L2/25-063

# Proposal to Encode 4 Characters and 1 Half-Vowel, and 12 Numerals in Tulu-Tigalari

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## 1 Background Documents

1) Answers to Dr. Kucera's letter to KTSA

2) Unicode committee Comments on encoding the Modern Tulu script & answers

3) Nov-Dec 24, 2024, Proposal from Karnataka Tulu Sahitya Academy ([1]KTSA) (3 revisions) requesting clarity on Tulu-Tigalari Unicode allocation with regards to missing alphabets, numerals and 40% differences of alphabet glyphs, codepoints between Tigalari and Tulu alphabets and implications for Modern Tulu fonts use in computer operating systems. Below document was submitted hitherto with evidence from 2008 onwards to 2024 along with answers to Unicode committee questions at various meetings.

- [1]**Unicode additions for Modern Tulu Lipi**: Tulu character (4), numeral (10) inclusions, stability roadmap for Modern Tulu & use cases since 2008, By **Dr. Pravinraj S. Rao**, for [1]**KTSA** Tulu Unicode Committee with Dr. Bellur R., Dr. Kekkunnayya, Dr. Prasad, G., (Ref. KTSA Unicode L2/21-019 Pavanaja, L2/22-034 Akashraj KTSA proposal. L2/23-021 Disunification & **110 References** in the end)

4) Tulu Cognate Dictionary, Nitte University
5) Tulu Lexicon
6) Dharmasthala Manuscript Library
7) Palantulu Kavya, Dr. Kabbinale Vasant Bharadwaj
8) Tulu Aksharolu, Pravinraj S Rao
9) Appe Basedo polabu: Tulu Sabdarto, Ugappa Poojari
10) Vyavadhana, N. Srinivasa Udupa
11) Tulu Akshara Mala (2012), Namma Tulunada Trust
12) Kala Konde Calendars, Rashtreeya Saksharata Samiti
13) Tulu alphabet book Toulavada Aksharolu & Toulava soft keyboard layout, Toulava font (2009), Dr, Praveenraj & Rastreeya Saksharata Samiti
14) Tulu Sri & Tulu Siri font by Nishkal Rao, Dr. Guru Prasad Kanaada Phonetics (2017)
15) Tulu Hardware Unicode keyboard, Kanaada Phonetics (2017)

Other documents of importance:

5) L2/17-411 6th Nov 2017

- Support letter, Tigalari style top skin on Ka-Naada hardware 7inch Tulu keyboard with E,EE,O, OO

6) L2/21-019 23 Sep 2020

- Proposal to encode Tulu, U. B. Pavanaja, Karnataka Tulu Sahitya Academy

7) L2/21-007 Oct 22, 2020

- Letter of support for Tulu -Guru Prasad

https://www.unicode.org/L2/L2021/21007-tulu-suppt-ltr.pdf

8) L2/21-189

- Tulu Lipi Parichaya by Bellur

16) L2/22-034 13-12-2021

- Proposal to Encode Tulu Script in Unicode, Karnataka Tulu Sahitya Academy, Dr. Akash Raj Jain, Syndicate Member, Karnataka Tulu Sahitya Academy

10) L2/22-031 15/1/22

- Updated proposal to encode the Tulu-Tigalari script in Unicode Vaishnavi Murthy Yerkadithaya, Vinodh Rajan

10) L2/22-034 13 dec 2022

- KTSA proposal to encode Tulu Unicode

11) L2/22-075 17 Feb 22

- Letter by Guru on Halant (Virama), consonant conjoiner issue

12) L2/23-021

- Disunification of Tulu-Tigalari proposal by Vaishnavi and KTSA proposal request by Vaishnavi et al

13) Sep-10-2024

- Unicode Script Ad-Hoc (SAH) Committee acceptance of initial Tulu-Tigalari character set.

## 2 Introduction

This is a proposal to add characters, numerals as in Tulu Unicode proposals [1]**Unicode additions for Modern Tulu Lipi** (2024) by KTSA, and previous proposals by KTSA (L2/21-019, L2/22-034), and which are not proposed in L2/22-031 or the recently accepted Unicode Tulu-Tigalari character sets. [1]KTSA has details on the evolution of modern Tulu characters and efforts by various scholars along with Karnataka Tulu Sahitya Academy to address the current needs of Tulu digital literacy and its standardization. “A language is a foundation of civilization”- Panini. Scripts are fundamental in expressing a language. We are at the cusp of losing Tulu scripts due to its non-use, as well at a stage to resuscitate by connecting our dear mother tongue Tulu to technology such as fonts, keyboards for a digital realm of possibilities for a new avatar to cherish for the next millennium rather than just being a spoken language. Tulu-Tigalari scripts have been a lifeline for all our ancient manuscripts for the longest time since Brahmi and

used by many languages and Tulu needs it even more now given that is a live language spoken by millions and use Kannada script for Tulu.

This proposal briefly goes over the character/alphabet sets, numerals that are very essential for its usefulness in daily use of Tulu and given that they are missing from recent acceptance of Tulu-Tigalari script. Kindly note, [1]KTSA has difference tables between Tulu and Tigalari also documented with glyphs, fonts and handwritten words and challenges in code point for ligatures and consonant additions.

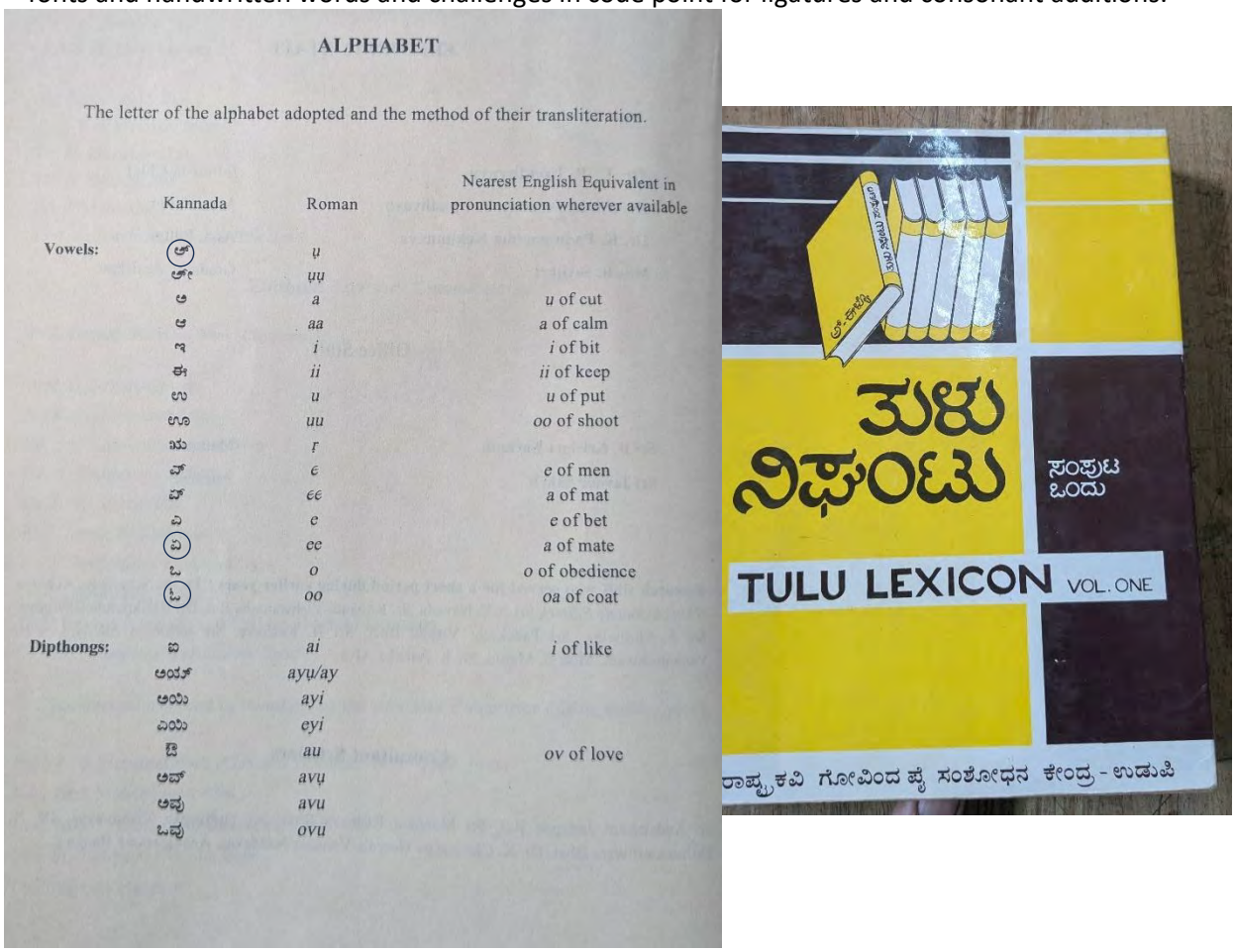


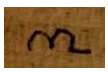

Figure 1. Tulu Lexicon vol 1 (uses Kannada script) distinctly showing most Tulu alphabets requested in this proposal and previous KTSA [1]proposals

## 2.1 Table of Requested Tulu Character/Numeral set: (rendered in Tulu Siri, ToulavaSri font)

| | | |
|---|---|---|
| ಅ E ಎ (Kannada) | 1138A | TULU VOWEL **E** (EE ಏ 1138B is ಅ *n.b. glyph*) |
| ಒ O ಓ | 1138F | TULU VOWEL **O** (OO ಓ11390 is ಒ *n.b. glyph*) |

| | | |
|---|---|---|
| ೋ or ೊ ಀ ◌ | 1138C | TULU HALF VOWEL ಀ back part of mouth ೊ |
| ೋ ಀಀ ◌ | 1138D | TULU HALF VOWEL ಀಀ back part of mouth ೋ |

| | | |
|---|---|---|
| ◌ (Kannada) | 113C1 | TULU LIGATURE **E** (EE ◌ |
| | | 113C2 is ◌) |
| ◌ (Kannada) | 113C6 | TULU LIGATURE O (OO ◌ |
| | | 113C7 is ◌) |
| ◌ ◌ | 113C3 | TULU LIGATURE HALFVOWEL ಀ back part of mouth |
| ◌ ◌ | 113C4 | TULU LIGATURE HALF VOWEL ಀಀ back part of mouth. Hard to print ligature using Kannada script (doesn't exist in Kannada language) |

| | | |
|---|---|---|
| ೦ (0) | 113F0(113BA4 KTSA) | TULU NUMERAL 0 |
| ೧ (1) | 113F1 | TULU NUMERAL 1 |
| ೨ (2) | 113F2 | TULU NUMERAL 2 |
| ೩ (3)  | 113F3 | TULU NUMERAL 3 |
| ೪ (4) | 113F4 | TULU NUMERAL 4 |
| ೫ (5) | 113F5 | TULU NUMERAL 5 |
| ೬ (6) | 113F6 | TULU NUMERAL 6 |
| ೭ (7) | 113F7 | TULU NUMERAL 7 |
| ೮ (8) | 113F8 | TULU NUMERAL 8 |

| | | |
|---|---|---|
| ೨ (9) | 113F9 | TULU NUMERAL 9 |
| ೭ ụ or u | 113CB | TULU VOWEL Back part of mouth sound ARCHAIC |
| ൰ (10 or X) | 113FA | TULU NUMERAL 10 |
| ೫ (100) | 113FB | TULU NUMERAL 100 |

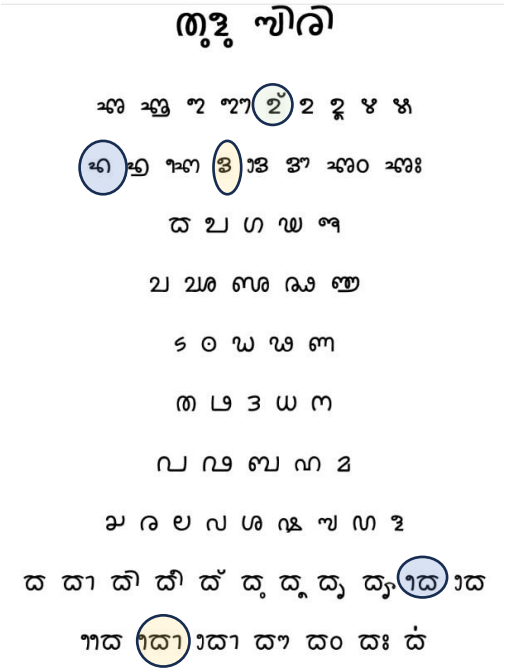
See Table on Page 31 for side-by-side comparison of Modern Tulu requested above and recently approved codepoints for Tulu-Tigalari character sets as well with most Modern Tulu alphabets/numerals in Page 47 . It appears recently approved Tulu-Tigalari set uses EE (U1138B), and OO (U11390) codepoints compared to the E,O used by current Devanagari script ( U90F,U0913) for Sanskrit and apriori Tulu-Tigalari was used for most Sanskrit manuscripts.

There are four basic types of ligatures in Tulu-Tigalari (same as in ref [3,9,10]):
1) [Consonant/Semi-Vowel] + [Consonant(s)/Semi-Vowel(s)] = Conjunct
2) [Consonant / Conjunct/Semi-Vowel] + Vowel Sign
3) [Consonant/Conjunct/Semi-Vowel] + Special Character
4) Ligating Special Characters

## 3 Description and attestations

### 3.1 Vowel 𑒁, E (ಎ in Kannada script)

The common way of representing E is 𑒁 (modern Tulu EE is 𑒁𑒰), and its rendering by various fonts, followed by words is documented in [1]Unicode additions proposal. Given the allocation of EE, 113CB in Tulu-Tigalari Unicode (unlike E in Devanagari commonly used for Sanskrit), we assume rendering of Modern Tulu EE is 𑒁𑒰 is possible with that code point 113CB along with requested 113CA for E 𑒁. This is a character added for modern Tulu stemming from the use of Kannada scripts usage for Tulu. First printing press to India came to Mangalore with a Kannada script typeset, not Tulu and hence the distinctive use of both E, EE in modern Tulu (compared to Sanskrit). Please note Kannada and most Indian languages have both E, EE. Scholar committees were setup by KTSA and after several deliberations, the scholar committee recommendations were published ([1]KTSA Figure 4, Parishkrita Tulu Lipi, Bellur, 2008) and recommended to KTSA Unicode committee (three of those scholars in this recent committee). Textbooks, fonts both ascii and those using Malayalam, Kannada Unicode, differences and their unification before KTSA proposal was submitted are discussed in [1]Unicode additions for Modern Tulu Lipi. Proof of their usage in daily life words, their stability is also discussed in detail from 2014 onwards. Dictionaries, lexicons quoting their meanings and uses are below.



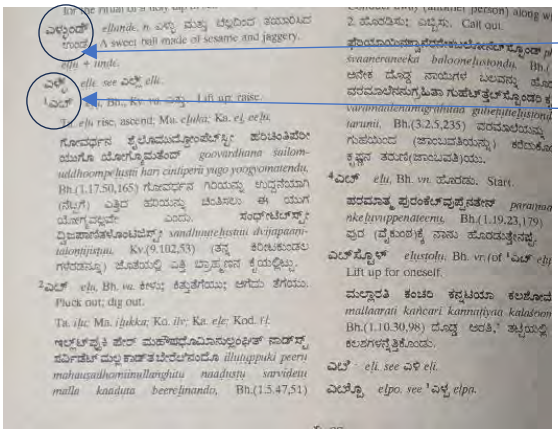
1. 𑒁𑒮𑓂𑒮𑒳 Ellu Not 𑒁𑒮𑓂𑒮𑒳

2. 𑒁𑒰𑒞𑓂𑒞𑒳 ಏತು, EEtu or EEtụ (and not 𑒁𑒞𑓂𑒞𑒳 Since EE is allotted, we are requesting E also *n.b.* Glyph appear similar to currently allotted Tulu-Tigalari EE )

vs

2. 𑎝𑎥𑎧 ಏಪ, EEpa (and not 𑎝𑎧 )

Inset shows 𑎝 (ಎ in Kannada) E character sets and other alphabets (currently missing in Tulu-Tigalari allotted scripts), rendered in Tulu Siri fonts submitted to Unicode committee supporting KTSA proposal [ref 7, L2/21-007]



ellundᵉ 𑎝𑎬𑎳𑎥𑎠

sailomuddhoompelustii

𑎠𑎬𑎳𑎝𑎠𑎳𑎠𑎳𑎠𑎥𑎧𑎳𑎬𑎳𑎬𑎳𑎬𑎳𑎬

Figure 2. Tulu Lexicon vol 5 (uses Kannada script) distinctly showing Tulu words beginning with E, 𑎝 in old Tulu as well (or ಎ in Kannada) as well as EE, 𑎥𑎝 in Tulu( or ಏ in Kannada script)

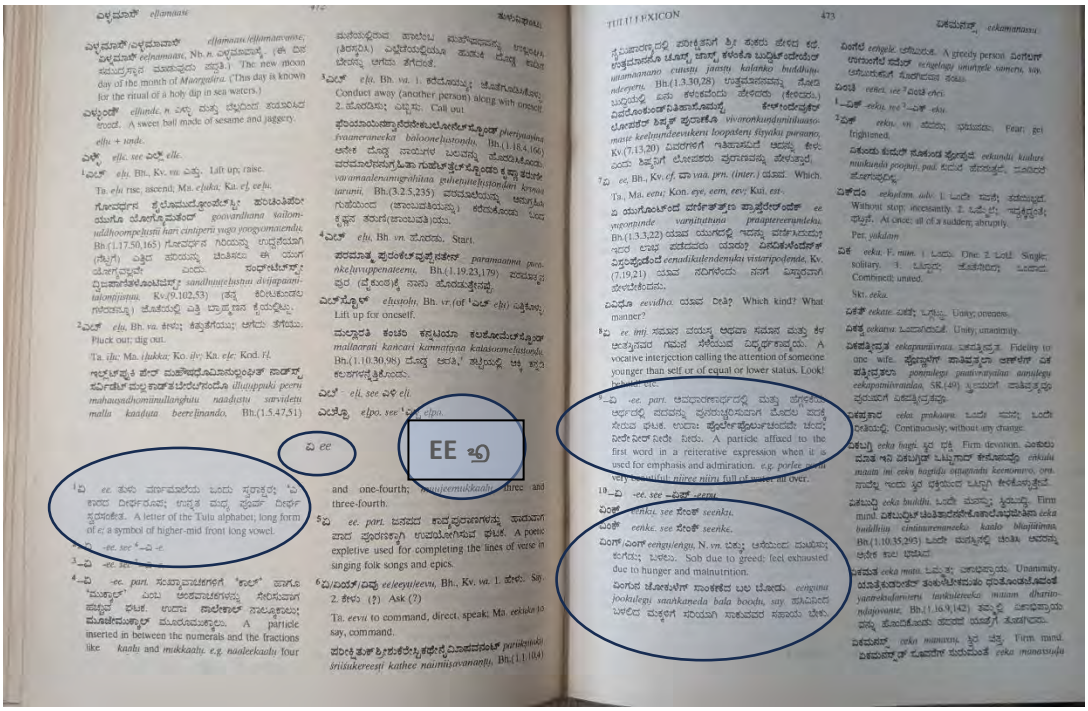


Figure 3. Tulu Lexicon vol 5 (uses Kannada script) distinctly showing Tulu words beginning with EE, ಇ (in Tulu or ಏ in Kannada) as well as E, ಎ (E in Tulu or ಎ in Kannada script)

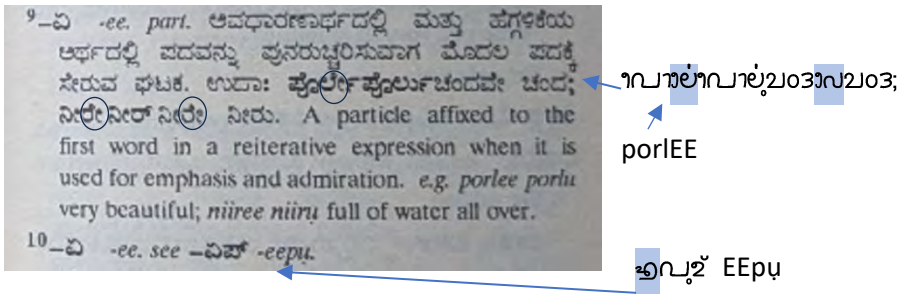
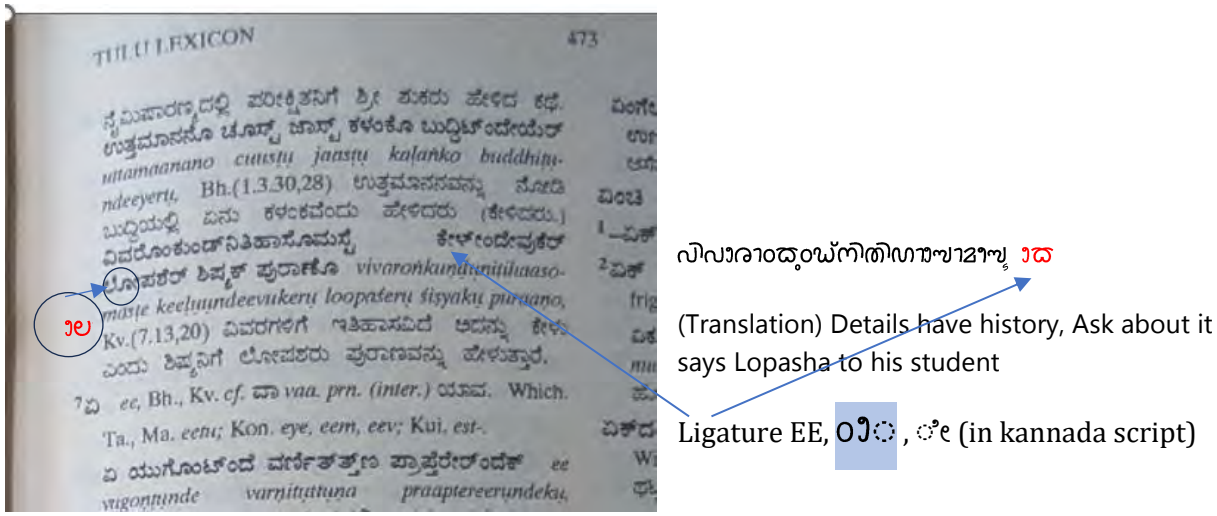



Figure 4. Inset from Tulu Lexicon (see Fig 1)showing EE , ಇ (in Tulu or ಏ in Kannada script) as reiterated expression commonly used in Tulu as well as ligatures


TULU LEXICON
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ಏ
ee, Bh., Kv. cf. ವಾ vaa. prn. (inter.) ಯಾವ. Which.
Ta., Ma. eenu; Kon. eye, eem, eev; Kui. est-.
ಏ ಯುಗೊಂಟ್‌ಂದೆ ವರ್ಣಿತತ್ತುಣ ಪ್ರಾಪ್ತೆರೇರ್‌ಂದೆಕ್ ee yugontunde varnitatuna praaptereerundeku,
ವಿವರೊಂಕುಂದ್‌ನಿತಿಹಾಸೊಮಸ್ಟೆ
ಲೋಪಕೆರ್ ಶಿಷ್ಯಕ್ ಪುರಾಣೊ vivaronkundunitihaaso-
maste keeluundeevukeru loopaseru sisyaku purano,
Kv.(7.13,20) ವಿವರಗಳಿಗೆ ಇತಿಹಾಸವಿದೆ ಅದನ್ನು ಕೇಳು
ಎಂದು ಶಿಷ್ಯನಿಗೆ ಲೋಪಶರು ಪುರಾಣವನ್ನು ಹೇಳುತ್ತಾರೆ.
ಏ
ಏಕ್‌ದ
ಏಲ
ಏಲ
ಏಲ

