Proposal to Encode the Mundari Bani Script in the Universal Character Set

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1 Introduction

This is a proposal to include the Mundari Bani script in the Universal Character Set (UCS).

2 Background

The Mundari Bani script (Mundari Bani: ᱬᱳᱣᱴᱯᱤᱯᱮ ᱱᱤᱣᱮ; Devanagari: मुंडारी बानी; Bengali: মুন্ডারী বানী; Oriya: ମୁଣ୍ଡାରୀ ବାନି) is used for writing Mundari (ISO 639-3: unr; Mundari Bani: ᱬᱳᱣᱴᱯᱤᱯᱮ; Devanagari: मुंडारी; Bengali: মুন্ডারী; Odiya: ମୁଣ୍ଡାରୀ), an Austroasiatic language spoken by 1.1 million people in India, primarily in the states of Jharkand, West Bengal, and Odisha [4]. Mundari has been written in Devanagari, Bengali script, Odiya script, and Latin script, as well as the script in question here, Mundari Bani, which was was invented by Rohidas Singh Nag (1934 - 2012) in the latter half of the 20th century.

There has been a huge surge of interest in recent years in the script. There are schools teaching Mundari Bani as well as workshops throuhout nearly all Munda-inhabited districts of Odisha, the districts of Jhargam, Purulia, and Medinipur in West Bengal, and the districts Ranchi, East Singhbum, West Singhbum, Saraikela-Kharsawan, and Kunti in Jharkhand. It is estimated that approximately 10% of Mundari speakers can read Mundari Bani.

There is limited information available on Mundari Bani in English. Most of the materials on the script are written in Mundari, Hindi, and Oriya. A number of different organizations and individuals have published primers for the script [7, 9, 10, 12–14] (see Fig. 14). Anthologies of stories and poems have also been published [2, 8]. There are also instructional videos by schools and individuals available on YouTube and Mundari advocacy Facebook groups with content released in Mundari Bani. Five Mundari Bani typefaces were developed by Baidyanath Singh [6] (see Fig. 6 for a comparison between the typefaces).

2.1 Timeline

Rohidas Singh Nag, a writer, poet and community advocate, originally began working on the earliest iteration of the Mundari Bani script in the early 1950s while in grade school. Later, Nag simplified the Mundari Bani script and by the early 1980s began sharing it with others in the Munda community [5]. By 1994 Mundari Bani had spread further throughout Odisha state and in 2004 ten different Mundari Bani schools opened in Odisha. In 2004, the first book written in Mundari Bani, Mundari Bani Hisir, was published under the auspices of Bharat Munda Samaj [13], and was handwritten as there was no typeface available at the time. In 2008, Bharat Munda Samaj and Mundari Samaj Sanwar Jamda, with the collaboration of original script inventor Rohidas Nag, reformed the script, altering some letterforms deemed confusing or hard to read or write, as well as inventing one new basic letter and one new 'Tong' (see §3.10). Additionally, the first Mundari Bani fonts were developed at this time. Since 2008, all (attested) books have been under this new standard, which is the one presented in this proposal.

3 Script Details

3.1 Structure

Mundari Bani is an alphabetic script that is written from left to right. There are no attested ligatures.

The typical didactic presentation of Mundari Bani (see Figs. 1 and 2) is shown with two major sections. The first section is a chart with five rows, where each row's first letter is a vowel, and the letter names for the row match the vowel of the first letter [7, 10, 12, 14]. Note the similarity in this traditional organization and structure to that of the Santali language's Ol Chiki script [1] (see Fig. 5a).

Ɜ O	Ⱨ OP	∩ OL	୪ OY	ꂅ ONG		
Ҙ A	५ AJ	ৡ AB	٩ ANY	୶ AH		
⅄ I	Ⴠ IS	୰ IDD	ⴲ IT	୪ IH		
Ɔ U	℞ UC	୫ UD	⋌ UK	४ UR		
Ɛ E	⋒ ENN	୬ EG	୶ EM	∨ EN	५ ETT	୬ ELL

The second section is a collection of "Tong" (⊕Ɜꂅ) which are a collection of symbols and diacritics who play a secondary role in the script. Depending on the orthographic tradition of the writer, they may use none, some, or all of the "Tong". Note again the similarity to Ol Chiki's modifier letters both in name and in function (see Fig. 5b).

Ȯ	Ọ	Ó	-	Ɛ	Õ
MUHOR	IKIR	TOYOR	ECED	OJOD	SUTUH

3.2 Basic Alphabet

The basic letters of Mundari Bani are enumerated below. In addition, for phonetic clarity, they are compared to Devanagari, Bengali, and Oriya scripts in Fig. 3 and to its phonemic inventory in Fig. 4.

Mundari Bani	Character Name
Ɜ	MUNDARI BANI LETTER O
Ⲏ	MUNDARI BANI LETTER OP
∩	MUNDARI BANI LETTER OL
ප	MUNDARI BANI LETTER OY
e	MUNDARI BANI LETTER ONG
ਤ	MUNDARI BANI LETTER A
ᛘ	MUNDARI BANI LETTER AJ
৪	MUNDARI BANI LETTER AB
գ	MUNDARI BANI LETTER ANY
৶	MUNDARI BANI LETTER AH
ᛟ	MUNDARI BANI LETTER I
ꞓ	MUNDARI BANI LETTER IS
७	MUNDARI BANI LETTER IDD
θ	MUNDARI BANI LETTER IT
४	MUNDARI BANI LETTER IH
Ɔ	MUNDARI BANI LETTER U
ౙ	MUNDARI BANI LETTER UC
Ɛ	MUNDARI BANI LETTER UD
⋀	MUNDARI BANI LETTER UK
৪	MUNDARI BANI LETTER UR
Ɛ	MUNDARI BANI LETTER E
ᨘ	MUNDARI BANI LETTER ENN
৶	MUNDARI BANI LETTER EG
ᴎ	MUNDARI BANI LETTER EM
∨	MUNDARI BANI LETTER EN
प	MUNDARI BANI LETTER ETT
থ	MUNDARI BANI LETTER ELL

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3.3 Muhor

Vowel nasalization is indicated by ◌̐ MUHOR (ᱫᱳᱶᱚᱨ). The sign is written in the top-right corner of the vowel in question. For example, the word ᱫᱳ /mũː/ *nose.* We note that unifying this with COMBINING DOT ABOVE RIGHT would not be appropriate as 2004-style ◌̐ MUHOR takes on an open circle shape rather than a dot (see §3.10).

Mundari Bani	Character Name
◌̐	MUNDARI BANI SIGN MUHOR

3.4 Toyor

The ◌́ TOYOR (ᱴᱳᱭᱳᱨ) indicates a long vowel. For example, ᱳ /u/ vs ᱳ́ /uː/. Use of TOYOR depends on the orthographic tradition of the writer and the lack of TOYOR does not necessarily imply a short vowel. The word 'Mundari' for example, can be seen both as ᱫᱳᱶᱱᱮᱨᱤ and as ᱫᱳᱶᱚᱱᱮᱨᱤ depending on the text in question.

Mundari Bani	Character Name
◌́	MUNDARI BANI SIGN TOYOR

3.5 Ikir

The ◌̥ IKIR (ᱤᱠᱤᱨ) is used to represent that a vowel is preceded by the /w/ sound [10, Pg. 15]. For example, ᱟ /a/ versus ᱟ̥ /wa/.

Mundari Bani	Character Name
◌̥	MUNDARI BANI SIGN IKIR

3.6 Ojod

The ꫢ ojod (ꓱꓵꓔꫢ) has different uses depending on author, or may not be used at all. In Mundari phonology, word-final /b/ and /d/ take on their so-called 'checked' forms [4], which can be indicated in writing using ojod. It generally immediately precedes the ꕁ ab or ꫢ ud that it is to affect. For example, Singh [12] has the word ꓵꫢꕊꕟꫢꕁ *scissors* (see Fig. 14), which in Singh [7] is spelled without ojod as ꓵꫢꕊꕟꕁ.

