognate to the Chukotian term.

**Proto-Nivkh**. *\*tik* (Fortescue 2016: 32; Savelyeva, Taksami 1965: 82, 97).

**Proto-Samoyed**. *\*tük-* (Janhunen 1977: 168) is attested in Nenets, Enets and Mator (in the latter apparently in the meaning 'totus'). This distribution does not guarantee a Proto-Samoyed status, but there is no alternative candidate.

**Proto-Yukaghir**. Kolyma and Chuvan *\*čömu* (Nikolaeva 2006: 139–140) vs. Tundra *\*γawnə-* (Nikolaeva 2006: 186). The Kolyma word is compared by Nikolaeva to Tungusic *\*čuŋnu* 'all, entirely', but borrowing from Tungusic is improbable on phonetic grounds.

**Proto-Burushaski**. Superseded with Indo-Aryan loans.

2. 'ashes'.

**Proto-Yeniseian**. *\*qol- ~ \*qor-* (S. Starostin 1995: 263). Of all known terms for 'ashes', only Ket *qɔlin* lacks any internal etymologization, and may therefore be tentatively regarded as the optimal candidate for Proto-Yeniseian 'ashes' at the moment.

**Proto-Athabaskan**. Not reconstructible reliably, because 'ashes' is normally expressed with help of various words for 'sand', 'dirt' (most frequently *\*łeːʔč* 'dirt' is involved), etc., frequently with the epithets 'of fire', 'of heat'.

**Eyak**. *cʰĩʔλ̃'-k*.

**Proto-Athabaskan-Eyak**. *\*cʰinλ'* (Eyak + scarcely retained Proto-Athabaskan *\*cʰiːλ'* 'hot coals'), apparently related to Tlingit *kʰéł'-t'* 'ashes'. For the correspondences such as Athabaskan-Eyak *\*c* / Tlingit *k*, Leer (2010: 178) reconstructs a PAET velar-palatal row *\*kʸ, kʸʰ, kʸ', xʸ*, although G. Starostin (2012: 130) tends to reinterpret it as a specific sibilant row *\*cʸ, cʸʰ, cʸ', sʸ*.

**Proto-Eskimo**. *\*aʁða* (Fortescue et al. 2010: 45) is retained as 'ashes' in Inuit, having shifted into such specific meanings as 'gunpowder', 'medicine', etc. in Yupik.

**Proto-Aleut**. *\*utxi-χ* (Bergsland 1994: 453; Golovko 1994: 213) is retained at least in Eastern and Atkan.

**Proto-Chukotian**. *piŋ-piŋ (Fortescue 2005: 216), retained as 'ashes' in all languages except for Kerek. Cognate to the Itelmen term.

**Proto-Itelmen**. *piŋ-piŋ (Volodin 2021: 203; Volodin, Khaloimova 2001: 70; Fortescue 2005: 216; Mudrak 2008: 157). Western 'ashes', Southern pin-pi 'ashes' (Dybowski & Radliński 1893a: 116), Eastern pin-pig 'gunpowder'; also various derivatives with the root piŋ meaning 'dust', 'gray', etc. are documented. Cognate to the Chukotian term (probably not a Chukotian loan in the light of the Itelmen distribution). In modern Western, tends to be superseded with a derivative from the durative verb *čin-zu- 'to be burnt vel sim.' (Volodin 2021: 421; Volodin, Khaloimova 2001: 102, 156).

**Proto-Nivkh**. *bləŋk (Fortescue 2016: 23). Attested as 'ashes' in East Sakhalin and South Sakhalin. Cf. the similar Amur form pʰləŋg 'ashes' (Savelyeva, Taksami 1965: 163; Savelyeva, Taksami 1970: 263), which is formally a loan from Manchu fule-ŋgi 'ashes'. Note that Amur pʰləŋg can represent an inherited term (which would be expected to be pləŋk in Amur) influenced on the part of the Manchu word. The second candidate is *hilm-r ~ *him-r (Fortescue 2016: 74) (Amur, North Sakhalin, East Sakhalin), but this one seems weaker. Firstly, because *hi(l)m-r is glossed specifically as Russian 'пепел', i.e. 'fine ashes', for Amur (Savelyeva, Taksami 1965: 282; Savelyeva, Taksami 1970: 428) and only as 'soot' for North Sakhalin (Peiros, Starostin 1986: 215). Secondly, because *hi(l)m-r is a transparent derivate from the verb *hil-m- 'to blaze, flare' (Savelyeva, Taksami 1970: 428).

**Proto-Samoyed**. *kimä (Janhunen 1977: 70) is retained in Nenets, Enets and Selkup. Its Nganasan reflex means 'soot'.

**Proto-Yukaghir**. *noŋgə (Nikolaeva 2006: 309) means 'ashes' in Tundra and 'sand' in Kolyma. Kolyma word for 'ashes' is a Russian loan.

3. 'bark'.

**Proto-Yeniseian**. *ʔiɢ- ~ *xiɢ- (S. Starostin 1995: 196). The sole uncontested candidate for Proto-Yeniseian 'bark', lost in Kott and not attested in either Arin or Pumpokol.

**Proto-Athabaskan**. Not reconstructible. The meaning 'bark' is usually expressed with the help of various compounds such as 'peel of branches' (*=laː=tʼuːčʼ in many Northern lects), 'skin of tree/branches' (Pacific Coast), simply 'covering' (Apachean), etc.

**Eyak**. qʰaht-ɬ, synchronously this is the basic term for 'bark', but its complex morphological structure could point to a new formation; the obsolete term ɬãh 'bark', which represents a bare root, probably has more chance to be a Proto-Eyak word for this meaning.

**Proto-Athabaskan-Eyak**. *ɬaːn (Eyak). We follow Leer 2008a and reconstruct a medial nasal on account of vowel nasalization and aspiration in Eyak.

**Proto-Eskimo**. *qaʔəʁu- (Fortescue et al. 2010: 301) can mean specifically 'birch bark' in some lects, nevertheless the generic meaning 'bark' is attested in both branches, e.g., in Central Siberian Yupik (Menovshchikov 1988: 178) and North Alaskan Inuit (MacLean 2014: 887). Morphologically unclear.

**Proto-Aleut**. *ukałaχ (Bergsland 1994: 428), morphologically unclear, means 'bark' at least in Eastern and Atkan. In each dialect tends to be superseded by *qačχ(i)- (Golovko 1994: 218; Bergsland & Dirks 1978: 143), whose original meaning is 'skin' (Bergsland 1994: 292).

**Proto-Chukotian**. *ut=qulɣə-n (Fortescue 2005: 311), retained in all languages. A compound of *ut(tə)- 'tree' (q.v.) and *qulɣə-n 'fish skin' (Fortescue 2005: 241).

**Proto-Itelmen**. *unʸx- (Volodin 2021: 263; Fortescue 2005: 311), Western, Eastern, Southern. In modern Western, superseded with isolated *ilʔal (Volodin 2021: 64; Volodin, Khaloimova 2001: 163; Fortescue 2005: 311).

**Proto-Nivkh**. *oʁm (Fortescue 2016: 126; Savelyeva, Taksami 1965: 187).

**Proto-Samoyed**. *kasʋ (Janhunen 1977: 65) is attested in Enets, Nganasan, Kamass and Selkup.

**Proto-Yukaghir**. Kolyma *ka:r ~ *kayr (Nikolaeva 2006: 379) vs. Tundra *cǫwa (Nikolaeva 2006: 399). Same word as 'skin', q.v.

**Proto-Burushaski**. Not documented.

4. 'belly'.

**Proto-Yeniseian**. Not reconstructible (all languages have different equivalents, mostly transparent new formations).

**Proto-Athabaskan**. *=wət' is retained in all three branches.

**Eyak**. =kʰəmah. Note wut' 'belly' attested in the extinct Yakutat dialect of the 18ᵗʰ century (modern meaning of wut' in the Copper River dialect is 'vomit').

**Proto-Athabaskan-Eyak**. *wVt' (Athabaskan, Yakutat Eyak).

**Proto-Eskimo**. *aqya- (Fortescue et al. 2010: 44), retained in all branches.

**Proto-Aleut**. *kimla-χ (Bergsland 1994: 238; Bergsland & Dirks 1978: 44; Golovko 1994: 208), attested in all branches, although tends to be superseded with sanʁu-χ 'stomach' (Bergsland 1994: 352) or ili-ða-χ < *ili- 'inside' (Bergsland 1994: 191).

**Proto-Chukotian**. *nanqə-n (Fortescue 2005: 185), retained in all languages.

**Proto-Itelmen**. *qʷełitq (Volodin 2021: 139; Volodin, Khaloimova 2001: 153; Fortescue 2005: 230). Western 'belly / stomach', Eastern 'belly / stomach' (Dybowski & Radliński 1892: 166), Southern 'stomach' (Dybowski & Radliński 1893a: 109). Probably *qʷełi-tq, although the final element -tq is unclear.

**Proto-Nivkh**. *ɢoʁ (Fortescue 2016: 68; Savelyeva, Taksami 1965: 141), meaning 'belly / stomach'.

**Proto-Samoyed**. It is hard to choose between *nancǝ (Janhunen 1977: 20) and *pärkä (Janhunen 1977: 122). *nancǝ is retained in Nenets, Mator, Kamass and Selkup, *pärkä – in Mator and Selkup (with derivatives in Nenets and Enets). The semantic difference between the two words in Mator and Selkup is difficult to establish.

**Proto-Yukaghir**. *ʎir-il (Nikolaeva 2006: 243–244) is attested in both modern Yukaghir languages. A possible alternative candidate, *moŋ-il (Nikolaeva 2006: 274), attested in Kolyma, Chuvan, and Tundra, rather means 'stomach (as an internal organ)'.

5. 'big'.

**Proto-Yeniseian**. *qeʔ (S. Starostin 1995: 300). In its original form and meaning, the word is well preserved in Ket-Yugh, as well as Pumpokol (where xä:-se = Ket qɛ:-sʸi 'big; chief', substantivized form), but seems to be absent as such in Kott and Arin.

**Proto-Athabaskan**. *=kʰʸɑ:χ (verb), *kʰʸuχ (noun-like adjective, enclitic) is retained in all three branches.

**Eyak**. =ʔluw ~ =ʔnuw.

**Proto-Athabaskan-Eyak**. *=kʰa:χ (Athabaskan), *nuw (Eyak).

**Proto-Eskimo**. *aŋə- (Fortescue et al. 2010: 35), retained in all branches. Cognate to the Aleut term.

**Proto-Aleut**. *aŋu-na-l- (Bergsland 1994: 91; Golovko 1994: 186), attested in all branches. Cognate to the Eskimo term.

**Proto-Chukotian**. *mäyəŋ- (Fortescue 2005: 171), retained in all languages.

**Proto-Itelmen**. *pul- (Volodin 2021: 204; Volodin, Khaloimova 2001: 136; Stebnitsky 1934: 102; Fortescue 2005: 420; Mudrak 2008: 158). Modern Western 'big' with various derivatives, also pellaɣa ~ plax 'big' (Pallas, Krasheninnikov, Dybowski & Radliński 1893b: 144), Uka/Tigil Eastern plea 'big' (Pallas), in Southern retained as pel-xučik 'midnight (lit. big night)' (Krasheninnikov).

Cf. Sothern xičin 'big' (Pallas, Krasheninnikov) which can be cognate to modern Western k'eči- 'good, kind, happy', keči-se- 'to get better (of the patient)' (Volodin 2021: 141; Mudrak 2008: 96).

Cf. Eastern *tɣol-o ~ tol-lo* 'big' (Pallas, Krasheninnikov, Dybowski & Radliński 1892: 202), probably cognate to Uka/Tigil Eastern *kutxol-lunʸ* 'big' (Pallas), Southern *katku-m* 'high hill, big wave' (Dybowski & Radliński 1893a: 110), see Mudrak 2008: 96.

**Proto-Nivkh**. *\*bil-* (Fortescue 2016: 23; Savelyeva, Taksami 1965: 71).

**Proto-Samoyed**. *\*ʋr-kʋ* (Janhunen 1977: 19) is retained in Nenets, Enets, Mator, Kamass and Selkup. The word is derived from *\*ʋrə* 'magnitude'.

**Proto-Yukaghir**. *\*čomo-* (Nikolaeva 2006: 138–139) is retained in Kolyma, Tundra, and Omok.

6. 'bird'.

**Proto-Yeniseian**. *\*duma* (S. Starostin 1995: 225). The word is found in both Ket-Yugh and Kott and is clearly of Proto-Yeniseian provenance, although its original semantics may have been specifically restricted to 'small bird'.

**Proto-Athabaskan**. Not reconstructible, because normally the concept 'bird' is expressed with various descriptive expression, e.g., 'small animal', 'the one with feathers' and so on.

**Eyak**. *yəχ=tə=łə=k'aʔt'-χ*, a descriptive formation 'it flies around'.

**Proto-Athabaskan-Eyak**. Not reconstructible.

**Proto-Eskimo**. *\*təŋ-miɣ-aʁ* (Fortescue et al. 2010: 372), attested with the generic meaning 'bird' in both Yupik and Inuit; derived from *\*təŋ-miɣ-* 'to be flying'.

**Proto-Aleut**. *\*sa-χ* (Bergsland 1994: 342; Golovko 1994: 257), attested in all branches.

**Proto-Chukotian**. *\*pəčiqä* (Fortescue 2005: 219), retained as a basic term in all languages except for Chukchi. Chukchi *ɣatle* 'bird' < 'duck' (Fortescue 2005: 82).

**Proto-Itelmen**. Not reconstructible and poorly documented concept. The only generic term is Western *unʸənʸa-čχ* 'small bird (in general)' (Volodin 2021: 264; Volodin, Khaloimova 2001: 93; Ono 2003: 100; Fortescue 2005: 186), the diminutive suffix *-čχ* is native, but the root *unʸənʸa* is likely a Chukotian loan (Alutor *unʸunʸu* 'child', thus Fortescue 2005: 186).

**Proto-Nivkh**. *\*bəy-ŋa* (Fortescue 2016: 28; Savelyeva, Taksami 1965: 350). Lit. 'flying animal' from *\*bəy-* 'to fly' q.v. and *\*ŋa* 'animal' (Fortescue 2016: 117). Cf. the same pattern in *\*gələ-ŋa* 'snake', lit. 'long animal'.

**Proto-Samoyed**. *\*sʋrmʋ* (Janhunen 1977: 136) is a general word for 'bird' and '(wild) animal'. No specific word for 'bird' can be reconstructed.

**Proto-Yukaghir**. *\*nondə* (Nikolaeva 2006: 309) is a general word for 'bird' and '(wild) animal' in Proto-Yukaghir (cf. a similar polysemy in Samoyed). In Kolyma Yukaghir, the word is retained in the meaning 'bird'; the Tundra Yukaghir reflex of *\*nondə* means 'wolf', but the older meaning is preserved in compound *nodod-uo* 'egg' (lit. 'bird's child'). The modern Tundra Yukaghir word for 'bird' is a compound 'thing with wings'.

7. 'to bite'.

**Proto-Yeniseian**. Not reconstructible due to insufficient attestation.

**Proto-Athabaskan**. The main candidate is *\*=ʁač' / \*=ʁaš* attested in all three branches.

**Eyak**. *=qʰa,* the Eyak paradigm can point to either a PAE *\*CV:-*root or a *\*CV:n-*root.

**Proto-Athabaskan-Eyak**. *\*=χVč'* (Athabaskan), *\*=qʰa: ~ \*=qʰa:n* (Eyak).

**Proto-Eskimo**. *\*kəɣə-* (Fortescue et al. 2010: 179), retained in both Yupik and Inuit. Cognate to the Aleut term.

**Proto-Aleut**. *\*kix-s-* (Bergsland 1994: 238; Golovko 1994: 280), attested in all branches. Cognate to the Eskimo term.

**Proto-Chukotian**. *\*yəɣu-* (Fortescue 2005: 119), retained in all languages.

**Proto-Itelmen**. *\*pəl-* (Volodin 2021: 208; Volodin, Khaloimova 2001: 73, 166; Fortescue 2005: 166). Western, Southern.

**Proto-Nivkh**. *\*haz-* (Fortescue 2016: 71; Savelyeva, Taksami 1965: 435).

**Proto-Samoyed**. *\*sacₔ* (Janhunen 1977: 136–137) is retained in Nenets, Enets, Nganasan and Selkup.

**Proto-Yukaghir**. Kolyma *tod-, preserved also in Chuvan in a derivative 'tooth' (Nikolaeva 2006: 432) vs. Tundra *nenʒ- (Nikolaeva 2006: 296). The Tundra word has a Kolyma cognate with the meaning 'to gnaw'.

8. 'black'.

**Proto-Yeniseian**. *tum- (S. Starostin 1995: 289). Preserved in all daughter languages.

**Proto-Athabaskan**. *=šǝɲ-ǝ is retained in all three branches. The initial š- points to either PAE *š- or *xʷ.

**Eyak**. =t'uːč', most likely borrowed from Tlingit t'uːč' 'black'.

**Proto-Athabaskan-Eyak**. *=šeɲ ~ *=xʷeɲ (Athabaskan).

**Proto-Eskimo**. *qiʁ-nǝʁ- (Fortescue et al. 2010: 336), attested with the basic meaning '(to be) black' in Inuit and in the derived stem 'blue fox' in Yupik, its antiquity may be proven by the potential Aleut cognate: *qax-čax- 'to be black', although the correspondence Eskimo *ʁ / Aleut *x is not fully regular. In some Yupik languages, expressions for '(to be) black' are derived from *taʁǝʁ-nǝʁ 'darkness' (Fortescue et al. 2010: 363).

**Proto-Aleut**. *qax-čax-s- (Bergsland 1994: 295; Golovko 1994: 287), attested in all branches.

**Proto-Chukotian**. *ǝv- (Fortescue 2005: 348), retained in all languages.

**Proto-Itelmen**. *ktɣǝ- (Volodin 2021: 107; Volodin, Khaloimova 2001: 221; Volodin 1976: 320; Fortescue 2005: 354). Western, Eastern, Southern.

**Proto-Nivkh**. *wǝl-wǝl (Fortescue 2016: 164; Savelyeva, Taksami 1965: 453; Savelyeva, Taksami 1970: 58). Other Amur forms, not included into Fortescue 2016, such as *biw- 'black' (Savelyeva, Taksami 1970: 262), seem more marginal.

**Proto-Samoyed**. Not reconstructible: none of the roots used in this meaning in various Samoyed languages can be safely projected on the Proto-Samoyed level.

**Proto-Yukaghir**. *em-i-wǝ, attested in Kolyma and Omok (Nikolaeva 2006: 157–158). Tundra *toro- (Nikolaeva 2006: 436) must be an innovation.

9. 'blood'.

**Proto-Yeniseian**. *sur (S. Starostin 1995: 278). Preserved in all daughter languages (but not attested in Pumpokol). The same root also served (already on the Proto-Yeniseian level) as the main derivational stem for the word 'red' q.v.

**Proto-Athabaskan**. *tǝł is retained in all three branches.

**Eyak**. tǝł, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *teł (Athabaskan, Eyak).

**Proto-Eskimo**. *aðuɣ (Fortescue et al. 2010: 5), retained in all branches.

**Proto-Aleut**. *aːmax ~ *aːmɣi-χ (Bergsland 1994: 63; Golovko 1994: 220), attested in all branches.

**Proto-Chukotian**. *mullǝ-mul (Fortescue 2005: 178), retained in all languages. Reduplicated stem. Cognate to the Itelmen term.

**Proto-Itelmen**. *młim (Volodin 2021: 172; Volodin, Khaloimova 2001: 165; Fortescue 2005: 178; Mudrak 2008: 135). Western, Eastern (Dybowski & Radliński 1892: 135), Southern (Dybowski & Radliński 1893a: 114). Probably partial reduplication *młi-m, cognate to the Chukotian term.

**Proto-Nivkh**. There are two candidates. First, *ŋar (Fortescue 2016: 121; Savelyeva, Taksami 1965: 191; Savelyeva, Taksami 1970: 227), attested in Amur and North Sakhalin, meaning 'blood'. Second, *toʁ (Fortescue 2016: 35; Savelyeva, Taksami 1970: 227), meaning 'blood' in East and South Sakhalin, but 'juice, sap' in Amur and North Sakhalin. The root *ŋar has the advantage because, firstly, it is possible that *ŋar is retained in East Sakhalin in a derivative which means 'vein' (thus Taksami 1996: 116); secondly, the meaning 'sap' or 'resin' is still documented for *toʁ in some South Sakhalin sources.

**Proto-Samoyed**. *kǝm (Janhunen 1977: 65) is retained in all Samoyed languages.

**Proto-Yukaghir**. There are three candidates. First, *lepk-ul (Nikolaeva 2006: 240–241), attested in Kolyma and probably in Omok (the Omok form nepao has unexpected n-). Second,

*če:mə (Nikolaeva 2006: 129), attested in Tundra and Chuvan. Third, *minǯə ~ *minʒə (Nikolaeva 2006: 269), retained in two old Kolyma wordlists and in Chuvan. Thus, Chuvan had two words for 'blood', but the semantic difference between them is not clear. The derivate of *minǯə ~ *minʒə, miḑe-ni-t 'bloody, covered with blood' is attested in a Kolyma text recorded by Jochelson in the end of the 19th century. It seems that in Kolyma *lepk-ul replaced *minǯə ~ *minʒə as the main word for 'blood'. Athough *lepk-ul is somewhat more dubious than other candidates, we list all three.

10. 'bone'.
**Proto-Yeniseian**. *ʔaʔd ~ *xaʔd (S. Starostin 1995: 178). Preserved in Ket-Yugh; not attested in Arin and Pumpokol. In Kott, the etymological parallel is ar-aŋ ~ ar-aŋ-an 'joint; limb', which may be analyzed as a former collective plural form: 'limb' = '(a set of) bones'.
**Proto-Athabaskan**. *c'ən is retained in all three branches.
**Eyak**. c'əl, cognate to Athabaskan.
**Proto-Athabaskan-Eyak**. *c'en (Athabaskan, Eyak).
**Proto-Eskimo**. *nənə-ʁ (Fortescue et al. 2010: 248) means 'bone' in Yupik and Sirenik, without Inuit cognates. The second candidate is *caHu-nəʁ (Fortescue et al. 2010: 78) which means 'bone' in Inuit, not attested in Yupik; this one looks like a recent deverbative with the common nominalizer *-nəʁ.
**Proto-Aleut**. *qaɣna-χ (Bergsland 1994: 296; Golovko 1994: 219), attested in all branches.
**Proto-Chukotian**. *qətʁəm (Fortescue 2005: 248), retained in all languages. Cognate to the Itelmen term.
**Proto-Itelmen**. *ktχʷəm (Volodin 2021: 108; Volodin, Khaloimova 2001: 164; Fortescue 2005: 248). Western, Eastern (Dybowski & Radliński 1892: 181), Southern (tekt-, Dybowski & Radliński 1893a: 119). Cognate to the Chukotian term.
**Proto-Nivkh**. *ŋa=ŋɣəv (Fortescue 2016: 121; Savelyeva, Taksami 1965: 189). A prefixal element *ŋa-, common for body part names, can be singled out.
**Proto-Samoyed**. *lə (Janhunen 1977: 82), retained in all Samoyed languages, goes back to Proto-Uralic *lïwi 'bone'.
**Proto-Yukaghir**. *am-un (Nikolaeva 2006: 102) is retained in all Yukaghir languages.

11. 'breast (generic or male), chest'.
**Proto-Yeniseian**. Ket-Yugh & Pumpokol *təga (S. Starostin 1995: 284) is distinctly opposed to the Kott-Arin isogloss, reconstructible with difficulty: Kott pa and Arin pʰi- are hard to reconcile; perhaps the vowel fluctuation is due to different ways of contraction of an earlier cluster, e.g., < *paxV or *pixV. Which of the two should be considered the primary candidate for Proto-Yeniseian '(male) breast', remains uncertain; we include both into comparison.
**Proto-Athabaskan**. *=ča:χ (in PCA and Apachean *=čẹ:χ because of contamination with *=čẹ:y 'heart') is retained in all three branches at least in relic expressions. PA retroflex points to PAE *kʷ.
**Eyak**. =še:k'.
**Proto-Athabaskan-Eyak**. *kʷV:χ (Athabaskan), *še:k' (Eyak).
**Proto-Eskimo**. *qatə-ɣ (Fortescue et al. 2010: 316) means 'human breast, chest' in Yupik and Sirenik, having shifted into the meaning 'breastbone of bird' in Inuit. In the Inuit languages, 'chest' is expressed with either a new suffixed derivation from *qatəɣ or a suffixed derivation from *caðə- 'front of body' (Fortescue et al. 2010: 67).
**Proto-Aleut**. *simsi- (Bergsland 1994: 361; Golovko 1994: 106, 199), attested in all branches. The second and more marginal candidate is *kači-χ (Bergsland 1994: 220).
**Proto-Chukotian**. *mačve (Fortescue 2005: 168), retained in all languages, frequently with suffix extensions.
**Proto-Itelmen**. Inherited terms are not documented reliably. Cf. the Chukotian loan wayeter 'chest' in Western (Volodin 2021: 49; Fortescue 2005: 322).

**Proto-Nivkh**. *ŋa=rɣər* (Fortescue 2016: 121; Savelyeva, Taksami 1965: 121; Savelyeva, Taksami 1970: 237). A prefixal element *ŋa-*, common for body part names, can be singled out.

**Proto-Samoyed**. *sünsə* (Janhunen 1977: 144), retained in Enets, Nganasan and Mator, has an external cognate in Hungarian and goes back to Proto-Uralic *cʸüncʸi*.

**Proto-Yukaghir**. Kolyma, Chuvan and Omok *mel-ut* (Nikolaeva 2006: 263). Tundra *sis-il* (Nikolaeva 2006: 407) must be an innovation.

12. 'to burn (trans.)'.

**Proto-Yeniseian**. *qɔʔt* (S. Starostin 1995: 304). In the Kott-Arin branch, this word is preserved only as a nominal stem 'fire', where it has wiped out the original root for 'fire' (*boʔk* q.v.), although the exact situation in Arin is actually unknown (no equivalent for the verb 'to burn' attested in that branch).

**Proto-Athabaskan**. *=q'aːn* is retained in all three branches.

**Eyak**. =q'a, the Eyak paradigm can point to either a PAE *CVː*-root or a *CVːn*-root.

**Proto-Athabaskan-Eyak**. *=q'aːn* (Athabaskan, Eyak), cognate to Tlingit χ'aːn 'fire'.

**Proto-Eskimo**. *əkə-* (Fortescue et al. 2010: 110) means 'to burn (intr.)' in both Yupik and Inuit, the transitive stem 'to burn (trans.)' is derived with help of perfective/causative suffixes: usually *-uma-* in Yupik-Sirenik, *-t-* in Inuit. In some Yupik lects and Sirenik, 'to burn (trans.)' is expressed with the verb *pinə-ʁ-* 'to fry out' (Fortescue et al. 2010: 272; Menovshchikov 1988: 237).

**Proto-Aleut**. *hix-t-* (Bergsland 1994: 175), causative from *hix-* 'to burn (intr.)'; cognate to the Aleut term, if *h-* is secondary. In Atkan, the transitive stem tends to be superseded with *a-ta-* 'to burn (trans.)' (Golovko 1994: 35) < *a-* 'to blaze' (Bergsland 1994: 5).

**Proto-Chukotian**. *ðən=käŋɣ-* (Fortescue 2005: 132) is a basic verb for 'to burn (tr.)' in Koryak (Zhukova 1990: 198) and Alutor (Kibrik et al. 2004: 421), derived from intransitive *käŋɣ-* 'to burn (in a specific way)' with the transitivizer *ðən-*. In Chukchi, the transitive stem *ðən=tləv-ät-* 'to burn' (Fortescue 2005: 69) is used < *təlvə-* 'to burn (oneself)' (Fortescue 2005: 296). Distinct from the basic Proto-Chukotian intransitive verb *ŋəl-ät-* 'to burn' (Fortescue 2005: 201).

**Proto-Itelmen**. *ən=q'wa-* (Volodin 2021: 315; Volodin, Khaloimova 2001: 112, 153). The basic term for 'to burn (tr.)' in Western, causative in *ən-* from intransitive *q'wa-* 'to burn'. For Eastern, the cognate participle *k=an=kwa-tan* 'baked, roasted' is documented (Dybowski & Radliński 1892: 162). Note that the basic Itelmen verb for 'to burn (intr.)' is likely *lu-* (Volodin 2021: 147; Volodin, Khaloimova 2001: 47, 146; Fortescue 2005: 297).

**Proto-Nivkh**. *tuv-* (Fortescue 2016: 152; Savelyeva, Taksami 1965: 386; Savelyeva, Taksami 1970: 323). This is the basic verb for 'to burn (tr.)' at least in Amur. Distinct from *u-* 'to burn (intr.)' (Fortescue 2016: 155; Savelyeva, Taksami 1965: 118; Savelyeva, Taksami 1970: 392).

**Proto-Samoyed**. Not reconstructible. Nenets, Enets and some varieties of Selkup have different derivatives of Proto-Samoyed *pərɒ-* 'to burn (intr.)', but this may be a parallel development in Nenets-Enets and Selkup. Mator has *kɒrə-*, which, according to Helimski (1997: 268–269), can be compared to Proto-Uralic *karti-* 'to roast, to burn'. However, *karti-* is not the main word for 'to burn' in any other Uralic language, so its use in this meaning in Mator is not necessarily an archaism.

**Proto-Yukaghir**. Kolyma *peːndə-* (Nikolaeva 2006: 349–350) vs. Tundra *end-* (Nikolaeva 2006: 162).

13. 'fingernail'.

**Proto-Yeniseian**. *ʔiːɲe ~ *xiːɲe* (S. Starostin 1995: 195). Preserved only in Ket-Yugh. In Kott, probably replaced by *halčiːg* 'hoof' = Ket *qɔlʸesʸ*, Arin *kalɨs* 'hoof'.

**Proto-Athabaskan**. *=qaɲ* is retained in all three branches.

**Eyak.** =*yə=ł=χahc-ł*, initial -*yə*- means 'hand', final -*ł* is a common nominal suffix (originally instrumental).

**Proto-Athabaskan-Eyak.** We follow Leer 2010: 183 and treat Eyak *χahc* as an etymological cognate of Tlingit *χaːkʷ* 'fingernail'. According to Leer 2008a, vowel aspiration in Eyak points to a nasal cluster, so the Proto-Athabaskan-Eyak-Tlingit form for 'fingernail' should be something like *\*χankʸ* > Proto-Athabaskan-Eyak *\*χanc* 'fingernail' (Proto-Athabaskan *\*=qaŋ* 'fingernail' is thus an innovation of unclear origin).

**Proto-Eskimo.** *\*kuki-ɣ* (Fortescue et al. 2010: 197), meaning 'nail, claw, hoof, a claw-like tool (e.g., stone head of scraper)' in Inuit. In Yupik, the root is only retained in the suffixed stem *\*kukiɣ-kšak* which denotes a claw-like tool: 'greenish stone used as chisel for ivory carving', 'grapnel hook'. In Yupik-Sirenik, 'fingernail' is expressed by *\*citu-ɣ* (Fortescue et al. 2010: 94), lacking Inuit cognates.

**Proto-Aleut.** *\*qaɣa-lʁi-χ* (Bergsland 1994: 295; Golovko 1994: 233), attested in all branches. Perhaps derived from *\*qaɣa-* 'to knock, crack, make a sharp noise' (Bergsland 1994: 294).

**Proto-Chukotian.** *\*väɣ* (Fortescue 2005: 313), retained in all languages.

**Proto-Itelmen.** *\*k'uxʷ-k'uxʷ* (Volodin 2021: 124; Volodin, Khaloimova 2001: 178; Fortescue 2005: 363), a reduplicated stem with polysemy 'fingernail / claw'. Western, Eastern, Southern.

**Proto-Nivkh.** *\*dak-ɲ* (Fortescue 2016: 38; Savelyeva, Taksami 1965: 243; Savelyeva, Taksami 1970: 367). Derived from *\*dak-* 'to carve, make cuts in' (Fortescue 2016: 37), see Panfilov 1962: 61 for the rare suffix *\*-ɲ*.

**Proto-Samoyed.** *\*kətɒ* (Janhunen 1977: 55–56) is retained in all Samoyed languages.

**Proto-Yukaghir.** *\*öɲǯ-il* (Nikolaeva 2006: 330) is retained in both modern Yukaghir languages.

14. 'cloud'.

**Proto-Yeniseian.** *\*ʔas=pur* (S. Starostin 1995: 255). Preserved in all daughter languages (although not attested in Pumpokol). Structure-wise, the word is clearly a compound, in which the first part is the Proto-Yeniseian word for 'sky': Ket *eˑsʸ*, Yugh *es*, Kott *eːš*, Arin *es*, Pumpokol *eč* < Proto-Yeniseian *\*ʔes* (S. Starostin 1995: 188).

**Proto-Athabaskan.** Apachean-Northern *\*q'us*. In Pacific Coast, superseded with *\*ʔaːq'* 'fog, mist'. The external Eyak cognate (*q'ahs* 'cloud') also speaks in favor of *\*q'us*.

**Eyak.** *q'ahs*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak.** *\*q'ʷVns* (Athabaskan, Eyak). We follow Leer 2008a and reconstruct a medial nasal on account of vowel aspiration in Eyak.

**Proto-Eskimo.** *\*qilaɣ-łuʁ* (Fortescue et al. 2010: 331), literally 'bad sky' < *\*qilaɣ* 'sky' + *\*-łuɣ* 'bad'. Formally this is the best candidate, because *\*qilaɣ-łuʁ* means 'cloud' everywhere in Yupik-Sirenik and in a dialect of Seward Peninsula Inuit. Another candidate is *\*nuviya-* (Fortescue et al. 2010: 266), which means 'cloud' everywhere in Inuit, lacking Yupik cognates.

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**Proto-Aleut.** *\*inka-maːʁu-χ* (Bergsland 1994: 202; Golovko 1994: 234), attested in all branches. Derived from *\*inka-χ* 'sky' + *\*-maːʁu- ~ -miːʁu-* '?'.

**Proto-Chukotian.** *\*yəʁə-n* (Fortescue 2005: 124), retained in all languages.

**Proto-Itelmen.** *\*mizʸə-* (Volodin 2021: 190; Fortescue 2005: 357). Western, Southern. Note the secondary initial *ŋ*- for expected *m*- in modern Western (Volodin, Khaloimova 2001: 65), although Krasheninnikov (18th c.) quotes it with *m*-.

**Proto-Nivkh**. *laɣ (Fortescue 2016: 92; Savelyeva, Taksami 1965: 248; Savelyeva, Taksami 1970: 157). Attested everywhere, although is East Sakhalin tends to be superseded with čʰarŋi 'cloud' (Savelyeva, Taksami 1970: 157) of unclear origin.

**Proto-Samoyed**. *tiə (Janhunen 1977: 162) is retained in all Samoyed languages.

**Proto-Yukaghir**. Kolyma *ka:r ~ *kayr (Nikolaeva 2006: 379) vs. Tundra *cạwa (Nikolaeva 2006: 399). In Tundra Yukaghir, the meaning 'cloud' is expressed by the compound 'skin of the sky'; Kolyma Yukaghir has a compound of 'skin' with an otherwise unknown root (an old word for 'sky'?). The main word is thus identical to 'skin', q.v.

15. 'cold'.

**Proto-Yeniseian**. It is impossible to choose a single candidate for the meaning 'cold' in Proto-Yeniseian, since at least two choices have the exact same probability: Ket-Yugh *taʔɣ (S. Starostin 1995: 280) and Kott-Arin *ʒVr₁- ~ *ʒVl- (S. Starostin 1995: 311). The vocalism in the case of the latter is hard to recover due to morphological vowel gradation in the attested forms.

**Proto-Athabaskan**. *=q'ac' is retained in all three branches.

**Eyak**. =ƛ'e, the Eyak paradigm can point to either a PAE *CV:-root or a *CV:n-root.

**Proto-Athabaskan-Eyak**. *q'Vc' (Athabaskan), *=ƛ'V ~ *=ƛ'Vn (Eyak).

**Proto-Eskimo**. An unstable and not very reliably documented item. The best candidates are various derivatives from *nəŋə- 'to be(come) cold' (Fortescue et al. 2010: 249) and *itðə- 'cold' (Fortescue et al. 2010: 160), both roots are attested in Yupik and Inuit. It is likely that *nəŋə- is typically applicable to weather, whereas *itðə- normally means 'cold (of objects)', but it cannot be established with certainty without detailed synchronous descriptions. We treat both roots as synonyms.

**Proto-Aleut**. *qiŋa-na- (Bergsland 1994: 325; Golovko 1994: 82, 284), attested in Eastern and Atkan, applicable to objects and weather, derived from the substantive *qiŋa- 'cold'. Distinct from *aču-na- 'cold (of weather)' attested in Atkan and Attuan (Bergsland 1994: 8).

**Proto-Chukotian**. *čəq- (Fortescue 2005: 53), apparently a basic term at least in Chukchi (Inenlikei 2005), Koryak (Zhukova 1990: 65, 215) and Alutor (Kibrik et al. 2004: 523).

**Proto-Itelmen**. *lqa- (Volodin 2021: 146; Volodin, Khaloimova 2001: 47, 219; Fortescue 2005: 166; Mudrak 2008: 83). Western lq- 'cold' (applicable to both objects and weather), Eastern dak- ~ dɨk- 'cold' (applicable at least to objects, Dybowski & Radliński 1892: 146, 147); In Southern, this root is retained as nok- in the name of February.
Distinct from *səqi (Fortescue 2005: 166; Mudrak 2008: 183) > Southern sek- 'cold (at least of weather)' (Pol. zimno, Lat. frigus (est)' (Dybowski & Radliński 1893a: 117), Eastern(?) marginal sok- 'cold' (Krasheninnikov as an example of a language game: student ~ cold).

**Proto-Nivkh**. *div- ~ *tiv- (Fortescue 2016: 148; Savelyeva, Taksami 1965: 448; Savelyeva, Taksami 1970: 353). Applicable to both objects and weather.

**Proto-Samoyed**. *täksV- ~ *tätsV- ~ *täcʂV- ~ *tässV- (Janhunen 1977: 159) is retained in all Samoyed languages.

**Proto-Yukaghir**. Kolyma, Chuvan and Omok *čel- (Nikolaeva 2006: 128). Tundra word for 'cold' goes back to Proto-Yukaghir *kanʒ-, whose Kolyma reflex means 'to temper' (Nikolaeva 2006: 377–378).

16. 'to come'.

**Proto-Yeniseian**. The Proto-Yeniseian form is not very well reconstructible, since the Ket-Yugh and Kott forms lack mutual etymologization. We may settle upon *=ət- (preserved in Kott) as the best candidate, because of a highly non-trivial morphophonological structure of the Kott paradigm that can speaks in favor of its archaic nature. In the Ket-Yugh branch, the root *i- is used as an element of the Ket-Yugh complex verb 'to come', but the secondary

morphological nature of the Ket-Yugh expression makes *i- a less probable candidate for the Proto-Yeniseian status.

**Proto-Athabaskan**. *=ha: 'to go / to come' (sg. subj.) is retained in all three branches.

**Eyak.** =a (sg. subj.), cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *=ha:, sg. subj. (Athabaskan, Eyak).

**Proto-Eskimo**. There are two equally probable candidates. The first one is *aɣə-ɣiʁ- (Fortescue et al. 2010: 7) which means 'to come' in Inuit. In Yupik, only the additionally suffixed stem is retained with the meaning 'to approach from a distance, return, pass'. An archaic derivative from Eskimo *aɣə- 'to go (over or past)'. The second candidate is *taɣi- (Fortescue et al. 2010: 354), meaning 'to come' in Yupik. We treat *aɣə-ɣiʁ- and *taɣi- as synonyms.

**Proto-Aleut**. *haqa-l- (Bergsland 1994: 93; Golovko 1994: 158), attested in all branches.

**Proto-Chukotian**. *yät- (Fortescue 2005: 112), retained in all languages.

**Proto-Itelmen**. *k'oɬ- (Volodin 2021: 122; Volodin, Khaloimova 2001: 194; Fortescue 2005: 358; Mudrak 2008: 114). Western, Southern, possible Eastern (with s for ɬ).

**Proto-Nivkh**. *prə- (Fortescue 2016: 137; Savelyeva, Taksami 1965: 334; Savelyeva, Taksami 1970: 291).

**Proto-Samoyed**. *toy- ~ *tuy- (Janhunen 1977: 164), retained in all Samoyed languages, goes back to Proto-Uralic *tuli- 'to come'.

**Proto-Yukaghir**. *kel- (Nikolaeva 2006: 205) is retained in both modern Yukaghir languages.


17. 'to die'.

**Proto-Yeniseian**. *qɔ (S. Starostin 1995: 264). Preserved in all daughter languages.

**Proto-Athabaskan**. Not reconstructible, because normally the concept 'to die' is expressed with various polite and euphemistic expressions ('to happen', to sleep' etc.).

**Eyak.** =sĩh.

**Proto-Athabaskan-Eyak**. *=sVn (Eyak).

**Proto-Eskimo**. *tuqu- (Fortescue et al. 2010: 386), retained in all branches.

**Proto-Aleut**. *asχa-l- (Bergsland 1994: 99; Golovko 1994: 281), attested in all branches.

**Proto-Chukotian**. *viʁ- (Fortescue 2005: 318), retained in all languages.

**Proto-Itelmen**. *izʸʔa- (Volodin 2021: 60, 77; Volodin, Khaloimova 2001: 217; Fortescue 2005: 359; Mudrak 2008: 80). Western, Eastern, Southern.

**Proto-Nivkh**. *mu- (Fortescue 2016: 108; Savelyeva, Taksami 1965: 435; Savelyeva, Taksami 1970: 196). Cf. the homonymous verb *mu- 'to become' (Fortescue 2016: 108), thus the Common Nivkh meaning 'to die' could be a result of polite usage.

**Proto-Samoyed**. *kɐə- (Janhunen 1977: 56–57), retained in all Samoyed languages, goes back to Proto-Uralic *kali- 'to die'.

**Proto-Yukaghir**. *yombə-, retained in Tundra and Chuvan (Nikolaeva 2006: 194). Connection with Kolyma you 'disease', accepted by Nikolaeva, is phonologically irregular. Modern Kolyma amdə- 'to die' is related to words meaning 'to lay down' etc. (Nikolaeva 2006: 102).


18. 'dog'.

**Proto-Yeniseian**. *čip. Preserved in all daughter languages. The Kott-Arin forms are attested in conjunction with a desemanticized prefix (Kott al=, Arin il=, original vocalism unclear) that is also encountered in several other entries on the Swadesh wordlist ('bird', 'star'); this seems to have been a shared Kott-Arin innovation.

**Proto-Athabaskan**. *ɬəɲ is retained in all three branches. Note unique suffixation in the possessed form: =ləɲ-k'ʸ-əʔ.

**Eyak.** χəwa:, morphologically unclear, looks like a secondary formation.

**Proto-Athabaskan-Eyak**. *ɬeɲ (Athabaskan).

**Proto-Eskimo**. *qikmi-ʁ (Fortescue et al. 2010: 331), retained as a basic term in both Yupik and Inuit.

**Proto-Aleut**. *\*ayku-χ* (Bergsland 1994: 120), attested in Eastern and Atkan.

**Proto-Chukotian**. *\*qətʁə-n* (Fortescue 2005: 247), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*qosχ* (Volodin 2021: 133; Volodin, Khaloimova 2001: 207; Fortescue 2005: 248). Cognate to the Chukotian term. Western, Eastern, Southern.

**Proto-Nivkh**. *\*ɢa-ŋ* (Fortescue 2016: 65; Savelyeva, Taksami 1965: 396; Savelyeva, Taksami 1970: 140). As proposed in Panfilov 1962: 51, the rare suffix *\*-nŋ* is to be singled out on the basis of the cognate Amur form *qa-χ* 'leading dog of a team in dog races at the bear festival', further cf. *\*wo* 'village' / *\*wo-nŋ* 'villager' (Fortescue 2016: 163).

**Proto-Samoyed**. *\*wǝn* (Janhunen 1977: 173–174) is retained in all daughter languages. This word is possibly a loan from Tocharian, cf. Tocharian B ⟨kweṃ⟩ 'dog', acc.sg. (Kallio 2004: 133–135).

