

On the reconstruction of Proto-Mari vocalism*

Two different theories regarding the Proto-Mari vowel system have been put forward by Erkki Itkonen and Gábor Berczki. This paper critically evaluates these theories and aims to establish a solidly argued reconstruction of Proto-Mari initial-syllable vocalism. It is argued that 11 distinct vowel phonemes must be reconstructed for Proto-Mari, as opposed to 13 reconstructed by Itkonen and 7 reconstructed by Berczki.

Keywords: Uralic languages, Mari language, language reconstruction, historical phonetics.

1. Introduction

Two quite different theories regarding the Proto-Mari vowel system and the development of first-syllable vocalism in Mari varieties have been put forward by Itkonen (1954) and Berczki (1994). The purpose of this paper is to critically evaluate these theories and to establish a solidly argued reconstruction of Proto-Mari vocalism. The older research history of Mari historical vocalism is reviewed by Itkonen (1954) and will not be discussed here.

Itkonen (1954) postulates thirteen vowels for Proto-Mari, whereas Berczki (1994) assumes only seven (Table 1).

Table 1. The Proto-Mari vowel system according to Itkonen (1954) and Berczki (1994).

	Itkonen 1954			Berczki 1994		
full:	i	ü	u	i	ü	u
	e	ö	o	e	ö	o
	ε		ǎ			a
	ä		a			
reduced:	ĩ (~ə)	ǔ	ũ			

It is interesting that two scholars have reached dramatically different conclusions regarding the Proto-Mari vowel system, as the Mari varieties are genetically very closely related to each other and show rather straightforward vowel correspondences. There are two key points of disagreement: the series of close reduced vowels postulated by Itkonen but rejected by Berczki, and the number of open or open-mid vowels (Itkonen's four vs. Berczki's one). Both questions will be reviewed below. In addition, the evidence for the reconstruction of the phoneme *ö will be examined, as in all Mari varieties /ö/ shows distributional peculiarities that suggest its secondary origin.

All Mari lexical material cited in this study derives from Moisio & Saarinen's *Tscheremisches Wörterbuch* (2008; henceforth TschWb). Forms are rendered in a broad near-phonologi-

* I am obliged to Juho Pystynen and an anonymous referee for remarks that have helped to improve this paper.

cal transcription, as a thorough analysis of Mari dialect phonology cannot be attempted in this paper. For the purpose of phonological reconstruction this seems justified, even though the possibility of errors in the simplification of the phonetic transcriptions in TschWb is a drawback. For ease of reading, reduced vowels other than schwa (*ə*, *â*) are indicated with a breve (*ĭ*, *ĭ̃*, *ũ*, *ö*) instead of sideways and rotated characters traditionally used in the Uralic Phonetic Alphabet. Mari can hardly be regarded a single language, but because the purpose of this study is not to address questions of dialect and language boundaries, the term ‘variety’ is used to refer to the traditional Mari regional lects.

2. The close reduced vowels

All the Mari varieties documented in TschWb, except for Bolshoj Kil’mez (Ki), possess reduced vowels in initial syllables that contrast phonologically with full vowels. The number of contrasting reduced vowels varies between one and three, as seen in Table 2.

Table 2. The reduced vowel phonemes in Mari varieties.

variety	reduced vowels
E (B Ka Kr M MU S)	/ə/
U	/ə ǔ ǔ̃/
V	/ǔ̃ ǔ̃ ǔ̃̃/
Nw	/ə ǔ̃ ö/
W	/ə â/

According to Itkonen (1954) the contrast between full and reduced vowels was already present in Proto-Mari. The most common reflexes of Itkonen’s Proto-Mari reduced and close full vowels in the attested varieties are shown in Table 3. As the table shows, in Ki all reduced vowels merged with full vowels, in E labial reduced vowels merged with full vowels, whereas U, V, Nw and W kept the reflexes of full and reduced vowels consistently apart (in W *ĭ and *ǔ merged, however).

Table 3. The most common reflexes of Proto-Mari close full and reduced vowels according to Itkonen’s (1954) reconstruction.

Proto-Mari	E	Ki	U	V	Nw	W
*ĭ (~ə)	ə	i	ə	ǔ̃	ə	ə
*ǔ̃	ũ	ũ	ǔ̃	ǔ̃	ǔ̃	ə
*ǔ̃̃	u	u	ǔ̃	ǔ̃	ö	â
*i	i	i	i	i	i	i
*ũ	ũ	ũ	ũ	ũ	ũ	ũ
*u	u	u	u	u	u	u

Bereczki (1994: 65–84) rejects Itkonen’s series of Proto-Mari reduced vowels, and maintains that attested reduced vowels represent secondary developments of original full vowels. His arguments for this view consist of two main points. First, according to Bereczki reduced vowels show irregular correspondences between Mari varieties, which would support their

secondary origin. Second, Berezcki claims that reduced vowels originated in loanwords from Turkic languages and then spread to native vocabulary; neighboring Chuvash and Tatar, which have heavily influenced Mari both structurally and lexically, possess a very similar contrast between full and reduced vowels. He summarizes his arguments for the secondary origin of reduced vowels as follows:

“In den benachbarten türkischen Sprachen, im Tschuwassischen und Tatarischen entwickelten sich aus den ursprünglichen Vokalen *i, *u, *ü die Vokale ə, ü, ũ, hier aber im gesamten Sprachgebiet und im jedem Wort. Im Tscheremissischen erscheinen diese Vokale in erster Linie in den tschuwassischen und tatarischen Lehnwörtern, in den ursprünglichen, eigenen Wörtern kommt sie seltener vor und oft variieren dialektal.” (Berezcki 1988: 337)

Berezcki’s claim that reduced vowels are rare in inherited Mari vocabulary is false, however. Lists of Uralic etymologies for Mari words with reduced vowels are given in Appendix B, and they include a total of 85 examples of inherited words with reduced vowels. In fact, reduced vowels are more common than close full vowels (*i, *ü, *u) in inherited vocabulary. We shall return to the Uralic background of reduced and close full vowels below.

Berezcki’s account of the history of reduced vowels in Mari presupposes that they are a product of irregular change, as his postulated changes *i > *ə, *ü > *ũ and *u > *ũ cannot be attributed to any conditioning factors. This is evident from the occurrence of words which in Itkonen’s reconstruction form minimal and semiminimal pairs between Proto-Mari close full and reduced vowels:

*u vs. *ũ

- E Ki *luḍo*, Nw W *luḍə* ‘gray’ (< *luḍə) vs. E Ki V (!) *luḍo*, U *lüḍö*, Nw *löḍö*, W *läḍə* ‘duck’ (< *lüḍə)
- E V U Nw W *šur* ‘horn’ (< *šur) vs. E Ki *šur*, V U *šür*, Nw *šör*, W *šär* ‘shit’ (< *šür)
- W *tul* ‘storm’ (< *tul) vs. E Ki *tul*, V U *tül*, Nw *töl*, W *täl* ‘fire’ (< *tül)
- E Ki U *šulḍo*, Nw W *šulḍə* ‘cheap’ (< *šulḍə) vs. E *šulḍor*, Ki *šulḍur*, V *šülḍür*, U *šulḍər* (!), Nw *šöḷḍör*, W *šälḍär* ‘wing’ (< *šülḍər)
- E Ki V U Nw W *kuškam* ‘I grow up’ (< *kuškam) vs. E Ki *kuškeḍam*, V U *küşkeḍam*, Nw *köškeḍäm*, W *käškeḍäm* ‘I tear apart’ (< *küşkeḍam)

*ü vs. *ũ

- E Ki V U *šüḍö*, Nw W *šüḍə* ‘hundred’ (< *šüḍə) vs. E *šüḍər*, Ki *šüḍür*, V U Nw *šüḍür*, W *šəḍər* ‘spindle’ (< *šüḍər)

*i vs. *ĩ

- E Ki V U Nw W *kiš* ‘resin’ (< *kiš) vs. E U Nw W *kəškem*, V *kĩškem*, Ki *kiškem* ‘I throw; I pour’ (< *kĩškem)

Let us first consider Berezcki’s argument that many words with first-syllable reduced vowels show irregular vowel correspondences between Mari varieties, and that the irregularities would support the idea that reduced vowels emerged through irregular sound change. In the examples above, for instance, there are two occurrences of irregular full vowels in cases where a reduced vowel is expected: V *luḍo* ‘duck’ and U *šulḍər* ‘wing’.

Berezcki (1994: 72) states that approximately 30 % of the words with reduced vowels show an irregular vowel reflex in at least one variety, which in his view supports the idea that vowel

reduction is a secondary phenomenon. This argument is fallacious, however: even if 30 % of the words show an irregular vowel in some variety, it does not follow that every reduced vowel in every variety is a product of irregular change. Berczki (1994: 69) also refers to varieties where there is synchronic variation between reduced and full vowels, and provides examples of his own fieldwork data from the Arbor variety, where variant forms such as *pūra* ~ *pura* ‘(s)he comes in’ and *īlāš* INF ~ *ilen* GER ‘live’ are attested even within a single idiolect. It is, however, difficult to see why such variation would support his conclusion that the distinction between full and reduced vowels arose through irregular sound change. It is a basic sociolinguistic fact that variation can result from many factors, including ongoing sound change and dialect coalescence. These weaknesses in Berczki’s argumentation already cast serious doubts on the validity of his account of the history of Mari reduced vowels.

It must be noted that if one intends to make statistical claims about regularity or irregularity, it is entirely uninformative to calculate the percentage of word-roots that show an irregular form in any arbitrary variety, because such a figure reveals nothing of the actual frequency of regular and irregular forms. Instead, the reflexes of assumed Proto-Mari reduced vowels must be separately studied in each Mari variety. In order to perform such a study, the word-roots for which a Proto-Mari reduced vowel (*ī, *ū, *ü) could be postulated in Itkonen’s system of reconstruction were compiled from TschWb, and the vowels attested for each root in each variety were put in tables. Recent borrowings (from Chuvash, Tatar, Permic and Russian) were excluded, as they include words that have spread between already differentiated Mari varieties and may thus exhibit irregularities. The data is given in Appendix A.

Let us first consider reduced rounded vowels. As only V, U, Nw and W contrast the reflexes of reduced rounded vowels with full ones, data from other varieties is irrelevant here. Figures indicating the absolute number and relative frequency of irregular reflexes of PMari *ū and *ü in the four varieties are given in Tables 4 and 5. As we are primarily interested in the phenomenon of vowel reduction here, numbers and percentages of cases of failed vowel reduction (i.e., a full vowel occurring where a reduced one is expected) have also been separately calculated. A part of the irregularities in the material are not directly related to vowel reduction: there are also instances of unexpected vowel quality (e.g., W *kāpš* ‘nap, fuzz’ instead of expected **kāpš* < PMari **kūpš*, cf. E *kūpš*, V Nw *kūpš*) and complete vowel loss (e.g., the reflexive pronoun *ške* ~ *aške*, Ki *iške* < **iške*). The rare instances of vowel loss have been counted as occurrences of reduced vowels, as it appears evident that they have involved a reduced vowel as an intermediate stage.¹ Instances where both a regular and an irregular form is attested (e.g., Nw *kūžū* ~ *küzü* ‘knife’ < PMari **kūčə*, cf. E *küzö*, W *kəzə*) have been counted as half an occurrence of both.

As Tables 4 and 5 show, the presence of a reduced vowel as the reflex of Itkonen’s PMari *ū and *ü is in most cases quite consistent, with reduction regularity rates in the range of 87–95%. A curious exception is formed by the reflexes of *ü in the Upsha variety, where there is remarkable inconsistency between *ü* (26,5 occurrences) and *ū* (45 occurrences). This variation

¹ As pointed out by the anonymous referee, some words that would superficially seem to exhibit vowel loss rather seem to involve loanwords in which a prothetic vowel was added for phonotactic reasons in some varieties of Mari: cf. E *ūžara*, V *ūžara*, U *žara*, Nw *žärä*, W *žerä* ‘red sky, dawn, dusk’ (< Russian *заря* ‘dawn, dusk’), E *žawa*, *užawa*, V *žawa*, U *ūžawa*, Nw *žawa*, *āžawa*, W *žawa* ‘toad’ (< Russian *жаба* ‘toad’). To this group one can also count E *uškal*, V *uškal*, U *skal*, *uškal*, Nw W *āškal*, *skal* ‘cow’. This word has been considered cognate with Mordvin *skal* and Udmurt *iskal*, *āskal*, *skal*, *sikal* ‘cow’, supposedly reflecting a proto-form **uskal*V (UEW: 805; HPUL: 552). In light of the irregular sound correspondences this is not justified; the forms rather look like recent nativizations of a non-Uralic word of the shape **skal*, but the source of the word remains unknown.

Table 4. The regularity of reflexes of PMari *ũ in V, U, Nw and W Mari.

Proto-Mari *ũ	U	V	Nw	W	all varieties
total reflexes	135	98	126	129	488
irregular reflexes	16	14,5	21,5	13	65
irregular full vowels	12	9,5	6	6	33,5
regularity rate	88%	85%	83%	90%	87%
reduction regularity rate	91%	90%	95%	95%	93%

Table 5. The regularity of reflexes of PMari *ũ̄ in V, U, Nw and W Mari.

Proto-Mari *ũ̄	U	V	Nw	W	all varieties
total reflexes	72	63	67	71	273
irregular reflexes	27	11	13,5	7	58,5
irregular full vowels	26,5	8	4,5	4	43
regularity rate	63%	83%	80%	92%	79%
reduction regularity rate	63%	87%	93%	94%	84%

Table 6. The regularity of reflexes of PMari *ĩ in Mari varieties.

Proto-Mari *ĩ	B	Kr	Ka	S	M	MU	U	V	Nw	W	all
total reflexes	110	75	68	109	105	82	113	89	105	108	964
irregular reflexes	19	16,5	16	20,5	12,5	9	17,5	9,5	16	7	143,5
irregular full	13	13,5	14	19,5	11,5	6	5	2	6	5	95,5
irregular reduced	4,5	0,5	1	—	—	2	—	—	—	—	8
regularity rate	83%	78%	76%	81%	88%	89%	85%	89%	85%	94%	85%
reduction regularity	84%	81%	78%	82%	89%	90%	96%	98%	94%	95%	89%

obviously has some special explanation, but as the Upsha material in TschWb was originally recorded by Yrjö Wichmann from a single informant, it is difficult to say anything definite about the issue without additional sources of data.

Next, let us consider the case of Itkonen's PMari *ĩ, which can be reflected as a reduced vowel (*ɘ*; in V *ɨ*) in all varieties except for Ki which lacks reduced vowels altogether. However, as discussed by Itkonen (1954: 225–238), there is also a notable number of cases which show *i* as the reflex of *ĩ in several East Mari varieties. Judging from the material in Appendix A, the regular reflex of Itkonen's *ĩ would seem to be B Kr Ka *i* when followed by PMari *ć and B Kr Ka M MU S *i* when followed by the cluster *ńć. There are also instances of E *i* in other environments: in initial position, after *j-, before palatalized consonants and adjacent to *š, for example. These do not seem to be explicable as results of regular development, even though there obviously are tendencies based on the consonant environment. Taking *ć and *ńć as regular conditioning factors into account, the regularity rates of the reflexes of *ĩ in Mari varieties turn out to be as shown in Table 6.

As the figures in Tables 4–6 are put together, we have 1725 attested reflexes of Itkonen's PMari reduced vowels *ĩ, *ũ̄ and *ũ in Mari varieties that contrast these reflexes with full vowels. Of these reflexes 1545 (90%) are regular in terms of vowel reduction, i.e. a reduced vowel

occurs where expected, and in East Mari a full vowel as the reflex of *ĩ occurs in those environments where expected.

These figures reveal the inadequacy of Berezcki's account of the history of Mari reduced vowels: in his model all occurrences of reduced vowels have to be interpreted as having undergone an irregular change, whereas only the exceptional occurrences of full vowels would represent regular development. In Berezcki's theory, of course, also those word-roots that have close full vowels according to Itkonen's reconstruction could be added to the instances of regular development, but because such roots are fewer in number than roots displaying reduced vowels, the presence of vowel reduction would still remain more common than its absence. While Itkonen's reconstruction successfully explains 90% of the material, the explanatory power of Berezcki's model is virtually nil: by postulating rampant irregular sound change, it provides no actual explanation to either the presence or the absence of a reduced vowel in any single word-root.