Some sources also use ojod to indicate consonant gemination in close-transcription of neighboring Indo-Aryan languages such as Hindi or Oriya, giving examples such as ꕉ ꫢꕊꓱ *bbo*, ꕀ ꫢꫢꓴꓱ *ddho*, and ꕘ ꫢꕟꓱ *jjo* [14] (see Fig. 13 for more such examples).

Note that while ꫢ ojod and ꫢ ud may have shapes reminiscent of each other to someone unfamiliar with the script, they are entirely distinct graphemes. Note also that the glyphic variant of ꫢ ojod present in Fig. 2, ꓱ, is also well attested in recent (post-2008) texts.

Mundari Bani	Character Name
ꫢ	MUNDARI BANI SIGN OJOD

3.7 Sutuh

The ◌̃ sutuh (ꓴꓔꕌꓴꕁ) is applied to existing letters of the alphabet to derive new sounds. It can be applied to both vowels and consonants and is used most often for close transcription of neighboring Indo-Aryan languages (see Fig. 12). For example, ũ ⟨is, sutuh⟩ can be used to transliterate Devanagari ष़, Bengali ষ়, and Oriya ଷ଼. Note that unifying this with combining tilde would not be appropriate as 2004-style ◌̃ sutuh takes on a "seagull" shape[1] rather than a tilde (see §3.10).

Mundari Bani	Character Name
◌̃	MUNDARI BANI SIGN SUTUH

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[1]The shape of ◌̃ sutuh in 2004-style is similar to ◌̼ U+033C combining seagull below except located above the base rather than below.

3.8 Digits

There is a full set of decimal digits (ᴎᴇᴠᴇ𐰴ꢢ): **0** ᴢᴇʀᴏ, **I** ᴏɴᴇ, **L** ᴛᴡᴏ, **Z** ᴛʜʀᴇᴇ, **ᴍ** ꜰᴏᴜʀ, **ᴣ** ꜰɪᴠᴇ, **Γ** sɪx, **ᴨ** sᴇᴠᴇɴ, **ᴑ** ᴇɪɢʜᴛ, **7** ɴɪɴᴇ. While some publications and people use the native digits, others may use digits from Latin, Devanagari, Bengali, or Oriya depending upon author preference (Note Mundari Bani verse numbers in Fig. 9 and Mundari Bani page numbers in Fig. 8, but European-style page numbers in Figs. 7, 12 and 17). The following table compares against Devanagari, Bengali, and Oriya digits:

Mundari Bani	Character Name	Deva	Beng	Orya
0	MUNDARI BANI DIGIT ZERO	०	০	୦
I	MUNDARI BANI DIGIT ONE	१	১	୧
L	MUNDARI BANI DIGIT TWO	२	২	୨
Z	MUNDARI BANI DIGIT THREE	३	৩	୩
ᴍ	MUNDARI BANI DIGIT FOUR	४	৪	୪
ᴣ	MUNDARI BANI DIGIT FIVE	५	৫	୫
Γ	MUNDARI BANI DIGIT SIX	६	৬	୬
ᴨ	MUNDARI BANI DIGIT SEVEN	७	৭	୭
ᴑ	MUNDARI BANI DIGIT EIGHT	८	৮	୮
7	MUNDARI BANI DIGIT NINE	९	৯	୯

3.9 Punctuation

European-style punctuation is used, as in English including ꜰᴜʟʟ sᴛᴏᴘ, ᴄᴏᴍᴍᴀ, ᴇxᴄʟᴀᴍᴀᴛɪᴏɴ ᴍᴀʀᴋ, ǫᴜᴇsᴛɪᴏɴ ᴍᴀʀᴋ, ʜʏᴘʜᴇɴ-ᴍɪɴᴜs and "quotes above".

3.9.1 Eced

The - ᴇᴄᴇᴅ (ᴇᴋᴇᴠ) is used for marking compound verbs [4, Pg. 74], reduplicative expressives [4, Pg. 103], and other such constructions. Examples include ᴇꢂꢢ-ꢢᴎꙅ *mother-father*, the compound verb constructions ᴴꢢᴎ-ᴠꙅ *to eat and drink* and ꙅᴨ-ꮛꢢꙅꢶ *to be able to write*, and the reduplicative expressive ᴴꢢꮛꢢᴇ-ᴴꢢꮛꢢᴇ *glittering in the sun* [13, Pg. 32]. ᴇᴄᴇᴅ can be represented by either U+002D ʜʏᴘʜᴇɴ-ᴍɪɴᴜs or U+2010 ʜʏᴘʜᴇɴ.

3.10   Historical Forms

Mundari Bani possesses some glyphic variants that are resultant of a script reform in 2008. Prior to the reform, neither letter ᱭ ᴇɴɴ nor ◌ ɪᴋɪʀ existed. The reform also fundamentally changed the basic shapes of ᱷ ᴏᴘ, ᱹ ᴏʟ, ᱻ ɪ, and ᱝ ᴜᴋ to unrecognizably different forms. Additionally, the glyphs of ◌ ᴍᴜʜᴏʀ and ◌̃ ꜱᴜᴛᴜʜ were modified, and many other letters were relatively minorly adjusted typographically. See Figs. 17 to 19 for examples and further details. We *do not* recommend disunifying the pre- and post-reform letters, and consider them mere variants. Modern users are unlikely to want to type in this pre-reform style, but if they wish to, a pre-reform font would be the appropriate way to achieve this.

For each letter or mark in modern Mundari Bani, the below chart gives an example word from the first Mundari Bani book, Mundari Bani Hisir [13], published in 2004, as well as a rendering in modern print (see §2.1 for history of the script). The letter or mark being analyzed is highlighted in *red* if the glyph has changed to a very significant degree, in *violet* if the glyph has changed in a minor way, and in *blue* if the glyph hasn't meaningfully changed since 2004. If the letter or mark did not exist in 2004, it is marked as such.

Letter		2004-Style Example	Modern Print
Ȝ	O		Ȝ
ᱷ	OP		ᱷ
ᱹ	OL		ᱹ
ᱝ	OY		ᱝ
e	ONG		e
ᱝ	A		ᱝ
ᱚ	AJ		ᱚ
᱾	AB		᱾
ᱤ	ANY		ᱤ
ᱸ	AH		ᱸ
ᱻ	I		ᱻ
ᱲ	IS		ᱲ
ᱨ	IDD		ᱨ
ᱴ	IT		ᱴ

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Letter		2004-Style Example	Modern Print
४	IH	४३´	४३´
ͻ	U	ͻ੧	੧ͻ
౼	UC	౼౩੧	౼౩੧
੬	UD	੬౩´	੬౩´
⅄	UK	⅄౩੬	⅄౩੬
੪	UR	੪౩´	੪౩´
౩	E	४౩౩੪	౩౩४੪
൜	ENN	N/A	
੪	EG	੪౩੧	੪౩੧
ൠ	EM	ൠ౩´	ൠ౩´
⋁	EN	⋁ͻ´	⋁ͻ´
੫	ETT	੫౩੧	੫౩੧
੨	ELL	४౩੨౩´	੪౩੨౩
○̇	MUHOR	⅄౩°	⅄౩˙
○́	TOYOR	੨´	੨´
○̥	IKIR	N/A	
-	ECED	੫౩ൠ-੪౼	੫౩ൠ-੪౼
੬	OJOD	౩੬੬	౩੬੬
○̃	SUTUH	੩̃ , ⃰౪४౩	੩̃ , ⃰౪४౩

3.11 Character Names

The characters are named in accordance with their traditional names, and are romanized so that the vowels ౩, ੪, ੪, ͻ, ౩ are romanized O, A, I, U, E respectively. All the consonants are romanized to match the customary name, while matching UCS conventions. For example, ൜ has the name ENN since it has the sound of ण DEVANAGARI LETTER NNA. The exception to this is ੧ AH which has a glottal stop sound and is generally transliterated into Devanagari using visarga.