**Proto-Yukaghir**. Kolyma *\*pumbə-l* (Nikolaeva 2006: 370) vs. Tundra *\*kapŋə* (Nikolaeva 2006: 379). Words for 'dog' in both modern Yukaghir languages are innovations. Modern Kolyma *towkə* (earlier *towoka, toboko, tabaka*) is borrowed from Russian *sobaka* 'dog' (Nikolaeva 2006: 408). Jochelson (1926: 326) lists Kolyma *pubel* 'dog' with the note: "ancient word, now *toboko*". The same word is attested in several old wordlists. It seems clear that *\*pumbə-l* is the original Kolyma word for 'dog', replaced by a Russian borrowing. The word *qapŋe*, attested in an old wordlist from Ust'-Yansk (this wordlist contains both Kolyma and Tundra words) as a word for 'dog', is used in modern Tundra as a curse and as a part of compound *qapŋe-burie* 'currants' (lit. 'dog's berry'). It must be noted that the English gloss 'infection, contagion (also used as a word of abuse)' in Nikolaeva 2006: 379 is a mistake: it is explicitly stated in Kurilov 2001: 249, the source of Tundra data in Nikolaeva 2006, that the word is used only as a mild swear-word. Kurilov glosses it by the Russian swear-word *зараза*, which literally means 'contagion': this polysemy is nowhere attested in Yukaghir. The origin of Modern Tundra *la:ma* 'dog' (Nikolaeva 2006: 232) is not known, but it seems clear that this word replaced an earlier word for 'dog', *qapŋe*.

19. 'to drink'.

**Proto-Yeniseian**. *\*=op* (S. Starostin 1995: 202). Best attested in Kott, as well as in a part of the Ket-Yugh paradigm.

**Proto-Athabaskan**. *\*=na:ŋ* is retained in all three branches; we interpret Krauss & Leer's (1981: 70) *\*ŋ₂* as *\*ŋ*.

**Eyak**. *=tə=la*, the Eyak paradigm can point to either a PAE *\*CV:*-root or a *\*CV:n*-root.

**Proto-Athabaskan-Eyak**. *\*=na:ŋ* (Athabaskan, Eyak), cognate to Tlingit *=na:* 'to drink', but details are not entirely clear.

**Proto-Eskimo**. *\*əmə-ʁ-* (Fortescue et al. 2010: 120), retained in all branches, the same stem as 'water' (q.v.).

**Proto-Aleut**. *\*ta:ŋa-χ* (Bergsland 1994: 392; Golovko 1994: 244), attested in all branches, the same stem as 'water' (q.v.).

**Proto-Chukotian**. *\*iw=ɣiči-* (Fortescue 2005: 105), retained in all languages, except for Kerek. The second candidate is *\*pəl-* (Fortescue 2005: 221), whose meaning is rather to be reconstructed as 'to drink up'.

**Proto-Itelmen**. *\*ɣil-* (Volodin 2021: 50; Volodin, Khaloimova 2001: 186; Fortescue 2005: 360; Mudrak 2008: 61). Western, Eastern.

**Proto-Nivkh**. *\*da-* (Fortescue 2016: 37; Savelyeva, Taksami 1965: 294).

**Proto-Samoyed**. *\*ə-r-* (Janhunen 1977: 21–22), retained in Nenets, Mator and Selkup, goes back to Proto-Uralic *\*yəɣi-* 'to drink'. Replaced in some daughter languages by *\*witV-*, derived from *\*wit* 'water'.

**Proto-Yukaghir**. *\*liŋgə-* (Nikolaeva 2006: 255), retained in Chuvan and Omok. Kolyma and Chuvan *\*oːnʒə-* (Nikolaeva 2006: 330–331) and Tundra *\*law-* (Nikolaeva 2006: 236) have a more restricted distribution.

20. 'dry'.

**Proto-Yeniseian**. *\*qɔɣ- ~ \*qɔɢ-* (S. Starostin 1995: 265). Preserved in all daughter languages except for the Kott dialect described by Castrén.

**Proto-Athabaskan**. Two roots compete with each other: *\*=qaɲ* and *\*=cʰaːxʸ / \*=cʰaːkʼʸ*.

**Eyak**. *=tə=ɬ=ʔeht*.

**Proto-Athabaskan-Eyak**. *\*=qaɲ, \*=cʰaːkʼ* (Athabaskan), *\*=ʔVnt* (Eyak).

**Proto-Eskimo**. An unstable and not very reliably documented item. The best candidate is *\*kinə-ʁ-* (Fortescue et al. 2010: 191), which means 'to be(come) dry' in Yupik and 'to filter out', 'to melt away', 'to have run off (water)' in Inuit. In Inuit, the meaning '(to be) dry' can be expressed with *\*pali-ʁ-* 'to be tanned by the sun, sunburnt' (Fortescue et al. 2010: 271) or *\*panə-ʁ* 'to dry out, starve' (Fortescue et al. 2010: 272).

**Proto-Aleut**. *\*qaka-* (Bergsland 1994: 300; Golovko 1994: 273), attested in all branches.

**Proto-Chukotian**. *\*kərɣə-* (Fortescue 2005: 150), retained as basic 'dry' in all languages except for Kerek. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*kʼizʸɣi-* (Volodin 2021: 120; Volodin, Khaloimova 2001: 211; Fortescue 2005: 151; Mudrak 2008: 113). Western, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. There are two candidates. First, *\*ţe- ~ \*te-* (Fortescue 2016: 31; Savelyeva, Taksami 1965: 414; Savelyeva, Taksami 1970: 446), meaning '(to be) dry' in Amur and perhaps South Sakhalin. Second, *\*qaw-* (Fortescue 2016: 140; Savelyeva, Taksami 1970: 446), meaning '(to be) dry' in East and North Sakhalin. We are forced to treat them as synonyms.

**Proto-Samoyed**. *\*kɒsə-* (Janhunen 1977: 60–61), retained in Nenets, Enets, Nganasan and Mator, goes back to Proto-Uralic *\*kocʸki* 'dry'.

**Proto-Yukaghir**. Kolyma *\*keːlə-* (Nikolaeva 2006: 204) vs. Tundra *\*cįl-nə-*, derived from the root *\*cįlgə-* (Nikolaeva 2006: 421–422). Tungusic *\*sile-*, compared to Tundra *\*cįl-nə-* in (Nikolaeva 2006: 422), means 'dew', not 'dry'.

**Proto-Burushaski**. In both Yasin and Hunza dialects the adjectival meaning 'dry' is expressed by forms derived from the Common Burushaski verb *\*buɻ-* 'to be dry / to be thirsty', but morphological models are not identical between the two dialects, making it likely that we are dealing with parallel new formations in both cases. Instead, we fill the slot with *\*qaq-* which is an alternate Yasin term for 'dry / thirsty' (synchronic difference between the two Yasin words for 'dry' is unclear); in Hunza it is only attested with the meaning 'hungry'. Thus the most likely scenario is that *\*qaq-* meant 'dry (adj.) / thirsty' in Proto-Burushaski as opposed to the verb *\*buɻ-* 'to be dry / to be thirsty'; in Yasin, *\*qaq-* is still retained with its original meaning 'dry / thirsty', competing with new deverbal formations from *\*buɻ-* 'to be dry / to be thirsty'; in Hunza, *\*qaq-* was superseded with the verb *\*buɻ-* and has itself shifted to the meaning 'hungry'.

21. 'ear'.

**Proto-Yeniseian**. *\*ʔɔdɢe* (S. Starostin 1995: 198). Preserved in all daughter languages except for Kott (*kaloːx*, most likely borrowed from a Turkic source). The reconstruction shape is somewhat problematic; however, the reconstruction *\*ʔɔdɢe*, despite the uniqueness of its medial cluster, accounts for most of the resulting diversity in daughter languages (Ket *ɔgdɛ*, Yugh *ɔχtiŋ*, Arin *utqʸöːn-oŋ*, Pumpokol *atkin*).

**Proto-Athabaskan**. *\*=čəχ* is retained in all three branches.

**Eyak**. *=čehχ*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*čVnχ* (Athabaskan, Eyak). We follow Leer 2008a and reconstruct a medial nasal on account of vowel aspiration in Eyak.

**Proto-Eskimo**. *\*ciɣ-un* (Fortescue et al. 2010: 82), retained in all branches. Deverbative form an unattested verb with the instrumental suffix *\*-un*.

**Proto-Aleut**. *tut-usi-χ (Bergsland 1994: 411; Golovko 1994: 283), attested in all branches. Derived from *tut- 'to hear' (q.v.) with the instrumental suffix *-Vsi.

**Proto-Chukotian**. *vilu (Fortescue 2005: 317), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *elwe- (Volodin 2021: 335; Volodin, Khaloimova 2001: 218; Fortescue 2005: 317; Mudrak 2008: 47). Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. *noz (Fortescue 2016: 112; Savelyeva, Taksami 1965: 440; Savelyeva, Taksami 1970: 213), attested in Amur and North Sakhalin. In East and South Sakhalin, it was superseded with *m-la 'ear' (Fortescue 2016: 106; Taksami 1996: 52), which is likely to be derived from *mə- 'to hear / to listen' q.v.

**Proto-Samoyed**. *kɒw (Janhunen 1977: 62) is retained in all Samoyed languages.

**Proto-Yukaghir**. *unəmə (Nikolaeva 2006: 444) is retained in Kolyma, Chuvan and Tundra.

22. 'earth (soil)'.

**Proto-Yeniseian**. *baʔŋ (S. Starostin 1995: 205). Preserved in all daughter languages.

**Proto-Athabaskan**. Two roots compete with each other: *nənʔ 'land' and *łe̩ːč 'dirt'. The external Eyak cognate (ʔãh 'earth') speaks in favor of *nənʔ.

**Eyak.** ʔãh, cognate to Athabaskan with *n > 0.

**Proto-Athabaskan-Eyak**. *nVn (Athabaskan, Eyak).

**Proto-Eskimo**. *nuna (Fortescue et al. 2010: 262), retained in Yupik and Inuit, meaning 'soil / land / ground'. Cognate to the Aleut term.

**Proto-Aleut**. *tana-χ (Bergsland 1994: 388; Golovko 1994: 119, 212), attested in all branches, meaning 'soil / land / ground'. Cognate to the Eskimo term.

**Proto-Chukotian**. *nutä-lq-ən (Fortescue 2005: 189), retained in all languages with polysemy 'soil / ground', derived from *nutä 'land'.

**Proto-Itelmen**. *kitxi-m (Volodin 2021: 108; Volodin, Khaloimova 2001: 35, 157; Fortescue 2005: 361), Western, Eastern, meaning specifically 'soil'. Distinct from Western, Eastern, Southern *sʸimt 'land' (Volodin 2021: 231; Volodin, Khaloimova 2001: 157; Fortescue 2005: 373), which can, however, acquire the meaning 'soil' in modern Western, thus Volodin 1976: 105, 153, 169; Ono 2003: 98.

**Proto-Nivkh**. *miv (Fortescue 2016: 105; Savelyeva, Taksami 1965: 162, 325; Savelyeva, Taksami 1970: 187), meaning 'earth (in general)'.

**Proto-Samoyed**. *yɒə (Janhunen 1977: 36–37) is retained in the meaning 'earth (soil)' in Nenets, Enets, Mator and Kamass. The root apparently also meant 'sand', q.v.

**Proto-Yukaghir**. *leweː (Nikolaeva 2006: 241–242) is retained in Kolyma and Chuvan as the word for 'earth, land'. Tundra Yukaghir has another word for 'earth': *luk-ul (Nikolaeva 2006: 252), but preserves *leweː in the meaning 'land, nature'. Pace (Nikolaeva 2006: 242), for semantic reasons *leweː can hardly be viewed as a loan from Tungusic *lebeː(n) 'swamp, marsh'.

23. 'to eat'.

**Proto-Yeniseian**. *siː- (S. Starostin 1995: 274, *siɢ-; later amended to *siː- in Starostin 2005a). Preserved as a verbal root with its original basic meaning in Ket-Yugh and possibly in Arin and Pumpokol, but only in derived stems in Kott (where the old verbal root 'to eat' is still preserved in the nominal derivate ši-g 'food, meal').

**Proto-Athabaskan**. *=haːɲ (or the secondary variant *=yaːɲ) is retained in all three branches.

**Eyak.** =a, cognate to Athabaskan, the Eyak paradigm can point to either a PAE *CVː-root or a *CVːn-root.

**Proto-Athabaskan-Eyak**. *=haːɲ (Athabaskan, Eyak).

**Proto-Eskimo**. *nəʁə- (Fortescue et al. 2010: 252), retained in all branches.

**Proto-Aleut**. *qa-l- (Bergsland 1994: 289; Golovko 1994: 206), attested in all branches. The same root as *qa-χ 'fish / meal' q.v. Distinct from more marginal *inu-l- 'to eat', *inu-χ 'piece of food' (Bergsland 1994: 203).

**Proto-Chukotian**. *nu- (Fortescue 2005: 188), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *nu- (Volodin 2021: 180; Volodin, Khaloimova 2001: 152; Fortescue 2005: 188; Mudrak 2008: 144). Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. *ɲi- (Fortescue 2016: 115; Savelyeva, Taksami 1965: 138; Savelyeva, Taksami 1970: 96).

**Proto-Samoyed**. *əm- (Janhunen 1977: 15), *por- (Janhunen 1977: 127–128). Proto-Samoyed apparently had two verbs for 'to eat'. The first, *əm-, is preserved in most daughter languages, while the second, *por- (< Proto-Uralic *puri- 'to gnaw, to bite') is retained only in Mator. However, derivatives from both roots – *əm-sʋ 'meat, food' and *por-sʋ 'fish flour' can be safely reconstructed for Proto-Samoyed. This fact suggests that both *əm- and *por- meant 'to eat' in Proto-Samoyed, possibly depending on the type of food.

**Proto-Yukaghir**. *leg- (Nikolaeva 2006: 237–238) is retained in Kolyma, Chuvan and Tundra.

24. 'egg'.

**Proto-Yeniseian**. *yeʔy (S. Starostin 1995: 232 as *yeŋ ~ *yɔŋ). Preserved (often in a morphologically modified form) in most Yeniseian records, with the exception of Kott. The current reconstruction is primarily based on the Ket-Yugh paradigm (sg. *ɛʔy, pl. *e-ŋ), but word-initial *y- is necessary to account for the related *dʸa-nan 'roe' in Kott.

**Proto-Athabaskan**. *=ʁe̞ːž-əʔ is retained in all three branches. The final sibilant points to either PAE *š- or *xʷ.

**Eyak**. =tə=ʔuht-k, looks like a deverbative, so may represent a new formation.

**Proto-Athabaskan-Eyak**. *χeːš ~ *χeːxʷ (Athabaskan).

**Proto-Eskimo**. *manniɣ (Fortescue et al. 2010: 208), retained in all branches. Distinct from *pəkyu (Fortescue et al. 2010: 278), whose proto-meaning was apparently 'wild eggs'.

**Proto-Aleut**. *saːm̥la-χ (Bergsland 1994: 351; Golovko 1994: 290), attested in all branches.

**Proto-Chukotian**. *liɣ-liɣ (Fortescue 2005: 159), retained in all languages. Reduplicated stem. Cognate to the Itelmen term.

**Proto-Itelmen**. *lɣi-lɣi (Volodin 2021: 145; Volodin, Khaloimova 2001: 224; Fortescue 2005: 159; Mudrak 2008: 121). Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. *ŋoyeq (Fortescue 2016: 125; Savelyeva, Taksami 1965: 467; Savelyeva, Taksami 1970: 232). Morphologically unclear, perhaps unrelated to *ŋoy 'bough / penis'.

**Proto-Samoyed**. *mənʋ (Janhunen 1977: 86), retained in Enets, Nganasan and Kamass (Selkup reflex of this word means 'penis'), goes back to Proto-Uralic *muna 'egg'.

**Proto-Yukaghir**. *ay-ʎ (Nikolaeva 2006: 98). Modern Kolyma Yukaghir yayčə 'egg' is a Russian loanword, modern Tundra has a compound nodod-uo (lit. 'bird's child'). The original word for 'egg' is attested in a number of old Kolyma wordlists.

25. 'eye'.

**Proto-Yeniseian**. *de-s (S. Starostin 1995: 220). Preserved in all daughter languages. In S. Starostin's reconstruction, final *-s is interpreted as a fossilized singulative suffix, a fuller variant of which may also be seen in *xu-sa 'one' q.v. and several other archaic nominal stems (e. g. 'stone' q.v.). This argumentation is solidly supported by Arin tie-ŋ, which probably preserves a trace of the archaic paradigm: sg. *de-s, pl. *de-ŋ (the latter form shifted to *des-ŋ in Proto-Ket-Yugh by analogy).

**Proto-Athabaskan**. *=naːʁ-əʔ is retained in all three branches. Despite the fact that the majority of Athabaskan languages confirm the reconstruction *=naːʁ-əʔ, the stem has substantial irregularities. Some Northern languages show the reflexes of *-eː-, i.e., *=neːʁ-əʔ (Krauss & Leer 1981: 61). Some Northern languages show the reflex of the stop *-q- for expected *-ʁ-. Krauss and Leer (1981: 60-62) propose a very complex solution in the light of the Degexit'an form =maːq 'eye' and the potential Tlingit *comparandum* waːq 'eye'. Actually, however, Degexit'an retains regular reflexes of *naːχ in compounds and incorporation (naːχ- ~ noːχ- ~ nʋχ- and naː- 'eye'), whereas =maːq is a rare term with a specific meaning

'animal's eye'. Thus Degexit'an =*maːq* and Tlingit *waːq* can simply be unrelated to PA *naːχ* 'eye'.

**Eyak.** =*laːχ*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*naːχ* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*əðə* (Fortescue et al. 2010: 106), retained in all branches. Cognate to the Aleut term.

**Proto-Aleut**. *\*ða-χ* (Bergsland 1994: 158; Golovko 1994: 197), attested in all branches. Cognate to the Eskimo term.

**Proto-Chukotian**. *\*ləlä* (Fortescue 2005: 163), retained in all languages. Perhaps historically a reduplicated plural stem *\*lə-lä* as follows from the cognate Itelmen root *\*lo-*.

**Proto-Itelmen**. *\*lo-ŋ* (Volodin 2021: 146; Volodin, Khaloimova 2001: 145; Fortescue 2005: 163; Mudrak 2008: 129). Western, Eastern, Southern. Final *\*-ŋ* is the singulative exponent. Reduplicated plural: *\*lu-l-*. Cognate to the Chukotian term.

**Proto-Nivkh**. *\*ɲŋaʙ* (Fortescue 2016: 116; Savelyeva, Taksami 1965: 116; Savelyeva, Taksami 1970: 221). Morphologically unclear (a contraction with *\*ɲi-* 'one'?).

**Proto-Samoyed**. *\*səymä* (Janhunen 1977: 132), retained in all daughter languages, goes back to Proto-Uralic *\*cʸilmä* 'eye'.

**Proto-Yukaghir**. *\*toː* (Nikolaeva 2006: 432), retained in Chuvan and Omok. Kolyma word for 'eye' is related to the verb 'to look for, to seek' (Nikolaeva 2006: 452); Tundra word for 'eye' is derived from 'to see' (Nikolaeva 2006: 191).

26. 'fat'.

**Proto-Yeniseian**. *\*giʔd* (S. Starostin 1995: 228). Preserved in all daughter languages where attested, but not found in Arin and Pumpokol.

**Proto-Athabaskan**. *\*q'aχ* is retained in all three branches.

**Eyak.** =*q'əχ*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*q'aχ* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*uqðu-ʙ* (Fortescue et al. 2010: 412), retained in all branches. Its narrow meaning can be 'blubber, seal oil'.

**Proto-Aleut**. *\*čaðu-χ* (Bergsland 1994: 124; Golovko 1994: 142, 208), attested in all branches.

**Proto-Chukotian**. *\*äčʙə-n* (Fortescue 2005: 25), retained in all languages except for Kerek.

**Proto-Itelmen**. *\*qʷətχ* (Volodin 2021: 141; missing from Volodin, Khaloimova 2001), glossed as 'visceral and subcutaneous fat (of deer, but also applicable to bear and generally to animals)' for Western and 'fat, lard (Polish sadło, Latin adeps)' for Eastern (Dybowski & Radliński 1892: 179).
Distinct from *\*xamłx* (Volodin 2021: 274; Volodin, Khaloimova 2001: 96; Fortescue 2005: 185); glossed as 'fat (of seal, but sometimes applicable to deer)' for Western and 'fatness (Polish tłustość, Latin adeps)' for Southern (Dybowski & Radliński 1893a: 106). Historically, it can be a partial reduplication *\*xa-młx* (thus Mudrak, cf. the same model in *\*xi-młx* 'fire'). Cf. the cognate adjective *xʸaumɨlli* 'stout, fat' offered by Pallas for Western (Mudrak 2008: 56).
Distinct from *\*kʷəč'x* (Volodin 2021: 92; Volodin, Khaloimova 2001: 153; Fortescue 2005: 363); glossed as 'bear visceral fat' for modern Western and 'external fat' (i.e. subcutaneous fat?) for Eastern (Dybowski & Radliński 1892: 159, 178).

**Proto-Nivkh**. *\*tom* (Fortescue 2016: 150; Savelyeva, Taksami 1965: 141; Savelyeva, Taksami 1970: 382).

**Proto-Samoyed**. *\*yür* (Janhunen 1977: 50), *\*tuyt ~ \*cʉyt ~ \*tuycₜ~ \*cʉycₜ* (Janhunen 1977: 166). The semantic difference between the two Proto-Samoyed words for 'fat' is not clear. The first one, *\*yür*, is a Turkic loanword, the second one probably is the original Samoyed word for 'fat'.

**Proto-Yukaghir**. Kolyma *\*poɲičə* (Nikolaeva 2006: 360) vs. Tundra *\*ɲaɲ-ir* (Nikolaeva 2006: 288). While the Kolyma word does not have cognates in other Yukaghir languages, the

Tundra word is derived from the root *ɲaŋ-, whose Kolyma derivatives mean 'to overeat fat', 'to be fatty (of food)'. Still, we list both candidates.

27. 'feather'.

**Proto-Yeniseian**. *ʔaːsi (S. Starostin 1995: 205). Preserved in all daughter languages (but not attested in Pumpokol). Vocalic correspondences are unclear, but the data suggest that, most likely, the stem-final *-i has influenced the root vocalism in the Kott-Arin branch (*ʔaːsi > *ʔiːsi).

**Proto-Athabaskan**. *t'aː is retained in all three branches.

**Eyak**. t'ahɬ 'feather / leaf', apparently the original meaning was 'leaf' (q.v.) with the later shift > 'feather' according to the areal isogloss.

**Proto-Athabaskan-Eyak**. *t'aː (Athabaskan).

**Proto-Eskimo**. *culu-ɣ (Fortescue et al. 2010: 100), retained in all branches. In Inuit, it shifted into the specific meaning 'large feather, wing feather', being superseded with *məl-quʁ 'body hair, fur' (Fortescue et al. 2010: 216), which acquires the polysemy 'feather (in general); body hair, fur' in Inuit.

**Proto-Aleut**. *haka-χ (Bergsland 1994: 42; Golovko 1994: 243), attested in all branches.

**Proto-Chukotian**. *teŋə-lŋən (Fortescue 2005: 284), retained in all languages, meaning 'wing feather'. Distinct from *ɣəð-ɣəð 'fur' (Fortescue 2005: 64) which acquires the polysemy 'fur / down, feather (in general)' in Koryak-Alutor.

**Proto-Itelmen**. *sʸisʸi (Volodin 2021: 233; Fortescue 2005: 60; Mudrak 2008: 190), Western, Eastern, apparently an old reduplication *sʸi-sʸi. In some sources documented with polysemy 'wing / feather'. In modern Western, narrowed into the meaning 'wing' (Volodin 2021: 233; Volodin, Khaloimova 2001: 83), having been superseded with *čeɬx 'fur / down' which is currently glossed as 'fur / down / feather' (Volodin 2021: 295; Volodin, Khaloimova 2001: 104, 186; Fortescue 2005: 64).

**Proto-Nivkh**. *dup-r (Fortescue 2016: 47; Savelyeva, Taksami 1965: 291; Savelyeva, Taksami 1970: 365). See Panfilov 1962: 59; Savelyeva, Taksami 1970: 530–531 for the rare suffix *-r.

**Proto-Samoyed**. *tuɒ (Janhunen 1977: 166), retained in the meaning 'feather' in Mator and Selkup, goes back to Proto-Uralic *tulka 'feather / wing'.

**Proto-Yukaghir**. *tiw-il (Nikolaeva 2006: 431–432) is attested in Kolyma Yukaghir and Chuvan. Words for 'feather' are absent from Kurilov 2001, the main lexicographic source for Tundra Yukaghir.

**Proto-Burushaski**. *pʰolʁo was borrowed as a marginal term for 'feather' in some Shina dialects (note that the basic Shina word for this meaning has Indo-Aryan etymology, Anton Kogan, p.c.).

28. 'fire'.

**Proto-Yeniseian**. *boʔk (S. Starostin 1995: 212). Preserved in Ket-Yugh and Pumpokol. In Kott and Arin (probably, in Proto-Kott-Arin), replaced by a nominalization of Proto-Yeniseian *qɔʔt 'to burn' q.v.

**Proto-Athabaskan**. *qʰunʔ is retained in all three branches.

**Eyak**. tə=q'aː-k, derived from =q'a 'to burn', so should represent a new formation.

**Proto-Athabaskan-Eyak**. *qʰʷen (Athabaskan).

**Proto-Eskimo**. *ək-nəʁ (Fortescue et al. 2010: 111), retained in all branches. Looks like a deverbative from *əkə- 'to burn' with the common nominalizer *-nəʁ. On the other hand, irregular dropping of final -ʁ is some lects can point to an independent stem *əknə-ʁ which was latter reanalyzed as a suffixed deverbative (thus Oleg Mudrak, p.c.).

**Proto-Aleut**. *qiɣna-χ (Bergsland 1994: 320; Golovko 1994: 235), attested in all branches.

**Proto-Chukotian**. *milɣə- (Fortescue 2005: 176), retained as the basic term in Chukchi (one of the non-east dialects, Moll, Inenlikei 1957: 77), Koryak (Zhukova 1990: 57, 163), Alutor (Kibrik et al. 2004: 455). Cognate to the Itelmen term.

**Proto-Itelmen**. *xi=mɫx* (Volodin 2021: 52, 277; Volodin, Khaloimova 2001: 180; Fortescue 2005: 176). Western, partial reduplication; cognate to the Chukotian term. In other Itelmen languages, some cognate forms are documented: Eastern (Uka) *bilgi-milč* 'fire', Southern *mix-čiz* 'lightning (Pol. błyskawica)', etc. Cf. *piŋ-č* which means 'oil lamp (Rus. *žirnik*); funnel (for liquid)' in Western and Eastern (Volodin 2021: 204; Fortescue 2005: 364), but in Southern it probably acquired the generic meaning 'fire' (Krasheninnikov, Dybowski) (Mudrak 2008: 157), some source also glossed it as 'fire' for Western (Volodin 2021: 277; Mudrak 2008: 157), but it could be an elicitation inaccuracy.

**Proto-Nivkh**. *tu-ɣr ~ *tuɣ-r* (Fortescue 2016: 152; Savelyeva, Taksami 1965: 255; Savelyeva, Taksami 1970: 384). Either derived from *tuv-* 'to burn (tr.)' q.v. with the rare suffix *-ɣr* (for which see Fortescue 2016: 175; Panfilov 1962: 62; Savelyeva, Taksami 1970: 523), although the loss of *-v-* seems irregular. Or derived from a root *tuɣ-* '?' with the rare suffix *-r* (for which see Panfilov 1962: 59; Savelyeva, Taksami 1970: 530– 531). Phonetic similarity with Proto-Tungusic *toɣa* 'fire' (> Orok *tawa*, Evenki *toɣo*, Nanai *tao*, all 'fire') seems accidental, since the scenario Tungusic > Nivkh does not explain the Nivkh non-productive suffixation.

**Proto-Samoyed**. *tuɣ* (Janhunen 1977: 166), retained in all Samoyed languages, goes back to Proto-Uralic *tuli* 'fire'.

**Proto-Yukaghir**. *yeŋgilə* 'fire' (Nikolaeva 2006: 188) is attested in Jochelson's Kolyma materials, as well as in a number of old Kolyma wordlists and in Omok. Although modern Kolyma and Tundra Yukaghir have reflexes of *loč-il* 'fire / firewood' (Nikolaeva 2006: 245–246) as the main word for fire, according to Jochelson, in Kolyma Yukaghir "[l]o'čil is a modern term which also means fuel and, more generally, any material for a fire or the hearth. Yegi'ļe is an ancient word" (Jochelson 1926: 141). We tentatively reconstruct an opposition *yeŋgilə* 'fire' vs. *loč-il* 'firewood' in Proto-Yukaghir with a homoplastic development 'firewood' > 'fire / firewood' in both modern languages.

29. 'fish'.

**Proto-Yeniseian**. *ciːk* (S. Starostin 1995: 214). Preserved in the original meaning in Kott-Arin and in Pumpokol. In Ket-Yugh, replaced in the meaning 'fish' with *ʔiːs* 'meat' and only preserved in the meaning 'snake'. The shift chain 'meat' > 'fish / meat', 'fish' > 'snake' is, overall, the most parsimonious solution, given the distribution of cognates in daughter languages.

**Proto-Athabaskan**. *ɫuːqʼeː ~ *ɫuːqʼə* is retained in all three branches.

**Eyak**. *tʰəʔ-yaʔ*, literally 'the one in water', a transparent new formation.

**Proto-Athabaskan-Eyak**. *ɫuqʼV* (Athabaskan).

**Proto-Eskimo**. *iqaɫuɣ* (Fortescue et al. 2010: 154), retained in all branches. Looks like an old suffixed derivation, cf. *-ɫuɣ* 'bad' (Fortescue et al. 2010: 453).

**Proto-Aleut**. *qa-χ* (Bergsland 1994: 289; Golovko 1994: 262), attested in all branches. Polysemy: 'fish / meal'. The same root as *qa-l-* 'to eat' q.v.

**Proto-Chukotian**. *ənnə* (Fortescue 2005: 345), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *ənč* (Volodin 2021: 330; Volodin, Khaloimova 2001: 201; Fortescue 2005: 345; Mudrak 2008: 70). Western, Eastern, Southern. Final *-č* can be a regular singulative exponent which fused with the root. Cognate to the Chukotian term.

**Proto-Nivkh**. *ʈo* (Fortescue 2016: 34; Savelyeva, Taksami 1965: 375; Savelyeva, Taksami 1970: 450).

**Proto-Samoyed**. *kɒlä* (Janhunen 1977: 59), retained in all Samoyed languages, goes back to Proto-Uralic *kala* 'fish'.

**Proto-Yukaghir**. Kolyma and Chuvan *an-il ~ *wan-il* (Nikolaeva 2006: 105) vs. Tundra *oʎogə* (Nikolaeva 2006: 325).

**Proto-Burushaski**. *ɕʰumo* was borrowed in Shina (not *vice versa* since Shina *čʰumu* 'fish' lacks Indo-Aryan etymology).

30. 'to fly (sg.)'.
**Proto-Yeniseian**. *=doːq* (S. Starostin 1995: 223). Preserved in Ket-Yugh, but not in Kott; not attested in either Arin or Pumpokol. The root *=doːq* is still attested in Kott in the meaning 'to jump'.
**Proto-Athabaskan**. *=t=ʔaq* is retained in all three branches.
**Eyak**. *=tə=ɬ=k'aʔt'*.
**Proto-Athabaskan-Eyak**. *=ʔaq* (Athabaskan), *=k'Vt'* (Eyak).
**Proto-Eskimo**. *təŋə-* (Fortescue et al. 2010: 372), retained in all branches. In Inuit (or already in Proto-Inuit?) tends to shift into the meaning 'to fly up, fly away', having been superseded with the durative stem *təŋ-miɣ-* 'to be flying'.
**Proto-Aleut**. *iɣa-χta-l-* (Bergsland 1994: 175; Golovko 1994: 222), attested in all branches. A durative from *iɣa-l-* 'to start to fly, fly up'.
**Proto-Chukotian**. *ðiŋä-* (Fortescue 2005: 59), retained as generic 'to fly' in Koryak, having shifted into such specific meanings as 'to fly up' or 'to fly off' in other languages (where the durative semantics 'to fly' is now expressed by various suffixed stems derived from *ðiŋä-*). Cognate to the Itelmen term.
**Proto-Itelmen**. *siŋ-* (Volodin 2021: 219; Volodin, Khaloimova 2001: 167; Fortescue 2005: 59). Western, Southern (Dybowski & Radliński 1893a: 117). Cognate to the Chukotian term.
**Proto-Nivkh**. *bəy-* (Fortescue 2016: 28; Savelyeva, Taksami 1965: 198; Savelyeva, Taksami 1970: 277).
**Proto-Samoyed**. *tey-* (Janhunen 1977: 161–162), retained in all languages save Kamass, goes back to Proto-Uralic *selki-* 'to fly'.
**Proto-Yukaghir**. Kolyma *möre-* (Nikolaeva 2006: 266), also reflected in a Chuvan compound <Мореконты> 'fly', lit. "flying worm" vs. Tundra *čen-* (Nikolaeva 2006: 129).

31. 'foot'.
**Proto-Yeniseian**. *bul* (S. Starostin 1995: 213). Preserved everywhere except for Pumpokol, where *bul* 'foot' *may* have been replaced with *an-* = Arin *an* 'thigh', Kott *aːn-ar* 'thigh' (there is a probability that Pumpokol *an-iŋ* really means 'legs', whereas the proper word for 'feet' was not recorded).
**Proto-Athabaskan**. *=qʰeː-ʔ* is retained in all three branches.
**Eyak**. *=k'ʷahš*.
**Proto-Athabaskan-Eyak**. *qʰe* (Athabaskan), *k'ʷVnš* (Eyak; we follow Leer 2008a and reconstruct a medial nasal on account of vowel aspiration in Eyak).
**Proto-Eskimo**. *itəɣ-aʁ* (Fortescue et al. 2010: 160), retained in all branches. Literally 'toe cap-like' from *itəɣ* 'toe cap, tip of boot'.
**Proto-Aleut**. *kita-χ* (Bergsland 1994: 241; Golovko 1994: 233), attested in all branches.
**Proto-Chukotian**. *kətka* (Fortescue 2005: 154), retained in all languages with polysemy 'foot / leg'. Cognate to the Itelmen term.
**Proto-Itelmen**. *qtχa* (Volodin 2021: 134; Volodin, Khaloimova 2001: 178; Fortescue 2005: 154; Mudrak 2008: 178), Western, Eastern, Southern, polysemy 'foot / leg'. Cognate to the Chukotian term.
**Proto-Nivkh**. *ŋa=ɬɣ* (Fortescue 2016: 117; Savelyeva, Taksami 1965: 243; Savelyeva, Taksami 1970: 238). Polysemy: 'foot / leg'. A prefixal element *ŋa-*, common for body part names, can be singled out. Distinct from a more specific and rarely used term *ŋa=zl* 'sole of foot' (Fortescue 2016: 124; Savelyeva, Taksami 1970: 234).
**Proto-Samoyed**. *ɲy* (Janhunen 1977: 17) is retained in all daughter languages save Selkup.
**Proto-Yukaghir**. Kolyma *noy-l* (Nikolaeva 2006: 306) vs. *konmə* (Nikolaeva 2006: 386), preserved in Omok as the word for 'foot', and in Tundra as part of some compounds.

Tundra *ugurče(ŋ)* 'foot', cognate to Kolyma *ugurče* 'kamus ski', is a transparent derivative from the root *\*egur-* ~ *\*egrə-* 'to walk' (Zhivlov 2022a: 77–78).

32. 'full'.

**Proto-Yeniseian**. *\*ʔute* (S. Starostin 1995: 201). Preserved in all daughter languages where attested, but not found in Arin or Pumpokol.

**Proto-Athabaskan**. *\*=wən* is retained in all three branches.

**Eyak**. *təq-i-taʔ...-tə-ʔya*, a transparent new formation based on the preverb *təq* 'upstream, upriver' and the postposition *-taʔ* 'arrival at'.

**Proto-Athabaskan-Eyak**. *\*=wen* (Athabaskan).

**Proto-Eskimo**. An unstable item. The best candidate seems to be *\*cilə-* (Fortescue et al. 2010: 86), which is attested with the meaning '(to be) full' in both Yupik (Central Siberian Yupik, Menovshchikov 1988: 127, 214) and Inuit (North Alaskan Inuit, MacLean 2014: 307). In other Inuit, it shifts into the neighboring meanings 'to have a full stomach, suffer from indigestion' or 'to leave the rest (having had enough)'.

**Proto-Aleut**. *\*čχa-l-* (Bergsland 1994: 134; Golovko 1994: 249), attested in all branches.

**Proto-Chukotian**. *\*γərʁ-* (Fortescue 2005: 123) means 'to fill (up)'. At least the Chukchi (Inenlikei 2005) and Alutor (Kibrik et al. 2004: 414) basic expressions for 'full' are derived from this verb.

**Proto-Itelmen**. *\*txnu-* ~ *\*t=xnu-* (Volodin 2021: 108, 250; Volodin, Khaloimova 2001: 35, 89, 190) 'to fill (trans.)' from which the expression for 'full' is derived in Western. In Eastern, a potentially cognate verb *tno-zalazum* 'to load (Pol. obarczać)' is documented (Dybowski & Radliński 1892: 207). Initial *\*t* can be an old causative exponent.

**Proto-Nivkh**. *\*tar-* (Fortescue 2016: 30; Savelyeva, Taksami 1965: 313; Savelyeva, Taksami 1970: 443).

**Proto-Samoyed**. *\*tärə* (Janhunen 1977: 158), retained in Selkup as the word for 'full' (Northern Samoyed cognates mean 'interior'), goes back to Proto-Uralic *\*täwði* 'full' (Aikio 2002: 31–34).

**Proto-Yukaghir**. *\*poto-* (Nikolaeva 2006: 363) is attested in Tundra Yukaghir. Kolyma *qodo-ɲe-y* 'full' is derived from *qodo* 'contents, handful' and further related to the verb *qodo:-* 'to lie down' (Nikolaeva 2006: 220–221).

33. 'to give'.

**Proto-Yeniseian**. There are altogether three different roots / stems attested with the meaning 'to give' in various Yeniseian languages. Of these: (1) Kott-Arin *\*=pen-* (always functions as the second root in a composite stem, with differing first elements) is compared by S. Starostin (2005) with Yugh *=fin* in the composite verbal stem *χзdʸiŋ=fin* ~ *χзdʸiŋ=fan* 'to give back; to give away'; however, external Ket evidence shows that it is Yugh *χзdʸiŋ-*, not *=fin*, that carries the main lexical meaning of 'give back, give away' (= Ket *qзr-am* ~ *qзr-aŋ* id.). Considering that in Kott and Arin, *=pen-* is also not found on its own, it is more likely that the verb was a general "directional" auxiliary in Proto-Yeniseian rather than an original 'to give'. (2) Ket-Yugh *=aq*, likewise, is a verbal root with much broader semantics than 'to give'. (3) Consequently, the only verbal stem that is attested *exclusively* in the meaning 'to give' is Ket-Yugh *\*n=...=o*. Furthermore, its highly unusual shape (monovocalic root + very rare directional prefix) is an additional indirect hint at archaicity.

**Proto-Athabaskan**. *\*=ʔa:*, a classificatory verb 'to handle smth. / to be in position (of smth.)', retained in all three branches.

**Eyak**. *=tʰa*, a generic classificatory verb 'to handle smth. / to be in position (of smth.)'; since the second classificatory verb which is also widely used, but nevertheless not so generally is *=ʔa* (cognate to Athabaskan *\*=ʔa:*), it is likely that *\*=ʔa* was the Proto-Athabaskan-Eyak verb used in the neutral expression 'to handle smth. / to be in position (of smth.)' (particularly 'to give'), gradually superseded with *=tʰa* in Eyak.

**Proto-Athabaskan-Eyak**. *\*=ʔa:* (Athabaskan).

**Proto-Eskimo**. *\*tunə-* (Fortescue et al. 2010: 381), retained in all branches.
**Proto-Aleut**. *\*aχ-s- ~ \*uχ-s-* (Bergsland 1994: 31; Golovko 1994: 37, 200), attested in all branches. Polysemy: 'to put, place / to give'; can be an old derivative from *\*a-/u-* 'to be'.
**Proto-Chukotian**. *\*yəl-* (Fortescue 2005: 119), retained in all languages. Cognate to the Itelmen term.
**Proto-Itelmen**. *\*zʸil-* (Volodin 2021: 58; Volodin, Khaloimova 2001: 147; Fortescue 2005: 119). Western, Eastern, Southern. Cognate to the Chukotian term.
**Proto-Nivkh**. *\*kim-* (Fortescue 2016: 86; Savelyeva, Taksami 1965: 124; Savelyeva, Taksami 1970: 92). Usually accompanied with the transitive prefix *\*i-*.
**Proto-Samoyed**. *\*mi-* (Janhunen 1977: 94), *\*tə-* (Janhunen 1977: 94). Judging by the situation in Tundra Nenets, the two verbs for 'give' were used depending on the person of recipient: *\*mi-* (< Proto-Uralic *\*meɣi-* 'to give') was used with 2nd and 3rd person recipient, while *\*tə-* was required in sentences with 1st person recipient.
**Proto-Yukaghir**. *\*tand-* 'give (to a speech act participant)' (Nikolaeva 2006: 426), *\*key-* 'give (to a 3rd person)' (Nikolaeva 2006: 203). Both verbs are retained in both modern Yukaghir languages.

34. 'good'.
**Proto-Yeniseian**. *\*haq-* (S. Starostin 1995: 230). Preserved in all daughter languages (but not attested in Pumpokol).
**Proto-Athabaskan**. *\*=žu꞉* is retained in all three branches. The PA sibilant points to either PAE *\*š* or *\*xʷ*.
**Eyak**. *=cu꞉*, goes back to PAET *\*kʸu꞉*, apparently unrelated to Proto-Athabaskan *\*=žu꞉* 'good' (Leer 2010: 177).
**Proto-Athabaskan-Eyak**. *\*=šu꞉ ~ \*=xʷu꞉* (Athabaskan), *\*=cu꞉* (Eyak).
**Proto-Eskimo**. An unstable and not very reliable documented item which cannot be reconstructed with certainty.
**Proto-Aleut**. *\*iʁama-na-l-* (Bergsland 1994: 184), attested in Eastern and Atkan. In modern Atkan, shifted to the narrower meaning 'good (of person)' (Golovko 1994: 48), whereas the meaning 'good (of object)' is now expressed with *suɣða-na-l-* 'good, beautiful, nice, pretty' (Golovko 1994: 113, 284), whose original meaning should be 'notable, distinguished; beautiful, fancy' (Bergsland 1994: 375).
**Proto-Chukotian**. *\*mäl-* (Fortescue 2005: 171), a basic root for 'good' at least in Chukchi, Alutor and perhaps in Kerek. Cognate to the Itelmen term. Distinct from *\*täŋ-* (Fortescue 2005: 281) whose meaning is rather to be reconstructed as 'good, kind, nice'.
**Proto-Itelmen**. *\*mel-* (Volodin 2021: 173; Volodin, Khaloimova 2001: 58; Fortescue 2005: 172; Mudrak 2008: 132). Only Western. In Eastern, the cognate compounds *klu-beʎ-u* 'good', *činu-beʎ-uk* 'happiness, success' are attested (Dybowski & Radliński 1892: 140, 177). Cognate to the Chukotian term.
**Proto-Nivkh**. *\*ur-* (Fortescue 2016: 157; Savelyeva, Taksami 1965: 448; Savelyeva, Taksami 1970: 395).
**Proto-Samoyed**. *\*somʙ* (Janhunen 1977: 132–133), retained in Nenets, Enets and Selkup, goes back to Proto-Uralic *\*cʸoma* 'good, nice' (Aikio 2020: 135).
**Proto-Yukaghir**. *\*omo-* (Nikolaeva 2006: 327–328) is retained in Kolyma, Chuvan and Tundra.
**Proto-Burushaski**. *ʃua* is likely borrowed from Dardic (cf. Shina *sʸo꞉*, Palula *šu꞉o* 'good').

35. 'green'.
**Proto-Yeniseian**. Not reconstructible. The item is poorly attested in all extinct languages; not a single match between two different languages can be detected; and there are reasons to assume that the meaning 'green' was not lexically distinct even in Proto-Ket-Yugh.
**Proto-Athabaskan**. *\*=cʰuχ* 'green; yellow' is retained as basic 'green' in Pacific Coast and Northern.
**Eyak**. *ti꞉yaʔ-kaʔ*, literally 'salt water-like', a transparent new formation.