It bears mentioning that there is yet another fatal problem in Berezcki's argument: as already shown by Itkonen (1954), Mari reduced and close full vowels have different Uralic origins. This becomes evident by examining the etymologies for Mari words which have the PMari vowel *i, *ĩ, *ü, *ũ, *u or *ũ according to Itkonen's reconstruction. In this connection we can ignore Mari monosyllabic vocalic roots of Uralic origin, as due to a phonotactic restriction reduced vowels do not occur in Mari stems of the type *CV-. The remainder of the etymological material (see Appendix B) allows the following two generalizations to be made.

- 1) PMari *ĩ and *ũ are reflexes of PU close and mid front vowels (*i, *ü and *e), whereas PMari *i and *ü are reflexes of PU *ä and *j. There appears to be one minor conditioned exception: PU *jä- and *nä- can be reflected as PMari *jĩ-.
- 2) PMari *ũ is the reflex of PU *u, whereas PMari *u occurs as the reflex of PU *o. There is a conditioned exception: PMari *ũ can also reflect PU *o when adjacent to a labial consonant (*p, *m or *w).

Most of the regular correspondences between Mari reduced vowels and their Uralic predecessors that underlie these generalizations had already been discovered by Itkonen (1954), but they are completely ignored by Berezcki (1988; 1994). Obviously, no such regularities could occur if reduced vowels had developed from full vowels through irregular sound change.

Berezcki's account of the origin of Mari reduced vowels is flawed, as it explains neither the regular vowel correspondences between Mari varieties nor the regular vowel correspondences between Mari and other Uralic languages. Thus, both internal and external comparison clearly indicates that Mari initial-syllable reduced vowels go back to Proto-Mari vowel phonemes that were distinct from the sources of close full vowels *i*, *ü* and *u* in the same varieties, as maintained by Itkonen (1954). Thus, two series of close vowels must be reconstructed for Proto-Mari: *i, *ü, *u vs. *ĩ, *ũ, *ũ.

Even though Berezcki's claim that Mari reduced vowels originated through irregular sound change under Turkic influence is untenable, it cannot be denied that the reduced vowels in V, U, Nw and W are strikingly analogous to those in the neighboring Turkic languages. Thus, it appears highly likely that language contact has nevertheless played a role in the development of Mari reduced vowels. The original distinctive feature between Proto-Mari *i, *ü, *u and *ĩ, *ũ, *ũ was not necessarily full vs. reduced articulation (e.g, IPA [u] vs. [ũ]). More probably, the opposition has become phonetically restructured as such under the influence of Turkic languages with reduced vowels. It could also have originally been a distinction of length (IPA [u:] : [u]), height (IPA [u] : [ũ]), or a combination of length and height (IPA [u:] : [ũ]).

It is worth noting that there are many examples of similar restructurings of vowel systems due to language contact. For example, Salminen describes how the Forest Nenets vowel system has become restructured under East Khanty influence so that the resulting system is in essential respects identical to the model in the contact language:

“...at least three of the main characteristics of the Forest Nenets vowel system, namely the nature of the quantity opposition, the smaller number of contrasts in non-initial or unstressed syllables, as well as the presence of metaphony leading to morphological vowel alternations, bear striking similarities to what is found in Eastern Khanty, which is also known to have provided Forest Nenets with the bulk of its loanwords. A look at Honti’s (1984: 20) description of the vowel system in the Tromagan dialect of Eastern Khanty shows that when the three peripheral vowels, which could not possibly be reflected in Forest Nenets where the frontness of the vowel depends on the palatality of the preceding consonant and the syllable as a whole, are eliminated, the remaining system of cardinal vowels consists of exactly six long vowels and four short vowels, and even the phonetic match is very close, especially if recent sound changes in Eastern Khanty dialects are taken into account. A claim can therefore be put forward that the Forest Nenets vowel system was reorganized following a specifically Eastern Khanty model.” (Salminen 1997: 368)

Thus, Berezki (1994) is still probably right in attributing the **nature** of the opposition of Mari full and reduced vowels to influence of Turkic languages. Contrary to his claim, however, this influence cannot account for the **origin** of this opposition, which must go back to Proto-Mari as maintained by Itkonen (1954). The original phonetic nature of the opposition in Proto-Mari remains unclear, and the present way of marking the Proto-Mari predecessors of Mari reduced vowels with a breve (*ĭ, *ǔ, *ǖ) is merely a practical solution for indicating the opposition in reconstructed forms.

3. Proto-Mari *ö

Both Itkonen (1954) and Berezki (1994) postulate a vowel phoneme *ö for Proto-Mari. Nevertheless, this vowel shows distributional peculiarities which require its status in Proto-Mari to be reassessed. Disregarding Tatar and Chuvash loanwords which may have spread between already distinct Mari varieties, TschWb contains 22 roots which uniformly have the front mid rounded vowel ö in all Mari varieties; for the sake of brevity, only E and W forms are cited here:

- E *öram*, W *öräm* ‘I am amazed’
- E, W *ördem* ‘I grow fat’
- E, W *örδəž* ‘side (body part)’
- E *öraš*, *örš*, W *öraš* ‘bullfinch’
- E *öraš*, *örš*, W *öraš* ‘mustache’
- E, W *jörem* ‘I put out (a fire)’
- E, W *jöraktem* ‘I knock over’
- E *köryö*, W *korya* ‘inside’
- E *löča*, (B Ka) *löča*, W *löčä* ‘it swells (due to moisture)’
- E, W *mör* ‘strawberry’
- E *nörtmö*, *mörtñö*, W *mörtñi* ‘roe’
- E *nöryö*, W *norya* ‘cartilage’
- E *nörö*, W *nöra* ‘pliable’
- E *pöčəž*, (B) *pöčöz*, W *pöča* ‘lingonberry’
- E *pördam*, W *pörtäm* ‘I go round’

- E *pörš*, W *pöršāņšə* ‘rime’
- E *pöraž*, *pörž*, W *pöraž*, *pörža* ‘brother-in-law’
- E, W *šör* ‘side’
- E, W *šörem* ‘I guess, I solve’
- E *šöryaltem*, W *šöryältem* ‘I tie loops’
- E *šörtnö*, W *šörtni* ‘gold’
- E *törya*, W *töryä* ~ *təryä* ‘it gallops’

Both Itkonen (1954: 213–215) and Bereczki (1994: 116–118) acknowledge that the reconstructed phoneme **ö* shows a distributional peculiarity: it is almost completely restricted to the position before **r*. This contextual factor was already noted by Räsänen (1920: 97), who suggested that Proto-Mari had no vowel **ö*, and that modern Mari *ö* is the reflex of Proto-Mari **ü* before **r*. Itkonen, however, supports the reconstruction of a distinct Proto-Mari vowel **ö* by noting that not only Finno-Ugric **ü* but also other Finno-Ugric vowels may be reflected as *ö* in Mari, for example:

- E W *örδəž* ‘side (body part)’ ~ SaaN *erttet*, MdE *ird’es*, Komi *ord-li* ‘rib’ (< **ertä* acc. Itkonen)
- E W *mör* ‘strawberry’ ~ SaaN *muorji*, Fi *marja* ‘berry’ (< **marja* acc. Itkonen)

Itkonen’s argument is entirely unconvincing, however. One must note that also Proto-Mari **ü* — when reflected as *ü* in all varieties — can appear as the reflex of several Uralic vowel phonemes, including for instance **e* and **a* in Itkonen’s reconstruction: cf., e.g., E, W *müks* ‘bee’ (< **mekši* acc. Itkonen), E *šüδö*, W *šüδə* ‘hundred’ (< **śata* acc. Itkonen). Hence, there is no reason why Mari *ö* in words such as *örδəž* ‘side (body part)’ and *mör* ‘strawberry’ could not go back to Proto-Mari **ü* as well, regardless of the actual Uralic source of this sound in each word. Thus, Itkonen’s argument for treating **ö* as an independent Proto-Mari phoneme is based on a confusion between the Proto-Mari and the Uralic levels of reconstruction.

If we restrict our analysis to the actual Mari material, it appears impossible to find clear evidence for reconstructing a phonological opposition **ü* : **ö* into Proto-Mari. Almost all the cases that uniformly show *ö* in all varieties involve the position before *r*, and in the same environment *ü* is not found. While the sequence *ür* does occur in East Mari, in such cases it goes back to PMari **ür* and regularly corresponds to V U Nw *ür* and W *ər*, as in the following examples:

- E *küram*, V U *küräm*, Nw *küräm*, W *kəräm* ‘I tear off’ (< PMari **küräm*)
- E *šüryö*, V U *šüryö*, Nw *šüryü*, W *šəryə* ‘cheek, face’ (< PMari **šürgə*)
- E *türwö*, V U *türwö*, Nw *türwü*, W *tərwə* ‘lip’ (< PMari **türwə*)
- E *wür*, V U Nw *wür*, W *wər* ‘blood’ (< PMari **wür*)

Hence, it appears evident that there has been a regular shift **ü* > *ö* before *r* in all varieties. In East Mari the opposition between [ö] and [ü] became phonologized through the merger of reduced labial vowels with full ones: PMari **ür* > E *ör*, but PMari **ür* > E *ür*.

In addition, *ö* is found in two words before the affricate **č*: E *löčä*, W *löčä* ‘it swells (due to moisture)’ and E *pöčəž*, W *pöčə* ‘lingonberry’. These cases have no straightforward explanation. One cannot assume a regular lowering **ü* > *ö* before **č*, because the sequence **-üč-* is preserved in four cases: E *tüčäm* ~ *čüčäm*, U *tücam*, Nw *tüčäm*, W *čüčäm* ‘I close (a door)’ (< PMari **tüčä-* ~ **čüčä-*), V *čüčem*, W *čüčem* ‘I make a hole’ (< PMari **čüče-*), E *čüčä*, B Kr *čüčä*, Nw *tüčä* ‘it drips’ (< PMari **čüče-*), and E *čüčkem*, B *čüčkem*, U *cuckem* (!), Nw *cüčkem* ‘I shake my body’ (< PMari

*čüčke-). Thus, *löča* and *pöčəž* could theoretically support the reconstruction of an opposition *ü : *ö. It would, however, be an implausible solution to reconstruct a phonological opposition of two vowels that was only realized before the consonant *č, especially as the number of examples supporting the postulation of such an opposition is limited to two word-roots.

It is worth noting that even in loanwords it is difficult to find examples of widespread Mari *ö* in contexts other than before *r*. Rare exceptions are the Tatar loanwords E W *jön* ‘means, way’, E W *kök* ‘gray (horse)’, and E *töwa*, W *töwä* ‘hill’. More commonly, Tatar loanwords with *ö* show irregular vowel correspondences: e.g., B Ka *pölek*, Kr *pölek* ~ *pelek*, S *pelek*, M *pölok*, U *pelak*, Nw *peläk* ‘gift’. All this points to the conclusion that *ö* was established as an independent phoneme only after the breaking up of Proto-Mari and the independent development of Mari varieties. However, [ö] may have existed as an allophone of *ü before *r already in Proto-Mari.

There is also a handful of words in which some varieties show *ö* corresponding to *ü* in other varieties. As already suggested by Itkonen (1954: 222), these correspondences seem to reflect Proto-Mari *ü. Most noteworthy is a group of words which show the correspondence E Ki V U *ö* ~ Nw W *ü*:

- B *nölaš*, Kr V *nölaš*, Ki *nölaš*, M *nölaš* ~ *nelaş* (!), MU *nelaş* (!), V *nölaš*, U *nelaş* ~ *lelaš* (!), Nw *lüläkš*, W *lüläš* ‘spindle ring, wheel’
- E *nölpö* ~ *lölpö*, V *nölpö*, U *lölpö*, Nw *lülpü*, W *lülpa* ‘alder’
- E *nöltem* ~ *löltem*, V U *nöltem*, Nw W *lültem* ‘I raise, lift’
- E *nönčäk*, B *nönčök*, V *nönčük*, U *nöncük*, Nw *nüncük*, W *nünčäk* ‘dough’
- E *nöšmö*, Nw *nüšmü*, W *nüšmü* ~ *nüšmä* ‘seed’
- E *nöštalam*, Nw W *nüštäläm* ‘I knead dough’

In addition, one can also count M *nölä pikš* ‘arrow with a bone head’ (*pikš* ‘arrow’) in this group. The word is not attested in other varieties, but we can assume it goes back to Proto-Mari *nülə. This is suggested both by the apparent regularity of the correspondence on account of the six cases listed above, and by the fact that the form *nülə is the regular reflex of PU *nülü ‘arrow’; other examples of the development PU *i > PMari *ü can be found in Appendix B.

It is notable that the phonological context is similar in all six words: there is a preceding coronal sonorant (*n* ~ *l*) and a following coronal continuant (*l*, *n* or *š*). Regardless of how exactly we choose to define the context for the shift *ü > E *ö* in these words, the correspondence is evidently regular: there are no counterexamples showing a retention of *ü in a comparable context. It must be noted that the consonant *d (> *δ*) apparently did not count as a coronal continuant at the time of lowering, as no lowering is attested in E *lüdam*, W *lüdäm* ‘I am afraid’, E *šüdam*, W *šüdäm* ‘I clear (forest)’, E, W *šüdem* ‘I order’, and E *šüdü*, W *šüdü* ‘hundred’. Also, the phonetic motive for the lowering *ü > *ö* in the defined context remains obscure, but this does not prevent us from recognizing the regularity of the development.

There are also two other possible cases of the same correspondence in different environments:

- E Ki *möngö*, U *müngö*, Nw *müngü*, W *məngə* (!) ‘back (= zurück)’
- B Kr Ki MU S V *kö*, M *ke* (!), U (!) Nw W *kü* ‘who’

The first word seems to have undergone the same East Mari change *ü > *ö, even though here we find *ü* in Upsha, perhaps due to dialect borrowing. However, in W there is a reduced vowel *ə* (< *ü). From an internal point of view it would seem plausible to treat this as a secondary case of irregular vowel reduction, but external data suggest otherwise: the word goes back to PU *münjä- (UEW: 276–277; HPUL: 546), and W *ə* < *ü is the expected reflex of PU *ü.

The interrogative pronoun ‘who’ is even more obscure. Here a vowel change *ü > ö has taken place in all Eastern varieties except for M and U, but this definitely cannot be regular, as in other CV-stems *ü is preserved throughout Mari:

- B Ka Ki *küj*, Kr S M MU V U Nw W *kü* ‘stone’ (< PMari *kü)
- B Ka Ki *müj*, Kr S M MU V U Nw W *mü* ‘honey’ (< PMari *mü)
- B Ka Ki *püj*, Kr S M MU V U Nw W *pü* ‘tooth’ (< PMari *pü)
- B Ka *šüj*, Ki *šüj*, Kr S M MU U Nw W *šü* ‘pus’ (< PMari *sü)
- B Ki *šüj*, Kr S M MU V U Nw W *šü* ‘charcoal’ (< PMari *šü)
- B Ka Ki *šüj*, Kr S M MU V U Nw W *šü* ‘neck’ (< PMari *šü)

Bereczki (1992) reconstructs these words as glide stems (*küj, *müj, etc.) on the basis of the B Ka and Ki forms. If this was correct, it could account for their difference to *kö* ‘who’. It is highly probable, however, that B Ka Ki *-j* originated as a hiatus-filling sound before suffixes beginning with a vowel, and was then analogically generalized as a part of the stem. The secondary status of *-j* in these varieties is also evident from the fact that it appears in the place of any deleted PU consonant: cf. Ki *küj* ‘stone’ (< PU *kiwi), *püj* ‘tooth’ (< PU *piŋi), *šüj* ‘pus’ (< PU *säji), *šüj* ‘charcoal’ (< PU *šüdi), *šüj* ‘neck’ (< PU *šepä). The word *müj* ‘honey’ (< *mü), in turn, is a loan from Proto-Udmurt *mü ‘honey’ (> Udmurt *mu*, dial. *mü*; cognate with Komi *ma*). It cannot be a direct reflex of PU *meti ‘honey’, because no loss of intervocalic *t has taken place in Mari, as opposed to Permic (cf. Bereczki 1992: 40).² Moreover, it is not even clear that the B Ka Ki glide *j* in these words is a phonological segment; Sebeok and Ingermann (1961: 7) describe the East Mari phoneme /ü/ as having the allophones [ü] ~ [ɥ] ~ [ü:] ~ [ɥ:] word-finally and [ü] ~ [ɥ] before another vowel. The vowel /i/ is described as having the same kind of phonetic glide component in the same environments.