3.12 Collation

Mundari Bani does not seem to have a consensus collation order, but native readers would likely expect a lexicographic order which matches with the typical didactic order (which is emulated in the code charts). This would require that the letters (basic alphabet and ꓕ OJOD) have primary weight and the combining characters have secondary weight.

3.13 Unicode Data

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1E4D0;MUNDARI BANI LETTER O;Lo;0;L;;;;;N;;;;;
1E4D1;MUNDARI BANI LETTER OP;Lo;0;L;;;;;N;;;;;
1E4D2;MUNDARI BANI LETTER OL;Lo;0;L;;;;;N;;;;;
1E4D3;MUNDARI BANI LETTER OY;Lo;0;L;;;;;N;;;;;
1E4D4;MUNDARI BANI LETTER ONG;Lo;0;L;;;;;N;;;;;
1E4D5;MUNDARI BANI LETTER A;Lo;0;L;;;;;N;;;;;
1E4D6;MUNDARI BANI LETTER AJ;Lo;0;L;;;;;N;;;;;
1E4D7;MUNDARI BANI LETTER AB;Lo;0;L;;;;;N;;;;;
1E4D8;MUNDARI BANI LETTER ANY;Lo;0;L;;;;;N;;;;;
1E4D9;MUNDARI BANI LETTER AH;Lo;0;L;;;;;N;;;;;
1E4DA;MUNDARI BANI LETTER I;Lo;0;L;;;;;N;;;;;
1E4DB;MUNDARI BANI LETTER IS;Lo;0;L;;;;;N;;;;;
1E4DC;MUNDARI BANI LETTER IDD;Lo;0;L;;;;;N;;;;;
1E4DD;MUNDARI BANI LETTER IT;Lo;0;L;;;;;N;;;;;
1E4DE;MUNDARI BANI LETTER IH;Lo;0;L;;;;;N;;;;;
1E4DF;MUNDARI BANI LETTER U;Lo;0;L;;;;;N;;;;;
1E4E0;MUNDARI BANI LETTER UC;Lo;0;L;;;;;N;;;;;
1E4E1;MUNDARI BANI LETTER UD;Lo;0;L;;;;;N;;;;;
1E4E2;MUNDARI BANI LETTER UK;Lo;0;L;;;;;N;;;;;
1E4E3;MUNDARI BANI LETTER UR;Lo;0;L;;;;;N;;;;;
1E4E4;MUNDARI BANI LETTER E;Lo;0;L;;;;;N;;;;;
1E4E5;MUNDARI BANI LETTER ENN;Lo;0;L;;;;;N;;;;;
1E4E6;MUNDARI BANI LETTER EG;Lo;0;L;;;;;N;;;;;
1E4E7;MUNDARI BANI LETTER EM;Lo;0;L;;;;;N;;;;;
1E4E8;MUNDARI BANI LETTER EN;Lo;0;L;;;;;N;;;;;
1E4E9;MUNDARI BANI LETTER ETT;Lo;0;L;;;;;N;;;;;
1E4EA;MUNDARI BANI LETTER ELL;Lo;0;L;;;;;N;;;;;
1E4EB;MUNDARI BANI SIGN OJOD;Lm;0;L;;;;;N;;;;;
1E4EC;MUNDARI BANI SIGN MUHOR;Mn;232;NSM;;;;;N;;;;;
1E4ED;MUNDARI BANI SIGN TOYOR;Mn;232;NSM;;;;;N;;;;;
1E4EE;MUNDARI BANI SIGN IKIR;Mn;220;NSM;;;;;N;;;;;
1E4EF;MUNDARI BANI SIGN SUTUH;Mn;230;NSM;;;;;N;;;;;
1E4F0;MUNDARI BANI DIGIT ZERO;Nd;0;L;;0;0;0;N;;;;;
1E4F1;MUNDARI BANI DIGIT ONE;Nd;0;L;;1;1;1;N;;;;;
1E4F2;MUNDARI BANI DIGIT TWO;Nd;0;L;;2;2;2;N;;;;;
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1E4F3;MUNDARI BANI DIGIT THREE;Nd;0;L;;3;3;3;N;;;;;
1E4F4;MUNDARI BANI DIGIT FOUR;Nd;0;L;;4;4;4;N;;;;;
1E4F5;MUNDARI BANI DIGIT FIVE;Nd;0;L;;5;5;5;N;;;;;
1E4F6;MUNDARI BANI DIGIT SIX;Nd;0;L;;6;6;6;N;;;;;
1E4F7;MUNDARI BANI DIGIT SEVEN;Nd;0;L;;7;7;7;N;;;;;
1E4F8;MUNDARI BANI DIGIT EIGHT;Nd;0;L;;8;8;8;N;;;;;
1E4F9;MUNDARI BANI DIGIT NINE;Nd;0;L;;9;9;9;N;;;;;
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	1E4D	1E4E	1E4F
0	Ʒ 1E4D0	٢ 1E4E0	0 1E4F0
1	Ⱨ 1E4D1	Ⴧ 1E4E1	I 1E4F1
2	∩ 1E4D2	Λ 1E4E2	L 1E4F2
3	੪ 1E4D3	⅙ 1E4E3	Z 1E4F3
4	℮ 1E4D4	Ɛ 1E4E4	M 1E4F4
5	℈ 1E4D5	ɯ 1E4E5	⊇ 1E4F5
6	Ⴗ 1E4D6	೮ 1E4E6	Γ 1E4F6
7	℘ 1E4D7	ฦ 1E4E7	⌐ 1E4F7
8	ꝗ 1E4D8	V 1E4E8	∟ 1E4F8
9	℈ 1E4D9	Ꮄ 1E4E9	7 1E4F9
A	℈ 1E4DA	ൃ 1E4EA	
B	ઘ 1E4DB	ℰ 1E4EB	
C	౧ 1E4DC	◌̇ 1E4EC	
D	ϑ 1E4DD	◌́ 1E4ED	
E	Ȣ 1E4DE	◌̇ 1E4EE	
F	Ɔ 1E4DF	◌̃ 1E4EF	

Letters

1E4D0 Ʒ MUNDARI BANI LETTER O
1E4D1 Ⱨ MUNDARI BANI LETTER OP
1E4D2 ∩ MUNDARI BANI LETTER OL
1E4D3 ੪ MUNDARI BANI LETTER OY
1E4D4 ℮ MUNDARI BANI LETTER ONG
1E4D5 ℈ MUNDARI BANI LETTER A
1E4D6 Ⴗ MUNDARI BANI LETTER AJ
1E4D7 ℘ MUNDARI BANI LETTER AB
1E4D8 ꝗ MUNDARI BANI LETTER ANY
1E4D9 ℈ MUNDARI BANI LETTER AH
1E4DA ℈ MUNDARI BANI LETTER I
1E4DB ઘ MUNDARI BANI LETTER IS
1E4DC ౧ MUNDARI BANI LETTER IDD
1E4DD ϑ MUNDARI BANI LETTER IT
1E4DE Ȣ MUNDARI BANI LETTER IH
1E4DF Ɔ MUNDARI BANI LETTER U
1E4E0 ٢ MUNDARI BANI LETTER UC
1E4E1 Ⴧ MUNDARI BANI LETTER UD
1E4E2 Λ MUNDARI BANI LETTER UK
1E4E3 ⅙ MUNDARI BANI LETTER UR
1E4E4 Ɛ MUNDARI BANI LETTER E
1E4E5 ɯ MUNDARI BANI LETTER ENN
1E4E6 ೮ MUNDARI BANI LETTER EG
1E4E7 ฦ MUNDARI BANI LETTER EM
1E4E8 V MUNDARI BANI LETTER EN
1E4E9 Ꮄ MUNDARI BANI LETTER ETT
1E4EA ൃ MUNDARI BANI LETTER ELL