**Proto-Athabaskan-Eyak**. *=cʰuχ (Athabaskan), although the Athabaskan color term may also be secondary, if it is cognate to Eyak =cʰeʔq' 'urine'.

**Proto-Eskimo**. *cuŋa- (Fortescue et al. 2010: 101), a substantive 'gall, bile' from which expressions for '(to be) blue/green' are derived in the majority of lects.

**Proto-Aleut**. *čið-ʁi-l- (Bergsland 1994: 135; Golovko 1994: 212), attested in all branches, meaning 'green/blue'.

**Proto-Chukotian**. *wət- (Fortescue 2005: 337), retained as a basic root for 'green' in Chukchi and Koryak (Alutor 'green' < 'gall'), cognate to the Itelmen term. The Proto-Chukotian word for 'leaf' (q.v.) is based on this root.

**Proto-Itelmen**. *nuxl- (Mudrak 2008: 144; Fortescue 2005: 337), meaning 'green / blue'. Western, Eastern, Southern, quoted in the sources of the 18th-19th c. (Pallas, Krasheninnikov, Dybowski & Radliński 1892: 145). In Western, already in the 19ᵗʰ c., superseded with fł- 'green / light blue / yellow' (Dybowski & Radliński 1893b: 103), later 'green / blue' (Volodin 2021: 271; Volodin, Khaloimova 2001: 157; Fortescue 2005: 337). Western fł- should goes back to something like *ʍł- which could be cognate to Proto-Chukotian. *wət- 'green'.

**Proto-Nivkh**. *təy- ~ *dəy- (Fortescue 2016: 154). Polysemy 'green / blue'. In Amur, retained with the meaning 'blue' (Savelyeva, Taksami 1965: 387; Savelyeva, Taksami 1970: 367), whereas 'green' is expressed with the new formation ɲlays-vala- (Savelyeva, Taksami 1965: 161; Savelyeva, Taksami 1970: 217), literary 'greenery-colored'.

**Proto-Samoyed**. *təŋkV- ~ *cəŋkV- 'green / blue' (Helimski 1997: 356) is retained in Forest Nenets and Mator.

**Proto-Yukaghir**. *komo- (Nikolaeva 2006: 385) is attested in Tundra Yukaghir. Kolyma ďeʎoːnoŋoːy 'green' is a Russian loanword.

36. 'hair'.

**Proto-Yeniseian**. *cəŋe (S. Starostin 1995: 213). Preserved in all daughter languages.

**Proto-Athabaskan**. *=ʁaː-ʔ is retained in all three branches, meaning generic 'hair, fur'.

**Eyak**. leːł, meaning specifically 'head hair'.

**Proto-Athabaskan-Eyak**. *=χVʔʷ (Athabaskan). Tlingit =χaːw 'hair (generic)' and Eyak =χuʔ 'fur, body-hair' prove that *=χVʔʷ should be a proto-term for 'hair (in general)', whereas Eyak leːł 'head hair' is an innovation.

**Proto-Eskimo**. *nuya-ʁ (Fortescue et al. 2010: 267), retained in all branches, meaning 'head hair'. Distinct from *məl-quʁ 'body hair, fur' (Fortescue et al. 2010: 216).

**Proto-Aleut**. *imli-χ (Bergsland 1994: 198; Golovko 1994: 192), attested in all branches, meaning 'head hair'. Distinct from *čŋa-χ 'body hair, fur' (Bergsland 1994: 147).

**Proto-Chukotian**. Compound *kəð=wir (Fortescue 2005: 143) is retained in all languages with the meaning 'hair (generic)'. The first morpheme *kəð may denote something related to head, it is also attested in such compounds as *kəð-ðel 'forehead' (Fortescue 2005: 143), *kərə-tkən ~ *kəðə-tkən 'top' (Fortescue 2005: 152), *kəð-täl 'braid, plait' (Fortescue 2005: 143). If so, the second element wir should be the main meaningful root here.

**Proto-Itelmen**. *kʼʷimi (Volodin 2021: 121; Volodin, Khaloimova 2001: 141; Fortescue 2005: 367; Mudrak 2008: 111), meaning 'hair (generic); a single hair'. Western, Eastern, Southern.

**Proto-Nivkh**. *ŋa=mɣ (Fortescue 2016: 120; Savelyeva, Taksami 1965: 91; Savelyeva, Taksami 1970: 236). Attested at least in Amur (ŋəŋg) and East Sakhalin (ŋamx), meaning 'hair (generic, normally applicable to human)'. A prefixal element *ŋa-, common for body part names, can be singled out. Tends to be either superseded or contaminated with *ŋa=vrki 'fur (of animal)' (Fortescue 2016: 120; Savelyeva, Taksami 1970: 233).

**Proto-Samoyed**. *əptə (Janhunen 1977: 21), retained in all Samoyed languages, goes back to Proto-Uralic *əpti 'hair'.

**Proto-Yukaghir**. *monaylə* (Nikolaeva 2006: 258) is attested in Kolyma and Tundra. Another candidate is Omok *awrap*, which can go back to Proto-Yukaghir *\*abdə* or *\*abrə*. The similarity to Samoyed *\*ǝptə* is hardly accidental and can reflect borrowing from Samoyed or genetic relationship with Uralic. Either way, the Omok word must go back to Proto-Yukaghir.

37. 'hand'.

**Proto-Yeniseian**. The meaning 'hand' is notoriously unstable in Yeniseian languages: almost every language has its own etymological equivalent (sometimes two!), and most of the etymological connections are problematic. The best chances lie with the pairing of Ket *hɜŋn* and Arin *pʸʰyaga* (= *pega*), which allows S. Starostin (1995: 254) to reconstruct the protoform as *\*pVg-*. The semantic matching is exact, and the correspondences are generally reconcilable. However, there is some doubt as to whether the Ket word is indeed the primary equivalent for 'hand', and, subsequently, this would influence Proto-Yeniseian semantics. One should probably also make a note of Ket *lʸaʔŋ* 'hand', with a parallel in Arin: *lan-tʸuːŋ ~ lʸan-puy* 'wing' (Starostin 2005a); the semantic shift 'hand' > 'wing' is theoretically possible.

**Proto-Athabaskan**. *\*=laː-ʔ* is retained in all three branches.

**Eyak**. *=yə=q'aʔc'* 'hand'; however internal Eyak evidence such as *č'ãːʔ* '5' points out that *=č'el-ih ~ č'ãː-* 'arm' previously denoted 'hand / arm'.

**Proto-Athabaskan-Eyak**. *\*łaː* (Athabaskan), *\*č'Vn* (Eyak).

**Proto-Eskimo**. *\*aðɣa-* (Fortescue et al. 2010: 4), retained in all branches.

**Proto-Aleut**. *\*ča-χ* (Bergsland 1994: 123; Golovko 1994: 262), attested in all branches.

**Proto-Chukotian**. Browsing through available sources suggests that *\*mənɣə* (Fortescue 2005: 184) is the basic term with polysemy 'hand / arm' in all languages. The Proto-Chukotian expression for '10' (Fortescue 2005: 184) is based on this root. Distinct from the specific term *\*käɣə* (Fortescue 2005: 129), meaning 'palm (of hand)'.

**Proto-Itelmen**. *\*sʸitu* (Volodin 2021: 278; Fortescue 2005: 350; Mudrak 2008: 192). Attested in the Western, Eastern and Southern sources of the 18th-19th c. (Krasheninnikov, Pallas, Dybowski), e.g., Eastern *sutu* 'hand (Lat. manus)' (Dybowski & Radliński 1892: 199), Southern *šetu*, pl. *šitu-t* 'hand (Lat. manus)', *šote-n* 'palm' or 'hand' (Pol. ręka od spojenia do końca palców, Lat. palma)' (Dybowski & Radliński 1893a: 117, 118). It remains unclear whether these forms denote specifically 'hand' or 'hand, arm' in general. These are usually glossed as Latin 'manus, palma', i.e., 'hand', or Russian/Polish 'ruka, ręka' which does not differentiate between 'hand' and 'arm'. Since separate words for 'arm', 'upper arm' or 'forearm' are usually missing from Itelmen sources, it is most likely that there was no lexical opposition between 'hand' and 'arm' in Itelmen varieties. The fact that Common Itelmen *\*teno* 'shoulder' (Volodin 2021: 278, 325; Fortescue 2005: 388; Mudrak 2008: 197) is glossed with the additional meaning 'manus, ruka' in Eastern sources also speaks in favor that Dybowski's Latin definition 'manus' can actually refer to 'arm' as well.

In Western, already in the 18th c. (Krasheninnikov, Pallas, Dybowski), it was superseded with *xk'i-č* 'hand, arm' (Volodin 2021: 278; Volodin, Khaloimova 2001: 98, 201; Ono 2003: 106; Fortescue 2005: 129; Mudrak 2008: 220), without reliable cognates in other languages, < virtual *\*xik'i*. Probably unrelated to *\*kik(')o* 'finger' (Western, Eastern, Southern) (Fortescue 2005: 129; Mudrak 2008: 102).

Distinct from *\*manzə-* 'palm (of hand)' (Volodin 2021: 171; Volodin, Khaloimova 2001: 56; Ono 2003: 106; Fortescue 2005: 178).

**Proto-Nivkh**. *\*damk* (Fortescue 2016: 39; Savelyeva, Taksami 1965: 374; Savelyeva, Taksami 1970: 368), glossed as 'hand' by Fortescue, but it has the generic meaning 'hand / arm' at least in Amur and North Sakhalin. Distinct from *\*dot* (Fortescue 2016: 45; Savelyeva, Taksami 1965: 374; Savelyeva, Taksami 1970: 360), which is glossed as 'arm' by Fortescue, but at least in Amur it means specifically 'forearm'.

**Proto-Samoyed**. *\*utʋ* (Janhunen 1977: 30) is retained in all Samoyed languages. Judging by its phonology, the word cannot be inherited from Proto-Uralic.

**Proto-Yukaghir**. *\*kaŋbə* (Nikolaeva 2006: 378) is the main word for 'hand' in Chuvan. Its Kolyma reflex means 'palm', but in both Chuvan and Kolyma the numeral 'five' is derived from *\*kaŋbə*. This means that the Kolyma reflex of *\*kaŋbə* also meant 'hand', and modern Kolyma *nugen* 'hand; arm', cognate to Tundra *niŋin* 'arm' (Nikolaeva 2006: 315), originally meant only 'arm'. Tundra *čaʎde(ŋ)* 'hand' (Nikolaeva 2006: 434) goes back to *\*tolo-ŋʒə* - a lexicalaized active participle of the root *\*tol-* 'to support, to prop up' (Zhivlov 2022a: 72–73). Omok <Порно> 'hand' lacks any cognates, so we do not list it as a candidate.

38. 'head'.

**Proto-Yeniseian**. *\*ciʔɢe* (S. Starostin 1995: 214). Preserved in Ket-Yugh (although mostly replaced in modern Ket), Kott, and possibly Arin (or at least one of the Arin dialects).

**Proto-Athabaskan**. *\*=cʰi:-ʔ* is retained in all three branches.

**Eyak**. *=lə=qʰah ~ =ša:w*, synchronously there are two common expressions for 'head' in Eyak (*=ša:w* can be a Tlingit loan, but it is not certain). It seems, however, that the old root for 'head' is retained as *=cʰĩʔ* 'neck' (q.v.), because, firstly, *cʰĩʔ* as a qualifier prefix or in some fossilized constructions means 'head', secondly, it corresponds to Athabaskan *\*=cʰi-ʔ* 'head', if one assumes a *n*-extension in Proto-Eyak: *cʰĩʔ < \*cʰi-n*. As noted in Leer 2010: 179, the same *n*-extension is observed for this root in the compound stems in Carrier (Athabaskan) and Tlingit (if Tlingit *šá* 'head' is related).

**Proto-Athabaskan-Eyak**. *\*cʰi ~ \*cʰi-n* (Athabaskan). Leer 2010: 179 compares Tlingit *šá* 'head' and reconstructs PEAT *kʸʰeŋʔ*. But if the Tlingit form is indeed related, PAE *cʰ* / Tlingit *š* is a very specific row of correspondences, distinct from the more reliable row PAE *cʰ* / Tlingit *kʰ* (presumably < PAET *\*kʸʰ*), and it remains unclear why we should merge these two rows in a single proto-phoneme (as *per* Leer) and, second, why the consistent sibilant reflexes should point to a guttural proto-phoneme.

**Proto-Eskimo**. *\*nayə-quʁ* (Fortescue et al. 2010: 243), retained in Yupik and Inuit. The suffix *\*-quʁ* means 'smth. associated with or attached to smth.' (Fortescue et al. 2010: 467).

**Proto-Aleut**. *\*kamɣi-χ* (Bergsland 1994: 226; Golovko 1994: 198), attested in all branches.

**Proto-Chukotian**. *\*läwət* (Fortescue 2005: 158), retained in all languages.

**Proto-Itelmen**. *\*ktxi-* (Volodin 2021: 108; Volodin, Khaloimova 2001: 145; Fortescue 2005: 152; Mudrak 2008: 113), Western, Southern. In Western, tends to be superseded with *kem-t'qol ~ kem-t'q'ol* 'head' (Volodin 2021: 114; Ono 2003: 104; Fortescue 2005: 368) < *\*tq'ol* 'matted hair'. Eastern *xabeʎ ~ xaweʎ* 'head' corresponds to Western *xewli* 'head of fish' (Volodin 2021: 108, 280; Fortescue 2005: 368; Mudrak 2008: 219). Distinct from Western *čaqol* 'head of animal' (Volodin 2021: 287) < virtual *\*čaqʷəl*.

**Proto-Nivkh**. *\*d̦oŋk-r* (Fortescue 2016: 53; Savelyeva, Taksami 1965: 117; Savelyeva, Taksami 1970: 351). See Panfilov 1962: 59; Savelyeva, Taksami 1970: 530–531 for the rare suffix *\*-r*. Also cf. *\*d̦oŋa-* 'to turn away from' (Savelyeva, Taksami 1970: 351).

**Proto-Samoyed**. *\*ŋywʋ* (Janhunen 1977: 17), retained in Nenets, Enets, Nganasan and Mator, goes back to Proto-Uralic *\*oywa* 'head'.

**Proto-Yukaghir**. *\*yo:* (Nikolaeva 2006: 190) is retained in both modern Yukaghir languages.

39. 'to hear'.

**Proto-Yeniseian**. *\*=ta* (S. Starostin 1995: 291). Preserved in all daughter languages (not attested in Pumpokol, but the root may be present in the form *hiti-fun* 'to be silent', literally 'without hearing').

**Proto-Athabaskan**. Two roots, likely cognate to each other, are intertwined between languages and dialects: *\*=c'a:ɲ* and *\*=c'aq / \*=c'aχ*. Leer (2008b) explain them as active/stative *\*=c'a:ɲ* and suffixed passive *\*=c'aq / \*=c'aχ < \*=c'a:ɲ-q* (the resulting passive root "was then generalized to transitive forms"). Synchronically for the PA level, *\*=c'a:ɲ* and *\*=c'aq*

/ *=c'aχ coexisted as basic transitive roots for 'hear' within a suppletive paradigm. At least PCA, Apachean and the Sarsi language have the suppletive paradigm *=c'aχ [imperf.] / *=c'aːɲ [perf.], this principal aspectual opposition can formally be reconstructed for PA, apparently with polysemy 'to hear / to listen'. Many Northern languages show various results of morphological leveling within the paradigm and sometimes distribution of the meanings 'to hear' 'to listen' between the suppletive roots (e.g., Central Carrier *=c'aːɲ 'to hear', *=c'aq 'to listen' vs. Gwich'in *=c'aːɲ 'to listen', *=c'aq 'to hear').

**Eyak.** =tə=łə=č'aːq', it is unclear whether the Eyak root is related to Athabaskan *=c'aːɲ and *=c'aːɲ-q or not.

**Proto-Athabaskan-Eyak.** *=c'aːɲ (Athabaskan), *=č'aːq' (Eyak).

**Proto-Eskimo.** *tuca-ʁ (Fortescue et al. 2010: 376), it means 'to hear' in Inuit, having shifted into more specific meanings such as 'to learn, hear from, find out' or 'to hear and comprehend' in Yupik; cognate to the Aleut term. Distinct from *naɣa-t- 'to listen' (Fortescue et al. 2010: 226), which acquired the meaning 'to hear' in some (not all) Yupik lects. Finally it is not excluded that a genuine root for either 'to hear' or 'to listen' is retained in *ciɣ-un 'ear' (q.v.) which contains the instrumental suffix *-un, cf. the same pattern in Aleut.

**Proto-Aleut.** *tut-s- (Bergsland 1994: 410; Golovko 1994: 127, 268), meaning 'to hear'; in modern lects superseded with the suffixed stem tut-a-l- 'to hear / to listen', attested in all branches. Cognate to the Eskimo term.

**Proto-Chukotian.** *valom- (Fortescue 2005: 313), retained in all languages, morphologically unclear; can be related to Itelmen *ilwsʸ- 'to hear'. Distinct from *palom-tel- 'to listen' (Fortescue 2005: 208), which partially contaminated with *valom- perhaps already in Proto-Chukotian as well in some attested languages such as Alutor. Additionally one can suspect contamination with *vilu 'ear' q.v.

**Proto-Itelmen.** *ilʌsʸ- (Volodin 2021: 65; Volodin, Khaloimova 2001: 119; Fortescue 2005: 369; Mudrak 2008: 67), Western 'to hear / to listen', Eastern 'to hear' (Dybowski & Radliński 1892: 211), Southern 'to listen' (Dybowski & Radliński 1893a: 112). Resembles *elwe- 'ear' q.v. Can be related to Chukotian *valom- 'to hear'.

**Proto-Nivkh.** *mə- (Fortescue 2016: 109; Savelyeva, Taksami 1965: 393; Savelyeva, Taksami 1970: 201), meaning 'to hear / to listen'.

**Proto-Samoyed.** *yüntə- (Janhunen 1977: 49) is retained in most Samoyed languages.

**Proto-Yukaghir.** *med- (Nikolaeva 2006: 261), retained in Kolyma, Chuvan and Tundra.

40. 'heart'.

**Proto-Yeniseian.** *pu (S. Starostin 1995: 251). Preserved in Ket-Yugh and Pumpokol. It is not a certified fact, despite the confidence in S. Starostin 1995: 251, that Ket-Yugh / Pumpokol *pu 'heart' is etymologically connected with *piɣ 'belly' q.v., despite phonetic similarity and semantic proximity. For the time being, it is preferable to judge it as an individual root with a precise Swadesh meaning ('heart') and not a member of any Proto-Yeniseian "word-family".

**Proto-Athabaskan.** *=čeːy-əʔ is retained in all three branches. The initial retroflex points to PAE *kʷ.

**Eyak.** =ʔuq-ł, final -ł is a common nominal suffix (originally instrumental).

**Proto-Athabaskan-Eyak.** *kʷeːy (Athabaskan), *ʔuq (Eyak).

**Proto-Eskimo.** *uɲu-ma-n (Fortescue et al. 2010: 410), derived from *uɲu-ma- 'to be alive' with the instrumental suffix *-(u)n. Formally this is the best candidate, well attested in all branches. In some Yupik lects, it was superseded with the stem *irca-quʁ (Fortescue et al. 2010: 157).

**Proto-Aleut.** *kanuː-χ (Bergsland 1994: 229; Golovko 1994: 265), attested in all branches.

**Proto-Chukotian.** *liŋ-liŋ (Fortescue 2005: 159), reduplicated stem, retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*liŋ* (Volodin 2021: 150; Volodin, Khaloimova 2001: 204; Fortescue 2005: 159; Mudrak 2008: 127). Western, Eastern, Southern, some forms reflect (partial) reduplication *\*liŋ-liŋ* and *\*ŋ-liŋ*. Cognate to the Chukotian term.

**Proto-Nivkh**. *\*ŋiv* (Fortescue 2016: 125; Savelyeva, Taksami 1965: 385; Savelyeva, Taksami 1970: 232).

**Proto-Samoyed**. *\*säyə*, retained in all Samoyed languages, goes back to Proto-Uralic *\*cʲädä* 'heart'.

**Proto-Yukaghir**. *\*cęgo-ɲǯə* (Nikolaeva 2006: 404) is retained in Tundra and Chuvan. This word is derived from the root *\*cęgo-* 'to be alive'. Kolyma *šubeɟe* 'heart', *pace* Nikolaeva (ibid.) is derived from a similar, but different root *\*cęwo-* 'to run'.

41. 'horn'.

**Proto-Yeniseian**. *\*qɔʔ* (S. Starostin 1995: 303). Preserved in all daughter languages where attested, but not found in Arin or Pumpokol.

**Proto-Athabaskan**. *\*=teˑ-ʔ* is retained in all three branches.

**Eyak**. *=təleh*, morphologically looks like a compound *=tə-leh*, whose first element corresponds to Athabaskan *\*teˑ*, whereas the second one remains unclear.

**Proto-Athabaskan-Eyak**. *\*teˑ* (Athabaskan, Eyak?).

**Proto-Eskimo**. *\*naɣðuɣ* (Fortescue et al. 2010: 227), attested in Inuit only, morphologically unclear, can be a descriptive form with the archaic and non-productive suffix *\*-yuɣ ~ \*-ðuɣ* 'thing resembling smth.' (Fortescue et al. 2010: 481). It was superseded with *\*ciʁu-nəʁ* in Yupik-Sirenik (Fortescue et al. 2010: 93), a transparent new formation < *\*ciʁu-* 'to cover' + nominalizer *\*-nəʁ*.

**Proto-Aleut**. *\*tumɣa-χ* (Bergsland 1994: 405), attested in Eastern and Atkan, polysemy 'walrus tusk / horn, antlers'.

**Proto-Chukotian**. *\*rətnə* (Fortescue 2005: 259), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*əntən* (Volodin 2021: 326; Volodin, Khaloimova 2001: 200; Fortescue 2005: 259; Mudrak 2008: 30). Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. *\*murki* (Fortescue 2016: 109; Savelyeva, Taksami 1965: 372; Savelyeva, Taksami 1970: 197).

**Proto-Samoyed**. *\*amtə* (Janhunen 1977: 20) is retained in all Samoyed languages.

**Proto-Yukaghir**. *\*önm-ut* (Nikolaeva 2006: 332–333) is retained in both modern Yukaghir languages.

42. 'I'.

**Proto-Yeniseian**. *\*ʔaʒ* (S. Starostin 1995: 185). Preserved in all daughter languages (Ket-Yugh *\*ʔad*, Kott, Arin *ai*). Reconstruction of the final consonant is questionable. The correspondence is interpreted by S. Starostin as a reflexation of the rare Proto-Yeniseian phoneme *\*-ʒ* in word-final position, but in reality, it is practically indistinguishable from word-final *\*-ǯ*, so that the reconstruction might ultimately be amended to *\*ʔaǯ*. However, the final consonant was almost certainly an affricate of some kind.

**Proto-Athabaskan**. *\*šiˑ* is retained in all three branches. Note that some languages show the reflexes of *\*s-*, some others — the reflexes of *\*xʲ-* (Leer 2010: 171), further see Krauss 1977: 33 for historical details.

**Eyak**. *xuˑ*, related to Athabaskan *\*šiˑ* 'I' < PAE *\*xʷiˑ*.

**Proto-Athabaskan-Eyak**. *\*xʷiˑ* (Athabaskan-Eyak).

**Proto-Eskimo**. *\*uva=ŋa ~ \*uvi=ŋa* (Fortescue et al. 2010: 418), retained in all branches. In some Yupik lects, it was simplified and lost the nasal element. Apparently the same pattern as in Aleut, i.e., a desemanticized proclitic *\*uva-* attached to the meaningful pronominal morphemes: *\*uva=ŋa* 'I', *\*uva=ku-t* 'we' (q.v.). The same *\*-ŋa* is used as the 1st p. sg. subject exponent in verbal forms (Fortescue et al. 2010: 489). Cognate to the Aleut pronominal morpheme.

**Proto-Aleut**. *ti=ŋ* (Bergsland 1994: 397; Bergsland 1997: 57), attested in all branches. The meaningful element is -ŋ, whereas *ti-* ~ *txi-* is a proclitic attached to the 1st, 2nd and reflexive 3rd person pronouns (Bergsland 1997: 56). The same *-ŋ* is used as the 1st p. sg. exponent in verbal forms. Cognate to the Eskimo pronominal morpheme.

**Proto-Chukotian**. *kəm-* (Fortescue 2005: 146), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *kəma* (Volodin 2021: 114; Volodin, Khaloimova 2001: 236; Fortescue 2005: 147). Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. *ɲi* (Fortescue 2016: 114; Gruzdeva 1998: 25; Panfilov 1962: 231).

**Proto-Samoyed**. *mə-n* (Janhunen 1977: 86), retained in all Samoyed languages, goes back to Proto-Uralic *mi-n* 'I'.

**Proto-Yukaghir**. *mə-t* (Nikolaeva 2006: 267) is retained in Kolyma, Chuvan and Tundra.

43. 'to kill'.

**Proto-Yeniseian**. *ʔeːy* ~ *xeːy* (S. Starostin 1995: 190). Attested only in Ket-Yugh; not attested in either Arin or Pumpokol, and most likely replaced in Kott. Since the word is known only from Ket-Yugh, word-initial zero could just as well have been *x-*.

**Proto-Athabaskan**. The opposition *=ʁeː* [imperf.] / *=ʁeː-n* [perf.] 'to kill (sg. obj.)' vs. *=ʁaːn* 'to kill (pl. obj.)' is retained in all three branches.

**Eyak**. =še, the Eyak paradigm can point to either a PAE *CVː*-root or a *CVːn*-root.

**Proto-Athabaskan-Eyak**. *=χeː* (Athabaskan), *=šV* ~ *=šVn* (Eyak).

**Proto-Eskimo**. *tuqu-t-* (Fortescue et al. 2010: 386), retained in all branches. A regular causative from *tuqu-* 'to die' (q.v.).

**Proto-Aleut**. *asχa-t-* (Bergsland 1994: 100; Golovko 1994: 279), attested in all branches. A regular causative from *asχa-l-* 'to die' (q.v.).

**Proto-Chukotian**. *təm-* (Fortescue 2005: 297), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *ɬmə-* (Volodin 2021: 168; Volodin, Khaloimova 2001: 53, 216; Fortescue 2005: 297; Mudrak 2008: 125). Only Western 'to kill' with generic application (to kill a person, an animal on the hunt, etc.). For Eastern, the cognate noun *tubi-sʸ* 'prey (killed on the hunt)' is documented. Cognate to the Chukotian term.

**Proto-Nivkh**. *ku-* (Fortescue 2016: 88; Savelyeva, Taksami 1965: 429; Savelyeva, Taksami 1970: 90). Usually accompanied with the transitive prefix *i-*.

**Proto-Samoyed**. *kɐ-tɐ-* (Janhunen 1977: 57), retained in all daughter languages, is a causative of Proto-Samoyed *kɐ-* 'to die' (< Proto-Uralic *kali-* 'to die').

**Proto-Yukaghir**. *puŋ-* (Nikolaeva 2006: 370) is attested in Tundra Yukaghir. The meaning of Kolyma *kude-də-* 'to kill' is evidently secondary: its Tundra cognate means 'to put down' (Nikolaeva 2006: 220–221).

44. 'knee'.

**Proto-Yeniseian**. *baʔt* (S. Starostin 1995: 206). Preserved everywhere except for Kott; not attested in Pumpokol. Replaced in Kott with *arša*, an etymologically obscure form. The root *baʔt* per se must have had the general meaning 'joint' in Proto-Yeniseian, but this does not technically prevent us from setting up *baʔt* as the main bearer of the meaning 'knee' as well for Proto-Yeniseian.

**Proto-Athabaskan**. *=qut'* is retained in all three branches.

**Eyak**. =quht ~ =qũht, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *qVnt'* (Athabaskan, Eyak), we follow Leer 2008a and reconstruct a medial nasal on account of vowel nasalization and aspiration in Eyak.

**Proto-Eskimo**. *ciɣəð-quʁ* (Fortescue et al. 2010: 81), retained in all branches. The final element is the suffix *-quʁ* 'smth. associated with or attached to smth.'. Cognate to the Aleut term via metathesis.

**Proto-Aleut**. *čiðiɣi-χ* (Bergsland 1994: 136; Golovko 1994: 218), attested in Atkan and, with an additional suffix, in Eastern and Attuan. Cognate to the Eskimo term via metathesis.

**Proto-Chukotian**. *ŋara-* (Fortescue 2005: 202), retained in all languages except for Kerek.

**Proto-Itelmen**. *sʸizʸə-* (Volodin 2021: 231; Volodin, Khaloimova 2001: 162; Fortescue 2005: 373; Mudrak 2008: 191). Western, Eastern, Southern.

**Proto-Nivkh**. *biɣ-tV* (Fortescue 2016: 22; Savelyeva, Taksami 1965: 183; Savelyeva, Taksami 1970: 262).

**Proto-Samoyed**. *puʋ-* (Janhunen 1977: 130), retained in all languages save Kamass, goes back to Proto-Uralic *puɣV ~ *puwV 'knee'.

**Proto-Yukaghir**. *pogo-nʒ-il ~ *poŋgə-nʒ-il* (Nikolaeva 2006: 354) is attested in Kolyma Yukaghir. Tundra word for 'knee' means literally 'joint bone'.

45. 'to know'.

**Proto-Yeniseian**. Dubious reconstruction: Ket-Yugh *ʔit-* is probably the best candidate for the PY slot, but even in Ket-Yugh the complex structure of this verb is not thoroughly understood, and it has no external parallels. Kott *ŋ=aːliga*, structured more like a nominal than a verbal formation, is even more obscure.

**Proto-Athabaskan**. The main candidates are: *=c'ət* ('to know' in Pacific Coast), *=nəxʸ / *=niːkʸ* ('to know' in Northern), *=zən* ('to know' in Apachean; its derivative *=yəniː=zən / *=yəniː=ziːn-ʔ* means 'to think' in Northern and Apachean). Out of them, *=nəxʸ* denotes a wide range of sensory perceptions and activities, it is thus likely that 'to know' was not the primary meaning of *=nəxʸ*. We take *=c'ət* and *=zən* as technical synonyms for PA 'to know (that)'.

**Eyak**. *=ka*, cognate to Tlingit *=keː* 'to understand' and potentially to PA *=čax ~ =čʌx* 'to try, test'.

**Proto-Athabaskan-Eyak**. *=c'Vt, *=sVn* (Athabaskan), *=kaː* (Eyak).

**Proto-Eskimo**. *əli-ci-ma-* (Fortescue et al. 2010: 116), retained in all branches; final *-ma-* is the perfective suffix. The same root is used in such Eskimo stems as *əli-ma-* 'to be knowledgeable; to be apprehensive' or *əli-t-* 'to learn' (Fortescue et al. 2010: 115). Also negated forms of *naɬu-* 'to not know' (Fortescue et al. 2010: 231) can be used for the positive meaning 'to know'.

**Proto-Aleut**. *iða-χta-laka-* (Bergsland 1994: 171; Golovko 1994: 49, 213), attested in Atkan and Attuan, meaning 'to know a situation or fact / to understand'. Cf. some Bergsland's examples: "did you know that it is foggy?", "his wife knows for sure that he'll be back", etc. The complex stem *iða-χta-laka-* literally means 'not to have (smth.) unknown' with the negative exponents *-laka-* and the bound root *iða-* 'unknown, unclear *vel sim.*' (Bergsland 1994: 171). Distinct from the verb *haqa-t-a-l-* (Bergsland 1994: 94; Golovko 1994: 158, 213), which means 'to know, be acquainted with object/person, have skill to' in Atkan and Attuan. Cf. some Bergsland's examples: "I don't know him", "he does not know how to hunt seals", etc. The stem *haqa-t-a-l-* is derived from causative *haqa-t-* 'to bring, give; to come upon, find; to find out, learn', finally from *haqa-l-* 'to come' (Bergsland 1994: 93). Note that in the Eastern dialect, only *haqa-t-a-l-* is used for both meaning, apparently this situation is secondary.

**Proto-Chukotian**. *ləɣi ləŋ-* (Fortescue 2005: 162), an analytic construction with *ləɣi* 'known' and auxiliary *ləŋ-* 'to consider as', retained in all languages as the basic expression for 'to know (in general)'.

**Proto-Itelmen**. *xiq* AUX (Volodin 2021: 276, 282; Volodin, Khaloimova 2001: 157; Fortescue 2005: 373). An analytic construction 'to know (in general)', lit. 'to be *xaq*'. Western, Eastern.

**Proto-Nivkh**. *haym-* (Fortescue 2016: 70; Savelyeva, Taksami 1965: 162; Savelyeva, Taksami 1970: 470).

**Proto-Samoyed**. *tänä-mä-* (Janhunen 1977: 157) is attested in most daughter languages. The word is derived from Proto-Samoyed *tänä-* 'to remember'.

**Proto-Yukaghir**. Kolyma *leyd-iː-*, whose Tundra cognate means 'to remember' (Nikolaeva 2006: 238) vs. Tundra *kuriʎ-* ~ *kudiʎ-* (Nikolaeva 2006: 229).

46. 'leaf'.

**Proto-Yeniseian**. *yəːpe* (S. Starostin 1995: 232). Preserved in all daughter languages.

**Proto-Athabaskan**. *=t'aːnʔ* is retained in all three branches.

**Eyak**. *t'ahɬ*, cognate to Athabaskan, historically should be analyzed as *t'ah-ɬ* with the common nominal suffix *-ɬ*.

**Proto-Athabaskan-Eyak**. *t'aːn* (Athabaskan, Eyak).

**Proto-Eskimo**. An unstable item. The best candidate is *pəɬu* (Fortescue et al. 2010: 279), which is attested as 'leaf' in both Yupik and Inuit. Theoretically it may be cognate to Aleut *huli-χ* 'leaf'.

**Proto-Aleut**. An unstable item. The best candidate is *huli-χ* attested in the Eastern dialect from the 18th c. on and in Attuan (Bergsland 1994: 435). In archaic Atkan, another word, *siʁli-χ* 'leaf', is attested from the 18th c. on (Bergsland 1994: 359). Cf. also the modern term with irregular sound fluctuation *yuʁli-χ* ~ *yuχli-χ* ~ *yuli-χ* 'leaf' (Bergsland 1994: 465; Golovko 1994: 223).

**Proto-Chukotian**. *wət-wət* (Fortescue 2005: 337), retained in all languages except for Kerek. Reduplicated stem, based on the root 'green'.

**Proto-Itelmen**. *palʔa-* (Volodin 2021: 209; Volodin, Khaloimova 2001: 168; Fortescue 2005: 374; Mudrak 2008: 153). Western, Southern, possibly Eastern.

**Proto-Nivkh**. The first candidate is *d̦om-r* (Fortescue 2016: 53), attested in all languages. In Amur, this is the basic term for 'leaf' (Savelyeva, Taksami 1965: 199; Savelyeva, Taksami 1970: 350; Shiraishi & Tangiku 2013; 2014; 2015). Probably the same is true for East Sakhalin: Tangiku et al. (2008: 35) quote it as a default term 'leaf'. Also the stem is documented for South Sakhalin, but not as a basic one.

The second candidate is *plaŋq* 'leaf' (Fortescue 2016: 23), which is also attested in three main languages. Amur *pʰlaŋq* 'leaf (of tree, brush)', not a basic term (Savelyeva & Taksami 1970: 287), East Sakhalin *plaŋ* 'leaf', probably not a basic term. Differently in South Sakhalin, where *plaŋq* seems to be a default term for this meaning: Hattori only offers *plaŋq* for 'leaf (of tree, grass)', widely applicable (e.g. Hattori 1962c: 12).

The semantic difference between the reflexes of two terms is not entirely clear even for living and well documented lects. We treat *d̦om-r* and *plaŋq* as synonyms for Proto-Itelmen.

**Proto-Samoyed**. *yapä* (Janhunen 1977: 41) is retained in Nenets, Kamass and Selkup.

**Proto-Yukaghir**. Kolyma *polʒi-čə* (Nikolaeva 2006: 356–357) vs. Tundra *pög-il* (Nikolaeva 2006: 354). Tundra *pug-il* (< *pög-il*) is glossed as 'leaf; widow(er)', but this is most likely a chance homonymy.

47. 'to lie'.

**Proto-Yeniseian**. *=qɔt* (S. Starostin 1995: 183 as *ʔaq-ɔt-*, with probably incorrect segmentation). Preserved in Ket-Yugh and Kott. In Arin, definitely preserved in the meaning 'sleep' q.v., but not attested in the meaning 'lie'; uncertain situation in Pumpokol (Pumpokol *ak* is an unclear form without any obvious parallels). The verb *=qɔt* was most likely polysemous in Proto-Yeniseian, meaning both 'to lie' and 'to sleep'. The paradigm must have been suppletive, since Ket-Yugh *=dam-* in plural forms corresponds to Kott *=tam-* in such forms as *dʸ=a=tam-an-toŋ* 'we lie / we sleep', etc. The opposition *=qɔt* [sg.] / *=dam-* [pl.] is thus safely reconstructible, although Kott shows no signs of the directional prefix *t=*, obligatory in Ket-Yugh.

**Proto-Athabaskan**. *=tʰeː* / *=tʰeː-ɲ* is retained in all three branches.

**Eyak**. *=tʰe*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *=tʰeː (Athabaskan, Eyak).

**Proto-Eskimo**. *in-naʁ ~ *iŋ-naʁ (Fortescue et al. 2010: 149), retained in all branches. The final element is the assimilated durative suffix known in many forms: *-aʁ, *-ðaʁ, *-laʁ, *-maʁ, *-taʁ, etc. In Yupik, it usually means 'to lie, lie down'. In the majority of Inuit lects, shifted into such specific meanings as 'lie down on side' or 'to go to bed', having been superseded with *nala- (Fortescue et al. 2010: 229), whose original meaning is not entirely clear ('to be lying down (of plant)'?).

**Proto-Aleut**. *quyu-ʁi-l- (Bergsland 1994: 340; Golovko 1994: 222), attested as a generic verb for 'to lie (of human)' in Eastern (from the 19th c. on) and Atkan (from the 18th c. on). Derived from *quyu-l- 'to go to bed, lie down'. The second and less probable candidate is *aŋa-mi-l- 'to lie down, be in lying position (on the side, or in general)' (Bergsland 1994: 83) which is a synonym of *quyu-ʁi-lix, but is restricted to the Eastern dialect; derived from *aŋa- 'side, lateral part'.

**Proto-Chukotian**. *rəl-tel- (Fortescue 2005: 256), retained as basic 'to lie' in all languages except for Kerek. Cognate to the Itelmen term.

**Proto-Itelmen**. *sʸol- (Volodin 2021: 223; Volodin, Khaloimova 2001: 167; Fortescue 2005: 256). Western and possibly Eastern čelezič 'to lie' (Dybowski & Radliński 1892: 139). Cognate to the Chukotian term.

**Proto-Nivkh**. *bor- (Fortescue 2016: 25; Savelyeva, Taksami 1965: 197; Savelyeva, Taksami 1970: 267), polysemy 'to lie / to lie down (of animate)'. Distinct from *ku- 'to lie, be located (of thing)' (Fortescue 2016: 89).

**Proto-Samoyed**. *kɨy-tV- (Helimski 1997: 280–281), going back to Proto-Uralic *kuyi- 'to lie', is retained in Mator.

**Proto-Yukaghir**. *kont-oː- (Nikolaeva 2006: 220–221), retained in both modern Yukaghir languages, is derived from the root *köntə-.

48. 'liver'.

**Proto-Yeniseian**. *seŋ (S. Starostin 1995: 272). Preserved only in Ket-Yugh. Kott šičil and Arin sal are most likely related and go back to Kott-Arin *sisal 'internal organ', a form with no transparent internal etymology and vague semantics. In this context, Ket-Yugh *seŋ is a more reliable candidate for Proto-Yeniseian 'liver'.

**Proto-Athabaskan**. *=zət' is retained in all three branches.

**Eyak.** =saht, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *sVnt' (Athabaskan, Eyak). We follow Leer 2008a and reconstruct a medial nasal on account of vowel aspiration in Eyak.

**Proto-Eskimo**. *təŋu-ɣ (Fortescue et al. 2010: 373), retained in all branches.

**Proto-Aleut**. *aːʁi-χ (Bergsland 1994: 38; Golovko 1994: 243), attested in all branches.

**Proto-Chukotian**. *ponta (Fortescue 2005: 218), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. Cannot be reconstructed with certainty. Cf. Eastern bɨzme-č 'liver' (Dybowski & Radliński 1892: 135) < virtual *mizm-. Western ponta-pont 'liver' (Volodin 2021: 206; Volodin, Khaloimova 2001: 186; Fortescue 2005: 218; Dybowski & Radliński 1893b: 145) is most likely a Chukotian loan.

**Proto-Nivkh**. *div-r (Fortescue 2016: 42; Savelyeva, Taksami 1965: 292; Savelyeva, Taksami 1970: 353). See Panfilov 1962: 59; Savelyeva, Taksami 1970: 530– 531 for the rare suffix *-r.

**Proto-Samoyed**. *mɨtə (Janhunen 1977: 93–94), retained in all Samoyed languages save Mator, goes back to Proto-Uralic *məksa 'liver'.

**Proto-Yukaghir**. Kolyma *kude-ɲʒə (Nikolaeva 2006: 225) vs. Tundra *aʎaː-yə (Nikolaeva 2006: 100).

49. 'long'.

**Proto-Yeniseian**. *ʔux- (S. Starostin 1995: 201). Preserved in all daughter languages, but not attested in Pumpokol.

**Proto-Athabaskan**. *=ŋę:s is retained in all three branches.

**Eyak**. =ʔa:w.

**Proto-Athabaskan-Eyak**. *=ŋe:s (Athabaskan), *=ʔa:w (Eyak).

**Proto-Eskimo**. *takə- (Fortescue et al. 2010: 355), retained in all branches.

**Proto-Aleut**. *aðu- (Bergsland 1994: 14; Golovko 1994: 202), attested in all branches.

**Proto-Chukotian**. *iwlə- (Fortescue 2005: 106), retained as basic 'long' in all languages except for Kerek. Cognate to the Itelmen term.

**Proto-Itelmen**. *iwl- (Volodin 2021: 60; Volodin, Khaloimova 2001: 149; Fortescue 2005: 106; Mudrak 2008: 62). Western, Eastern (Dybowski & Radliński 1892: 145). Cognate to the Chukotian term.

**Proto-Nivkh**. *gəl- (Fortescue 2016: 64; Savelyeva, Taksami 1965: 128; Savelyeva, Taksami 1970: 126).

**Proto-Samoyed**. *yɒmpə (Janhunen 1977: 37) is retained in all daughter languages save Nganasan.

**Proto-Yukaghir**. *čit-nə-, derived from the root *čič- (Nikolaeva 2006: 134; Zhivlov 2022b: 47), is retained in both modern Yukaghir languages.

50. 'louse'.

**Proto-Yeniseian**. *ʔə:ke ~ *xə:ke (S. Starostin 1995: 192). Preserved in both of the primary Yeniseian branches (including Ket-Yugh and Kott). Lack of Arin parallels means that either *ʔ- or *x- were present in the word-initial position.

**Proto-Athabaskan**. *ya:ʔ is retained in all three branches.

**Eyak**. kuks-k.

**Proto-Athabaskan-Eyak**. *ya: (Athabaskan), *kVks (Eyak).

**Proto-Eskimo**. *kuma-γ (Fortescue et al. 2010: 198), retained in all branches.

**Proto-Aleut**. *kitu-χ (Bergsland 1994: 242), attested in Eastern and Atkan.

**Proto-Chukotian**. *mə=məl (Fortescue 2005: 183), partial reduplication, retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *mil-mil (Ono 2003: 102; Fortescue 2005: 183; missing from Volodin's dictionaries), reduplicated stem, Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. An unclear situation. There are two terms attested in Amur and North Sakhalin, namely morphologically unclear *amrak 'head louse' (Fortescue 2016: 13; Savelyeva, Taksami 1965: 95; Savelyeva, Taksami 1970: 32) and *dar 'body louse' (Fortescue 2016: 40; Savelyeva, Taksami 1970: 344). The third term *hirk 'louse' is attested in East and South Sakhalin (Fortescue 2016: 74; Savelyeva, Taksami 1970: 344), where it is glossed as a generic term for 'louse' (Tangiku et al. 2008: 32; Hattori 1962a: 114; 1962b: 79, 80), although, strictly speaking, the data in Savelyeva, Taksami 1970 suggest the specific meaning 'body louse' for *hirk. The proto-term for 'nit' attested in Amur and South Sakhalin, is derived from the latter root: *hirk-r 'nit' (Fortescue 2016: 75), which makes *hirk a more preferable candidate for 'louse'. Nevertheless, we treat *amrak and *hirk as synonyms.