The vowel change *ü > ö in *kö* ‘who’ thus must be irregular, and its reason remains unclear; perhaps it is related to the high frequency of the pronoun. An even more mysterious question is why the pronoun contains a labial vowel in the first place, as it goes back to PU *ke (cf. North Saami *gii*, Finnish *ke-n*, Mordvin *ki*, Komi, Udmurt *ki-n*, Hungarian *ki*, Nganasan *sĭ-lĭ* ‘who’). The M form *ke* is noteworthy in this connection. Despite its limited distribution, it is tempting to consider M *ke* an archaism, as it is exactly the expected reflex of PU *ke ‘who’: cf. M *me* ‘we’ < PU *me (> North Saami *mii*, Finnish *me*, Mordvin *mi-ń*, Komi, Udmurt *mi*, Hungarian *mi*, Nganasan *mĭ-ŋ*) and M *te* ‘you (pl.)’ < PU *te (> North Saami *dii*, Finnish *te*, Mordvin *ti-ń*, Komi, Udmurt *ti*, Hungarian *ti*, Nganasan *tĭ-ŋ*). Thus, the forms *kö* and *kü* in other varieties would seem to be the result of some post-Proto-Mari irregular development.

In addition to the words discussed above, there are three nouns that seem to show a shift *ü > ö in a more restricted set of varieties:

- M V *šön*, MU *šön* ~ *šin* (!), S *šön* ~ *šün*, Ka Kr U Nw W *šün*, Ki *šün*, B *šün* ~ *sün* (!) ‘vein’
- V *šöm*, M *šöm* ~ *šüm*, B Ka Ki Kr S MU *šüm*, U Nw *šüm* (!), W *süm* (!) ‘scale’
- S *löðä*, M *löðä* ~ *lüðä*, V *löðö*, B *rüðö* ~ *lüðö*, Ka *rüðö*, Ki *lüðö*, Kr MU U *lüðö*, NW W *lüðä* ‘trap (e.g. for mice)’

² According to an alternative etymology, PMari *mü ‘honey’ is unrelated to Udmurt *mu*, *mü*, and instead cognate with Proto-Khanty *mäy (VVj *mäy*, Irt *mäy*, Ni Kaz *maw* ‘honey’) and Proto-Mansi *mäy (E *möäy*, N *mäy* ‘honey’) (? < *mäkV; UEW: 266). This seems unlikely, however, because there is a perfect match between PMari and Proto-Udmurt *mü ‘honey’, and Mari has a large number of Udmurt loanwords in any case. Also, the vowel correspondence Proto-Khanty *ä ~ Proto-Mansi *ä is atypical of inherited Uralic vocabulary.

In these cases one can hardly provide a regular account of the forms with *ö*, as in each case the dialect distribution of these variants is unique. It is also worth noting that each of these words also displays some other irregularities: MU *šin* (irregular *i*) ‘vein’, U Nw *šüm* (irregular *ü*), W *süm* (irregular *s-*) ‘scale’, and B Ka *rüdü* ‘trap’ (irregular *r-*).³ Due to the limited distribution of the forms with *ö* they are no doubt secondary, even though the reasons behind their development remain unclear.

4. Proto-Mari *e and *ɛ

Itkonen (1954: 207–211) reconstructs a PMari opposition between *ɛ (> W *ä*, other varieties *e*) and *e (> *e* in all varieties). He points out, however, that the reconstructed phoneme *ɛ shows a skewed distribution: in nearly all cases it occurs before either *r or a velar (*ŋ or *k). In light of this distribution, Bereczki (1994: 92–95) rejects the opposition *ɛ : *e, and regards W *ä* as the result of a change *e > *ä* in these particular environments. As the common Mari words in TschWb in which W *ä* corresponds to *e* in other varieties are examined, the correspondence is indeed found to be almost exclusively restricted to three kinds of environments:

1) Before a velar:

- W *än̄gər* ~ E V U Nw *eŋer* ‘river’
- W *än̄gər* ~ E V *eŋer*, U Nw *eŋər* ‘fishing hook’
- W *än̄gəremša* ~ E *eŋeremše*, *eŋəremaš*, V *eyremaš*, U Nw *eŋəremša* ‘spider’
- W *jän̄* ‘soul’ ~ E *jeŋ*, *jəŋ*, V *jŋ* (!), U Nw *jeŋ* ‘person’⁴
- W *kän̄gəž* ~ E V *keŋež*, U Nw *keŋəž* ‘summer’
- W *läktäm* ~ E V U *lektam*, Nw *lektäm* ‘I go out’
- W *läŋgəš* ~ E V *leŋež*, U *leŋəž*, Nw *leŋəš* ‘wooden pail’
- W *mäkš* ~ E V U *mekš* ‘rotten spot in a tree’
- W *män̄gə* ~ E V *meŋge*, U Nw *meŋgə* ‘post, stake’
- W *pän̄geš* ~ E U Nw *peŋeš* ‘it smolders’
- W *šäkš* ~ E V U Nw *šekš*, Ki *šekš* ‘gall’
- W *šän̄gə* ‘dead branch’ ~ E V *pu-šeŋge*, Ki U Nw *pu-šeŋgə* ‘tree’
- W *šän̄gäm* ~ E V U *šeŋam*, Ki *šeŋam*, Nw *šeŋäm* ‘I rummage, search through’
- W *täktä* ~ E *tekte*, U *tektä* ‘beehive’

2) Before *r:

- W *är̄dä* ~ E V *erde*, Ki U Nw *erdä* ‘thigh’
- W *äryem* ~ E Ki V U Nw *eryem* ‘I coil yarn’
- W *ärt̄ni* ~ E V *ert̄ne*, U *ert̄ná*, Nw *ärt̄ná* (!) ‘birch-bark container’
- W *jär* ~ E Ki V U Nw *jer* ‘lake’
- W *käryältem* ~ E Ki V U *keryältem*, Nw *keryältem* ‘I roll up’
- W *pärt̄nä* ~ E *pert̄ná*, Ki *part̄ni* (!), U *pert̄ná* ‘bud’
- W *šär* ~ E U Nw *šer*, Ki *šer* ‘vein’
- W *šäryem* ~ E *šeryem* ‘I open, disperse, scatter’

³ It has been suggested that *rüdü* ~ *lüdü* ~ *lödü* is etymologically related to Skolt Saami *râä'tt*, Finnish *rita* ‘cage trap’ and Komi *ri* ‘well sweep; trigger of a trap’ (UEW: 746; HPUL: 553); if correct, then B Ka *r-* must be an archaism. However, this lexical set is a Wanderwort at best; the vowel correspondences are irregular, and hence the proposed reconstruction *rita cannot be justified.

⁴ Nw *jän̄* ‘soul’ appears to have been borrowed from W.

- *W šártńi* ~ *E šertńe, šartńe (!)*, *Ki šartńi (!)*, *V šertńe*, *U šertńa*, *Nw šerńa* ‘willow’
- *W wär* ~ *E Ki V U wer*, *Nw wär* ~ *wer (!)* ‘place’
- *W wäryǵa* ~ *E V werye*, *Ki U Nw weryǵa* ‘kidney’

3) In CV-stems:

- *W mä* ~ *E Ki V U Nw me* ‘we’
- *W tä* ~ *E Ki V U Nw te* ‘you (pl.)’

If we disregard Tatar and Chuvash loanwords, the only case in TschWb falling outside these conditions is *W kädä* ~ *E keǵe*, *U Nw keǵa* ‘dove’. In Turkic loanwords there are more examples of *W ä* in other environments, e.g. *W käpšäl* ~ *E kepšäl* ‘fetter’. Such words, however, have probably been borrowed after the conditioned change **e* > *W ä*. In this case also the irregular correspondence *W l* ~ *E l* points to the word having entered West and East Mari separately.

Next, we need to consider possible counterexamples where PMari **e* would have been retained in *W* in environments where *ä* is expected. In the case of CV-type stems none occur. Before velars *W e* only occurs in loanwords that have obviously diffused between already distinct Mari varieties (e.g., *W jengä* ~ *E jenga* ‘older brother’s wife’ < Tatar). TschWb cites no etymology for *W wek-ät*, *U wek-at* ‘at all (in negated sentences)’, *E wek* ‘constantly; at all (in negated sentences)’, but this must be a loan from Russian *век* ‘century, age, lifetime; for ages, always’ (Komi *vek* ‘always, constantly’ derives from the same source).

However, there are some examples of *W a*, *i*, and *ö* corresponding to *e* in other varieties:

- *W aŋǵaž* ~ *E Ki Nw eŋǵž*, *V eŋež*, *U eŋǵz* ‘raspberry’
- *W aŋǵeš* ~ *E Ki V U Nw eŋeš* ‘it is scorched’
- *W šaŋǵal* ~ *E V šeŋǵel, šeŋǵal*, *U šeŋǵel* ~ *šaŋǵel*, *Ki šeŋǵel* ‘back side’
- *W piŋǵada* ~ *E V U peŋǵade*, *Nw peŋǵada* ‘hard, tight, strong’
- *W töŋǵal* ~ *E U Nw teŋǵal*, *Ki teŋǵal* ‘bench’

The last two examples are unique correspondences, and as such clearly irregular. The three cases of *W a* could theoretically result from some kind of regular development, but this seems unlikely, as further cases of *W a* corresponding to *e* in other varieties are not found in other environments. Hence, these three words hardly serve as counterevidence to the assumption of a regular sound change **e* > *W ä* before velars.

The situation is quite different when we take the examples involving *r* into consideration. There are many cases where all varieties, including *W*, show *e* in this environment:

- *E V erye*, *Ki U Nw W erya* ‘son, boy’
- *E Ki V U keram*, *Nw W keräm* ‘I stick in’
- *E V kerye*, *Ki U Nw W kerya* ‘woodpecker’
- *E Ki kertam*, *V ketam (!)*, *U kerǵam*, *Nw W kertäm* ‘I can, am able’
- *E šu-kerte*, *-kerše*, *Ki šu-kerta*, *-kerša*, *U šu-kerǵa*, *Nw W šu-kerǵa*, *-kerša* ‘a long time ago’
- *E V merčem*, *B nerčem (!)*, *U Nw W mercem* ‘I am unwell, sickly’
- *E Ki V U Nw W ner* ‘nose’
- *E nerye*, *U W nerya* ‘badger’
- *E Nw W šer* ‘pearl’
- *E V U šeram*, *Ki šeram*, *Nw W šeräm* ‘I brush’
- *E V šerye*, *Ki U Nw W šerya* ‘expensive’
- *E werč(ǵan)*, *Ki werčǵan*, *V werčǵ*, *U Nw W werc(ǵan)* ‘instead of’

Thus, there are 12 examples of *W -er-* and 11 examples of *W -är-*. The distinction cannot be attributed to any conditioning factor, as revealed by the minimal pair *šer* ‘pearl’ : *šär* ‘vein’ and the semiminimal pairs *keryə* ‘woodpecker’ : *käryältem* ‘I roll up’ and *eryə* ‘son’ : *äryem* ‘I coil yarn’. Thus, in this environment a contrast between Itkonen’s PMari **e* and **ε* really can be established. The reconstruction of a phoneme **ε* is an unsatisfactory interpretation of this contrast, however. From a typological point of view it appears implausible that Proto-Mari possessed a phonological contrast between /*e*/ and /*ε*/, but that this contrast was only realized before the consonant /*r*/ (in addition, there is the unique word *käδə* ‘dove’ which could perhaps be reconstructed as **kεdə*). Such a claim would also make it quite impossible to understand why the specific sound correspondence that **ε* is reconstructed to account for can be explained as a result of conditioned development of **e* in another context, namely before a velar (**ŋ* or **k*).

On the other hand, Bereczki’s (1994: 92–95) solution of reconstructing **e* in place of both Itkonen’s **e* and **ε* is unacceptable, because it leaves it a mystery why **er* is sometimes reflected as *W är* and sometimes as *W er*. Importantly, *W er* and *W är* have different Uralic sources, which shows that the opposition must represent an archaism. *W är* appears in the reflexes of Uralic **ä*-stems and *W er* in the reflexes of **i*-stems:

- *W ärδə* ‘thigh’ < **ärtä* < PU **ertä* (cf. Itkonen 1954: 178; UEW: 625; HPUL: 552)⁵
- *W jär* ‘lake’ < PU **jäwrä* (UEW: 633)
- *W šär* ‘vein’ < PU **särä* (UEW: 437; HPUL: 548)
- *W šärtüi* ‘willow’ < PU **särnä* (UEW: 752)⁶

- *W keräm* ‘I stick in’ < PU **käri-* (Aikio 2002: 18)
- *W keryə* ‘woodpecker’ < PU **kärki* (UEW: 652)
- *W kertäm* ‘I can, am able’ < PU **kärti-* (UEW: 652)
- *W ner* ‘nose’ < PU **näri* (UEW: 303–304; HPUL: 552)

Hence, the opposition between *W er* and *W är* must date back to Proto-Mari, but a distinct vowel phoneme **ε* is unlikely to be the source of this opposition. Instead, we can postulate the hypothesis that *W är* reflects PMari **er*, whereas *W er* reflects PMari **ir*. This implies that there has been a change **i* > *e* before *r* in all varieties of Mari. This would of course remain an ad hoc claim, were it not that two circumstances support this idea. First, there appear to be no common Mari words with the sequence *ir*. Second, the assumed change **i* > *e* / *_r* is completely analogous with the change **ü* > *ö* / *_r*, which in section 3 above was shown to have taken place in all varieties of Mari. Hence, we can assume that Proto-Mari close full front vowels (**i* and **ü*) became lowered to mid vowels (*e* and *ö*) before **r*.

⁵ Traditionally Mari E *W örδəž* ‘side (body part)’ (< PMari **ürdäž*) has been considered the reflex of PU **ertä*, and thus cognate with Inari Saami *ertti* ‘side’, Erzya Mordvin *ird’es* ‘rib’, Udmurt *urdes* ‘side’ and Komi *ord-lj* ‘rib’ (UEW: 625; HPUL: 552). Itkonen (1954: 178) cautiously suggests that also Mari E *erδe*, *W ärδə* ‘thigh’ could belong in this connection. However, there is no regular internal relationship between the Mari words for ‘thigh’ and ‘side’, and PMari **ürdäž* is not a regular reflex of PU **ertä* because of its vowel **ü*. Hence, it seems that Mari E *erδe*, *W ärδə* ‘thigh’ is the true inherited reflex of PU **ertä*, and that **ürdäž* was borrowed from some other branch, probably from Pre-Proto-Permic **ördVs* (> Proto-Permic **ordēs*).

⁶ UEW reconstructs the proto-form as **saríe*, but the front vowel in Mari *W šärtüi*, E V *šertüe*, U *šertüa*, Nw *šerüa* cannot be a reflex of PU **a*. Instead, the form **särnä* can be reconstructed. Finnish *saarni* ‘ash’ shows secondary back vocalism like, e.g., Finnish *sappi* ‘gall’ (< PU **säppä*) and *talvi* ‘winter’ (< PU **tälwä*). The irregular back vocalic forms in some Mari varieties (B Ka *šartüe*, Ki *sartüi* ~ *šärtüi*) also seem to be secondary.