Tong

1E4EB ℰ MUNDARI BANI SIGN OJOD
1E4EC ◌̇ MUNDARI BANI SIGN MUHOR
1E4ED ◌́ MUNDARI BANI SIGN TOYOR
1E4EE ◌̇ MUNDARI BANI SIGN IKIR
1E4EF ◌̃ MUNDARI BANI SIGN SUTUH

Digits

1E4F0 0 MUNDARI BANI DIGIT ZERO
1E4F1 I MUNDARI BANI DIGIT ONE
1E4F2 L MUNDARI BANI DIGIT TWO
1E4F3 Z MUNDARI BANI DIGIT THREE
1E4F4 M MUNDARI BANI DIGIT FOUR
1E4F5 ⊇ MUNDARI BANI DIGIT FIVE
1E4F6 Γ MUNDARI BANI DIGIT SIX
1E4F7 ⌐ MUNDARI BANI DIGIT SEVEN
1E4F8 ∟ MUNDARI BANI DIGIT EIGHT
1E4F9 7 MUNDARI BANI DIGIT NINE

ᱛᱳᱣᱴᱹᱨᱵᱽ ᱵᱹᱣᱽ (মুন্ডারি বানি) MUNDARI BANI

(অ) **O**	(অপ্) **OP**	(অল্) **OL**	(অয়) **OY**	(অং) **ONG**		
(আ) **AA**	(আজ্) **AAJ**	(আব্) **AAB**	(আয়্) **AAY**	(আঃ) **AAH**		
(ই) **II**	(ইস্) **IIS**	(ইড়্) **IID**	(ইত্) **IIT**	(ইহ্) **IIH**		
(উ) **U**	(উচ্) **UCH**	(উদ্) **UD**	(উক্) **UK**	(উর্) **UR**		
(এ্যা) **E**	(এ্যাণ্) **EN**	(এ্যাগ্) **EG**	(এ্যাম্) **EM**	(এ্যান্) **EN**	(এ্যাট্) **ET**	(এ্যাড়্) **ERR**

ᱛᱳᱣ (তং) Tong

·	´	˙	ᱫ
মুঁহর	তয়র্	ইকির্	অজদ্
Muhor	**Toyor**	**Ikir**	**Ojod**

ᱞᱮᱱᱮᱠᱳ (লেনেকা) Leneka

0	I	L	Z	M	2	Γ	ᖚ	ᐰ	7	IO
শুন্	মদ্	বার্	আপি	উপুন	মনে	তুরি	এয়া	ইরাল	আরে	গেল্
Sun	**Mod**	**Bar**	**Api**	**Upun**	**Mone**	**Turi**	**Eya**	**Iral**	**Aare**	**Gel**

Figure 1: Mundari Bani–Bengali Alphabet Correspondence, provided by Bharat Munda Samaj

मुनडारी लिपी

अ	अप्	अल्	अय्	अं		
आ	आज़	आब्	आज़	आ :		
इ	इस्	इड्	इत्	इह्		
उ	उच्	उद्	उक्	उर्		
ए	एण्	एग्	एम्	एन्	एट्	एल्

तोड्

मुँहर तोड्	तोयोर् तोड्	इकीर् तोड्	ओजोद् तोड्

मुनडारी संख्या

0	I	L	Z	M	ᘓ	Γ	ᘀ	ᒾ	ᒻ	10
०	१	२	३	४	५	६	७	८	९	१०
शून	मोद्	बार्	आपी	उपुन्	मोणे	तुरी	एया	इराल्	आरे	गेल

3
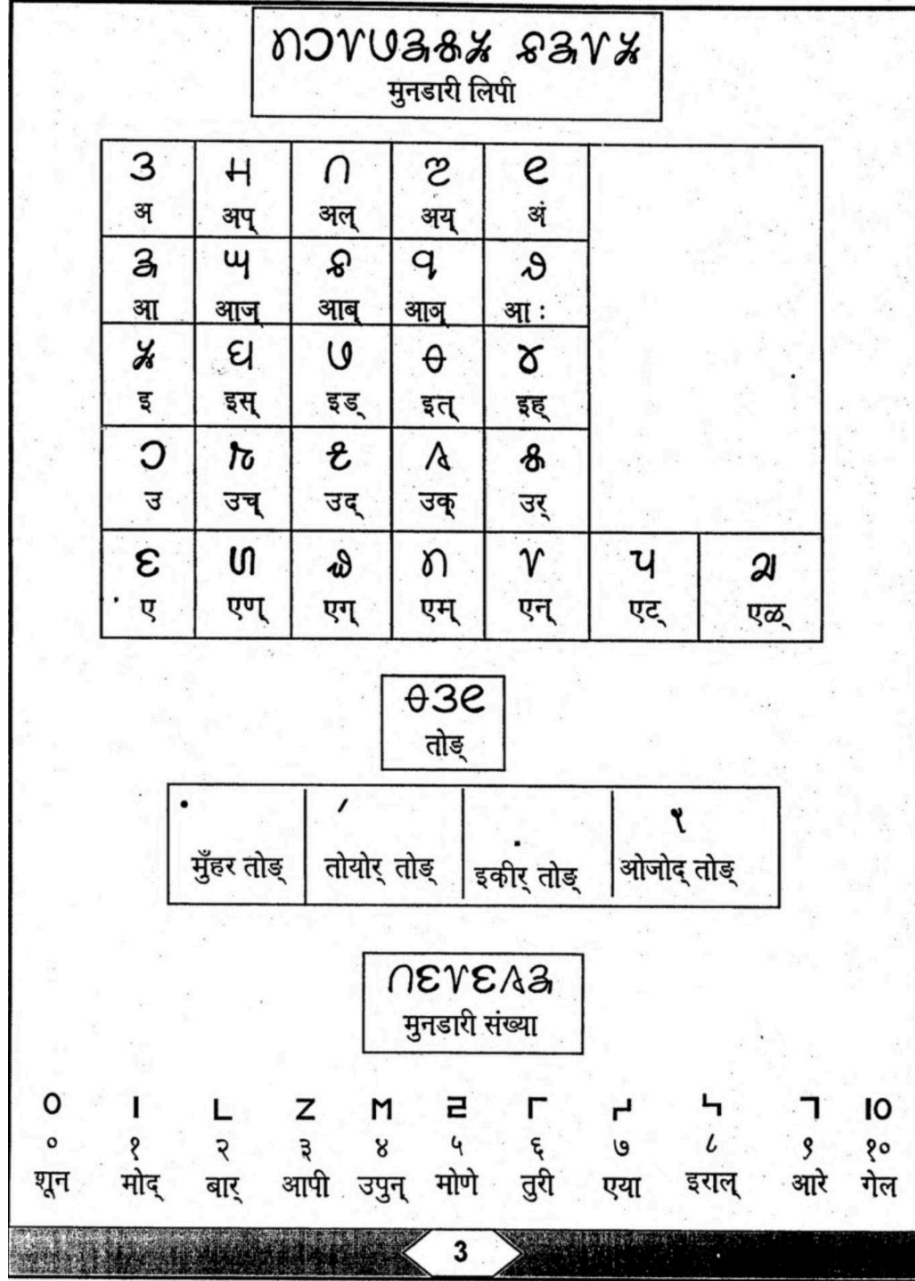
Figure 2: Mundari Bani–Devanagari Alphabet Correspondence [9]