**Proto-Samoyed**. *ɒncʉ (Janhunen 1977: 18) is attested in Forest Nenets, Enets, Nganasan, Kamass and Selkup, whereas *pənsV (Helimski 1997: 246) is attested in Tundra Nenets and Mator with derivatives in Forest Nenets and Enets. It seems clear that both roots were present in Proto-Samoyed, but the semantic difference between them is not clear.

**Proto-Yukaghir**. *peme ~ *pime (Nikolaeva 2006: 348) is retained in both modern Yukaghir languages.

51. 'man (male human being)'.

**Proto-Yeniseian**. *pixe (S. Starostin 1995: 249). Preserved in all daughter languages where attested, but not found in Pumpokol, and dubious in Arin.

**Proto-Athabaskan**. *tə=ne: 'man / person' is the main candidate (the initial element *tə is a desemanticized nominal prefix).

**Eyak**. ɬi=la:ʔ, morphologically unclear, either a deverbative from =la:ʔ '?' (thus a secondary formation) or the second element is a direct cognate to Athab. *=ne:.

**Proto-Athabaskan-Eyak**. *nV: (Athabaskan, Eyak?).

**Proto-Eskimo**. *aŋu-n (Fortescue et al. 2010: 38), retained in all branches, although it was superseded with *inʸu-ɣ 'person' (q.v.) in some Yupik lects.

**Proto-Aleut**. *taya-ʁu-χ (Bergsland 1994: 395; Golovko 1994: 227), attested in all branches, the starting root is unclear, perhaps literally 'the one with many taya'.

**Proto-Chukotian**. *qəlavol (Fortescue 2005: 243), retained as a basic word for 'man' in all languages except for Koryak. Morphologically unclear.

**Proto-Itelmen**. *iχɬχ (Volodin 2021: 81; Volodin, Khaloimova 2001: 172; Ono 2003: 110; Fortescue 2005: 244; Mudrak 2008: 62). Western 'man, male', Southern elku ~ ilʸx 'husband' (Krasheninnikov; Dybowski & Radliński 1893a: 107).
Distinct from *qəmzʸa 'husband' attested in Western and Eastern (Uka) (Volodin 2021: 128; Mudrak 2008: 167), also the Eastern derivative kimzanaan ~ kamzanaan 'male (adj.)' (Dybowski).

**Proto-Nivkh**. There are two terms for 'man' competing with each other. First, Amur and North Sakhalin *ut-kun (Fortescue 2016: 158; Savelyeva, Taksami 1965: 214; Savelyeva, Taksami 1970: 397), formally looks like a regular plural form in *-kun, thus can be an old collective term, alternatively *-kun in *ut-kun can be related to the anthroponymic suffixes of the shape -kun for which see Panfilov 1962: 52 (for the starting root cf. *ut 'body', Fortescue 2016: 163). Second, East and South Sakhalin *ar-məṭ (Fortescue 2016: 16; Savelyeva, Taksami 1970: 397), derived from *ar 'male' (Fortescue 2016: 15), the second element is probably related to the verb mu- 'to become', thus Panfilov 1962: 81. We treat *ut-kun and *ar-məṭ as synonyms.

**Proto-Samoyed**. *tepä (Janhunen 1977: 163) is retained in Mator, Kamass and Selkup. Nganasan has a derivative with the meaning 'boy'. In Nenets, Enets and Nganasan this word was replaced by Proto-Samoyed *kʋə-sʋ 'person'.

**Proto-Yukaghir**. *köy (Nikolaeva 2006: 215–216) is retained in both modern Yukaghir languages.

52. 'many'.

**Proto-Yeniseian**. *bəy- (S. Starostin 1995: 209). Preserved in Kott, but possibly still active in its original meaning in mid-19th century Ket as well. Attestation of Ket bзäуäm 'many' in Castrén's records, clearly related to Kott payaŋ, shows that the modern Ket descendant of this proto-item, bзуаŋ 'enough', may have undergone a semantic shift.

**Proto-Athabaskan**. *ɬa:ɲ is retained in all three branches.

**Eyak**. =t'uʔ, note the Athabaskan verb *=t'e: 'to be thus, be in circumstances of' on which expressions for 'many' are based in some Athabaskan languages. Theoretically Eyak =t'uʔ and Athabaskan *=t'e: can be cognates.

**Proto-Athabaskan-Eyak**. *ɬa:ɲ (Athabaskan), *=t'V (Eyak).

**Proto-Eskimo**. *amə-cu- ~ *amə-lʁa- (Fortescue et al. 2010: 24–25), retained in all branches, although suffix extensions are not entirely clear.

**Proto-Aleut**. *qala-χ (Bergsland 1994: 302), attested in Eastern and Atkan; a more widely used expression is suffixed *qala-ʁi-l- (Bergsland 1994: 302; Golovko 1994: 74), attested in all branches. Tends to be superseded with the new formation *hasi-na-l- 'to be many' (Bergsland 1994: 101; Golovko 1994: 161), derived from the bound root *hasi- 'crowd vel sim.'.

**Proto-Chukotian**. *\*mək-* (Fortescue 2005: 181), retained in all languages. Distinct from *\*ŋənvəq* 'much' (Fortescue 2005: 202).

**Proto-Itelmen**. Not reconstructible. The concept 'many' is only documented for modern Western. Two terms are known which tend to be distributed between two main dialects, according to Volodin 1976: 320-321; both roots lack Itelmen cognates.

    1) Napana *pto-s*, *pto-q*, *əm=pto-wa* 'many, much' (Volodin 2021: 208; Volodin, Khaloimova 2001: 73; Volodin 1976: 320, 345; Fortescue 2005: 226). < virtual *\*puto-*.

    2) Sedanka *iwni-ł* ~ *n=iwni-ł* ~ *n=ini-ł* 'many, much' (Volodin 2021: 60, 181, 182), in earlier sources: *iɣne-lʸ*, *ixine-lʸ*, *iɣəne-lʸ*. < virtual *\*iɣʷini-*.

    Also cf. modern Western *meyim* ~ *meyiŋ* 'enough, many, much, thoroughly' (Volodin 2021: 173; Volodin, Khaloimova 2001: 58; Volodin 1976: 344; Fortescue 2005: 171). Volodin and Fortescue suppose that *meyim* ~ *meyiŋ* is a loan from Chukotian *\*mäyəŋ-* 'big' (q.v.) which is likely despite the semantic difference.

**Proto-Nivkh**. *\*mal-ɣo-* (Fortescue 2016: 101; Savelyeva, Taksami 1965: 210; Savelyeva, Taksami 1970: 173; Taksami 1996: 147). Attested everywhere; a basic expression for '(to be) many' at least in Amur and likely East Sakhalin (Tangiku et al. 2008: 64). The second candidate is *\*dam-* (Fortescue 2016: 38; Savelyeva, Taksami 1970: 342), which is attested with the meaning '(to be) many' in Amur, North and East Sakhalin.

**Proto-Samoyed**. *\*oykkɒ* ~ *\*oytkɒ* ~ *\*oycḱɒ* ~ *\*oyskɒ* (Janhunen 1977: 29) is retained in most daughter languages.

**Proto-Yukaghir**. Kolyma and Chuvan *\*ningə-* (Nikolaeva 2006: 303) vs. Tundra *\*poy-oː-* (Nikolaeva 2006: 355).

53. 'meat'.

**Proto-Yeniseian**. *\*ʔise* (S. Starostin 1995: 194). Preserved in all daughter languages except for Pumpokol, where it was replaced with *cič* = Kott *šig* 'food' < Proto-Yeniseian *\*siː-k* 'food', a nominal derivative from *\*siː-* 'to eat' q.v.

**Proto-Athabaskan**. *\*=cʰənʔ* is retained in all three branches.

**Eyak**. *=cʰeʔ*, cognate to Athabaskan, final *-ʔ* prevents the expected aspiration of *e*.

**Proto-Athabaskan-Eyak**. *\*cʰenʔ* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*nəqə* (Fortescue et al. 2010: 251), retained in all branches, usually polysemy: 'food / meat'.

**Proto-Aleut**. *\*ulu-χ* (Bergsland 1994: 436; Golovko 1994: 228), attested in all branches.

**Proto-Chukotian**. *\*tərɣe-tər* (Fortescue 2005: 301), partial reduplication, a basic term at least in Chukchi (Inenlikei 2005) and Alutor (Kibrik et al. 2004: 558). Superseded with *\*kinuŋi* (Zhukova 1990: 155; Fortescue 2005: 138) in Koryak, whose Alutor cognate means specifically 'reindeer meat' (Nagayama 2003: 267).

**Proto-Itelmen**. *\*tχal-tχal* (Volodin 2021: 249; Volodin, Khaloimova 2001: 173; Fortescue 2005: 302; Mudrak 2008: 202), Western, Eastern, Southern, reduplicated stem.

**Proto-Nivkh**. *\*dur* ~ *\*ḍur* (Fortescue 2016: 47; Savelyeva, Taksami 1965: 216; Savelyeva, Taksami 1970: 373).

**Proto-Samoyed**. *\*ɒyɒ* (Janhunen 1977: 17) preserves the sense 'meat / flesh' in Kamass and Selkup. In Northern Samoyed this word retains only the meaning 'flesh', being replaced in the sense 'meat' by *\*əm-sɒ* (originally 'food', derived from *\*əm-* 'to eat'). In Mator, the root *\*ɒyɒ* is also replaced by *\*əm-sɒ*, being preserved only in the derivate 'raw'.

**Proto-Yukaghir**. *\*čuː-l* (Nikolaeva 2006: 143) is retained in Kolyma, Chuvan and Tundra.

54. 'moon'.

**Proto-Yeniseian**. The etymon *\*suɣ* (S. Starostin 1995: 204) is seen in Kott-Arin and Pumpokol; in Ket-Yugh, the equivalent of 'moon' is *\*qip*, of unclear origin; the most tempting solution would be to identify it with *\*qib* 'grandfather', but the idea runs into significant phonetic problems, unless one can come up with a satisfactory solution for the irregular devoicing

of the final consonant in the word for 'moon'. We include both words into comparison for extra safety.

**Proto-Athabaskan**. *ša: 'sun / moon' is retained in all three branches, although, in the meaning 'moon', this root tends to be superseded with various descriptive formation. The PA sibilant points to either PAE *š or *xʷ.

**Eyak**. qʰə=χah, perhaps contains the same root as ʔiš=χah 'round howl, (round-bottomed) mixing-howl'.

**Proto-Athabaskan-Eyak**. *šʷa: ~ *xʷa: 'sun / moon' (Athabaskan). Another possible candidate is PAE *nen (> PA *nen 'month', Eyak leh 'year'), since 'moon' is the main semantic source for the meaning 'month' and it is not a rare situation when an innovative term acquires the meaning 'moon', whereas the old term is retained as 'month'.

**Proto-Eskimo**. *tanqi- (Fortescue et al. 2010: 360), retained in all branches. Formally this is the best candidate, apparently with Proto-Eskimo polysemy 'light, to be bright / moon'.

**Proto-Aleut**. *tuɣi-ða-χ (Bergsland 1994: 402; Golovko 1994: 224), attested in all branches.

**Proto-Chukotian**. *yəʁ=ilɣən (Fortescue 2005: 124), retained in all languages. Literally 'cloud's whiteness'(?) with *yəʁə-n 'cloud' (q.v.) and *ilɣə 'white' (q.v.).

**Proto-Itelmen**. Apparently, the stem *kulač (Volodin 2021: 144; Fortescue 2005: 393; Mudrak 2008: 116), which is normally attested with the meaning 'sun', is to be reconstructed with the areal polysemy 'sun / moon'. Firstly, the synchronic polysemy 'sun / moon' is documented for Eastern Itelmen. Secondly, in Southern, 'moon' is expressed with the collocation 'night *kulač', whereas 'sun' is denoted as 'day *kulač' vel sim. In Western, inherited *kulač is retained as lač 'sun' (with irregular simplification *kul- > *kl- > l-), whereas 'moon' is denoted with either the Chukotian loans such as yeʔalɣən ~ yeʔalŋin 'moon' (Ono 2003: 116; Fortescue 2005: 124) or the Russian loan mesic 'moon' (Volodin, Khaloimova 2001: 168).

**Proto-Nivkh**. *loŋ (Fortescue 2016: 98; Savelyeva, Taksami 1965: 202; Savelyeva, Taksami 1970: 163).

**Proto-Samoyed**. *kɨy (Janhunen 1977: 69), retained in Nganasan, Mator and Kamass, goes back to Proto-Uralic *kəwi 'moon'.

**Proto-Yukaghir**. *kini-ɲǯə (Nikolaeva 2006: 212) is retained in both modern Yukaghir languages.

55. 'mountain'.

**Proto-Yeniseian**. *rʸɨʔǯ (S. Starostin 1995: 267). The situation with Proto-Yeniseian 'mountain' is quite complex. Ket-Yugh *qaʔy 'mountain; steep bank' corresponds to Kott xey ~ kʰey 'back side of axe / knife'; the same root is most likely present in Kott xe:-le:x ~ kʰe:-le:g 'back side of mountain'. The semantic development 'mountain' > 'side of axe / knife' is suspicious; a more likely common invariant would be 'elevation', 'protruding part', etc., implying that the primary semantics of 'mountain' for this root on the Proto-Yeniseian level is not likely. In Ket-Yugh, the word was probably originally applied to 'cliffs' or 'steep riverbanks', then extended to denote 'wood-covered mountains' as well. The original word for 'wood-covered mountain' (the default kind of mountain for Yeniseian territory) must have been *rʸɨʔǯ. Arin kar 'mountain' is isolated in Yeniseian and has no etymological connections whatsoever.

**Proto-Athabaskan**. Northern and Apachean *cəł is the best candidate. Descriptive new formation in the Pacific Coast branch.

**Eyak**. ʔiλ'.

**Proto-Athabaskan-Eyak**. *ceł (Athabaskan), *ʔiλ' (Eyak).

**Proto-Eskimo**. *iŋʁi-ʁ (Fortescue et al. 2010: 150), retained in all branches.

**Proto-Aleut**. *ki:ʁu:-si-χ (Bergsland 1994: 238; Golovko 1994: 67), attested in all branches.

**Proto-Chukotian**. *ŋäy (Fortescue 2005: 194), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *ŋey-ŋe (Volodin 2021: 193; Volodin, Khaloimova 2001: 145; Volodin 1976: 31, 150, 323; Fortescue 2005: 194; Mudrak 2008: 146). Western, Southern. Reduplicated stem. Cognate to the Chukotian term.

**Proto-Nivkh**. *bal (Fortescue 2016: 20; Savelyeva, Taksami 1965: 118; Savelyeva, Taksami 1970: 250). In Amur, it means specifically 'mountain covered with forest / forest'. Distinct from *tir (Fortescue 2016: 33) which denotes a forestless area: 'forestless mountain' in Amur, 'field' in East Sakhalin.

**Proto-Samoyed**. *wɒrɒ, retained in Enets, Nganasan and Kamass, goes back to Proto-Uralic *wara 'mountain'.

**Proto-Yukaghir**. *peː 'mountain / big stone', retained in Kolyma and Omok, is possibly connected with the Proto-Samoyed word for 'stone' (Nikolaeva 2006: 344–345). Tundra *anaː 'mountain' has no cognates in other Yukaghir languages (Nikolaeva 2006: 105–106).

56. 'mouth'.

**Proto-Yeniseian**. *qowe (S. Starostin 1995: 302). Preserved in all daughter languages.

**Proto-Athabaskan**. *=zaː-ʔ and *=taː-ʔ are the main candidates with the protolanguage opposition 'interior mouth' / 'exterior mouth'.

**Eyak**. =saʔ, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *saː (Athabaskan, Eyak).

**Proto-Eskimo**. *qanə-ʁ (Fortescue et al. 2010: 309), retained in all branches, frequently with polysemy 'mouth / to speak'.

**Proto-Aleut**. *aɣi-lʁ- ~ *aɣa-lʁ- (Bergsland 1994: 23; Golovko 1994: 261), attested in all branches, sometimes with polysemy: 'mouth / door'. Derived from *aɣi-l- 'to open one's mouth; to yawn'.

**Proto-Chukotian**. *rək-ərŋə-n (Fortescue 2005: 256), retained in all languages. The final element is the suffix *-ɣərŋə-n (cf. Fortescue 2005: 408), attested in some nouns with the semantics of hole.

**Proto-Itelmen**. *qasχ (Volodin 2021: 140; Volodin, Khaloimova 2001: 201; Fortescue 2005: 378; Mudrak 2008: 167). Western, Uka/Tigil Eastern, Southern. Krasheninnikov (followed by Pallas) glosses the reflexes of *qasχ as 'lip(s)', thus it is possible that in the Itelmen languages of the 18th c. the opposition 'exterior mouth (*qasχ)' / 'interior mouth (*???)' existed.

**Proto-Nivkh**. Two terms for 'mouth' can be reconstructed: *al 'interior mouth' (Fortescue 2016: 10; Savelyeva, Taksami 1970: 463) and *amɣ 'exterior mouth' (Fortescue 2016: 12; Savelyeva, Taksami 1965: 373; Savelyeva, Taksami 1970: 464). Phonetic similarity with Proto-Tungusic *amŋa 'mouth' (> Orok amŋa, Evenki amŋa, Nanai aŋma ~ amɢa, all 'mouth') can be accidental.

**Proto-Samoyed**. *aŋ (Janhunen 1977: 20), retained in all Samoyed languages, goes back to Proto-Uralic *aŋi 'mouth / opening'.

**Proto-Yukaghir**. *aŋa (Nikolaeva 2006: 106) is retained in all Yukaghir languages. It is cognate to, or borrowed from, Proto-Samoyed *aŋ 'mouth'.

57. 'name'.

**Proto-Yeniseian**. *ʔiɢ (S. Starostin 1995: 193). Preserved in all daughter languages, although not attested in Arin (the Pumpokol form could also, in theory, be Yugh rather than Pumpokol). Root-final *-ɢ reconstructed based on its complete disappearance in Ket-Yugh (*iː) but preservation in Kott (ix).

**Proto-Athabaskan**. *=uː=žiː-ʔ is retained in all three branches.

**Eyak**. wə=šeh, cognate to Athabaskan and to Tlingit saː 'name', although the Eyak aspirated phonation should point to an additional n-suffix in Proto-Eyak.

**Proto-Athabaskan-Eyak**. *we=še (Athabaskan, Eyak).

**Proto-Eskimo**. *atə-ʁ (Fortescue et al. 2010: 55), retained in all branches. Cognate to the Aleut term.

**Proto-Aleut**. *asa-χ (Bergsland 1994: 96; Golovko 1994: 215), attested in all branches. Cognate to the Eskimo term.

**Proto-Chukotian**. *nannə (Fortescue 2005: 191), retained in all languages.

**Proto-Itelmen**. *χela-ŋ (Volodin 2021: 286; Volodin, Khaloimova 2001: 159; Fortescue 2005: 379; Mudrak 2008: 57). Western, Eastern. The concept is poorly documented in older sources.

**Proto-Nivkh**. *qa (Fortescue 2016: 138; Savelyeva, Taksami 1965: 169; Savelyeva, Taksami 1970: 146).

**Proto-Samoyed**. *nim (Janhunen 1977: 102), retained in all Samoyed languages, goes back to Proto-Uralic *nimi 'name'.

**Proto-Yukaghir**. Kolyma and Chuvan *ni-w (Nikolaeva 2006: 312) vs. Tundra *kiri-yə (Nikolaeva 2006: 213). Kolyma word is traditionally compared with Proto-Uralic *nimi 'name' and its Samoyed reflex *nim. Early attestations of the Yukaghir word include *nim* in the 17th century Yukaghir translation of the Lord's prayer and the 18th and 19th century forms like *nywa, niiv* and *niw*. Modern Kolyma has *ɲuː*. Based on the earliest attestation, Nikolaeva postulates a development *nime > niwe > niw > ɲuː*. The reconstruction with *m* cannot be correct, because there are plenty of Proto-Yukaghir words with word-internal and word-final *m*, which is regularly preserved in all daughter idioms. It is much more probable that the form *nim* results from a misprint or some other kind of error. We suggest that *ɲuː* can be etymologized as a derivative from the Proto-Yukaghir verb *ɲeː- 'call, call by name' (Nikolaeva 2006: 292), formed with the deverbal noun suffix -uː < *-w (Zhivlov 2022a: 75–77). Older forms like *niw* preserve the root vowel (some derivatives from *ɲeː- have an allomorph *ni-). Thus, despite superficial similarity, the Kolyma word for 'name' has nothing to do with Uralic *nimi.

**Proto-Burushaski**. We reconstruct the Proto-Burushaski form as *=yek ~ *=ek (> Yasin =yˈek, Hunza =ˈik) for S. Starostin's *yek, since initial *y- is generally expected to be retained in Hunza.

58. 'neck'.

**Proto-Yeniseian**. *kəqənt (S. Starostin 1995: 237). Preserved in Ket-Yugh. In Kott-Arin, replaced with *puyme ~ *puymur, of unclear origin. The reason why the Ket-Yugh word is seen as more archaic is the Kott parallel in *agantan* 'collar' (< *kagantan with dissimilation): the semantic development 'neck' > 'collar' is typologically normal, whereas the opposite would be quite strange. Due to its sheer length, Proto-Yeniseian *kəqənt must have contained a suffix, although the element *-nt is hardly segmentable as a productive derivative morpheme on any level.

**Proto-Athabaskan**. *qˈus is retained in all three branches.

**Eyak**. =cʰĩʔ, the original meaning was apparently 'head' (q.v.), the Proto-Eyak term for 'neck' is unknown, cf. =tə=qˈəcˈ 'collar' which looks similar to PA *qˈus 'neck'.

**Proto-Athabaskan-Eyak**. *qˈus (Athabaskan).

**Proto-Eskimo**. *uya- (Fortescue et al. 2010: 420), scarcely retained with the meaning 'neck (non-anatomic, e.g., neck of bottle)'. In Proto-Yupik, the stem *uya-quʁ 'neck' was derived (suffix *-quʁ means 'smth. associated with or attached to smth.'). Cognate to the Aleut term. In Proto-Inuit, superseded with a derivative *quŋ-uciʁ of unclear origin (Fortescue et al. 2010: 345).

**Proto-Aleut**. *uyu-χ (Bergsland 1994: 457; Golovko 1994: 288), attested in all branches. Cognate to the Eskimo term.

**Proto-Chukotian**. *ləʁitən (Fortescue 2005: 167), retained in all languages. Morphologically unclear. Can be cognate to the Itelmen term.

**Proto-Itelmen**. *\*xeyte-* (Volodin 2021: 280; Volodin, Khaloimova 2001: 222; Fortescue 2005: 167; Mudrak 2008: 56). Western, Eastern, Southern. Can be cognate to the Chukotian term.

**Proto-Nivkh**. *\*qor* (Fortescue 2016: 142; Savelyeva, Taksami 1965: 459; Savelyeva, Taksami 1970: 151).

**Proto-Samoyed**. *\*wayk-kə* (Janhunen 1977: 173), retained in all languages save Selkup. Replaced in Selkup by reflexes of Proto-Samoyed *\*soy* 'throat' (Janhunen 1977: 142). The word *\*wayk-kə* is etymologically a dual form of *\*wayk* 'shoulder' (< Proto-Uralic *\*wolka* 'shoulder'), itself preserved only in Selkup, being replaced in most other languages by *\*mərkä* 'shoulder'.

**Proto-Yukaghir**. *\*ɲom-il* (Nikolaeva 2006: 307) is retained in both modern Yukaghir languages.

59. 'new'.

**Proto-Yeniseian**. *\*giʔ* (S. Starostin 1995: 227). Preserved in Ket-Yugh and Kott, not attested in Arin and Pumpokol.

**Proto-Athabaskan**. Not reconstructible, because 'new' is normally expressed with the help of various morphological structures based on roots with the meanings 'now', 'right now', 'recent' which looks like new formations.

**Eyak**. *q'aˑ-yaˑ*, a transparent new formation based on *q'ah* 'already, finally, now, by now'.

**Proto-Athabaskan-Eyak**. Not reconstructible.

**Proto-Eskimo**. *\*nuta-ʁ-aʁ* (Fortescue et al. 2010: 265), retained in all branches. Derived from the verb *\*nuta-ʁ-* 'to renew'.

**Proto-Aleut**. *\*taɣa-ða-l-* (Bergsland 1994: 380; Golovko 1994: 233), attested in Eastern and Atkan.

**Proto-Chukotian**. *\*tur-* (Fortescue 2005: 291), retained in all languages.

**Proto-Itelmen**. Not reconstructible reliably. The concept is only documented for Western: *nʸenʸ-an* 'new' (Dybowski & Radliński 1893b: 138) < *neʔn* 'now, at present', *ifa-laχ* 'new' (Volodin 2021: 81) < *ifa* 'just now', *novoy* 'new' (Volodin 2021: 178) < Russian.

**Proto-Nivkh**. *\*tur-* (Fortescue 2016: 36; Savelyeva, Taksami 1965: 243; Savelyeva, Taksami 1970: 454).

**Proto-Samoyed**. Nenets, Nganasan, Selkup, Kamass and Mator each have their own words for 'new'. Enets languages have three synonyms for 'new', one of which is apparently related to the Mator word, allowing the reconstruction *\*ɲʊrpV* (Helimski 1997: 315). Even if this comparison is correct, it does not necessarily indicate Proto-Samoyed status of *\*ɲʊrpV* 'new': according to an unpublished idea of Eugene Helimski, Mator is specifically related to Enets and Nenets. Still, there is a plausible candidate: *\*ojV*, preserved only in a Taz Selkup derivate *oćị-ŋ* 'again, anew' (Helimski 1976: 123–124). This word goes back to *\*wuði,* the main Proto-Uralic word for 'new'. Since the Proto-Uralic word was replaced by different innovations in different Samoyed languages, the replacement itself must have happened after the breakup of Proto-Samoyed, which allows us to reconstruct *\*ojV* as the Proto-Samoyed word for 'new'.

**Proto-Yukaghir**. Kolyma *\*il-ʌ̌ə* (Nikolaeva 2006: 175–176), derived from *\*ile* '(an)other' (Maslova 2003: 71) vs. Tundra *\*miɲǯ̌ər-pə-* (Nikolaeva 2006: 269).

60. 'night'.

**Proto-Yeniseian**. *\*siɢ* (S. Starostin 1995: 274). Preserved in all daughter languages. Word-final *\*-ɢ* is reconstructed primarily on the basis of its deletion in Ket-Yugh *\*siˑ* (the other uvular consonants are usually preserved).

**Proto-Athabaskan**. Two main candidates are *\*λ'eˑq'ə* (Pacific Coast, Apachean) and *\*tʰəcə* (Northern).

**Eyak**. *χəλ'* 'night / darkness', cf. the paronymous verb *=ł=χeʔλ'* 'to get dark, night falls', cognate to PA *\*=χəł / \*=χəλ'* 'to be dark'. Since the semantic shift '(to be) dark' > 'night' seems more normal than *vice verso*, it is likely the 'night' is the secondary meaning for Eyak; the same semantic derivation is found in some Athabaskan, e.g., Sarsi *xìł* 'night'.

**Proto-Athabaskan-Eyak**. *λ’e:q’, *tʰec (Athabaskan).

**Proto-Eskimo**. *unnu-ɣ (Fortescue et al. 2010: 407), retained in Yupik-Sirenik as 'night', having shifted in Inuit into the meaning 'evening', the original semantics is retained in Inuit verbal formations 'to become night', 'to spend the night', 'to work during the night'.

**Proto-Aleut**. *amax ~ *amɣi-χ ~ (Bergsland 1994: 62; Golovko 1994: 27, 233), attested in all branches. Tends to be superseded with *ðaya-χ 'late evening' (Bergsland 1994: 160; Golovko 1994: 44).

**Proto-Chukotian**. *nəki-nək (Fortescue 2005: 189), reduplicated stem, retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *niku ~ *nku-nku (Volodin 2021: 115; Volodin 1976: 154; Fortescue 2005: 189; Mudrak 2008: 71). Western, Eastern, probably Southern.
Distinct from *ɬixʷi- 'to spend the night' from which the nominal stem *ɬixʷi-ŋu 'night' was derived, mostly used in the adverb 'at night', as modern Western k=ɬʍiŋ-le 'at night' (Volodin 2021: 98, 167; Fortescue 2005: 294; Mudrak 2008: 68).
We generally follow Mudrak's (2008: 68, 72-73) etymological and morphological analysis of these two roots.

**Proto-Nivkh**. *urk (Fortescue 2016: 157; Savelyeva, Taksami 1965: 244; Savelyeva, Taksami 1970: 396).

**Proto-Samoyed**. *pi (Janhunen 1977: 123) is retained in all Samoyed languages.

**Proto-Yukaghir**. Kolyma and Chuvan *em-il (Nikolaeva 2006: 157–158), derived from the same root as *em-i-wə 'black', vs. Tundra *čiŋi-čə-l (Nikolaeva 2006: 133).

61. 'nose'.

**Proto-Yeniseian**. *xaŋ (S. Starostin 1995: 295). Preserved in Kott and Pumpokol; in Ket-Yugh, the old word for 'nose' was replaced with *ʔɔlin, and in Arin, with ar-quy, where -quy = 'hole', as in tim-quy 'window'.

**Proto-Athabaskan**. *=nə=čʰən-xʸ (Krauss & Leer 1981: 115) is retained in all three branches. The stem is derived from PA =čʰən 'to smell' with the help of the auxiliary morpheme *nə 'face' and the repetitive aspect suffix. Such a derivation should be relatively recent, since the nasalization is retained is some languages (old PAE *nC-clusters normally lose the nasal element).

**Eyak**. =ni:k', cognate to PA *=nə=ni:k'- 'nostril', Tlingit =ni:x' 'to smell'.

**Proto-Athabaskan-Eyak**. *ni:k' (Eyak).

**Proto-Eskimo**. *qəŋa-ʁ (Fortescue et al. 2010: 325), retained in all branches.

**Proto-Aleut**. *anʁ-usi- (Bergsland 1994: 76; Golovko 1994: 233), attested in all branches. Derived from *anʁ- 'to breath'.

**Proto-Chukotian**. There are two candidates, intertwined between languages and dialects. First, *yeqa (Fortescue 2005: 113), a basic term for 'human nose' in Chukchi, Koryak of the 18th-19th c. (Klaproth, Dybowski) and the Palana dialect of Alutor, meaning 'tip, end' in modern Koryak. Second, *qiŋ (Fortescue 2005: 235), a basic term for 'nose (of human and animal) / beak' in modern Koryak, Kerek and proper Alutor, meaning specifically 'nose (of animal)' in Chukchi. It is likely that the opposition *yeqa 'nose (of human)' / *qiŋ 'nose (of animal)' is to be reconstructed for Proto-Chukotian. In modern lects, *qiŋ tends to acquire the generic meaning 'nose', superseding *yeqa.

**Proto-Itelmen**. *qəŋ (Volodin 2021: 127; Volodin, Khaloimova 2001: 178; Fortescue 2005: 235; Mudrak 2008: 167, 172). Southern sg. kan-kan 'nose', pl. kanə-d 'nostrils' (Dybowski & Radliński 1893a: 110), Eastern kanas 'nose' (Dybowski & Radliński 1892: 162). In Western, final -ŋ was reanalyzed as a singulative exponent in the partially reduplicated stem: sg. qeqe-ŋ, pl. qeqe-ʔn, but the original shape of the root is retained in t=qŋa-č 'bow or stern of boat' (Volodin 2021: 238), kono-kon 'nose (of fish)' (Dybowski & Radliński 1893b: 125).

Surprisingly, Krasheninnikov offered quite different forms for the meaning 'nose' for three Itelmen languages of the 18th c. (these forms have been further adopted by Pallas): *kayako, kayaka-n, kaikɨ,* contracted variants *keka, kekʸu* (Mudrak 2008: 159). No potential cognates of these forms in later sources. It is very hard to believe, however, that all Itelmen varieties completely lost such a basic root during the 19th c. having replaced it with *\*qəŋ.* It is more likely that we are dealing with Krasheninnikov's error, although the nature of this error remains unclear (cf. the Chukchi and Koryak reduplicated stem *yeqa-yeq* 'nose').

**Proto-Nivkh**. *\*wiɣ* (Fortescue 2016: 163; Savelyeva, Taksami 1965: 244; Savelyeva, Taksami 1970: 55).

**Proto-Samoyed**. *\*pɨyɒ ~ \*puyɒ* (Janhunen 1977: 122–123) is retained in all daughter languages save Nganasan.

**Proto-Yukaghir**. *\*yoŋ-ul* (Nikolaeva 2006: 196) is retained in all Yukaghir languages.


62. 'not'.

**Proto-Yeniseian**. *\*wən* (S. Starostin 1995: 294 as *\*wə-*). Preserved in all daughter languages. Initial *\*w-* is reconstructed by S. Starostin on the basis of the voiced stop (or nasal *m,* assimilated from *\*b* under the influence of the following *n*) reflexation in all languages and dialects (Ket *bənʸ,* etc.).

**Proto-Athabaskan**. The best candidate is the prefix *\*tu:-* attested as the main exponent of negation of assertion in the Pacific Coast and Apachean branches as well as in the Northern branch as a relic. Besides, there are attested very complex systems of negation in Northern lects, analyzed in detail by Leer (2000). So, we provisionally add three verbal morphemes that are likely to be reconstructed at least for the Proto-Northern level: the prefixes *\*i̱:-* (perfective and stative imperfective), *\*s-* (active imperfective), the enclitic *\*=ə.*

**Eyak**. *ti-k' ...-q,* it is not entirely clear how the negative particle *tik'* is to be analyzed. The final -*k'* is apparently the morpheme *k'u ~ k'ə* — a negative prefix of interrogative pronouns. In this case the initial *ti-* resembles the Athab. negation *\*tu:* (< *\*tV-wV?*). Provisionally we accept this match and posit the Proto-Athabaskan-Eyak negative exponent *\*tV-*.

**Proto-Athabaskan-Eyak**. *\*tV-* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*=nʁi-* (Fortescue et al. 2010: 460), retained as the suffix of negation of assertion in Yupik and Inuit.

**Proto-Aleut**. *\*=laka-* (Bergsland 1994: 518; Bergsland 1997: 84; Golovko 1994: 298), suffix used in the present tense. With other verbal forms, the enclitic *\*u=lax* is used (Bergsland 1994: 483; Bergsland 1997: 103; Golovko 1994: 293), originating from *\*a-/u-* 'to be' and the negative exponent *\*-lax.*

**Proto-Chukotian**. The basic negation of assertion is to be reconstructed as the verbal confix *\*ä-...-kä* (Fortescue 2005: 402), as it is attested in everywhere. Usually, but not always the confixed verbal form is accompanied with a negative particle. These particles vary across languages and thus can hardly be reconstructed for proto-language.

**Proto-Itelmen**. Negated forms are systematically described for modern Western Itelmen only (Volodin 1976: 271–272): the verbal suffix *-aq* plus the particle *qaʔm* express negation of assertion; *-aq* with the particles *z-aq* or *wey-aq* express prohibitive. The second way to express negation is the particle *xeʔ-nʸč,* used without additional suffixes for the future tenses and prohibitive (Volodin 1976: 276; Volodin 2021: 281). Browsing through older sources on Western, Eastern and Southern Itelmen — Krasheninnikov (vol. 2, p. 143, 174) and Dybowski (see Fortescue 2005: 421; Mudrak 2008: 52, 161) — show that the common Itelmen negative exponent is the suffix *\*-q,* it can be accompanied with various negative particles which vary across languages and grammatical categories and probably can be optional is some cases (the same situation as in Chukotian). Moreover, sources of the 18th-19th c. show traces of the confix *\*ə-...-q* as a negative exponent in all three languages (Fortescue 2005: 421; Mudrak 2008: 52). Modern Western totally lost prefixal *\*ə-*. In the

light of the Chukotian parallels, it does not seem risky to posit the confix *ə-...-q as the basic Proto-Itelmen exponent of negation.

**Proto-Nivkh**. According to Panfilov 1965: 158–159; Gruzdeva 1998: 44–45, the basic exponent of negation of assertion is the verb *qaw- 'to be not' (Fortescue 2016: 140), which can function either as a copula or a verbal affix (Fortescue 2016: 171). Distinct from the prohibitive particle *ta (Fortescue 2016: 144; Gruzdeva 1998: 34).

**Proto-Samoyed**. *e- (Janhunen 1977: 26). Negative verb, inherited from Proto-Uralic and retained in all daughter languages.

**Proto-Yukaghir**. *əl (Nikolaeva 2006: 155–156). Negative proclitic, retained in Kolyma, Chuvan and Tundra.

63. 'one'.

**Proto-Yeniseian**. *qu-s-a (S. Starostin 1995: 306). Preserved in all daughter languages. Forms such as Ket-Yugh *qɔʔ-k 'one (animate)' clearly imply that *-s(a) was a suffixal element in Proto-Yeniseian. Word-final *-a is a morpheme common for most of Proto-Yeniseian numerals; as for the component *-s-, it may be compared with the singulative suffix *-s that is segmented out of archaic nominal stems such as 'eye' q.v. or 'stone' q.v.

**Proto-Athabaskan**. *łaqʼ-, in many lects, the root was fused with a prefix and/or reanalyzed towards the shape ł(V).

**Eyak**. łĩhq-ih.

**Proto-Athabaskan-Eyak**. *łVnqʼ-, we follow Leer 2008a and reconstruct a medial nasal on account of vowel nasalization and aspiration in Eyak (Eyak łĩhq < *łĩhqʼ according to Leer's rule).

**Proto-Eskimo**. *ataʁ-uciʁ (Fortescue et al. 2010: 54), retained in all branches. Final element is probably the instrumental suffix *-uciʁ. Cognate to the Aleut form.

**Proto-Aleut**. *ataqa- (Bergsland 1994: 106, 570; Golovko 1994: 236), attested in all branches. Cognate to the Eskimo form.

**Proto-Chukotian**. *ənnän (Fortescue 2005: 345), retained in all languages. Morphologically unclear, probably related to *ən-no 'he, she, it' (Fortescue 2005: 342).

**Proto-Itelmen**. *nizʸəq (Volodin 2021: 132; Fortescue 2005: 380; Mudrak 2008: 142), retained in Eastern and Southern Itelmen. In Western Itelmen, superseded with qn-iŋ '1', derived from *qun 'once' (Volodin 2021: 131; Volodin, Khaloimova 2001: 181; Fortescue 2005: 241).

**Proto-Nivkh**. *ɲə (Fortescue 2016: 117, 178; Panfilov 1962: 181, 214–215; Gruzdeva 1998: 24).

**Proto-Samoyed**. *o-p (Janhunen 1977: 28) is retained in all daughter languages except Selkup that has another derivative of the same root *o-.

**Proto-Yukaghir**. *irk- (Nikolaeva 2006: 177) is retained in Kolyma and Omok. Tundra maːrq- (Nikolaeva 2006: 259) with its atypical long vowel in a closed syllable, according to Nikolaeva, can be a contraction of affirmative proclitic *mə- + *irk-.

64. 'person'.

**Proto-Yeniseian**. *keʔt (S. Starostin 1995: 236). Preserved in all daughter languages. The word had a suppletive plural on the Proto-Yeniseian level, reconstructed as *ǯeʔŋ (S. Starostin 1995: 309), probably the original plural of an unpreserved singular *ǯeʔ 'person'.

**Proto-Athabaskan**. *te=neː 'man / person' is the main candidate.

**Eyak**. tə=χũh, morphologically unclear.

**Proto-Athabaskan-Eyak**. *nVː (Athabaskan).

**Proto-Eskimo**. *inʸu-ɣ (Fortescue et al. 2010: 150), retained in all branches.

**Proto-Aleut**. *anʁ-aʁi-χ ~ *anʁ-aʁi-na-χ (Bergsland 1994: 74; Golovko 1994: 286), attested in all branches. Derived from *anʁ-aʁi-l- 'to be alive' < *anʁ- 'to breath'. Also *taya-ʁu-χ 'man' (q.v.) can be used for generic 'person'.

**Proto-Chukotian**. *ʁuyä-mtä-wi-łʁə-n (Fortescue 2005: 269), a complex stem apparently with descriptive semantics, although details are not entirely clear. It is reconstructed on the basis of the attested Koryak, Kerek and Alutor words for 'person'. The similar Chukchi term

*ɁorawetlɁa-n* 'person' is probably a result of contamination with *Ɂorawer* 'openly, visibly'. Can be cognate to the Itelmen term.

**Proto-Itelmen**. *\*qčʼamzʸa-n-łχ* (Volodin 2021: 296; Volodin, Khaloimova 2001: 221; Ono 2003: 110; Fortescue 2005: 371; Mudrak 2008: 169). Western, Southern, possibly Eastern (*Kamchadal* and *Kamchatka* originate from this word). Morphological details are not entirely clear, it can be cognate to or at least calqued from the Chukotian term.
Suppletive plural/collective: Eastern and Southern *\*nuka-* 'people' (Fortescue 2005: 381).

**Proto-Nivkh**. *\*ɲiɣ-vŋ* (Fortescue 2016: 115; Savelyeva, Taksami 1965: 452; Savelyeva, Taksami 1970: 210). It is likely that the Nivkh term for 'person' (self-designation of the Nivkhs) originally means 'the one living in a territory called *Niɣ*'.

**Proto-Samoyed**. *\*kɒə-sɒ* (Janhunen 1977: 61) retains the meaning 'person' in Mator and Kamass. In Nenets, Enets and Nganasan *\*kɒə-sɒ* changed its meaning to 'man'. The word goes back to Proto-Uralic *\*kali-cʸa* 'person' (preserved also in Mansi), derived from Proto-Uralic *\*kali-* (> Samoyed *\*kɒə-*) 'to die'.

**Proto-Yukaghir**. *\*köndə* (Nikolaeva 2006: 220) is retained in Tundra and Chuvan. Kolyma reflex of *\*köndə* is used in the old texts instead of the accusative form of the personal pronoun 'me'. Kolyma *\*soromə* (Nikolaeva 2006: 415), therefore, is an innovation.

65. 'rain'.

**Proto-Yeniseian**. *\*xur* (S. Starostin 1995: 297). Preserved in all daughter languages; however, there is a problematic relationship between the listed forms and the original Proto-Yeniseian word for 'water'. In Ket-Yugh, 'rain' is easily analyzable as a compound form: *\*Ɂur* 'water' + *\*Ɂes* 'sky'. However, Kott, Arin, and Pumpokol consistently feature *different* resonants in the root morphemes for 'water' and 'rain', e.g., Arin *kur* 'rain' vs. *kul* 'water', Pumpokol *ur-ait* (where *-ait* < *\*Ɂes*) 'rain' vs. *ul* 'water'. This is accounted for in S. Starostin's reconstruction, where original *\*xur* 'rain' is opposed to *\*xur₁* 'water'. It is not excluded that the two roots are, in the end, related (through some non-trivial morphophonological connection) on a higher level than Proto-Yeniseian, but for Proto-Yeniseian it is indeed preferable to separate them.

**Proto-Athabaskan**. *\*kʰʸaːn* is retained in all three branches.

**Eyak**. *kʼu=leh*, literally 'something is happening', a transparent innovation.

**Proto-Athabaskan-Eyak**. *\*kʰaːn* (Athabaskan).

**Proto-Eskimo**. *\*cila-łuɣ* (Fortescue et al. 2010: 85), retained with the meaning 'rain' in Yupik and Inuit. Literally 'bad weather' with *\*cila* 'weather' and the suffix *\*-łuɣ* 'bad'.

**Proto-Aleut**. *\*kim-ðux* (Bergsland 1994: 239; Golovko 1994: 65, 203), attested in Atkan and Attuan; derived from *\*kim-s-* 'to descend, go down'. In Eastern and occasionally in Atkan, superseded with *\*čiχ-ta-l-* 'to rain', *\*čiχ-ta-χ* 'rain' (Bergsland 1994: 139), whose original Proto-Aleut meaning was 'to be wet'.

**Proto-Chukotian**. *\*muqä-* (Fortescue 2005: 179), retained as the basic root for '(to) rain' in Koryak and Kerek. In Chukchi, superseded with the root *\*ilə-* 'damp' (Fortescue 2005: 97).