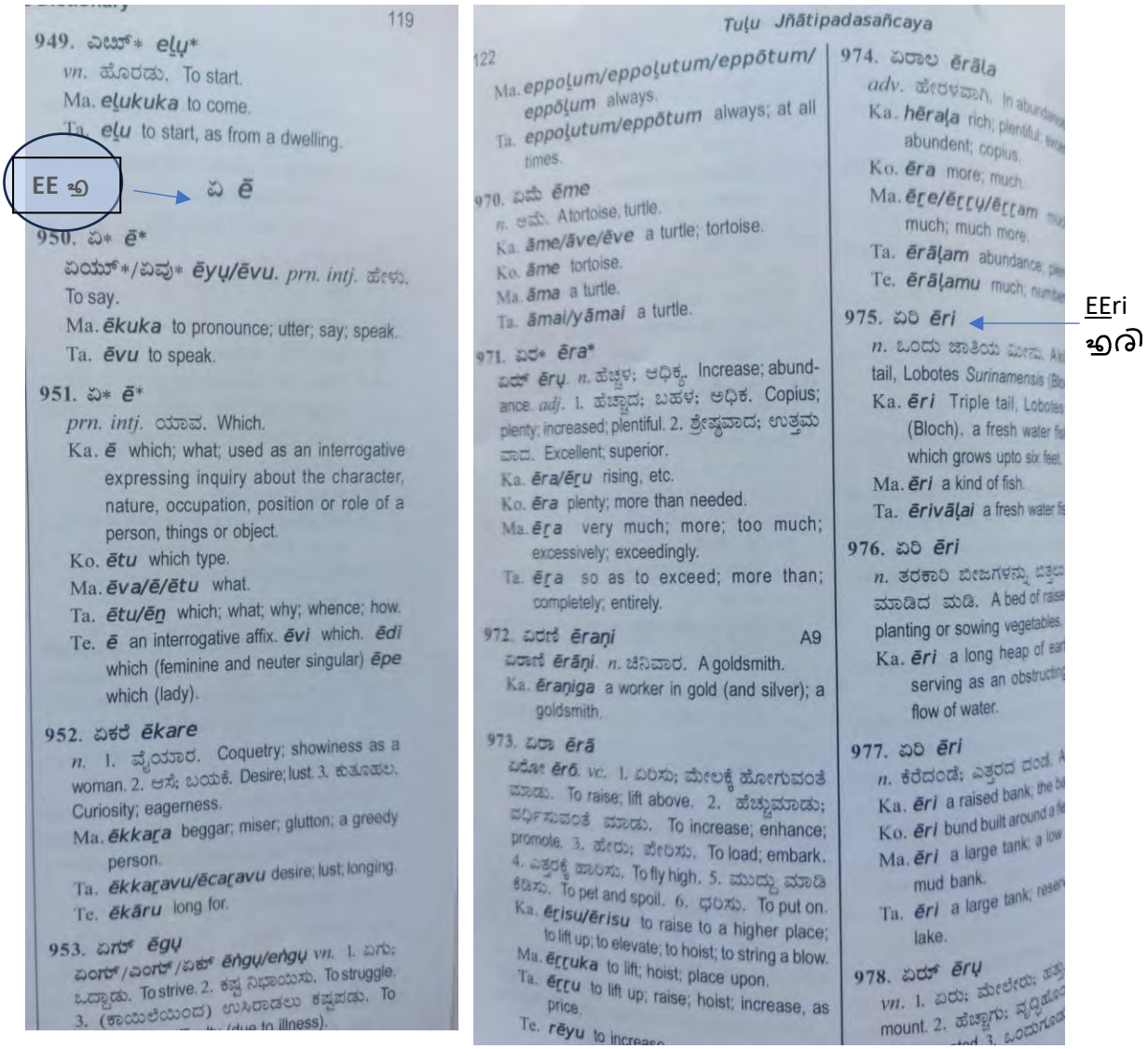
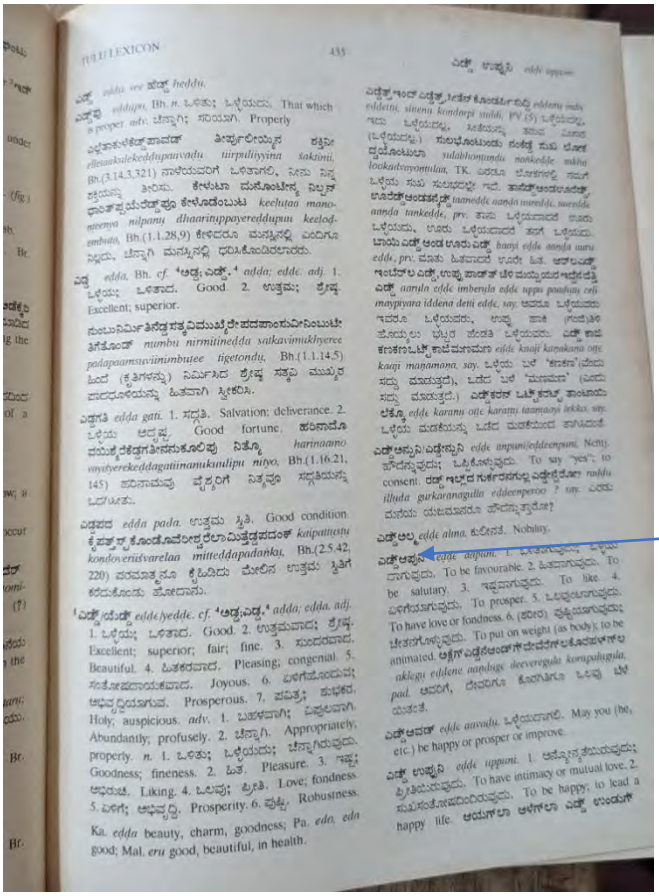



Figure 7. Tulu cognate Dictionary:Jnatipadasancaya by Dr. Kekkunnayya has references to use of EE ಀ (in Tulu or ಏ in Kannada)




Please note E ligature used instead of the one for ಀ (see section 3.5. once allotted can be rendered correctly)

Figure 8. Small E vowel, ಎ (E n Tulu or ಎ in Kannada script) usage in Tulu Lexicon Vol 5 showing use of dorsal and frontal parts of mouth for three different sounds resulting in ಀ, ೲ, E,EE

Corresponding text from a printed books [1KTSA Figure 8, Figure 9] confirms usage of E,EE in live usage daily in TuluNadu and elsewhere.

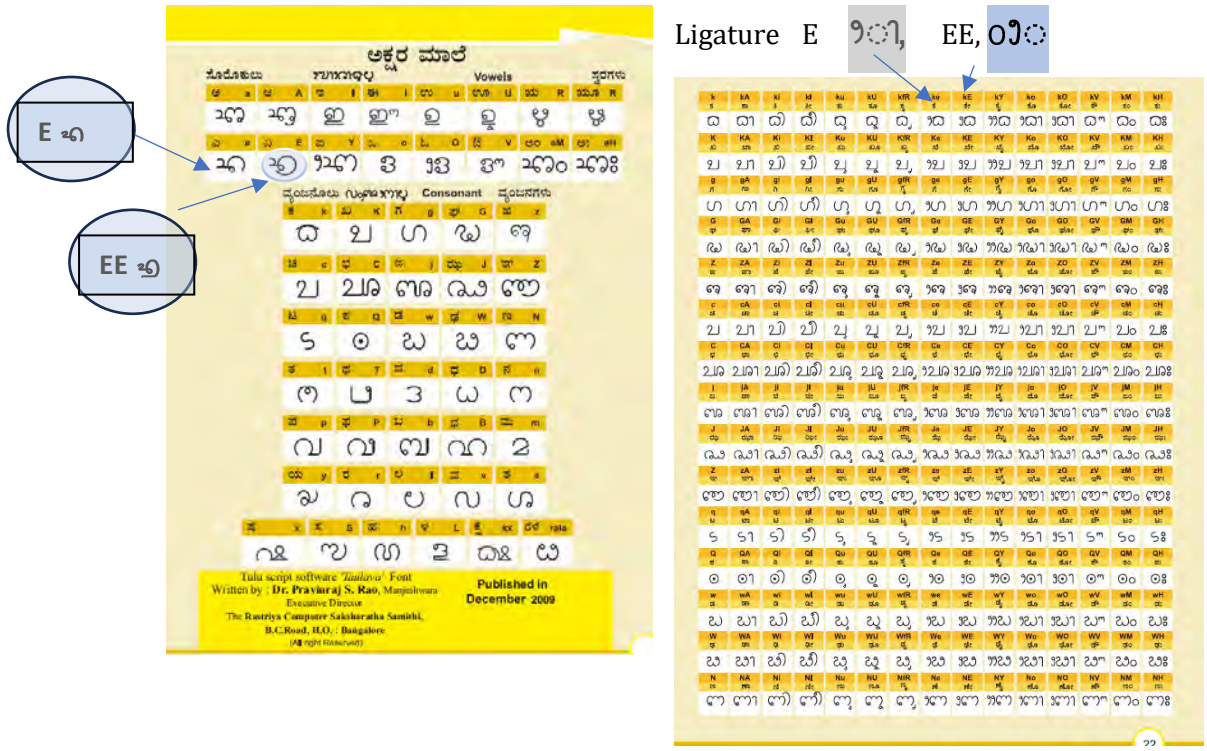



Figure 9. Tulu alphabet set from Toulavada Aksharolu (2009) Tulu Class text books [see [1]KTSA Figures 3-8,13 has other initial text books as early as 2001,2004 before consolidation on accepted sets by KTSA and scholars]

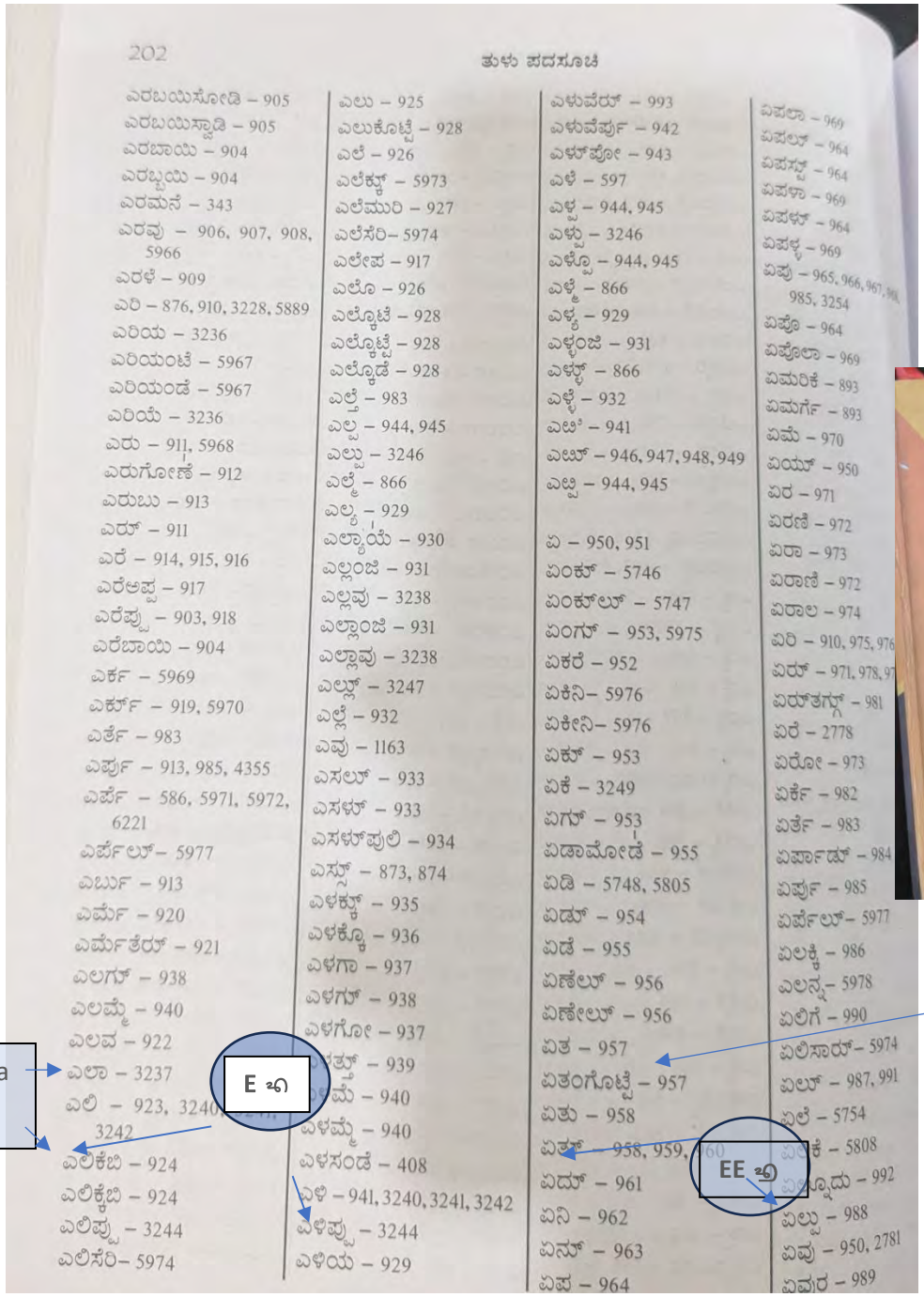



Figure 10. Distinctive uses of E ಎ, EE ಏ in Tulu words in Tulu Cognate Dictionary

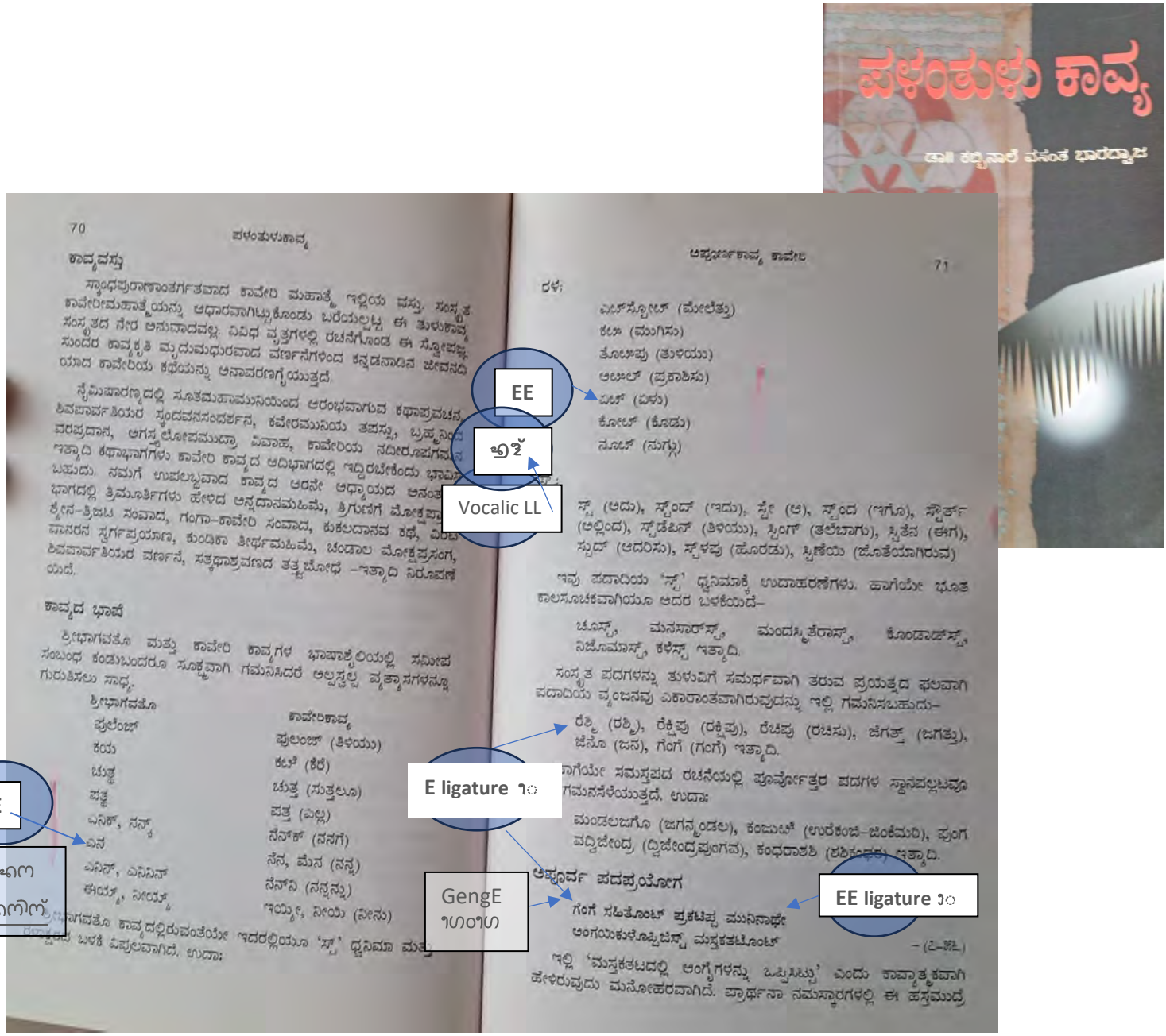



Figure 11. Old Tulu Poems by Vasanth Bharadwaj (written in Kannada script) has nice references on uses of E ಎ, EE, ಎೈ in Tulu, corresponding ligature ಿ , (ೀ in Kannada script)

### 3.2 **Ligature** ᭕᭖ for **Vowel E** ᭑ ᭒ in Kannada (for EE ᭑ ᭕᭖, ᭒ in Kannada)

Figure 10 and others show continued use of vowel combinations for E, ᭑. Please note the tiny hook in the ligature for EE at the bottom, ᭕᭖ that distinguishes from the ligature for E. Several words are also illustrated in [1]KTSA.

### 3.3 **Vowel** ᭓ O, ᭔ in Kannada (OO ᭕᭓, ᭔ in Kannada script)

The common way of representing O is ᭓. Various words rendered in different fonts can be found in [1]KTSA proposal. Several words demonstrate the glyph rendering, code points with various fonts. This is another Vowel needed and requested by KTSA for modern Tulu use and scholars collectively endorsed the shape of OO for Unicode and textbooks.

1. ᭓ — Olpa ᭓᭞ (*n.b.* Glyph appears similar to OO 11390 of Tulu-Tigalari. Distinctions below for modern Tulu)
2. ᭕᭓ — OOnkụ ᭕᭓᭐᭘᭙᭘᭚
3. ᭕᭓ — Oolu ᭕᭓᭞᭘᭚

For more words and their glyphs from font developers see [1]KTSA.

Table A4-2

Major Difference between TIGALARI AND MODERN TULU FONTS with script.
Kindly note Code point, ligature attachment, gaps causing mismatches

| Kannada character | Tulu word in Kannada | Tulu words TuluSiri font | Tulu word ToulavaSri font | Tigalari words |
|---|---|---|---|---|
| A ಅ | ಅಕ್ಕ | ಅಕ್ಕ | ಅಕ್ಕ | |
| I ಇ | ಇಲ್ಲ | ಇಲ್ಲ | ಇಲ್ಲ | |
| II ಈ | ಈರೋಲ್ಡ ಕೈಲ್ | ಈರಲ್ಲ ಗದಲ್ | ಈರಲ್ಲ ಗದಲ | |
| U ಉ | ಉಜ್ಜಲ್ | ಉಜ್ಜಲ್ | ಉಜ್ಜಲ | |
| UU ಊ | ಊರುಡ್ಡ ಪಿದಾಯಿ | ಊರುಡ್ಡ ಪಿದಾಯಿ | ಊರುಡ್ಡ ಪಿದಾಯಿ | |
| E ಎ | ಎಣ್ಮಕಜೆ | ಎಣ್ಮಕಜೆ | ಎಣ್ಮಕಜೆ | |
| EE ಏ | ಏಮೆ | ಏಮೆ | ಏಮೆ | |
| AI ಐ | ಐಕ್ಕೋ | ಐಕ್ಕೋ | ಐಕ್ಕೋ | |
| O ಒ | ಒಯ್ತ್ ಪಣ್ಣೆ | ಒಯ್ತ್ ಪಣ್ಣೆ | ಒಯ್ತ್ ಪಣ್ಣೆ | |
| O ಓ | ಓಳ್ಳ ಬತ್ತೆ | ಓಳ್ಳ ಬತ್ತೆ | ಓಳ್ಳ ಬತ್ತೆ | |
| OO ಔ | ಔಕುಳಿ | ಔದ್ದಳಿ | ಔದ್ದಳಿ | |

([1]KTSA See page 86, Table A4-2)

KERE KEERE

Kindly note that only one E, O has been alloted in recent unicode character set for Tulu-Tigalari and can lead to significant confusion in modern use. Tables below show more words, differences in code oints, rendering etc. Let us look at various combinations of other characters where there can be code point mismatches between KTSA proposed modern Tulu and Tigalari alphabet sets.

Distinction between kEre (ಇದಾಣ) and kEEre (ಇದಾಣ)

Like the previous characters E,EE, O as well as OO is very commonly used in modern Tulu as well as old Tulu as seen in Figure 11. O along with OO

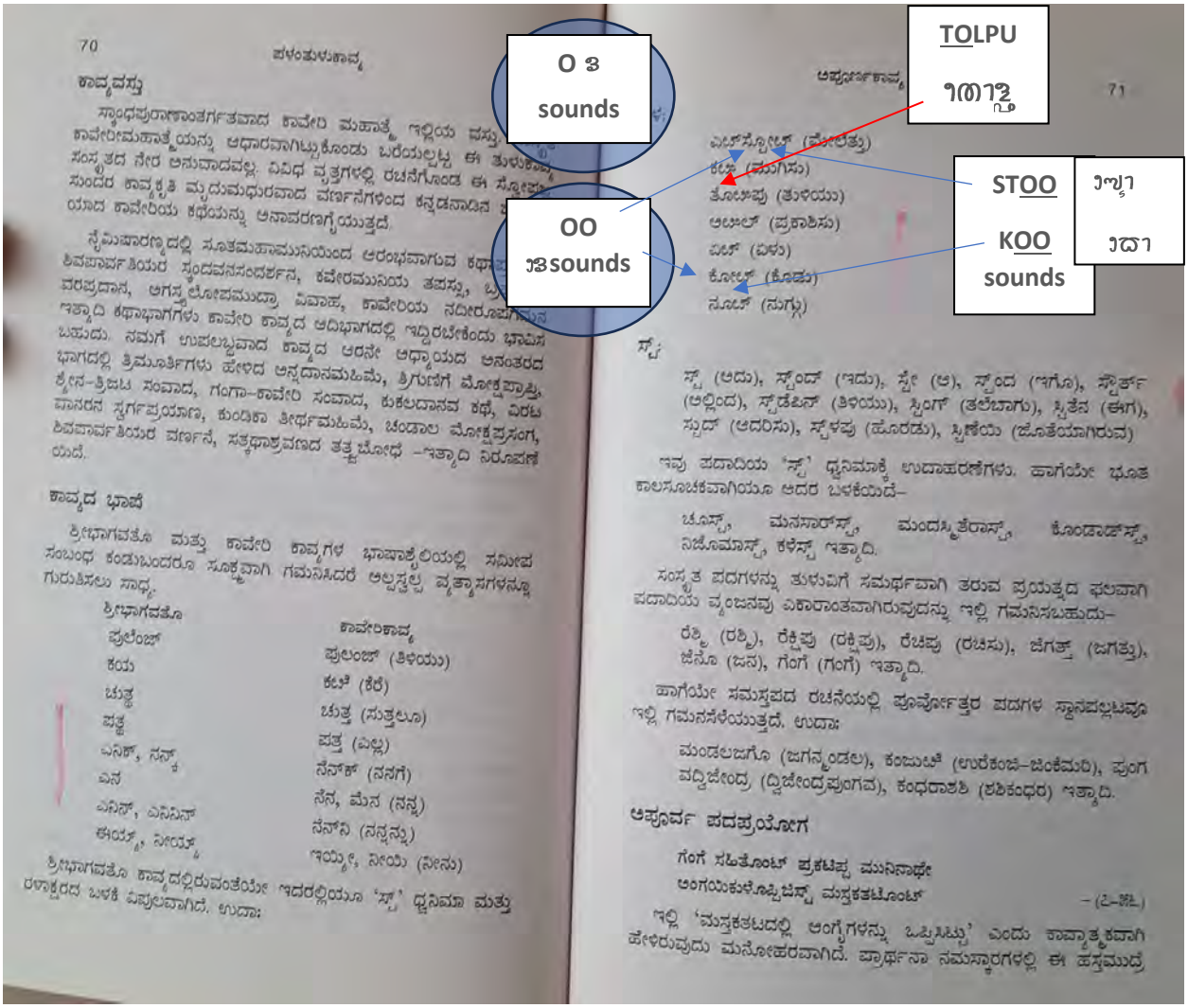
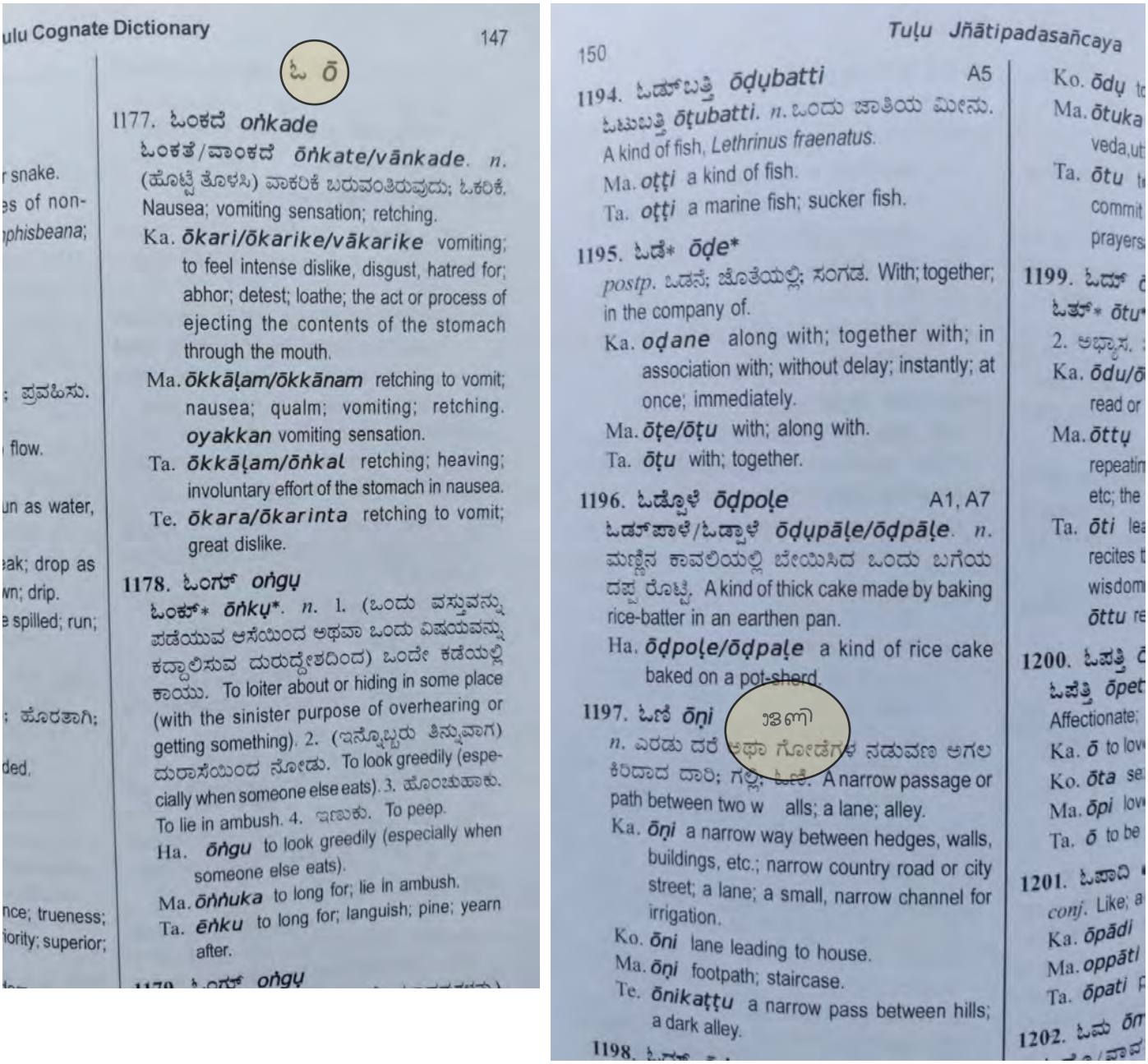



Figure 12. Tulu Old Tulu Poems by Vasanth Bharadwaj (written in Kannada script) has nice references on uses of OO, (ಓ in Kannada script) ೞೞ in Tulu, corresponding ligature ೞ◌ೞ, (◌ೋ in Kannada script)



ulu Cognate Dictionary 147

ಓ ō

1177. ಓಂಕದೆ *oṅkade*
ಓಂಕತೆ/ವಾಂಕದೆ *ōṅkate/vānkade*. *n.* (ಹೊಟ್ಟೆ ತೊಳಸಿ) ವಾಕರಿಕೆ ಬರುವಂತಿರುವುದು; ಓಕರಿಕೆ. Nausea; vomiting sensation; retching.
Ka. *ōkari/ōkarike/vākarike* vomiting; to feel intense dislike, disgust, hatred for; abhor; detest; loathe; the act or process of ejecting the contents of the stomach through the mouth.
Ma. *ōkkāḷam/ōkkānam* retching to vomit; nausea; qualm; vomiting; retching. *oyakkan* vomiting sensation.
Ta. *ōkkāḷam/ōṅkal* retching; heaving; involuntary effort of the stomach in nausea.
Te. *ōkara/ōkarinta* retching to vomit; great dislike.

1178. ಓಂಗ್ *oṅgụ*
ಓಂಕ್* *ōṅkụ**. *n.* 1. (ಒಂದು ವಸ್ತುವನ್ನು ಪಡೆಯುವ ಆಸೆಯಿಂದ ಅಥವಾ ಒಂದು ವಿಷಯವನ್ನು ಕದ್ದಾಲಿಸುವ ದುರುದ್ದೇಶದಿಂದ) ಒಂದೇ ಕಡೆಯಲ್ಲಿ ಕಾಯು. To loiter about or hiding in some place (with the sinister purpose of overhearing or getting something). 2. (ಇನ್ನೊಬ್ಬರು ತಿನ್ನುವಾಗ) ದುರಾಸೆಯಿಂದ ನೋಡು. To look greedily (especially when someone else eats). 3. ಹೊಂಚುಹಾಕು. To lie in ambush. 4. ಇಣುಕು. To peep.
Ha. *ōṅgu* to look greedily (especially when someone else eats).
Ma. *ōṅṅuka* to long for; lie in ambush.
Ta. *ēṅku* to long for; languish; pine; yearn after.

150 Tuḷu Jñātipadasañcaya

1194. ಓಡ್‌ಬತ್ತಿ *ōḍụbatti* A5
ಓಟುಬತ್ತಿ *ōṭubatti*. *n.* ಒಂದು ಜಾತಿಯ ಮೀನು. A kind of fish, *Lethrinus fraenatus*.
Ma. *oṭṭi* a kind of fish.
Ta. *oṭṭi* a marine fish; sucker fish.

1195. ಓಡೆ* *ōḍe**
*postp.* ಒಡನೆ; ಜೊತೆಯಲ್ಲಿ; ಸಂಗಡ. With; together; in the company of.
Ka. *oḍane* along with; together with; in association with; without delay; instantly; at once; immediately.
Ma. *ōṭe/ōṭu* with; along with.
Ta. *ōṭu* with; together.

1196. ಓಡ್ಪೊಳೆ *ōḍpoḷe* A1, A7
ಓಡ್‌ಪಾಳೆ/ಓಡ್ಪಾಳೆ *ōḍụpāḷe/ōḍpāḷe*. *n.* ಮಣ್ಣಿನ ಕಾವಲಿಯಲ್ಲಿ ಬೇಯಿಸಿದ ಒಂದು ಬಗೆಯ ದಪ್ಪ ರೊಟ್ಟಿ. A kind of thick cake made by baking rice-batter in an earthen pan.
Ha. *ōḍpoḷe/ōḍpaḷe* a kind of rice cake baked on a pot-sherd.

1197. ಓಣಿ *ōṇi* ೨೩೧೧
*n.* ಎರಡು ದರೆ ಅಥಾ ಗೋಡೆಗಳ ನಡುವಣ ಅಗಲ ಕಿರಿದಾದ ದಾರಿ; ಗಲ್ಲಿ; ಓಣಿ. A narrow passage or path between two w alls; a lane; alley.
Ka. *ōṇi* a narrow way between hedges, walls, buildings, etc.; narrow country road or city street; a lane; a small, narrow channel for irrigation.
Ko. *ōni* lane leading to house.
Ma. *ōṇi* footpath; staircase.
Te. *ōnikaṭṭu* a narrow pass between hills; a dark alley.

Figure 13. Tulu cognate Dictionary:Jnatipadasancaya by Dr. Kekkunnayya has references to use of Tulu words beginning with OO (ಓ in Kannada script) ೨೩ in Tulu (*n.b. compare glyph to Tulu-Tigalari OO)*

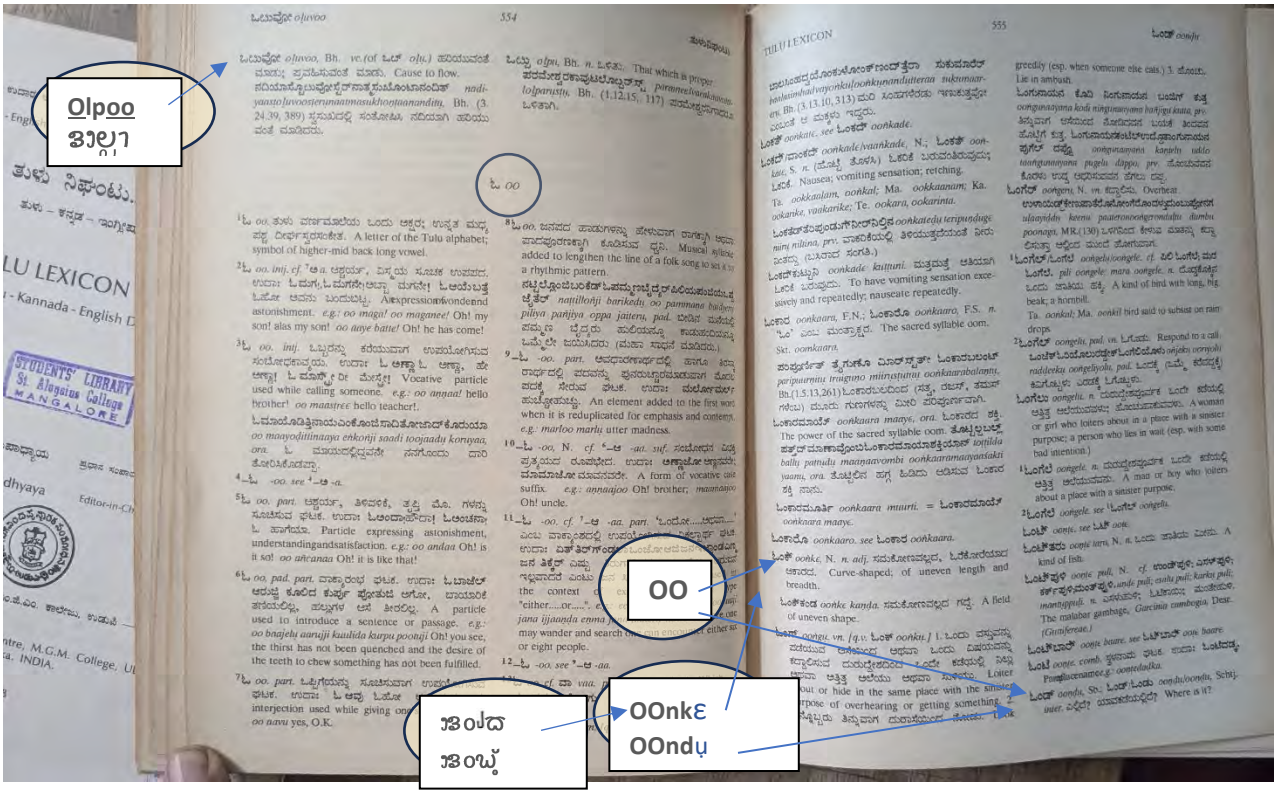



Figure 14. Tulu Lexicon vol 5 (uses Kannada script) distinctly showing Tulu words beginning with 0, 𑤃 (or ಒ in Kannada script) as well as 00, 𑤃𑤃 (ೂ in Kannada)

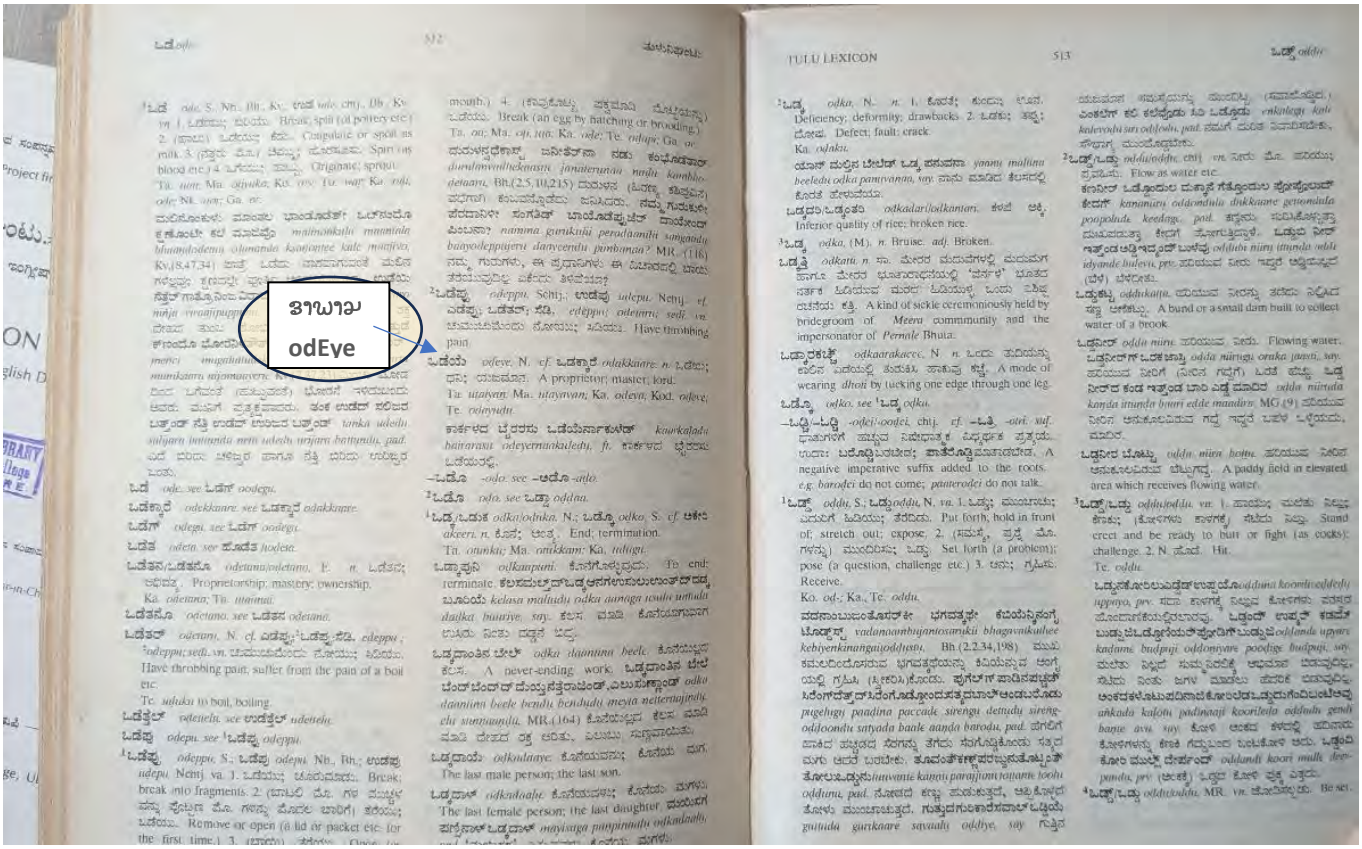
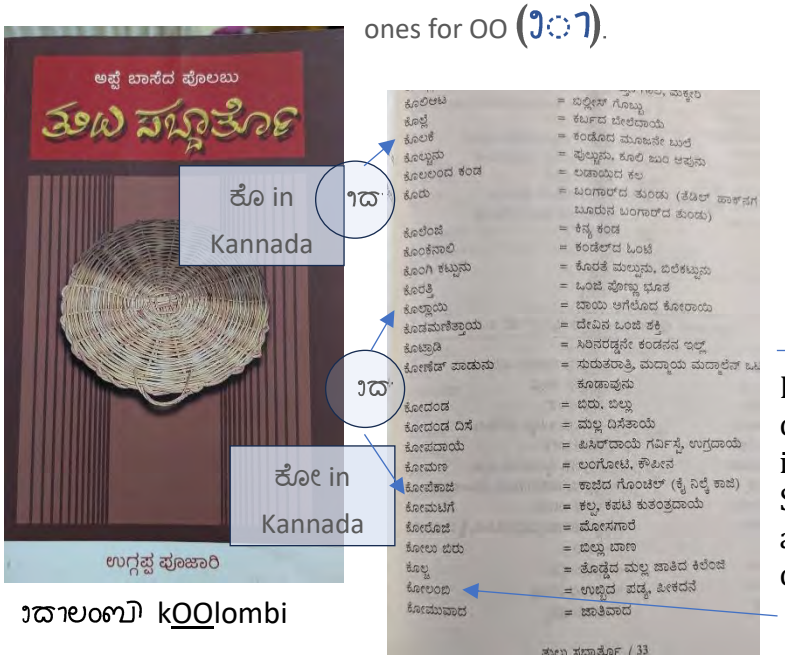



Figure 15. Tulu Lexicon vol 5 distinctly showing Tulu words beginning with ಠ as well, ತಾ (or ಒ in Kannada script)

3.4 Ligature for **Vowel O (ಒ),** ೊ (for OO (ಓ) it is ೋ in Kannada script)

No hook at the bottom of the ligature O distinguishes from the ones for OO (ೋ).




ಕೊಲಂಬಿ kOOlombi

Figure 16. Old Tulu colloquial or folklore words in Appe Basedo polabu: Tulu Sabdarto by Ugappa Poojari, also has consonant Ka that combine vowel O, OO

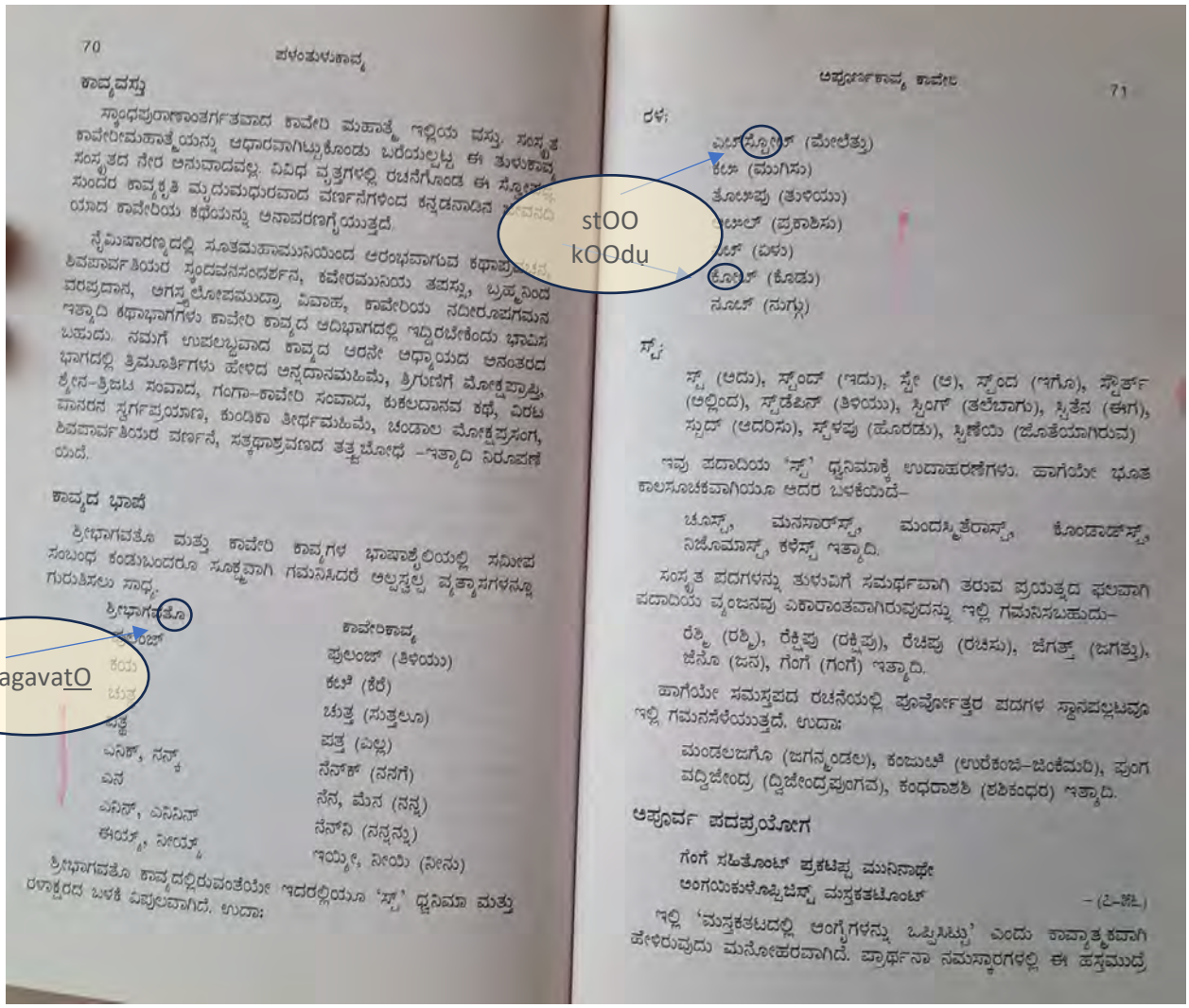



Figure 17. Palantulu Kavya (Old Tulu Poetry) By Dr. Kabbinale also refers to words with OO (ಓ in Kannada script) ೨೩ in Tulu, added to consonants

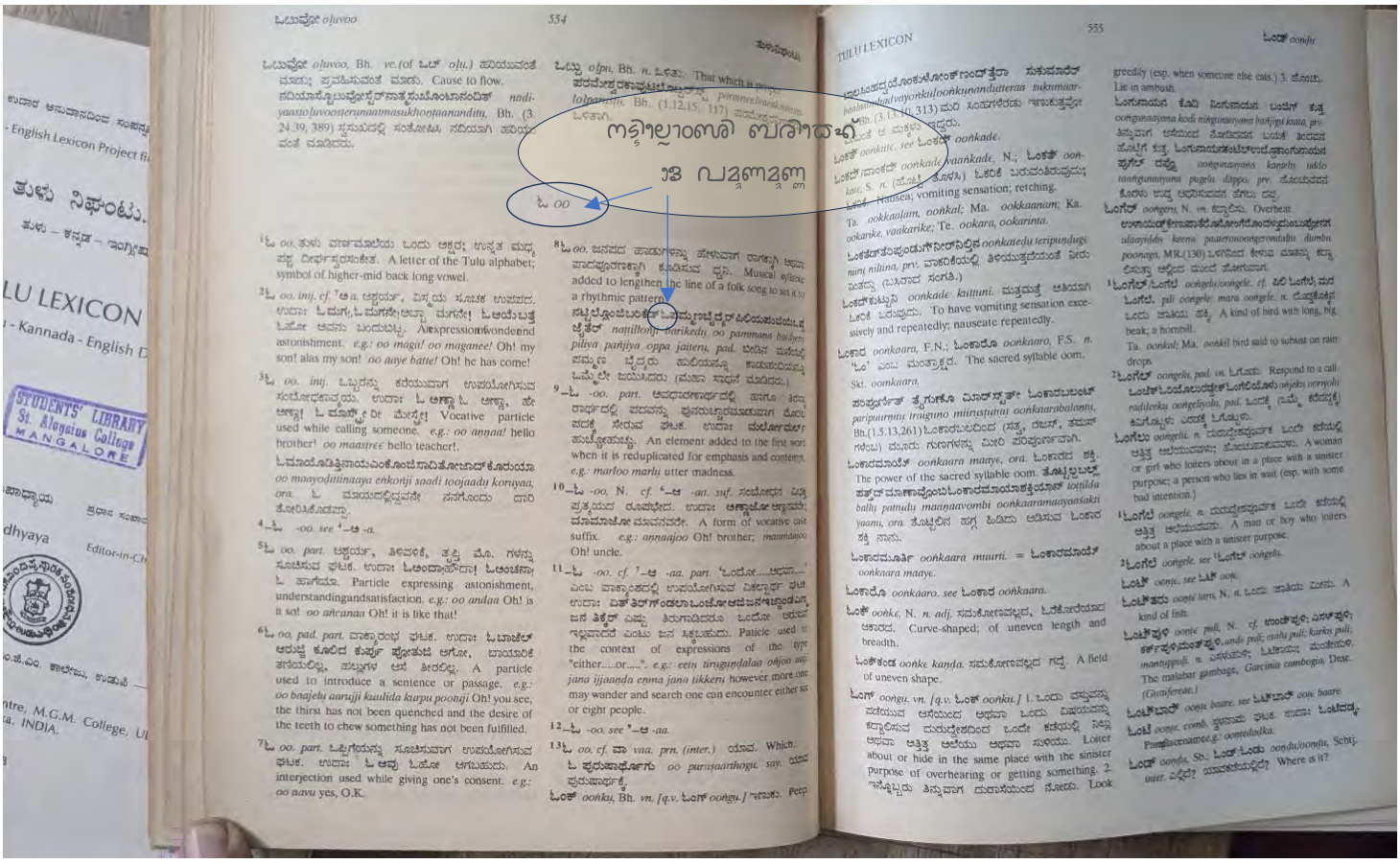


Figure 18. Tulu cognate Dictionary:Jnatipadasancaya by Dr. Kekkunnayya has references to use of Tulu vowel sounds with OO (ಓ in Kannada script) ೧೩ in Tulu

## 3.5 Vowel ϵ e (sounds from dorsal part of mouth)

These sounds are slightly different from E which is from the frontal part of the mouth, Some examples include

- **OOnkϵ** ೧೩ಗ್ದ+ϵ = ೧೩ಗ್ದ different from last sound Ka+E in ೧೩ಗ್ದ. Note the ligature ೧ಂ
- **Enkϵ** ಎಗ್ದ+ϵ = ಎಗ್ದ different from last ಎಗ್ದ
- **Amakϵ** ಅಡದ+ϵ = ಅಡದ different from last ಅಡದ

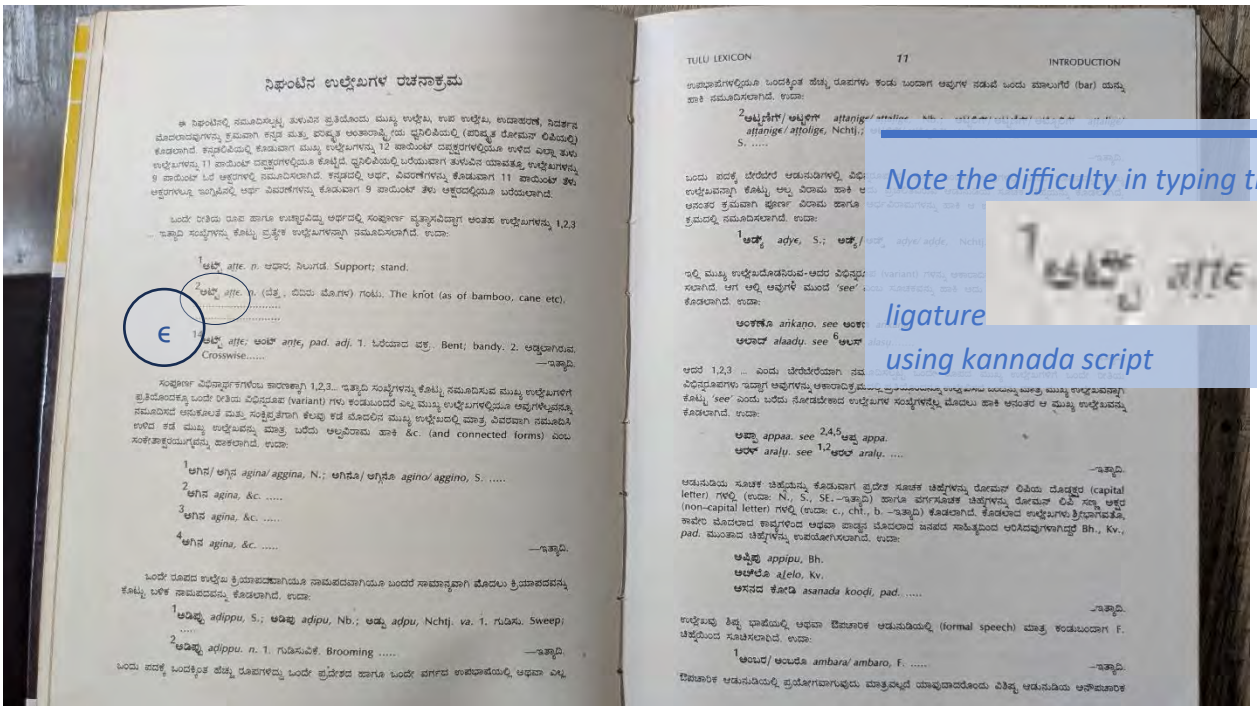



Figure 19. Preface in Tulu Lexicon Vol1 providing introduction to Vowel ϵ ೨೧

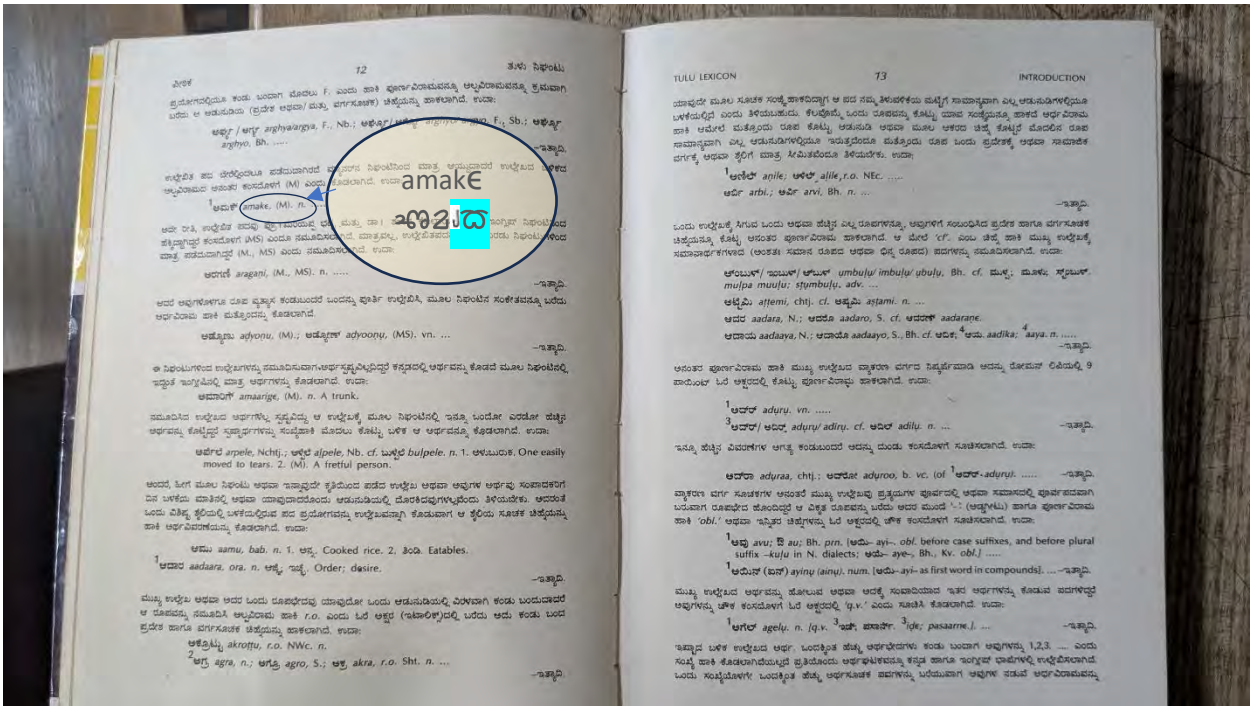
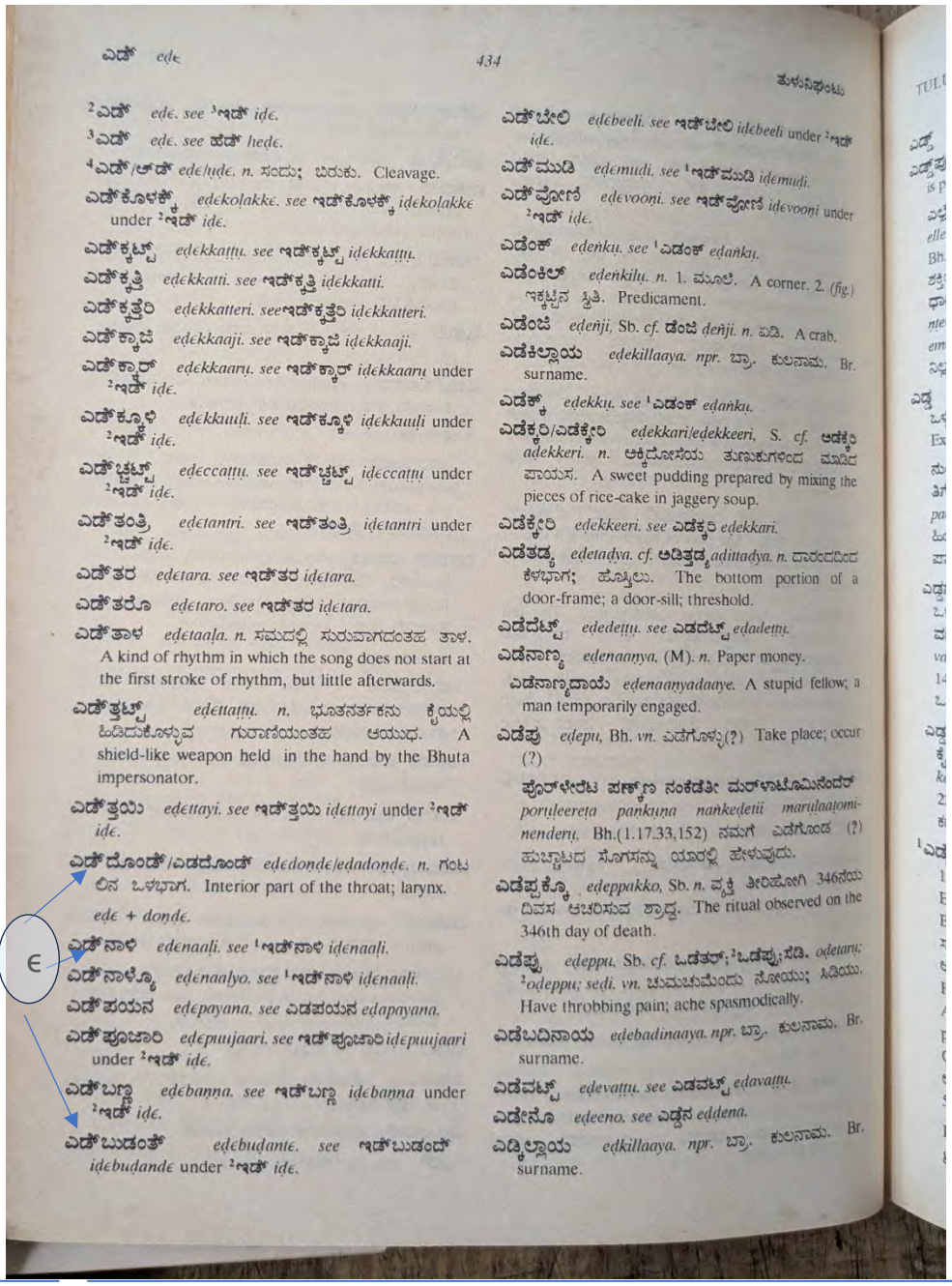


Figure 20. Tulu Lexicon Vol1 illustrating more words with half vowel sound ϵ ೨೧



ಎಡ್ edɛ 434 ತುಳುನಿಘಂಟು

²ಎಡ್ edɛ. see ³ಇಡ್ idɛ.

³ಎಡ್ edɛ. see ಹೆಡ್ heḍɛ.

⁴ಎಡ್/ಅಡ್ edɛ/idɛ. n. ಸಂದು; ಬಿರುಕು. Cleavage.

ಎಡ್‌ಕೊಳಕ್ಕ್ edɛkolakkɛ. see ಇಡ್‌ಕೊಳಕ್ಕ್ idɛkolakkɛ under ²ಇಡ್ idɛ.

ಎಡ್‌ಕ್ಕಟ್ಟ್ edɛkkaṭṭu. see ಇಡ್‌ಕ್ಕಟ್ಟ್ idɛkkaṭṭu.

ಎಡ್‌ಕ್ಕತ್ತಿ edɛkkatti. see ಇಡ್‌ಕ್ಕತ್ತಿ idɛkkatti.

ಎಡ್‌ಕ್ಕತ್ತೆರಿ edɛkkatteri. see ಇಡ್‌ಕ್ಕತ್ತೆರಿ idɛkkatteri.

ಎಡ್‌ಕ್ಕಾಜಿ edɛkkaaji. see ಇಡ್‌ಕ್ಕಾಜಿ idɛkkaaji.

ಎಡ್‌ಕ್ಕಾರ್ edɛkkaaru. see ಇಡ್‌ಕ್ಕಾರ್ idɛkkaaru under ²ಇಡ್ idɛ.

ಎಡ್‌ಕ್ಕೂಳಿ edɛkkuuli. see ಇಡ್‌ಕ್ಕೂಳಿ idɛkkuuli under ²ಇಡ್ idɛ.

ಎಡ್‌ಚ್ಚಟ್ಟ್ edɛccaṭṭu. see ಇಡ್‌ಚ್ಚಟ್ಟ್ idɛccaṭṭu under ²ಇಡ್ idɛ.

ಎಡ್‌ತಂತ್ರಿ edɛtantri. see ಇಡ್‌ತಂತ್ರಿ idɛtantri under ²ಇಡ್ idɛ.

ಎಡ್‌ತರ edɛtara. see ಇಡ್‌ತರ idɛtara.

ಎಡ್‌ತರೊ edɛtaro. see ಇಡ್‌ತರ idɛtara.

ಎಡ್‌ತಾಳ edɛtaaḷa. n. ಸಮದಲ್ಲಿ ಸುರುವಾಗದಂತಹ ತಾಳ. A kind of rhythm in which the song does not start at the first stroke of rhythm, but little afterwards.

ಎಡ್‌ತ್ತಟ್ಟ್ edɛttaṭṭu. n. ಭೂತನರ್ತಕನು ಕೈಯಲ್ಲಿ ಹಿಡಿದುಕೊಳ್ಳುವ ಗುರಾಣಿಯಂತಹ ಆಯುಧ. A shield-like weapon held in the hand by the Bhuta impersonator.

ಎಡ್‌ತ್ತಯಿ edɛttayi. see ಇಡ್‌ತ್ತಯಿ idɛttayi under ²ಇಡ್ idɛ.

ಎಡ್‌ದೊಂಡ್/ಎಡದೊಂಡ್ edɛdonḍe/edadonḍe. n. ಗಂಟಲಿನ ಒಳಭಾಗ. Interior part of the throat; larynx.

edɛ + donḍe.

ಎಡ್‌ನಾಳಿ edɛnaaḷi. see ¹ಇಡ್‌ನಾಳಿ idɛnaaḷi.

ಎಡ್‌ನಾಳ್ಯೊ edɛnaaḷyo. see ¹ಇಡ್‌ನಾಳಿ idɛnaaḷi.

ಎಡ್‌ಪಯನ edɛpayana. see ಎಡಪಯನ edapayana.

ಎಡ್‌ಪೂಜಾರಿ edɛpuujaari. see ಇಡ್‌ಪೂಜಾರಿ idɛpuujaari under ²ಇಡ್ idɛ.

ಎಡ್‌ಬಣ್ಣ edɛbaṇṇa. see ಇಡ್‌ಬಣ್ಣ idɛbaṇṇa under ²ಇಡ್ idɛ.

ಎಡ್‌ಬುಡಂತೆ edɛbudanṭe. see ಇಡ್‌ಬುಡಂದೆ idɛbudanḍe under ²ಇಡ್ idɛ.

ಎಡ್‌ಬೇಲಿ edɛbeeli. see ಇಡ್‌ಬೇಲಿ idɛbeeli under ²ಇಡ್ idɛ.

ಎಡ್‌ಮುಡಿ edɛmuḍi. see ¹ಇಡ್‌ಮುಡಿ idɛmuḍi.

ಎಡ್‌ವೋಣಿ edɛvooṇi. see ಇಡ್‌ವೋಣಿ idɛvooṇi under ²ಇಡ್ idɛ.

ಎಡೆಂಕ್ edeṅku. see ¹ಎಡಂಕ್ eḍaṅku.

ಎಡೆಂಕಿಲ್ edeṅkilu. n. 1. ಮೂಲೆ. A corner. 2. (fig.) ಇಕ್ಕಟ್ಟಿನ ಸ್ಥಿತಿ. Predicament.

ಎಡೆಂಜಿ edeñji, Sb. cf. ಡೆಂಜಿ ḍeñji. n. ಏಡಿ. A crab.

ಎಡೆಕಿಲ್ಲಾಯ edekillaaya. npr. ಬ್ರಾ. ಕುಲನಾಮ. Br. surname.

ಎಡೆಕ್ಕ edekku. see ¹ಎಡಂಕ್ eḍaṅku.

ಎಡೆಕ್ಕರಿ/ಎಡೆಕ್ಕೀರಿ edekkari/edekkeeri, S. cf. ಅಡೆಕ್ಕರಿ aḍekkeri. n. ಅಕ್ಕಿದೋಸೆಯ ತುಣುಕುಗಳಿಂದ ಮಾಡಿದ ಪಾಯಸ. A sweet pudding prepared by mixing the pieces of rice-cake in jaggery soup.

ಎಡೆಕ್ಕೀರಿ edekkeeri. see ಎಡೆಕ್ಕರಿ edekkari.

ಎಡೆತಡ್ಯ edetaḍya. cf. ಅಡಿತ್ತಡ್ಯ aḍittaḍya. n. ದಾರಂದದಿಂದ ಕೆಳಭಾಗ; ಹೊಸ್ತಿಲು. The bottom portion of a door-frame; a door-sill; threshold.

ಎಡೆದೆಟ್ಟು ededeṭṭu. see ಎಡದೆಟ್ಟು eḍaḍeṭṭu.

ಎಡೆನಾಣ್ಯ edenaaṇya, (M). n. Paper money.

ಎಡೆನಾಣ್ಯದಾಯೆ edenaaṇyadaaye. A stupid fellow; a man temporarily engaged.

ಎಡೆಪು edepu, Bh. vn. ಎಡೆಗೊಳ್ಳು(?) Take place; occur (?)

ಪೊರ್‌ಲೀರೆಟ ಪಣ್ಕ್ಣ ನಂಕೆಡೆತೀ ಮರ್‌ಲಾಟೊಮಿನೆಂದರ್ porụleereṭa paṅkụṇa naṅkeḍetii maruḷaaṭomi-neṇḍeru. Bh.(1.17.33,152) ನಮಗೆ ಎಡೆಗೊಂಡ (?) ಹುಚ್ಚಾಟದ ಸೊಗಸನ್ನು ಯಾರಲ್ಲಿ ಹೇಳುವುದು.

ಎಡೆಪ್ಪಕ್ಕೊ edeppakko, Sb. n. ವ್ಯಕ್ತಿ ತೀರಿಹೋಗಿ 346ನೆಯ ದಿವಸ ಆಚರಿಸುವ ಶ್ರಾದ್ಧ. The ritual observed on the 346th day of death.

ಎಡೆಪ್ಪು edeppu, Sb. cf. ಒಡೆತರ್; ²ಒಡೆಪ್ಪು; ಸೆಡಿ. oḍetaru; ²oḍeppu; seḍi. vn. ಚುಮಚುಮೆಂದು ನೋಯು; ಸಿಡಿಯು. Have throbbing pain; ache spasmodically.

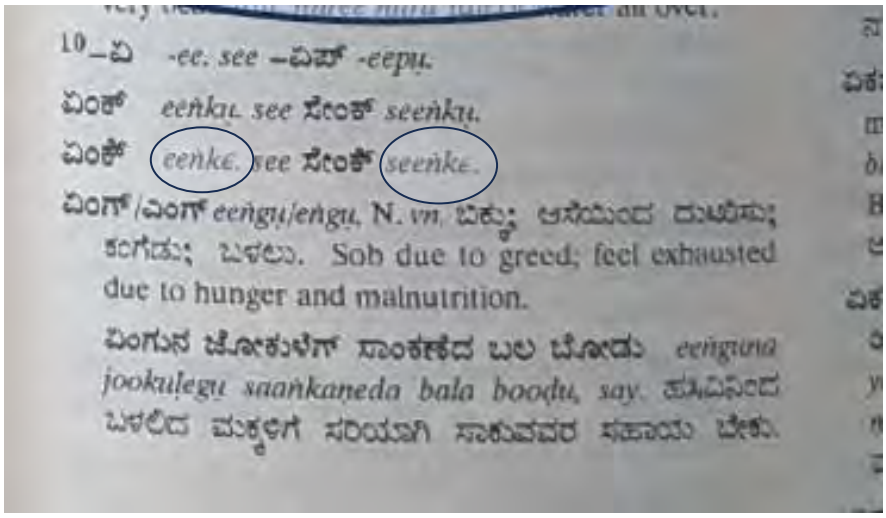
ಎಡೆಬದಿನಾಯ edebadinaaya. npr. ಬ್ರಾ. ಕುಲನಾಮ. Br. surname.

ಎಡೆವಟ್ಟು edevaṭṭu. see ಎಡವಟ್ಟು eḍavaṭṭu.

ಎಡೇನೊ edeeno. see ಎಡ್ಡೆನ eḍḍena.

ಎಡ್ಕಿಲ್ಲಾಯ edkillaaya. npr. ಬ್ರಾ. ಕುಲನಾಮ. Br. surname.

Figure 21. Lexicon vol 5 showing abundance of words using ɛ along with other consonants, e.g. edɛbudan(t+ɛ), ಹ(ಬ+ɛ)ಬ್ಬಂ(ತ+ɛ) ಹಬ್ಬಬ್ಬಂತ



10 –ಏ -ee. see –ಏಪ್ -eepu.

ಏಂಕ್ eeṅku. see ಸೇಂಕ್ seeṅku.

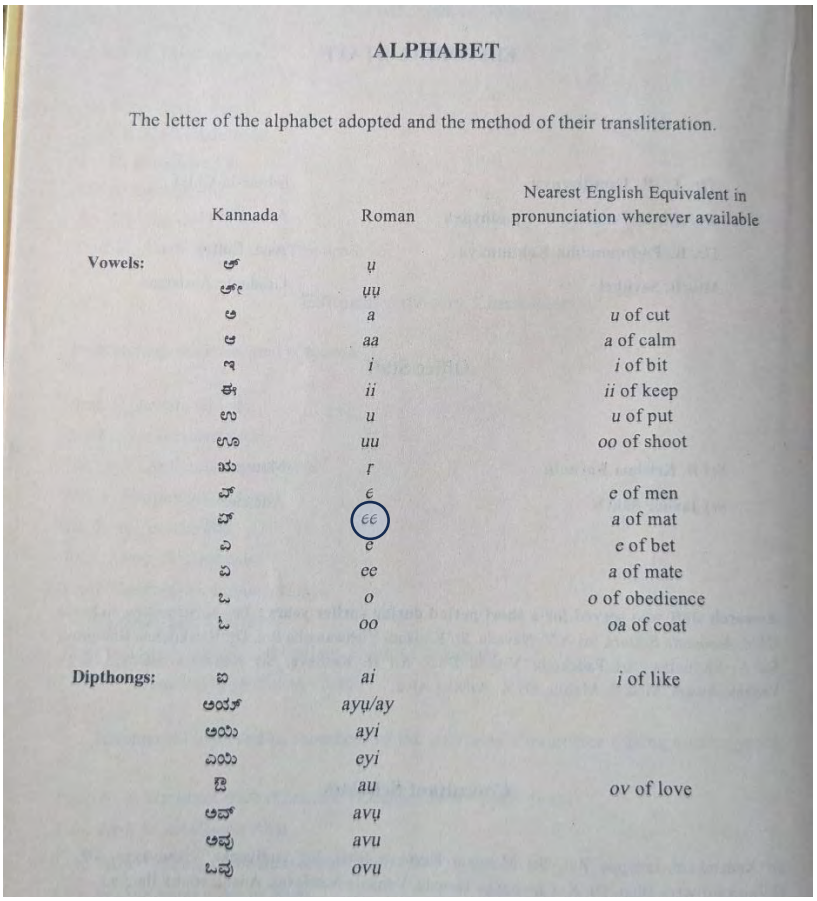
ಏಂಕೆ eeṅkɛ. see ಸೇಂಕೆ seeṅkɛ.

ಏಂಗ್/ಎಂಗ್ eeṅgu/eṅgu. N. vn. ಬಿಕ್ಕು; ಆಸೆಯಿಂದ ದುಃಖಿಸು; ಕಂಗೆಡು; ಬಳಲು. Sob due to greed; feel exhausted due to hunger and malnutrition.

ಏಂಗುನ ಜೋಕುಳೆಗ್ ಸಾಂಕಣೆದ ಬಲ ಬೋಡು eeṅguna jookuḷegu saaṅkaṇeda bala booḍu, say. ಹಸಿವಿನಿಂದ ಬಳಲಿದ ಮಕ್ಕಳಿಗೆ ಸರಿಯಾಗಿ ಸಾಕುವವರ ಸಹಾಯ ಬೇಕು.

Figure 22. Tulu cognate Dictionary:Jnatipadasancaya by Dr. Kekkunnayya has references to use of Tulu sound ɛɛnkụ (ɛɛ𑌨𑍍𑌕𑍍𑌉 OR 𑌎𑌨𑍍𑌕𑍍𑌉 ), ɛɛnkɛ (ɛɛ𑌨𑍍𑌕𑍍𑌏 or 𑌎𑌨𑍍𑌕𑍍𑌏) different from Enku 𑌎𑌨𑍍𑌕𑍍𑌉 or Enke 𑌎𑌨𑍍𑌕𑍍𑌏

## 3.6 Vowel ϵϵ ಱ (dorsal part of mouth compared to frontal EE ಏ)



**ALPHABET**

The letter of the alphabet adopted and the method of their transliteration.

| | Kannada | Roman | Nearest English Equivalent in pronunciation wherever available |
|---|---|---|---|
| **Vowels:** | ಅ್ | *ụ* | |
| | ಅ್ಯ | *ụụ* | |
| | ಅ | *a* | *u* of cut |
| | ಆ | *aa* | *a* of calm |
| | ಇ | *i* | *i* of bit |
| | ಈ | *ii* | *ii* of keep |
| | ಉ | *u* | *u* of put |
| | ಊ | *uu* | *oo* of shoot |
| | ಋ | *ṛ* | |
| | ಎ್ | *ϵ* | *e* of men |
| | ಏ್ | *ϵϵ* | *a* of mat |
| | ಎ | *e* | *e* of bet |
| | ಏ | *ee* | *a* of mate |
| | ಒ | *o* | *o* of obedience |
| | ಓ | *oo* | *oa* of coat |
| **Dipthongs:** | ಐ | *ai* | *i* of like |
| | ಅಯ್ | *ayụ/ay* | |
| | ಅಯಿ | *ayi* | |
| | ಎಯಿ | *eyi* | |
| | ಔ | *au* | *ov* of love |
| | ಅವ್ | *avụ* | |
| | ಅವು | *avu* | |
| | ಒವು | *ovu* | |

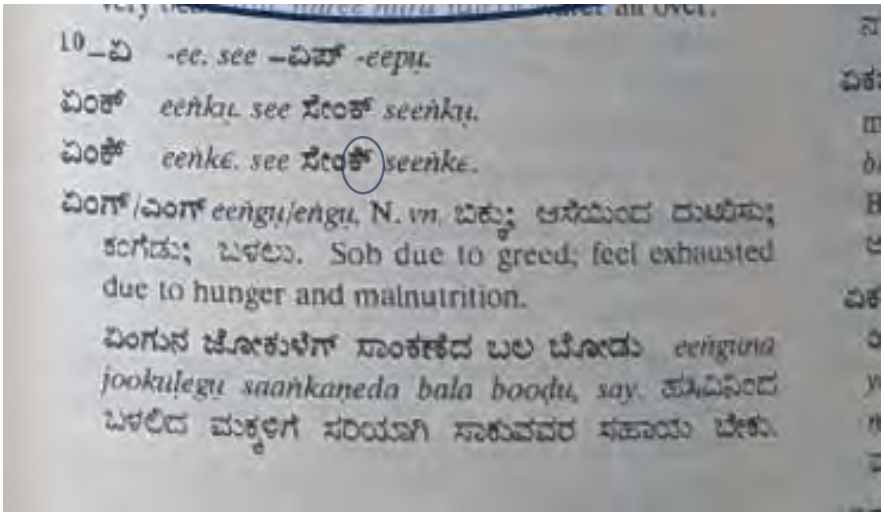
Figure 23. Tulu Lexicon Vol 1 clearly showing the use of ϵϵ (sounds as in mat)

Some words supporting them in modern Tulu are

- bϵϵte ಱಬೀತ (different from bEEte ಬೆಬೀತ
- daanϵϵ ತಾಱಗ (different from daanEE, ತಾಬಗ)

## 3.7 Ligature ೦ೂ ೦ೡ (for ೬ ೂ)

Currently using Kannada script it is difficult to typeset this word, as seen in examples above. The ligature sign ೦ೂ distinguishes itself from the ligature used for vowel E.



10 –ಏ -ee. see –ಏಪ್ -eepu.

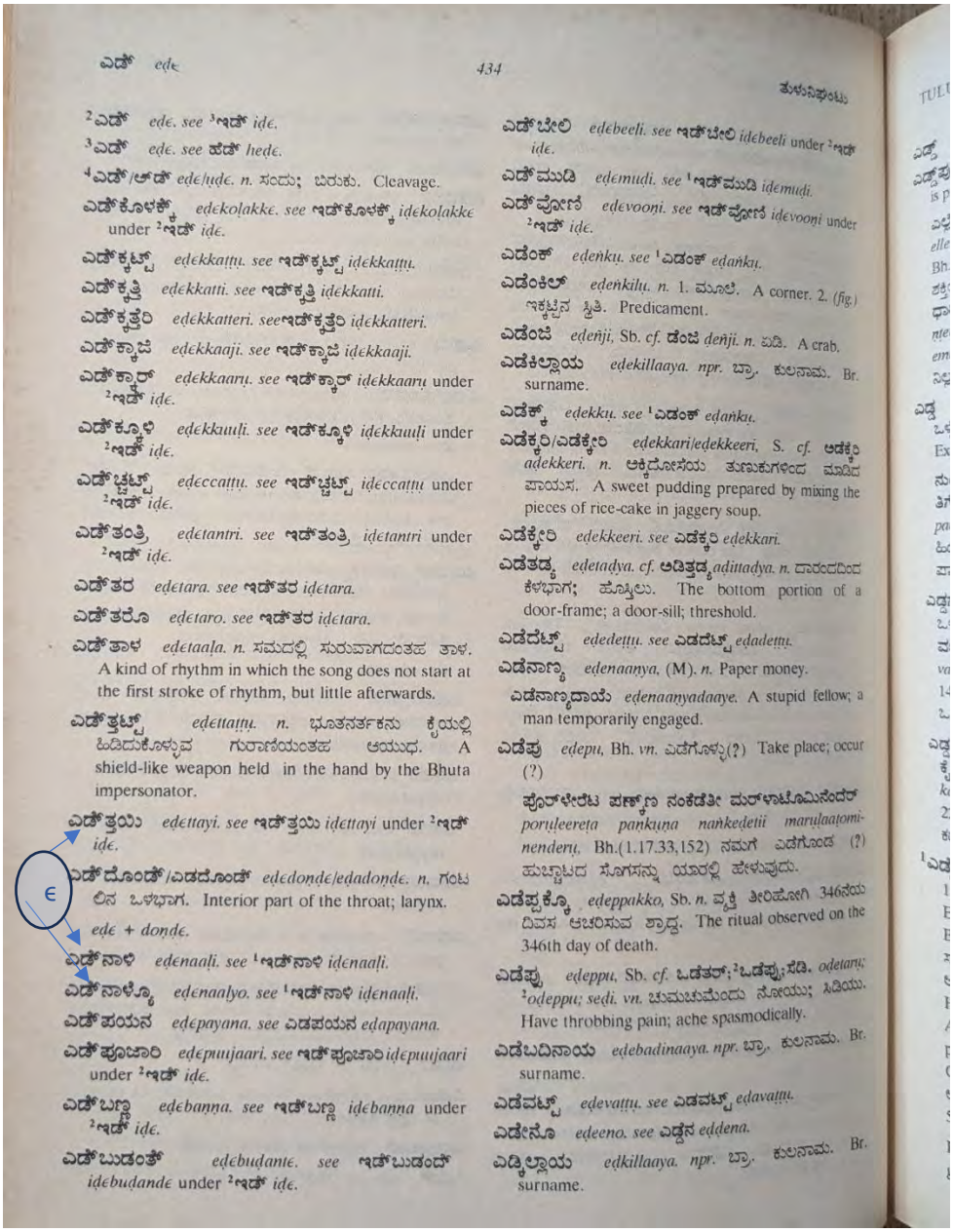
ಏಂಕ್ eeṅku. see ಸೇಂಕ್ seeṅku.

ಏಂಕೆ eeṅke. see ಸೇಂಕೆ seeṅke.

ಏಂಗ್/ಎಂಗ್ eeṅgu/eṅgu, N. vn. ಬಿಕ್ಕು; ಆಸೆಯಿಂದ ದುಃಖಿಸು; ಕಂಗೆಡು; ಬಳಲು. Sob due to greed; feel exhausted due to hunger and malnutrition.

ಏಂಗುನ ಜೋಕುಳೆಗ್ ಸಾಂಕಣೆದ ಬಲ ಬೋಡು eeṅguna jookuḷegu saaṅkaṇeda bala booḍu, say. ಹಸಿವಿನಿಂದ ಬಳಲಿದ ಮಕ್ಕಳಿಗೆ ಸರಿಯಾಗಿ ಸಾಕುವವರ ಸಹಾಯ ಬೇಕು.

Figure 24. Difficulty in Kannada script to represent Tulu alphabet ೬ ೂ as the sound doesn't exist in Kannada language



ಎಡ್ edɛ 434 ತುಳುನಿಘಂಟು

²ಎಡ್ edɛ. see ³ಇಡ್ idɛ.

³ಎಡ್ edɛ. see ಹೆಡ್ heḍɛ.

⁴ಎಡ್/ಅಡ್ edɛ/ḍɛ. n. ಸಂದು; ಬಿರುಕು. Cleavage.

ಎಡ್‌ಕೊಳಕ್ಕೆ edɛkoḷakkɛ. see ಇಡ್‌ಕೊಳಕ್ಕೆ idɛkoḷakkɛ under ²ಇಡ್ idɛ.

ಎಡ್‌ಕ್ಕಟ್ಟು edɛkkaṭṭu. see ಇಡ್‌ಕ್ಕಟ್ಟು idɛkkaṭṭu.

ಎಡ್‌ಕ್ಕತ್ತಿ edɛkkatti. see ಇಡ್‌ಕ್ಕತ್ತಿ idɛkkatti.

ಎಡ್‌ಕ್ಕತ್ತೆರಿ edɛkkatteri. seeಇಡ್‌ಕ್ಕತ್ತೆರಿ idɛkkatteri.

ಎಡ್‌ಕ್ಕಾಜಿ edɛkkaaji. see ಇಡ್‌ಕ್ಕಾಜಿ idɛkkaaji.

ಎಡ್‌ಕ್ಕಾರ್ edɛkkaaru. see ಇಡ್‌ಕ್ಕಾರ್ idɛkkaaru under ²ಇಡ್ idɛ.

ಎಡ್‌ಕ್ಕೂಳಿ edɛkkuuli. see ಇಡ್‌ಕ್ಕೂಳಿ idɛkkuuli under ²ಇಡ್ idɛ.

ಎಡ್‌ಚ್ಚಟ್ಟು edɛccaṭṭu. see ಇಡ್‌ಚ್ಚಟ್ಟು idɛccaṭṭu under ²ಇಡ್ idɛ.

ಎಡ್‌ತಂತ್ರಿ edɛtantri. see ಇಡ್‌ತಂತ್ರಿ idɛtantri under ²ಇಡ್ idɛ.

ಎಡ್‌ತರ edɛtara. see ಇಡ್‌ತರ idɛtara.

ಎಡ್‌ತರೊ edɛtaro. see ಇಡ್‌ತರ idɛtara.

ಎಡ್‌ತಾಳ edɛtaaḷa. n. ಸಮದಲ್ಲಿ ಸುರುವಾಗದಂತಹ ತಾಳ. A kind of rhythm in which the song does not start at the first stroke of rhythm, but little afterwards.

ಎಡ್‌ತ್ತಟ್ಟು edɛttaṭṭu. n. ಭೂತನರ್ತಕನು ಕೈಯಲ್ಲಿ ಹಿಡಿದುಕೊಳ್ಳುವ ಗುರಾಣಿಯಂತಹ ಆಯುಧ. A shield-like weapon held in the hand by the Bhuta impersonator.

ಎಡ್‌ತ್ತಯಿ edɛttayi. see ಇಡ್‌ತ್ತಯಿ idɛttayi under ²ಇಡ್ idɛ.

ಎಡ್‌ದೊಂಡ್/ಎಡದೊಂಡ್ edɛdonḍɛ/ɛḍadonḍɛ. n. ಗಂಟಲಿನ ಒಳಭಾಗ. Interior part of the throat; larynx.

edɛ + donḍɛ.

ಎಡ್‌ನಾಳಿ edɛnaaḷi. see ¹ಇಡ್‌ನಾಳಿ idɛnaaḷi.

ಎಡ್‌ನಾಳ್ಯೊ edɛnaaḷyo. see ¹ಇಡ್‌ನಾಳಿ idɛnaaḷi.

ಎಡ್‌ಪಯನ edɛpayana. see ಎಡಪಯನ ɛḍapayana.

ಎಡ್‌ಪೂಜಾರಿ edɛpuujaari. see ಇಡ್‌ಪೂಜಾರಿ idɛpuujaari under ²ಇಡ್ idɛ.

ಎಡ್‌ಬಣ್ಣ edɛbaṇṇa. see ಇಡ್‌ಬಣ್ಣ idɛbaṇṇa under ²ಇಡ್ idɛ.

ಎಡ್‌ಬುಡಂತೆ edɛbuḍanṭɛ. see ಇಡ್‌ಬುಡಂದೆ idɛbuḍandɛ under ²ಇಡ್ idɛ.

ಎಡ್‌ಬೇಲಿ edɛbeeli. see ಇಡ್‌ಬೇಲಿ idɛbeeli under ²ಇಡ್ idɛ.

ಎಡ್‌ಮುಡಿ edɛmuḍi. see ¹ಇಡ್‌ಮುಡಿ idɛmuḍi.

ಎಡ್‌ವೋಣಿ edɛvooṇi. see ಇಡ್‌ವೋಣಿ idɛvooṇi under ²ಇಡ್ idɛ.

ಎಡೆಂಕ್ edeṅku. see ¹ಎಡಂಕ್ eḍaṅku.

ಎಡೆಂಕಿಲ್ edeṅkilu. n. 1. ಮೂಲೆ. A corner. 2. (fig.) ಇಕ್ಕಟ್ಟಿನ ಸ್ಥಿತಿ. Predicament.

ಎಡೆಂಜಿ edeṅji, Sb. cf. ಡೆಂಜಿ deṅji. n. ಏಡಿ. A crab.

ಎಡೆಕಿಲ್ಲಾಯ edekillaaya. npr. ಬ್ರಾ. ಕುಲನಾಮ. Br. surname.

ಎಡೆಕ್ಕ edekku. see ¹ಎಡಂಕ್ eḍaṅku.

ಎಡೆಕ್ಕರಿ/ಎಡೆಕ್ಕೀರಿ edekkari/edekkeeri, S. cf. ಅಡೆಕ್ಕಿರಿ aḍekkeri. n. ಅಕ್ಕಿದೋಸೆಯ ತುಣುಕುಗಳಿಂದ ಮಾಡಿದ ಪಾಯಸ. A sweet pudding prepared by mixing the pieces of rice-cake in jaggery soup.

ಎಡೆಕ್ಕೀರಿ edekkeeri. see ಎಡೆಕ್ಕರಿ edekkari.

ಎಡೆತಡ್ಯ edetaḍya. cf. ಅಡಿತ್ತಡ್ಯ aḍittaḍya. n. ದಾರಂದದಿಂದ ಕೆಳಭಾಗ; ಹೊಸ್ತಿಲು. The bottom portion of a door-frame; a door-sill; threshold.

ಎಡೆದೆಟ್ಟು ededeṭṭu. see ಎಡದೆಟ್ಟು eḍaḍeṭṭu.

ಎಡೆನಾಣ್ಯ edenaaṇya, (M). n. Paper money.

ಎಡೆನಾಣ್ಯದಾಯೆ edenaaṇyadaaye. A stupid fellow; a man temporarily engaged.

ಎಡೆಪು edepu, Bh. vn. ಎಡೆಗೊಳ್ಳು(?) Take place; occur (?)

ಪೊರ್‌ಳೀರೆಟ ಪಣ್ಕುಣ ನಂಕೆಡೆತೀ ಮರ್‌ಳಾಟೊಮಿನೆಂದರ್ poruḷeereṭa paṅkuṇa naṅkeḍetii maruḷaatomi-nenderu, Bh.(1.17.33,152) ನಮಗೆ ಎಡೆಗೊಂಡ (?) ಹುಚ್ಚಾಟದ ಸೊಗಸನ್ನು ಯಾರಲ್ಲಿ ಹೇಳುವುದು.

ಎಡೆಪ್ಪಕ್ಕೊ edeppakko, Sb. n. ವ್ಯಕ್ತಿ ತೀರಿಹೋಗಿ 346ನೆಯ ದಿವಸ ಆಚರಿಸುವ ಶ್ರಾದ್ಧ. The ritual observed on the 346th day of death.

ಎಡೆಪ್ಪು edeppu, Sb. cf. ಒಡೆತರ್;²ಒಡೆಪ್ಪು;ಸೆಡಿ. odetaru; ²odeppu; seḍi. vn. ಚುಮುಚುಮೆಂದು ನೋಯು; ಸಿಡಿಯು. Have throbbing pain; ache spasmodically.

ಎಡೆಬದಿನಾಯ edebadinaaya. npr. ಬ್ರಾ. ಕುಲನಾಮ. Br. surname.

ಎಡೆವಟ್ಟು edevaṭṭu. see ಎಡವಟ್ಟು eḍavaṭṭu.

ಎಡೇನೊ edeeno. see ಎಡ್ದೆನ eḍdena.

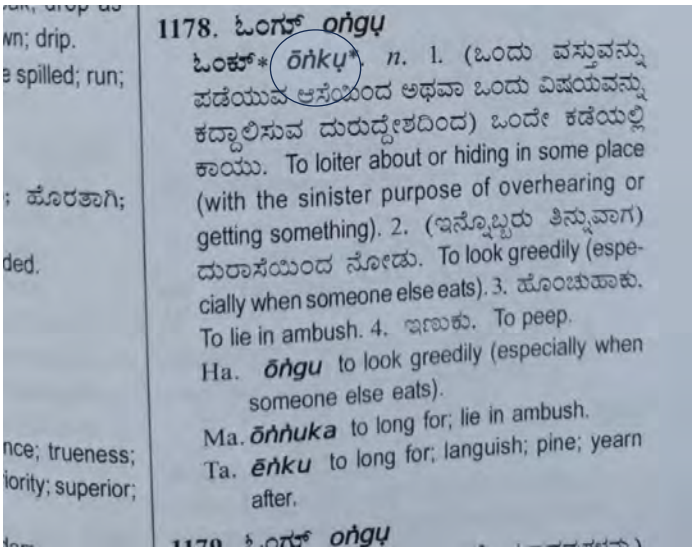
ಎಡ್ಕಿಲ್ಲಾಯ edkillaaya. npr. ಬ್ರಾ. ಕುಲನಾಮ. Br. surname.

Figure 25. More examples from Tulu Nigantu on uses of vowel ɛ ligature ◌ೇ◌ೊ

## 3.8 Ligature Oɗ◌ ಂಎ◌ೆ

There is a need for ligature for ϵϵ and hard to show using Kannada script. A circular hook in the end differentiates it from OJ◌.

## 3.9 ೨ (ụ) half vowel suppressed compared to U or (ಉ)



1178. ಓಂಗ್ *oṅgụ*

ಓಂಕ್* *ōṅkụ** *n.* 1. (ಒಂದು ವಸ್ತುವನ್ನು ಪಡೆಯುವ ಆಸೆಯಿಂದ ಅಥವಾ ಒಂದು ವಿಷಯವನ್ನು ಕದ್ದಾಲಿಸುವ ದುರುದ್ದೇಶದಿಂದ) ಒಂದೇ ಕಡೆಯಲ್ಲಿ ಕಾಯು. To loiter about or hiding in some place (with the sinister purpose of overhearing or getting something). 2. (ಇನ್ನೊಬ್ಬರು ತಿನ್ನುವಾಗ) ದುರಾಸೆಯಿಂದ ನೋಡು. To look greedily (especially when someone else eats). 3. ಹೊಂಚುಹಾಕು. To lie in ambush. 4. ಇಣುಕು. To peep.

Ha. *ōṅgu* to look greedily (especially when someone else eats).

Ma. *ōṅṅuka* to long for; lie in ambush.

Ta. *ēṅku* to long for; languish; pine; yearn after.

Figure 26. Tulu cognate Dictionary:Jnatipadasancaya by Dr. Kekkunnayya has references to use of Tulu half vowel ụ ೨ in words like OOnkụ in Tulu

.org / U11380

**Side by Side comparison of Modern Tulu and Tulu-Tigalari character s**

| | 1138 | 1139 | 113A | 113B | 113C | 113D | 113E | 113F |
|---|---|---|---|---|---|---|---|---|
| 0 | ಀ | ಁ | ಂ | ಃ | | | | 0 |
| 1 | ಄ | ಅ | ಆ | ಇ | ಀ | | | ಏ |
| 2 | ಈ | ಉ | ಊ | ಋ | ಁ | | | ಐ |
| 3 | ಋ | ಌ | ಍ | ಎ | ಂ | | | ಑ |
| 4 | ಒ | ಓ | ಔ | ಕ | ಃ | ಽ | | ಘ |
| 5 | ಖ | ಗ | ಘ | ಙ | ಄ | ಾ | | ಙ |
| 6 | ಚ | ಛ | ಜ | | ಅ | ಿ | | ಛ |
| 7 | ಝ | ಞ | ಟ | ಠ | ಆ | ೀ | | ಜ |
| 8 | | ಡ | ಢ | ಣ | ಇ | ು | | ಝ |
| 9 | | ತ | ಥ | ದ | | ೂ | | ಞ |
| A | ಪ | ಫ | ಬ | ಭ | | ೃ | | ಟ |
| B | ಮ | ಯ | ರ | ಱ | ಉ | ೄ | | ಠ |
| C | ಲ | ವ | ಶ | ಷ | ೊ | ೅ | | |
| D | ಳ | ೞ | ಸ | ಹ | ೋ | ೆ | | |
| E | ೦ | ೧ | ೨ | ೩ | ೌ | ೇ | | |
| F | ೯ | ೰ | ೱ | | ್ | ೈ | | |

**Tulu-Tigalari**

| | 1138 | 1139 | 113A | 113B | 113C | 113D | 113E | 113F |
|---|---|---|---|---|---|---|---|---|
| 0 | 𑎀 | 𑎁 | 𑎂 | 𑎃 | 𑎀 | 𑎐 | | |
| 1 | 𑎄 | 𑎅 | 𑎆 | 𑎇 | | 𑎑 | 𑎡 | |
| 2 | 𑎈 | 𑎉 | 𑎊 | 𑎋 | 𑎂 | 𑎒 | 𑎢 | |
| 3 | 𑎌 | 𑎍 | 𑎎 | 𑎏 | | 𑎓 | | |
| 4 | 𑎐 | 𑎑 | 𑎒 | 𑎓 | | 𑎔 | | |
| 5 | 𑎖 | 𑎗 | 𑎘 | 𑎙 | 𑎃 | 𑎕 | | |
| 6 | 𑎚 | 𑎛 | 𑎜 | | | | | |
| 7 | 𑎜 | 𑎝 | 𑎞 | 𑎟 | 𑎄 | 𑎖 | | |
| 8 | 𑎠 | 𑎡 | 𑎢 | 𑎣 | 𑎅 | 𑎗 | | |
| 9 | 𑎤 | 𑎥 | 𑎦 | 𑎧 | 𑎆 | | | |
| A | | 𑎪 | 𑎫 | 𑎬 | 𑎇 | | | |
| B | 𑎨 | 𑎩 | 𑎪 | 𑎭 | | | | |
| C | | 𑎮 | 𑎯 | 𑎰 | 𑎈 | | | |
| D | | 𑎱 | 𑎲 | 𑎳 | 𑎉 | | | |
| E | 𑎮 | 𑎲 | 𑎳 | 𑎾 | 𑎊 | | | |
| F | | 𑎹 | 𑎺 | 𑎿 | 𑎋 | | | |

*The Unicode Standard, Version 16.0, Copyright © 1991-2024 Unicode, Inc. A*

([1]KTSA Figure 2) [1]KTSA proposal requested a separate character position (U11B54 Pavanaja) for independent half vowel, rather than adding a VIRAMA on U, ೱ.

Since the consonant joiner is separated in Tulu-Tigalari, it is unclear if the behavior of U11384 (Tigalari

U) + U113CE (Virama) = ೨ೆ, is the same as U113CB in left table(See Pavanaja U11B54 ). Also note that glyph of character U is different in Tulu-Tigalari and modern Tulu.

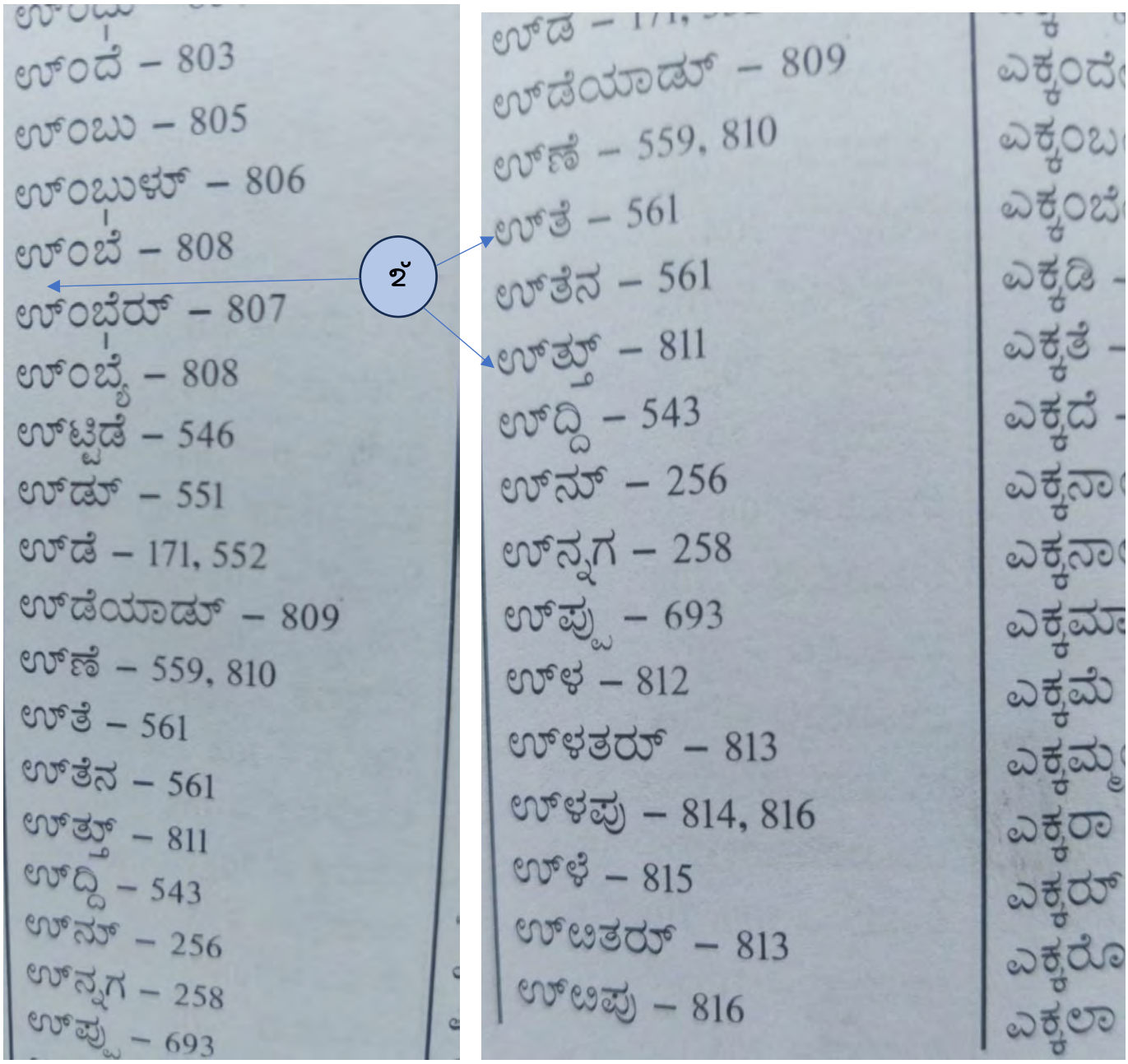
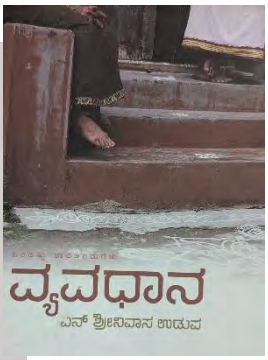



Figure 27. ụ, ೨ೆ used in a number of words illustrated in Tulu cognate Dictionary:Jnatipadasancaya by Dr. Kekkunnayya, ụmḅe ೨ೆ೦೧೮

## 3.10 Numeral 0 (0)

**Numerals** are historically found in astrology and Tantra charts in Tulu manuscripts. 0 is typically not used in old Tulu, however modern Tulu uses and needs zero 0 and glyphs are similar to Kannada 0.




ಇನ್ನು ವಿಜ್ಞಾನ ಜಗತ್ತಿನಲ್ಲಿ – ಮುಖ್ಯವಾಗಿ, ವಿಜ್ಞಾನಕ್ಕೆ ಬೆನ್ನೆಲುಬಾದ ಗಣಿತದಲ್ಲಿ – ಶೂನ್ಯದ ಕಲ್ಪನೆ ದೊಡ್ಡ ಕ್ರಾಂತಿಯನ್ನೇ ಮಾಡಿದೆ. ಗಣಿತ ಕ್ಷೇತ್ರಕ್ಕೆ ಸೊನ್ನೆಯ ಪರಿಕಲ್ಪನೆಯನ್ನು ನೀಡಿದವರು ಭಾರತೀಯರು. ರೋಮನ್ನರಿಗೆ ಸೊನ್ನೆಯ ಪರಿಕಲ್ಪನೆ ಇಲ್ಲದಿದ್ದುರಿಂದ ಅವರ ಸಂಖ್ಯಾಪದ್ಧತಿ ತುಂಬಾ ತೊಡಕಾಯಿತು. ರೋಮನ್ ಪದ್ಧತಿಯಲ್ಲಿ 18 ಎಂಬ ಚಿಕ್ಕ ಸಂಖ್ಯೆಯನ್ನು ಬರೆಯಬೇಕಾದರೂ XVIII ಎಂದು ದ್ರಾವಿಡ ಪ್ರಾಣಾಯಾಮ ಮಾಡಬೇಕು. ಹೀಗಿರುವಾಗ ಲಕ್ಷ, ಕೋಟಿ ಪರಿಮಾಣಗಳನ್ನು ಸೂಚಿಸುವ ಸಂಖ್ಯೆಗಳನ್ನು ಆ ಪದ್ಧತಿಯಲ್ಲಿ ಬರೆಯಹೊರಟರೆ ಎಷ್ಟೊಂದು ಕಷ್ಟವಾದೀತು! ಯವನರ ಗಣಿತದಲ್ಲಿಯೂ ಸೊನ್ನೆಯಿಲ್ಲದೇ ಇಂಥದೇ ತೊಡಕಿಗೆ ಕಾರಣವಾಗಿತ್ತೆಂದು ಬಲ್ಲವರು ಹೇಳುತ್ತಾರೆ. ಇಷ್ಟೆಲ್ಲಾ ಜಟಿಲವಾಗಿದ್ದ ಸಂಖ್ಯಾಜಗತ್ತಿಗೆ ಭಾರತೀಯರು ಸೊನ್ನೆಯನ್ನು ಪ್ರವೇಶ ಮಾಡಿಸಿ, ಬಹು ದೊಡ್ಡ ಅದ್ಭುತವನ್ನೇ ಸಾಧಿಸಿದರೆಂದರೆ ಅತ್ಯುಕ್ತಿಯಲ್ಲ.

ಭಾರತೀಯರಿಗೆ ಸೊನ್ನೆಯ ಕಲ್ಪನೆ ಹೇಗೆ, ಯಾವಾಗ ಬಂದಿತೆಂಬುದನ್ನು ವಿವಿಚಿತವಾಗಿ ಹೇಳಲಾಗದು. ಕ್ರಿ.ಪೂ. ಮೂರನೆಯ ಶತಮಾನದ್ದೆಂದು ಭಾವಿಸಲಾಗಿರುವ 'ಪಿಂಗಲ ಛಂದಾಹಶಾಸ್ತ್ರ' ಎಂಬ ಗ್ರಂಥದಲ್ಲಿ ಸೊನ್ನೆಯ ಪ್ರಸ್ತಾಪವಿದೆಯಂತೆ. ಕ್ರಿ.ಶ. 850ರಲ್ಲಿದ್ದ ವರಾಹಮಿಹಿರಾಚಾರ್ಯರು ತಮ್ಮ 'ಗಣಿತ ಸಾರಸಂಗ್ರಹ' ಎಂಬ ಗ್ರಂಥದಲ್ಲಿ ಸೊನ್ನೆಗೆ ಪರ್ಯಾಯ ಶಬ್ದಗಳನ್ನು ಹೀಗೆ ಕೊಟ್ಟಿದ್ದಾರೆ:

ಆಕಾಶಂ ಗಗನಂ ಶೂನ್ಯಂ ಅಂಬರಂ ಖಂ ನಭೋ ವಿಯತ್ ।
ಅನಂತಂ ಅರಿತರಿಕ್ತಂ ಚ ವಿಷ್ಣುಪಾದಂ ದಿವಿಂ ಸ್ಮರೇತ್ ॥

ಶ್ಲೋಕದ ಪ್ರಕಾರ ಸೊನ್ನೆಯನ್ನು ಪ್ರತಿನಿಧಿಸುವ ಎಲ್ಲ ಪದಗಳೂ ಆಕಾಶವಾಚಿಗಳು ಎಂಬುದು ಗಮನಾರ್ಹ.

ಹೀಗೆ ಭಾರತೀಯರ ಕಲ್ಪನೆಯಲ್ಲಿ ರೂಪು ತಳೆದ ಶೂನ್ಯ ಅರಬ್ಬಿಯಲ್ಲಿ ssifr ಎಂದಾಗಿ ಲ್ಯಾಟಿನ್ ಭಾಷೆಯಲ್ಲಿ zephyrium ಎಂದು ಕರೆಯಲ್ಪಟ್ಟಿತೆಂದೂ, ಇಂಗ್ಲೀಷ್‌ನಲ್ಲಿ zero ಮತ್ತು cipher ಎಂದಾಯಿತೆಂದು ಭಾಷಾವಿಜ್ಞಾನಿಗಳು ಹೇಳುತ್ತಾರೆ.

ಒಟ್ಟಿನಲ್ಲಿ ವಿಜ್ಞಾನ ತಂತ್ರಜ್ಞಾನಗಳ ಬುನಾದಿಯ ಮೇಲೆ ಚಲಿಸುವ ನಾಗರಿಕತೆಯ ರಥಕ್ಕೆ 'ಸೊನ್ನೆ' ಎಂಬ ಚಕ್ರವನ್ನು ಜೋಡಿಸಿದವರು ಭಾರತೀಯರು ಎಂಬುದು ನಾವೆಲ್ಲ ಅಭಿಮಾನ ಪಡಬೇಕಾದ ಸಂಗತಿ.

23 ನವೆಂಬರ್ 2006

ವ್ಯವಧಾನ 111

ಶೂನ್ಯಂ

Figure 28. In the book Vyavadhan by N. Srinivasa Udupa the origin of word Zero comes from Latin Zephyrium, out of this world. In mathematical treatise by Varahimi Acharya, zero or Shunya in sloka is refered to unearthly or Akashavachi.

Similarly requested set of numerals in modern Tulu are below. In addition, we do not see allocation of numerals in the recently accepted Tulu-Tigalari set. The proof of below manuscripts on numeral usage is clear and scholars had approved it for modern Tulu at KTSA meetings and w (10) is also requested in addition to below. Tulu calendars are is use for a long time and numerals are consistent as requested glyph sets and details of various calendars from 2014 or so are in [1]KTSA.

(0 1 2 3 4 5 6 7 8 9).

(0 ೧ ೨ ೩ ೪ ೫ ೬ ೭ ೮ ೯).

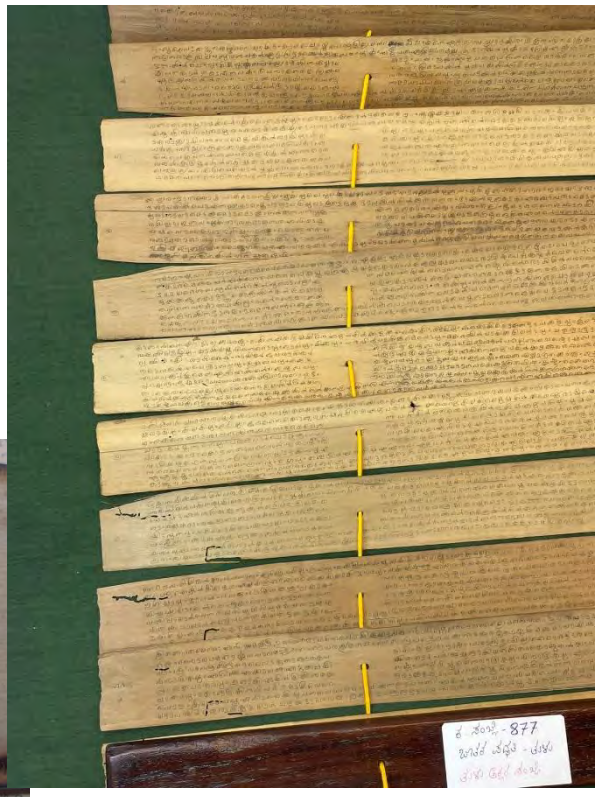
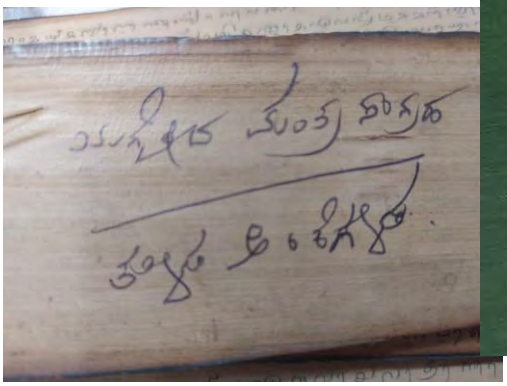


Figure 29. Rig Veda Hymns Collection, atrology charts – Tulu Numerals ref. (Courtesy: Dharmasthala Manuscript Library. Support letter in [1] KTSA Appendix 6 by Dr. Vignaraj and Appendix 7 ha numeral pictures from manuscripts)

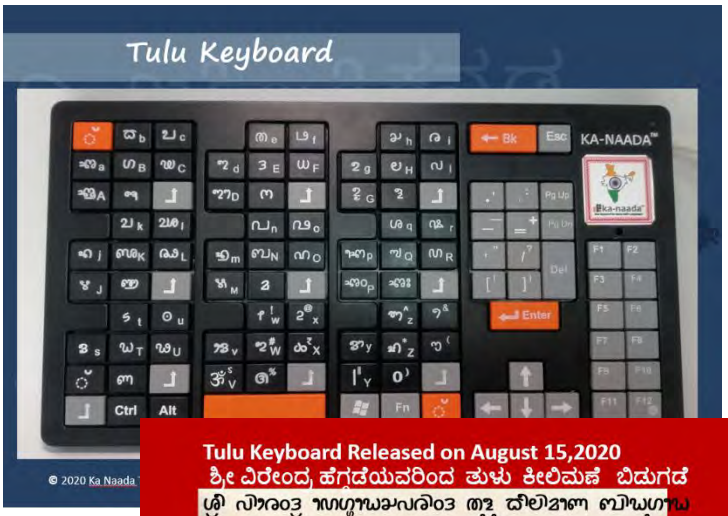


### 3.11 ೧ **Tulu Numeral** (1) (numeral glyph rendered using TuluSiri font)

Tulu numerals are used consistently over the years in alphabet books by Rastreeya Saksharata Samithi (National literacy mission 2009) and Namma Tulunada Trust (2012).

In addition, Kala Konde calendars have been in existence since 2014. See pictures on stability of usage in [1]KTSA.

Kalakonde Tulu calendars from 2014 are using Tulu numerals. 2025 calendars were recently released by Speaker of the house U.T. Khader and KTSA President Taranath Gatti along with Dr. Pravinraj author of KTSA proposal and director of Rastreeya Saksharata Samithi.




Tulu hardware keyboards from Kanaada Phonetics are in use for modern Tulu and both EE, OO, Numerals have been in use using Unicode fonts Tulu Sri, Tulu Siri and ToulavaSri fonts. The initial keyboard supported Vaishnavi et al proposal. Recent molded keyboards released by Dharmasthala Temple head, Sri Veerendra Hegde and in use in schools. Several manuscripts are decoded using keyboard. Letter from Dharmasthala manuscript library curator Dr. Vignaraj has given letter of support (in [1]KTSA) for numerals proposed here based on manuscript evidence. Additional proof from manuscripts is below.

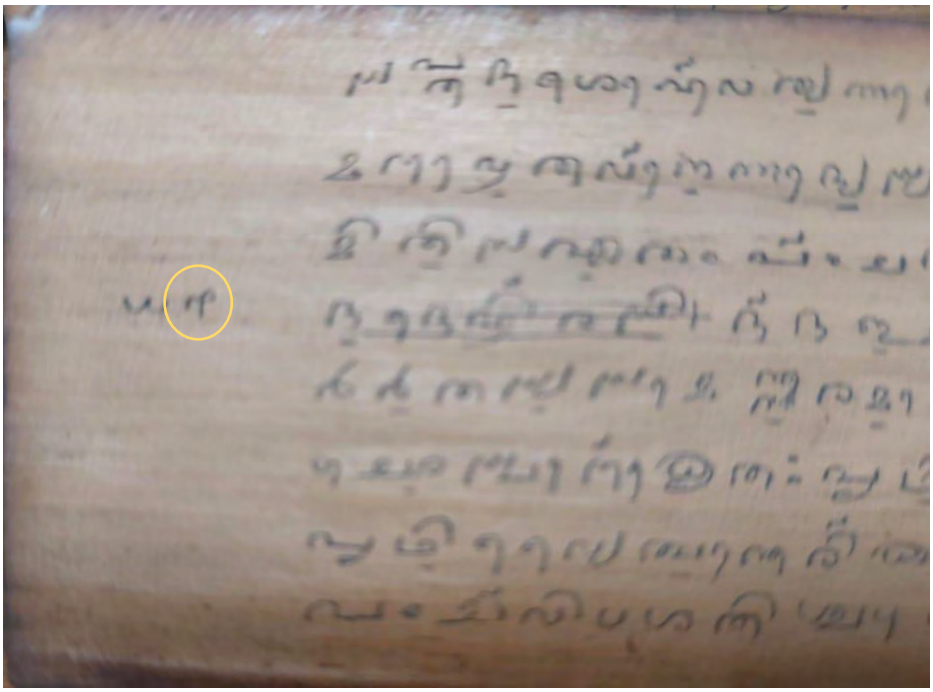


Figure 30. Numeral 1 used in manuscripts like Rig Vedic textbook as above

Calendars have been consistently using Tulu numerals, Tulu Kala Konde by Rastriya Saksharata Samiti since 2014 and also by Namma Tulunada Trust and is a necessity. Its existence is seen in several manuscripts and consistently used over the years and warrants Unicode allocation.

## 3.12 2 Tulu Numeral (2)

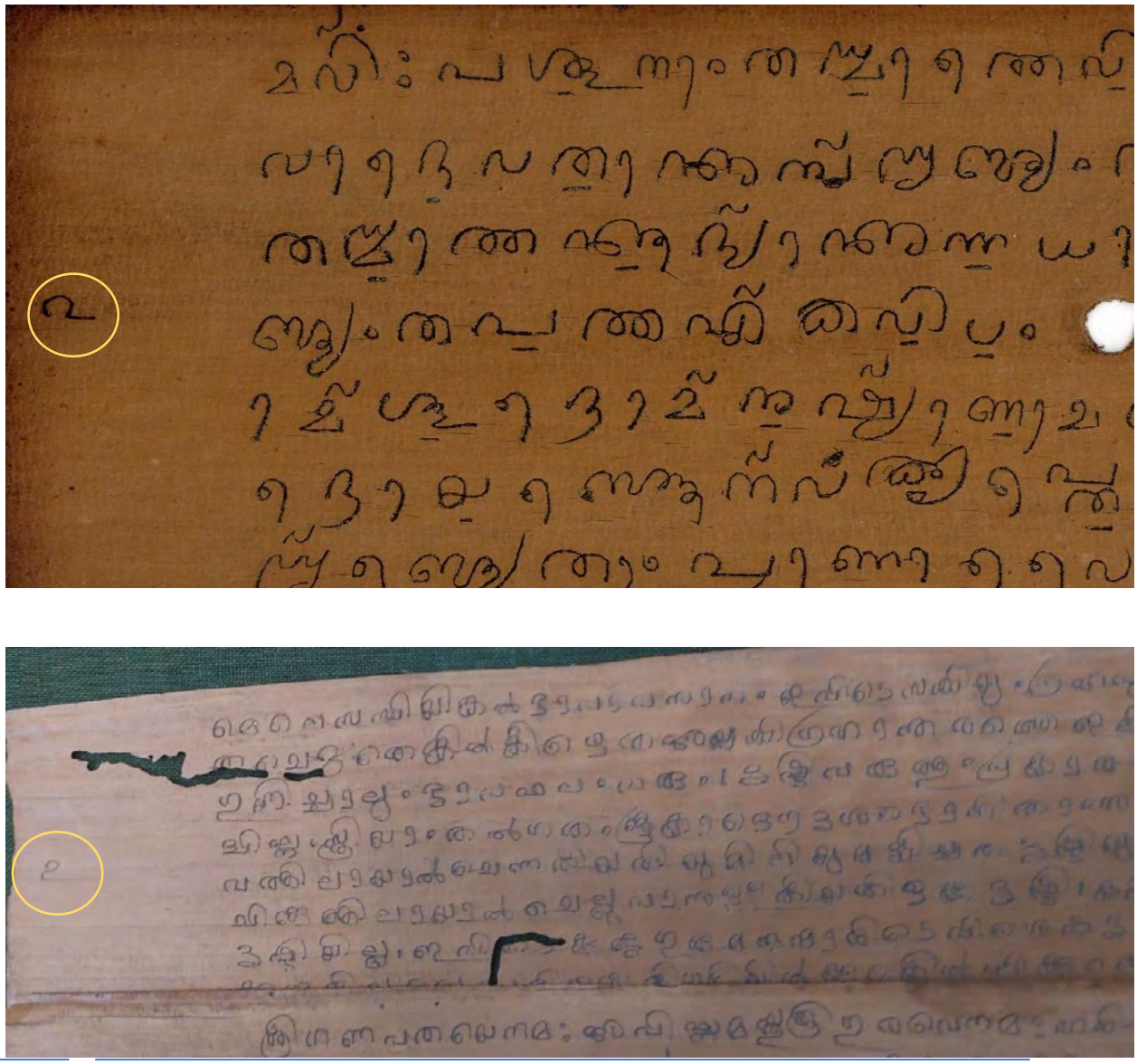


Figure 31. Tulu numeral 2

### 3.13 ൩ Tulu Numeral (3)

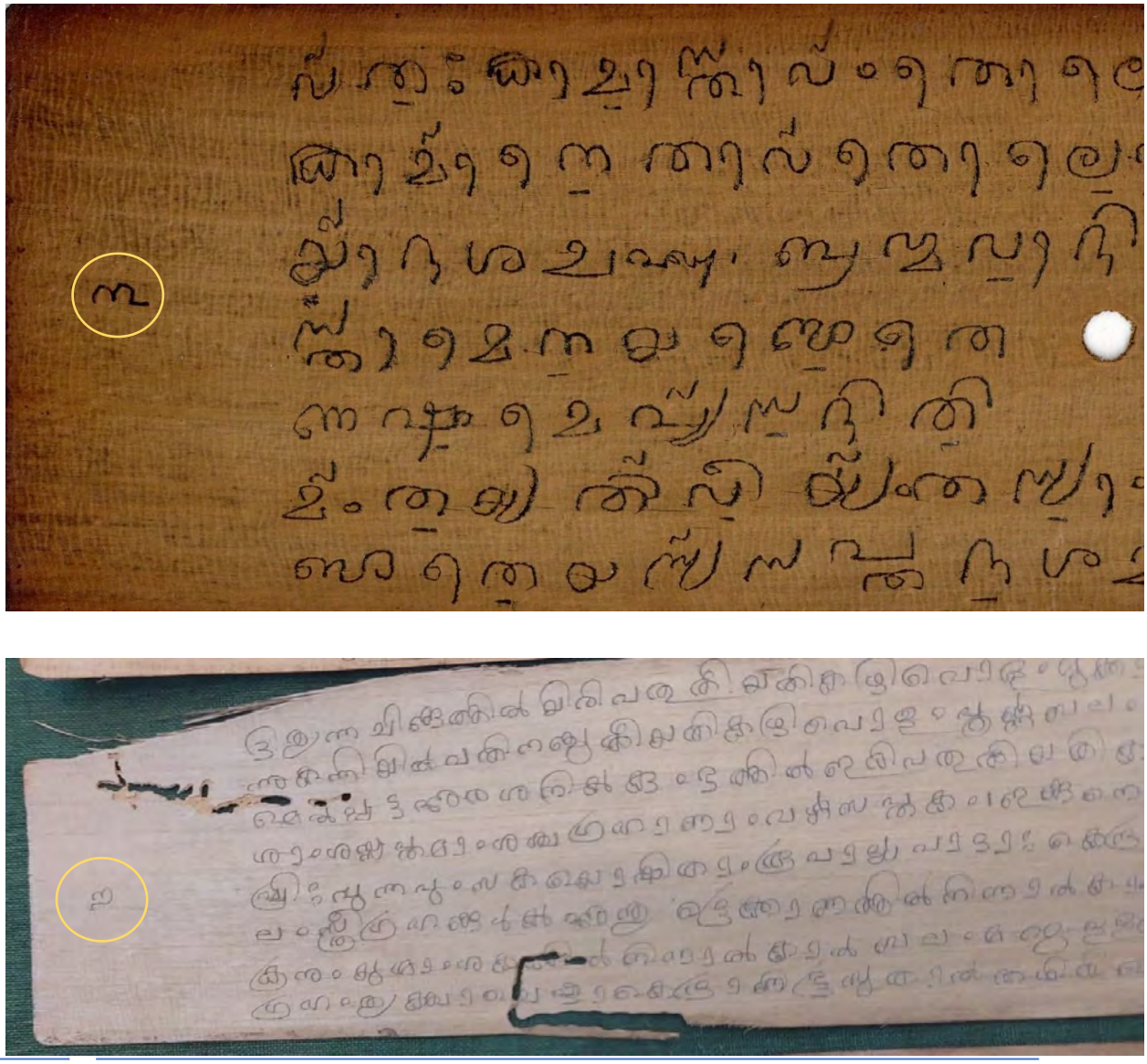
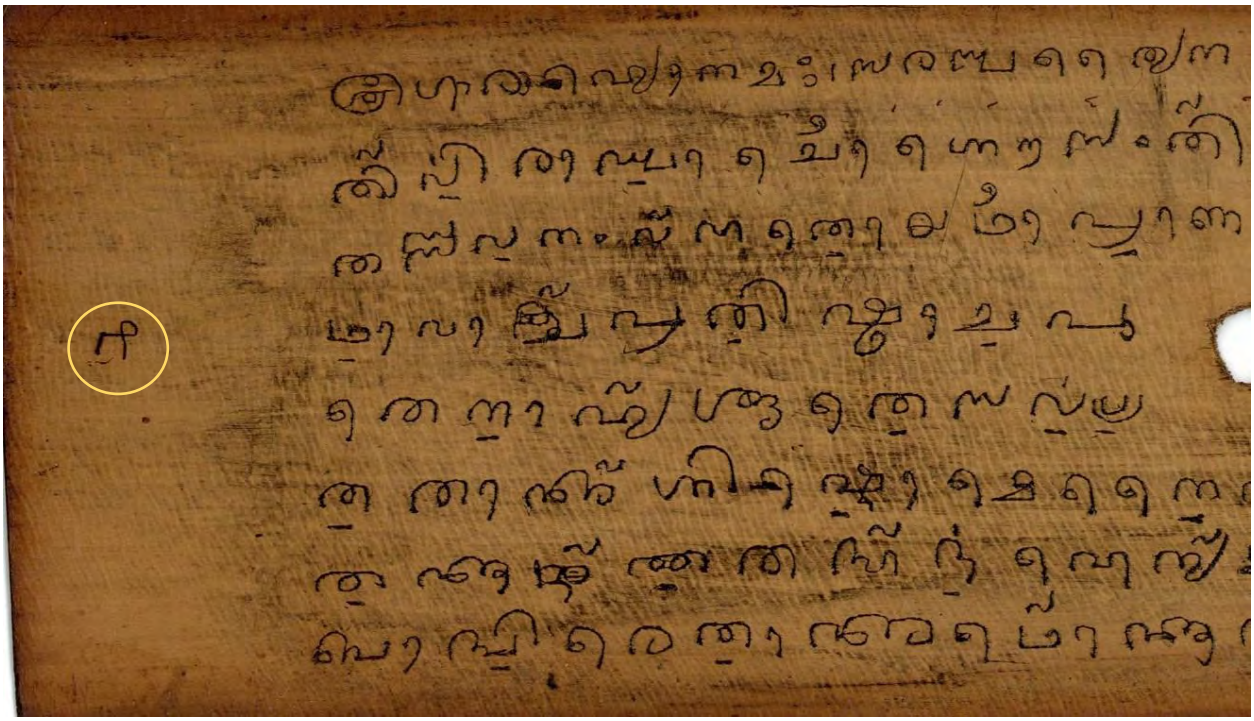


Figure 32. Tulu Numeral 3

### 3.14 ൪ Tulu Numeral (4)



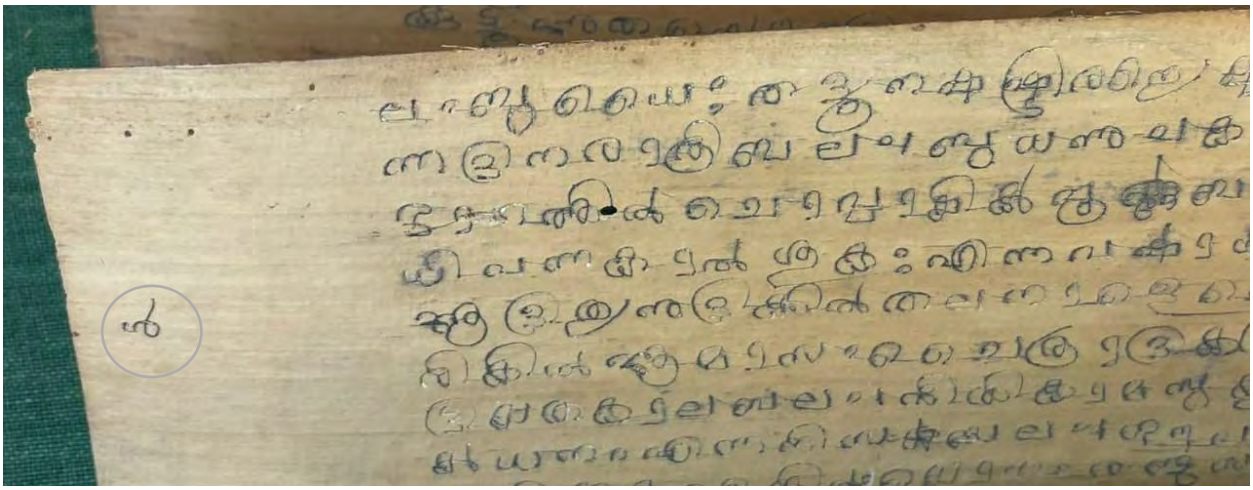


Figure 33. Tulu Numeral 4

### 3.15 ൫ Tulu Numeral (5)

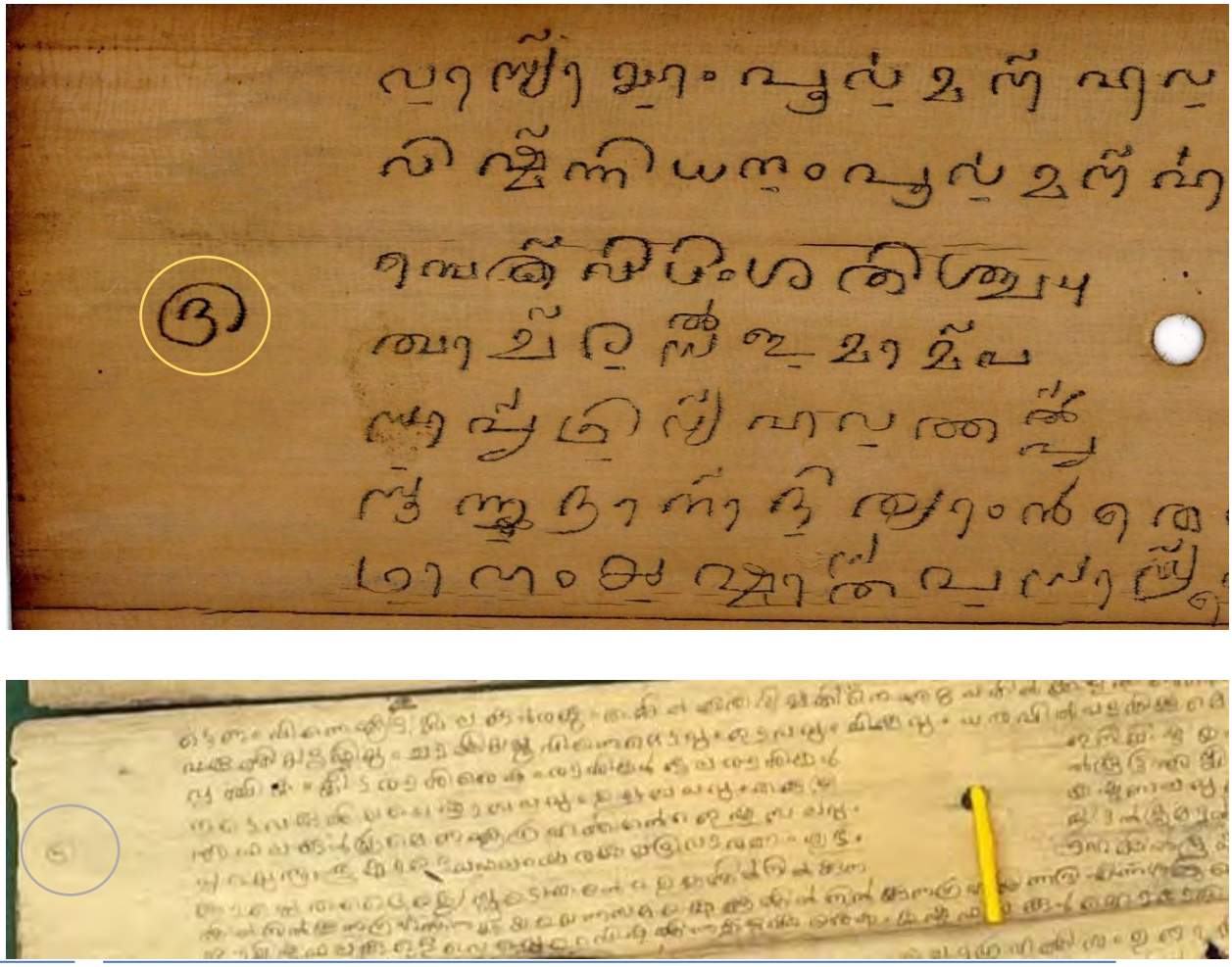
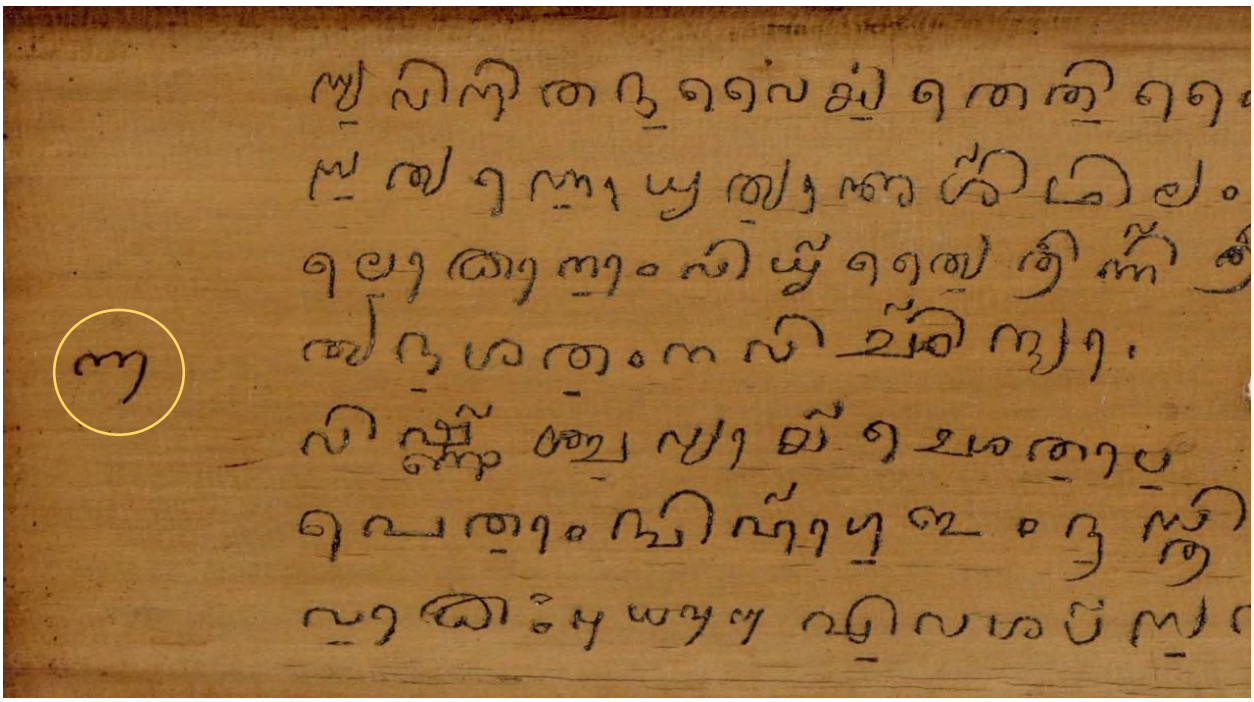


Figure 34. Tulu Numeral 5

### 3.16 ൬ Tulu Numeral (6)



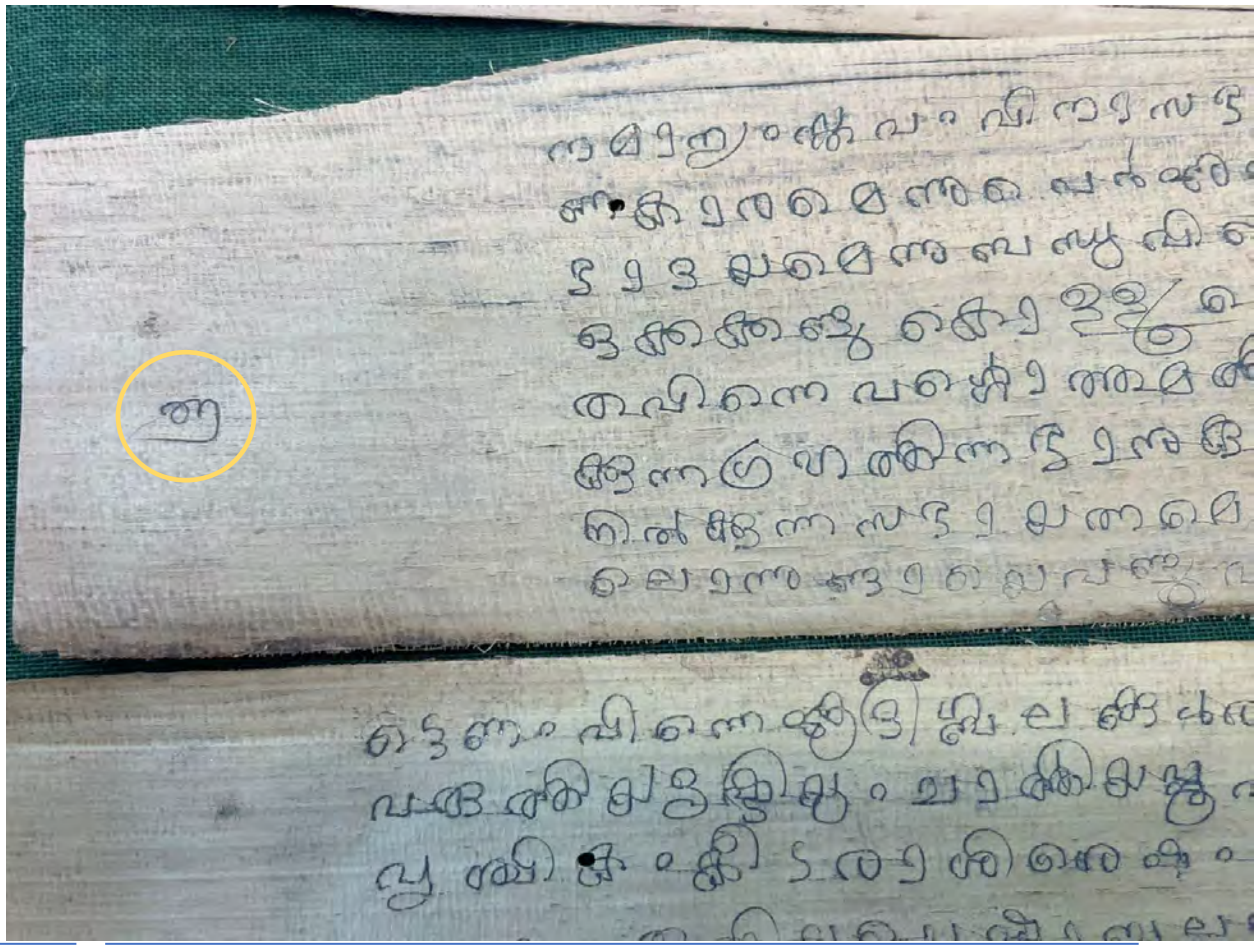


Figure 35. Tulu Numeral 6

### 3.17 ൭ Tulu Numeral (7)

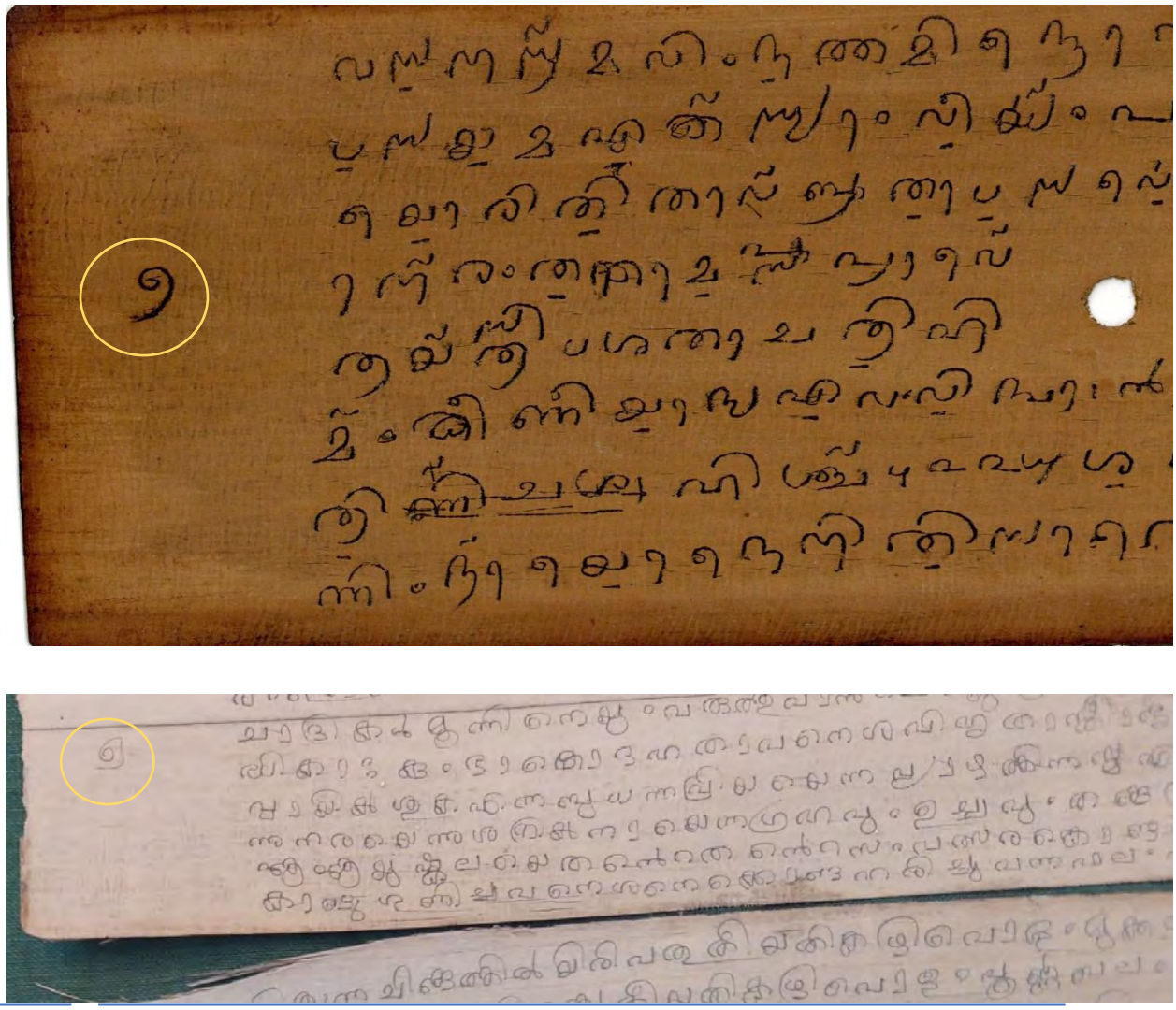


Figure 36. Tulu Numeral 7

### 3.18 ൮ Tulu Numeral (8)

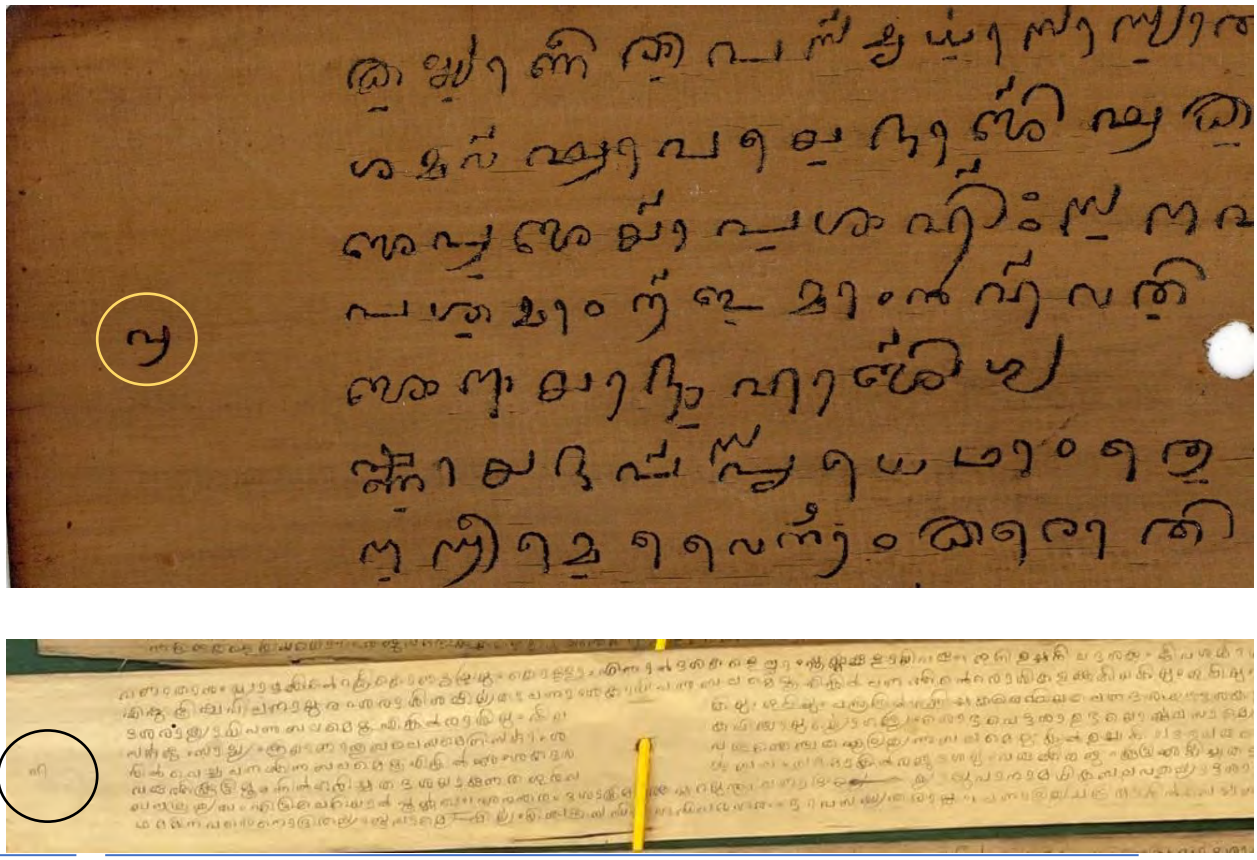


Figure 37. Tulu Numeral 8

3.19 ೯ **Tulu Numeral** (9)

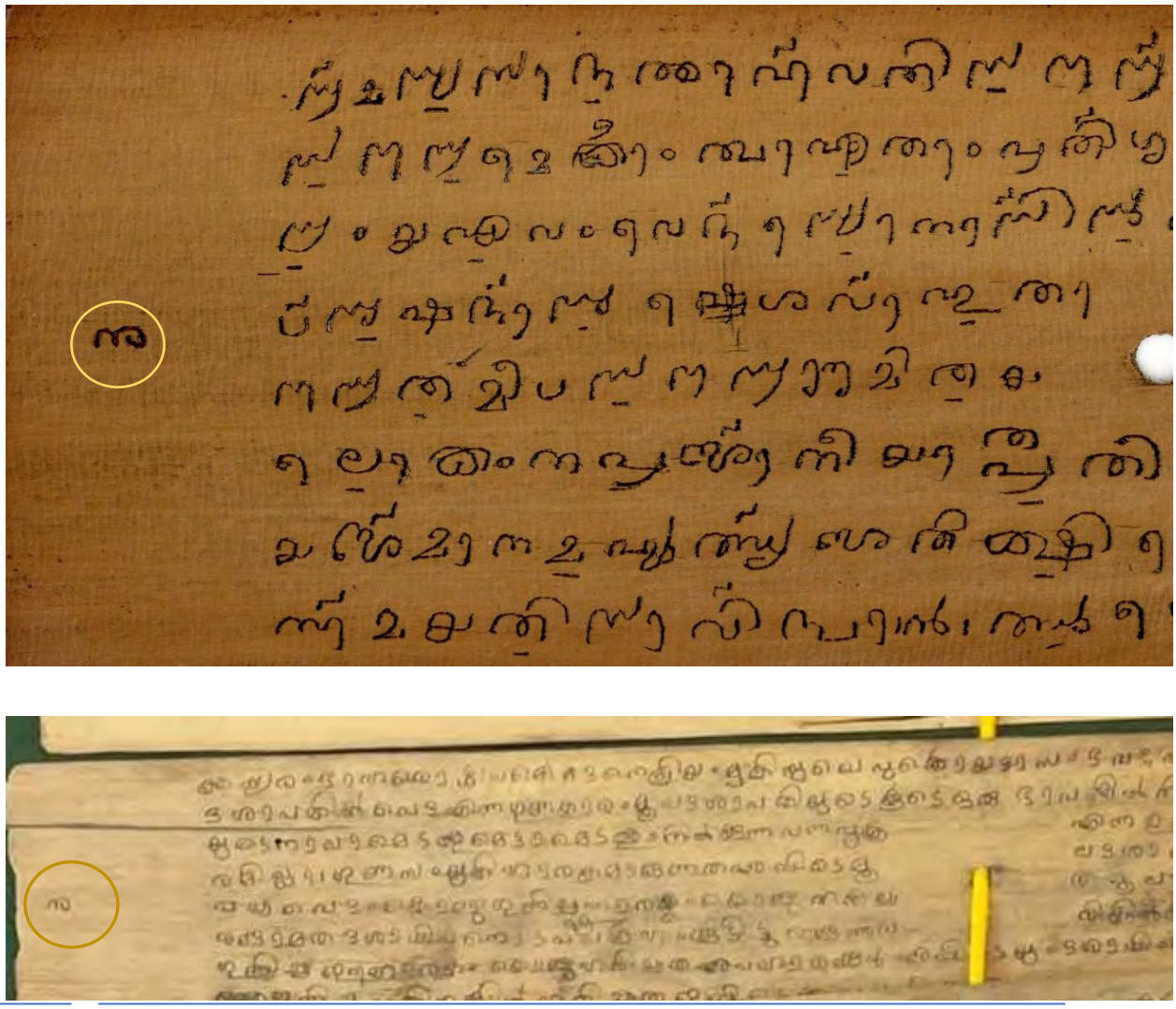


Figure 38. Tulu Numeral 9

3.20 ೧೦ Tulu Numeral (10)

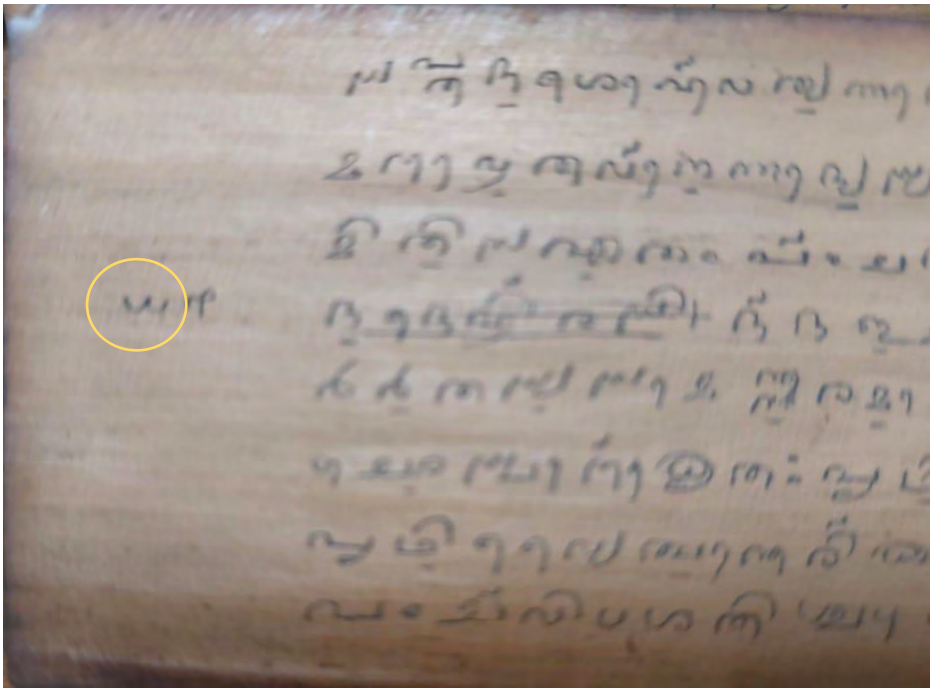


Figure 39. Tulu Numeral 10 like Roman X

## 3.21 𑻲 Tulu Numeral (100)

Astrology charts have consistently used 𑻲 for numeral 100. (113FB requested code point)

**Tulu-Tigalari**

| | 1138 | 1139 | 113A | 113B | 113C | 113D | 113E | 113F |
|---|---|---|---|---|---|---|---|---|
| 0 | 11380 | 11390 | 113A0 | 113B0 | 113C0 | 113D0 | | |
| 1 | 11381 | 11391 | 113A1 | 113B1 | | 113D1 | 113E1 | |
| 2 | 11382 | 11392 | 113A2 | 113B2 | 113C2 | 113D2 | 113E2 | |
| 3 | 11383 | 11393 | 113A3 | 113B3 | | 113D3 | | |
| 4 | 11384 | 11394 | 113A4 | 113B4 | | 113D4 | | |
| 5 | 11385 | 11395 | 113A5 | 113B5 | 113C5 | 113D5 | | |
| 6 | 11386 | 11396 | 113A6 | | | | | |
| 7 | 11387 | 11397 | 113A7 | 113B7 | 113C7 | 113D7 | | |
| 8 | 11388 | 11398 | 113A8 | 113B8 | 113C8 | 113D8 | | |
| 9 | 11389 | 11399 | 113A9 | 113B9 | 113C9 | | | |
| A | | 1139A | 113AA | 113BA | 113CA | | | |
| B | 1138B | 1139B | 113AB | 113BB | | | | |
| C | | 1139C | 113AC | 113BC | 113CC | | | |
| D | | 1139D | 113AD | 113BD | 113CD | | | |
| E | 1138E | 1139E | 113AE | 113BE | 113CE | | | |
| F | | 1139F | 113AF | 113BF | 113CF | | | |

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**Side by Side comparison of Modern Tulu and Tulu-Tigalari character set**

| | 1138 | 1139 | 113A | 113B | 113C | 113D | 113E | 113F |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| A | | | | | | | | |
| B | | | | | | | | |
| C | | | | | | | | |
| D | | | | | | | | |
| E | | | | | | | | |
| F | | | | | | | | |

## 4 Character Data

**Character Properties**

**Vowels and Ligatures**

1. **1138A**
   113D2; TULU VOWEL E; Lo; 0; L;;;;;N;;;;;
2. **1138F**
   113D3; TULU VOWEL O; Lo; 0; L;;;;;N;;;;;
3. **1138C**
   113DA; TULU HALF VOWEL ϵ; Lo; 0; L;;;;;N;;;;;
4. **1138D**
   113DB; TULU HALF VOWEL ϵϵ; Lo; 0; L;;;;;N;;;;;
5. **113C1**
   113D4; TULU LIGATURE E; Lo; 0; L;;;;;N;;;;;
6. **113C6**
   113D5; TULU LIGATURE O; Lo; 0; L;;;;;N;;;;;
7. **113C3**
   113DC; TULU LIGATURE HALF VOWEL ϵ; Lo; 0; L;;;;;N;;;;;
8. **113C4**
   113DD; TULU LIGATURE HALF VOWEL ϵϵ; Lo; 0; L;;;;;N;;;;;

---

**Numerals**

1. **113F0**
   113F0; TULU DIGIT ZERO; Nd; 0; L; 0; 0; 0; N;;;;;
2. **113F1**
   113F1; TULU DIGIT ONE; Nd; 0; L; 1; 1; 1; N;;;;;
3. **113F2**
   113F2; TULU DIGIT TWO; Nd; 0; L; 2; 2; 2; N;;;;;
4. **113F3**
   113F3; TULU DIGIT THREE; Nd; 0; L; 3; 3; 3; N;;;;;
5. **113F4**
   113F4; TULU DIGIT FOUR; Nd; 0; L; 4; 4; 4; N;;;;;

6. **113F5**
   113F5; TULU DIGIT FIVE; Nd; 0; L; 5; 5; 5; N;;;;;
7. **113F6**
   113F6; TULU DIGIT SIX; Nd; 0; L; 6; 6; 6; N;;;;;
8. **113F7**
   113F7; TULU DIGIT SEVEN; Nd; 0; L; 7; 7; 7; N;;;;;
9. **113F8**
   113F8; TULU DIGIT EIGHT; Nd; 0; L; 8; 8; 8; N;;;;;
10. **113F9**
    113F9; TULU DIGIT NINE; Nd; 0; L; 9; 9; 9; N;;;;;
11. **113FA**
    113FA; TULU NUMERAL TEN; No; 0; L; 10; 10; 10; N;;;;;
12. **113FB**
    113FB; TULU NUMERAL HUNDRED; No; 0; L; 10; 10; 10; N;;;;;

---

**Archaic Vowel**

1. **113CB**

   113CB; TULU HALF U; Mn; 9; NSM; ; ; ; ; N;;;;;

[1]KTSA proposal requested for a separate character position (U11B54 Pavanaja) an independent half vowel, rather than adding a VIRAMA on U, ೨ೌ. Since the consonant joiner is separated in Tulu-Tigalari, it is unclear if the behavior is the same as U11384 (Tigalari U) + U113CE (Virama) = ೨ೌ. It is unclear if the alloted Tulu-Tigalari behaves as below, (vowel modified) or will it add as a iscii consonant conjoiner if any letter added next to it ?

**Key Details for the New U Virama or Half U**

1. **Position**: It will have the same **above position** as **U+113CE**, since it is placed over the base glyph U, ೨.
2. **Functionality**: The new mark will likely indicate a half vowel or suppress the inherent vowel for specific use cases in Tulu-Tigalari.
3. **Combining Class**: For consistency with viramas across Indic scripts, this new mark will retain the **canonical combining class of 9**.
4. **General Category**: **Mn (Non-Spacing Mark)** remains applicable because it modifies the base glyph without occupying independent space.

**Syllabic categories**

Not applicable

**Positional categories**

# Indic_Positional_Category=Top

113CB; Above # Mn TULU HALF U

**Positioning and Usage: (if Tulu-Tigalari is modified)**

- **Position**: This mark will appear **above the base character** 𑎒, just like U+113CB page 47,table R.
- **Interaction with U+11384**: When combined with **U+11384 (TULU-TIGALARI LETTER)**, the rendering will place the virama directly above the base glyph, indicating a suppressed inherent vowel or a half vowel.

**Example:**

If the base glyph is **U+11384**, and this new virama is **U+113DE**, the sequence would look like this:

1. **Base Character**: U+11384 (TULU-TIGALARI LETTER 𑎒 ).
2. **Modified Character**: U+11384 U+113CE (LETTER + VIRAMA).

**Rendered Output**: The glyph for U+11384 with a virama placed above is as 𑎒𑏎 (U113CB in table right page 47)

## 5 Acknowledgments

We would like to thank our committee of scholars Dr. R Bellur, Dr. Pravinraj S Rao, Dr. Kekkunnayya, Dr. Guru Prasad, for their seminal contributions to Tulu and digital Tulu. We would like to thanks to KTSA president Tharanath Gatty for his continued support to Tulu Unicode. We thank Dr. Deborah and Dr. Kucera for their guidance and support on Tulu Unicode efforts. Our special thanks to Dr. Radhakrishna Bellur, Dr. Akashraj Jain,Dr. Pavanaja and KTSA previous team and Vaishnavi Murthy, Srinidhi, also Rastriya Computer Saksharatha Samithi's ThawlavaShri Font on Dr.Pravin Rao, Satyashankar B and Nirmala P Rao, Geetha K.L. & Vivek Acharya & Udayananda Barke. Dr.Guru Prasad and Kanaada Phonetics team, Nishkal & Nischit on Tulu Siri fonts, GVS Ullal and Vidyasri on initial glyphs set and teaching Tulu classes along with Sathish Agpala and Jai Tulunadu team and also help in initial proposals. We thank many Seers of Mutis and their scholars, Academic scholars, Dr. Veerendra Hegde and Dr. Vignaraj from Dharmastala Manuscript Library, Dr. Kekkunnayya and Dr. Sai Geetha & team Nitte University for publishing Tulu Cognate Dictionary, Dr. Upadhyaya and team of scholars publishing 6 volume Tulu Lexicon, Kabbinaale Vasant Bharadwaj for publishing Tulu meaning book, various University Tulu Chairs & faculty, Learn Tulu using English, Pradyoth Hegde & Nitte University, Tulu alphabet book publishers, Tulu teachers, Tulu so and hard keyboard developers and most of all people of Tulunadu, AATA- All American Tulu Association and Janaki from N.Carolina, USA on providing with scanners to scan manuscripts and all from AATA who shared their private manuscripts, and other organizations like Achar from Manuscript research center in Geetha Mandir, Puttige Mutt Udupi for supporting Tulu Unicode proposal. We thank Unicode member past AATA president Bhaskar Sherigaar and current president Shreevalli Rai (Miami) for their support. Thanks to Prof. BVK Sastry of Yoga Samskrutam University for his advice on Sanskrut words and pronunciations, behaviour. Special thanks to Private manuscript collections, St. Aloysius, Udupi Geetha Mandir, Dharmasthala Manuscript library who shared their manuscript collections and helped in decoding

**ISO/IEC JTC 1/SC 2/WG 2**
**PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS**
**FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646**[1]
**Please fill all the sections A, B and C below.**
**Please read Principles and Procedures Document (P & P) from** http://std.dkuug.dk/JTC1/SC2/WG2/docs/principles.html **for guidelines and details before filling this form.**
**Please ensure you are using the latest Form from** http://std.dkuug.dk/JTC1/SC2/WG2/docs/summaryform.html **.**
**See also** http://std.dkuug.dk/JTC1/SC2/WG2/docs/roadmaps.html **for latest *Roadmaps*.**

## A. Administrative

1. **Title:** ***Proposal for the Inclusion of Modern Tulu Lipi Characters and Numerals***
2. Requester's name: *Dr. Pravinraj S. Rao on behalf of Karnataka Tulu Sahitya Academy (KTSA) and supporting scholars*
3. Requester type (Member body/Liaison/Individual contribution): *Individual Contribution under KTSA Tulu Unicode Committee*
4. Submission date: *24-12-2024 Tulu Stability file revised on 04-02-2025*
5. Requester's reference (if applicable): *KTSA Proposal Modern Tulu Stability (2024)*
6. Choose one of the following:
   This is a complete proposal: *This is a complete*
   (or) More information will be provided later:

## B. Technical – General

1. Choose one of the following:
   a. This proposal is for a new script (set of characters):
      Proposed name of script: *Modern Tulu Lipi*
   b. The proposal is for addition of character(s) to an existing block:
      Name of the existing block:
2. Number of characters in proposal: ***87 Number of the Block***
3. Proposed category (select one from below - see section 2.2 of P&P document):

| | | | | | |
|---|---|---|---|---|---|
| A-Contemporary | ✓ | B.1-Specialized (small collection) | | B.2-Specialized (large collection) | |
| C-Major extinct | | D-Attested extinct | | E-Minor extinct | |
| F-Archaic Hieroglyphic or Ideographic | | | | G-Obscure or questionable usage symbols | |

4. Is a repertoire including character names provided? *Yes*
   a. If YES, are the names in accordance with the "character naming guidelines" in Annex L of P&P document?
   b. Are the character shapes attached in a legible form suitable for review? *Yes*
5. Fonts related:
   a. Who will provide the appropriate computerized font to the Project Editor of 10646 for publishing the standard?

   *The Tulu digital font was initially developed by Dr. Pravinraj S. Rao in 2009 and was named "Taulava" Later developments incorporated Kannada phonetics, with contributions from Nishkal Rao, who developed the Tulu Siri and Pravin S Rao developed Unicode fonts '' Tulu Shri'' fonts through Malayalam Kathik keyboard layout*

   b. Identify the party granting a license for use of the font by the editors (include address, e-mail, ftp-site, etc.):
   *Dr. Pravinraj S Rao (KTSA), Email:[ktsa.unicode@gmail.com]*
6. References:
   a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided? *Yes*
   b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached? *Yes, including Tulu calendars (2014-2025), textbooks, and printed media Ex(Jnathipada Sanchya) and Tulu Lexicon*
7. Special encoding issues:
   Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)? *Yes*
   *Details in KTSA Proposal Modern Tulu Stability Final (2024)*

[1] Form number: N4502-F (Original 1994-10-14; Revised 1995-01, 1995-04, 1996-04, 1996-08, 1999-03, 2001-05, 2001-09, 2003-11, 2005-01, 2005-09, 2005-10, 2007-03, 2008-05, 2009-11, 2011-03, 2012-01)

**C. Technical - Justification**

1. Has this proposal for addition of character(s) been submitted before? *Yes*

If YES explain *Revised and resubmitted based on the Unicode Committee's feedback (ref: L2/23-021, L2/23-055)*

2. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)? *Yes*

If YES, with whom? Scholars, teachers, and community groups, including All American Tulu Association (AATA) and Tulu Academy

If YES, available relevant documents:

3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included?

Reference: *Modern Tulu Lipi is used in educational, cultural, and digital literacy programs in Tulu Nadu and abroad (e.g., USA)*

4. The context of use for the proposed characters (type of use; common or rare)

Reference: *Frequent use in calendars, textbooks, certificates, public events, and digital content creation*

5. Are the proposed characters in current use by the user community? *Yes*

If YES, where? Reference: *Refer to Tulu calendars, school materials, and KTSA-endorsed publications since 2008*

6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP? *Yes*

If YES, is a rationale provided? *BMP is preferred for compatibility with modern digital systems*

If YES, reference:

7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)? *Yes*

8. Can any of the proposed characters be considered a presentation form of an existing character or character sequence? *No*

If YES, is a rationale for its inclusion provided?

If YES, reference:

9. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters? *No*

If YES, is a rationale for its inclusion provided?

If YES, reference:

10. Can any of the proposed character(s) be considered to be similar (in appearance or function) to, or could be confused with, an existing character? *No*

If YES, is a rationale for its inclusion provided? Minor difference es are clarified in the proposal with visual example

If YES, reference:

11. Does the proposal include use of combining characters and/or use of composite sequences? *Yes*

If YES, is a rationale for such use provided? Ligatures and half character s have been tested for usability

If YES, reference: *On KTSA PROPOSAL*

Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided?

If YES, reference:

12. Does the proposal contain characters with any special properties such as control function or similar semantics? *No*

If YES, describe in detail (include attachment if necessary)

| | |
|---|---|
| 13. Does the proposal contain any Ideographic compatibility characters? | *No* |
| If YES, are the equivalent corresponding unified ideographic characters identified? | |
| If YES, reference: | |