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		Deva	Beng	Orya
Ɬ	O	अ	অ	ଅ
ꞥ	OP	अप्	অপ্	ଅପ୍
ꞯ	OL	अल्	অল্	ଅଲ୍
ꞵ	OY	अय्	অয্	ଅୟ୍
ꞿ	ONG	अं	অং	ଅଂ
ꞩ	A	आ	আ	ଆ
ꞧ	AJ	आज्	আজ্	ଆଜ୍
ꞟ	AB	आब्	আব্	ଆବ୍
ꞟ	ANY	आञ्	আঞ্	ଆଙ୍
ꞟ	AH	आः	আঃ	ଆଃ
ꞣ	I	इ	ই	ଇ
ꞩ	IS	इस्	ইস্	ଇସ୍
Ꭓ	IDD	इड्	ইড্	ଇଡ୍
ꞥ	IT	इत्	ইত্	ଇଟ୍
ꞩ	IH	इह्	ইহ্	ଇହ୍
ꞯ	U	उ	উ	ଉ
ꞩ	UC	उच्	উচ্	ଉଚ୍
ꞩ	UD	उद्	উদ্	ଉଦ୍
ꞩ	UK	उक्	উক্	ଉକ୍
ꞩ	UR	उर्	উর্	ଉର୍
�epsilon	E	ए	এ	ଏ
ꞩ	ENN	एण्	এণ্	ଏଣ୍
ꞩ	EG	एग्	এগ্	ଏଗ୍
ꞩ	EM	एम्	এম্	ଏମ୍
V	EN	एन्	এন্	ଏନ୍
ꞩ	ETT	एट्	এটে	ଏଟ୍
ꞩ	ELL	एल्	এড়	ଏଳ୍

Figure 3: Transliteration of the basic Mundari Bani letter names into the other common scripts used in the writing of Mundari: Devanagari, Bengali, and Oriya.

Ȝ /o/	ꚱ /p/	∩ /l/	ꙅ /y/	ꬲ /ŋ/		
ꙉ /a/	Ꮞ /j/	ꙸ /b/	� /ñ/	ꙡ /ʔ/		
ꙥ /i/	ꙃ /s/	ꙍ /ḍ/	ꙫ /t/	ꚉ /h/		
Ɔ /u/	ꚍ /c/	ꙫ /d/	ꙩ /k/	ꙸ /r/		
Ɛ /e/	ꙏ /ŋ/	ꙸ /g/	ꙉ /m/	Ꮩ /n/	ꚑ /ʈ/	ꙇ /ɽ/

Figure 4: A (nearly) one-to-one mapping between Osada [3]'s analysis of the Mundari phonemic inventory and the basic Mundari Bani alphabet. Only the phoneme /w/ is missing, which is represented in Mundari Bani as ♀ ɪᴋɪʀ. Note that Osada [3] does not consider vowel nasalization, vowel length, or word-final 'checking' of /b/ and /d/ to be phonemic distinctions.

O	OP	OL	OY	ONG		
A	AJ	AB	ANY	AH		
I	IS	IDD	IT	IH		
U	UC	UD	UK	UR		
E	ENN	EG	EM	EN	ETT	ELL

LA	AT	AG	ANG	AL
LAA	AAK	AAJ	AAM	AAW
LI	IS	IH	INY	IR
LU	UC	UD	UNN	UY
LE	EP	EDD	EN	ERR
LO	OTT	OB	OV	OH

(a) Both Ol Chiki and Mundari Bani are organized in similar, grid-style charts where each row begins with a vowel letter and all consonant members of a row have a name starting on a matching vowel. Though past this organizational resemblance, there is little graphical similarity in the basic alphabet of each. The primarily apparent parallels are the very similar glyphs for ꝗ ANY and ꝗ INY as well as the way that letters ꝱ A / ꝳ LAA are graphically derived from Ɔ O / ꝴ LA through the addition of a rightward-then-downward stroke.

MUHOR		MU TTUDDAG	
IKIR		GAAHLAA TTUDDAAG	
TOYOR		MU-GAAHLAA TTUDDAAG	
ECED		RELAA	
OJOD		PHAARKAA	
SUTUH		AHAD	

(b) The extended marks (called 'Tong' in Mundari Bani) have a very significant number of parallels in form and function between the two scripts. MUHOR and MU TTUDDAG have a very similar name and form, and an identical function (nasalization). Both OJOD and AHAD have very similar names, letter-like shapes, and nearly identical function (marking glottalization / 'checking' of certain stop consonants). We note that while the Ol Chiki block encodes PHAARKAA, we propose Mundari Bani's ECED to instead be represented with existing encoded characters (see §3.9.1). We note that the remaining similar marks between these scripts differ in being combining marks versus modifier letters respectively.

Figure 5: A side-by-side comparing Ol Chiki to Mundari Bani. Both are unicameral scripts for related Munda family languages with a very reminiscent organizational style.

Left table:

	(a)	(b)	(c)	(d)	(e)
O	ꡠ	ꡠ	ꡠ	ꡠ	ꡠ
OP					
OL					
OY					
ONG	e	e	e	e	e
A					
AJ					
AB					
ANY					
AH					
I					
IS					
IDD					
IT					
IH					
U					
UC					
UD					
UK					
UR					
E					
ENN					
EG					
EM					
EN	V	V	V	V	V
ETT					
ELL					
MUHOR					
IKIR					
TOYOR					
ECED	-	-	-	-	-
OJOD					

Right table:

	(a)	(b)	(c)	(d)	(e)
ZERO	0	0	0	0	0
ONE	I	I	I	I	I
TWO	L	L	L	L	L
THREE	Z	Z	Z	Z	Z
FOUR	M	M	M	M	M
FIVE	ꝛ	ꝛ	ꝛ	ꝛ	ꝛ
SIX	Γ	Γ	Γ	Γ	Γ
SEVEN	ꝛ	ꝛ	ꝛ	ꝛ	ꝛ
EIGHT	ꝛ	ꝛ	ꝛ	ꝛ	ꝛ
NINE	7	7	7	7	7

Figure 6: Side-by-side comparison of all five Mundari Bani typefaces released by Baidyanath Singh in 2008 [6]. (a) Mundari Lipi Arial (b) Mundari Lipi (c) Mundari Lipi Standard (d) Mundari Lipi JagaMohan (e) Mundari Lipi Stoneage. We note that the ommission of õ SUTUH is intentional, as these fonts *do not* currently contain it.

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Figure 7: Excerpt from student's notes, titled ꯱꯭ꯅ꯯ꯗꯪ ꯅꯑꯨꯛꯞ ꯅꯑꯁꯗꯪ, about Indian tribal freedom fighter Birsa Munda. Provided by Nandalal Singh, president of Mundari Samaj Sanwar Jamda.

"ଇକିର୍ ଟ"ର ବ୍ୟବହାର

"ଡ଼" ଫଳା ପାଇଁ (.) "ଇକିର୍ ଟ" କୁ ବ୍ୟବହାର କରାଯାଏ । ଏହାକୁ ଓ,

ଆ, ଉ, ୁ, ଏ ଆଦି ସ୍ୱରବର୍ଣ୍ଣ ସହିତ ବ୍ୟବହାର କରାଯାଏ ।

ଯେପରିକି :-

ଓ	ଆ	ଉ	ୁ	ଏ
କ୍	କ୍	କ୍	କ୍	କ୍

"ଅଜଦ୍ ଟ"ର ବ୍ୟବହାର

(ମୁଣ୍ଡାରୀ ବର୍ଣ୍ଣମାଳା) ରେ ଦୁଇଟି ଅର୍ଦ୍ଧ ଉଚ୍ଚାରିତ

ଅକ୍ଷର ରହିଛି । ସେ ଦୁଇଟି ହେଉଛି :- ଏବଂ ।

- ଏହା ସମ୍ପୂର୍ଣ୍ଣ 'ବ୍' ନୁହେଁ ।

- ଏହା ସମ୍ପୂର୍ଣ୍ଣ 'ଦ୍' ନୁହେଁ ।

ଏମାନଙ୍କୁ ସମ୍ପୂର୍ଣ୍ଣ 'ବ୍' ଏବଂ 'ଦ୍' କରିବା ପାଇଁ କୁ ବ୍ୟବହାର କରାଯାଏ ।

- ଏହା ସମ୍ପୂର୍ଣ୍ଣ 'ବ୍' ଅଟେ ।

- ଏହା ସମ୍ପୂର୍ଣ୍ଣ 'ଦ୍' ଅଟେ ।

୧୨

Figure 8: Excerpt from ଚଟଜୀନ୍ଦ ନଟ ଏଦ଼ଟ ମୁଣ୍ଡାରୀ ବାନୀ ଟୁଣ୍ [10, Pg. 15] showing another common glyphic variation of OJOD, ୧. Note that in this presentation, OJOD is said to follow rather than precede the letter it is to affect. Additionally, this contains a Mundari Bani page number: ୧୨ (15).