**Proto-Itelmen**. *\*čuxʷ* (Volodin 2021: 293; Volodin, Khaloimova 2001: 158; Fortescue 2005: 383; Mudrak 2008: 11). Western, Eastern, Southern.

**Proto-Nivkh**. *\*ləɣ ~ \*nəɣ* (Fortescue 2016: 99; Savelyeva, Taksami 1965: 130; Savelyeva, Taksami 1970: 171). Unclear fluctuation of the onset resonant: Amur and North Sakhalin *l-*, East Sakhalin *n- ~ l-*, South Sakhalin *n-*.

**Proto-Samoyed**. *\*sɒr-ö* (Janhunen 1977 135–136), retained in Nenets, Enets, Nganasan and Mator, is derived from the verb *\*sɒrɒ-* 'to rain' (< Proto-Uralic *\*cʸaða-* 'to rain'). Kamass and Selkup have another derivative from the same verb.

**Proto-Yukaghir**. *\*tiwo* (Nikolaeva 2006: 440) is retained in both modern Yukaghir languages. Cf. also the root *\*liŋgə* (Nikolaeva 2006: 255), absent from modern Yukaghir languages,

whose reflexes mean 'rain' and 'to drink' in Chuvan and 'rain, water; to drink water' in Omok.

66. 'red'.

**Proto-Yeniseian**. *sur- (S. Starostin 1995: 278). Preserved everywhere, with the likely exception of Arin: Arin *t*ʲu:ra* cannot be regarded as a regular reflexation of Proto-Yeniseian *sur- (the regular reflexation is found in Arin *sur* 'blood' q.v.).

**Proto-Athabaskan**. *=čʰi:xʸ (Pacific Coast, Apachean 'red', Northern 'yellow-red, reddish') is the main candidate. Cf. the cognate noun *čʰi:xʸ / *POSSR=čʰi:kʸ-əʔ 'red ochre'.

**Eyak**. =č'e:ʔ.

**Proto-Athabaskan-Eyak**. *=čʰi:x (Athabaskan), *=č'e:ʔ (Eyak).

**Proto-Eskimo**. *kavi-ʁ- (Fortescue et al. 2010: 177), retained in all branches. In Inuit, tends to be superseded with the new formation *aðuɣ-valuɣ, lit. 'blood-like' (Fortescue et al. 2010: 6).

**Proto-Aleut**. *ulu:-ða- (Bergsland 1994: 436; Golovko 1994: 134, 220), attested in all branches. Derived from *ulu- 'meat' (q.v.).

**Proto-Chukotian**. *yərrə- (Fortescue 2005: 123), retained in all languages except for Chukchi. Can be cognate to the Itelmen term.

**Proto-Itelmen**. *č'a-č'a (Volodin 2021: 296; Volodin, Khaloimova 2001: 164; Volodin 1976: 320; Fortescue 2005: 123; Mudrak 2008: 34). Reduplication. Western, Eastern, Southern. Can be cognate to the Chukotian term.

**Proto-Nivkh**. *baʁ-la- (Fortescue 2016: 19; Savelyeva, Taksami 1965: 190; Savelyeva, Taksami 1970: 250).

**Proto-Samoyed**. *ɲar- (Janhunen 1977: 107–108) is retained in Nenets, Enets, Mator and Selkup.

**Proto-Yukaghir**. Kolyma and Chuvan *keylə-ɲ- (Nikolaeva 2006: 204) vs. Tundra *ɲamu-čə-ɲ- (Nikolaeva 2006: 287).

67. 'road'.

**Proto-Yeniseian**. It seems that Ket-Yugh preserved the original lexical distinction between *qiq* 'summer road' (S. Starostin 1995: 301) and *qoʔt* 'winter road' (S. Starostin 1995: 261), whereas Kott, Arin, and Pumpokol generalized one word of the two. We have to include both terms into comparison as synonyms.

**Proto-Athabaskan**. *tʰənə is retained in all three branches.

**Eyak**. tʰa:, cognate to Athabaskan with *ɲ > 0 or simply with the loss of nasalization (vowel correspondence between Eyak *tʰa:* and *tʰeɲ(e)* is unclear).

**Proto-Athabaskan-Eyak**. *tʰeɲ (Athabaskan, Eyak).

**Proto-Eskimo**. *apʁ-un (Fortescue et al. 2010: 41), retained in Yupik and Inuit. The final element is the instrumental suffix *-un. In some lects, superseded with *tumə 'track, footprint' (Fortescue et al. 2010: 381).

**Proto-Aleut**. *aka-lu-χ (Bergsland 1994: 43; Golovko 1994: 204), attested in all branches.

**Proto-Chukotian**. *rəʁet (Fortescue 2005: 258), retained in all languages except for Alutor. Tends to be superseded with *winvə 'track' (Fortescue 2005: 329).

**Proto-Itelmen**. Either unstable or poorly elicited concept (see various forms collected in Fortescue 2005: 258; Volodin 2021: 109). The most reliable candidate is Western *ktχas* 'road' (Volodin 2021: 109), *ktxoz* 'road' (Dybowski), potentially Western *kučaža* 'road' (Krasheninnikov) can also cover the same form, plus Southern *txuduna* 'road' (Dybowski) < *kitχʷə- if one accepts different and not entirely clear suffixal patterns in the Western and Southern forms (*ktχa-s*, *txu-duna*). Note that this is not the only Southern word for 'road' in Dybowski's data.
Cf. Eastern *šiži-č* 'road' (Krasheninnikov), *sizi-č* 'road' (Dybowski), Uka/Tigil Eastern *šiž-ič* 'road' (Krasheninnikov), can be cognate to Western *saze-t-* 'to wander, to ford (the river)' (Dybowski) < *sʲezi (Mudrak 2008: 184).
Cf. Southern *eši-čum* (Krasheninnikov), *ezi-čan* (Dybowski) 'road', cognate to Western *es-* 'to go out' (Volodin 2021: 339) < *esi- (Mudrak 2008: 51).

**Proto-Nivkh**. *ɖiv (Fortescue 2016: 53; Savelyeva, Taksami 1965: 132; Savelyeva, Taksami 1970: 354).

**Proto-Samoyed**. *ätɒ (Janhunen 1977: 24) is retained in Mator, Kamass and Selkup. The root also has derivatives in Nenets.

**Proto-Yukaghir**. *yaw-ul (Nikolaeva 2006: 186), attested in Tundra Yukaghir. Kolyma has the word čugö (Nikolaeva 2006: 144), apparently borrowed from Ewen.


68. 'root'.

**Proto-Yeniseian**. *ciːʒ (S. Starostin 1995: 217). Best preserved in Ket-Yugh and in Pumpokol. In Kott-Arin, the original simple form was replaced with *tem-bul, where *-bul may be the same root as 'foot', q.v. and the first part is technically etymologizable as an assimilated form of the original *čiːʒ (cf. the dialectal Arin form tiy-bul ~ tuy-bul).

**Proto-Athabaskan**. There are three main candidates. (1) *=ʁaχt-əʔ ('root' in Pacific Coast and as a relic 'main root of tree' or 'curved root or branch used for ribs on boat' in Northern). (2) *=qeːc' (Northern). (3) *χay, =*χay-əʔ ('root' or specifically 'spruce root' in Northern, 'spruce root' in PCA). For *χay, the specific meaning 'spruce root, long thin flexible root' can be reconstructed. The stem *=ʁaχt-əʔ has a complex, but morphologically non-transparent structure which implies its relative antiquity (could Tlingit χaːt 'root' be an old loan from Pacific Coast?). The primary root *=qeːc' is supported by the Eyak cognate qeːc' 'root', the main weakness of Athabaskan *=qeːc' is its sporadic distribution in the Northern branch. We fill the slot with *=ʁaχt-əʔ and *=qeːc'.

**Eyak**. qeːc'.

**Proto-Athabaskan-Eyak**. *=qeːc' (Athabaskan, Eyak).

**Proto-Eskimo**. *aku-ʁ (Fortescue et al. 2010: 15), retained in all branches.

**Proto-Aleut**. *halɣi-χ (Bergsland 1994: 52; Golovko 1994: 219), attested in Atkan and Attuan. Superseded with *quŋ-lux 'root' (Bergsland 1994: 338) in Eastern.

**Proto-Chukotian**. There are two main candidates. First, *tätqu (Fortescue 2005: 282), which is the basic term in Koryak (Zhukova 1990: 77) and Alutor (Kibrik et al. 2004: 533), meaning 'cambium' in Chukchi. Second, *kinmä (Fortescue 2005: 138), the basic term in Chukchi, which is also attested in other languages with a 'root' semantics. We treat both as synonyms. Cf. also *nən(n)əl, which denotes 'root (generic)' in a dialect of Chukchi (Moll, Inenlikei 1957: 88) and 'lobe of root' in Koryak and Alutor (Fortescue 2005: 191).

**Proto-Itelmen**. *piŋil (Volodin 2021: 205; Volodin, Khaloimova 2001: 163; Fortescue 2005: 385; Mudrak 2008: 158). Western, Eastern, Southern.

**Proto-Nivkh**. *miz-ləɣ ~ *viz-ləɣ (Fortescue 2016: 105; Savelyeva, Taksami 1965: 187; Savelyeva, Taksami 1970: 54; Tangiku et al. 2008: 35; Hattori 1962a: 100). Quoted as a default term for 'root (of tree, plant)' for Amur, East and South Sakhalin. The second candidate is *oz (Fortescue 2016: 131; Savelyeva, Taksami 1970: 247), also attested everywhere as 'root', but apparently it has a more specific meaning and represents a more marginal term.

**Proto-Samoyed**. *wɒncɒ (Janhunen 1977: 171), retained in all Samoyed languages, goes back to Proto-Uralic *wancɑw 'root'.

**Proto-Yukaghir**. Kolyma *lark-ul (Nikolaeva 2006: 235). Tundra Yukaghir has warulu: 'root'. Nikolaeva compares this word with Kolyma ožu: 'thin root used as a thread for fastening boats' and reconstructs Proto-Yukaghir *wonč-. The Proto-Yukaghir form is usually compared with Proto-Uralic *wancɑw 'root'. While the comparison of Tundra warulu: with Kolyma ožu: is acceptable phonologically, it faces a morphological problem, since there is no denominal suffix -lu: in Yukaghir. We prefer an alternative etymology: Tundra warulu: is derived with the deverbal noun suffix -u: from the verbal stem warul-, attested in the Tundra derivatives warul-mu- 'to become strong (of rope, thread)' and warul-we- 'id.' (Zhivlov 2022a: 78–79). The stem warul- itself is derived from the verb war- 'to be strong', related to Kolyma ad- 'firm, strong' < Proto-Yukaghir *waд- (Nikolaeva 2006:

449-450). This derivation makes sense, because willow roots were used by the Tundra Yukaghir to tie together posts for Yukaghir traditional tents. Since the Tundra word is a deverbal derivative, while the Kolyma word is not derived from any known verb, we do not list *warulu:* as a candidate.

69. 'round'.

**Proto-Yeniseian**. Poorly documented item, sometimes superseded with loans. Formally the best candidate is virtual *\*pVd-* reconstructed on the basis of the Kott form.

**Proto-Athabaskan**. It is most likely that the actual Proto-Athabaskan system was binary with the opposition 'round 3D' / 'round 2D'. For PCA and Apachean the opposition *\*=čə=ʁuλ'* / *\*=čə=ʁul* 'round 3D' vs. *\*=ł=t=wa:nc'* / *\*=ł=t=wa:ns* 'round 2D' can be safely reconstructed. For the Northern branch, the following opposition is probable (in many lects, however, corrupted by local innovations): *\*=ł=t=ʁẹ:š* 'round 3D' vs. *\*=ł=t=wa:nc'* / *\*=ł=t=wa:ns* 'round 2D'. Northern *\*=ł=t=ʁẹ:š* 'round 3D' is a transparent derivative from *\*=ʁẹ:ž-əʔ* 'egg' and thus looks like a Northern innovation. We reconstruct the PA opposition as *\*=čə=ʁuλ'* / *\*=čə=ʁul* 'round 3D' vs. *\*=ł=t=wa:nc'* / *\*=ł=t=wa:ns* 'round 2D'. Both stems are not entirely clear morphologically. The exact meaning of initial *\*čə-* is unclear, but this element is detachable and functions as a verbal prefix in the Pacific Coast lects (Hupa). In the Northern and Apachean groups, the sequence *\*čəʁul* was fossilized and contracted > *\*ču:l* (in Northern, this stem is retained with the meaning 'ball'). As for *\*=ł=t=wa:nc'* / *\*=ł=t=wa:ns*, the retained nasal component should point to a relatively recent PA suffixation *\*=wa:n-c'* / *\*=wa:n-s* with a non-productive suffix.

**Eyak**. *qəmək'*, morphologically unclear, somewhat resembles PA *\*=wa:n-c'*, but details remain vague.

**Proto-Athabaskan-Eyak**. *\*=wa:n-*, *\*=χuλ'* (Athabaskan).

**Proto-Eskimo**. Not reconstructible. In Yupik, 'round' is usually expressed with various suffixed derivatives from *\*akða-ɣ-* 'to roll' (Fortescue et al. 2010: 11). In Inuit, 'round' is usually expressed with various suffixed derivatives from *\*aŋva-luʁ-* (Fortescue et al. 2010: 39), whose literal proto-meaning is expected to be 'place of opening', i.e. 'round hole'(?).

**Proto-Aleut**. Not reconstructible with certainty. Cf. Atkan *imu-ðiɣa-* 'round' (Bergsland 1994: 198; Golovko 1994: 220) < *\*imu-χ* 'circle; area around' and Eastern *qiṃa-ðɣu-l-* 'round' (Bergsland 1994: 324; Bergsland & Dirks 1978: 153) < *\*qiṃa-* '?' + *\*-ðɣu-* 'to become, to get to'. Both looks like new formations.

**Proto-Chukotian**. Basic expressions for 'round' are based on the verbal root *\*kəvlə-* 'to roll' (Fortescue 2005: 156) at least in Chukchi and Alutor, but it may be a parallel development.

**Proto-Itelmen**. Not documented reliably or superseded with a Russian loan.

**Proto-Nivkh**. *\*bulk-* (Fortescue 2016: 27; Savelyeva, Taksami 1965: 192; Savelyeva, Taksami 1970: 275). The substantive *\*bulk* means 'small ball, skein', synchronic expressions for '(to be) round' are derived from it via either reduplication or a causative suffix.

**Proto-Samoyed**. Not reconstructible for Proto-Samoyed.

**Proto-Yukaghir**. *\*pöm-nə-* (Nikolaeva 2006: 347–348), retained in both modern Yukaghir languages. Comparison with isolated Even forms meaning 'to wind, be twisted' and 'loop on a thread, rope', proposed in (Nikolaeva 2006: 348), is not convincing.

**Proto-Burushaski**. *pinḍoro ~ biḍiro* is borrowed from Dardic (cf. Khowar *pinḍoru*, Shina *biḍiru* 'round').

70. 'sand'.

**Proto-Yeniseian**. *\*pən-əŋ* (S. Starostin 1995: 248). Preserved everywhere except in Kott (where the meaning shifted to 'ashes').

**Proto-Athabaskan**. *\*sa:xʸ* is retained in all three branches.

**Eyak**. *čʰi:š-k.*

**Proto-Athabaskan-Eyak**. *\*sa:x* (Athabaskan), *\*čʰi:š* (Eyak).

**Proto-Eskimo**. *qavə-yaʁ* (Fortescue et al. 2010: 318), retained in all branches. The starting root is unclear, the suffix *-yaʁ* means 'place where action takes place'. In some Inuit lects, superseded with the complex stem *ciɣu-ʁ-aʁ* ~ *ciʁu-ʁ-aʁ* (Fortescue et al. 2010: 94), which resembles Aleut *čuɣu-χ* 'sand'.

**Proto-Aleut**. *čuɣu-χ* (Bergsland 1994: 151; Golovko 1994: 243), attested in all branches.

**Proto-Chukotian**. *čəɣăy* (Fortescue 2005: 50), retained in all languages, for Chukchi see Moll, Inenlikei 1957: 145.

**Proto-Itelmen**. A tangled situation. According to the sources of the 18ᵗʰ-19ᵗʰ c. (Krasheninnikov, Dybowski), each of the tree Itelmen languages had the lexical opposition between 'sand (as a substance)' and 'sand (as a landscape unit, Polish pl. *piaski*)'.

Western *sɨmɨ-žɨm-č* 'sand' (Krasheninnikov) and the Russian loan *pʸesok-an* 'sand' (Dybowski & Radliński 1893b: 144) vs. *tosʸx* 'sandy seashore; sand (Pol. piasek, piaski, i.e., probably a landscape unit, not a substance)' (Dybowski & Radliński 1893b: 159)

Eastern *bɨzɨ-lʸk* 'sand (Pol. piasek, Lat. arena, sabulum)' (Dybowski & Radliński 1892: 135), Eastern proper, Uka/Tigil Eastern *bɨžɨ-mt* 'sand' (Krasheninnikov) vs. *tosx* 'sands on the river (Pol. piaski na rzece, Lat. arena in flumine, i.e., sand as a landscape unite)' (Dybowski & Radliński 1892: 208).

Southern *kazo-m* 'sand (Pol. piasek, Lat. arena)' (Dybowski & Radliński 1893a: 110), *kaše-mt* 'sand' (Krasheninnikov) vs. the collocation *tusx-azkik* 'the boat is coming' (Dybowski & Radliński 1893a: 120).

As one can see, the concept 'sand (landscape unit)' is very stable, the root *tosʸx* is attested in all language with this meaning. In modern Western *tosx* acquires the generic meaning glossed as 'sand, river spit' (Volodin 2021: 243; Volodin, Khaloimova 2001: 86, 186).

As for the basic concept 'sand (substance)', it cannot be reconstructed with certainty.

Western *sɨmɨ-žɨm-č* 'sand' can contain the root *łem-* (with Krasheninnikov's *š* for *ł*), whose meaning can be reconstructed as 'island' according to its other reflexes in Western and Southern (Mudrak 2008: 122).

Eastern *bɨzɨ-lʸk* 'sand' is an isolate < virtual *mizɨ-* (Mudrak 2008: 137).

Southern *kazo-m* 'sand' is compared by Mudrak 2008: 110 with the Western derivatives *kiza-kil* ~ *kia-kil* 'river bay, backwater' (Dybowski), modern Western *k'izwi-laχ* 'dry (in general), shallow (of river, i.e., dried river)', reduplicated *k'izwi-zwe-č* '(river) shoal, (river) rolling'. But relationship between Dybowski's *ki(z)a-kil* 'river bay' and Southern *kazo-m* 'sand' is doubtful for semantic reasons, whereas modern *k'izwi-* 'dry' goes back to another root, namely *k'izʸɣi-* 'dry' (Volodin 2021: 120; Volodin, Khaloimova 2001: 211; Fortescue 2005: 151; Mudrak 2008: 113).

**Proto-Nivkh**. *maʁ* (Fortescue 2016: 102; Savelyeva, Taksami 1965: 292; Savelyeva, Taksami 1970: 178), attested in Amur and North Sakhalin. In East and South Sakhalin, superseded with *ɢom-r* (Fortescue 2016: 141; Savelyeva, Taksami 1970: 178), which is probably derived from the verb *ɢom-* 'to dwell near sea shore (e.g. in summer settlements)' (Savelyeva, Taksami 1970: 144) with the deverbative suffix *-r*.

**Proto-Samoyed**. *yɰə* (Janhunen 1977: 36–37), the root for 'earth (soil)', also means 'sand' in Enets and Nganasan; its derivative *yɰə-rɒ* 'sandy / sandy bank' is reflected in all Samoyed languages. Another word for 'sand', *puərɒ* (Helimski 1997: 251), attested only in Mator and Kamass, is more likely an areal isogloss than retention from Proto-Samoyed.

**Proto-Yukaghir**. *noŋgə* (Nikolaeva 2006: 309) has the meaning 'sand' in Kolyma Yukaghir, its Tundra cognate means 'ashes', q.v. Another candiate is the Tundra word for 'sand', going back to *öni-ɲǯə* (Nikolaeva 2006: 331). *Pace* Nikolaeva (ibid.), the Tundra word can hardly be a loan from a Tungusic word for 'sand', since *-ɲǯə* is a deverbal suffix.

71. 'to say'.

**Proto-Yeniseian**. *saga-* (S. Starostin 1995: 269). Preserved in all the languages where it is attested, but the original semantics raises doubts: it is possible that the actual meaning of

Proto-Yeniseian *saga- was closer to 'speak, talk' than to 'say', considering that in Ket-Yugh at least, the highly irregular verb *=ma 'to say' looks more archaic than *saga-; formally, however, it is difficult to project *=ma onto the Proto-Yeniseian level due to its conspicuous absence from old records of Kott material.

**Proto-Athabaskan**. *=niː is retained in all three branches.

**Eyak.** =le, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *=niːʼ.

**Proto-Eskimo**. *pi- (Fortescue et al. 2010: 282), retained in all branches with polysemy: 'to do, act / to say'. Cognate to the Aleut stem.

**Proto-Aleut**. *hi-l- ~ *hi-χta-l- (Bergsland 1994: 167, 168; Golovko 1994: 165, 166, 266), attested in all braches. Cognate to the Eskimo stem.

**Proto-Chukotian**. *iv- (Fortescue 2005: 105), retained in all languages. Distinct from *təv- 'to tell' (Fortescue 2005: 304).

**Proto-Itelmen**. *la- (Volodin 2021: 143; Fortescue 2005: 387) is a relatively reliable candidate, since it is attested as 'to say' in Eastern and Western.

Eastern la-snakoz 'to say (Pol. powiedzieć; Lat. dicere)', k=la-snekč 'to talk, speak, tell (Pol. mówić, powiadać, opowiadać; Lat. loqui, dicere, narrare)' (Dybowski & Radliński 1892: 177, 187)

In Western of the 19ᵗʰ c., la- means 'to say' and 'to speak, talk': la-kaz 'to speak (Pol. mówić; Lat. dicere)', ti=la-kičan 'he has said (Pol. powiedział; lat. dixit)' (Dybowski & Radliński 1893b: 129, 160), 'I will say' (Tyushov apud Volodin 2021: 143). In modern Sedanka Western, la- is the basic verb for 'to say' (Ono 2003: 81). In modern Napana Western, the main meaning of la- is 'to talk (about), tell (about)' (Volodin 2021: 143).

In modern Napana Western, 'to say' is expressed with the help of the verb χene- without further cognates (Volodin 2021: 286; Volodin 1976: 33, 149, 245; Fortescue 2005: 262). Distinct from the phonetically similar verb *lʲo- 'to speak, talk' (Volodin 2021: 165; Fortescue 2005: 304; Mudrak 2008: 127): Western ło- 'to speak, talk', Eastern lʲe-lu-z-ed 'spoken [words] (Pol. powiedziane [słowa], Lat. dictum, dicta [verba])' (Dybowski & Radliński 1892: 187).

Distinct from *nu- 'to speak, talk' (Mudrak 2008: 127): Eastern nu-, Southern nu- ~ du-, e.g., in the phrase "people say" (Pol. ludzie mówią; Lat. homines dicunt, dicitur) (Dybowski & Radliński 1893a: 116). Mudrak unites the reflexes of *lʲo- and *nu- under the single Proto-Itelmen root *lʲo-, but such a solution seems dubious (two verbs yield different reflexes in Eastern).

**Proto-Nivkh**. *it- (Fortescue 2016: 80; Savelyeva, Taksami 1965: 387; Savelyeva, Taksami 1970: 99). Distinct from *pur- 'to tell' (Fortescue 2016: 138; Savelyeva, Taksami 1970: 406).

**Proto-Samoyed**. *mʋ- ~ *mʋn- (Janhunen 1977: 88), retained in Nenets, Enets, Nganasan and Kamass, goes back to Proto-Uralic *moni- 'to say' (reflected in Mari and Hungarian).

**Proto-Yukaghir**. *mon- (Nikolaeva 2006: 274), retained in both modern Yukaghir languages, is cognate to, or borrowed from, Proto-Samoyed *mʋn- 'to say'.

72. 'to see'.

**Proto-Yeniseian**. *t=...=ɔŋ (S. Starostin 1995: 290). Preserved in Ket-Yugh and Kott, but apparently lost in Arin and Pumpokol. Ket-Yugh and Kott agree on the basic structure of the verb, consisting of the directional prefix *t= and the root *=ɔŋ, separated by grammatical morphemes such as the tense and conjugation markers.

**Proto-Athabaskan**. *=ʔeːn is retained in all three branches and supported by the Eyak cognate.

**Eyak.** =ʔe ~ =ʔã, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *=ʔeːn (Athabaskan, Eyak).

**Proto-Eskimo**. An unstable item which cannot be reconstructed with certainty.

**Proto-Aleut**. *uku-l- ~ *uku-χta-l- (Bergsland 1994: 429, 430; Golovko 1994: 133, 190), attested in all branches, polysemy: 'to see / to look'.

**Proto-Chukotian**. *ˡəʁu-* (Fortescue 2005: 167), retained in all languages. Can be cognate to the Itelmen term.

**Proto-Itelmen**. *ˀətčku-* (Volodin 2021: 307; Volodin, Khaloimova 2001: 140; Fortescue 2005: 376; Mudrak 2008: 82). Western, Eastern, Southern, polysemy 'to see / to look'. Can be cognate to the Chukotian term.

**Proto-Nivkh**. *nətə* (Fortescue 2016: 112; Savelyeva, Taksami 1965: 84; Savelyeva, Taksami 1970: 94). Distinct from *ama-* 'to look, watch' (Fortescue 2016: 12; Savelyeva, Taksami 1965: 395; Savelyeva, Taksami 1970: 498).

**Proto-Samoyed**. *mənc̮V́-* (Janhunen 1977: 86–87) is retained in Nenets, Enets, Kamass and Selkup. A less likely candidate is *ko-nc̮ţor-* (Janhunen 1977: 72-73), attested in Selkup and Mator.

**Proto-Yukaghir**. *yö·-* (Nikolaeva 2006: 191) is retained in both modern Yukaghir languages, although the Tundra reflex of this root is not the main word for 'to see' in that language. The main Tundra word for 'to see', *ičuo-* (Nikolaeva 2006: 460), is borrowed from Tungusic *iče-* 'to see'.

## 73. 'seed'.

**Proto-Yeniseian**. Not reconstructible due to lack of data.

**Proto-Athabaskan**. Not reconstructible reliably.

**Eyak.** Not documented.

**Proto-Athabaskan-Eyak**. Not reconstructible.

**Proto-Eskimo**. Not reconstructible.

**Proto-Aleut**. Not reconstructible.

**Proto-Chukotian**. Not reconstructible.

**Proto-Itelmen**. Not reconstructible.

**Proto-Nivkh**. Not reconstructible.

**Proto-Samoyed**. Not reconstructible reliably. Nenets and Enets use reflexes of *səymä* 'eye' (Janhunen 1977: 132); in most other languages the word for 'seed' is not attested.

**Proto-Yukaghir**. Not reconstructible.

## 74. 'to sit'.

**Proto-Yeniseian**. *xu-* (S. Starostin 1995: 297). Preserved in Kott-Arin and still seen in the Ket-Yugh infinitive form *u-ŋ* 'to sit'; replaced in Ket-Yugh with *ses-* otherwise.

**Proto-Athabaskan**. *=ta·* is retained in all three branches.

**Eyak.** =ta, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *=ta·* (Athabaskan, Eyak). Krauss & Leer (1981: 82) suggest to reconstruct it as *=ta·w*.

**Proto-Eskimo**. *aqu-mə-ɣa-* ~ *aqu-vət-* (Fortescue et al. 2010: 44), retained in Yupik (*aqu-mə-ɣa-*) and Inuit (*aqu-vət-*).

**Proto-Aleut**. *uŋu-či-l-* (Bergsland 1994: 448; Golovko 1994: 266), attested in all branches.

**Proto-Chukotian**. There are two candidates. First, *vakəʁo-* and the resultative *vakəʁo-tva-* (Fortescue 2005: 312), which mean 'to sit down' and 'to sit' respectively in Chukchi and Kerek; in Alutor, the deverbative 'seat' is attested. The stem *vakəʁo-* is morphologically unclear. Second, *təva-ɣal-* (Fortescue 2005: 304), meaning 'to sit down' in Koryak and Alutor, from which 'to sit' is derived in Koryak (resultative *va-ɣalə-tva-*), whereas in Alutor *tva-lʸʔat-* 'to sit; to be located' the habitual suffix is used. The verb *təva-* itself means 'to be (somewhere), live, exist' everywhere in Chukotian (Fortescue 2005: 304). The problem is that *təva-* and its derivative *təva-ɣal-* 'to sit down' are likely to be cognate to Itelmen *ła-* 'to sit', *ła-wul-* 'to sit down' (q.v.). Various scenarios of semantic development can be proposed. We prefer to posit both *vakəʁo-tva-* and *təva-* as technical synonyms for 'to sit'.

**Proto-Itelmen**. *ɬa-* (Volodin 2021: 155; Volodin, Khaloimova 2001: 205; Fortescue 2005: 304). Western, Eastern (Dybowski & Radliński 1892: 186). The same root in *ɬa-ɣul-* 'to sit down' (Volodin, Khaloimova 2001: 202; Fortescue 2005: 304).

**Proto-Nivkh**. *tiv-* (Fortescue 2016: 148; Savelyeva, Taksami 1965: 386; Savelyeva, Taksami 1970: 98).

**Proto-Samoyed**. *ʋmtə-* (Janhunen 1977: 17–18) is retained in all Samoyed languages.

**Proto-Yukaghir**. Kolyma *mondə-* (Nikolaeva 2006: 276) vs. Tundra *saganə- ~ *saŋgənə-* (Nikolaeva 2006: 393).

75. 'skin (human)'.

**Proto-Yeniseian**. Not reconstructible due to lack of data. The Ket-Yugh word (Ket *îꞏ*, Yugh *iɔl ~ iyɔl ~ igɔl*) is comparable with Kott *eꞏk* 'hair', meaning that the original meaning of the etymon was probably closer to 'body hair; animal hair, fur' than to 'skin'.

**Proto-Athabaskan**. *=səcʼ* is widely attested as 'human skin' in PCA and Northern. The original shape of the root should be *=səcʼ* (as retained in PCA) with the assimilation > *=səs* and the retention of creaky voice in (Proto)-Northern. In some individual lects, the root underwent further occasional corruptions (e.g., dissimilation in Tanaina *=yəs*, metathesis in Mattole *=cʰeʔs*).

**Eyak.** *=tʰah*.

**Proto-Athabaskan-Eyak**. *=səcʼ* (Athabaskan), *=tʰa(ꞏ)n* (Eyak). We follow Leer 2008a and reconstruct a medial nasal on account of vowel nasalization and aspiration in Eyak.

**Proto-Eskimo**. *uvinə-ɣ* (Fortescue et al. 2010: 419), meaning '(human) skin' in Inuit and '(human) skin' or '(human) body' in Yupik. Distinct from *ami-ʁ* (Fortescue et al. 2010: 25), which means 'hide, animal skin' in both Yupik and Inuit.

**Proto-Aleut**. *qačχi-χ* (Bergsland 1994: 292; Golovko 1994: 78, 218), attested in all branches.

**Proto-Chukotian**. *kəlɣə* (Fortescue 2005: 145), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *kilɣʷi-* (Volodin 2021: 94; Volodin, Khaloimova 2001: 162; Fortescue 2005: 145). Western of the 19th c. *kulx* 'skin (Pol. skóra; Lat. cutis, corium, pellis)' (Dybowski & Radliński 1893b: 128), modern Western *kilwi-ɬχ* 'skin; body', Southern *kig* 'body' (Dybowski & Radliński 1893a: 111), Uka Eastern *kɨlx-lɨx* 'skin' (Klaproth), possibly also Eastern *gɨlx* 'skin of head' with *g* for *k* (Dybowski & Radliński 1892: 152). Cognate to the Chukotian term. Polysemy 'skin (of human) / body' can be projected on the Proto-Itelmen level.

**Proto-Nivkh**. *hal* (Fortescue 2016: 70; Savelyeva, Taksami 1965: 182; Savelyeva, Taksami 1970: 422; Hattori 1962a: 116; 1962b: 80), polysemy 'skin (of human) / body'. A basic term for 'human skin' at least in Amur and South Sakhalin. Distinct from *ŋaɣ-r* 'skin (of animal)' (Fortescue 2016: 118; Savelyeva, Taksami 1965: 182; Savelyeva, Taksami 1970: 233).

**Proto-Samoyed**. *kopʋ* (Janhunen 1977: 73), retained in all Samoyed languages, goes back to Proto-Uralic *kopa* 'skin'.

**Proto-Yukaghir**. Kolyma *kaꞏr ~ *kayr* (Nikolaeva 2006: 379) vs. Tundra *cạwa* (Nikolaeva 2006: 399). Both words go back to Proto-Yukaghir: the Tundra reflex of *kayr* is retained in a compound *ɲaꞏča=ʁayr* 'skin from the head of an animal', while the Kolyma reflex of *cạwa* is attested in derivatives with the negative prefix, such as *a-ruo-ńe-* 'to be naked; to be bald'. However, the original semantic distinction between the two words is not clear. In both modern Yukaghir languages, the word for 'skin' is used also for 'bark' ("skin of tree") and 'cloud' ("skin of sky").

76. 'to sleep'.

**Proto-Yeniseian**. *=qɔt*, see notes on 'to lie'; in Proto-Yeniseian, the meanings 'lie' and 'sleep' were most likely expressed by the same root.

**Proto-Athabaskan**. An unstable item. *=*laːɬ* can be reconstructed as 'to sleep' for Proto-PCA (sparsely attested as 'dream' in Northern). *=*tʰeː* / *=*tʰeː-n* can be reconstructed as 'to lie; to sleep' for Proto-Northern (a Proto-Athabaskan verb for 'to lie'). *=*ʁʷɡ̣ːš* ~ *=*ʁuš* can be reconstructed as 'to sleep' for Proto-Apachean, but its Proto-Athabaskan meaning was rather 'to snore' as proven by PCA and Northern data. Out of these, *=*laːɬ* seems the most appropriate candidate for the status of PA 'to sleep', but we prefer to leave the PA slot empty.

**Eyak.** =*cʰuʔt.*

**Proto-Athabaskan-Eyak**. *=*cʰVt* (Eyak). Leer (2010: 179) compares Eyak =*cʰuʔt* with Tlingit =*kʰiːt* 'to snore', if so the PAET form should be *=*kʸʰVt.*

**Proto-Eskimo**. *qava-ʁ-* (Fortescue et al. 2010: 317) means 'to sleep' in Yupik. In Inuit it is either retained with the semantics of sleeping as shaman's words or narrowed into the meaning 'sleep on back in water (of seal)'. The Proto-Inuit term is *činə-ɣ-* 'to sleep' (Fortescue et al. 2010: 87) without reliable Yupik cognates.

**Proto-Aleut**. *saʁa-l-* (Bergsland 1994: 345; Golovko 1994: 271), attested in all branches.

**Proto-Chukotian**. *yəlq-ät-* (Fortescue 2005: 120), retained in all languages except for Kerek. If the common verbalizer *-ät-* is to be singled out, the root *yəlq-* is expected to be nominal or adjectival.

**Proto-Itelmen**. *ŋʷikɬə-* ~ *ŋʷiksi-* (Volodin 2021: 190; Volodin, Khaloimova 2001: 208; Fortescue 2005: 390; Mudrak 2008: 147). Western, Eastern, Southern.

**Proto-Nivkh**. *qo-* (Fortescue 2016: 141; Savelyeva, Taksami 1965: 403; Savelyeva, Taksami 1970: 150).

**Proto-Samoyed**. *kont-ö-* (Janhunen 1977: 73) is retained in all daughter languages. Eventually borrowed from Proto-Yukaghir *kont-oː-* 'to lie'. The direction of borrowing is clear from the fact that the back vowel in Proto-Yukaghir *kont-oː-,* derived from the root *köntə-,* results from a regular Yukaghir umlaut before *oː.*

**Proto-Yukaghir**. *yoŋʒə-* (Nikolaeva 2006: 194–195) is retained in both modern Yukaghir languages, although the Tundra reflex of this root is not the main word for 'to sleep' in that language. The root of the main Tundra word for 'to sleep', *aː-we-* (Nikolaeva 2006: 115), is possibly borrowed from North Tungusic *aː-* 'to sleep'.


77. 'small'.

**Proto-Yeniseian**. *pəŋ-* (S. Starostin 1995: 248). Preserved only in Ket-Yugh. Kott, Arin, and Pumpokol parallels are complex forms of either clearly secondary or etymologically obscure origins.

**Proto-Athabaskan**. An unstable item, not reconstructible reliably. *=*čʰəƛ'-ə* is a possible candidate for Proto-Northern 'small', but we prefer to leave the slot empty.

**Eyak.** *kʰuč'-k.*

**Proto-Athabaskan-Eyak**. *kʰVč'* (Eyak).

**Proto-Eskimo**. *mikə-* (Fortescue et al. 2010: 219), retained in all branches.

**Proto-Aleut**. *čuqu-ða-l-* (Bergsland 1994: 156; Golovko 1994: 151, 224), attested as generic '(to be) small' in Atkan and Attuan, but shifted into the specific meaning 'to be extremely small' in Eastern, having been superseded with the new formation *aŋuna-laka-n* ~ *aŋunaː-ð(a)-laka-n*, lit. 'not big' (Bergsland 1994: 91; Bergsland & Dirks 1978: 90).

**Proto-Chukotian**. *əppəlu* (Fortescue 2005: 347), retained in all languages except for Alutor (Alutor 'small' < *məq-*, Fortescue 2005: 184). Morphologically unclear, if a compound, the second part can be cognate to the Alutor term. Distinct from the specific term *məl-* 'small (мелкий), minute, fine' (Fortescue 2005: 181).

**Proto-Itelmen**. *čiŋu* (Fortescue 2005: 376; Mudrak 2008: 42). Attested in the sources of the 18th-19th c., but for all three languages: Western *wičenanʸ* 'small' (Pallas), Eastern *učyinolo* 'small' (Pallas), *učinelu, wičinilu* 'small' (Dybowski & Radliński 1892: 213, 216), Southern *čuŋuyuŋ* ~ *čuŋyuŋ* 'small' (Krasheninnikov, Pallas), <u>*činul*</u> 'small' (Dybowski &

Radliński 1893a: 106). Initial *u-/wi-* in the Western and Eastern forms is not entirely clear. Apparently unrelated to the phonetically similar Itelmen forms with the meaning 'good, accurate' (despite Mudrak 2008: 42). In modern Western, superseded with *ulʰu-* 'small' (Volodin 2021: 263) without cognates.

**Proto-Nivkh**. *\*mat-ik-* (Fortescue 2016: 100; Savelyeva, Taksami 1965: 204; Savelyeva, Taksami 1970: 177). The plain root *\*mat-* 'small' is retained in derivatives.

**Proto-Samoyed**. *\*ücä* (Janhunen 1977: 31) is retained in Nenets and Selkup.

**Proto-Yukaghir**. *\*ʎuk-* (Nikolaeva 2006: 252–253) is retained in Kolyma, Chuvan and Tundra.


78. 'smoke'.

**Proto-Yeniseian**. *\*duʔ* (S. Starostin 1995: 224). Preserved in all daughter languages. Evidence for a final back consonant is weak and inconclusive.

**Proto-Athabaskan**. *\*ɬət* is retained in all three branches.

**Eyak.** *ɬãht*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*ɬVnt* (Athabaskan, Eyak), we follow Leer 2008a and reconstruct a medial nasal on account of vowel nasalization and aspiration in Eyak.

**Proto-Eskimo**. *\*puyu-ʁ* (Fortescue et al. 2010: 296), retained in all branches.

**Proto-Aleut**. *\*мaχ* (Bergsland 1994: 460; Golovko 1994: 170, 205), attested in all branches as the neutral term for 'smoke'. Distinct from *\*huyu-χ* 'white smoke; steam, vapor' (Bergsland 1994: 457; Golovko 1994: 168), which is cognate to Eskimo *\*puyu-ʁ* 'smoke'.

**Proto-Chukotian**. The lexical opposition 'visible smoke' / 'invisible smoke, smoke in house, fumes' is characteristic of the Chukotian-Itelmen area. The situation is rather tangled with three candidates competing with each other. One of the possible scenarios is to reconstruct the reduplicated stem *\*ipi-ʔipi* (Fortescue 2005: 103) with the meaning 'visible smoke', this is the Alutor term for 'visible smoke' (glossed simply 'smoke' in Kibrik et al. 2004: 398) and one of the two Koryak words for 'smoke' — *ipi-ip* apparently with the specific meaning 'visible smoke' (glossed as 'smoke; vapor' in Zhukova 1990: 35). The second stem is reduplicated *\*ŋəl-ŋəl* (Fortescue 2005: 201) 'invisible smoke', which is attested as the only term for 'smoke' in Chukchi (Moll, Inenlikei 1957: 93) and apparently Kerek (the exact Kerek semantics is unknown); Koryak *ŋəl-ŋəl* is glossed as 'smoke (in house)' in Zhukova 1967: 116 and simply as 'smoke' in Zhukova 1990: 67. The third term is *\*təqi-* (Fortescue 2005: 300), attested only is Alutor apparently with the meaning 'invisible smoke' (Kibrik et al. 2004: 557).

**Proto-Itelmen**. *\*t'i-* (Volodin 2021: 258; Volodin, Khaloimova 2001: 92, 151; Fortescue 2005: 301), attested in Western as *t'i-ti'-m* 'visible smoke; vapor', *t'e-kas, t'i-z-in* 'to smoke (intr.)', causative *ən=t'i-* 'to smoke (e.g. fish)'. For Eastern, only the cognate verbs *dɨ=di-z-em-inʸ* 'to evaporate (intr.)', *in=te-z-in* 'to smoke with incense' are documented (Dybowski). Can be cognate to Chukotian *\*təqi-* 'a k. of smoke'.
Distinct from *\*ŋačəz* 'invisible smoke', Western, Eastern, Southern (Volodin 2021: 189; Volodin, Khaloimova 2001: 151; Fortescue 2005: 201; Mudrak 2008: 145), which may ultimately be cognate to Chukotian *\*ŋəl-* 'invisible smoke'.

**Proto-Nivkh**. There are two candidates for 'smoke' intertwined between the lects. First, *\*taw-laŋ* (Fortescue 2016: 147), derived from the verb *\*taw-* 'to smoke' (Savelyeva, Taksami 1970: 380). Second, *\*tuv* (Fortescue 2016: 152–153; Savelyeva, Taksami 1965: 136; Savelyeva, Taksami 1970: 387), derived from *\*tuv-* 'to burn (tr.)' q.v. We treat them as synonyms.

**Proto-Samoyed**. *\*küntə* (Janhunen 1977: 79), the main word for 'smoke' in Enets, Nganasan and Mator, goes back to Proto-Uralic *\*künti*, whose Finno-Ugric reflexes mean 'fog'. Cf. *\*kəčku* (Janhunen 1977: 40) with reflexes meaning 'fog' (Enets, Nganasan) and 'smoke' (Selkup).

**Proto-Yukaghir**. Kolyma *\*ʎuː-l* (Nikolaeva 2006: 251) vs. Tundra *\*kögri-ɲǯə ~ *kögdi-ɲǯə* (Nikolaeva 2006: 216).

79. 'to stand'.

**Proto-Yeniseian**. *=dɨŋ ~ *=dɨk (S. Starostin 1995: 221). Preserved everywhere except for Ket-Yugh; the basic equivalent for 'stand' in Ket-Yugh (*ʔipɨn) finds no parallels in Kott, Arin, and Pumpokol, and so, technically, counts as a replacement, although from an unknown source.

**Proto-Athabaskan**. *=heːn is retained in all three branches.

**Eyak**. =ã:ʔ, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *=hVːn (Athabaskan, Eyak).

**Proto-Eskimo**. An unstable item, the best candidate is *naŋə-ʁ- (Fortescue et al. 2010: 235) which is fragmentarily retained in both branches meaning 'to stand / to stand up' in Yupik and stative 'to stand' in Inuit. The obvious candidate for the Proto-Eskimo meaning 'to stand up' is *nʸəkəvə- (Fortescue et al. 2010: 246) which retains the change-of-state semantics in the majority of the Yupik and Inuit lects. The derivative Yupik-Inuit stem *nʸəkəv-ʁ-a- (Fortescue et al. 2010: 246) means generally 'to stand' in some Yupik lects and specifically 'to stand upright, be upright' in Inuit (apparently innovations according to the productive morphological model).