There are, however, two words which seem to serve as counterevidence to the idea of a change **i > e / _r* in all varieties. In the following cases the change **i > e* has occurred in B Ka Kr Ki S M V, whereas *i* is retained in U Nw W:

- B Kr V *šere*, Ki *šera*, M S *šera*, MU *šire*, U Nw W *šira* ‘unleavened’
- B Ka Ki Kr S M MU *ter*, U Nw W *tir* ‘sled’

These items belong to a larger group of words that appear to have undergone a change **i > e* in all eastern varieties except for U (in MU the reflexes are inconsistent, perhaps as a result of dialect borrowing):

- B Ka Kr M MU (!) S V *lewa*, Ki *lewa*, U *liwa*, Nw W *livä* ‘it becomes warm’
- B Ka Ki Kr M S V *mež*, U Nw W *miž* ‘wool’
- B Ka Kr *peče*, Ki M S *peča*, V *peče*, MU *piče* ~ *peče* (!), U Nw *pica*, W *piča* ‘fence’
- Ki M *pemba*, U *pimba*, W *piŋa* (!) ‘finch’
- B M S V *šem*, Ki *šim* (!), Ka (!) MU U Nw W *šim* ‘black’
- B Ka Ki Kr M S V *šen*, MU U Nw W *šin* ‘tinder’
- E *ter*, Ki *teř*, U Nw W *tir* ‘sled’
- B Ka Kr M S V *weleš*, Ki *wel’eš*, MU U Nw W *wileš* ‘it falls’
- B Ki Kr S M V *wem*, MU *wime*, U *wimə*, Nw *mimə*, W *wim* ‘marrow’
- B Ka V *wenə*, Ki Kr M S *wenə*, MU U Nw *wiŋə*, Nw *wiŋə* ‘son-in-law’

This group of words has been discussed by Itkonen (1954: 219–221), who presents cogent arguments for interpreting *i* as the original vowel, and speaks of a “tendency” (“Neigung”) of **i* to change to *e* before the consonants *l*, *r* and *m* in eastern varieties. It is worth noting that in all cases except for *peče*, *peče* ‘fence’ and *mež* ‘wool’ the following consonant is a sonorant. In contrast, however, there are only three common Mari words that are not known to be recent borrowings and that uniformly show *i* before a sonorant:

- E W U *ime*, Ki Nw *imə*, W *im* ‘needle’
- E *imúe*, Ki *imúə*, V *imúĩ* (!), U Nw W *imúi* ‘horse’
- E V U *kinde*, Ki Nw W *kində* ‘bread; grain’

Common Mari *i* occurs, however, in many words before Proto-Mari obstruents:

- E V *iye*, U Nw W *iya* ‘young (of animals)’ (< PMari **igə*)
- E Ki V U Nw W *ik* ‘one’ (< PMari **ik*)
- E *iksa*, Ki *iks*, V *ikša*, U *iŋsa* (!), Nw W *iksä* ‘small bay’ (< PMari **ikša*)
- E *ize*, *izi*, V *izi*, U Nw W *izi* ‘small’ (< PMari **icə*)
- E V U *iške*, Ki *iskə*, Nw W *iškə* ‘wedge’ (< PMari **iskə*)
- E V U Nw W *kiš* ‘resin’ (< PMari **kiš*)
- E *kit*, (M MU) *kət* (!), Ki U Nw W *kit*, V *kýt* (!) ‘hand’ (< PMari **kit*)
- Ki S M MU U *lišan*, Nw W *lišän* ‘near’, B Ka Kr *lašän* (!) (< PMari **lišan*)
- E V U *pidam*, Nw W *pidäm* ‘I bind’ (< PMari **pidam*)⁷
- E V U Nw W *pikš*, Ki *pikš* ‘arrow’ (< PMari **piks*)

⁷ This verb seems to be an Indo-European loan: PMari **pida-* < Pre-PMari **pänti-* < Indo-European **b^hend^h-* ‘bind’. The suggested comparison to Hungarian *fűz* ‘laces, strings, threads’ (UEW: 386) is not phonologically regular.

- E U Nw *piktem*, W *püktem* (secondary *pi- > pü-), V *pĭktem* (!) ‘I strangle’ (< PMari *piktem)
- E *pište*, *piste*, V *piste*, U Nw W *pištə* ‘linden’ (< PMari *pistə)
- E Ki U Nw W *piž*, V *pež* (!) ‘woolen mitten’ (< PMari *piž)
- E V *šište*, Ki U Nw W *šištə* ‘woodpecker’ (< PMari *šištə)
- V U Nw W *widem*, E Ki *wüdem* (secondary *wi- > wü-) ‘I take (somewhere), lead’ (< PMari *widem)
- E U *wiškađe*, Ki *wiškiđe*, Nw W *wiškaðə* ‘fluid, washy’ (< PMari *wiškəðə)

As there are six examples of lowering of *i before sonorants in eastern varieties and only three cases showing *i retained in the same environment, the former treatment appears to be the regular one. The lack of lowering in *ime* ‘needle’ and *imĭne* ‘horse’ might perhaps be explained by the fact that the vowel appears in initial position. At least *ime* ‘needle’ is very probably an old word and goes back to PU *äjmä (UEW: 22; HPUL: 536), even though one cannot completely disregard the possibility that it was borrowed from Permic (cf. Komi *jem*, Jazva Komi *i-m* ‘needle’ < Proto-Permic *im < PU *äjmä). Also, why the vowel was lowered in *peče*, *peće* ‘fence’ and *mež* ‘wool’ lacks an explanation, but it is worth noting that *mež* ‘wool’ seems to be a Permic loanword and as such may have spread between Mari varieties: its loan original is Komi *mež* ‘ram’ (< Proto-Permic *miž < Aryan, cf. Sanskrit *meṣá-* ‘sheep, ram’, Avestan *maēša-* ‘sheep’). Berczki (1992: 92) considers the Mari and Komi words to be independent borrowings from Aryan, but this notion lacks supporting evidence. The word *peče*, *peće* ‘fence’ seems to be of Uralic origin (cf. Finnish *piha* ‘yard’, Udmurt *puč*, Komi *poč* ‘stick, bar’), but the vowel correspondences between the cognates are deviant, and the proposed reconstructions *piča (UEW: 729) and *pičča (HPUL: 553) lack justification. Due to the scarcity of examples and the multiple etymological possibilities regarding some of the words, the details of the eastern Mari change *i > e remain rather unclear.

Let us now return to common Mari *-er-*. The interpretation that *-er-* reflects PMari **-ir-* raises a question: why did the lowering *i > e / *_r* take place only in eastern varieties in the words *šere* (~ U Nw W *šira*) ‘unleavened’ and *ter* (~ U Nw W *tir*) ‘sled’, but in all varieties in other words? This question cannot be given a definite answer for the time being, but we must assume that the common Mari vowel lowering *i > e / *_r* is older than the eastern Mari lowering *i > e before sonorants. This implies that any new loanword with the sequence *-ir-* that was introduced after the first lowering would then have undergone the second lowering in eastern varieties, but not in the west. This is, indeed, confirmed by Chuvash loanwords:

- E V *er*, MU *er* ~ *ir*, V Nw W *ir* ‘morning, early’ < *ir < Chuvash *ir* ‘morning, early’
- E MU *erək*, V *erĭk*, U Nw W *irək* ‘freedom’ < *irək < Chuvash *irək* ‘freedom’
- E *ser*, *šer*, Ki *šer*, U Nw W *sir* ‘shore’ < *šir < Chuvash *šir* ‘precipice, ravine, slope on a shore’
- E *serem*, *šerem*, Ki *šerem*, MU U Nw W *sirem* ‘I write’ < *šire- < Chuvash *šir* ‘write’

Thus, we can speculate that also *šere* ‘unleavened’ and *ter* ‘sled’ could be loanwords from some as yet unidentified source. A Uralic etymology has been proposed for *ter* ‘sled’; UEW (517) regards it cognate with Estonian *tari* ‘wickerwork, basketwork’, Finnish *tarjat* ~ *tärjät* and East Khanty *tārās* ‘lathwork bottom in a type of sled’, but due to irregular vowel correspondences this fails to convince. While the idea of recent loan origin of *šere* ‘unleavened’ and *ter* ‘sled’ remains a conjecture, the hypothesis put forward here explains the twelve attested cases of W *-er-* as regular and accounts for the fact that W *-är-* and *-er-* have distinct Uralic sources: PU **-är-* developed

to PMari *-er- in *ä-stems and to PMari *-ir- in *i-stems. The cost of this explanation is that the phonological development of two words, Nw W *širə* ‘unleavened’ and *tir* ‘sled’, turns out difficult to account for.

5. Proto-Mari *å and *o

Itkonen (1954) reconstructs an opposition between PMari *å (> E Ki V U *o*, Nw W *a*) and *o (> *o* in all varieties). Bereczki (1994: 92–95) does not accept this postulated opposition, and reconstructs PMari *o for both correspondence patterns. The key reason for these different interpretations is connected with Itkonen and Bereczki’s different views of the Uralic sources of the Mari vowels. Itkonen (1954: 191–195) maintains that PMari *o can reflect either PU *a or *o, but PMari *å only occurs as a regular reflex of PU *a. However, his material also contains a number of exceptions to this postulated rule, which he explains away as results of “sporadic” developments. As noted by Bereczki (1994: 93), this position is untenable: because Itkonen’s PMari *å and *o both occur as reflexes of PU *a and *o alike, Itkonen’s account of the development of these PU vowels in Mari is inadequate. Even though Bereczki is right in pointing this out, his reasoning is faulty, too: it does not follow from this that the reconstruction of an opposition between PMari *å and *o is incorrect.

A major problem is that Bereczki (1994) postulates no conditioning factors that would account for the distribution of Nw W *a* and *o* as reflexes of his reconstructed PMari *o. Numerous semiminimal pairs, such as the following, demonstrate that no such conditioning factors can be established:

- E *kođama*, W *kađama* ‘gudgeon’ (< *kåđama) vs. E Nw W *kođam* ‘I remain’ (< *kodam)
- E *oškal*, W *aškâl* ‘step’ (< *åškâl) vs. E *oško*, W *oškâ* ‘poplar’ (< *oškâ)
- E *podam*, Nw *padam*, W *pađâm* ACC ‘pot’ (< *pådâm) vs. E Nw *podalam*, W *pođâlam* ‘I eat with a spoon’ (< *podâlam)
- E *polđalye*, W *pałđalyâ* ‘crooked’ (< *påldalgâ) vs. E *polđaş*, W *połđâš* ‘button’ (< *poldâš)
- E *šongo*, Nw *šonğa*, W *šonğâ* ‘old’ (< *šonğâ) vs. E *šonšo*, Nw *šañšâ* ‘hedgehog’ (< *šañšâ)

Hence, there seems to be no viable alternative to reconstructing an opposition between PMari *å and *o. It ought to be noted, however, that the distribution of PMari *å and *o seems to show clear tendencies based on the consonant environment, even though these tendencies do not amount to absolute rules. Judging from the material in TschWb, PMari *å tends to occur after initial glides (*w, *j) and before the coronal consonants *ć, *č, *t, *d, *r and *n. PMari *o, in turn, is much more common before velars (*k, *ŋ). These distributional tendencies probably reflect the phonological conditions that once caused a single Pre-Proto-Mari vowel to split into PMari *å and *o, but a further examination of the issue is beyond the scope of this paper.

6. Proto-Mari *a and *ä

Itkonen (1954: 185–188, 203–207) assumes that Proto-Mari *a is uniformly preserved as *a* in the Mari varieties, whereas the correspondence E Ki V U *a* ~ Nw W *ä* reflects a distinct Proto-Mari vowel *ä. According to Bereczki (1994: 88–92), however, both correspondences reflect an original *a, and there has been a sound change *a > ä in Nw and W. His argument for this interpretation is that Nw W *ä* can correspond to foreign *a in loanwords: e.g., E *waraš*, V U *warakš*, Nw *wäräkš*, W *wäräš* ‘hawk’ < Proto-Permic *variš (> Komi and Udmurt *variš* ‘hawk’).

The problem with this interpretation is that Berczki postulates no conditions under which the assumed change PMari *a > Nw W *ä* would have taken place. An examination of the relevant lexical data in TschWb reveals that no conditions can be postulated, as illustrated by the following examples.

PMari *-ašk-:

- E Ki V U Nw W *paškar* ‘small block of wood, plug’ (< PMari *paškar)
- E *raskalta*, *raškalda*, Ki *raskalta*, V U Nw W *raškalta* ‘(lightning) strikes’ (< PMari *raškalta)

PMari *-äšk-:

- E Ki V U *laška*, Nw W *läškä* ‘noodle’ (< PMari *läška)
- E U *šaške*, Nw W *šäškə* ‘otter’ (< PMari *šäškə)

The initial consonants do not serve as conditioning factors, as there are also examples of PMari *pä-, *la- and *ša-:

- E Ki V *parča*, U *parca*, Nw W *pärcä* ‘ear of corn’ (< PMari *pärcä)⁸
- E U *laštartem*, Ki *laštirtem* ‘I crush into pieces’, W *laštârtem* ‘I splinter (wood)’ (< PMari *laštartem)
- E *šaraŋge*, Ki *šaraŋgi*, U *šoraŋge* (!), Nw W *šaraŋgə* ‘willow’ (< PMari *šaraŋgə)

Hence, an application of the comparative method leaves no alternative to reconstructing two Proto-Mari phonemes: *a and *ä. How the vowel substitution patterns observed in loanwords that Berczki brings up are to be explained is a complex question which cannot be addressed in the present study. It must be noted, however, that it is not justified to mechanically interpret sound correspondences in loanwords so that if the donor form contains an *a, then this sound also must have been adopted as an *a in the recipient language. Sound substitutions are influenced by a multitude of factors, including phonological and allophonic differences between the contacting languages and rival sound substitution strategies based on conflicting phonetic, etymological and systemic motives (Aikio 2007).

7. Conclusion

The main results of this study can be summarized as follows:

- As maintained by Ikonen (1954), the initial-syllable reduced vowels in Mari varieties clearly go back to Proto-Mari vowel phonemes that were distinct from the source of Northwest and West Mari close full vowels *i*, *ü* and *u*. Thus, two series of close vowels must be postulated for Proto-Mari: *i, *ü, *u vs. *ĩ, *ũ, *ũ. The alternative view of Berczki (1994) that reduced vowels developed from full vowels through irregular sound change motivated by extensive Turkic influence is untenable, because this assumption does not account for the regular vowel correspondences between the Mari varieties, and because reduced and full close vowels can be shown to have distinct Uralic sources.
- The original distinctive factor between Proto-Mari *i, *ü, *u and *ĩ, *ũ, *ũ was not necessarily full vs. reduced articulation. It is likely that the opposition became phonetically

⁸ PMari *pärcä is apparently a loan from some Iranian source, cf. Young Avestan *parša-* ‘ear of corn’, Sanskrit *parśā-* ‘sheaf, bundle’.

- restructured as such under the influence of Turkic languages. The original distinctive factor could also have been length or height, or a combination of these features.
- c) No phoneme **ö* can be reconstructed to Proto-Mari. The vowel **ö* reconstructed by both Itkonen (1954) and Bereczki (1994) can be interpreted as an allophone of Proto-Mari **ü*; there has been a regular change **ü* > *ö* before **r* in all Mari varieties.
 - d) As maintained by Itkonen (1954; *contra* Bereczki 1994), a phonological opposition between PMari **â* (> E *o*, Nw W *a*) and **o* (> E Nw W *o*) must be reconstructed; the occurrence of both Nw W *a* and *o* as correspondents of E *o* cannot be attributed to any conditioning factors. However, contrary to what is claimed by Itkonen (1954), the PMari opposition **â* : **o* does not appear to be a continuation of the Proto-Uralic opposition **a* : **o*.
 - e) As maintained by Bereczki (1994; *contra* Itkonen 1954), no Proto-Mari vowel phoneme **ε* needs to be reconstructed to account for the correspondence E Nw *e* ~ W *ä*. The open vowel in W is a result of sound change **e* > *ä* that took place 1) before velars, 2) before *r*, and 3) in CV-type stems.
 - f) In cases where W *e* occurs before *r*, Proto-Mari **i* must be reconstructed (*contra* Bereczki 1994). There appears to have been a change **i* > *e* before **r* in all varieties of Mari.
 - g) As maintained by Itkonen (1954; *contra* Bereczki 1994), a Proto-Mari vowel **ä* must be reconstructed to account for the correspondence E *a* ~ Nw W *ä*.

On the basis of these results we can postulate the vowel inventory shown in Table 7 for Proto-Mari initial syllables. The regular reflexes of the Proto-Mari initial syllable vowels in the Mari varieties are shown in Table 8.

On a more general level, the results of the present study provide an example of how the development of vowel systems in the Uralic languages can — and should — be explained as an effect of regular sound change. In the field of Uralic comparative linguistics there has been an unfortunate tradition of resorting to ‘sporadic’ changes to explain the data that do not conform to some preconceived view of historical phonology. In the case of Mari this is most conspicuous in the work of Bereczki (1994), who operates with wholesale irregular change that is assumed to have affected individual word-roots on a random basis. However, also Itkonen’s (1954) attempt to account for the Uralic background of Mari vocalism frequently evokes the mysterious force of ‘sporadic’ change to explain away those parts of data that are incompatible with his own reconstruction of Uralic vocalism.

Thus, the notion of ‘sporadic’ sound change is a source of ad hoc hypotheses whose methodological purpose seems to be to avoid addressing flaws in theory: ‘sporadic’ changes are brought to account for those regular sound correspondences that lack an explanation in the framework of Uralic historical phonology endorsed by the author. However, if regular sound correspondences are thought to result from both regular and irregular change, the basis for a consistent application of the comparative method is lost. Hence, the alleged instances of ‘sporadic’ change should rather be viewed as indicators of weak points in theories of Uralic historical phonology. An essential task for future research in comparative Uralic linguistics is to examine whether regular accounts of supposedly ‘sporadic’ phonological developments can be provided, and the explanatory power of theories of Uralic historical phonology increased accordingly.

Table 7. The Proto-Mari initial syllable vowels.

i	ü	u
ĩ	ǔ	ǘ
e		o
ä	a	ã

Table 8. The reflexes of Proto-Mari initial syllable vowels in the Mari varieties.

Proto-Mari	E	Ki	V	U	Nw	W
*ä	a	a	a	a	ä	ä, e ¹
*e	e	e	e	e	e	e, ä ²
*i	i, e ³	i, e ³	i, e ³	i, e ⁴	i, e ⁴	i, e ⁴
*ü	ü, ö ⁵	ü, ö ⁵	ü, ö ⁵	ü, ö ⁵	ü, ö ⁶	ü, ö ⁶
*a	a	a	a	a	a	a
*ã	o	o	o	o	a	a
*o	o, u ⁷	o, u ⁷	o, u ⁷	o, u ⁷	o, u ⁷	o
*u	u	u	u	u	u	u
*ĩ	ə, i ⁸	i	ə	ĩ	ə	ə
*ǔ	ü	ü	ǔ	ǔ, ü ⁹	ǔ	ə
*ǘ	u	u	ǘ	ǘ	ǒ	ê

Notes:

¹ e before *j² ä before a velar or *r and in *CV-type roots³ e before sonorants, except in word-initial position (?)⁴ e before *r⁵ ö before *r and between a coronal sonorant and a coronal continuant (not δ)⁶ ö before *r⁷ u word finally and before a hiatus⁸ i before the cluster *ńć, and in B Ka Kr also before *ć⁹ usually ǔ, but numerous exceptional forms with ü are attested

Abbreviations for Mari varieties

B	Birsk	Ki	Bolshoj Kil'mez	MU	Mari-Ushem	V	Volga
E	East (any of the varieties B Ka Kr M MU S)	Ka	Kaltasy	Nw	Northwest	W	West
		Kr	Krasnoufimsk	S	Sernur		
		M	Morki	U	Upsha		

Literature

- AIKIO, Ante 2002. New and Old Samoyed Etymologies. *Finnisch-Ugrische Forschungen* 57: 9–57.
- AIKIO, Ante 2006. New and Old Samoyed Etymologies (Part 2). *Finnisch-Ugrische Forschungen* 59: 9–34.
- AIKIO, Ante 2007. Etymological Nativization of Loanwords: a Case Study of Saami and Finnish. In: Ida TOIVONEN & Diane NELSON (eds.), *Saami linguistics*. Amsterdam & Philadelphia: John Benjamins. Pp. 17–52.
- AIKIO, Ante 2012. On Finnic long vowels, Samoyed vowel sequences and Proto-Uralic *x. In: Tiina HYYTIÄINEN, Lotta JALAVA, Janne SAARIKIVI & Erika SANDMAN (eds.), *Per Urales ad Orientem: Iter polyphonicum multilingue*.

Festschrift tillägnad Juha Janhunen på hans sextioårsdag den 12 februari 2012. Mémoires de la Société Finno-Ougrienne 264: 227–250.

- AIKIO, Ante (forthcoming). Studies in Uralic etymology III: Mari etymologies.
- BERECZKI, Gábor 1988. Geschichte der wolgafinnischen Sprachen. In: Denis SINOR (ed.), *The Uralic languages. Description, history and foreign influences*, pp. 314–350. Leiden & New York & København & Köln: E.J. Brill.
- BERECZKI, Gábor 1992. *Grundzüge der tscheremissischen Sprachgeschichte II.* Studia Uralo-Altaica 34. Szeged.
- BERECZKI, Gábor 1994. *Grundzüge der tscheremissischen Sprachgeschichte I.* Studia Uralo-Altaica 35. Szeged.
- HONTI, László 1984: *Chrestomathia Ostiacica.* Budapest: Tankönyvkiadó.
- HPUL = SAMMALLAHTI, Pekka 1988. Historical phonology of the Uralic languages with special reference to Samoyed, Ugric and Permian. In: Denis SINOR (ed.), *The Uralic languages. Description, history and foreign influences*, pp. 478–554. Leiden & New York & København & Köln: E.J. Brill.
- ITKONEN, Erkki 1954. Zur Geschichte des Vokalismus der ersten Silbe im Tscheremissischen und in den permischen Sprachen. In: *Finnisch-Ugrische Forschungen* 31: 149–345.
- RÄSÄNEN, Martti 1920. *Die tschuwassischen Lehnwörter im Tscheremissischen.* Mémoires de la Société Finno-ougrienne 48. Helsinki: Société Finno-ougrienne.
- SALMINEN, Tapani 2007. Notes on Forest Nenets phonology. In: Jussi YLIKOSKI & Ante AIKIO (eds.), *Sámit, sánit, sátnehámít.* Riepmočála Pekka Sammallahtii miessemánu 21. beaivve 2007. Mémoires de la Société Finno-Ougrienne 253. Pp. 349–372.
- SEBEOK, Thomas A. & INGERMANN, Frances J. 1961. *An Eastern Chereemis Manual: Phonology, Grammar, Texts, Glossary.* Indiana University Publications, Uralic and Altaic Series vol. 5. Bloomington: Indiana University.
- SSA = Erkki ITKONEN & Ulla-Maija KULONEN (eds.) 1992–2000. *Suomen sanojen alkuperä. Etymologinen sanakirja.* Helsinki: Kotimaisten kielten tutkimuskeskus & Suomalaisen kirjallisuuden seura.
- TschWb = MOISIO, Arto & SAARINEN, Sirkka 2008. *Tscheremissisches Wörterbuch.* Aufgezeichnet von Volmari Porkka, Arvid Genetz, Yrjö Wichmann, Martti Räsänen, T. E. Uotila und Erkki Itkonen. Lexica Societatis Fenno-Ugricae XXXII. Helsinki: Suomalais-ugrilainen seura & Kotimaisten kielten tutkimuskeskus.
- UEW = RÉDEI, Károly 1988–1991. *Uralisches Etymologisches Wörterbuch.* Budapest: Akadémiai Kiadó.

Appendix A. Correspondences of reduced vowels between Mari varieties

This Appendix includes lists of those Proto-Mari word-roots for which Proto-Mari *i, *ǔ or *ũ can be reconstructed according to Itkonen's (1954) system of Proto-Mari vocalism. For each word, the reflexes of the first syllable vowel in the Mari varieties documented in TschWb are given. Reflexes judged irregular appear underlined and in bold font weight.

Proto-Mari *i:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*ćícá 'nipple'	i	<u>u</u>	i	i	ə, <u>i</u>	ə, <u>i</u>	ə, <u>i</u>	ə	ǔ	ə	ə
*ćǵalte- 'tickle'	ə	ə	ə	i	ə	ə			ǔ	ə	ə
*ćilä 'all'	ə	ə	ə	i	ə	ə	ə	ə	ǔ	ə	<u>i</u>
*ćirkæne- 'hurry'	ə							ə		ə	ə
*ćiwälte- 'bathe'	ə		ə		ə	ə		ə	ǔ	ə	ə
*ćiwäšte- 'pinch'	ə	ə	ə	i	ə	ə		<u>i</u>		<u>i</u>	ə
*ćiwätan 'pinchers'	ə	ə		i		ə		ə	ǔ	ə	ə
*ćime- 'stretch'	ə	ə	ə	i	ə	ə		<u>ũ</u>	<u>ũ</u>	ə	ə
*íca 'older brother'	i	i	i	i	<u>i</u>	<u>i</u>	<u>i</u>	ə	ǔ	ə	ə
*íle- 'live'	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u>	<u>i</u> , ə	ə	ǔ	ə	ə
*índəŋšə 'nine'	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u>	<u>i</u>	ə	ǔ	<u>ũ</u>	ə
*írwećá 'young'	ə	<u>ø</u>	ə	<u>u</u>	ə	ə, <u>ø</u>	ə	<u>ø</u>	ǔ	ə	ə

Proto-Mari *i:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*iške (reflexive pronoun)	∅	ə, ∅	∅	i	∅	ə, ∅	∅	∅	∅	∅	∅
*ište- ‘make, do’	ə		ə		ə	ə	ə	ə	ĩ	ə	ə
*ištar ‘footwrap’	ə	ə	ə	i	ə	ə	ə	ə	ĩ	ə	ə
*jīče- ‘hurt’	ə			i	ə	ə		ə	ĩ	ə	ə
*jīčke- ‘pick, pluck’				i					ĩ	ə	ə
*jīčkəšte- ‘get dislocated’	ə			i	ə	ə		ə		ə	ə, ı
*jīdan ‘bowstring’	ə		ə	i		ə		ə		ə	ə
*jīde ‘every’	<u>i</u> , <u>e</u>		ə		<u>e</u>	<u>e</u> , ə	ə	ə	ĩ	ə	ə, ı
*jīdəm ‘threshing floor’	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u>	ə	ə	ĩ	ə	ə
*jīgəлта- ‘mock’	<u>i</u>			i	<u>i</u>				ĩ		ə
*jīgəžge- ‘be disgusted’	ə		ə	i	ə	ə	ə	ə	ĩ		
*jīl ‘earthworm’	ə	ə, <u>e</u>		i	ə	ə	ə	ə		ə	ə, ı
*jīle ‘quick, soon’	ə	ə		i				ə		ə	ə
*jīlgəža- ‘shine, glitter’	ə	ə		ı	ə	ə		ə	ĩ	ə	ə, ı
*jīlmə ‘tongue’	ə	ə	ə	<u>ü</u>	ə	ə	ə	ə		ə, ı	ə, ı
*jīlt ‘entirely’	ə				ə	ə		ə	ĩ	ə, <u>ö</u>	ı
*jīme- ‘go numb’	ə	ə	ə	i	ə	ə		ə	ĩ	ə	ə
*jīnəše- ‘whimper’	ə, <u>e</u>			<u>e</u>	ə	ə		ə			ı
*jīngəl/r ‘bell’	ə, <u>o</u>					ə				ə	ə, ı
*jīp ‘spark’					ə		ə	<u>ü</u>		<u>i</u>	<u>i</u>
*jīps ‘spear, sharp stick’	ə	ə		i			ə	ə			ı
*jīr ‘around’	ə	ə	ə	ı	ə	ə	ə	ə	ĩ	ə	ə
*jīwəžge ‘still, quiet’					ə	ə		ə		ə	ə
*jīžəŋ ‘joint’	ə	ə	ə	ı	ə	ə	ə	ə	ĩ	ə	<u>e</u>
*jīžge ‘quiet, slow’	ə				ə	ə		<u>ü</u>		ə	
*kīcət ‘now’	<u>i</u> , <u>ə</u>	<u>i</u>		<u>i</u>	ə	ə	ə	ə		ə	ə
*kīčke- ‘harness’	<u>i</u> , <u>ə</u>	<u>i</u>	<u>i</u>	<u>i</u>	<u>i</u> , ə	ə	ə	ə	ĩ	ə	ə
*kīčkə ‘seed’	<u>i</u>	<u>i</u>	<u>i</u>	<u>i</u>	<u>i</u>	ə	ə	ə	ĩ	ə	ə
*kīčala- ‘search’	ə	ə	ə	i	ə	ə	ə	ə	ĩ	ə	ə
*kīčək, *kīča ‘fresh, fine snow’	ə	ə		ı	ə	ə	ə	ə	ĩ	ə	ə
*kīdal ‘waist’	ə	ə	ə	i	ə	ə	ə	ə	ĩ	ə	ə
*kīdež ‘room’	ə			i	ə	ə	ə	ə	ĩ	ə	ə
*kīlakš ‘best linen fibers’	<u>ü</u>	<u>ü</u>	<u>ü</u>	<u>ü</u>	<u>ü</u>	ə	ə	ə	ĩ	ə	ə
*kīlde- ‘bind’	ə	ə	ə	i	ə	ə	ə	ə	ĩ	ə	ə
*kīlōmdə ‘navel’	ə	ə	ə	i	ə	ə	ə	ə	ĩ	ə	ə
*kīlmə ‘cold’	ə	ə		i	ə	ə	ə	ə	ĩ	ə	ə
*kīńe ‘hemp’	ə			i	ə	ə	ə	ə	ĩ	ə	ə
*kīńela- ‘stand up, rise, wake up’	ə			i	ə	ə	ə	ə	ĩ	ə	ə
*kīńer ‘ell’	ə			i	ə	ə	ə	ə	ĩ	ə	ə

Proto-Mari *i:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*kīre- 'hit'	ə	ə	ə	i	ə	ə		∅	ǃ, ∅	ə	ə
*kīrəkš 'ruffe'							ə	ə		ə	ə
*kīrme- 'grab'				ǃ	ə	ə		ə	ǃ	ə	ə
*kīša 'track'	ə	<u>i</u>	ə	i	<u>i</u>	ə	ə	ə	ǃ	<u>i</u>	<u>i</u>
*kīsəja 'great tit'	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u>		ə	∅	ə	ə
*kīškar 'swift (for yarn)'	ə	ə	ə	i	ə	ə	ə	ə	ǃ	ə	ə
*kīške- 'throw'	ə	ə	ə	i	ə	ə	ə	ə	ǃ	ə	ə
*kīškə 'snake'	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u>	ə, <u>i</u>	ə	ǃ	ə	ə
*kīškə-wuj ~ *kīškə-wi 'cowry'	ə			i	ə	ə	ə	ə	ǃ	ə	ə
*līgə 'scale'	ə	<u>i</u>	<u>i</u>	i	ə	ə	ə	ə	ǃ	ə	ə
*līŋ 'much, very'	ə	ə			ə	ə		ə		ə	
*līp/wə 'butterfly'					ə	ə	ə	ə	ǃ	<u>ǃ</u>	ə
*līštaš 'leaf'	ə	ə		i	ə	ə	ə	ə	ǃ	ə	ə
*līšte- 'make, do'		ə		i	ə			ə		ə	
*līwərgə 'flexible'	ə			i	ə	ə	ə	ə, <u>ǃ</u>	ǃ	<u>ǃ</u>	<u>ǃ</u>
*līwəžge- 'wilt'	ə	ə	ə	i	ə	ə	ə	ə	ǃ	ə	ə
*līžga 'mild, calm'				ǃ	ə	ə		ə	ǃ	ə, <u>ǃ</u>	ə
*mīn/jə 'I'	ə, <u>i</u>	<u>i</u> , <u>e</u> , <u>o</u>	<u>i</u>	i	ə	ə	ə	ə	ǃ	ǃ	ə, ǃ
*mīndər 'happy'								ə	ǃ		ə
*mīžar 'coat'	ə	ə	ə	i	ə	ə	ə	ə	ǃ	ə, <u>ǃ</u>	ə
*nīl 'four'	ə	ə	<u>i</u>	i	ə	ə	ə	ə	ǃ, ǃ	ə	ə
*nīžəlgə 'mild, soft'	ə		ə		ə		ə	ə		ə	ə
*nīcəlge- 'get scratched (skin)'	<u>ǃ</u>		<u>ǃ</u>						ǃ		ə
*nīgəlge- 'get scratched (skin)'	ə			i	ə	ə		ə	ǃ		ə
*nīkta- 'skin'	ə		ə	i	ə	ə, <u>e</u>	ə	<u>i</u>	ǃ	<u>i</u>	ə
*nīmərge- 'get squashed'	ə				ə			ə	ǃ		ə
*pīce- 'adhere'	<u>ǃ</u>			i	ə	ə		ə		ə	
*pīcə 'meat'	i				<u>i</u> , ə	ə	ə	ə		ə	
*pīcəre- 'squeeze'	<u>ǃ</u> , i	<u>ǃ</u> , i	i	i	ə	ə	ə	ə	ǃ	ə	ə
*pīclə, *pīcəlmə 'rowan'	<u>ǃ</u> , i	i	i	i	ə, <u>i</u>	<u>i</u>	ə	ə		i	ə
*pīčək 'vagina'	ə				ə	ə	ə	ə		<u>ǃ</u>	ə
*pīdala- 'defend, rescue'				i	<u>i</u> , ə		ə	ə			
*pīl 'cloud'	ə	ə		i	ə	ə	ə	ǃ	<u>ǃ</u>	ə	ə
*pīldəra 'lewd'	ə			ǃ	ə	ə			ǃ		ə
*pīləkš 'ear'	ə	ə	ə	i	ə	ə	ə	ə	ǃ	ə	ə
*pīrdəš/ž 'wall'	ə			<u>ǃ</u>	ə	ə	ə	ə	<u>ǃ</u>		
*pīšte- 'put'	ə	ə	ə	i	ə	ə	ə	ə	ǃ	ə	<u>i</u>
*pīstəl 'feather'	ə	ə	ə	i	ə	ə	ə, <u>i</u>	<u>i</u>	<u>i</u>	<u>i</u>	
*pīzakš 'nest'	<u>u</u> , ə	ə	ə	i	ə	ə	ə, <u>ǃ</u>	<u>ǃ</u>	<u>ǃ</u> , ǃ	<u>ǃ</u>	ə

Proto-Mari *i:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*r̥wəʒ ‘fox’	ə	ə	ə	i	ə	ə	<u>ü</u>	<u>ǔ</u>		ə	ə
*sila- ‘esape, hide’	ə	ə	ə	i	ə	ə	ə	ə	ǐ	ə	ə
*šir ‘nature, character’	ə				ə			ə			ə
*šire- ‘get angry’	ə	ə	ə	i	ə	ə	ə	ǐ	<u>ə</u>		
*šim ~ *šišəm ‘seven’	ə	ə	ə	i	ə	ə	ə	ə	ǐ	ə	ə
*šidə ‘hatred’	<u>i</u> , ə	<u>i</u>	<u>i</u>	i	ə	ə	ə	ə	ǐ	ə	ə
*šigəʎə ‘wart’	ə	ə	ə	i	ə	ə	ə	ə	ǐ	ə	ə
*šiks ‘smoke’	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u> , ə	<u>i</u>	<u>i</u>	ǐ	ə	ə
*šil ‘meat’	ə	ə	ə	i	ə	ə	ə	ə	ǐ	ə	ə
*šiləʒ ‘lower back’	ə	ə	ə		ə	ə	ə	ə		ə	ə
*šima ‘dark (of clouds)’	ə			i	ə	ə		ə		ə	ə
*šínca ‘eye’	i	i	i	i	i	i	i, <u>ə</u>	ə	ǐ	ǐ	ǐ, ə
*šínca- ‘sit down’, *šínce- ‘sit, stand’	i	i	i	i	i	i	i, <u>ə</u>	ə	ǐ	ǐ	ǐ, ə
*šínce- ‘know’	i	i	i	i	i	i	i	ə	ǐ	ǐ	ǐ
*šinde- ‘put, set’	ə	ə	ə	i	ə	ə	ə	ə	ǐ	ǐ	ǐ, ə
*šine- ‘check, keep an eye on’	ə				ə						ə
*šire- ‘grimace’	ə			i		ə	ə	ə			
*širkama ‘brooch’	ə	ə		i	ə	ə		<u>ü</u>	ǐ	<u>ü</u>	ə
*širt ‘evil spirit (of illness)’	ə				ə	ə		ə		ə	
*šistə ‘wax’	<u>i</u>	<u>i</u>	<u>i</u>	i	<u>i</u>	<u>i</u> , ə	ə	ə	ǐ	ə	ə
*šizə ‘drizzle’ (+ derivatives)	ə	ə		i	ə	ə	ə	<u>ü</u>	ǐ	ə	ə
*šizə ‘autumn’	ə, <u>i</u>	ə	<u>i</u>	i	<u>i</u>	ə	ə	<u>ü</u>	ǐ	ə, <u>ü</u>	ə
*t̥iləcə ‘moon’	ə	ə	ə	i	ə	ə	ə	ə	ǐ	ə	ə
*t̥in/jə ‘you’	ə	<u>i</u>	<u>i</u>	i	ə	ə	ə	ə	ǐ	ǐ, ə	ǐ, ə
*t̥iŋga ‘gadfly’	ə	ə		i	<u>i</u>	ə		ə	ǐ	<u>e</u>	ə
*t̥irtəš ‘round’	ə				ə	ə	ə	ə	ǐ	ə	ə
*wíc ‘five’	i	i	i	i	<u>i</u>	<u>i</u>	<u>i</u> , ə	ə	<u>i</u>	ə	ə
*wíčkəʒ ‘thin’	i	i	i	i	<u>i</u>	ə	ə	ə	ǐ	ə	ə
*wínər ‘linen’	<u>ə</u> , i	i	i	i	ə	ə	ə	ə	ǐ	ə	ə
*wirləŋə ‘wagtail, titmouse’	ə				ə	<u>ü</u>		ə		<u>ü</u>	ə

Proto-Mari *ú:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*čüme- 'tread'	u	u		u	u	u	u	ê		ê	ê
*jügǎńća- 'have hiccups'	ü	ü	ü	ü	ü	ü	u	ǔ		ê	ə
*jüle- 'burn'	ü	ü	ü	ü	ü	ü	u	ǔ	ê	ê	ə
*jümǎ 'god'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*jüt 'night'	ü	ü	ü	ü	ü	ü	ü	ü	ǔ	ö	ê, ə
*kü- (interrogative pronoun root)	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*küče- 'hold, grab'	u	u	u	u	u	u	u	ǔ	ǔ	ê	ê
*küďala- 'run (animal); ride fast'	u	u	u		u	u	u	ǔ	ǔ	ê	ê
*küďakša- 'take off'	u		u	u	u	u	u	u	ǔ	ê	ê
*küm 'three'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*kümda 'broad'	u	u	u	u	u	u		ǔ		ö	ê
*küme- 'close the eyes'	u	u	u	u	u	u	u	ǔ		ö	ê
*kümək 'upside down'	u	u			u	u	u	ǔ	ǔ	ö	ê
*küməž 'birch-bark'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*künəž 'dirt'	u							ǔ			ê
*küpe- 'get moldy'							u	ǔ	ǔ	ö	ê
*küpšǎlə 'jay'		u		u	u	u	u	ǔ		ö	ê
*küptǎrge- 'get wrinkled'	u	u		u	u	u		ǔ	ǔ	ö	ê
*küřala- 'plough'	u	u	u	u	u	u	u	ǔ	ǔ	ê	ê
*küřək 'mountain'	u	u	u	u	u	u	u	ǔ		ö	ê
*küřəkš 'bark basket'	u	u				u	u	ǔ	ǔ	ö	ê
*küřgǎ 'food, fodder'					u			ǔ		ö	
*küřgǎža- 'run'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*küřmǎćak 'woodcock'	u			u		u	u	ǔ	ǔ		ê
*küřkeda- 'tear'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*küřkǎža- 'mount (horse)'	u	u	u	u	u	u	u	ǔ			ê
*küt 'length'	u			u	u	u		ǔ	ǔ	ö	ê
*kütka 'ant'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*küwa 'old woman'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*küwǎl 'bubble'				u	u	u		ǔ		ö	ê
*küž 'urine'							u	ǔ	ǔ	ö	ê
*lüďa- 'count'	u	u		u	u	u	u	u	ǔ	u	ê
*lüďǎ 'duck'	u	u	u	u	u	u	u	ǔ	u	ö	ê
*lüge- 'mix'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*lǔj 'marten'	u		u	u	u	u	u	u	u	u	ê
*lúk 'corner, bend'	u	u	u	u	u	u		ǔ	ǔ	ö	ê
*lúkta- 'take out'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê
*lüm 'snow'	u	u	u	u	u	u	u	ǔ	ǔ	ö	ê

Proto-Mari *ú:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*lúmej ‘blackfly’	u, <u>ü</u>	u		u		u	u	ǔ		ǒ	ê
*lúpš ‘dew’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*lúpš ‘whip’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*lúške- ‘loosen’	u	u		u	u	u	u	<u>u</u>	ǔ	<u>u</u>	ê
*múnčalte- ~ *púnčalte- ‘slide’	u	u	u	u	u	u	u	ǔ		ǒ	
*múč ‘end’	u	u	u	u	u	u	u	ǔ, <u>u</u>	ǔ	ǒ, ê	ê
*múčə ‘hazel grouse’	u			u	u	ê, <u>i</u>	u	ǔ	<u>i</u>	ǒ	ê
*múčə-wuj ‘tussock’	u	u	u	u	u		u	ǔ, <u>u</u>		ǒ	ê
*mǔgəłə ‘gnarl’	u	u		u	u	u, ê	u	ǔ	ǔ	ǒ	ê
*mǔgər ‘bend’						u		ǔ			ê
*mündəra ‘ball (of yarn)’	u	u	u	u	u	u	u	ǔ		ǒ	ê
*múnə ‘egg’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*múnəj ‘toad’	u	u	u	u				ǔ			ê
*mūrə ‘song’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*múška- ‘wash’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*múškəndə ‘fist’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*múžeda- ‘tell the fortune’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	<u>u</u>
*múžə ‘illness; evil spirit’	u	u		u	u		u				ê
*múšge- ‘chew something soft’						u		ǔ		ê	ê
*núčəl- ‘scratch’	u			u	u	u		ǔ		ê	ê
*nǔgədə ‘thick (of fluids)’	u		u	u	u	u	u	ǔ	ǔ	ǒ	ê
*núle- ‘lick’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*núlgə ‘silver fir’	u	u		u	u	u		<u>u</u>		ǒ	
*núnə ‘they’	u	u			u	u	u	<u>ü</u>	ǔ	<u>ü</u>	<u>a</u>
*núr ‘field’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*núška-, *núškəšta- ‘crawl’	u	u		u	u	u		ǔ		ǒ	
*púč ‘stalk, tube’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ, ê	ê
*púče- ‘fall (of water level)’	u	u		u	u	u	u	ǔ	ǔ	ǒ	ê
*púčəšte- ‘itch’	u				u	u		ǔ	ǔ	ǒ	ê
*púdešta- ‘burst’	u	u		u	u	u	u	ǔ	ǔ	ǒ	ê
*púdərge- ‘break’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*púl-wuj ‘knee’	u	u	u	u	u	u	u	ǔ	<u>u</u>	<u>u</u>	ê, <u>u</u>
*pún ‘hair’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*púnčala- ‘wring’	u				u	u	u	ǔ	ǔ	ǒ	ê
*púndaš ‘bottom’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*püne- ‘braid’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*púnəlmə ‘bumblebee’							u	ǔ		ǒ	ê
*púnəške- ‘get moldy’	<u>ü</u>		<u>ü</u>		<u>ü</u>	ê		ǔ	ǔ	ǒ	ê
*púra- ‘bite, chew’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*püre- ‘enter’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê

Proto-Mari *ú:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*pürgeda- 'hoe, dig up, burrow'	u				u	u	u	ǔ	ǔ	ǒ	ê
*pürgəšte- 'snow over'	u			u	u	u	u	ǔ		ǒ	ê, <u>u</u> , <u>ü</u>
*püşkəla- 'sting'	<u>ü</u>	<u>ü</u>	<u>ü</u>	<u>ü</u>	<u>ü</u>	u, <u>ü</u>	u	ǔ	ǔ	ǒ	ê
*püş 'boat'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*püşkeda- 'have diarrhea'	u		u	u	u	u	u	ǔ	ǔ	ǒ	ê
*püşkədə 'soft'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*püt, *pütərak 'strong'	u			u	u	u		ǔ	<u>ı</u>	<u>ê</u>	ê
*püžar 'plane'	u	u		u	u	u	u	ǔ	ǔ	ǒ	ê
*rüde- 'unbind'	u	u	u	u	u	u	u	ǔ	<u>u</u>	ǒ	ê
*rümbək 'mud'	u	u		u	u	u	u	ǔ		ǒ	ê
*šüwan 'boil, abscess'	<u>ü</u>	<u>ü</u>	<u>ü</u>	<u>ü</u>		<u>ü</u>		ǔ		<u>ê</u>	<u>ə</u>
*šügəñə 'lever'	u		u	u	u	u		ǔ	ǔ	ǒ	ê
*šüldər 'feather'	u	u	u	u	u	u	u	<u>u</u>	ǔ	ǒ	ê
*šüle- 'melt'	u	u	u	u	u	u		ǔ	ǔ	ǒ	ê
*šüləkš 'boot leg'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	
*šüma- 'get tired'	u	u		u	u	u		ǔ		ǒ	ê
*šüme- 'whet'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*šüŋalta- 'fall head-on'	u	u	u	u	u	u		ǔ	ǔ		ê
*šüpša- 'pull, suck'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*šür 'shit'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*šüre- 'pound, crush'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*šüwəkš 'leather sack'	u	u		u	u	u	u	ǔ	ǔ, <u>ı</u>	ǒ	<u>u</u>
*tüdə 'this'	u	u	u	u	u	u	u	<u>ü</u>	ǔ	<u>ü</u>	<u>ə</u>
*tügər 'shirt'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*tüjə 'sick, lean'	u				u	u		<u>u</u>	<u>u</u>	ǒ	
*tül 'fire'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*tünəma- 'learn'	u	u	u	u	u	u	<u>ü</u>	<u>ü</u>	<u>ü</u>	ǒ	ê
*tünğər 'thick tree bark'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*tüp 'back'	u	u	u	u	u	u	u	ǔ	ǔ	<u>u</u>	ê
*tüpka 'heckled flax or hemp'						u	u	ǔ	ǔ	ǒ	ê
*türta- 'shrink'	u	u	u	u	u	u	u	<u>u</u>	<u>u</u>	ǒ	ê
*türəža- 'trample'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê
*tüške- 'glue'	u			u	u	u		ǔ	ǔ	ǒ	ê
*tüšte- 'ask a riddle'	u	u	u	u	u	u	u	<u>u</u>	<u>u</u>	ǒ	ê
*tütəš 'often, constantly'	u				u	u					ê
*tűwəle- 'defend, rescue'							u	ǔ			ê
*tűwərgə- 'curdle, turn sour'	u	u	u	u	u	u		ǔ	ǔ	ǒ	ê
*üdəla- 'pray for'	u	u		u	u	u		ǔ			ê
*üdəre- 'rake'	u	u	u	u	u	u	u	ǔ	ǔ	<u>ê</u>	ê
*üla- 'be'	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ê

Proto-Mari *ú:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*úlde- ‘ask for’						u		ǔ		ǒ	
*ǔlmə ‘man’	u	u						<u>ǔ</u>		ǒ	
*ǔmša ‘mouth’	u	u	u	u	u	u	u	ǔ		ǒ	<u>ə</u>
*ǔmər ‘warm’	u	u		u	u	u		ǔ		ǒ	
*ǔmbal ‘distant’	u	u		u		u	u	ǔ		ǒ, <u>ə</u>	ə
*ǔre- ‘put in the ground’	u		u	u	u	u	u	ǔ		ǒ	ə
*ǔrə ‘two handfuls’	u		u	u				ǔ		ǒ	ə
*ǔrge- ‘sew’	u	u	u	u	u	u	u	ǔ		ǒ	ə
*ǔžar ‘green’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ə, <u>ə</u>
*ǔžga ‘fur-coat’					u	u	u	ǔ	ǔ	ǒ	ə
*wǔcək ‘much’	u, <u>ǔ</u>			u	u	u		ǔ			ə
*wǔče- ‘wait’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ə
*wǔle- ‘get spoiled’	u					u		ǔ			ə
*wǔlnə ‘tin’	u	u	u	u	u	u	u	ǔ	<u>ə, ǐ</u>	ǒ	<u>ə</u>
*wǔrde- ‘tend’		u						ǔ		ǒ	<u>ə</u>
*wǔrgem ‘clothes’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ə
*wǔrgəže- ‘be restless’	u			u	u	u	u	ǔ		ǒ	ə
*wǔrt ‘heddle’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	<u>ə</u>
*wǔž (onomatopoetic root)					u	u		ǔ		ǒ	ə
*wǔžale- ‘buy’	u	u	u	u	u	u	u	ǔ	ǔ	ǒ	ə

Proto-Mari *ú:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*čüčə ‘maternal uncle’	ü		ü	ü	ü	ü	ü	ü	ü	<u>ə</u>	ə
*čüdə ‘lack, need’	ü			ü	ü			<u>ü</u>			ə
*čünge- ‘peck (of birds)’	ü	ü	ü	ü	ü	ü		ü	ı	ü	ə
*küč ‘nail’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ü	ə
*küče- ‘beg’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>		ü	ə
*küćə ‘knife’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	<u>ü</u>	ü, <u>ü</u>	ə
*küdər ‘black grouse’	ü	ü	ü	ü	ü	ü		<u>ü</u>	ü	ü	ə
*küdərte- ‘thunder’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ü	ə
*künčä- ‘dig’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>		ü	
*küpš ‘nap, fuzz’	ü				ü	ü		<u>ü</u>	ü	ü	<u>ə</u>
*kür ‘bast’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ü	ə
*kūra- ‘tear, rip’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*kürtńə ‘iron’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ü	ə
*küśedək ‘lapwing’	ü	ü	<u>ə</u>	∅	ü	ü		ü		<u>ə</u>	ə
*küžgə ‘thick’	ü	ü	ü	ü	ü	ü	ü		<u>ü</u>	ü	ə
*lūgəšte- ‘itch’	ü	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ə
*lūkə ‘boggy area’						ü		<u>ü</u>		ü	
*lūm ‘name’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*lūmə ‘scab’	ü			ü	ü	ü	ü	ü	ü	ü	<u>ı</u>
*lūnge- ‘rock’	ü	ü		ü	ü	ü	ü	<u>ü</u>	ü	ü	<u>ö</u>
*lūškalta- ‘shake, swing’			ü				ü	ü		ü	
*lūšte- ‘milk’	ü	ü	ü	ü	ü	ü	ü		ü		ə
*mündər ‘far’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ü	ə
*mūškər ‘belly’	ü	ü	ü	ü	ü	ü	ü	ü		ü, <u>ə</u>	ə
*nūštala- ‘blow one’s nose’	ü	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	<u>ö</u>	<u>ə</u>
*nūškə ‘blunt’	ü	ü		ü	ü	ü	ü	<u>ü</u>	ü	ü	ə
*nūža- ‘scrape’	ü	ü		ü	ü	ü	ü	ü	ü	ü	ə
*pūčka- ‘cut off’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*pūncə ‘pine’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ü	ü	
*pūrde- ‘cover with a cloth’	ü				ü	ü	ü	<u>ü</u>	ü	<u>ü</u>	ə
*rūće- ‘shake’	ü	<u>ü</u>	<u>ü</u>	ü	ü	ü	ü	ü	ü	ü	ə
*rūdaŋa- ‘rust’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*rūde- ‘pick, pluck’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*rūdə ‘core’	ü	ü		ü	ü	ü	ü	ü	ü	ü	ə
*rūm(b)alge- ‘get dark’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*rūpse- ‘rock’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*rūškalta- ‘quake, rumble’					ü	ü					ə
*rūškə ‘gnarl’	ü					ü		<u>ü</u>	ü	ü	ə
*sūdər(n)e- ‘drag’	ü	ü	ü	ü	ü	ü	ü	ü	ü	ü	ə
*sūke- ‘shove’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	<u>ü</u>	<u>ü</u>	ə

Proto-Mari *ů:	B	Kr	Ka	Ki	S	M	MU	U	V	Nw	W
*sŭlə ‘fathom’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	<u>ü</u>	<u>ü</u>	ə
*sŭm ‘sense of touch’	ü			ü	ü	ü			ŭ		ə
*sŭre- ‘smear’	ü	ü	ü	ü	ü	ü		ŭ	ŭ	ŭ	ə
*sŭrtŭe- ‘trip, tumble’	ü	ü		ü	ü	ü	ü		ŭ		ə
*sŭwǎce- ‘shell (nuts)’					ü			ŭ	ŭ	ŭ	
*sŭc ‘soot’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ŭ	<u>ə</u>	<u>ə</u>
*sŭdǎkš ‘barrel hoop’	ü	ü	ü	ü	ü	ü	<u>ə</u>	ŭ	<u>ə</u>	<u>ə</u>	
*sŭdər ‘spindle’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ, <u>ə</u>	ə
*sŭgə ‘bark beetle’		ü		ü			ü	ŭ		ŭ	ə
*sŭm ‘heart’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	<u>ü</u>
*sŭm ‘scale’	ü	ü	ü	ü	ü	ü, <u>ö</u>	ü	ŭ	<u>ö</u>	ŭ	<u>ü</u>
*sŭrgə ‘cheeks, face’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*sŭrgə ‘forest’				ü		ü			ŭ		ə
*sŭrtə ‘yarn’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ŭ	ŭ	ə
*sŭška- ‘stuff’	ü	ü	ü	ü	ü	ü		ŭ	ŭ	ŭ	ə
*sŭštə ‘leather’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	ŭ	<u>ə</u>	ə
*sŭwala- ‘spit’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*tŭj ‘base’	ü	ü, <u>ə</u>	ü	ü	ü	ü	ü	ŭ, <u>ü</u>	ŭ	ŭ	ə
*tŭr ‘edge; blade’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*tŭreda- ‘harvest’	ü	ü	ü	ü	ü	ü		ŭ, <u>ø</u>	ŭ	<u>ə</u>	ə
*tŭrəs ‘full’	ü	ü		ü	ü	ü	ü	ŭ	ŭ		ə
*tŭrwə ‘lip’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*tŭrwǎŭca- ‘sneeze’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*tŭška ‘group (of people), herd’	ü		ü	ü		ü	ü	<u>ü</u>	ŭ		ə
*tŭwət ‘entirely’		ü		ü	ü	ü		ŭ			ə
*tŭžem ‘thousand’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*ŭdər ‘girl, daughter’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*ŭškərt ‘stubborn’	ü				ü	ü	ü	ŭ, <u>ü</u>		ŭ	
*ŭštə ‘belt’	ü	ü	ü	ü	ü	ü	ü	<u>ü</u>	<u>ü</u>	<u>ü</u>	ə
*ŭžgar ‘thing’	ü	ü			ü	ü, <u>u</u>	ü	ŭ	<u>ə</u>	ŭ, <u>ə</u>	ə
*ŭžəwər ‘common swift’	ü	ü		ü		ü		ŭ			ə
*wŭčə ‘cut, notch’		ü		ü			ü	<u>ü</u>			ə
*wŭl- ‘on, up, over’							ü	ŭ		ŭ, <u>ə</u>	ə
*wŭl/lə ‘mare’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*wŭr ‘blood’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*wŭrgeŭə ‘copper’	ü	ü		ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*wŭt ‘water’	ü	ü	ü	ü	ü	ü	ü	ŭ	ŭ	ŭ	ə
*wŭtelə ‘snipe’	ü				ü	ü	ü	ŭ, <u>ü</u>		ŭ	ə

Appendix B. Uralic etymologies of Mari words with close full and reduced vowels

PMari *i < PU *e

- E *ilem*, Ki *ilem*, V *ilem*, U Nw W *alem* ‘I live’ < PMari *ile- < PU *elä- (UEW: 73; HPUL: 536)
- E *iza*, Ki *iza*, V *iza*, U *za* (!), Nw W *azä* ‘older brother’ < PMari *iça < PU *içä ~ *eçä (UEW: 22; HPUL: 541)
- E Nw W *kaldem*, Ki *kil'dem*, V *kıldem* ‘I bind, lash’ < PMari *kilde- < PU *keltä- (UEW: 657)
- E U *laštaš*, Ki *lištaš*, V *ljštaš*, Nw *laštäš*, W *laštäš* ~ *alaštäš* (!) ‘leaf’ < PMari *lištaš < PU *lešti (UEW: 690)
- E U Nw W *nal*, Ki *nil* ‘four’ < PMari *nıl < PU *neljä (UEW: 315–316; HPUL: 547)
- E *palaš*, Ki *pil'iš*, V *pil'iš*, Nw *pələkš*, W *palaš*, *palaš* ‘ear’ < PMari *pələkš < PU *peljä (UEW: 370; HPUL: 547)
- E *pəžaš*, Ki *pizaš*, V *pžakš*, U *pžžaš* (!), Nw *pžžakš* (!), W *pžžäš* ‘nest, den’ < PMari *pžakš < PU *pesä (UEW: 375; HPUL: 539)
- E Nw *rəwəž*, Ki *riwiž*, U *rüwüž* (!), W *rəwəž* ~ *əwəž* ‘fox’ < PMari *rəwəž < PU *repäs (UEW: 423–424; HPUL: 553)
- E U Nw *šalaž* ‘small of the back’ < PMari *šiləž < PU *šelkä (UEW: 772)

PMari *i < PU *i

- E *iza*, Ki *iza*, V *iza*, U *za* (!), Nw W *azä* ‘older brother’ < PMari *iça < PU *içä ~ *eçä (UEW: 22; HPUL: 541)
- E *káčək*, Ka *kačək*, U *kacək*, Nw *kacä löm*, W *káčä* ‘newly fallen fine snow’ < PMari *kičək, *kičä < PU *kičV- (SSA s.v. *kide*)
- E *kərem*, *krem*, Ki *kirem*, V *krem*, Nw *kərem* ‘I hit, forge, hammer, thresh’ < PMari *kire- < PU *kirä- (UEW: 666; HPUL: 552)
- E Nw W *kəškem*, Ki *kiškem*, V *kjškem* ‘I throw; I pour’ < PMari *kiške- < PU *kiški- (HPUL: 552; cf. UEW: 667)
- Ki *jičke-*, W *jačke-* ‘pick, pluck, pull’ < PMari *jičke- < PU *ničkä- (Aikio, forthcoming). — The change *ń- > *ji- has a parallel in PMari *jilmə ‘tongue’ < PU *nälmä (see below). Note that E Nw W *nal*, Ki *nil* ‘four’ (< PMari *nıl) is not a counterexample to this change, because this numeral originally had *n- instead of *ń- (PU *neljä). The unpalatalized nasal is also preserved in Hungarian *négy* and many Saami languages (e.g., Ume Saami *nelja*, Inari Saami *nelji*). The initial *ń-* of some cognates (e.g., Komi *ńol*, East Khanty *ńělə*, North Mansi *ńila*) seems to have developed due the assimilatory influence of word-internal *j-.
- E Nw *pəzem*, Ki *pižem* ‘I hold on, cling to’ < PMari *piče- < PU *pitä- (Aikio, forthcoming)
- E *məń*, *məj*, *məjə*, Ki *miń*, U *məń*, *məńe*, V *mijń*, Nw *miń*, W *mińə*, *məńə* ‘I’ < PMari *mińə < PU *minä (cf. UEW: 294)
- E *šińčä*, Nw *šincä*, W *šincä*, *səncä* ‘eye’ < PMari *šin-čä < PU *šilmä (UEW: 479; HPUL: 540)
- E *təjə*, *təj*, Ki *tiń*, U *təńə*, *təń*, V *tij*, Nw *təń*, *tij*, W *təńə*, *tij* ‘you (sg.)’ < PMari *tińə < PU *tinä (cf. UEW: 539)

PMari *i < PU *ü

- E *šəže*, *šiže*, Ki *šiža*, U *šüža*, Nw *šəža*, *šüžü*, W *šəža* ‘autumn’ < PMari *šüzə < PU *sükiš (UEW: 443; HPUL: 549)
- E *káčkem*, *kičkem*, Ki *kičkem*, V *kjškem*, U Nw W *káčkem* ‘I harness’ < PMari *kičke- < PU *kütki- (UEW: 903)
- E *kəlme*, Ki *kil'me*, V *kil'me*, Nw W *kəlmə* ‘frozen’ < PMari *kilmə < PU *külmä (UEW: 663; HPUL: 552)
- E Nw W *kəńer*, Ki *kińer*, V *kjńer* ‘ell’ < PMari *kińer < PU *küńärä (UEW: 158–159; HPUL: 544)
- E *ńakta-*, Nw *ńiktä-*, W *ńaktä-* ‘skin’ < PMari *ńihta- < PU *ńühtä- (UEW: 715)
- E *šəyal'e*, Ki *šiyil'a*, U Nw *šəyal'a*, W *šəyal'* ‘wart’ < PMari *šigəľə < PU *süklä (UEW: 36–37; HPUL: 549)

PMari *ji- < PU *jä-, *nä-

- E *jədaŋ*, Ki *jiđaŋ*, U *jəraŋ* (!), Nw W *jədaŋ* ‘bowstring’ < PMari *jidaŋ < PU *jäntiŋ (UEW: 92; HPUL: 537)
- E U Nw *jəžəŋ*, Ki *jižin*, W *ježəŋ* (!) ‘joint’ < PMari *jižəŋ < PU *jäsin (UEW: 95; HPUL: 552)
- E *jəma*, Ki *jima* ‘(a body part) grows numb; (an eye) goes blind’, U *jəma*, Nw W *jəmä* ‘hides oneself; (a tooth) aches severely; (an eye) goes blind’ < PMari *jime- ‘go numb’ < PU *jämə- (Aikio, forthcoming)
- E V *jəlme*, Ki *jülmə* (!), Nw *jilma*, W *jilma*, *jəlma* ‘tongue, language’ < PMari *jilmə < PU *nälmä (UEW: 313; HPUL: 546).

PMari *i < PU *ä

- E *ime*, Nw *imə*, W *im* ‘needle’ < PMari *imə < PU *äjmä (UEW: 22; HPUL: 536)
- W *kiže* ‘feel cold’ < PMari *kiže- < PU *känšV- (Aikio 2002: 21; cf. UEW: 648, HPUL: 552)
- E *kit*, *kət* (!), Nw W *kit* ‘hand’ < PMari *kit < PU *käti (UEW: 140; HPUL: 545)

- E *liš-*, *laš-* (!), Nw W *liš-* ‘near’ < PMari *liš- < PU *läsi- (UEW: 687)
- E *piste*, *pište*, Nw W *pistə* ‘linden’ < PMari *pistə < PU *päksnä (UEW: 726)
- E *šiste*, Nw W *šišta* ‘woodpecker’ < PMari *šišta < PU *šäsna (UEW: 772; HPUL: 554)
- E *tič*, U Nw *tic*, W *cic* ‘full’ < PMari *tič < PU *täwdi (cf. UEW: 518; HPUL: 550; Aikio 2002: 31–34)
- E V *lewa*, Ki *lewa*, U *liwa*, Nw W *liwä* ‘it becomes warm’ < PMari *liwe- < PU *lämpi- (UEW: 685; Aikio, forthcoming)
- E V *šen*, MU U Nw W *šin* ‘tinder’ < PMari *šin < PU *šänä (UEW: 494–495; HPUL: 548)
- E *wenə*, Ki *wenə*, MU U Nw *winə*, Nw *winğə* ‘son-in-law’ < PMari *winə < PU *wäniw (UEW: 565–566; HPUL: 541)
- E *wüdem* (!), Nw W *wiðem* ‘I take (somewhere), lead’ < PMari *widem < PU *wätä- (UEW: 569; HPUL: 551).
— Traditionally reconstructed as *wetä-, but both Moksha Mordvin *vätä-* ‘lead, guide’ and Hungarian *vezet* ‘leads, guides’ point to PU *ä instead of *e; the vocalism of Finnish *vetää* ‘pulls’ is irregular.

PMari *ü < PU *ü

- E *künčem*, (Ka Kr) *künčem*, Nw *künčem* ‘I dig’ < PMari *künče- < PU *künčä- (UEW: 663–664)
- E *küč*, (B Ka Kr) *küč*, Nw *küč*, W *káč* ‘nail’ < PMari *küč < PU *künči (UEW: 157; HPUL: 554)
- E *küžyö*, Nw *küžyü*, W *kəžyə* ‘thick, fat, stout’ < PMari *küžgə < PU *küsä (UEW: 161; HPUL: 544)
- E *küðar*, V U Nw *küðür*, W *kəðar* ‘black grouse’ < PMari *küðar < PU *kütVrV (UEW: 231)
- E *šülö*, Nw *šülü* (!), W *šəl* ‘fathom’ < PMari *šülə < PU *süli (UEW: 444; HPUL: 540)
- E *šüşkam*, Nw *šüşkäm*, W *šəškäm* ‘I cram, pack’ < PMari *šüşka- < PU *süskä- (UEW: 768)
- E *šüwəl*, Nw *šüwül*, W *šəwəl*, *šəwəl* ‘spit’ < PMari *šüwəl < PU *šülki (UEW: 479–480; HPUL: 549)
- E *tünj*, Nw *tünj*, W *təj* ‘base (of a tree)’ < PMari *tünj < PU *tünji (UEW: 523–524; HPUL: 550)
- U *wül-*, Nw *wül-*, *wəl-*, W *wəl-* ‘on’ < PMari *wül- < PU *wüli- (UEW: 573–574; cf. HPUL: 536)

PMari *ü < PU *i

- E *lüm*, Nw *lüm*, W *ləm* ‘name’ < PMari *lüm < PU *nimi (UEW: 305; HPUL: 538)

PMari *ü < PU *e

- E *čüčö*, (B Ka) *čüčö*, U *cüci*, Nw *cəcə*, W *čəčə* ‘maternal uncle’ < PMari *čüčə < PU *čečä (UEW: 34–35; HPUL: 536)
- E *kür*, Nw *kür*, W *kər* ‘bast’ < PMari *kür < PU *keri (UEW: 148–149; HPUL: 543)
- E *pünčö*, (B Ka Kr) *pünčö*, Nw *pünči* ‘pine’ < PMari *pünčə < PU *pe(n)čä (UEW: 727; HPUL: 553)
- E *tür*, Nw *tür*, W *tər* ‘blade; edge; shore’ < PMari *tür < PU *terä (cf. UEW: 522, 795)
- E *wür*, Nw *wür*, W *wər* ‘blood’ < PMari *wür < PU *weri (UEW: 576; HPUL: 551)
- E *wüt*, Nw *wüt*, W *wət* ‘water’ < PMari *wüt < PU *weti (UEW: 570–571; HPUL: 541)

PMari *ü < PU *j

- E W *üp* ‘hair on the head’ < PMari *üp < PU *jpti (UEW: 14–15; HPUL: 536)
- E *ülö-*, W *ülä-* ‘under-’ < PMari *ülə- < PU *jla (UEW: 6; HPUL: 536)
- E *lüda-*, Nw W *lüdä-* ‘be afraid’ < PMari *lüda- < PU *ljdi- (Aikio, forthcoming)
- E W *šüm* ‘scale’ < PMari *šüm < PU *šjmi (UEW: 476; 549)
- E *šün*, *šön*, Ki *šün*, W *šün* ‘vein, sinew’ < PMari *šün < PU *šjni (UEW: 441; HPUL: 548)
- E V *šüdam*, Ki *šüdam*, W *šüdam* ‘I clear (e.g., road, field, forest)’ < PMari *šüda- < PU *šjinti- (Aikio, forthcoming)
- E *šüdü*, W *šüdə* ‘hundred’ < PMari *šüdə < PU *šjta (UEW: 467; HPUL: 549)
- M *nölä pikš* ‘arrow with a bone head’ < PMari *nülə < PU *njli ‘arrow’ (UEW: 317; HPUL: 539)
- E W *mör* ‘strawberry’ < PU *mjrja ‘berry’ (UEW: 264–265)
- E *nörö*, W *nöra* ‘flexible, pliable’ < PMari *nürə < PU *njri (Aikio 2012: 234)
- E *nörjö*, W *nörjə* ‘cartilage’ < PMari *nürgə < PU *njrki (UEW: 317; HPUL: 546)

PMari *ü < PU *ä

- E Nw *jükšem*, W *ükšem* ‘I get cold’ < PMari *jükše- < PU *jäksi- (UEW: 90–91)
- E Nw W *pükš* ‘nut’ < PMari *pükš < PU *päski (UEW: 726–727; HPUL: 553)
- E *šükšö*, Nw W *šükšə* ‘rag; worn-out, bad, unsuitable; rotten’ < PU *säksä (Aikio, forthcoming)

PMari *ũ < PU *u

- E *jumo*, Nw *jōmo*, W *jâmâ* ‘god; heaven’ < PMari *jũmæ < PU *juma (UEW: 638)
- E *kum*, V U *kũm*, Nw *kōm*, W *kâm* ‘three’ < PMari *kũm < PU *kolmi ~ *kulmi (UEW: 174; HPUL: 543)
- E *kumæk*, V U *kũmuk*, Nw *kōmøk*, W *kâmæk* ‘upside down’ < PMari *kũmæk < PU *kuma- (UEW: 201–202; HPUL: 537)
- E *kumða*, U *kũmða*, Nw *kōmða*, W *kâmða* ‘broad’ < PMari *kũmða < PU *kumta (UEW: 203–204)
- M *kužam*, V U *kũžam*, Nw *kōžam*, W *kâžam* ‘I urinate’ < PMari *kũža- < PU *kunsi- (UEW: 210; HPUL: 537)
- E *kuwæl*, U *kũwul*, Nw *kōwol*, W *kâwâl* ‘blister’ < PMari *kũwæl < PU *kupla (UEW: 212–213)
- E *kurmæzak*, W *kârmæzak* ‘Eurasian woodcock’ < PMari *kũrmæcak < PU *kurmićca (UEW: 676–677). — This etymology is not accepted in SSA (s.v. *kurppa*), but the correspondence between Fi *kurmitsa* ‘Eurasian woodcock’ and PMari *kũrmæc- is fully regular.
- E *kuræk*, U *kũruk*, Nw *kōrok*, W *kâræk* ‘hill, mountain’ < PMari *kũræk < PU *kuri (UEW: 677)
- E *kutko*, V *kũtko*, Nw *kōtko*, W *kâtkâ* ‘ant’ < PMari *kũtkæ < PU *kutki (UEW: 678; HPUL: 552)
- E *luđam*, V *lũđam*, Nw *luđam* (!), W *lâđam* ‘I count; I read’ < PMari *lũda- < PU *luki-(ta-) (UEW: 253; HPUL: 545)
- E *lum*, V U *lũm*, Nw *lōm*, W *lâm* ‘snow’ < PMari *lũm < PU *lumi (UEW: 253; HPUL: 538)
- E *šínćam lumem*, W *sancām lāmem* ‘I bewitch, cast a spell on’ (*šínćam*, *sancām* ACC ‘eye’) < PMari *lũme- < PU *lumV- (UEW: 694)
- E V *luđo*, U *lũdo*, Nw *lōđo*, W *lâđâ* ‘duck’ < PMari *lũdæ < PU *lunta (UEW: 254; HPUL: 545)
- E *lupš*, Ki *luφš*, V U *lũpš*, Nw *lōpš*, W *lâpš* ‘dew’ < PMari *lũpš < PU *lupsa (UEW: 261; HPUL: 538)
- E *muč-*, V *mũč-*, *mūs-*, Nw *mōc-*, *mæc-*, W *mâč-* ‘end’ (in compounds) < PMari *mũč- < PU *muča (UEW: 283)
- E *muno*, M *munæ*, V U *mũno*, Nw *mōno*, W *mânâ* ‘egg; testicle’ < PMari *mũnæ < PU *muna (UEW: 285; HPUL: 538)
- E *nužem*, U *nũžem* ‘I scrub (my skin); I rub off, scrape off’ < PMari *nũže- < PU *nusi- (UEW: 309)
- E *puč*, (B Ka Kr) *puč*, V *pũč*, U *pũc*, Nw *pōc*, *pâc*, W *pâč* ‘hollow plant stalk, tube; shepherd’s horn’ < PMari *pũč < PU *pučki (UEW: 397; HPUL: 539)
- E *pudešteš*, V U *pũdešteš*, Nw *pōdešteš*, W *pâdešteš* ‘it bursts’ < PMari *pũdæšte- < PU *puđa- (Aikio 2006: 22–23)
- E *pun*, V U *pũn*, Nw *pōn*, W *pân* ‘body hair, animal hair, down’ < PMari *pũn < PU *puna (UEW: 402; HPUL: 547)
- E *punem*, V U *pũnem*, Nw *pōnem*, W *pânem* ‘I braid, plait, twine, twist’ < PMari *pũne- < PU *puna- (UEW: 402–403; HPUL: 539)
- E *puram*, V U *pũram*, Nw *pōram*, W *pâram* ‘I chew, bite’ < PMari *pũra- < PU *puri- (UEW: 405; HPUL: 539)
- E *purγeđam*, V U *pũrγeđam*, Nw *pōrγeđam*, W *pârγeđam* ‘I hoe up, dig up, burrow’ < PMari *pũrgeđa- < PU *purka- (UEW: 741)
- E *purγæšta*, U *pũrγæšta* ‘covers in snow’, Nw *pōrγøšta*, W *pũrγæšta*, *pârγæšta* ‘whirls (of snow, dust, etc.)’ < PMari *pũrgešte- (UEW: 406; HPUL: 547)
- E *pũškeš* (!), Ki *pũškeš* (!), Nw *pōškeš*, W *pâškeš* ‘stings (of an insect)’ < PMari *pũska- < PU *puski- (UEW: 408; HPUL: 547)
- E *šula*, V U *šũla*, Nw *šōla*, W *šâla* ‘it melts’ < PMari *šũla- < PU *sula- (UEW: 450–541; HPUL: 548)
- E *šurem*, V U *šũrem*, Nw *šōrem*, W *šârem* ‘I pound, crush, trample; I prick (with a pin), thrust (with a knife)’ < PMari *šũre- < PU *šurwV- (UEW: 491)
- W *tâktâ* ‘boat rib’ < PMari *tũktæ < PU *tuktV (UEW: 534; HPUL: 550)
- E *tul*, V U *tũl*, Nw *tōl*, *tâl*, W *tâl* ‘fire’ < PMari *tũl < PU *tuli (UEW: 535; HPUL: 540)
- E *tunemam*, V *tũnemam*, U *tũnemam* (!), Nw *tōmejäm*, W *tâmeiäm* ‘I practice, learn’ < PMari *tũnema- < PU *tuni- (UEW: 537; HPUL: 550)

PMari *ũ < PU *i (in disharmonic roots)

- E *kuškeđam*, V U *kũškeđam*, Nw *kōškeđam*, W *kâškeđam* ‘I tear off, tear in two’ < PMari *kũškeda- < PU *kiška- (Aikio, forthcoming; cf. HPUL: 552)
- E *užar*, V U *ũžar*, Nw *ōžar*, W *âžar*, *žar* ‘green’ < PMari *ũžar < PU *wiša(-ra) (UEW: 823; HPUL: 554)

PMari *ũ < PU *o (adjacent to labial consonants)

- E *kum*, V U *kũm*, Nw *kõm*, W *kâm* ‘three’ < PMari *kũm < PU *kolmi ~ *kulmi (UEW: 174; HPUL: 543)
- E *kuməž*, U *kũmuž*, Nw *kõmož*, W *kâməž* ‘birch-bark’ < PMari *kũməž < PU *kolmis (Aikio, forthcoming)
- E *kuwo*, V *kũwo* ‘husk’ < PMari *kũwə < PU *kopa (UEW: 180; HPUL: 537)
- E *kuwəlčo*, U *kũwũlzo* ‘wood grouse hen’ < PMari *kũwəlčo < PU *koppala (UEW: 181)
- E *kupa*, V U *kũpa*, Nw *kõpa*, W *kâpa* ‘gets moldy’ < PMari *kũpe- < PU *koppi- (UEW: 680)
- E *muškam*, V *mũškam*, Nw *mõškam*, W *mâškam* ‘I wash’ < PMari *mũška- < PU *moški- (UEW: 289; HPUL: 538)
- E *šumam*, U *šũmam*, Nw *šõmam*, W *šâmam* ‘I get tired, languish’ < PMari *šũma- < PU *šoma- (Aikio, forthcoming)
- E *ulam*, V U *ũlam*, Nw *õlam*, *alam*, W *âlam* ‘I am’ < PMari *ũla- < PU *woli- (UEW: 580–581; HPUL: 551)
- E *uryem*, U *ũryem*, Nw *õryem*, W *âryem* ‘I sew’ < PMari *ũrge- < PU *worka- (UEW: 584–585; HPUL: 551)
- E *wučem*, (B Ka Kr) *wučem*, V *wũčem*, U *wũcem*, Nw *wõcem*, W *wâcem* ‘I wait’ < PMari *wũče- < PU *woča- (UEW: 334)
- E *užalem*, V U *ũžalem*, Nw *õžalem*, W *wâžalem* ‘I sell’ < PMari *wũžale- < PU *wosa (UEW: 585; HPUL: 551)

PMari *u < PU *o

- E V U Nw W *ukš*, Ki *uks* ‘branch’ < PMari *ukš < PU *oksa (UEW: 716; HPUL: 552)
- E *ukšəńcam*, *ukšĩńcam*, V *ukšjńcam*, U *ukšəncam*, Nw *ukšəncam*, W *ukšəncam*, *uksənzam* ‘I vomit’ < PMari *ukšəńca- < PU *oksinta- (UEW: 716; HPUL: 552)
- E *ur* (Kr M S *ur* ~ *ər!*), Ki V U Nw W *ur* ‘squirrel’ < PMari *ur < PU *ora (UEW: 343; HPUL: 552)
- E Ki V U Nw W *wuj* ‘head; end; ear (of corn); tree top’ < PMari *wuj < PU *ojwa (UEW: 336–337; HPUL: 536)
- E *kutkaž*, W *kučkəž* ‘eagle’ < PMari *kut/čkəž < PU *kočka (UEW: 668; HPUL: 552)
- E Ki V U *kuđo*, Nw *kuđə*, W *kuđə* ‘Mari summer house’ < PMari *kuđə < PU *kota (UEW: 120; HPUL: 543)
- E *püčö*, (B Ka) *püčö* (!), Ki *pučo*, V *pjče* (!), U *puco*, Nw *puca*, W *pučə* ‘(wild) reindeer’ < PMari *pučə < PU *počaw (UEW: 387–388; HPUL: 553)
- E *pulaš*, V *pũliš*, Nw *pulõkš*, W *pulaš* ‘shoulder’ < PMari *pulaš < PU *pola (UEW: 734; HPUL: 553)
- E V Nw *pul-wuj*, U *pũl-wuji* (!), W *pul-wuj*, *pəl-wuj* (!) ‘knee’ < PMari *pul- < PU *polwi (UEW: 393; HPUL: 539)
- E Ki V U Nw W *šukš* ‘worm’ < PMari *šukš < PU *soksi (UEW: 764)
- E Ki V U Nw W *šudalam* ‘I scold; I curse’ < PMari *šudala- < PU *šoda- (UEW: 777)

Unexpected instances of full vowels

- E Ki V U *pižam*, Nw W *pižäm* ‘I grab; I get stuck’ < PMari *piže- < PU *pisi- (UEW: 732)
- E *wiste*, Nw *wištə* ‘spelt’ < PMari *wistə < PU *wešnə (UEW: 821)
- E Nw W *üps*, Ki *üφs* ‘smell’ < PMari *üps < PU *ipsi (UEW: 83–84; HPUL: 536)
- E Ki V U Nw W *müks* ‘bee’ < PMari *mükš < PU *mekši (UEW: 271; HPUL: 545)
- W *juž-wat* ‘sweat; fluid in a blister’ (< PMari *juž-; *wat* ‘water’) < PU *jiša ‘skin’ (UEW: 636–637; HPUL: 552)

A. Айкио. К реконструкции прамарийского вокализма.

На настоящий момент существуют две теории устройства вокалической системы в прамарийском языке, выдвинутые соответственно Э. Итконеном и Г. Беречки. В статье дается критический анализ обеих теорий, после чего автор предлагает собственную, детально аргументированную реконструкцию прамарийского вокализма первого слога. В частности, обосновывается необходимость реконструкции 11 отдельных фонем, в отличие от 13-фонемной системы Итконена и 7-фонемной системы Беречки.

Ключевые слова: уральские языки, марийский язык, праязыковая реконструкция, историческая фонетика.