Figure 9: Excerpt from Mundari Gaumuidi Hamar (ᱱᱳᱣᱶᱬᱩᱥ ᱶᱱᱳᱭᱬᱩ ᱨᱬᱱᱬᱥ)
[8, Pg. 4]. Circled in red is an instance of ᱤKIR, and in blue are instances of
TOYOR.

Figure 10: Excerpt from ᱳᱞᱟ � ᱞᱟᱨᱟᱣᱡᱟᱢ (Seven New Mundari Stories) [2, Pg. 2].
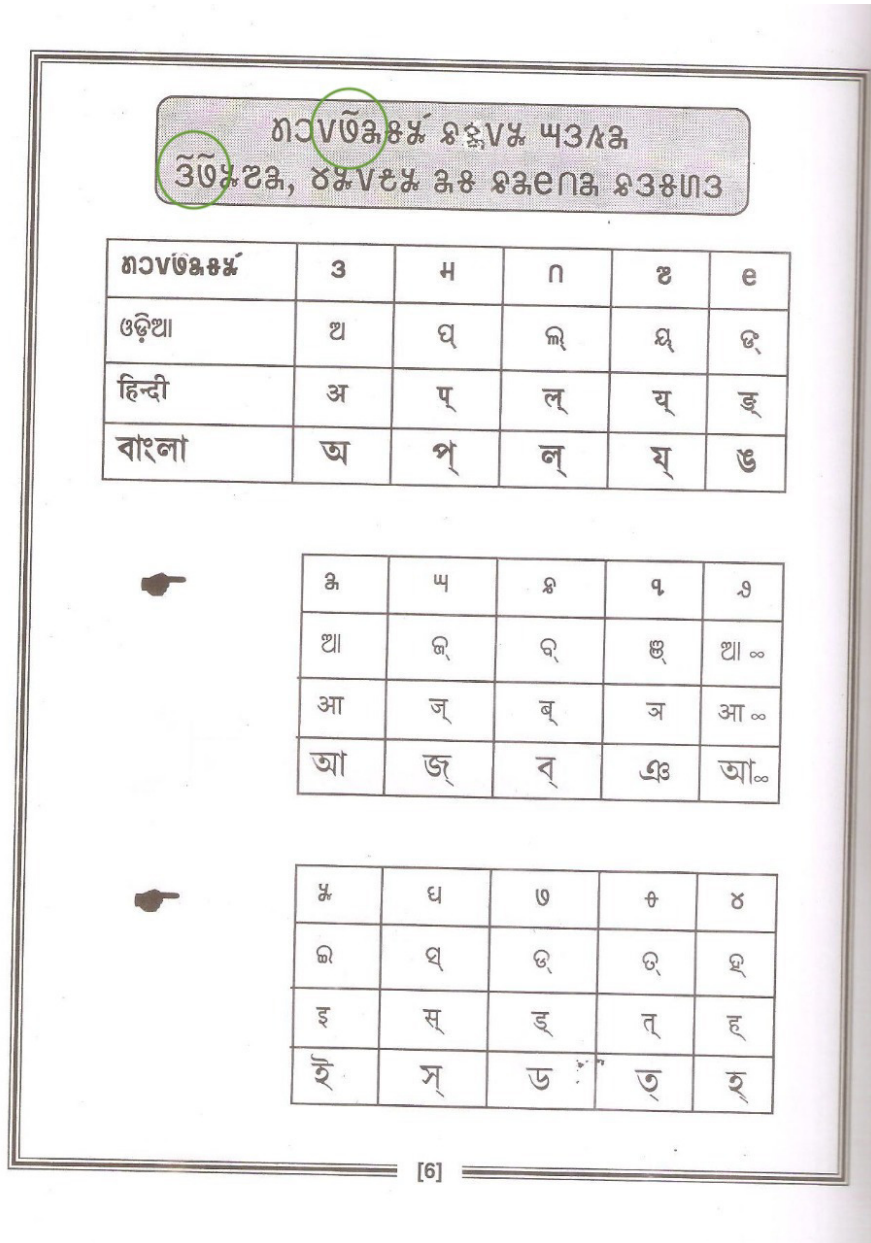
Figure 11: Excerpt from Bani Upurum (ᱥᱛᱣᱹ ᱚᱢᱚᱠᱚᱱ) [12, Pg. 6], titled ᱬᱚᱣᱴᱹᱨᱹᱴ ᱥᱛᱣᱹ ᱩᱹᱛᱚᱨ ᱛᱴᱹᱥᱴᱹ, ᱥᱹᱣᱹᱹ, ᱹᱴ ᱥᱹᱹᱱᱹ ᱥᱛᱴᱤᱛ. Circled in green are instances of Õ sutuh.
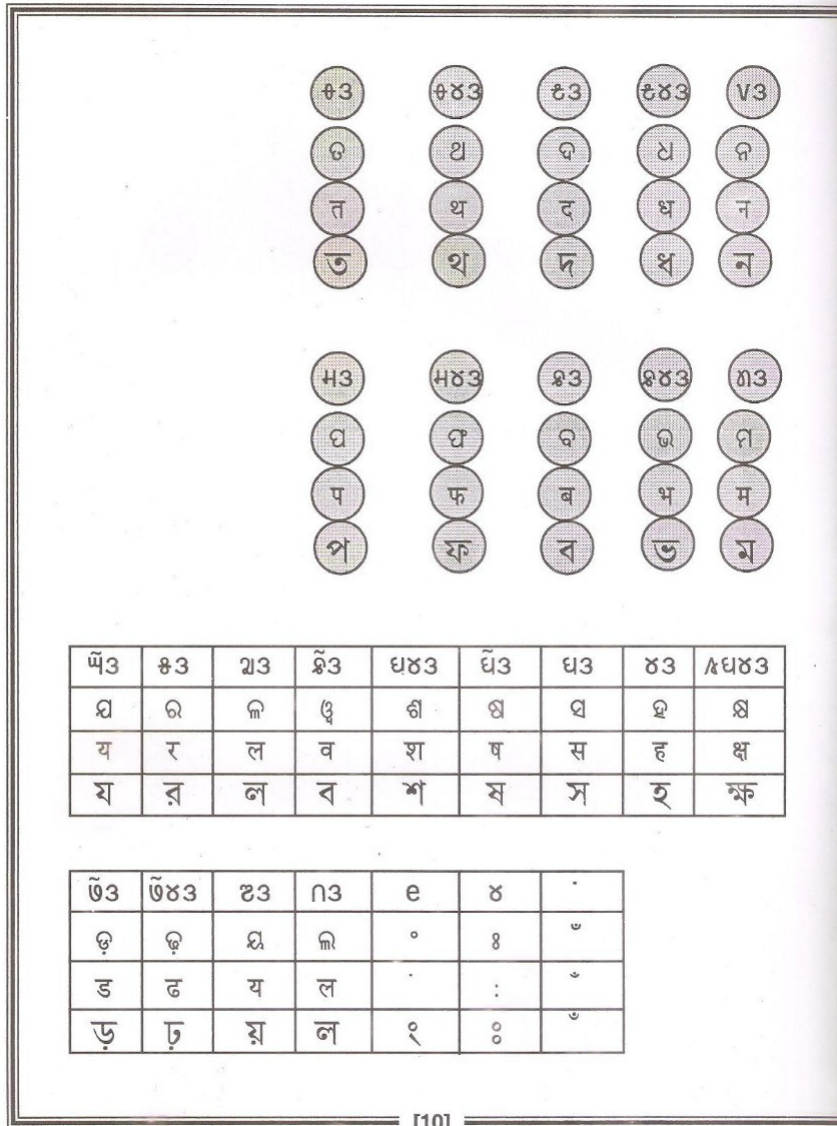
Figure 12: Excerpt from Bani Upurum (ଶ୍ରୀୟୁକ ଠାଠଉକଠଣ) [12, Pg. 10], showing examples of $\tilde{\circ}$ sutuh being used to closely represent sounds from neighboring Indo-Aryan languages.