**Proto-Aleut**. There are two verbs with the meaning 'to stand, be in upright position (of human)', both are widely attested and coexist within dialects. The first one is *anqa-χta-l- (Bergsland 1994: 78; Golovko 1994: 31, 272) from *anqa-l- 'to stand up'. The second one is *haχ-ta-l- (Bergsland 1994: 33; Golovko 1994: 162) from the bound root *haʁ- 'to rise from lying position *vel sim.*'. The semantic and pragmatic difference is unclear.

**Proto-Chukotian**. *təvella- (Fortescue 2005: 315), morphologically unclear, retained in all languages, usually means 'to stand up', although the durative meaning 'to stand' is also attested (Koryak, Alutor); also the derived stem with the resultative suffix *-tva- means 'to stand'.
Distinct from *ləqut- 'to stand up' (Fortescue 2005: 242) attested with this meaning in all languages.

**Proto-Itelmen**. *izʸi- (Fortescue 2005: 393; Mudrak 2008: 80), attested in Eastern and Southern (Krasheninnikov, Dybowski), meaning 'to stand'. In Western (already in Krasheninnikov's records), superseded with *tχ-zo- 'to stand' (Volodin 2021: 249; Volodin, Khaloimova 2001: 210; Volodin 1976: 210, 258; Ono 2003: 30; Fortescue 2005: 242; Mudrak 2008: 201) without Itelmen cognates; final *-zo- is a continuative suffix (Fortescue 2005: 422).
Distinct from *te- 'to stand up' (Fortescue 2005: 242; Volodin 2021: 234, 254), attested in Western and Southern, frequently in the compound *te-key- 'to get up from bed' (with *key* '?').

**Proto-Nivkh**. *gəpr- (Fortescue 2016: 64; Savelyeva, Taksami 1965: 411; Savelyeva, Taksami 1970: 127). Morphologically unclear.

**Proto-Samoyed**. *nu- ~ *nɨ- (Janhunen 1977: 104) is retained in Nenets, Enets, Kamass and Selkup.

**Proto-Yukaghir**. *oŋg-oː- (Nikolaeva 2006: 331–332), retained in both modern Yukaghir languages, is derived from the root *öŋgə-.

80. 'star'.

**Proto-Yeniseian**. *qɔːqa (S. Starostin 1995: 265). Preserved in all daughter languages. In Kott and Arin, the word shows fusion with the same obscure prefix as in the word for 'dog' q.v. (*al=qɔːqa ~ *il=qɔːqa).

**Proto-Athabaskan**. *səŋʔ ~ *cʰəŋʔ is retained in all three branches, although phonetic reflexes are very complex (Krauss & Leer 1981: 65-68). It is unclear whether we should introduce a PA phoneme *m for this case (*semʔ) or simply attribute the observed variety of reflexes to the marginal phoneme *$ŋ_2$ postulated by Krauss and Leer (1981: 14-15) for cases when nasalization is accompanied with occasional and irregular labialization. The solution with *$ŋ_2$ (which we interpret as proper ŋ) seems more parsimonious.

**Eyak.** *laʔχc'-ɬ*, looks like a deverbative formation.

**Proto-Athabaskan-Eyak**. *\*sVŋ ~ \*cʰVŋ* (Athabaskan).

**Proto-Eskimo**. Despites its scanty attestations, the best candidate is *\*aɣ-yaʁ* (Fortescue et al. 2010: 10), meaning 'star' in some Yupik lects, final *\*-yaʁ* is the non-productive suffix 'place or thing where action takes place'. In other Yupik lects, it was superseded with a new formation derived from *\*iʁa-liʁ-* 'moon shining (*vel sim.*)' (Fortescue et al. 2010: 157). In Inuit, it was superseded with the new formation from *\*umɬuʁ* 'day' (Fortescue et al. 2010: 404).

**Proto-Aleut**. *\*sða-χ* (Bergsland 1994: 355; Golovko 1994: 105, 212), attested in Eastern and Atkan. In Attuan superseded with the deverbative from *\*siðʁi-sax-* 'to shine' (Bergsland 1994: 357).

**Proto-Chukotian**. *\*äŋär* (Fortescue 2005: 35), retained in all languages except for Kerek. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*eŋezi-* (Volodin 2021: 338; Volodin, Khaloimova 2001: 156; Fortescue 2005: 36; Mudrak 2008: 49). Western *eŋeze-*, note the consonant metathesis *\*ezeŋi-* in two other languages: Eastern *ežeŋi-, ezeni*, Southern *ašaŋi-, azani-*. Cognate to the Chukotian term.

**Proto-Nivkh**. *\*uɲiɣr* (Fortescue 2016: 156; Savelyeva, Taksami 1965: 161; Savelyeva, Taksami 1970: 394). A rare suffix *\*-ɣr* (for which see Fortescue 2016: 175; Panfilov 1962: 62; Savelyeva, Taksami 1970: 523) can be singled out: *\*uɲi-ɣr*.

**Proto-Samoyed**. *\*kinsV-knʲə* (Helimski 1997: 278), retained in Mator, Kamass and Selkup, goes back to Proto-Uralic *\*kuɲcʲV* 'star'.

**Proto-Yukaghir**. Not reconstructible: words for 'star' in Yukaghir languages are derivatives or compounds with the root 'hole' (in fact, different roots for 'hole' in the two modern Yukaghir languages), reflecting the regional folklore motif "star as holes in the sky".

81. 'stone'.

**Proto-Yeniseian**. *\*ciʔ-s* (S. Starostin 1995: 217). Preserved in all daughter languages. The original paradigm is reconstructible as sg. *\*ciʔs*, pl. *\*ciʔŋ*; this means that *\*-s* is most likely a fossilized singulative suffix (cf. a similar case with the word for 'eye' q.v.).

**Proto-Athabaskan**. *\*cʰeː* is retained in all three branches.

**Eyak.** *cʰaː*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*cʰVː* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*uyaʁa-ɣ* (Fortescue et al. 2010: 420), retained in Yupik and Inuit.

**Proto-Aleut**. There are two almost equal candidates with generic semantics 'stone': *\*quɣa-na-χ* (Bergsland 1994: 332; Golovko 1994: 83, 216), attested in all branches; *\*nuχ* (Bergsland 1994: 284), attested in Eastern and Attuan. Difference is unclear, we treat them as synonyms.

**Proto-Chukotian**. *\*ɣvə* (Fortescue 2005: 93), reduplicated stem, retained in all languages. In independent use, the root is partially reduplicated: *\*və-ɣvə* (Alutor *ɣəv-ɣəv* is probably a secondary formation).

**Proto-Itelmen**. *\*wa-* (Volodin 2021: 50; Volodin, Khaloimova 2001: 19, 160; Volodin 1976: 28, 129; Fortescue 2005: 93; Mudrak 2008: 216). Napana Western sg. *wa-č*, pl. *wa-ʔn* 'stone' (Krasheninnikov, Dybowski, and basic modern sources), note the Napana doublets *wa-ʔan ~ kwa-ʔan* 'stony' (Volodin, Khaloimova 2001: 19, 28). Here Napana *wa-ɣ-al* 'stony (place) with the collective pl. suffix *-al* and epenthetic(?) *-ɣ-* (Volodin 1976: 72). In Sedanka Western, it is retained as *wa-* in the compound 'big stone'. Southern *uwa-ču, ua-d, ua-n* 'stone' (Krasheninnikov, Dybowski). In Eastern it is retained in Krasheninnikov's records as *oa-ču* 'iron' and as *wa-ču ~ ɣa-ču* in the compounds 'gold, lit. red *ɣaču*, red iron', 'silver, lit. bright *waču*, bright iron' (*-ču* is the singular exponent) + the specific compound for 'smith', see Mudrak 2008: 216 for the Eastern forms. Some Eastern derivatives can also be related here: Eastern *wal-a-* 'knife', *walʲ-an* 'cooper', *walʲ-wan*

'iron, steel, cooper' (Dybowski & Radliński 1892: 214-215), although the element -*l*- ~ -*lʸ*- is not entirely clear, cf. comments on Eastern *kwal* 'stone' below.

Differently in Sedanka Western: *kox* 'stone' (Ono 2003: 98; also Moll), *kov*- 'stone' (Stebnitsky 1934: 91) < virtual *\*kəɣʷ*- (thus Mudrak 2008: 91).

Differently in Eastern proper and Uka Eastern: *kwal* 'stone' (Krasheninnikov; Dybowski & Radliński 1892: 185). Mudrak (2008: 91) analyzes it as *kwa-l* with the collective pl. suffix, but at least in Western Itelmen the collective pl. suffix -*al* behaves differently: *wa-ɣ-al*, see above.

Mudrak (2008: 91, 216) attempts to unite common Itelmen *\*wa*-, Sedanka Western *\*kəɣʷ*- and Eastern *kwal* under the same proto-root with some non-standard morphological scenarios, but since *\*kəɣʷ*- and *kwal* are restricted to individual lects, they look like routine lexical replacements in Sedanka Western and Eastern respectively. The Western (Napana?) by-form *kwa-ʔan* 'stony' remains enigmatic, however.

**Proto-Nivkh**. *\*baʁ* (Fortescue 2016: 21; Savelyeva, Taksami 1965: 175; Savelyeva, Taksami 1970: 255).

**Proto-Samoyed**. There are two candidates. First, *\*pʌɣ* (Janhunen 1977: 112), is retained in Nenets, Enets, Kamass and Selkup. Second, *\*pələ* (Janhunen 1977: 112), is attested in Nganasan and Mator. Janhunen (ibid.) considers these to be variants of a single root, but see Aikio 2014: 73 on the necessity to distinguish two roots here.

**Proto-Yukaghir**. Kolyma *\*cög-l* 'small stone' (Nikolaeva 2006: 410), whose Chuvan cognate means 'sand', vs. Tundra *\*kɨɣ-l* 'stone' (Nikolaeva 2006: 390). Cf. also Kolyma and Omok *\*peː* 'mountain / big stone' (Nikolaeva 2006: 344–345), possibly connected with the Proto-Samoyed word for 'stone'.

82. 'sun'.

**Proto-Yeniseian**. *\*xiɢ-a* (S. Starostin 1995: 296). Preserved in all daughter languages. Proto-Yeniseian *\*xiɢ-a* 'sun' formally looks like an old suffixal derivative from *\*xiʔɢ* 'day' (S. Starostin 1995: 296) > Ket *iʔ*, etc.

**Proto-Athabaskan**. *\*šaː* 'sun / moon' is retained in all three branches. The PA sibilant points to either PAE *\*š* or *\*xʷ*.

**Eyak**. *qətə=kəɫ*, a descriptive formation 'place of shriveling' *vel sim*.

**Proto-Athabaskan-Eyak**. *\*šʷaː* ~ *\*xʷaː* (Athabaskan).

**Proto-Eskimo**. There are two candidates which are attested in both Yupik and Inuit in the criss-crossed configuration: *\*maca-ʁ* (Fortescue et al. 2010: 201) and *\*ciqi-nəʁ* (Fortescue et al. 2010: 91). We treat them as synonyms.

**Proto-Aleut**. *\*aʁa-ðaχ* (Bergsland 1994: 36; Golovko 1994: 270), attested in all branches. Derived from *\*aʁa-l*- 'to become open; to open, clear up (of sky); to become visible'.

**Proto-Chukotian**. *\*tiðkə-tið* (Fortescue 2005: 285), reduplicated stem, retained in all languages except for Kerek.

**Proto-Itelmen**. *\*kulač* (Volodin 2021: 144; Volodin, Khaloimova 2001: 208; Fortescue 2005: 393; Mudrak 2008: 116). Apparently with polysemy 'sun / moon' (see notes on 'moon').

**Proto-Nivkh**. *\*keŋ* (Fortescue 2016: 84; Savelyeva, Taksami 1965: 399; Savelyeva, Taksami 1970: 130).

**Proto-Samoyed**. *\*kʌyʌ* (Janhunen 1977: 58), retained as the word for 'sun' in all daughter languages save Selkup, where its meaning shifted to 'heat'. Related to Proto-Uralic verb *\*kaya*- 'appear, become visible'.

**Proto-Yukaghir**. Kolyma and Chuvan *\*pug-uw* (Nikolaeva 2006: 366) vs. Tundra *\*yerpə-yə* (Nikolaeva 2006: 189). Modern Kolyma word for 'sun' *yeʎ-uo-ɟe* is an active participle of an unattested passive verb *\*eːʎ-oː*- from the root *\*eːʎə*- 'to boil' (Nikolaeva 2006: 187). This word replaced earlier *\*pug-uw* (from the same root as 'warm', q.v.). Old Kolyma *pugu* 'sun' is attested in several wordlists; Jochelson notes that it is "an ancient word" (Jochelson 1926: 141) as opposed to modern *yeʎ-uo-ɟe*. The meaning 'sun' is also retained in such

modern Kolyma compounds as *puge-d=anɖə* 'tsar [lit. sun chief]' and *pugu-d=onora:* 'rainbow [lit. sun tongue]'.

83. 'to swim'.

**Proto-Yeniseian**. *\*suːy* (S. Starostin 1995: 279). Preserved in all daughter languages where it is attested, but not found in Arin or Pumpokol. In Kott, the verb only exists in conjunction with *ul* 'water'; this may be a hint at some earlier meaning, but it might just as well be a Kott innovation, carried out in order to reduce homonymy with multiple other words that have the same phonetic shape (*šuy* 'moon', *šuy* 'midge', etc.).

**Proto-Athabaskan**. The best candidate is *\*=weː* retained in Pacific Coast and Northern.

**Eyak.** *=we*, cognate to Athabaskan.

**Proto-Athabaskan-Eyak**. *\*=weː* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*puɣə-mə-* (Fortescue et al. 2010: 291), retained in all branches.

**Proto-Aleut**. *\*ɣučix-s ~ \*učix-s* (Bergsland 1994: 165; Golovko 1994: 245), attested in Eastern and Atkan, fluctuation of *ɣ-* is unlear. Cf. Attuan *taʁuχ-s-* 'to swim' (Bergsland 1994: 384).

**Proto-Chukotian**. *\*alʁeq-at-* (Fortescue 2005: 20), retained in all languages.

**Proto-Itelmen**. *\*ʍi-* (Volodin 2021: 268; Volodin, Khaloimova 2001: 96, 186; Volodin 1976: 341; Fortescue 2005: 328; Mudrak 2008: 219). Western, Southern. The specific meaning is 'to swim downstream', but this verb also functions as a generic term for 'to swim'.

**Proto-Nivkh**. There are two candidates, both are attested with the meaning 'to swim (of human) / to bath' in Amur and East Sakhalin. First, *\*mrə-* (Fortescue 2016: 108; Savelyeva, Taksami 1965: 296; Savelyeva, Taksami 1970: 194). Second, *\*təmə-* (Fortescue 2016: 149; Savelyeva, Taksami 1970: 325; Taksami 1996: 72, 160); cf. the cognate transitive stem *\*i=təmə-* 'to cross (river, mountain, etc.). We are forced to treat them as synonyms.

**Proto-Samoyed**. *\*u-* (Janhunen 1977: 29), retained in Nenets, Mator and Selkup, goes back to Proto-Uralic *\*uyi-* 'to swim'.

**Proto-Yukaghir**. Not reconstructible due to insufficient attestation.

**Proto-Burushaski**. Yasin *minyˈa-* 'to swim' is the primary verbal stem which should represent the Proto-Bur. term. The Hunza compound expression *tam del-* 'to wash, bathe, swim', literally 'to hit *tam*' looks like a recent introduction. The bound noun *tam* '?' also appears in the Shina complex verbs for 'to swim' and 'to wash', but the direction of borrowing was apparently from Burushaski to Shina, since, first of all, Shina *tam* lacks Indo-European etymology, and second, *tam* is only attested in the Gilgiti and Astori dialects of Shina which are the ones most influenced by Burushaski.

84. 'tail'.

**Proto-Yeniseian**. *\*puɢ-aʒ* (S. Starostin 1995: 253). Preserved in all daughter languages, but not attested in Pumpokol. The stem ends in the same morpheme that is also found in Ket *ulʸ-et* = Kott *ul-ay* 'rib' and several other words denoting body parts; this seems to be an old fossilized suffix.

**Proto-Athabaskan**. *\*=kʰʸeː-ʔ* is retained in all three branches, cognate to Eyak *=kə=kʰaʔ* 'tail (of a bird)'.

**Eyak.** *=k=ƛ'ah*, a descriptive formation based on *=ƛ'ah* 'rear, back end'.

**Proto-Athabaskan-Eyak**. *\*kʰV* (Athabaskan).

**Proto-Eskimo**. *\*pamyu-ʁ* (Fortescue et al. 2010: 272), retained in Yupik and Inuit.

**Proto-Aleut**. *\*hit-xi-χ* (Bergsland 1994: 217; Golovko 1994: 284), attested in Eastern and Atkan. Derived from *\*hit-* 'to go out, come out; to come out, grow (of plant)'. Cf. Attuan *kimaʁu-χ* 'tail (generic)' (Bergsland 1994: 239).

**Proto-Chukotian**. *\*ŋoyŋ-ən* (Fortescue 2005: 198), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*ŋosχ* (Volodin 2021: 193; Volodin, Khaloimova 2001: 219; Fortescue 2005: 198). Western *ŋosx ~ ŋosχ*, Southern *muzi-*. Cognate to the Chukotian term.

**Proto-Nivkh**. *ŋaki ~ *ŋa=ki (Fortescue 2016: 119; Savelyeva, Taksami 1965: 446; Savelyeva, Taksami 1970: 235). Can be derived from *ŋak 'cartilage' (Fortescue 2016: 119; Savelyeva, Taksami 1970: 235). Alternatively, a prefixal element *ŋa-, common for body part names, can be singled out.

**Proto-Samoyed**. *təywɒ (Janhunen 1977: 150) is retained in all daughter languages save Enets.

**Proto-Yukaghir**. *lɨk-il (Nikolaeva 2006: 234–235) is retained in Kolyma, Chuvan and Tundra.

**Proto-Burushaski**. Yasin =ʃˈilan 'tail' (no Hunza cognates) looks more archaic, since Hunza =sˈum-al 'tail' is derived from Common Burushaski *sum 'sprout, shoot'.

85. 'that'.

**Proto-Yeniseian**. We tentatively reconstruct the tripartite system *ʔi 'this' / *ʔu 'that (medial)' / *ʔa 'that (distal)', for Proto-Yeniseian, although it has been subjected to various modifications in modern languages.

**Proto-Athabaskan**. *yə ~ *ye: 'that (distal/medial deixis)' is retained at least in all three subgroups (frequently accompanied with additional deictic proclitics such as *ʔə-, *ha-). For the Northern subgroup, the opposition *ʔə=yə 'that (medial)' / *ʁa 'that (distal)' can be reconstructed.

**Eyak**. ʔəw ~ ʔu:.

**Proto-Athabaskan-Eyak**. *yV (Athabaskan), *ʔVw (Eyak).

**Proto-Eskimo**. The synchronic Eskimo systems of the demonstrative pronouns are very complex, the same complexity is to be reconstructed for Proto-Eskimo (Fortescue et al. 2010: 497). For our purposes, we choose pronouns referring to visible non-moving compact objects on the horizontal axe: *uv- 'this' / *iŋ- 'that (medial)' / *ik- 'that (distal)'.

**Proto-Aleut**. The Aleut deictic system (Bergsland 1997: 72; Golovko et al. 2009: 148–149) is even more complex than the Eskimo ones. For our purposes, we choose pronouns referring to visible non-moving compact objects on the horizontal axe in front of the speaker: *u-ka 'this' (Bergsland 1994: 426) / *a-ka 'that (situated longitudinally)' (Bergsland 1994: 41) ~ *i-ka 'that (situated transversally)' (Bergsland 1994: 187).

**Proto-Chukotian**. The basic system of demonstrative pronouns in the Chukotian languages in ternary: 'this' / 'that (medial, or close to the listener)' / 'that (distal, or far from the speaker and listener)'. On the basis of the Chukchi (Skorik 1961: 138), Koryak (Zhukova 1972: 191) and Alutor (Nagayama 2003: 304) data, the proto-system can be safely reconstructed as *ŋut- ~ *ɣut- 'this' (Fortescue 2005: 199) / *ən- 'that (medial), 3rd p. pronoun' (Fortescue 2005: 342) / *ŋan- 'that (distant)' (Fortescue 2005: 193). The only discrepancy between lects concerns the fluctuation of the initial consonant in the proximal pronoun: *ŋ- in Chukchi and *ɣ- in Koryak-Alutor.

**Proto-Itelmen**. According to Volodin 1976: 170, the Western system is binary: *tiʔ- 'this' (Volodin, Khaloimova 2001: 223; Fortescue 2005: 200) / *nu- 'that' (Volodin 2021: 179; Volodin, Khaloimova 2001: 214; Fortescue 2005: 342). The cognate pronouns are documented for Eastern: tɨy-e 'this' (Dybowski & Radliński 1892: 210), duw-e 'that' (Dybowski & Radliński 1892: 147).

**Proto-Nivkh**. Despite the fact that the full system of demonstrative pronouns is described as a complex opposition with several degrees of remoteness (Gruzdeva 1998: 26; Panfilov 1962: 241), it is likely that the basic system is to be reconstructed as a ternary one: *du- 'this' (Fortescue 2016: 46) / *hu- 'that (medial)' (Fortescue 2016: 77) / *a- 'that (distal)' (Fortescue 2016: 7).

**Proto-Samoyed**. The reconstruction of Proto-Samoyed demonstratives is rather complicated. It involves at least three stems: *ta- ~ *tä- (Janhunen 1977: 150), *tə- (Janhunen 1977: 144) and *ti- (Janhunen 1977: 160–161). We tentatively reconstruct the basic opposition as that between distal *ta- ~ *tä- and proximal *tə-. Such an opposition is directly preserved in Kamass and Selkup, while Northern Samoyed languages suffered various restructurings of the system. It is possible, but not certain, that *ti- functioned as medial demonstrative.

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**Proto-Yukaghir**. The Tundra system of demonstratives distinguishes between proximal, medial, distal and two kinds of invisible demonstratives (Kurilov 2006: 122–126). The Kolyma system is simpler: it consists of proximal, distal and invisible demonstratives (Maslova 2003: 238-248). We reconstruct the ternary basic system of visible attributive demonstratives: *tu-ŋ 'this' (Nikolaeva 2006: 437) / *an-du-ŋ 'that (medial)' (Nikolaeva 2006: 104) / *te:-ŋ 'that (distal)' (Nikolaeva 2006: 429–430). Attributive proximal demonstrative *tu-ŋ remains in Tundra and is replaced in Kolyma by *ti-ŋ (Nikolaeva 2006: 429–430). The Tundra reflex of *ti- is used in one of invisible demonstratives. The Kolyma reflex of *tu-ŋ is preserved in independent proximal demonstrative tuön ~ tuwen 'this one' < *tu-bon 'this thing', which shows its earlier use in attributive function in Kolyma. The medial attributive demonstrative *an-du-ŋ is retained in Tundra and is replaced by *an-di-ŋ in Kolyma, where the opposition between medial and distal demonstratives is lost. Both *an-du-ŋ and *an-di-ŋ are compounds of *an, preserved in Tundra as an independent medial demonstrative, and proximal demonstrative stems. The 'medial' sense is expressed by *an-, so we treat it as the main morpheme for lexicostatistic purposes. Finally, the distal attributive *te:-ŋ is retained in Tundra and replaced in Kolyma by medial *an-di-ŋ.

86. 'this'.
**Proto-Yeniseian**. *ʔi.
**Proto-Athabaskan**. *ti: is retained in all three branches.
**Eyak**. ʔəl ~ ʔã:.
**Proto-Athabaskan-Eyak**. *tV (Athabaskan), *ʔVn (Eyak).
**Proto-Eskimo**. *uv-.
**Proto-Aleut**. *u-ka.
**Proto-Chukotian**. *ŋut- ~ *ɣut-.
**Proto-Itelmen**. *tiʔ-.
**Proto-Nivkh**. *du- (Fortescue 2016: 46), see notes on 'that'.
**Proto-Samoyed**. *tə- (Janhunen 1977: 144), see notes on 'that'.
**Proto-Yukaghir**. *tu-ŋ (Nikolaeva 2006: 437), see notes on 'that'.

87. 'thou'.
**Proto-Yeniseian**. *ʔaw (S. Starostin 1995: 185). Preserved in all daughter languages. The "diphthongal" structure of this pronoun is rather unique for Proto-Yeniseian, so the regularity of the correspondences cannot be ascertained, but no better reconstruction can probably explain the discrepancy between Ket-Yugh *ʔu and Kott-Arin *au. The form *ʔaw represents the direct stem of the 2nd p. sg. pronoun. The etymologically different oblique stem, lost in Kott-Arin, is still preserved in Ket-Yugh as *ʔuk (possessive pronoun: 'your') or *ku (verbal prefix of subject or object). These forms may have been influenced by Ket-Yugh *ʔu 'you', but their velar constituent is completely autonomous, and there is no direct or indirect evidence that it was, at any time, present in the direct stem as well.
**Proto-Athabaskan**. *ɲə-n is retained in all three branches.
**Eyak**. ʔi:, cognate to Athabaskan with *ɲ > 0.
**Proto-Athabaskan-Eyak**. *ɲV (Athabaskan, Eyak).
**Proto-Eskimo**. *əɬ=və- ~ *əɬ=pə- (Fortescue et al. 2010: 116), retained in all branches. The 2nd p. pl. pronoun is *əɬ=və-ci 'you'. Origin and function of initial *əɬ= are unclear, but the main meaningful morpheme is *=və- ~ * =pə-, cf. the 2nd p. subj. exponent *-və-C- (sg.), *-v-ci- (pl.) in some verbal forms (Fortescue et al. 2010: 491, 494).
**Proto-Aleut**. *t(x)i=n (Bergsland 1994: 397; Bergsland 1997: 57), attested in all branches. Meaning 'you (2 sg.) / (s)he self (3 sg. reflexive)'. The meaningful element is -n, see notes on 'I'.
**Proto-Chukotian**. *ɣəð [direct] / *ɣən- [obl.] (Fortescue 2005: 142), retained in all languages. Cognate to the Itelmen paradigm with the same suppletion.

**Proto-Itelmen**. *\*kəz^ya* [direct] / *\*kni-* [obl.] (Volodin 2021: 113; Volodin 1976: 171; Volodin, Khaloimova 2001: 236; Fortescue 2005: 142; Mudrak 2008: 108). Western, Eastern, Southern.

**Proto-Nivkh**. *\*ti* (Fortescue 2016: 32; Gruzdeva 1998: 25; Panfilov 1962: 231). Cf. *\*ti-n* 'you (pl.)' (Fortescue 2016: 33).

**Proto-Samoyed**. *\*tə-n* (Janhunen 1977: 147) is retained almost everywhere with the notable exception of (Tundra and Forest) Nenets, where 'thou' is etymologically 'thine body' and Forest Enets, where 'thou' is borrowed from Ket. Goes back to Proto-Uralic *\*ti-n* 'thou'.

**Proto-Yukaghir**. *\*tə-t* (Nikolaeva 2006: 429) is retained in Kolyma, Chuvan and Tundra.

88. 'tongue'.

**Proto-Yeniseian**. *\*ʔey* (S. Starostin 1995: 187). Preserved in Ket-Yugh and Pumpokol. In Proto-Kott-Arin, *\*ʔey* was replaced by *\*alup* (vocalism provisionally follows the Kott form rather than the controversial Arin variants), of unclear origin. Proto-Yeniseian *\*ʔey* 'tongue' is still preserved in Kott *ey*, pl. *eːy-aŋ*, but only in the meaning 'voice; sound'; since the semantic shift 'tongue' > 'voice' (the actual meaning in Castrén's vocabulary may have been 'speech, language') is more probable than the opposite, this increases the chances of *\*ʔey* as the original Proto-Yeniseian equivalent for 'tongue'.

**Proto-Athabaskan**. *\*=c^hu-ʔ* is retained in all three branches. In Northern, frequently as the compound *\*=c^hu-la-ʔ* 'tongue' with *\*=la:* 'tip' (in some lects, the compound was reanalyzed as a root *\*=c^huːl*).

**Eyak.** *=laʔt'*, cognate to Tlingit *ł'úːt'* 'tongue', thus represent the Proto-Athabaskan-Eyak term (the marginal Eyak variant *=naʔt'* is unclear).

**Proto-Athabaskan-Eyak**. *\*łVt'* (Eyak).

**Proto-Eskimo**. The main candidates are Yupik-Sirenik *\*ulu* (Fortescue et al. 2010: 400) and Inuit *\*uqa-ʁ* (Fortescue et al. 2010: 411). We treat them as synonyms.

**Proto-Eskimo**. The main candidate is *\*ulu* which means 'tongue' in Yupik-Sirenik and 'woman's semi-lunar knife' in Inuit (Fortescue et al. 2010: 400). In Yupik, the meaning 'woman's semi-lunar knife' is expressed by the suffixed stem *\*ulu-ʁ-aʁ*, lit. 'tongue-like'. In Inuit, *\*ulu* 'tongue' has been superseded with the stem *\*uqaʁ* 'tongue / to speak' (Fortescue et al. 2010: 411) without Yupik-Sirenik cognates.

**Proto-Aleut**. *\*umsu-χ* (Bergsland 1994: 442; Golovko 1994: 290), attested in Atkan and Attuan as 'tongue', having shifted into the meanings 'flukes, whale's tail; lap, blade as support' in Eastern. Superseded with *\*aɣna-χ* (Bergsland 1994: 27) in Eastern, without cognates in other dialects.

**Proto-Chukotian**. *\*yilə-yil* (Fortescue 2005: 115), reduplicated stem, retained in all languages. Cognate to the Itelmen stem?

**Proto-Itelmen**. *\*čil ~ \*ičil* (Volodin 2021: 168; Volodin, Khaloimova 2001: 224; Fortescue 2005: 115; Mudrak 2008: 66). The following forms are relevant for reconstruction:
Modern Napana Western *łčel ~ ličil* (regular pl. *łčeʔl*), Modern Sedanka Western sg. *ləče-l*, pl. *ləče-ʔn* (Ono 2003: 106; a reanalysis of the final *-l* as a partially reduplicated root).
Western of the 18th-19th c. *ečella* (Krasheninnikov), *ičil ~ l^yčil* (Dybowski).
Eastern *dičil ~ dičil* (Krasheninnikov, Dybowski).
Southern *ničil* (Krasheninnikov, Dybowski).
Most likely the original shape of the root is *\*čil* or *\*ičil* as retained in archaic Western (*ečella*, *ičil*). Western *łčel ~ ličil* represents the partial reduplication *\*li-čil*. Eastern *dičil* and Southern *ničil* formally go back to *\*ničil* < probably *\*li-čil* with the occasional dissimilation.
The relationship between Chukotian *\*yil-* 'tongue' and Itelmen *\*čil* remains unclear, because *\*y- / \*č-* is not a regular correspondence, but cross-linguistically the concept 'tongue' frequently undergoes occasional phonetic mutations.

**Proto-Nivkh**. *hilʁ (Fortescue 2016: 74; Savelyeva, Taksami 1965: 467; Savelyeva, Taksami 1970: 428). Could be related to the verb *helel- 'to lick' (Fortescue 2016: 72), if one analyzes the noun as *hil-ʁ with the rare deverbal suffix *-x (Panfilov 1962: 61) and the verb as a partly reduplicated stem *hel-el-; the voicing *-x > *-ʁ remains unclear however.

**Proto-Samoyed**. *käǝ ~ *kääʁ (Janhunen 1977: 66), retained in all daughter languages except Tundra Nenets, goes back to Proto-Uralic *käli 'tongue'.

**Proto-Yukaghir**. *wonor (Nikolaeva 2006: 458) is retained in Kolyma, Tundra and Omok.

89. 'tooth'.

**Proto-Yeniseian**. *ʔiːti (S. Starostin 1995: 195). Preserved in all daughter languages, but not attested in Pumpokol.

**Proto-Athabaskan**. *=ʁuː-ʔ is retained in all three branches.

**Eyak**. =χũː-ɬǝ-yah, the meaningful element is here the bound morpheme χũː ~χuːl 'tooth' which is apparently cognate to Athabaskan *=ʁu-ʔ 'tooth' and Tlingit ʔuːχ 'tooth', although the origin of the final nasal reflected in Eyak χũː ~χuːl (l < *n) is unclear.

**Proto-Athabaskan-Eyak**. *χuː (Athabaskan, Eyak?). Apparently cognate to Tlingit ʔuːχ 'tooth' with a metathesis in either Proto-Tlingit or Proto-Athabaskan-Eyak.

**Proto-Eskimo**. *kǝʁ-un (Fortescue et al. 2010: 180), retained in all branches. Derived from *kǝʁǝ- 'to bite' (q.v.) with the instrumental suffix.

**Proto-Aleut**. *aʁa-lu-χ (Bergsland 1994: 21; Golovko 1994: 15, 213), attested in all branches. In Eastern, tends to be superseded with the new instrumental formation kiʁ-usi-χ (Bergsland 1994: 238) from *kix-s- 'to bite' (q.v.).

**Proto-Chukotian**. *wannǝ (Fortescue 2005: 323), retained in all languages, although tends to be superseded with *rǝtnǝ 'horn' (q.v.) in Chukchi.

**Proto-Itelmen**. *kǝp- (Volodin 2021: 115; Volodin, Khaloimova 2001: 157; Fortescue 2005: 396; Mudrak 2008: 99). Western, Eastern, Southern.

**Proto-Nivkh**. *ŋa=ʁzǝr (Fortescue 2016: 118; Savelyeva, Taksami 1965: 163; Savelyeva, Taksami 1970: 233). A prefixal element *ŋa-, common for body part names, can be singled out.

**Proto-Samoyed**. *timä (Janhunen 1977: 163) is retained in all daughter languages.

**Proto-Yukaghir**. Kolyma and Chuvan *tod-iː, derived from *tod- 'to bite' (Nikolaeva 2006: 432) vs. Tundra *cɑʎgǝ-r-iː, derived from *cɑʎgǝ-r-ej- 'to break (tr.)' (Nikolaeva 2006: 394, 411).

90. 'tree'.

**Proto-Yeniseian**. *ʔɔksi (S. Starostin 1995: 198). Preserved everywhere except in Pumpokol, where the suppletive plural has replaced the old singular form. The word 'tree' was suppletive on the Proto-Yeniseian level; the plural form is reconstructed as *xaʔq > Ket-Yugh *ʔaʔq, Kott ak ~ ax, Pumpokol hox- in hox-on.

**Proto-Athabaskan**. *kʰʸǝn is retained in all three branches.

**Eyak**. lis, can be a Russian loanword.

**Proto-Athabaskan-Eyak**. *kʰen (Athabaskan), this root is retained in Eyak as t=kʰĩh 'stick; wood (timber)'; because the semantic shift 'tree' > 'timber' is much more frequent than vice versa, *kʰen is to be posit as the Proto-Athabaskan-Eyak term for 'tree'.

**Proto-Eskimo**. *napa-ʁ-aq-tuʁ (Fortescue et al. 2010: 236), a Yupik-Inuit derivative from *napa- 'to be standing (upright)'.

**Proto-Aleut**. Not reconstructible.

**Proto-Chukotian**. *uttǝ (Fortescue 2005: 310), retained in all languages.

**Proto-Itelmen**. *uxʷu (Volodin 2021: 266; Volodin, Khaloimova 2001: 149; Fortescue 2005: 310; Mudrak 2008: 212). Western, Southern, Eastern. In the attested forms, -xʷ- is almost totally due to labial vowels around, it is better preserved in the lexicalized pl. form *uxʷu-t 'forest' (Mudrak 2008: 213).

**Proto-Nivkh**. *ɖiɣar (Fortescue 2016: 52; Savelyeva, Taksami 1965: 126; Savelyeva, Taksami 1970: 353). Polysemy 'tree / firewood'. Morphologically unclear.

**Proto-Samoyed**. *pa (Janhunen 1977: 117), retained in all daughter languages, goes back to Proto-Uralic *pawi 'tree'.

**Proto-Yukaghir**. *cạ:-l (Nikolaeva 2006: 392) is retained in Kolyma, Tundra and Omok. Chuvan *mut* 'tree' lacks cognates in other Yukaghir languages.

**Proto-Burushaski**. Borrowed from Indo-Aryan sources.

91. 'two'.

**Proto-Yeniseian**. *xɨn-a (S. Starostin 1995: 296). Preserved in all daughter languages. Initial *x- is reconstructed based on the presence of back consonants in Arin and Pumpokol. The suffix *-a is a common element in the formation of Yeniseian numerals; the original root is simply *xɨn-.

**Proto-Athabaskan**. *nạ:- (Krauss & Leer 1981: 22, 76, 133) is retained in all three branches, always accompanied with various and sometimes fanciful suffixes.

**Eyak**. laʔt-, comparison with Athabaskan *nạ:- suggests that historically -t- is a fossilized suffix.

**Proto-Athabaskan-Eyak**. *na:ʔ- (Athabaskan, Eyak).

**Proto-Eskimo**. *malʁu-ɣ (Fortescue et al. 2010: 205), retained in all branches.

**Proto-Aleut**. *a:lax ~ *ulax (Bergsland 1994: 49, 570; Golovko 1994: 200), attested in all branches. Can be derivative from *a-/u- 'to be'.

**Proto-Chukotian**. *ŋɨðä-q (Fortescue 2005: 197), retained in all languages.

**Proto-Itelmen**. *kasχə (Volodin 2021: 91; Volodin, Khaloimova 2001: 148; Fortescue 2005: 397; Mudrak 2008: 89). Western, Eastern, Southern. Morphologically unclear.

**Proto-Nivkh**. *me- (Fortescue 2016: 103, 178; Panfilov 1962: 181, 214–215; Gruzdeva 1998: 24).

**Proto-Samoyed**. *kitä (Janhunen 1977 71–72), retained in all daughter languages, goes back to the Proto-Uralic numeral 'two', whose exact phonetic shape remains unclear.

**Proto-Yukaghir**. *ki- (Nikolaeva 2006: 209) is retained in Tundra, Omok, and Chuvan. Kolyma has ataq- (Nikolaeva 2006: 110–111) of unclear origin. The reflex of Proto-Yukaghir *ki- 'two' is preserved in the word for 'seven': Kolyma pur-ki-, Tundra pus-ki-, originally 'two on [five]' (Nikolaeva 2006: 365). Because of this, Kolyma ataq- must be an innovation.

92. 'to go'.

**Proto-Yeniseian**. Proto-Yeniseian *hey- 'to go' (S. Starostin 1995: 231) is reconstructible based on the Ket-Yugh infinitive (verbal noun) form *ʔey-iŋ 'to go' and the exactly corresponding Kott infinitive hey-aŋ. The second, more hypothetical, reconstruction *=ʒe- ~ *=ʒen reconciles two of the most basic Ket-Yugh and Kott equivalents for the meaning 'to go', namely, the Kott root *=in- and Ket-Yugh *=de(n); in Kott, according to S. Starostin's correspondences, *=ʒen should have yielded *=yen, with subsequent contractions (*i=yen-aŋ 'I go' > i:naŋ, etc.).

**Proto-Athabaskan**. *=ha: 'to go / to come' (sg. subj.) is retained in all three branches.

**Eyak**. =a (sg. subj.), cognate to Athabaskan, see note on 'to come'.

**Proto-Athabaskan-Eyak**. *=ha:, sg. subj. (Athabaskan, Eyak).

**Proto-Eskimo**. Cannot be reconstructed with certainty. Cf. the stable verb *pi-yuɣ- 'to walk' (Fortescue et al. 2010: 289).

**Proto-Aleut**. *huya-l- (Bergsland 1994: 455; Golovko 1994: 213), attested in all branches.

**Proto-Chukotian**. *təlä (Fortescue 2005: 295), retained as a basic term at least in Chukchi and Koryak.

**Proto-Itelmen**. *təɬale- (Volodin 2021: 156; Volodin, Khaloimova 2001: 51; Stebnitsky 1934: 93; Fortescue 2005: 295; Mudrak 2008: 120). Phonetical simplification in modern Napana Western: ɬale- < *tɬale-, but cf., e.g., Stebnitsky's tlale-. In modern Western *təɬale- means 'to walk' (already Dybowski & Radliński 1893b: lʲalɨ-zik 'chodzić, ire' ~ šalʲa-kaz 'chodzić, ire', further Stebnitsky and Volodin), but Krasheninnikov (18th c.) offers reflexes of *təɬale- as basic words for 'to go' in Western (tlalam) and Eastern (tɨlleʒk). Perhaps

Dybowski's Eastern forms *tulelk* 'I will go (ja pójdę, ego ibo)', *tusik ~ tušik* 'to go (iść, ire)' (Dybowski & Radliński 1892: 158, 209) reflect the same proto-root. The comparison with Chukotian. *təlä* 'to go' also speaks in favor of *təlale-* as the basic Proto-Itelmen term for 'to go'.

Differently in modern Western, where the verb *ił-* 'to go, go away' is used as a basic term (Volodin 2021: 66; Volodin, Khaloimova 2001: 119, 158), without further cognates.

Various Southern verbs for 'to go' documented by Dybowski are probably unrelated to the aforementioned forms.

Generally, the concept 'to go' is unstable in Itelmen.

**Proto-Nivkh**. *wi-* (Fortescue 2016: 163; Savelyeva, Taksami 1965: 164; Savelyeva, Taksami 1970: 54).

**Proto-Samoyed**. *men-* (Janhunen 1977: 94), retained in Nenets, Nganasan and Kamass, goes back to Proto-Uralic *meni-* 'to go'.

**Proto-Yukaghir**. Kolyma *kon-* (Nikolaeva 2006: 385–386) vs. Tundra *u:-* (Nikolaeva 2006: 441–442). Both roots go back to Proto-Yukaghir: *kon-* has Tundra Yukaghir reflexes *qan-a:-* 'to roam away (of nomads)' and *qan-de-* 'to accompany', while *u:-* has Kolyma Yukaghir reflex *u:-že-* 'to move' (some other Kolyma reflexes adduced by Nikolaeva are more dubious). The original semantic difference between *kon-* and *u:-* is not clear. Proto-Yukaghir *kon-* is related to, or borrowed from, Proto-Samoyed *kɒn-* 'to go (away)' (Janhunen 1977: 59–60).

**Proto-Burushaski**. Out of three roots involved in the Yasin and Hunza suppletive paradigms, two are present in both dialects: *ne-* & *gal-*. We reconstruct these two for the Proto-Burushaski paradigm.


93. 'warm'.

**Proto-Yeniseian**. *xus-* (S. Starostin 1995: 299). Preserved in all daughter languages, with the probable exception of Kott, where there may have been a merger of the lexically distinct Proto-Yeniseian meanings 'warm' and 'hot' (Kott *fal ~ pʰal* is compared to such forms as Yugh *a:p*, Ket *a:* 'heat', etc. < Proto-Yeniseian *ʔap-* 'hot'). The semantic opposition *xus-* 'warm' / *ʔap-* 'hot', best attested in Ket-Yugh, is probably of Proto-Yeniseian origin.

**Proto-Athabaskan**. The best candidate is *=zəł* retained in all three branches.

**Eyak**. *=tə=χã*, based on the verb 'to melt, thaw', thus looks like a new formation.

**Proto-Athabaskan-Eyak**. *=seł* (Athabaskan).

**Proto-Eskimo**. *maqa-ʁ-* (Fortescue et al. 2010: 210), a Yupik-Sirenik term. In Inuit lects, '(to be) warm' is usually derived from *uɣu-naʁ-* 'to be burning hot' (Fortescue et al. 2010: 395). The meaning '(to be) hot' is usually expressed with the help of various derivatives from *uɣu-* 'to be heated up, cooked' (Fortescue et al. 2010: 394).

**Proto-Aleut**. *huʁ-na:-za-* (Bergsland 1994: 425; Golovko 1994: 167), attested in all branches. Derived from *huʁ-na:* 'lee side of house'.

**Proto-Chukotian**. *om-* (Fortescue 2005: 205), meaning 'warm (of object / of weather)' in Koryak and Alutor, but only 'warm (of weather)' in Chukchi. Cognate to the Itelmen term. Distinct from *təɣəl-* 'hot' (Fortescue 2005: 293).

**Proto-Itelmen**. *om-* (Volodin 2021: 196; Volodin, Khaloimova 2001: 213; Fortescue 2005: 205; Mudrak 2008: 150). Western, Eastern, Southern, meaning 'warm'. At least in modern Western, it is applicable to objects and weather. Cognate to the Chukchi term. Distinct from *kika- ~ *xika-* 'hot' (Volodin 2021: 278; Volodin, Khaloimova 2001: 146; Fortescue 2005: 339; Mudrak 2008: 222).

**Proto-Nivkh**. *dak-* (Fortescue 2016: 38; Savelyeva, Taksami 1965: 419; Savelyeva, Taksami 1970: 367), meaning 'to be warm'. Distinct from *qav-* 'to be hot' (Fortescue 2016: 140; Savelyeva, Taksami 1965: 119; Savelyeva, Taksami 1970: 146).

**Proto-Samoyed**. There are two candidates. The first, *yu-pŋ* (Janhunen 1977: 47–48), is derived from the verb *yu-* 'to be warm / to melt'. This is the main word for 'warm' in Nenets,

Enets and Mator. The second candidate, *päywä (Janhunen 1977: 120), means 'heat, warmth' in Nganasan and 'warm' in Selkup. Its Finnic and Saami cognates (< Proto-Uralic *päywä) mean 'sun, day'.

**Proto-Yukaghir**. *pugö 'warm, hot' (Nikolaeva 2006: 366) is retained in all Yukaghir languages.

94. 'water'.

**Proto-Yeniseian**. *xur₁ (S. Starostin 1995: 298). Preserved in all daughter languages. Initial *x- is reconstructed based on the velar reflexation k- in Arin. For the difference between 'water' and 'rain', see notes on 'rain'.

**Proto-Athabaskan**. *tʰuː is retained in all three branches.

**Eyak**. kiyah, morphologically unclear; the old root is retained as the preverb tʰaʔ 'into water'.

**Proto-Athabaskan-Eyak**. *tʰVː (Athabaskan). Leer (2008a) compares Proto-Athabaskan *tʰuː 'water' with Eyak tʰãh 'wave' and reconstruct Proto-Athabaskan-Eyak *tʰam. Such a solution seems dubious since, firstly, it is based on a one-example rule *Vm > Proto-Athabaskan -u, secondly, it implies that Proto-Athabaskan *tʰuː is unrelated to Proto-Athabaskan *tʰaː- 'water, into water (first element in compounds). The Proto-Athabaskan vowel alternation between *tʰuː and *tʰaː- is indeed unique, but Krauss and Leer (Krauss & Leer 1981: 87; Leer 1996) might be right analyzing Proto-Athabaskan *tʰuː 'water' as an old compound *tʰaː-wV (the second element is unclear).

**Proto-Eskimo**. *əmə-ʁ (Fortescue et al. 2010: 120), retained in all branches, the same stem as 'to drink' (q.v.).

**Proto-Aleut**. *taːŋa-χ (Bergsland 1994: 392; Golovko 1994: 191), attested in all branches, the same stem as 'to drink' (q.v.).

**Proto-Chukotian**. *mi=məl ~ *iməl (Fortescue 2005: 99), retained in all languages. Reduplication in daughter languages.

**Proto-Itelmen**. *iʔi (Volodin 2021: 82; Volodin, Khaloimova 2001: 141; Fortescue 2005: 398; Mudrak 2008: 59). Western, Southern (Krasheninnikov, Dybowski, modern sources). Distinct from Eastern *azʸam 'water' offered by Krasheninnikov and Dybowski (Volodin 2021: 82; Fortescue 2005: 17; Mudrak 2008: 25) (probably erroneously ascribed to the Southern language as well).

**Proto-Nivkh**. *taʁ (Fortescue 2016: 30; Savelyeva, Taksami 1965: 88; Savelyeva, Taksami 1970: 444). Panfilov (1962: 61) proposes the analysis *ta-ʁ, but it is not certain.

**Proto-Samoyed**. *wet (Janhunen 1977: 176), retained in all Samoyed languages, goes back to Proto-Uralic *weti 'water'.

**Proto-Yukaghir**. *liŋgə (Nikolaeva 2006: 255), retained as the word for 'water' in Omok and as the word for 'rain' in Chuvan. This word has the same root as the verb 'to drink', q.v. Modern Yukaghir languages have similar derivatives from verbs for 'to drink': Kolyma and Chuvan *oːnʒ-iː 'water' from *oːnʒə- 'to drink' (Nikolaeva 2006: 330–331), Tundra *law-yə from *law- 'to drink' (Nikolaeva 2006: 236).

95. 'we'.

**Proto-Yeniseian**. *ʔaʒ-əŋ (S. Starostin 1995: 185). The Proto-Yeniseian equivalent for 'we' was clearly the regular plural form of 'I'; hence, see notes on 'I' for reconstruction peculiarities.

**Proto-Athabaskan**. *naχə-neː is retained in all three branches.

**Eyak**. taː [direct stem] / qʰaː [oblique stem].

**Proto-Athabaskan-Eyak**. *nVh- (Athabaskan), *tV ~ *qʰV (Eyak).

**Proto-Eskimo**. *uva=ku-t (Fortescue et al. 2010: 418), retained in all branches. In some Yupik lects, phonetically contaminated with *uva=ŋa 'I'. For desemanticized *uva- see notes on 'I'; final -t is a regular plural suffix (cf. the same pattern in Aleut); the same *-ku-t is used as the 1st p. pl. subject exponent in verbal forms (Fortescue et al. 2010: 489).

**Proto-Aleut**. *t(x)i=ma- (Bergsland 1994: 397; Bergsland 1997: 57), attested in all branches. Modified with the plural suffixes -(i)s or -(i)n. The meaningful element is -ma-, whereas ti- ~ txi- is a proclitic attached to the 1st, 2nd and reflexive 3rd person pronouns (Bergsland

1997: 56). Sometimes the forms *ti=ŋ-is ~ ti=ŋ-in* 'we' are used instead, literally 'I-PL' from *ti=ŋ* 'I'.

**Proto-Chukotian.** *\*mur-* (Fortescue 2005: 179), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen.** *\*muzʸa* (Volodin 2021: 173; Volodin, Khaloimova 2001: 236; Fortescue 2005: 179; Mudrak 2008: 139). Western, Eastern, Southern. Paradigm: *\*muzʸa* [dir.] / *\*mizʸ-ɣ-* [obl.] (as attested in Western and Southern). Cognate to the Chukotian term.

**Proto-Nivkh.** All Nivkh lects possess the category of clusivity. The pronoun *\*ɲi-n* (Fortescue 2016: 114; Gruzdeva 1998: 25; Panfilov 1962: 231) means 'we (exclusive)'. In Amur, it was additionally modified with the standard plural suffix *\*-kun*. The suffix *-n* can be singled out on the basis of comparison with *\*ɲi* 'I' q.v., *\*mer-n* 'we (inclusive)' and the mirroring pair *\*ti* 'thou' / *\*ti-n* 'you (pl.)'. See Panfilov 1962: 50–51 for rare *\*-n* which expresses something related to humans or animate creatures in general. Additionally one can suspect that the plural suffix *\*-kun* is to be historically analyzed as *\*-ku-n* with the same *-n* as in the plural personal pronouns (thus Panfilov 1962: 95). The exclusive pronoun is opposed to *\*mer-n* 'we (inclusive)' (Fortescue 2016: 105; Gruzdeva 1998: 25; Panfilov 1962: 231). Panfilov (1962: 59) proposes to analyze it as *\*me-r-n* with the archaic suffix *\*-r*, cf. the pronoun *\*mengin* 'we (dual.)' (Fortescue 2016: 103), but *\*mengin* can be actually based on or contaminated with the numeral *me-* 'two' (q.v.).

**Proto-Samoyed.** *\*me-* (Janhunen 1977: 91), retained in Nganasan, Mator, Kamass and Selkup, goes back to Proto-Uralic *\*me-* 'we'. Nenets and Enets replaced the original pronoun by dual/plural forms of 'I'.

**Proto-Yukaghir.** *\*mi-t* (Nikolaeva 2006: 269–270) is retained in all Yukaghir languages.

96. 'what?'.

**Proto-Yeniseian.** *\*si ~ \*ʔa=si* (S. Starostin 1995: 183). Preserved in all daughter languages where attested, but not found in Arin or Pumpokol. The Proto-Yeniseian morpheme clearly had the fricative *\*-s-* as its main distinctive component, but the vocalic "framing" differs in between Ket-Yugh and Kott and is hard to reconstruct convincingly.

**Proto-Athabaskan.** *\*yə* 'what?' is well attested in all three branches, although *\*yə* is never or almost never used alone. Usually, it is accompanied with the generic interrogative morpheme *\*tɑ: ~ \*tɑ*. The sequence can be either *\*yə-tɑ* (such Northern lects as Tanaina, Upper Kuskokwim, some Apachean lects) or *\*tɑ-yə* (PCA, such Northern lects as Lower Tanana); in many languages a generic interrogative function of the element *tV* can be shown by comparison with other interrogative pronouns which contain the same affixed morpheme *tV*. Probably, all cases of the synchronic form *ti(:)* (e.g., Upper Tanana *ti:* 'what') can be treated as a contraction of *\*tɑ-yə*. In some languages, *\*ye: ~ \*yə* 'what?' is accompanied with other generic interrogative morphemes, e.g., *\*a:* (Dogrib *á-yì:*, Beaver: *ye-a*).

**Eyak.** *te:*. As plausibly proposed by Krauss & Leer 1981: 88–89, Eyak *te:* 'what?' and *tu:* 'who?' directly corresponds the Athabaskan sequences *\*tɑ-yə* 'what?' and *\*tɑ-wə* 'who?'. Further probably to Tlingit *ta:-t* 'what?' and *ʔa:-tu:* 'who?'.

**Proto-Athabaskan-Eyak.** *\*ye* (Athabaskan, Eyak).

**Proto-Eskimo.** *\*cu-* (Fortescue et al. 2010: 97), retained in all branches. Modified with various suffixes, most frequently *\*cu-na*.

**Proto-Aleut.** *\*alqu-* (Bergsland 1994: 55; Bergsland 1997: 80; Golovko 1994: 287), attested in all branches.

**Proto-Chukotian.** The original paradigm was likely *\*ðən-* [abs.] / *\*ðäq-* [obl.], it is generally retained in Koryak-Alutor, but simplified in favor of the oblique stem *\*ðäq-* in Chukchi-Kerek (Fortescue 2005: 56). The paradigm is irregular, but the morpheme *\*ðV-* with the "extensions" *-n-* and *-q-* of unclear origin can be singled out. For *-q-* cf. Itelmen *\*ənəqa* 'what' which can contain the same "extension".

**Proto-Itelmen**. *ʼ*ənəqa* (Volodin 2021: 38; Volodin, Khaloimova 2001: 222; Fortescue 2005: 399; Mudrak 2008: 29). Western (archaic *ənok-*, modern *əŋqa*), Eastern (*nak-*), Southern (*nak-*).

**Proto-Nivkh**. *V=du-nt* (Fortescue 2016: 152; Gruzdeva 1998: 28; Panfilov 1962: 253). Formally the same root as the demonstrative *du-* 'this' q.v. Initial morpheme *V-* (*i-*?) is also optionally seen in some other pronouns such as *ta-nt* 'which' or *ta-ŋz* 'how which'.

**Proto-Samoyed**. Not reconstructible. Samoyed languages have different words for 'what'. Proto-Samoyed *mэ* (Janhunen 1977: 91), whose reflexes function as an interrogative pronoun 'what' in Enets and Nganasan, was a noun 'thing, something' (with a related verb *mэ-* meaning 'to do something'), not an interrogative pronoun.

**Proto-Yukaghir**. *leme* (Nikolaeva 2006: 239) is retained in both modern Yukaghir languages alongside of the variant *neme*. Since both assimilation and dissimilation are typologically normal in such sequences, we take *leme ~ *neme* as synonyms.

97. 'white'.

**Proto-Yeniseian**. *tak-am* (S. Starostin 1995: 282). Preserved in all daughter languages, but morphologically restructured in Yugh. Probably derived from Proto-Yeniseian *tik* 'snow', but discrepancies in vocalism remain unexplainable.

**Proto-Athabaskan**. *=qay* is retained in all three branches.

**Eyak**. *xiƛ'-kaʔ*, literally 'snow-like', a transparent new formation.

**Proto-Athabaskan-Eyak**. *=qay* (Athabaskan).

**Proto-Eskimo**. *qatə-ʁ-* (Fortescue et al. 2010: 316), retained in Yupik and Inuit. In Yupik some lects, superseded with *qak-cuʁ-* (Fortescue et al. 2010: 303), derived from *qakə-* 'be bleached'

**Proto-Aleut**. *quṃa-l-* (Bergsland 1994: 335; Golovko 1994: 184), attested in all branches.

**Proto-Chukotian**. *ilɣə* (Fortescue 2005: 96), meaning 'white / clean', retained in all languages.

**Proto-Itelmen**. *atix-* (Volodin 2021: 43; Volodin, Khaloimova 2001: 16, 135; Volodin 1976: 320; Fortescue 2005: 77; Mudrak 2008: 25), Western, Eastern, Southern. At least in Western and Eastern, it has the wide semantics 'white, light, bright' (Eastern *d=atx-*, Dybowski & Radliński 1892: 143; here Southern *atui-t* 'clear (weather)', Dybowski & Radliński 1893a: 104).

**Proto-Nivkh**. *ɢon-u-* (Fortescue 2016: 67; Savelyeva, Taksami 1965: 65; Savelyeva, Taksami 1970: 140, 144).

**Proto-Samoyed**. *sэr* (Janhunen 1977: 138), retained in all daughter languages save Mator, goes back to Proto-Uralic *cʲэrki* 'white' (Aikio 2020: 126).

**Proto-Yukaghir**. *poy-nə,* derived from the root *poŋǯ-* (Nikolaeva 2006: 355; Zhivlov 2022a: 74), is retained in Kolyma as the main word for 'white' and in Tundra as a secondary synonym. Another, less likely, candidate is the main root for 'white' in Tundra, *ɲaːwə* (Nikolaeva 2006: 291), that has no cognates in Kolyma.

98. 'who?'.

**Proto-Yeniseian**. *ʔan-* (S. Starostin 1995: 181). Preserved only in Ket-Yugh; the Kott system of interrogative pronouns seems to have been restructured.

**Proto-Athabaskan**. *wə* 'who?' is never or almost never used alone and the whole situation mirrors the pronoun *yə* 'what?'. Most frequently, *wə* is accompanied with the generic interrogative morpheme *tɑː ~ *tɑ*. The sequence can be either *wə-tɑ* (such Northern lects as Tanaina, Upper Kuskokwim) or *tɑ-wə* as in PCA (as plausibly proposed in Krauss & Leer 1981: 88-89, Hupa *tan-t < ta-m-t*) and some Northern lects (e.g., Lower Tanana, Koyukon). Further see notes on 'what'.

**Eyak**. *tuː*, cognate to the Athabaskan sequences *tɑ-wə* 'what?', further Tlingit *ʔaː-tuː* 'who?', see notes on 'what'.

**Proto-Athabaskan-Eyak**. *we* (Athabaskan, Eyak).

**Proto-Eskimo**. *\*ki-na* (Fortescue et al. 2010: 190), retained in all branches. The final element *-na* is detachable. Cognate to the Aleut term.

**Proto-Aleut**. *\*kiːn* (Bergsland 1994: 239; Bergsland 1997: 81; Golovko 1994: 221), attested in all branches. Comparison with Eskimo *\*ki-n* 'who?' suggests that the final *-n* is a fossilized suffix.

**Proto-Chukotian**. *\*mi-kä* (Fortescue 2005: 175), retained in all languages. Consists of two interrogative morphemes, cf., e.g., *\*mi-ŋ-kə* 'where' (Fortescue 2005: 176). The second element can be cognate to the Itelmen term.

**Proto-Itelmen**. *\*k'e* (Volodin 2021: 124; Volodin, Khaloimova 2001: 165; Fortescue 2005: 175; Mudrak 2008: 96). Paradigm: *\*k'e* [dir.] / *\*k'e-n-* [obl., poss.] (attested in Western and Eastern). Can be cognate to the Chukotian term.

**Proto-Nivkh**. *\*nat* (Fortescue 2016: 111; Gruzdeva 1998: 28; Panfilov 1962: 253).

**Proto-Samoyed**. *\*ke-* (Janhunen 1977: 69), retained in Nenets, Enets, Mator and Kamass, goes back to Proto-Uralic *\*ke-* 'who'.

**Proto-Yukaghir**. *\*kin* (Nikolaeva 2006: 211–212) is retained in both modern Yukaghir languages.

99. 'woman'.

**Proto-Yeniseian**. *\*qem* (S. Starostin 1995: 266). Preserved in Ket-Yugh and, most likely, in Arin; possibly also in Pumpokol, if the attested word for 'wife' in that language had the same root as 'woman'. In Kott-Arin, there is another stem for the meanings 'woman' and 'wife', functioning on its own in Kott (*alit*) and as part of a compound with the older word for 'woman' in Arin (*\*qem-alit*, with various assimilations and reductions in the actual attested dialectal forms). There are no parallels for this *\*ʔalit* in Ket-Yugh, and it is not clear why Arin turned the old word into a compound, and Kott retained only the newer part of this compound, but from the point of view of cognate distribution, this is the most economic scenario.

**Proto-Athabaskan**. Besides various descriptive new formations (such as 'apron on to her' in Hupa or 'a one having a hole' in Apachean), the main candidate is the widely attested stem *\*čʼ̣eːʔ-qʰeː* 'woman'. It means 'woman' in many Northern languages, it is also attested in Apachean, although usually not as the main term for this meaning. Its first element is the root *\*čʼ̣eːʔ* 'female' normally used as the second element of compounds (female of an animal). The second element *\*-qʰeː* is also attested in other expressions for 'woman' in PCA languages: Mattole *yaŋ-kʰʼeh* 'woman' (*yaŋ* 'female(?)'), Taldash Galice *c'ãː-kʰeː* 'woman' (*c'ãː* '?').

In the light of Eyak *qʰeʔɬ* 'woman' (can be analyzed as *qʰeʔ-ɬ* with a common desemanticized suffix), Proto-Athabaskan *\*-qʰeː* looks like an old term for 'woman' which should be projected at least onto the Proto-Athabaskan-Eyak level.

On the other hand, *\*čʼ̣eːʔ-qʰeː* can originally be the collective form 'women' with the plural/collective suffix *\*-qʰeː* which is attested as a relic in the Pacific Coast and Apachean subgroups, applicable specifically to a few kinship terms. The weak point of this analysis, that such new formations as Mattole *yaŋ-kʰʼeh* 'woman' and Taldash Galice *c'ãː-kʰeː* 'woman' should also be treated as fossilized plural forms spread into the singular number. It is somewhat suspicious that the plural form 'women' recursively acquires the singular meaning in Athabaskan (firstly in Pre-Proto-Athabaskan, then in Mattole, Taldash Galice).

**Eyak**. *qʰeʔ-ɬ*, comparison with the Athabaskan data suggests that final *-ɬ* should be the common nominal suffix *-ɬ*.

**Proto-Athabaskan-Eyak**. *\*qʰeː* (Athabaskan?, Eyak), *\*k'ʷeː* (Athabaskan).

**Proto-Eskimo**. *\*aʁna-ʁ* (Fortescue et al. 2010: 47), retained in Yupik and Inuit.

**Proto-Aleut**. *\*ayaɣa-χ* (Bergsland 1994: 115; Golovko 1994: 207), attested in all branches.

**Proto-Chukotian**. *\*ŋäv-* (Fortescue 2005: 195) means 'female', expressions for 'woman' are based on it in all languages.

**Proto-Itelmen**. Cannot be reconstructed with certainty. Western (Napana) *ŋimsx ~ mimsx*, (Sedanka) *wimsx ~ yimsx* 'woman' (Dybowski & Radliński 1893b: 139; Volodin 2021: 51, 172, 191; Volodin, Khaloimova 2001: 153; Fortescue 2005: 195) is derived from Itelmen *\*ŋi-* 'female (of animal), wife' (Volodin 2021: 192; Fortescue 2005: 195; Mudrak 2008: 146) with the help of the rare kinship suffix *\*-sx* and an unclear element *-m-*. Virtual *\*ŋi-m-sx* is the best candidate, since *\*ŋi-* has obvious Chukotian *comparanda*, but formally the suffixed stem *\*ŋi-m-sx* can represent a local Western innovation. In other languages, unetymologizable forms are attested: Eastern *čid ~ čide-č* 'female (of animal), woman' (Dybowski & Radliński 1892: 139), Southern *kenižax* 'woman' (Dybowski & Radliński 1893a: 111).

**Proto-Nivkh**. *\*taŋq* (Fortescue 2016: 146; Savelyeva, Taksami 1970: 393; Peiros, Starostin 1986: 146). In Amur, superseded with unclear *umgu* 'woman' (Fortescue 2016: 158; Savelyeva, Taksami 1965: 140; Savelyeva, Taksami 1970: 393).

**Proto-Samoyed**. *\*ne* (Janhunen 1977: 100), retained in all Samoyed languages, goes back to Proto-Uralic *\*näγi* 'woman'.

**Proto-Yukaghir**. *\*pay* (Nikolaeva 2006: 340) is retained in both modern Yukaghir languages.

100. 'yellow'.

**Proto-Yeniseian**. Not reconstructible: the Ket word *qɜlʸ-ay-sʸ* is transparently derived from 'gall', the Kott word *šuy* is the same as 'moon', the Pumpokol word *tul-si* is the same as 'red'.

**Proto-Athabaskan**. *\*=cʰuχ* 'green; yellow' is retained in all three branches as basic 'yellow'.

**Eyak**. *χəwaː-cʰeʔqʼ-kaʔ*, literally 'dog urine-like', a transparent new formation.

**Proto-Athabaskan-Eyak**. *\*=cʰuχ* (Athabaskan).

**Proto-Eskimo**. Cannot be reconstructed with certainty. Cf. Inuit *\*quq-yuɣ ~ \*quq-cuʁ* 'yellow(ish)', lit. 'urine-like' (Fortescue et al. 2010: 348).

**Proto-Aleut**. *\*čum-nux* (Bergsland 1994: 153; Golovko 1994: 152), attested in all branches, polysemy: 'yellow / brown / gray'. Morphologically unclear.

**Proto-Chukotian**. Not reconstructible with certainty.

**Proto-Itelmen**. Not reconstructible with certainty. Cf. Western *fl-* 'green / light blue / yellow' (Dybowski & Radliński 1893b: 103), later 'green / blue' (Volodin 2021: 271; Fortescue 2005: 337), modern *žoltoy* 'yellow' < Russian (Volodin 2021: 56); cf. comm. on 'green'. Eastern unclear *pintxlʸu* 'yellow' (Dybowski & Radliński 1892: 194).

**Proto-Nivkh**. *\*evrq-wala-* (Fortescue 2016: 57; Savelyeva, Taksami 1965: 140; Savelyeva, Taksami 1970: 476). Literally 'tinder-colored' from *\*evrq* 'tinder, amadou'.

**Proto-Samoyed**. *\*tɒsV- ~ \*cpsV*, attested in Tundra Nenets, Forest Enets and Nganasan.

**Proto-Yukaghir**. *\*ɲor-inə-* (Nikolaeva 2006: 311), retained in Tundra. This is the only possible candidate, since Kolyma Yukaghir word for 'yellow' is derived from the noun 'fox'. The root *\*ɲor-* may be compared to Proto-Samoyed *\*ɲar-* 'red' (Janhunen 1977: 107–108).

101. 'far'.

**Proto-Yeniseian**. *\*biːr₁* (S. Starostin 1995: 211). Preserved in Ket-Yugh and Kott.

**Proto-Athabaskan**. *\*=zɑːt* is retained in all three branches.

**Eyak**. *qə=ƛaː=ʔaːw*, based on the verb *=ʔaːw* 'long', thus apparently a new formation.

**Proto-Athabaskan-Eyak**. *\*=saːt* (Athabaskan).

**Proto-Eskimo**. *\*uŋa-ðiɣ-* (Fortescue et al. 2010: 408), an Inuit term, derived from the bound root *\*uŋa-* 'area beyond (partition)' plus the suffix *\*-ðiɣ* 'being far in a direction'. An unstable item in Yupik.

**Proto-Aleut**. *\*amaː-txa-l-* (Bergsland 1994: 60; Golovko 1994: 27), attested in Eastern and Atkan. Derived from the locative word *\*ama-* 'away, out of sight'.

**Proto-Chukotian**. *\*əyava* (Fortescue 2005: 339), retained in all languages.

**Proto-Itelmen**. *\*tʼał-* (Volodin 2021: 257; Volodin, Khaloimova 2001: 92; Volodin 1976: 339; Fortescue 2005: 283), attested as Western *tʼał-* 'distant, far (adv.)' (not a basic term for 'far' at least in modern Napana) and Eastern *tal-k* 'distant, far (adv.) (oddalony, daleki,

remotus, longinquus; daleko, longe)' (Dybowski & Radliński 1892: 201) (is it a basic term for 'far' in Eastern?).

The second candidate is *meč'a- (Volodin 2021: 175; Volodin, Khaloimova 2001: 60; Volodin 1976: 340, 341, 342; Stebnitsky 1934: 102; Fortescue 2005: 257), a basic term for 'far' in Western: according to Volodin 1976: 340, 341, meč'a- 'far' forms a pair with tmal- 'near' in modern Napana Western. The weakness of Western meč'a- is that it lacks reliable cognates in other languages (cf. Southern biča-skik 'to stay with smb., to be a guest' which is problematic semantically).

Cf. other forms without etymology: Eastern tada-ko 'far (adv.) (daleko, longe)' (Dybowski & Radliński 1892: 200), Southern nizk (n=iz-k?) 'far' (Dybowski & Radliński 1893a: 115) without etymology.

**Proto-Nivkh.** *tə-l-v- (Fortescue 2016: 154; Savelyeva, Taksami 1965: 123; Savelyeva, Taksami 1970: 388). Derived from the verb *tə- 'to be far' (Savelyeva, Taksami 1970: 387) with the help of the same suffix as *ma-la- 'near' from *ma- 'to be near' (q.v.).

**Proto-Samoyed.** *kuntə-kɒ (Janhunen 1977: 78), retained in all languages save Nenets, is derived from *kuntə 'long, length'.

**Proto-Yukaghir.** *yuː-kə (Nikolaeva 2006: 199) is retained in Kolyma, Chuvan and Tundra.


102. 'heavy'.

**Proto-Yeniseian.** *səɢ- (S. Starostin 1995: 273). Preserved in all daughter languages, but not attested in Pumpokol.

**Proto-Athabaskan.** *=tɑːs is retained in all three branches.

**Eyak.** =taːs, cognate to Athabaskan.

**Proto-Athabaskan-Eyak.** *=taːs (Athabaskan, Eyak).

**Proto-Eskimo.** *uqi-ma-ŋit- (Fortescue et al. 2010: 414), retained in Yupik and Inuit. Eventually from *uqiɣ 'heaviness', but morphological details are not entirely cleat (*-ŋit is a negative suffix).

**Proto-Aleut.** *kayaɣ-na-l- (Bergsland 1994: 234; Golovko 1994: 60), attested in Eastern and Atkan. According to the examples in Bergsland & Dirks 1978, this is the basic term for 'heavy' in Eastern. Derived from the bound root *kayaɣ- 'heavy' (Bergsland 1994: 234). In Atkan, almost superseded with the new formation *iɣna-tu-l- (Bergsland 1994: 179; Golovko 1994: 47), attested however in Eastern as well, which is derived from *iɣna-χ 'weight'.

**Proto-Chukotian.** *itčə- ~ *iččə- (Fortescue 2005: 94), retained in all languages.

**Proto-Itelmen.** *kaz- (Volodin 2021: 87; Volodin, Khaloimova 2001: 215; Fortescue 2005: 369). Western, Eastern, Southern.

**Proto-Nivkh.** *ber- (Fortescue 2016: 22; Savelyeva, Taksami 1965: 428; Savelyeva, Taksami 1970: 257).

**Proto-Samoyed.** *säcɿ (Janhunen 1977: 139) is retained in Nenets, Enets, Mator, Kamass and Selkup.

**Proto-Yukaghir.** Kolyma *nigey- ~ *niŋgəy- (Nikolaeva 2006: 299) vs. Tundra *iraʎə- (Nikolaeva 2006: 462).


103. 'near'.

**Proto-Yeniseian.** *ʔuti ~ *xuti (S. Starostin 1995: 201). Preserved only in Ket-Yugh. In Kott, PY *ʔuti 'near' is preserved in the adverbial form uti-ga 'here'. Lack of parallels in Arin means that the Proto-Yeniseian equivalent of the Ket-Yugh forms could have been *ʔuti or *xuti.

**Proto-Athabaskan.** The postposition *=ʁan 'near, by' or its derivatives *=ʁaːn-eː, *=ʁaːn-ʁ-eː 'near' are attested in Northern and Apachean.

**Eyak.** =taː- (postoposition).

**Proto-Athabaskan-Eyak.** *=χan (Athabaskan), *=tV (Eyak).

**Proto-Eskimo.** *qanə-t- (Fortescue et al. 2010: 309), retained in Yupik and Inuit.

**Proto-Aleut**. *am̦i-ʁ-* (Bergsland 1994: 65; Bergsland & Dirks 1978: 86), probably the basic expression for 'near' in Eastern. In Atkan, the negated new formation *amaːtxa-laka-n* 'near' is used (Bergsland 1994: 60; Golovko 1994: 27), lit. 'not far'.

**Proto-Chukotian**. There are two similar candidates. First, *čəmčä-* (Fortescue 2005: 52), a basic root for 'near' in Chukchi (Inenlikei 2005), meaning 'neighboring' in Koryak. Second, *äymə- ~ *čäymə-* (Fortescue 2005: 28), a basic root for 'near' in Koryak (Zhukova 1990: 109) and Alutor (Kibrik et al. 2004: 518), meaning 'to approach' in Chukchi and Kerek. Fortescue is apparently correct that the original shape of the latter root is *äymə-* and the initial *č-* in is the result of influence on the part of *čəmčä-*. We treat both roots as synonyms.

**Proto-Itelmen**. *tɨmal-* (Volodin 2021: 239; Volodin, Khaloimova 2001: 136; Volodin 1976: 340, 341; Fortescue 2005: 298). Western *tmal* 'near'. In Eastern (Dybowski's records), the root is retained as the comparative degree *ka=tmal* 'nearer (bliżej; propius)' (*ka-* = Western superlative *xi- ~ xe-*?) and in some derivatives such as *tamli-zan* 'twins', *timil-zik* 'to bring closer'.

Distinct from the Eastern-Southern match without Western cognates: Eastern *dulu-k* 'near', Southern *duu-k* 'near' (Dybowski & Radliński 1892: 146; Dybowski & Radliński 1893a: 107; Volodin 2021: 239; Fortescue 2005: 379).

**Proto-Nivkh**. *ma-la-* (Fortescue 2016: 100; Savelyeva, Taksami 1965: 69; Savelyeva, Taksami 1970: 173). Derived from *ma-* 'to be near' (Savelyeva, Taksami 1970: 172), the same suffix as in *tə-l-v-* 'far' from *tə-* 'to be distant' (q.v.).

**Proto-Samoyed**. *wan-i-* (Helimski 1997: 301) is retained in Enets, Mator and Kamass.

**Proto-Yukaghir**. *meː-kə* (Nikolaeva 2006: 262–263) is retained in Kolyma and Chuvan; its Tundra cognate means 'till, up to'. The Tundra word *e-yuoke* 'near' means literally 'not far'.


104. 'salt'.

**Proto-Yeniseian**. *čəʔ* (S. Starostin 1995: 216. Preserved in Ket-Yugh and in Kott (as part of a compound). Arin and Pumpokol *tus* 'salt' are borrowed from Turkic.

**Proto-Athabaskan**. An unstable item which cannot be reconstructed with certainty.

**Eyak**. *tiːyaʔ*, morphologically unclear, perhaps a new formation.

**Proto-Athabaskan-Eyak**. Not reconstructible.

**Proto-Eskimo**. *taʁəyu-ʁ* (Fortescue et al. 2010: 364), retained in all branches. Cognate to the Aleut term, if not a loan in any direction.

**Proto-Aleut**. *taʁayu-χ* (Bergsland 1994: 384; Bergsland & Dirks 1978: 171; Golovko 1994: 116), attested in Eastern and Atkan; suspiciously close to Proto-Eskimo *taʁəyu-ʁ* 'salt', so can be an Eskimo loan. A more frequent Eastern term for 'salt' is *alaʁi-χ*, whose Common Aleut meaning is 'sea, ocean' (Bergsland 1994: 50; Bergsland & Dirks 1978: 82). It is possible that the concept 'salt' should not be reconstructed for Proto-Aleut at all.

**Proto-Chukotian**. Superseded with Russian or Eskimo loanwords.

**Proto-Itelmen**. *pim-* (Fortescue 2005: 387). Dybowski offers the following forms: Eastern *ipipman ~ pipem ~ pipim* 'salt', *pipip-kmexlin* 'salty', *pipme-sik* 'to salt', Western and Southern *pibɨ* 'salt'. Dybowski's Western *pibɨ* is probably an error or a Southern loan; Fortescue 2005: 387 quotes Klaproth's Western *penpöm* 'salt', which is not found in *Asia Polyglotta* however. All these forms can be explained as various reduplication patterns of initial *pim* with occasional assimilation and, in some cases, influence on the part of *piŋ-piŋ* 'ashes' (q.v.). Modern Western *solʸ* 'salt' (Volodin 2021: 223) < Russian.

**Proto-Nivkh**. The Nivkh forms for 'salt' which can formally traced to Proto-Nivkh *davɨt(-iŋ)* (Fortescue 2016: 41) represent a Tungusic loanword: Orok *dawsũ*, Evenki *dawasun*, Nanai *daosõ*, etc., all 'salt'. In their turn, the Tungusic forms have been borrowed from Mongolic.

**Proto-Samoyed**. *sǝr (Janhunen 1977: 138), the Proto-Samoyed word for 'ice', in Nenets, Enets and Nganasan also means 'salt'. Mator and Kamass words for 'salt' are borrowed from Turkic, Selkup word for 'salt' is apparently an Iranian loan.

**Proto-Yukaghir**. *logo- (Nikolaeva 2006: 246) is attested as a first part of several old Kolyma and Chuvan compounds glossed as 'salt'. The second part of the Chuvan compound means 'water', the second parts of old Kolyma compounds cannot be identified. Modern Tundra and Kolyma words for 'salt' are Russian borrowings.

**Proto-Burushaski**. *bayu was borrowed in Balti, Domaaki (as *payu*) and the Shina dialects neighboring Burushaski (as *pažu*, probably due to contamination with *paž-* 'to cook'), apparently not *vice versa* since *payu* lacks Indo-Aryan etymology and there is an inherited term for 'salt' in other Dardic lects (Anton Kogan, p.c.).

105. 'short'.

**Proto-Yeniseian**. A single candidate is not selectable: Ket-Yugh *pɔʔl 'short' and Kott tʰuːki (< *tuk?) have more or less equal chances at representing the Proto-Yeniseian item.

**Proto-Athabaskan**. An unstable item.

**Eyak.** =tik'.

**Proto-Athabaskan-Eyak**. *=tik' (Eyak).

**Proto-Eskimo**. *nani-t- (Fortescue et al. 2010: 233), retained in Yupik and Inuit.

**Proto-Aleut**. *aðu-laka- (Bergsland 1994: 14; Golovko 1994: 219), attested in all branches. Literally 'not long' from *aðu-l- 'long' (q.v.).

**Proto-Chukotian**. *ikmǝ- (Fortescue 2005: 95), retained in all languages. Cognate to the Itelmen term.

**Proto-Itelmen**. Not reconstructible with certainty, because the concept is only documented for modern Western: ikǝm- 'short' (Volodin 2021: 62; Volodin, Khaloimova 2001: 163; Fortescue 2005: 95) < virtual *ikǝm-, related to the Chukotian term. If Western ikǝm- is inherited, the Chukotian cognates prove its Proto-Itelmen status, but alternatively ikǝm- can be a Chukotian loan.

**Proto-Nivkh**. *bǝʁaq- (Fortescue 2016: 25; Savelyeva, Taksami 1965: 188; Savelyeva, Taksami 1970: 298). Morphologically unclear.

**Proto-Samoyed**. *kǝym (Janhunen 1977: 51) is retained in all Samoyed languages.

**Proto-Yukaghir**. *mon-nǝ-, derived from the root *monmǝ- (Nikolaeva 2006: 275) is attested in Tundra Yukaghir. The Kolyma word čitnǝdin=yukoː- 'short' means literally 'small to long' (Nikolaeva 2006: 134).

106. 'snake'.

**Proto-Yeniseian**. Not reconstructible. The original meaning of Proto-Ket-Yugh *čiːk, considering the external evidence and distribution of cognates, must have been 'fish' q.v. Kott-Arin *ʔaŋ-koy is clearly a composite formation where the second component is *koy 'worm' q.v., and the first one remains unclear.

**Proto-Athabaskan**. *ƛ'ǝʁǝš is retained in all three branches, morphologically unclear.

**Eyak.** χuhχ-ʔa-ʔluw-yuː, literally 'big worm', a new formation.

**Proto-Athabaskan-Eyak**. Not reconstructible.

**Proto-Eskimo**. Not reconstructible.

**Proto-Aleut**. Not reconstructible, superseded with loans.

**Proto-Chukotian**. Not reconstructible.

**Proto-Itelmen**. Not reconstructible.

**Proto-Nivkh**. *gǝl-ǝ-ŋa (Fortescue 2016: 64; Savelyeva, Taksami 1965: 162; Savelyeva, Taksami 1970: 126). Lit. 'long animal' from *gǝl- 'long' q.v. and *ŋa 'animal' (Fortescue 2016: 117). Cf. the same pattern in *bǝy-ŋa 'bird', lit. 'flying animal'.

**Proto-Samoyed**. *ki-wä (Janhunen 1977: 72), retained as a word for 'snake' only in Selkup, goes back to Proto-Uralic *küyi-wä 'snake' (Aikio 2002: 43–44).

**Proto-Yukaghir**. Not reconstructible.

107. 'thin'.

**Proto-Yeniseian**. *$pakse$-$m$ 'thin 2D' (S. Starostin 1995: 245). Preserved in all daughter languages where attested, but not found in Arin or Pumpokol. In Proto-Yeniseian, as in attested languages, the word must have been applied to flat objects. Morphological segmentation of the stem into *$pak$-$si$-$m$ is conditioned by external comparison; Yeniseian-internally, *-$m$ is indeed a derivational suffix, but *$pakse$- (or *$paksi$-) functioned as a monolithic stem already in Proto-Yeniseian. Distinct from *$tɔq$- 'thin 1D' (S. Starostin 1995: 287). Preserved in all daughter languages where attested, but not found in Arin or Pumpokol. In Proto-Yeniseian, as in attested languages, the word must have been applied to 1D-objects.

**Proto-Athabaskan**. The main candidates are *=$t'a:n\text{?}$, *=$t'a:n$-$e:$ 'thin 2D' (all three branches; looks like a denominative from *=$t'a:n\text{?}$ 'leaf', thus Leer) and *=$č'e:q'$ 'thin 1D' (Northern and likely Pacific Coast, if Mattole =$č'ix$ is related).

**Eyak.** =$c^hic$-$k$.

**Proto-Athabaskan-Eyak**. *=$t'a:n\text{?}$, *=$č'e:q'$ (Athabaskan), *=$c^hi:c$ (Eyak). If Nikolaev is correct and PA *=$č'e:q'$ is to be compared with Eyak =$č'ã:q$ 'to be weak' (the correspondence *$q'$ / $q$ is irregular), the PAE should be reconstructed as *=$č'Vnq'$. Leer (2010: 179) compares Eyak =$c^hic$-$k$ with Tlingit =$k^héx^w$-$k^w$ 'light, fluffy', if so the PAET form should be *=$k^{yh}Vk^y$.

**Proto-Eskimo**. Only tentative reconstruction can be proposed due to inconsistence of the available lexicographic data. Provisionally we fill the slot with two terms. Firstly, *$ami$-$t$- (Fortescue et al. 2010: 26) which means 'to be narrow / to be thin 1D' in Yupik and simply 'to be narrow' in Inuit. Secondly, *$caγə$-$t$- (Fortescue et al. 2010: 67), which means 'to be thin 2D / to be thin 1D' in Inuit, not attested in Yupik.

**Proto-Aleut**. Reconstruction is based on the Atkan data: *$iʁiχ$-$s$- ~ *$iʁiʁi$-$ða$-$l$- 'to be thin 1D' (Bergsland 1994: 185; Golovko 1994: 48), *$iča:$-$qi$-$ða$-$l$- 'to be thin 2D' (Bergsland 1994: 170; Golovko 1994: 56). In Eastern, both terms are superseded with negated new formations: $hanatu$-$laka$- and $a:ntu:ða$-$laka$-, both literally mean 'not thick' (Bergsland 1994: 70).

**Proto-Chukotian**. The opposition *$γət$- 'thin 1D' (Fortescue 2005: 91) / *$vəlγə$- 'thin 2D' (Fortescue 2005: 319) can be safely reconstructed. This system is generally retained in Chukchi, Koryak, Alutor.

**Proto-Itelmen**. *$kčon^y$- 'thin' (Volodin 2021: 112; Volodin, Khaloimova 2001: 36; Fortescue 2005: 395). The lexical opposition between 'thin 1D' and 'thin 2D' is only documented for modern Napana Western, according to Volodin's data: $kčon^y$- 'thin 1D (as of log)' (Volodin 2021: 112; Volodin, Khaloimova 2001: 36), $ol^ywe$- 'thin 2D (as of skin)' (Volodin 2021: 195; Volodin, Khaloimova 2001: 67).

For other varieties, only a single term is known, which is glossed as generic 'thin' in the available sources: modern Sedanka Western $kčon^y$- (Ono 2003: 18), Eastern $doxčalalo$ (Dybowski & Radliński 1892: 145), Southern $čun$-$am$ (Dybowski & Radliński 1893a: 106). Thus, it is most likely that *$kčon^y$-, attested at least as Western $kčon^y$- and Southern $čun$-, can be reconstructed as generic 'thin' for Proto-Itelmen (Fortescue 2005: 395). Most recently, Napana Western has introduced the general opposition 'thin 1D' / 'thin 2D' under the Chukotian influence and borrowed $ol^ywe$- 'thin 2D' from one of the continuants of Chukotian *$vəlγə$- 'thin 2D' (Fortescue 2005: 319). Dybowski also offers Napana Western $olge$- 'naked', which is phonetically compatible with modern $ol^ywe$- 'thin 2D', but semantically is too distant.

**Proto-Nivkh**. *$nok$- 'thin 1D' (Fortescue 2016: 112; Savelyeva, Taksami 1965: 421; Savelyeva, Taksami 1970: 212) is opposed to *$hizk$-$i$-$la$- 'thin 2D' (Fortescue 2016: 75; Savelyeva, Taksami 1970: 428). In East and South Sakhalin, *$nok$- acquires the shape *$nozk$- under the influence on the part of *$hizk$-.

**Proto-Samoyed**. *$yɒptɒ$ (Janhunen 1977: 38) is retained in Nenets, Enets, Nganasan, Mator and Selkup.

**Proto-Yukaghir**. Tundra *čöŋgə-, also attested in Kolyma, but not as the main word for 'thin' (Nikolaeva 2006: 140) vs. Kolyma *keywə- (Nikolaeva 2006: 204).

108. 'wind'.
**Proto-Yeniseian**. *bey (S. Starostin 1995: 208). Preserved in all daughter languages.
**Proto-Athabaskan**. *=ɬ=č̣'əy, literally 'it blows' (sometimes modified with locative prefixes, e.g., 'it blows along'), is retained in all three branches.
**Eyak**. k'u:y, apparently cognate to Athabaskan.
**Proto-Athabaskan-Eyak**. *k'ʷey (Athabaskan, Eyak).
**Proto-Eskimo**. *anuqə (Fortescue et al. 2010: 33), retained in Yupik and Inuit.
**Proto-Aleut**. *sla-χ (Bergsland 1994: 367; Golovko 1994: 189), attested in Eastern and Atkan.
**Proto-Chukotian**. *kətə=yɣ (Fortescue 2005: 155), attested as a basic term in all languages. Historically 'strong wind' with *kət 'hard' (Fortescue 2005: 152) and *yəɣə- 'wind' (Fortescue 2005: 119), the latter root is scarcely retained with the meaning 'wind', although in the majority of cases it has shifted into the meaning 'cool, cold (of weather)'.
**Proto-Itelmen**. *sʸɨpəl (Volodin 2021: 225; Volodin, Khaloimova 2001: 140; Fortescue 2005: 400; Mudrak 2008: 192). Western, Eastern, Southern.
**Proto-Nivkh**. *la (Fortescue 2016: 92; Savelyeva, Taksami 1965: 82; Savelyeva, Taksami 1970: 152).
**Proto-Samoyed**. *märkä (Janhunen 1977: 93) is retained in all daughter languages save Nganasan.
**Proto-Yukaghir**. *iʎe-yə (Nikolaeva 2006: 172) is retained in both modern Yukaghir languages.

109. '(earth)worm'.
**Proto-Yeniseian**. *koy (S. Starostin 1995: 242). Preserved only in Kott (although the Arin and Pumpokol equivalents are simply not attested). In Ket, replaced in the meaning 'worm' by ut'iɣ, a compound of 'snake' with an unclear first component (see notes on the Ket form); in Yugh, replaced by ɔllɨ 'worm / small insect', cognate with Ket ɔləŋəs 'spider', indicating a more generic term than simply 'worm'.
**Proto-Athabaskan**. A very tangled situation with three similar roots each of which can denote 'worm, maggot' or 'insect in general (incl. worms)': *qu:, *qu:χ, *qu:n. Relationship between them is unclear, it could be a rare and non-productive suffixation or mutual phonological influence. Note that these roots have two potential Eyak *comparanda*, although sound correspondences and phonological details are not entirely clear: Eyak χuhχ (< *χunχ) 'insect (incl. worms)', qəma: 'maggot'.
    From the distributive point of view, *qu: (PCA, Northern) and *qu:χ (Apachean, Northern) can be projected onto the Proto-Athabaskan level with the meaning 'worm' or 'insect (incl. worms)', whereas *qu:n with the meaning 'worm' looks like a local Northern innovation.
**Eyak**. χuhχ.
**Proto-Athabaskan-Eyak**. *qu: ~ *qu:χ (Athabaskan), *χunχ (Eyak; we follow Leer 2008a and reconstruct a medial nasal on account of vowel aspiration in Eyak). Theoretically, Athabaskan *qu:χ can go back to *χunχ, if *q- the result of either dissimilation χ-χ > q-χ or influence on the part of unrelated *qu:.
**Proto-Eskimo**. Not reconstructible, 'earthworm' is an unstable and poorly documented concept. Cf. Proto-Eskimo *qupəl-ʁuʁ 'worm (e.g., in meat), maggot' (Fortescue et al. 2010: 347) and *quma-ʁ 'intestinal worm' (Fortescue et al. 2010: 344).
**Proto-Aleut**. *iχči-χ 'worm (in general)' (Bergsland 1994: 185; Golovko 1994: 56, 286), attested in Eastern and Atkan.
**Proto-Chukotian**. There are two main candidates. First, *kəmʁə (Fortescue 2005: 148), meaning 'worm (generic)' in Chukchi and apparently Kerek. Second, *ənɣäm (Fortescue 2005: 343), meaning 'worm (generic)' in Koryak and Alutor. The second one seems to be cognate

to the Itelmen term, so it has a better chance to represent a Proto-Chukotian term. Nevertheless, we prefer to treat both as synonyms.

**Proto-Itelmen**. Not reconstructible with certainty. The available sources, from Pallas to modern dictionaries, quote a bulk of various forms, which are glossed simply as 'worm' (without further specialization) and usually lack cognates in other Itelmen languages, see Fortescue 2005: 343. The most promising is Western *xim-wim* 'worm (in earth, meat, etc.)' < virtual *\*xim* (Volodin 2021: 277; Volodin 1976: 108; Ono 2003: 102; Fortescue 2005: 343), since it can be related to Chukotian *\*ənɣäm* 'worm(?)'. We prefer to leave the slot empty.

**Proto-Nivkh**. *\*perŋ* (Fortescue 2016: 133; Savelyeva, Taksami 1970: 284; Tangiku et al. 2008: 31) is a generic term for 'worm' and '(crawling) insect'. At least in Amur and East Sakhalin, this seems to be a default expression used for 'worn'.

**Proto-Samoyed**. *\*cʉk ~ \*cʉkə* (Janhunen 1977: 34) is attested as the main word for 'worm' and 'insect' in Mator and Selkup. Its Nenets and Enets cognates mean rather 'fly / larva of a fly'. The main word for 'worm' in Nenets and Nganasan, *\*kələ-*, lacks cognates in Southern languages. We list both words as synonyms.

**Proto-Yukaghir**. *\*köɲǯə* (Nikolaeva 2006: 218) is attested in Kolyma, Chuvan and Tundra, although its Kolyma reflex is not the main word for 'worm' in that language. Kolyma *\*keli-ɲǯə* (Nikolaeva 2006: 205) lacks cognates in other languages.

110. 'year'.

**Proto-Yeniseian**. *\*sɨɢa* (S. Starostin 1995: 275). Preserved in all daughter languages. S. Starostin has proposed that *\*-ɢa* is an old suffixal element, present also in such words denoting time as *\*si-ɢ* 'night' q.v., *\*xiʔ-ɢ* 'day' (see 'sun'), but this is questionable.

**Proto-Athabaskan**. *\*χaɣ* 'winter / year' is retained in all three branches.

**Eyak.** *leh q-ʔya*, a descriptive formation based on the preverb *leh* 'through complete seasonal cycle' which is the main meaningful morpheme here.

**Proto-Athabaskan-Eyak**. *\*χaɣ* (Athabaskan).

**Proto-Eskimo**. *\*ukyu-ʁ* (Fortescue et al. 2010: 397), retained in Yupik and Inuit, polysemy 'year / winter'.

**Proto-Aleut**. *\*slu-χ* (Bergsland 1994: 368), attested in all branches, polysemy 'summer / year'. Also the world *\*qanax ~ \*qanɣi-χ* 'winter' can be used with polysemy 'winter / year' (Bergsland 1994: 308) in all branches.

**Proto-Chukotian**. *\*təɣivi* (Fortescue 2005: 292), retained in all languages, except for Kerek. Cognate to the Itelmen term.

**Proto-Itelmen**. *\*txaz^y* (Volodin 2021: 246; Fortescue 2005: 292; Mudrak 2008: 211). Western, Eastern, Southern. Cognate to the Chukotian term.

**Proto-Nivkh**. *\*aɲi* (Fortescue 2016: 14; Savelyeva, Taksami 1965: 117; Savelyeva, Taksami 1970: 33). Resembles Proto-Tungusic *\*aŋŋa-ni:* 'year', but it can be an accidental similarity, since the stems for 'year' in the neighboring Tungusic languages are phonetically far from the Nivkh forms: Orok *anaɲɪ*, Evenki *anŋani:*, Nanai *ayŋanɪ*.

**Proto-Samoyed**. *\*poə* (Janhunen 1977: 127) is retained in all daughter languages.

**Proto-Yukaghir**. Not reconstructible. The Kolyma word *ɲə=molʁil* 'year' consists of the reciprocal marker *ɲə-* and the word *molʁil* 'joint'. Tundra Yukaghir has an extremely polysemous word *sukun* 'clothes / stuff / ground / sky / weather / year / age / world / life / fact / event' that can also form a compound with the Tundra word for 'joint': *sukun-moʎʁal* 'year / age'.

# 8. Transcription system

The [transcription system](#) of the *Global Lexicostatistical Database* used in the present paper.

Table S11. Principal consonants

| Place → | Labial | | Coronal | | | | Dorsal | | | Radical | | Glottal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ↓ Manner | Bilabial | Labiodental | Dental | Alveolar | Postalveolar | Retroflex | Palatal | Velar | Uvular | Pharyngeal | Epiglottal | Glottal |
| Nasal | m | ɱ | n̪ | n | | ɳ | ɲ | ŋ | ɴ | | | |
| Plosive | p b | p̪ b̪ | t̪ d̪ | t d | | ʈ ɖ | ȶ ȡ | k g | q ɢ | | ʡ | ʔ |
| Implosive | ɓ | | ɗ̪ | ɗ | | | ʄ | ɠ | ʛ | | | |
| Ejective | p' | | t̪' | t' | | | c' | k' | q' | | | |
| Fricative | ɸ β | f v | θ ð | s z | š ž | ʂ ʐ | ~ʃ ʑ | x ɣ | χ ʁ | ħ ʕ | ʜ ʢ | h ɦ |
| Affricate | | pf bv | tθ dð | c ʒ | č ǯ | cˌ ʒ | ɕ ʑ | kˣ gˠ | qˣ ɢʁ | | | |
| Approximant | ʍ w | | | ɹ | | ɻ | j | ɰ | | | | |
| Trill | | | | r | | | | | ʀ | | | |
| Flap | | ⱱ | | ɾ | | ɽ | | | ɢ̆ | | | |
| Lateral fric. | | | | ɬ ɮ | | | | | | | | |
| Lateral affr. | | | | | | | | | | | | |
| Lateral appr. | | | | l | | ɭ | ʎ | ʟ | | | | |

 **Notes:**
1. Most of the coronal affricates have been modified from IPA's original notation in order to reduce the number of digraphs.
2. For languages with no phonological opposition between dental and alveolar stops, it is recommended to mark dental plosives as *t*, *d*, in order to avoid extra diacritics.

3. Palatal and alveo-palatal fricatives are transcribed by the exact same symbols (~ʃ, ʒ), since we are not aware of any single language that phonologically opposes the two. Since (s with curl) is a non-Unicode symbol, it is permissible to use ʃ as a compatible replacement.

4. The palatal approximant is transcribed as *y* rather than IPA's *j*, for better transparency reasons (*j* is used to denote an affricate in many of the world's transcription systems).

Table S12. Clicks

| Efflux type | Labial | Dental | Palatal | Alveolar | Retroflex | Lateral |
|---|---|---|---|---|---|---|
| Zero (velar) efflux | ʘ | ǀ | ǂ | ! | !! | ǁ |
| Voiced efflux | ʘ̬ ~ gʘ | ǀ̬ ~ gǀ | ǂ̬ ~ gǂ | !̬ ~ g! | !!̬ ~ g!! | ǁ̬ ~ gǁ |
| Nasalized efflux | ʘ̃ ~ ŋʘ | ǀ̃ ~ ŋǀ | ǂ̃ ~ ŋǂ | !̃ ~ ŋ! | !!̃ ~ ŋ!! | ǁ̃ ~ ŋǁ |
| Glottalized efflux | ʘ' | ǀ' | ǂ' | !' | !!' | ǁ' |
| Aspiration | ʘʰ | ǀʰ | ǂʰ | !ʰ | !!ʰ | ǁʰ |
| Delayed aspiration | ʘ'ʰ | ǀ'ʰ | ǂ'ʰ | !'ʰ | !!'ʰ | ǁ'ʰ |
| Preglottalized | ʔʘ̃ ~ ʔŋʘ | ʔǀ̃ ~ ʔŋǀ | ʔǂ̃ ~ ʔŋǂ | ʔ!̃ ~ ʔŋ! | ʔ!!̃ ~ ʔŋ!! | ʔǁ̃ ~ ʔŋǁ |
| Velar fricative | ʘx | ǀx | ǂx | !x | !!x | ǁx |
| Velar affricate | ʘkx | ǀkx | ǂkx | !kx | !!kx | ǁkx |

**Notes**:

1. The retroflex click symbol is not included in IPA; it is, however, attested as an independent phoneme in North Khoisan languages and is represented here by the traditionally used symbol (double exclamation mark).

2. Transcription of the various types of click effluxes is not standardized in the IPA. For the voiced and nasalized effluxes we use R. Vossen's system (voicing = tilde below the click; nasalization = tilde above the click), but those fonts that lack these symbols may em-ploy the alternate tradition of preceding the click symbol with a *g* or *n*, respectively (it is also advisable to use a non-standard graphic form of these letters, e. g. ɡ and ŋ, for technical recoding reasons).

3. Several of the efflux types can have slightly different manners of articulation and, accordingly, different transcriptions in various systems, such as: (a) the "zero" efflux, in most of the old sources, is perceived as a "velar" efflux, and the clicks are accordingly marked as ǀk, ǂk etc.; this norm is nowadays deemed phonetically incorrect, and most transcriptions simply supply the basic click symbol without any accompaniments; (b) the "velar fricative" and "velar affricate" effluxes, in some languages, are recognized as reflecting uvular articulation and, accordingly, transcribed as ǀχ, ǀqχ, ǂχ, ǂqχ, etc. This distinction is not, however, known to have any phonological relevance in any living or reconstructed Khoisan language.

Table S13. Vowels

| | Front | | Central | | Back | |
|---|---|---|---|---|---|---|
| | Plain | Rounded | Plain | Rounded | Plain | Rounded |
| Close (high) | i | ü | ɨ | ʉ | ɯ | u |
| Near close (high) | ɪ | ʏ | | | | ʊ |
| Close (high) mid | e | ö | ɘ | ɵ | ɤ | o |
| Mid | | | ə | | | |
| Open (low) mid | ɛ | œ | ɜ | ɞ | ʌ | ɔ |
| Near open (low) | ä | | ɐ | | | |
| Open (low) | | | a | | ɑ | ɒ |

**Notes**:
1. The IPA symbols *y*, *ø*, and *æ* have been replaced by umlaut letters *ü*, *ö*, and *ä* respectively (this is particularly important for *y*, which is used in the UTS to denote the consonantal palatal approximant).
2. In many languages, vocalic articulation is either too blurry or too poorly described to allow the transcriber to make a single deci-sive choice (e. g. when choosing between ɘ and ə). In general, we recommend sticking to the more «common» vocalic symbols, frequently employed in phonological transcription, avoiding more rare symbols like ʉ, ʏ, ɘ, ɵ, ɜ, ɞ, ɐ, ɒ, etc., <u>unless</u> it is quite clear that the sounds in question make up individual phonemes or at least transparently clear and phonetically stable allophones.

Table S14. Secondary articulation features

| Syllabic | ◌̩ | ɹ̩ n̩ | Non-syllabic | ◌̯ | e̯ ʊ̯ |
|---|---|---|---|---|---|
| Aspirated | ◌ʰ | tʰ dʰ | No audible release | ◌̚ | d̚ |
| Nasal release | ◌ⁿ | dⁿ | Lateral release | ◌ˡ | dˡ |
| Voiceless phonation | ◌̥ | n̥ d̥ | Voiced phonation | ◌̬ | s̬ t̬ |

| Breathy voice | ◌̤ | b̤ a̤ | Creaky voice | ◌̰ | b̰ a̰ |
|---|---|---|---|---|---|
| Labialized | ◌ʷ | tʷ dʷ | Palatalized | ◌ʲ | tʲ dʲ |
| Nasalized | ◌̃ | ẽ z̃ | Pharyngealized | ◌ˤ | tˤ aˤ |

**Notes**:
1. Several secondary features prescribed by IPA have been omitted from this table for their non-phonological nature. (In case of need, they can always be reinstated).
2. Breathy articulation for vowels can be alternately marked as aspiration ($a^h$, $e^h$, etc.).

Table S15. Suprasegmental features

| Primary stress (before stressed vowel) | ˈa | Secondary stress (before stressed vowel) | ˌa |
|---|---|---|---|
| Length | aː kː | Half-length | aˑ |
| Extra-short | ă | Syllable break | a.a |
| Minor (foot) break | \| | Major (intonation) break | ‖ |
| Global rise | ↗ | Global fall | ↘ |
| Extra high tone | ŋ̋ e̋ ~ e˥ | Upstep | ꜛke |
| High tone | ŋ́ é ~ e˦ | Downstep | ꜜke |
| Mid level tone | ŋ̄ ē ~ e˧ | Rising | ŋ̌ ě |
| Low level tone | ŋ̀ è ~ e˨ | Falling | ŋ̂ ê |
| Extra low tone | ŋ̏ ȅ ~ e˩ | Various contour tones | ɛ̄, ɛ̃... |

**Notes**:
1. It is permissible to mark tone-bearing syllables with number schemes (e. g. **pa¹**, **maŋ²**, etc.), but only if the exact phonetic infor-ma-tion on the tonal scheme cannot be found in available information sources.
2. The stress, as stated in the table, should be placed before the *vowel* rather than the accented syllable (i. e., *patˈa*, not *paˈta*).
3. In languages with three degrees of vowel length, extra-long vowels should be marked as long, and long vowels as half-long.

# 9. References

Aikio, Ante. 2002. New and old Samoyed etymologies. *Finnisch-Ugrische Forschungen* 57. 9–57.

Aikio, Ante. 2014. The Uralic-Yukaghir lexical correspondences: genetic inheritance, language contact or chance resemblance? *Finnisch-Ugrische Forschungen* 62. 7–76.

Aikio, Ante. 2020. Uralic etymological dictionary (draft version of entries A–Ć). https://www.academia.edu/41659514/ (18 December, 2022).

Anderson, Gregory D. S. 2004. The languages of Central Siberia: Introduction and overview. In Edward J. Vajda (ed.), *Languages and prehistory of Central Siberia* (Amsterdam Studies in the Theory and History of Linguistic Science v. 262), 1–119. Amsterdam: John Benjamins.

Baxter, William H. & Alexis Manaster Ramer. 2000. Beyond lumping and splitting: probabilistic issues in historical linguistics. In Colin Renfrew, April McMahon & Larry Trask (eds.), *Time depth in historical linguistics*, vol. 2, 167–188. Cambridge, England: McDonald Institute for Archaeological Research.

Berge, Anna. 2016. Lexical Differentiation in Aleut (Unangam Tunuu). Paper presented at Frontiers of Early Human Expansion in Asia: Linguistic Perspectives on Ainu, Japan, and the North Pacific Rim, Zurich, 13–14 March 2016. Handout available at https://www.academia.edu/30870719.

Berge, Anna. 2018. Re-evaluating the reconstruction of Proto-Eskimo-Aleut. *Journal of Historical Linguistics* 8(2). 230–272. doi:10.1075/jhl.17017.ber.

Berger, Hermann. 1998. *Die Burushaski-Sprache von Hunza und Nager* (Neuindische Studien 13). 3 vols. Wiesbaden: Harrassowitz.

Bergsland, Knut. 1986. Comparative Eskimo-Aleut phonology and lexicon. *Journal de la Société Finno-Ougrienne* 80. 63–137.

Bergsland, Knut. 1989. Comparative aspects of Aleut syntax. *Journal de la Société Finno-Ougrienne* 82. 7–80.

Bergsland, Knut. 1994. *Aleut dictionary*. Fairbanks, Alaska: Alaska Native Language Center, University of Alaska Fairbanks.

Bergsland, Knut. 1997. *Aleut grammar* (Alaska Native Language Center Research Paper no. 10). Fairbanks, Alaska: Alaska Native Language Center, University of Alaska Fairbanks.

Bergsland, Knut & Moses Dirks. 1978. *Qawalangim tunugan kaduuĝingin / Eastern Aleut grammar and lexicon*. Anchorage, Alaska: University of Alaska.

Ceolin, Andrea. 2019. Significance testing of the Altaic family. *Diachronica* 36(3). 299–336. doi:10.1075/dia.17007.ceo.

Ceolin, Andrea, Cristina Guardiano, Giuseppe Longobardi, Monica Alexandrina Irimia, Luca Bortolussi & Andrea Sgarro. 2021. At the boundaries of syntactic prehistory. *Philosophical Transactions of the Royal Society B: Biological Sciences* 376(1824). doi:10.1098/rstb.2020.0197. https://royalsocietypublishing.org/doi/10.1098/rstb.2020.0197 (19 May, 2023).

Cook, Eung-Do & Keren D. Rice. 1989. Introduction. In Eung-Do Cook & Keren D. Rice (eds.), *Athapaskan linguistics: current perspectives on a language family* (Trends in Linguistics. State of-the-Art Reports 15), 1–62. Berlin: Mouton de Gruyter.

Driem, George van. 2001. *Languages of the Himalayas: an ethnolinguistic handbook of the greater Himalayan region containing an introduction to the symbiotic theory of language* (Handbook of Oriental Studies, Section 2 South Asia 10). 2 vols. Leiden: Brill.

Dunn, Michael & Angela Terrill. 2012. Assessing the lexical evidence for a Central Solomons Papuan family using the Oswalt Monte Carlo Test. *Diachronica* 29(1). 1–27. doi:10.1075/dia.29.1.01dun.

Dybo, Anna V. & George S. Starostin. 2008. In defense of the comparative method, or the end of the Vovin controversy. *Aspects of comparative linguistics*, vol. 3, 119–258. Moscow: RSUH Publishers.

Dybowski, Benedykt & Ignacy Radliński. 1892. Słowniki narzeczy ludów kamczackich: Słownik narzecza Kamczadałów, zamieszkałych nad rzeką Kamczatką. *Rozprawy Akademii umiejętności, Wydział filologiczni, Serya II* 1. 130–217.

Dybowski, Benedykt & Ignacy Radliński. 1893a. Słowniki narzeczy ludów kamczackich: Słownik narzecza Kamczadałów południowych. *Rozprawy Akademii umiejętności, Wydział filologiczni, Serya II* 2. 103–122.

Dybowski, Benedykt & Ignacy Radliński. 1893b. Słowniki narzeczy ludów kamczackich: Słownik narzecza Kamczadałów zachodnich. *Rozprawy Akademii umiejętności, Wydział filologiczni, Serya II* 3. 81–164.

Enrico, John. 2005. *Haida dictionary: Skidegate, Masset, and Alaskan dialects*. 2 vols. Fairbanks, AK: Alaska Native Language Center.

Fortescue, Michael. 1984. *West Greenlandic*. London: Croom Helm.

Fortescue, Michael. 1998. *Language relations across Bering Strait: reappraising the archaeological and linguistic evidence* (Open Linguistics Series). London: Cassell.

Fortescue, Michael. 2003. Diachronic typology and the genealogical unity of Chukotko-Kamchatkan. *Linguistic Typology* 7. 51–88.

Fortescue, Michael. 2005. *Comparative Chukotko-Kamchatkan dictionary*. Berlin: De Gruyter.

Fortescue, Michael. 2016. *Comparative Nivkh dictionary* (Languages of the World. Dictionaries 62). München: LINCOM GmbH.

Fortescue, Michael, Steven Jacobson & Lawrence Kaplan. 2010. *Comparative Eskimo dictionary: with Aleut cognates* (Research Paper / Alaska Native Language Center no. 9). 2nd ed. Fairbanks, AK: Alaska Native Language Center, University of Alaska Fairbanks.

Georg, Stefan. 2008. Yeniseic languages and the Siberian linguistic area. In Alexander Lubotsky, Jos Schaeken, Jeroen Wiedenhof, Rick Derksen & Sjoerd Siebinga (eds.), *Evidence and Counter-Evidence: Essays in Honour of Frederik Kortlandt* (Studies in Slavic and General Linguistics 33), vol. 2, 151–168. Amsterdam: Rodopi.

Georg, Stefan & Aleksandr P. Volodin. 1999. *Die itelmenische Sprache: Grammatik und Texte* (Tunguso-Sibirica 5). Wiesbaden: Harrassowitz.

Golovko, Evgenii V. 1994. *Slovar' aleutsko-russkij i russko-aleutskij (beringovskij dialekt) [Aleut-Russian and Russian-Aleut dictionary (Bering Island dialect)]*. Saint Petersburg: Prosveshchenie.

Golovko, Evgenii V., Nikolai B. Vakhtin & A. S. Asinovskiy. 2009. *Jazyk komandorskikh aleutov. Dialekt ostrova Beringa [Language of the Commander Islands Aleuts. Bering Island dialect]*. Saint Petersburg: Nauka.

Gruzdeva, Ekaterina. 1998. *Nivkh* (Languages of the World 111). München: LINCOM EUROPA.

Gruzdeva, Ekaterina. 2022. On Diversification of Nivkh Varieties. 北方言語研究 *[Northern Language Studies]* Special Volume. 25–33.

Hattori, Takesi. 1962a. Versuch einer Phonologie des Sudostgiljakischen (I): Phonembestand und Verteilung. *Journal of Hokkaido University of Education. Section 1-A Humanities* 13(1). 67–130.

Hattori, Takesi. 1962b. Versuch einer Phonologie des Sudostgiljakischen (II): Alternation. *Journal of Hokkaido University of Education. Section 1-A Humanities* 13(2). 29–96.

Hattori, Takesi. 1962c. Bemerkungen zur Phonologie des Südostgiljakischen. 音声科学研究 = *Studia phonologica* 2. 1–26.

Helimski, Eugen A. 1976. O sootvetstvijax ural'skix a- i e-osnov v tazovskom dialekte sel'kupskogo jazyka [On the reflexes of the Uralic a- and e-stems in the Taz dialect of Selkup]. *Sovetskoe finno-ugrovedenie* 12(2). 113–132.

Helimski, Eugen A. 1982. *Drevnejšie vengersko-samodijskie jazykovye paralleli [Ancient linguistic parallels between Hungarian and Samoyed]*. Moscow: Nauka.

Helimski, Eugen A. 1997. *Die matorische Sprache : Wörterverzeichnis, Grundzüge der Grammatik, Sprachgeschichte* (Studia Uralo-Altaica 41). Szeged: Department of Altaic Studies, University of Szeged.

Helimski, Eugen A. 2005. The 13th Proto-Samoyedic vowel. In Beáta Wagner-Nagy (ed.), *Mikola-konferencia 2004*, 27–39. Szeged: SzTE Department of Finnougristics.

Holman, Eric W., Søren Wichmann, Cecil H. Brown, Viveka Velupillai, André Müller & Dik Bakker. 2008. Explorations in automated language classification. *Folia Linguistica* 42(3–4). doi:10.1515/FLIN.2008.331.

Inenlikei, Petr I. 2005. *Slovar' čukotsko-russkij i russko-čukotskij [Chukchi-Russian and Russian-Chukchi dictionary]*. 3rd ed. Saint Petersburg: Prosveshchenie.

Janhunen, Juha. 1977. *Samojedischer Wortschatz: gemeinsamojedische Etymologien* (Castrenianumin Toimitteita 17). Helsinki: Helsingin yliopisto: Suomalais-ugrilainen seura.

Jochelson, Waldemar. 1926. *The Yukaghir and the Yukaghirized Tungus* (Memoir of the American Museum of Natural History 9). Leiden: Brill / Stechert.

Kallio, Petri. 2004. Tocharian loanwords in Samoyed? In Irma Hyvärinen, Petri Kallio & Jarmo Korhonen (eds.), *Etymologie, Entlehnungen und Entwicklungen: Festschrift für Jorma Koivulehto zum 70. Geburtstag* (Mémoires de La Société Néophilologique de Helsinki 63), 129–137. Helsinki: Société Néophilologique.

Kari, James. 2010. The concept of geolinguistic conservatism in Na-Dene prehistory. In James Kari, Ben A. Potter, & et al. (eds.), *The Dene-Yeniseian connection* (Anthropological Papers of the University of Alaska 5), vol. 1–2, 194–222. Fairbanks, Alaska: University of Alaska Fairbanks.

Kassian, Alexei S. 2011a. Annotated Swadesh wordlists for the Athapaskan group (Na-Dene family). Ongoing project. In George S. Starostin (ed.), *Global lexicostatistical database*. http://starling.rinet.ru/cgi-bin/main.cgi?root=new100.

Kassian, Alexei S. 2011b. Annotated Swadesh wordlists for the Eyak group (Na-Dene family). In George S. Starostin (ed.), *Global lexicostatistical database*. http://starling.rinet.ru/cgi-bin/main.cgi?root=new100.

Kassian, Alexei S. 2011c. Annotated Swadesh wordlists for the Tlingit group (Na-Dene family). In George S. Starostin (ed.), *Global lexicostatistical database*. http://starling.rinet.ru/cgi-bin/main.cgi?root=new100.

Kassian, Alexei S. 2011d. Annotated Swadesh wordlists for the Haida group (Haida family). In George S. Starostin (ed.), *Global lexicostatistical database*. http://starling.rinet.ru/cgi-bin/main.cgi?root=new100.

Kassian, Alexei S. 2014. Lexical matches between Sumerian and Hurro-Urartian: possible historical scenarios. *Cuneiform Digital Library Journal* 004. https://cdli.ucla.edu/pubs/cdlj/2014/cdlj2014_004.html.

Kassian, Alexei S., George Starostin, Ilya M. Egorov, Ekaterina S. Logunova & Anna V. Dybo. 2021. Permutation test applied to lexical reconstructions partially supports the Altaic linguistic macrofamily. *Evolutionary Human Sciences* 3(e32). doi:10.1017/ehs.2021.28.

Kassian, Alexei S., George S. Starostin & Mikhail A. Zhivlov. 2015a. Proto-Indo-European-Uralic comparison from the probabilistic point of view. *Journal of Indo-European Studies* 43(3–4). 301–347.

Kassian, Alexei S., George S. Starostin & Mikhail A. Zhivlov. 2015b. Lexicostatistics, probability, and other matters. *Journal of Indo-European Studies* 43(3–4). 376–392.

Kessler, Brett. 2007. Word similarity metrics and multilateral comparison. *Proceedings of Ninth Meeting of the ACL Special Interest Group in Computational Morphology and Phonology*, 6–14. Prague, Czech Republic: Association for Computational Linguistics. https://aclanthology.org/W07-1302.

Kessler, Brett & Annukka Lehtonen. 2006. Multilateral comparison and significance testing of the Indo-Uralic question. In Peter Forster & Colin Renfrew (eds.), *Phylogenetic methods and the prehistory of languages*, 33–42. Cambridge, UK: McDonald Institute for Archaeological Research.

Kibrik, Aleksandr E., Sandro V. Kodzasov & Irina A. Muravyeva. 2004. *Language and folklore of the Alutor people* (Endangered Languages of the Pacific Rim A2-042). Kyoto: Nakanishi.

Kilani, Marwan. 2015. Calculating false cognates: An extension of the Baxter & Manaster-Ramer solution and its application to the case of Pre-Greek. *Diachronica* 32(3). 331–364. doi:10.1075/dia.32.3.02kil.

Kingston, John. 2005. The phonetics of Athabaskan tonogenesis. In Sharon Hargus & Keren Rice (eds.), *Athabaskan prosody* (Amsterdam Studies in the Theory and History of Linguistic Science 269), 136–184. Amsterdam: John Benjamins.

Koryakov, Yuri B. 2018. Problema «jazyk ili dialekt» i samodijskie jazyki [Language vs. dialect question and the Samoyedic languages]. *Ural-Altaic Studies* 31. 156–217.

Krauss, Michael E. 1965. Eyak: a preliminary report. *Canadian Journal of Linguistics* 10. 167–187.

Krauss, Michael E. 1976. Na-Dene. In Thomas A. Sebeok (ed.), *Native Languages of the Americas*, vol. 1, 283–358. New York: Springer.

Krauss, Michael E. 1977. Proto-Athabaskan-Eyak Fricatives and the First Person Singular. Alaska Native Language Archive, ms. https://www.uaf.edu/anla/record.php?identifier=CA961K1977a (1 January, 2019).

Krauss, Michael E. & Jeff Leer. 1981. *Athabaskan, Eyak, And Tlingit sonorants* (Alaska Native Language Center Research Papers 5). Fairbanks, Alaska: University of Alaska Fairbanks.

Kurebito, Tokusu, Megumi Kurebito, Yukari Nagayama, Chikako Ono & Mitsuhiro Yazu. 2001. *Comparative basic vocabulary of the Chukchee-Kamchatkan language family* (Endangered Languages of the Pacific Rim A2-011). Vol. 1. Suita, Japan: Faculty of Informatics, Osaka Gakuin University.

Kurilov, Gavril N. 2001. *Jukagirsko-russkij slovar' [Yukaghir-Russian dictionary]*. Novosibirsk: Nauka.

Kurilov, Gavril N. 2006. *Sovremennyj jukagirskij jazyk [The modern Yukaghir language]*. Yakutsk: Ofset.

Leer, Jeff. 1979. *A conversational dictionary of Kodiak Alutiiq*. Fairbanks, Alaska: University of Alaska Fairbanks.

Leer, Jeff. 1996. Comparative Athabaskan lexicon. Alaska Native Language Archive, ms. https://www.uaf.edu/anla/record.php?identifier=CA965L1996a (1 January, 2019).

Leer, Jeff. 2000. The negative/irrealis category in Athabaskan-Eyak-Tlingit. In Theodore B. Fernald & Paul R. Platero (eds.), *The Athabaskan languages: perspectives on a Native American language family* (Oxford Studies in Anthropological Linguistics 24), 101–138. Oxford [UK]; New York: Oxford University Press.

Leer, Jeff. 2008a. Proto-Athabascan nasal codas and Eyak aspirated vowels. In Tokusu Kurebito (ed.), *Linguistic typology of the North*, vol. 1, 1–16. Tokyo: Research Institute for Languages and Cultures of Asia and Africa, Tokyo University of Foreign Studies.

Leer, Jeff. 2008b. Recent advances in AET comparison. Handout presented at the Dene-Yeniseian Symposium, Fairbanks, AK. https://www.uaf.edu/files/anlc/leer-2008.pdf (28 November, 2018).

Leer, Jeff. 2010. The palatal series in Athabascan-Eyak-Tlingit, with an overview of the basic sound correspondences. In James Kari, Ben A. Potter, & et al. (eds.), *The Dene-Yeniseian connection* (Anthropological Papers of the University of Alaska 5), vol. 1–2, 168–193. Fairbanks, Alaska: University of Alaska Fairbanks.

MacLean, Edna Ahgeak. 2014. *Iñupiaq to English dictionary*. Fairbanks, Alaska: University of Alaska Press.

Maslova, Elena. 2003. *A grammar of Kolyma Yukaghir*. Berlin: Mouton de Gruyter.

McMahon, April M. S. & Robert McMahon. 2005. *Language classification by numbers* (Oxford Linguistics). Oxford NY: Oxford University Press.

Menovshchikov, Georgiy A. 1964. *Jazyk sirenikskix èskimosov (fonetika, očerk morfologii, teksty i slovar') [Language of the Sirenik Eskimos. Phonology, morphology sketch, texts, dictionary]*. Moscow: Nauka.

Menovshchikov, Georgiy A. 1988. *Slovar' èskimossko-russkij i russko-èskimosskij [Eskimo-Russian and Russian-Eskimo dictionary]*. Leningrad: Prosveshchenie.

Moll, Tatiana A. & Petr I. Inenlikei. 1957. *Čukotsko-russkij slovar' [Chukchi-Russian dictionary]*. Leningrad: Ministerstvo prosvescheniya.

Mudrak, Oleg A. 2000. *Ètimologičeskij slovar' čukotsko-kamčatskix jazykov [Etymological dictionary of the Chukotko-Kamchatkan languages]*. Moscow: Yazyki russkoy kultury.

Mudrak, Oleg A. 2005. Itelmen etymology. In Sergei A. Starostin (ed.), *The Tower of Babel. An etymological database project*. http://starling.rinet.ru/cgi-bin/main.cgi.

Mudrak, Oleg A. 2008. *Svod kamčadal'skoj leksiki po pamjatnikam XVIII veka [Compendium of Kamchadal words from the 18th century sources]*. Moscow: Vostochnaya Literatura.

Nagayama, Yukari. 2003. *Očerk grammatiki aljutorskogo jazyka [Grammatical outline of Alutor]* (Endangered Languages of the Pacific Rim A2-038). Kyoto: Nakanishi.

Nikolaev, Sergei L. 2014. Toward the reconstruction of Proto-Na-Dene. *Journal of Language Relationship* 11. 103–123.

Nikolaeva, Irina A. 2006. *A historical dictionary of Yukaghir* (Trends in Linguistics 25). Berlin: Mouton de Gruyter.

Ono, Chikako. 2003. *A lexicon of words and conversational phrases for the Itelmen Northern dialect* (Endangered Languages of the Pacific Rim A2-029). Kyoto: Nakanishi.

Oswalt, Robert L. 1970. The detection of remote linguistic relationships. *Computer Studies in the Humanities and Verbal Behavior* 3. 117–129.

Oswalt, Robert L. 1998. A probabilistic evaluation of North Eurasiatic Nostratic. In Joseph C. Salmons & Brian D. Joseph (eds.), *Nostratic: sifting the evidence*, 199–216. Amsterdam: Benjamins. (24 October, 2020).

Panfilov, Valery Z. 1962. *Grammatika nivxskogo jazyka [Grammar of the Nivkh language]*. Vol. 1. 2 vols. Moscow: AN SSSR.

Panfilov, Valery Z. 1965. *Grammatika nivxskogo jazyka [Grammar of the Nivkh language]*. Vol. 2. 2 vols. Moscow: AN SSSR.

Peiros, Ilya I. & Sergei A. Starostin. 1986. O tonax nivxskogo jazyka [On Nivkh tones]. In Petr Ya. Skorik (ed.), *Paleoaziatskie jazyki [Paleoasiatic languages]*, 213–218. Leningrad: Nauka.

Peust, Carsten. 2020. Significance testing of Na-Dene. *Mother Tongue* 22(1). 61–84. doi:10.1515/mot-2020-220106.

Pozdniakov, Konstantin I. 2014. O poroge rodstva i indekse stabil′nosti v bazisnoj leksike pri massovom sravnenii: atlantičeskie jazyki [On the threshold of relationship and the "stability index" of basic lexicon in mass comparison: Atlantic languages]. *Journal of Language Relationship* 11. 187–210.

Rice, Keren & Sharon Hargus. 2005. Introduction. In Sharon Hargus & Keren Rice (eds.), *Athabaskan prosody* (Amsterdam Studies in the Theory and History of Linguistic Science 269), 1–46. Amsterdam: John Benjamins.

Savelyeva, Valentina N. & Chuner M. Taksami. 1965. *Russko-nivxskij slovar' [Russian-Nivkh dictionary]*. Moscow: Sovetskaya entsiklopediya.

Savelyeva, Valentina N. & Chuner M. Taksami. 1970. *Nivxsko-russkij slovar' [Nivkh-Russian dictionary]*. Moscow: Sovetskaya entsiklopediya.

Shiraishi, Hidetoshi & Itsuji Tangiku. 2013. Basic Vocabulary of the Amur Dialect of Nivkh. 北方言語研究 *[Northern Language Studies]* 3. 201–212.

Shiraishi, Hidetoshi & Itsuji Tangiku. 2014. Basic Vocabulary of the Amur Dialect of Nivkh 2. 北方言語研究 [Northern Language Studies] 4. 173–184.

Shiraishi, Hidetoshi & Itsuji Tangiku. 2015. Basic Vocabulary of the Amur Dialect of Nivkh 3. 北方言語研究 [Northern Language Studies] 5. 215–226.

Skorik, Petr Ya. 1958. K voprosu o klassifikacii čukotsko-kamčatskix jazykov [On the classification of the Chukotko-Kamchatkan languages]. *Voprosy Jazykoznanija* 1. 21–35.

Skorik, Petr Ya. 1961. *Grammatika čukotskogo jazyka. Č. 1. Fonetika i morfologija imennyx častej reči [Chukchi grammar. Part 1. Phonology, nominal morphology]*. Moscow: AN SSSR.

Skorik, Petr Ya. 1977. *Grammatika čukotskogo jazyka. Č. 2. Glagol. Narečija. Služebnye slova [Chukchi grammar. Part 2. Verb, adverbs, auxiliary words]*. Leningrad: Nauka.

Starostin, George S. 2012. Dene-Yeniseian: a critical assessment. *Journal of Language Relationship* 8. 117–138.

Starostin, George S. 2013a. Annotated Swadesh wordlists for the Yeniseian group (Yeniseian family). In George S. Starostin (ed.), *Global lexicostatistical database*. http://starling.rinet.ru/cgi-bin/main.cgi?root=new100.

Starostin, George S. 2013b. Annotated Swadesh wordlists for the Burushaski group (Burushaski family). In George S. Starostin (ed.), *Global lexicostatistical database*. http://starling.rinet.ru/cgi-bin/main.cgi?root=new100.

Starostin, Sergei A. 1995. Sravnitel'nyj slovar' enisejskix jazykov [Comparative dictionary of the Yeniseian languages]. In Sergei A. Starostin (ed.), *Ketskij sbornik: lingvistika / Studia ketica: Linguistics*, 176–315. Moscow: Vostochnaya literatura.

Starostin, Sergei A. 2005a. Yenisseian etymology. In Sergei A. Starostin (ed.), *The Tower of Babel. An etymological database project*. http://starling.rinet.ru/cgi-bin/main.cgi.

Starostin, Sergei A. 2005b. Burushaski etymology. In Sergei A. Starostin (ed.), *The Tower of Babel. An etymological database project*. http://starling.rinet.ru/cgi-bin/main.cgi.

Starostin, Sergei A. 2007a. Opredelenie ustojčivosti bazisnoj leksiki [Defining the stability of basic lexicon]. *Trudy po jazykoznaniju [Works on linguistics]*, 827–839. Moscow: Jazyki slavjanskix kul'tur.

Starostin, Sergei A. 2007b. Praenisejskaja rekonstrukcija i vnešnie svjazi enisejskix jazykov [Proto-Yeniseian reconstruction and the external connections of the Yeniseian languages]. *Trudy po jazykoznaniju [Works on linguistics]*, 147–246. Moscow: Jazyki slavjanskix kul'tur.

Stebnitsky, S.N. 1934. Itel'menskij jazyk [Itelmen language]. In E.A. Kreinovich (ed.), *Jazyki i pis'mennost' narodov severa. Č. 3. Jazyki i pis'mennost' paleoaziatskix narodov [The language and literature of the people of the North. P. 3. The language and literature of the Paleoasiatic peoples]*, 85–104. Moscow: GUPI.

Taksami, Chuner M. 1996. *Slovar' nivxsko-russkij i russko-nivxskij [Nivkh-Russian and Russian-Nivkh dictionary]*. 2nd ed. Saint Petersburg: Prosveshchenie.

Tangiku, Itsuji, N. Ya. Tanzina & N. V. Nitkuk. 2008. *Basic vocabulary of the Sakhalin dialect of Nivkh language (Nogliki dialect)* (Asian and African Lexicon 51). Tokyo: Tokyo University of Foreign Studies.

Thomason, Sarah Grey & Terrence Kaufman. 1988. *Language contact, creolization, and genetic linguistics*. Berkeley: University of California Press.

Turchin, Peter, Ilya I. Peiros & Murray Gell-Mann. 2010. Analyzing genetic connections between languages by matching consonant classes. *Journal of Language Relationship* 3. 117–126.

Vajda, Edward J. 2001. *Yeniseian peoples and languages: a history of Yeniseian studies with an annotated bibliography and a source guide*. Richmond: Curzon.

Volodin, Aleksandr P. 1976. *Itel'menskij jazyk [Itelmen language]*. Leningrad: Prosveshchenie.

Volodin, Aleksandr P. 1997. Čukotsko-kamčatskie jazyki [Chukotko-Kamchatkan languages]. In Aleksandr P. Volodin (ed.), *Jazyki mira: paleoaziatskie jazyki [Languages of the World: Paleoasiatic languages]*, 12–22. Moscow: Indrik.

Volodin, Aleksandr P. 2021. *Polnyj itel'mensko-russkij slovar' [Complete Itelmen-Russian dictionary]*. (Ed.) Chikako Ono. Saint Petersburg: Verlag der Kulturstiftung Sibirien.

Volodin, Aleksandr P. & Klavdia N. Khaloimova. 2001. *Slovar' itel'mensko-russkij i russko-itel'menskij [Itelmen-Russian and Russian-Itelmen dictionary]*. 2nd ed. Saint Petersburg: Prosveshchenie.

Werner, Heinrich. 2002. *Vergleichendes Wörterbuch der Jenissej-Sprachen*. 3 vols. Wiesbaden: Harrassowitz.

Worth, Dean S. 1962. La place du kamtchadal parmi les langues soi-disant paleosiberiennes. *Orbis* 11. 579–599.

Zhivlov, Mikhail A. 2022a. Studies in Yukaghir etymology I. *Journal of Language Relationship* 20(1). 71–80.

Zhivlov, Mikhail A. 2022b. Pre-Proto-Yukaghir consonant clusters. *International Journal of Eurasian Linguistics* 4. 41–59.

Zhukova, Alevtina N. 1967. *Russko-korjakskij slovar' [Russian-Koryak dictionary]*. Moscow: Sovetskaya entsiklopediya.

Zhukova, Alevtina N. 1972. *Grammatika korjakskogo jazyka. Fonetika i morfologija [Koryak grammar: phonology, morphology]*. Leningrad: Nauka.

Zhukova, Alevtina N. 1990. *Slovar' korjaksko-russkij i russko-korjakskij [Russian-Koryak and Koryak-Russian dictionary]*. 2nd ed. Leningrad: Prosveschenie.