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Figure 13: Excerpt from Bani Upurum (ꯕꯅꯤ ꯎꯄꯨꯔꯝ) [12, Pg. 15], showing examples of ꯭ ojod being used to express consonant gemination.

Figure 14: Excerpt from Bani Upurum (ᱥᱟᱱᱟᱢ ᱚᱢᱚᱠᱚᱱ) [12, Pg. 19] on the letter ᱧ OL. Circled in pink are instances of ᱮ OJOD.
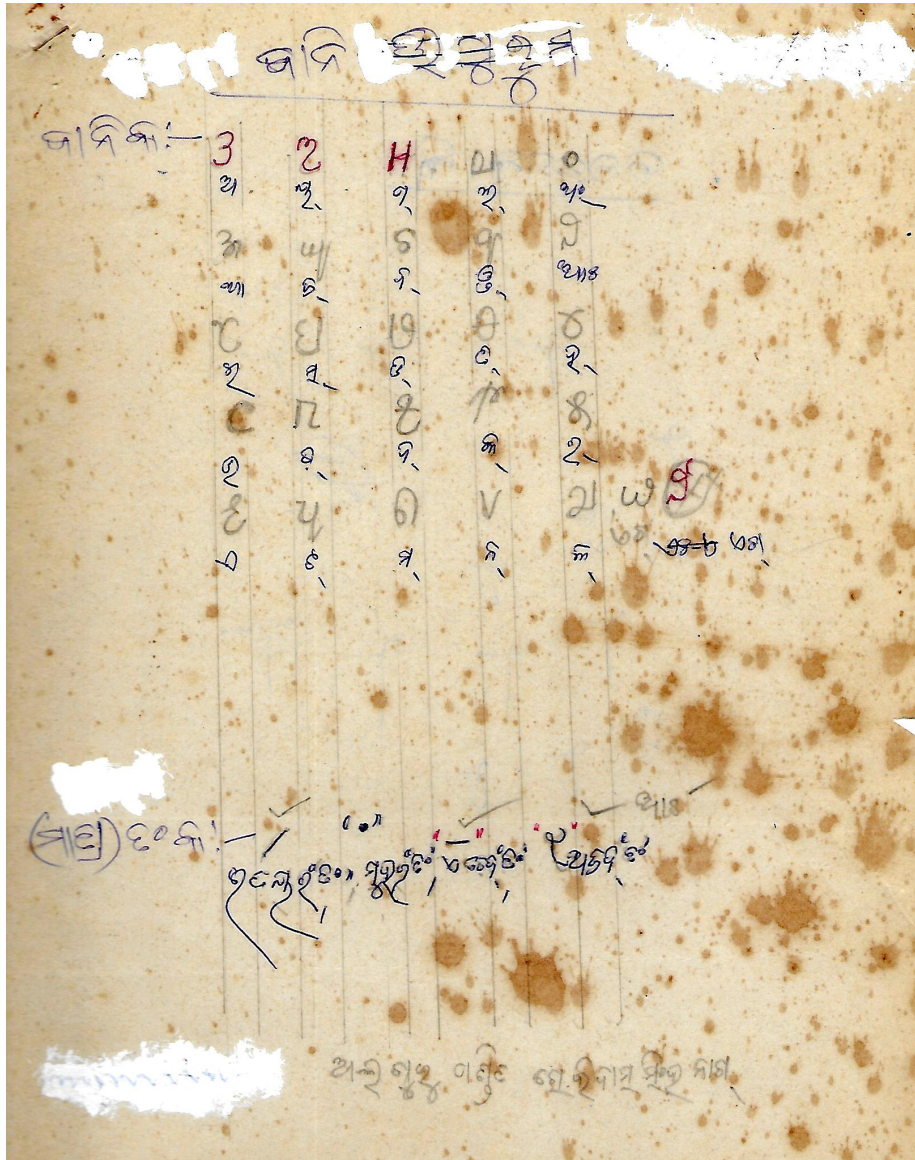
Figure 15: Original manuscript, dated July 10th 1982, by script creator, Ol Guru Rohidas Singh Nag, showing an earlier iteration of Mundari Bani, a predecessor to the pre-reform style shown in Figs. 17 to 19 and §3.10.

ତବେ ଜାଗାରରେୟାଃ ନାରାଦୁରା ଦିଆଁତେ ଶ୍ରୀୟୁକ୍ତ ରୋହିଦାସ ସିଂହ ନାଗ ତାକିନ ୧୯୮୨ ମସିହା ଲଃତେ "ମୁଣ୍ଡାରୀ ବାନି" ମେନ୍ତେ ମୁଣ୍ଡାରୀ ଜାଗାର ନାଗେନ୍ତେ ଲିପି (ଲିପି) ସିର୍ଜାନ ଲେଦାକିନ୍ ଆର ନେ ହାତୁକରେ ୧୦ଟା ସ୍କୁଲକ ଜାମଡ଼ାଃ ଦେଙ୍ଗାତେ ତିଙ୍ଗୁକାତେ ଏନ୍ ସ୍କୁଲକରେ ମୁଣ୍ଡାରୀ ଜାଗାର ବାନିତେ ଅଲ ଏତେଃ ଲେନା । (୧) ହେଁସଡ଼ା। (୨) ବାଙ୍ଗ୍ ପୋଷି, (୩) ବଡ଼କୁଲଡ଼ିହା, (୪) ଶାଲବନୀ, (୫) କିସନ ଡାହି (୬) ମୁଚିୟା ସାହି, (୭) କମଲାଶୋଲ୍ (୮) କାଲିଆପଦା (୯) ଜାମବୁନୀ, (୧୦) ମଧୁପୁର – ଏମାନ ।

ମୁଣ୍ଡାରୀ ବାନି ଆବୁ ସମାଜରେ ମୟଦ୍ ନାଓଁ ସେନ

ହରାରେ ଉଲଗୁଲାନ୍ ଆଉ ତାଦାଃ । ତରାଁ ଆବୁ ୟତହଲ କାବୁ ଇତୁଡ଼ୁନା । ଇନା ଲିପି (ବାନି) ନେ ଲେକା – ଅକ ବାନିଟି ମୁସିଂ ଓଡ଼ିଶା ସରକାର ତାଃରେ ସ୍ୱିକୃତି ନାତେନ୍ତେ ଅମଲେନା ମେନ୍ତେ ମେନଓଁ ।

— କାହାନି ତାଲି : ୨୯

Figure 16: Excerpt showing an older version of Rohidas Nag's version of Mundari Bani script [11]. Note that this proposal does not attempt to cover encoding of these original manuscripts with which, to our knowledge, no books were published.

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Figure 17: Pre-reform alphabet chart from Mundari Bani Hisir [13]. For discussion on these forms, see §3.10.

Figure 18: Excerpt from Mundari Bani Hisir [13] aligning Mundari Bani to Devanagari. This shows that the post-reform letter ꞟ ENN (parallel to Devanagari ण) was previously represented as Ṽ.

Figure 19: Excerpt from the introduction of Mundari Bani Hisir [13]. Note that the larger letters at the beginning of the paragraphs seem to be stylistic dropcaps rather than any evidence of capital letters.
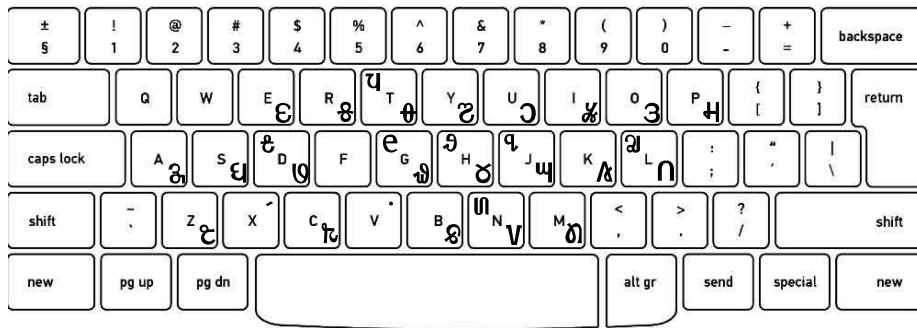
Figure 20: De-facto Mundari Bani keyboard layout, for those that use the current ASCII-encoded fonts [15].

MUNDARI SAMAJ SANWAR JAMDA

ᱱᱳᱣᱰᱟᱵᱽ ᱪ᱓ᱱᱟᱪ ᱪ᱓ᱱᱟᱶ ᱫᱟᱱᱣᱪ

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L.No. 3/2021   Dt. 18/01/2021

To
Dr. Deborah Anderson, Unicode Technical Director,
Unicode Technical Committee
USA

From
Nandalal Singh, President, Mundari Samaj Sanwar Jamda
And
Birbal Singh, Secretary, Mundari Samaj Sanwar Jamda

Dear Dr. Deborah and other members of Unicode Committee
Ref: Mundari Bani Unicode L2/L2021/21031

We, on behalf of Mundari Samaj Sanwar Jamda Organisation, would like to thank you and your team for extending continuous support for Mundari language and its script, the Mundari Bani. For favour of your information I would like to mention here that MSS Jamda Social organization is working in Odisha State for the Munda tribe focusing on the preservation and development of Mundari language, cultural values and education that can make people discover their potential for action and change since the year 1976-77. Today in this point of time we see many languages die out gradually as successive generations of speakers become bilingual and then begin to lose proficiency in their traditional languages. We experience that the Mundari speakers seek to learn more-prestigious language in order to gain social and economic advantages or to avoid discrimination. Mundari is categorized as a vulnerable language. For the preservation of Mundari language though a good number of books has been written in English, Hindi and other regional scripts, but there is a problem of accurate pronunciation of Mundari and that is leading to poor acceptance of these literary works by the Mundari speakers.

Necessity of a script for the preservation and development of Mundari language was deeply felt by Rohidas Singh Nag who worked about 30 years on it and invented the Mundari bani (script). During 1960s he along with some like-minded social workers formed this organisation, Mundari Samaj Sanwar Jamda. Since then this organization is running dedicatedly to give shape of its aim and objectives. The Mundari bani has gone through several verifications and simplified to its
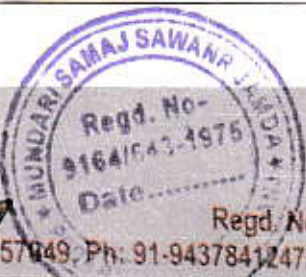
MUNDARI SAMAJ SANWAR JAMDA

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Regd. No: 9164/643 – 1975-76 Dt. 06/12/1975, At/PO-Poda Astia, Baripada, Odisha,
N-757949, Ph: 91-9437841247/ 91-7064683929, Email: mss.jamda@gmail.com/ birbal.77@rediffmail.com

optimum level. This script was accepted not only by Mundari Samaj Sanwar Jamda and Bharat Munda Samaj (a National level organisation) but also by other local organizations and scholars. Later Baidyanath Singh developed software for computerized use of Mundari bani. The software is easily installable in any computer and laptop. The software was widely distributed which led to wide use of the script. After this a number of books in Mundari bani have been published. More than 65 schools are running where students learn Mundari bani. A board namely, Central Board of Mundari Education is formed which controls the Mundari education in Mundari bani in India. As this script full filled all aspects of the language it is popularised among the Mundari speaking people. Because of this script we see a ray of hope not only to keep Mundari language alive but also for its development. All possible ways for the development of Mundari language with its script is being adopted.

Fortunately the state governments of Odisha and Jharkhand states have extended support considering our demand for inclusion of Muindari in Eighth schedule of Indian Constitution. Both the state governments have sent proposals to the Central government to include Mundari in the Eighth Schedule of Indian Constitution.

Munda community is struggling for survival of its language and script in such a point of time we request you to consider our Proposal to Encode the Mundari Bani Script in the Universal Character Set.

It is our humble Request to you and your team to release Mundari Bani Unicode set in **version 14.0** at an early date. Your support will definitely influence that sustains our mission and makes all the difference.

Sincerely yours

President
Mundari Samaj Sawar
Poda Astia, Mayurbhanj

Nandalol Singh

(Nandalal Singh)
President
Mundari Samaj Sanwar Jamda

(Birbal Singh)
Secretary
Mundari Samaj Sanwar Jamda

ଉଦ୍ଭୋଷୟ ଉଦ୍ଭୋୟ ଉଦୋ ଦୋ ୟଷୟ
Togetherness is Strength.

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President

Nandalal Singh.

Poda Astia, Mayurbhanj

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 to Encode the Mundari Bani Script in the Universal Character Set*
2. Requester's name: *Lawrence Wolf-Sonkin (lawrencewolfsonkin@gmail.com) and Biswajit Mandal (biswajitmandal.bm90@gmail.com)*
3. Requester type (Member body/Liaison/Individual contribution): *Individual Contribution*
4. Submission date: *2020-01-08*
5. Requester's reference (if applicable):
6. Choose one of the following:
   This is a complete proposal: *Yes*
   (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): *Yes*
      Proposed name of script: *Mundari Bani*
   b. The proposal is for addition of character(s) to an existing block:
      Name of the existing block:
2. Number of characters in proposal: *42*
3. Proposed category (select one from below - see section 2.2 of P&P document):
   A-Contemporary **X**   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? *Yes*
   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?
      Lawrence Wolf-Sonkin
   b. Identify the party granting a license for use of the font by the editors (include address, e-mail, ftp-site, etc.):
      Baidyanath Singh
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*
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*

8. Additional Information:

Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script. Examples of such properties are: Casing information, Numeric information, Currency information, Display behaviour information such as line breaks, widths etc., Combining behaviour, Spacing behaviour, Directional behaviour, Default Collation behaviour, relevance in Mark Up contexts, Compatibility equivalence and other Unicode normalization related information. See the Unicode standard at http://www.unicode.org for such information on other scripts. Also see Unicode Character Database (http://www.unicode.org/reports/tr44/) and associated Unicode Technical Reports for information needed for consideration by the Unicode Technical Committee for inclusion in the Unicode Standard.

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before? ..... *No*
   If YES explain
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? *Mundari Samaj Sanwar Jamda and Bharat Munda Samaj*
   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? ..... *Yes*
   Reference: *This document*
4. The context of use for the proposed characters (type of use; common or rare) ..... *Mild, and developing*

   Reference:
5. Are the proposed characters in current use by the user community? ..... *Yes*
   If YES, where? Reference: *The Indian states of Jharkhand, Orissa, and West Bengal*
6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely
   in the BMP? ..... *No*
   If YES, is a rationale provided?
   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? ..... *Yes*
    If YES, is a rationale for its inclusion provided? ..... *Yes*
    If YES, reference: *This document*
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? ..... *Yes*
    If YES, reference: *This document*
    Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided? ..... *No*
    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: