10.15446/fyf.v34n2.88423
Artículos

VOWEL SYSTEMS OF THE CHIBCHAN LANGUAGES[1]

SISTEMAS VOCÁLICOS DE LAS LENGUAS CHIBCHENSES

Haakon S. Krohn[2]

Cómo citar este artículo:
Krohn, H. S. (2021). Vowel systems of the Chibchan languages. *Forma y Función*, *34*(2). https://doi.org/10.15446/fyf.v34n2.88423

Recibido: 2020-06-18, aceptado: 2020-11-25

1 This paper is the result of an independent study.

2 ORCID https://orcid.org/0000-0002-8888-8512
Universidad de Costa Rica, San José, Costa Rica. hkrohn@gmail.com

Abstract

This paper presents the phonological vowel systems of 16 Chibchan languages, according to existing descriptions. Its purpose is to provide a basic and systematic overview of the vowel systems found in this family. For each language, the distinctive features needed to distinguish the vowel phonemes are discussed, as well as their phonetic realizations when this is relevant. Whereas the phoneme classification is uncontroversial for many of the languages, there are also some Chibchan languages that have been subject to very different analyses over the years; in these cases, a more thorough discussion is provided. At the end of the paper, the Chibchan vowel systems are compared from a quantitative perspective.

Keywords: *Chibchan languages; distinctive features; phonetics; phonology; vowels.*

Resumen

En este artículo se presentan los sistemas vocálicos fonológicos de 16 lenguas chibchenses, de acuerdo con descripciones existentes. El objetivo es proporcionar un panorama básico y sistemático de los sistemas vocálicos presentes en esta familia lingüística. Para cada lengua, se abordan los rasgos distintivos necesarios para distinguir los fonemas vocálicos, así como sus realizaciones fonéticas cuando esto es relevante. Mientras que la clasificación fonemática no es controvertida para muchas de las lenguas, también hay algunas lenguas chibchenses que han sido sujeto de análisis muy diferentes a lo largo de los años; en estos casos, se ofrece una discusión más exhaustiva. Al final del artículo se comparan los sistemas vocálicos chibchenses desde una perspectiva cuantitativa.

Palabras clave: *lenguas chibchenses; rasgos distintivos; fonética; fonología; vocales.*

1. Introduction

With approximately 250.000 speakers (Quesada, 2007, pp. 34-35) distributed among 15 living languages, the Chibchan language family is present in Honduras, Nicaragua, Costa Rica, Panama, Colombia, and Venezuela. The majority of the speakers of Chibchan languages live in Panama, followed by Colombia and Costa Rica. The individual languages have been described in varying degrees of detail, as will become clear throughout this article. Apart from several diachronic works, such as Wheeler (1972), Constenla Umaña (1981, 1982, 1985, 1988, 1989, 1991, 1995, 2005, 2008), Holt (1986), and Pache (2018), there are few publications dedicated to the Chibchan family as a whole, with the notable exceptions of Quesada (2007) and Constenla Umaña (2012).

The main goal of the present paper is to provide a systematic and uniform description of the phonological vowel systems of 16 Chibchan languages (all the 15 living languages plus the recently obsolete/extinct Boruca), based on current knowledge. Until now, the only author who actually describes and compares the phonological systems of all these languages from a synchronic perspective is Quesada (2007), but his sections about vowel systems are very brief and sketchy. The present work should therefore be a useful overview for researchers of both Chibchan languages and phonological typology in general. On the one hand, the paper pretends to facilitate historical analyses within the language family, as well as interfamilial studies. On the other hand, it searches to point out where more detailed analyses are needed in order to improve the phonetic and phonological descriptions of each Chibchan language, especially regarding the number of vowel phonemes, their position in the vowel space, the distinctive features that most accurately represent the contrasts between them, and the phonological interpretations of secondary vowel features.

To begin with, in section 2, I discuss the most relevant theoretical considerations for this paper. In section 3, I exhibit the reconstructed Proto-Chibchan vowel system and the genetic relationships among the Chibchan languages. The article's core is section 4, dedicated to the modern-day Chibchan vowel systems. For each language, I give a brief outline of the information published on its vowel inventory and, based on these data, organize the phonemes in a table according to their phonological features, which are often not provided by the original researchers. The phonetic symbols used in the tables are mostly intended to reflect the most representative allophone of each phoneme, according to the information found in the sources; however, see section 2.3 for further details about this. A greater number of sources are cited for languages whose vowel system is debated than for languages whose system is completely agreed upon. Finally, the quantitative findings about the systems are synthesized and discussed in section 5.

Since many of the Chibchan languages have received several different names in both English and Spanish throughout the years, it is not an easy task to choose the most appropriate ones. For the sake of consistency, in this paper I decided to use the names found in the English-language publications by Quesada (2007) and Constenla Umaña (2012)[1].

2. Theoretical considerations

2.1. Basic and secondary vowel systems

A fundamental distinction made in this paper is between basic (or primary) and secondary vowel systems. Following Duanmu (2015, p. 218), the basic vowels «are those that involve lip rounding, the backness of the tongue, the height of the tongue, and the tongue root gesture». In other words, basic vowels differ in terms of rounding and their position in the vowel space; i.e., vowel quality. Any additional phonological attributes, such as nasality and quantity, are considered secondary. Hence, any language with secondary phonological vowel features can be said to have two or more subsystems of vowels. This is a common approach (Ladefoged & Maddieson, 1996, p. 298, and Schwartz, Boë, Vallée & Abry, 1997) and a sensible way to handle the problem that has surged from the fact that some researchers of Chibchan languages consider vowels with these additional features to be separate phonemes (e.g. a language with five basic vowel qualities with a phonological oral/nasal distinction would be considered to have ten vowel phonemes), while others treat nasality and quantity as prosodic features that combine with the basic vowels without forming new phonemes. In the phoneme tables included for each language below, the vowels belonging to the secondary systems are written next to the basic vowels. Determining the most precise phonological representations of nasality and quantity in each Chibchan language is beyond the scope of the present article. Stress and tone are not considered to be vowel features, and are thus not taken into account in the descriptions.

Within the set of basic vowels, I make an additional distinction between peripheral and non-peripheral vowels. Traditionally, the former group includes front unrounded and back rounded vowels. Just like Schwartz et al. (1997, p. 239), I also define all low vowels as peripheral, since the classification of unrounded low vowels as front or back is unclear for most of the Chibchan languages.

2.2. Distinctive features

In the presentation of the vowel systems, distinctive features are used. The complete set needed for the basic vowel phonemes in Chibchan languages is [HIGH], [LOW],

[TENSE], [BACK], and [ROUND], whereas [NASAL] and [LONG] distinguish between subsystems. I employ these traditional features because they correspond to the most frequently used terminology in phonological descriptions of Chibchan languages. I must note that the only goal of the features is to represent the phonological contrasts within each system according to available data. They do not necessarily define natural classes revealed by phonetic realizations, because the phonetic information provided by the sources is generally scarce, and space restrictions do not permit me to dive into detailed analyses of each language. Therefore, the classifications of the vowel phonemes in terms of distinctive features must only be seen as a rudimentary approach that hopefully will be refined in future studies.

It is important to highlight that most of the existing descriptions of Chibchan vowel systems postulate three-way distinctions between front, central and back vowels. This seems to be based on phonetic realizations rather than phonological contrasts, since, as Odden (2013, p. 50) points out, «phonologists primarily distinguish just front and back vowels». Phonetic central vowels are thus usually classified as [+BACK], «since typically central vowels are unrounded and back vowels are rounded» (Odden, 2013, p. 50). Lip rounding lowers considerably the frequency of a vowel's second formant (Catford, 2001, p. 154), which causes unrounded back vowels to be perceived as central, as their second formant (F2) falls in between the F2 of unrounded front vowels and the F2 of rounded back vowels. This implies that, for instance, /i̟/ and /u/ contrast phonologically only in terms of lip rounding, not backness, and that distinctions such as the one between [i̟] and [ɯ] «are usually considered to be phonologically unimportant over-differentiations of language-specific phonetic values of phonologically back unrounded vowels» (Odden, 2013, p. 50). In other words, one can assert that «although there are three degrees of backness phonetically (front, central, back), there are only two dimensions of contrast phonologically: [–back] front vowels and [+back] back and central vowels» (Zsiga, 2013, p. 269). Despite the fact that there might exist some languages in the world where a phonological three-way distinction on the horizontal axis is necessary[2], none of the information from the sources indicates that this is the case for any Chibchan vowel system, since all the vowels represented as central in the sources differ from the ones represented as back in terms of rounding. This means that a three-way distinction would be redundant.

In all the sources that describe Chibchan languages with only one low vowel phoneme, the symbol /a/ is used to represent it. It is almost always explicitly classified as central, which is probably due to its most common pronunciation. A phonetic unrounded central vowel would normally function as [+BACK] phonologically, but phonological patterns

in the language could indicate the contrary. Unfortunately, most current descriptions of Chibchan phonology and phonetics are not elaborate enough to provide this kind of details. Because of this uncertainty, I leave low vowel phonemes unspecified for the feature [BACK] when no other low vowel occurs in the language, representing them invariably by the symbol /a/. This does not mean that I assume this feature to actually be phonologically unspecified in the particular language, just that further research is needed to determine the value. On the other hand, when a language has two low unrounded vowels, as is the case in Teribe, one of them must naturally be [+BACK].

2.3. Phonetic symbols

The phonetic symbols employed in this paper are in accordance with the International Phonetic Alphabet (IPA), except for /a/, which is used to represent a low vowel that is not necessarily [–BACK], for the reason explained above. For all other vowel phonemes, I intend to use the symbol that best represents its most common phonetic realization in terms of height. This means, for example, that the choice between the symbols /o/ and /ɔ/ to represent the only non-high non-low back vowel in a language depends merely on the phonetic height of the vowel, not on any phonological criterion.

However, an issue that needs to be addressed is the discrepancy regarding the phonetic symbols used to represent phonological [+BACK] vowels in the existing descriptions of Chibchan languages. For instance, take the case of Kogi and Barí. According to Ortiz Ricaurte (2000), Kogi has an unrounded back vowel /ɯ/, while Mogollón Pérez (2000) postulates an unrounded central vowel /ɨ/ for Barí. Both these vowels are probably phonologically [+BACK, +HIGH, –ROUND], and the choice of phonetic symbols might make two vowel systems look more different than they really are. This problem is even found within the different descriptions of Kogi, as Stendal (1976) and Gawthorne & Hensarling (1984) use the symbol /ɨ/ for one of the vowel phonemes of this language, while Ortiz Ricaurte (2000) represents the same phoneme by the symbol /ɯ/. The reason why the exact pronunciation of the vowels in Chibchan languages is hard to pinpoint is that virtually no acoustic data have been published from any of the languages. The only study of this type is Krohn (2019) on Guaymí, which is referred to in section 4.8. Although some of the cited scholars might have based their descriptions on acoustic analyses, it is hard to tell when this is the case and when they have simply trusted their own auditory perceptions. One must therefore assume that the phonetic values given for the vowels in most descriptions of Chibchan languages are purely impressionistic, which is not sufficient to firmly

distinguish central vowels from unrounded back vowels. As a consequence, I avoid the use of central vowel symbols in this paper, representing all vowels described as central by the corresponding back vowel symbols. My choice of symbols does not imply that I assume all the phonological back vowels in Chibchan languages to be phonetically back; it is merely a reflection of the fact that data from instrumental phonetic analyses are needed before any distinction can be made.

3. Proto-Chibchan and the internal structure of the family

The most recent reconstruction of the phonological system of Proto-Chibchan is presented in Constenla Umaña (2008). The reconstructed vowel system, which is shown in Table 1, consists of five phonemes: /i/, /e/, /a/, /o/, /u/[3]. The former two are classified as front, the latter two as back, and /a/ as central. For the reasons explained in section 2.2., I leave the feature [BACK] unspecified for /a/, since it is the only low vowel. Moreover, the cited author postulates a nasal prosodeme that combined with any of the vowel phonemes, meaning that if the nasal vowels are counted as separate phonemes, Proto-Chibchan would have had a total of ten vowel phonemes.

Table 1. Reconstructed vowel system of Proto-Chibchan (Constenla Umaña, 2008)

		–BACK	+BACK
+HIGH	–LOW	i ĩ	u ũ
–HIGH		e ẽ	o õ
	+LOW	a ã	

According to Constenla Umaña (2008, 2012), Proto-Chibchan evolved initially into two main branches: Paya and Core Chibchan. The former contains only one language, Paya, while the rest of the family's languages belong to Core Chibchan. Constenla Umaña has proposed the genetic relationships among a total of 21 Chibchan languages, both living and extinct ones. Some of the extinct members of the family, such and Antioquian and Huetar, are excluded from the classification due to insufficient data (Constenla Umaña, 2012, p. 417). Below, the cited subdivision is reproduced, with groups and subgroups in bold typeface, individual languages in regular typeface and alternative names for each language in parentheses:

- **I. Paya:**
    - Paya (or Pech) (ISO code: pay)
- **II. Core Chibchan:**
    - **IIA. Votic:**
        - Rama (ISO code: rma)
        - Guatuso (or Malecu, Maléku Jaíka) (ISO code: gut)
    - **IIB. Isthmic:**
        - **B1. Western Isthmic:**
    - **B1.1. Viceitic:**
        - Cabécar (ISO code: cjp)
        - Bribri (ISO code: bzd)
    - **B1.2.** Teribe (or Naso) (ISO code: tfr)
    - **B1.3.** Boruca (or Brunca, Brúnkajk) (ISO code: brn)
- **B2. Doracic:**
    - Dorasque *(extinct)*
    - Chánguena *(extinct)*
- **B3. Eastern Isthmic:**
    - **B3.1. Guaymiic:**
        - Guaymí (or Move, Movere, Ngäbe, Ngäbere, Nove) (ISO code: gym)
        - Bocotá (or Buglere) (ISO code: sab)
    - **B3.2.** Cuna (or Guna, Kuna) (ISO codes: cuk, kvn)
- **IIC. Magdalenic:**
- **C1. Southern Magdalenic:**
    - **C1.1. Chibcha:**
        - Muisca (or Chibcha) *(extinct)* (ISO code: chb)
        - Duit *(extinct)*
    - **C1.2.** Tunebo (or Uwa, Uw Cuwa) (ISO codes: tbn, tnb, tnd, tuf)
    - **C1.3.** Barí (or Barira, Cunausaya, Dobocubi, Motilón) (ISO code: mot)
- **C2. Northern Magdalenic:**
    - **C2.1. Arhuacic:**
    - **C2.1.1.** Kogi (or Cágaba, Cogui, Kággaba, Kogui) (ISO code: kog)
    - **C2.1.2. Eastern-Southern Arhuacic:**
        - **C2.1.2.1. Eastern Arhuacic:**
            - Damana (or Arsario, Guamaca, Malayo, Marocasero, Sanká, Wiwa) (ISO code: mbp)
            - Kankuamo (or Atanques, Cancuamo) *(extinct)*
        - **C2.1.2.2.** Ika (or Ica, Arhuaco, Bíntucua) (ISO code: arh)
    - **C2.2.** Chimila (or Ette Taara, Shimizya) (ISO code: cbg)

4. Vowel systems of each language

4.1. Paya

Paya has a five-vowel primary system consisting of /i/, /u/, /e/, /o/ and /a/ (Holt, 1986, 1999; República de Honduras, 2012). All the vowel qualities also exhibit phonological nasality and length, which makes Paya the only Chibchan language with two secondary vowel features. According to the sources, however, it seems that these features do not appear simultaneously on the same vowel. The complete system is represented in Table 2.

As for the phonetic realizations of the vowels, Holt (1999, p. 18) points out that «in rapid speech unstressed *i* is sometimes realized as [ə]» and «vowels in unstressed syllables are sometimes voiceless between voiceless consonants». In addition, «there is a tendency for nasal vowels to be somewhat more open than their oral counterparts».

Table 2. Vowel system of Paya

<table>
<tr><td></td><td></td><td>–BACK</td><td>+BACK</td></tr>
<tr><td>+HIGH</td><td rowspan="2">–LOW</td><td>i ĩ i:</td><td>u ũ u:</td></tr>
<tr><td rowspan="2">–HIGH</td><td>e ẽ e:</td><td>o õ o:</td></tr>
<tr><td>+LOW</td><td colspan="2">a ã a:</td></tr>
</table>

4.2. Rama

Rama's basic vowel inventory consists of only three qualities: /i/, /u/ and /a/ (Craig, 1986; CIDCA, 1987). The vowels /e/ and /o/ are contrastive in lexical borrowings, but are not part of the native Rama system (Craig, 1986; CIDCA, 1987). This means that the primary vowel system of this language is made up of only two distinctive features, [HIGH] and [BACK], as shown in Table 3. However, it presents length as a secondary phonological feature (Craig, 1986).

Table 3. Vowel system of Rama

<table>
<tr><td></td><td>–BACK</td><td>+BACK</td></tr>
<tr><td>+HIGH</td><td>i i:</td><td>u u:</td></tr>
<tr><td>–HIGH</td><td colspan="2">a a:</td></tr>
</table>

4.3. Guatuso

Guatuso has a basic five-vowel system, with /i/, /u/, /e/, /o/ and /a/ (Constenla Umaña, 1998, p. 8). It also exhibits phonemic vowel length, which Constenla Umaña (1998, p. 12) interprets as a separate phoneme (or prosodeme) that combines with each of the vowels. He notes that the long vowels, except /a:/, are pronounced as diphthongizing, and considers /a/ to be central, corresponding to its most frequent phonetic realization, although it is often fronted before front vowels (Constenla Umaña, 1998, p. 11). This fronting, as well as a backing of /k/ towards a uvular position after /a/ noticed by Constenla Umaña (1981, p. 93), is an example of facts that suggest that /a/ patterns as a back vowel in this language. As explained in section 2.2., this kind of information is not provided for most of the other Chibchan languages, and the space limit for the paper does not allow detailed discussions of this issue for each language either. The Guatuso vowel system is represented in Table 4, with [BACK] unspecified for /a/ and /a:/ (since this issue should be analyzed more thoroughly before drawing any conclusions).

Table 4. Vowel system of Guatuso

<table>
<tr><td></td><td></td><td>–BACK</td><td>+BACK</td></tr>
<tr><td>+HIGH</td><td rowspan="2">–LOW</td><td>i i:</td><td>u u:</td></tr>
<tr><td rowspan="2">–HIGH</td><td>e e:</td><td>o o:</td></tr>
<tr><td>+LOW</td><td colspan="2">a a:</td></tr>
</table>

4.4. Cabécar

Cabécar has a notable dialectal variation that even extends to the vowel inventory. Bourland Hawley (1975) and Margery Peña (1989) recognize seven phonemic vowel qualities, /i/, /u/, /ɪ/, /ʊ/, /e/, /o/ and /a/, which, according to González Campos (2011) and González Campos & Obando Martínez (2017), is true for the southern dialects.

However, the northern dialects have an additional vowel, a non-front, non-high and unrounded phoneme represented by the symbol /ɤ/ (enclosed in parentheses in Table 5, due to its absence in southern Cabécar). Both /ɤ/ and /a/ are classified as [–ANTERIOR] by González Campos (2011, p. 9), while González Campos & Obando Martínez (2017, p. 81), referring to their phonetic properties, state that /ɤ/ is close-mid and back, with /a/ being open and central. The representation of the system in Table 5 follows González Campos (2011) (with the exception of using [BACK] instead of [ANTERIOR]), whose classification is explicitly phonological. As for /e/ and /o/, these symbols are used in all the cited publications except González Campos (2011), where they are represented by /ɛ/ and /ɔ/. The author nonetheless states that they are freely pronounced as [e] and [o],

respectively. In addition to the basic qualities, the vowels /i/, /u/, /e/, /o/, and /a/ present phonological nasality in all the dialects of Cabécar.

Table 5. Vowel system of Cabécar

		–BACK	+BACK	
		–ROUND		+ROUND
+HIGH	+TENSE	i ĩ		u ũ
	–TENSE	ɪ		ʊ
–HIGH	–LOW	e ẽ	(ɤ)	o õ
	+LOW	a ã		

4.5. Bribri

Bribri has seven basic vowels that have been classified in different ways over the years. Wilson (1982) divides them into two high (/i/ and /u/), two mid (/ɪ/ and /ʊ/) and three open (/ɛ/, /a/ and /ɔ/) vowels, with a three-way distinction on the horizontal axis. A recent description by Jara Murillo (2018) presents the same classification. On the other hand, Constenla Umaña, Elizondo Figueroa & Pereira Mora (1998) postulate three phonological heights plus a tense/lax distinction on the high vowels, so that /i/, /u/, /ɪ/ and /ʊ/ are high (the latter two being lax), /e/ and /o/ are mid and /a/ is the only low (and central) vowel. They also specify that the mid vowels are realized phonetically as open-mid. Almost the same analysis is provided by Chevrier (2017), with the exception that she uses only two horizontal degrees, leaving /a/ unspecified for backness. This classification is the one that makes the most sense according to the theoretical framework of this article, and is therefore represented in Table 6.

Regarding secondary features, all the vowel qualities except the two lax high vowels can present phonological nasality. However, /ã/ is marginal in the dialect spoken in and around Coroma, as it has fused with /ɔ̃/ in most words (Jara Murillo, 2018, p. 26).

Table 6. Vowel system of Bribri

		–BACK	+BACK
+HIGH	+TENSE	i ĩ	u ũ
	–TENSE	ɪ	ʊ
–HIGH	–LOW	ɛ ɛ̃	ɔ ɔ̃
	+LOW	a ã	

4.6. Teribe

Teribe is divided into two main dialects, one Panamanian and one Costa Rican. The latter is often referred to as Térraba or Bröráñ, and is today considered to be extinct (Constenla Umaña, 2007; Sánchez Avendaño, 2009).

The vowel system (of the still spoken Panamanian variety) is displayed in Table 7. It consists of eight basic vowels: /i/, /u/, /ɪ/, /ʊ/, /ɛ/, /ɔ/, /a/, and /ɑ/. The phoneme /a/ is classified by Quesada (2000) as central, but must be phonologically non-back, as stated explicitly by Portilla Chaves (1989), since it contrasts with the unrounded back vowel /ɑ/. This results in a symmetric primary phonological system, with four back and four non-back vowels, as can be seen in Table 7. Five of the vowel qualities also appear with a contrastive nasal feature: /ĩ/, /ũ/, /ɛ̃/, /ɔ̃/, and /ã/.

There is a difference between the vowel inventories of the two dialects, namely that the Costa Rican variety lacked the phoneme /ɑ/ (Constenla Umaña, 2007), which originally existed when its speakers separated from the rest in the 17th century (Portilla Chaves, 1989).

Table 7. Vowel system of Teribe

		–BACK	+BACK
+HIGH	+TENSE	i ĩ	u ũ
	–TENSE	ɪ	ʊ
–HIGH	–LOW	ɛ ɛ̃	ɔ ɔ̃
	+LOW	a ã	ɑ

4.7. Boruca

Boruca does not have any fluent speakers left (Quesada Pacheco, 2019, pp. 20-22), since the last one passed away in 2003 (Constenla Umaña, 2011, p. 150). The language is nevertheless included in this paper because it is well documented, has several semi-speakers and is subject to ongoing revitalization projects (Quesada Pacheco, 2019, pp. 20-22).

The vowel system of Boruca consists of five vowels (/i/, /u/, /e/, /o/, and /a/) without any secondary features (Quesada Pacheco, 2019, pp. 33-34), as shown in Table 8.

Table 8. Vowel system of Boruca

		–BACK	+BACK
+HIGH	–LOW	i	u
–HIGH		e	o
	+LOW	a	

4.8. Guaymí

Guaymí has eight vowel phonemes, of which three are traditionally classified as front (/i/, /e/, and /a/), two as unrounded back (/ɯ/ and /ɤ/) and three as rounded back (/u/, /o/, and /ɔ/), both for the Panamanian (Quesada Pacheco, 2008) and the Costa Rican variant (Abarca González, 1985) (although Lininger Ross, 1981, classifies /a/ as back instead of front). A different analysis is offered by Murillo Miranda (2016) for the Costa Rican dialect, where the two non-peripheral vowels are classified as central (but represented by the same back symbols) and the symbol /ɒ/ is used instead of /ɔ/ for the most open back vowel.

Krohn (2019) provides formant frequency values of vowels pronounced by a Costa Rican Guaymí speaker. This is actually the only publication so far that contains this kind of information from a Chibchan language. It shows that the two non-peripheral vowels indeed could be considered phonetically central (which is common for unrounded phonological back vowels, as explained in section 2.2 above), since their F2 values are located around what commonly would be considered to be the limit between back and central vowels. A three-way horizontal distinction is nonetheless unnecessary, because the feature [ROUND] accounts for the contrast between these two vowels and the rounded back vowels. Moreover, the analysis reveals a phonetic four-way height distinction, with /ɔ/ located between /o/ and /a/ on the vertical axis, while the frontness of /a/ is quite unclear, since this vowel was measured as considerably centralized. Based on these data, the most precise phonological classification seems to be to consider both /a/ and /ɔ/ as [+LOW] (using the symbol /ɔ/ to specify that this phoneme is pronounced less open than /a/) and to let the feature [ROUND] distinguish these two phonemes, although [–BACK] for /a/ probably is a further distinction between them. This (except the classification of /a/) coincides with the classification made by Quesada Pacheco (2008).

All the eight vowels of the basic system also appear with phonological nasality (Quesada Pacheco, 2008; Murillo Miranda, 2016). This gives the vowel inventory shown in Table 9.

Table 9. Vowel system of Guaymí

<table>
<tr><td></td><td></td><td>–BACK</td><td colspan="2">+BACK</td></tr>
<tr><td></td><td></td><td colspan="2">–ROUND</td><td>+ROUND</td></tr>
<tr><td>+HIGH</td><td rowspan="2">–LOW</td><td>i ĩ</td><td>ɯ ɯ̃</td><td>u ũ</td></tr>
<tr><td rowspan="2">–HIGH</td><td>e ẽ</td><td>ɤ ɤ̃</td><td>o õ</td></tr>
<tr><td>+LOW</td><td colspan="2">a ã</td><td>ɔ ɔ̃</td></tr>
</table>

4.9. Bocotá

Two significantly different analyses of the vowel system of Bocotá have been published, both including seven basic vowel qualities. Margery Peña (1988, 1996) considers there to be four distinctive heights, using the symbols /i/, /u/, /e/, /o/, /ɛ/, /ɔ/, and /a/. On the other hand, the most recent description, published by Quesada (2012), represents them as /i/, /u/, /ɪ/, /ʊ/, /e/, /o/, and /a/; that is, with a three-way height distinction and a contrast between tense and lax high vowels. As Quesada undoubtedly had access to more advanced analysis tools and explicitly rejects the four-way height distinction proposed by Margery Peña, his approach regarding vowel height is the one represented in Table 10. It is also worth pointing out that, as stated by Quesada (2012, p. 15), the two lax vowels are infrequent and can be considered marginal to the system.

Regarding secondary vowel features, the two aforementioned authors' analyses are even more divergent. Margery Peña (1988, 1996) proposes a nasal phoneme that combines with five of the vowels (/ĩ/, /ũ/, /ɛ̃/, /ɔ̃/, and /ã/), meaning that these would be underlyingly nasal, whereas Quesada (2012) argues that vocalic nasality is not phonemic but allophonic, resulting from assimilation to a following nasal consonant that, in turn, sometimes (but not always) drops subsequently. Considering the complementary analysis of Margery's (1988, 1996) data conducted by Chevrier (2017, pp. 369-372), it seems more plausible that vowel nasality is phonological, and this feature is therefore included in Table 10. However, this issue definitely needs to be further studied.

Table 10. Vowel system of Bocotá

		–BACK	+BACK
+HIGH	+TENSE	i ĩ	u ũ
	–TENSE	ɪ	ʊ
–HIGH	–LOW	e ɛ̃	o ɔ̃
	+LOW	a ã	

4.10. Cuna

Cuna has a basic five-vowel system with the phonemes /i/, /u/, /e/, /o/ and /a/ (Llerena Villalobos, 2000; Orán & Wagua 2011; Forster, 2011), as displayed in Table 11. There are no secondary features, but vowels are phonetically lengthened before lenis consonants (Forster, 2011, p. 4).

Table 11. Vowel system of Cuna

		–BACK	+BACK
+HIGH	–LOW	i	u
–HIGH		e	o
	+LOW	a	

4.11. Tunebo

Tunebo has a simple system consisting of five vowel phonemes, /i/, /u/, /e/, /o/, and /a/ (Headland & Headland, 1976; Headland, 1997), represented in Table 12. They do not exhibit secondary features.

Table 12. Vowel system of Tunebo

		–BACK	+BACK
+HIGH	–LOW	i	u
–HIGH		e	o
	+LOW	a	

4.12. Barí

Barí has six phonological vowel qualities, five of which are the peripheral /i/, /u/, /e/, /o/, and /a/, while the last one, according to Mogollón Pérez (2000) and Pache (2018), is the high unrounded central vowel /ɨ/. This non-peripheral vowel is represented by the symbol /ɯ/ in Table 13. It is noteworthy that this vowel quality has a very limited distribution: Pache (2018, p. 256) states that it is only attested after low vowels in diphthongs. As a consequence, its status as a vowel phoneme rather than a glide does not seem obvious.

All the vowel qualities also occur with phonological nasality. Additionally, Mogollón Pérez (2000) identifies phonetic long vowels, but considers these to be sequences of two identical vowel phonemes.

Table 13. Vowel system of Barí

		–BACK	+BACK	
		–ROUND		+ROUND
+HIGH	–LOW	i ĩ	ɯ ɯ̃	u ũ
–HIGH		e ẽ		o õ
	+LOW	a ã		

4.13. Kogi

The phonology of Kogi is definitely in need for further research, as the vowel system has been described in very different ways. The first point of discussion is the existence of the mid vowel phonemes /e/ and /o/. Holmer (1953) does not include these phonemes in his analysis, claiming that the sounds [e] and [o] are allophones of the diphthongs /ai̯/ and /au̯/, respectively, a statement he also bases on native Kogi speakers' pronunciation of Spanish words. Stendal (1976) and Jackson (1995) share this view. In contrast, both Gawthorne & Hensarling (1984) and Ortiz Ricaurte (1989, 2000) include these segments in Kogi's vowel inventory. Nevertheless, neither of them provides any minimal pairs to prove the existence of the mid phonemes, and Ortiz Ricaurte (2000) also notes that the phoneme /o/ is very infrequent, without giving any further details regarding this observation. Jackson (1995, p. 63) shows that in the closely related languages Damana and Ika the historical /e/ and /o/ phonemes have turned into diphthongs in many cases (but not all), and argues that this process has gone even further in Kogi, to the point that /e/ and /o/ have lost their phonemic status. Because of the lack of evidences of the contrary in newer publications, I choose to assume that these phonemes are non-existent in Kogi, but do not discard the possibility for the opposite being true.

The second uncertainty in the vowel system of Kogi regards the existence of non-peripheral vowel phonemes. Holmer (1953) does not include any of these in his analysis, while Gawthorne & Hensarling (1984) postulate two: a high (/ɨ/) and a mid (/ʌ/). In contrast, Stendal (1976), Jackson (1995) and Ortiz Ricaurte (2000) include only a high one, but they classify it differently; Stendal (1976) uses the phonetic symbol /ɨ/, which means he considers it central, Jackson (1995) also claims it to be central (using the symbol /ʉ/), while Ortiz Ricaurte (2000) classifies it as back (/ɯ/). The symbol /ʉ/ used by Jackson (1995) denotes a rounded vowel in IPA, but apart from the symbol, he does claim at any point that it is actually rounded. He also uses the same symbol for the non-peripheral vowels in Ika and Damana, which are clearly identified as unrounded by other authors, so it seems to only be a matter of an unconventional symbol choice. I therefore follow Stendal (1976) and Ortiz Ricaurte (2000) and assume that Kogi has a phonological unrounded back vowel, represented by the symbol /ɯ/. According to Jackson (1995), this phoneme has a different origin than /ɤ/ in Ika and Damana (see sections 4.14 and 4.15, respectively), being the result of a fusion between /i/ and /u/, which would indicate that the distinctive feature [+HIGH] is appropriate to assume for this phoneme in Kogi. It is also worth pointing out that all the above-mentioned authors classify /a/ as central, except for Ortiz Ricaurte (2000), who defines it as an unrounded back vowel, but does not provide any evidence for the backness of this phoneme.

As for secondary vowel features, Stendal (1976) and Gawthorne & Hensarling (1984) postulate a phonological nasal feature, but Ortiz Ricaurte (2000) considers the nasal vowels to be allophonic realizations that result from assimilations to the nasal consonant /n/, which is what I assume to be the most precise analysis. The few cases where nasal vowels show up without a nasal consonant next to it would be explained as a consequence of a subsequent deletion of the consonant. Moreover, neither Holmer (1953) nor Jackson (1995) mentions nasal vowels in their analyses.

Based on all these facts, what I consider to be the most probable vowel system of Kogi is represented in Table 14, but future research could alter this classification significantly.

Table 14. Vowel system of Kogi

	–BACK	+BACK	
	–ROUND		+ROUND
+HIGH	i	ɯ	u
–HIGH	a		

4.14. Ika

Ika has six vowel phonemes, five of which are the peripheral vowels /i/, /u/, /e/, /o/, and /a/, while the last one is described as phonetically central and unrounded. Frank (1985) originally postulated two central vowels, /ɨ/ (high) and /ä/ (mid), but this is corrected in Frank (2008), where the only central vowel included is /ɨ/. This is in line with Landaburu (2000), who also includes one central vowel phoneme, which he classifies as high, but nevertheless represents by the symbol /ə/. He describes a very variable and complex realization pattern of this phoneme, with oscillations between the high [ɨ], the mid [ə] and even the mid-open [ʌ], depending on surrounding consonants and syllable structure. This variation suggests that the feature [HIGH] is irrelevant for this phoneme, so I choose to classify it just as [+BACK, –LOW, –ROUND]. In Table 15, the symbol /ɤ/ is used to represent it, as it likely is phonologically back and its mean realization seems to be more mid than high, according to Landaburu's (2000) description. The vowels do not present any secondary feature in Ika.

Table 15. Vowel system of Ika

		–BACK	+BACK	
		–ROUND		+ROUND
+HIGH	–LOW	i	ɤ	u
–HIGH		e		o
	+LOW	a		

4.15. Damana

Damana's vowel system consists of the five peripheral vowels /i/, /u/, /e/, /o/, and /a/, as well as one phonetic central vowel phoneme, just like Ika. The latter vowel is represented by the symbol /ə/ by Trillos Amaya (2000, p. 751). She further (p. 752) explains that this phoneme is pronounced [ɨ] in stressed syllables without contact with nasal consonants, but that it also opens up to [ə̨] in some other contexts. These data suggest that its phonetic behavior is very similar to the behavior of the non-peripheral vowel in Ika treated above, so I assume that the feature [LOW] is irrelevant for this phoneme in Damana too. As a result, Table 16, where the vowel phonemes of Damana are shown, is identical to Table 15 above.

Interestingly, Trillos Amaya (2000) also postulates one nasal vowel phoneme, /ũ/. However, she notes that it is a marginal segment and that it needs to be studied further, as she has found only one minimal pair with the opposition /u/ ≠ /ũ/. Based on information given by the same author (p. 752), where she states that the vowels get nasalized in contact with nasal consonants in stressed syllables, I believe that the [ũ] in the sole minimal pair in reality is the product of an allophonic nasalization of /u/ and a subsequent deletion of the nasal consonant, a process also observed in Kogi. Therefore, I do not consider nasality to be a vowel feature in Damana.

Table 16. Vowel system of Damana

		–BACK	+BACK	
		–ROUND		+ROUND
+HIGH	–LOW	i	ɤ	u
–HIGH		e		o
	+LOW	a		

4.16. Chimila

It is agreed upon that Chimila has a simple basic vowel system consisting of five qualities, /i/, /u/, /e/, /o/, and /a/ (Trillos Amaya, 1997; Malone, 2006), but the secondary

features have been subject to very diverse analyses. Trillos Amaya (1997) identifies three of them: long, interrupt (probably meaning laryngealized or creaky) and aspirated. This would result in a very big inventory in comparison to the other languages in the family, with a total of 20 contrasting vowel sounds, and her analysis has indeed led other scholars, such as Quesada (2007, p. 116), to conclude that Chimila has one of the more complicated vowel systems among the Chibchan languages.

However, Malone (2006) offers a different interpretation. Regarding the interrupt feature, he states that the laryngealization of vowels in Chimila occurs immediately before glottal stops, which indicates that it is a phonetic and not a phonological property. Moreover, he does not mention aspiration as a phonological feature at all, but on the other hand postulates a phonological distinction between oral and nasal vowels. This last claim is downgraded in Malone (2010), where it becomes clear that phonemic nasal vowels only occur in certain interjections and onomatopoeia, some of which contrast with oral vowels in core lexemes. As an explanation, he proposes that «a contrast between nasal and nonnasal vowels existed at one time in core lexemes», and that «synchronically these contrasts have only been preserved in interjections and in onomatopoeia» (p. 8).

The only secondary vowel feature that seems to be uncontroversial in Chimila is the contrast between short and long vowels. Actually, Malone (2010, p. 4) states that «vowels occur with three contrastive phonetic lengths», but that one of these is the result of gemination, meaning that the only phonological distinction would be between short and long vowels. Hence, this is the only secondary feature included in Table 17, which displays what seems to be the vowel system of Chimila.

Table 17. Vowel system of Chimila

		–BACK	+BACK
+HIGH	–LOW	i i:	u u:
–HIGH		e e:	o o:
	+LOW	a a:	

5. Quantitative summary and conclusions

I have shown that the number of basic vowels varies considerably among the Chibchan languages, as it commonly does in any language family. The figures are summed up in Table 18, showing the amount of basic vowels in each language in the column labelled

«Total». Rama has the lowest number, with three, whereas Cabécar[4], Guaymí, and Teribe are located in the other end of the scale, having eight basic vowels.

The table also shows how many of the basic vowel qualities that are peripheral and non-peripheral in each language. Guaymí is the only Chibchan language with two non-peripheral vowels, while Barí, Cabécar, Damana, Ika, and Kogi have one. Without exception, the Chibchan non-peripheral vowels are unrounded back vowels. The most common primary system consists of the five vowel qualities /i/, /u/, /e/, /o/, and /a/ (found in six languages). This comes as no surprise, since five-vowel systems are the most common worldwide (Maddieson, 2013).

Table 18. Number of basic vowel qualities in Chibchan languages

Languages	Peripheral	Non-peripheral	Total
Guaymí	6	2	8
Cabécar	7	1	8
Teribe	8	0	8
Bocotá, Bribri	7	0	7
Barí, Damana, Ika	5	1	6
Boruca, Chimila, Cuna, Guatuso, Paya, Tunebo	5	0	5
Kogi	3	1	4
Rama	3	0	3

As for secondary vowel features, only [NASAL] and [LONG] seem to occur in Chibchan languages. Table 19 shows in which languages these are present. Only one language, Paya, uses both features, whereas six languages have no secondary vowel features.

Table 19. Secondary vowel features present in Chibchan vowel systems

Languages	[nasal]	[long]
Paya	✓	✓
Barí, Bocotá, Bribri, Cabécar, Guaymí, Teribe	✓	
Chimila, Guatuso, Rama		✓
Boruca, Cuna, Damana, Ika, Kogi, Tunebo		

If the vowels pertaining to both the basic and the secondary systems are counted as separate phonemes, Paya has the greatest number of contrasting vowels, with 15. On the other hand, Kogi seems to have the lowest number, with only four. This is displayed in Table 20.

Table 20. Total number of vowel phonemes in Chibchan languages if vowels with secondary features are counted as separate phonemes

Languages	Number
Guaymí	16
Paya	15
Cabécar, Teribe	13
Barí, Bocotá, Bribri	12
Chimila, Guatuso	10
Damana, Ika, Rama	6
Boruca, Cuna, Tunebo	5
Kogi	4

This article has offered an overview of the existing descriptions of the vowel systems of all the Chibchan languages, and the data have been summed up in a systematic way for each language according to a consistent theoretical framework. This is intended to facilitate the use of these languages in comparative studies, as well as making the information of each language more available in general.

The comparison conducted here also reveals to what extent the vowel systems vary within the family. For instance, none of the languages have developed rounded front vowels, and unrounded non-low back/central vowels are scarce. On the other hand, the number of vowel qualities differs significantly, from three to eight, partly due to the existence of additional contrastive vowel features in many of the languages. Most common in the modern-day Chibchan languages is a basic five-vowel system, just like in the reconstructed Proto-Chibchan. However, the majority of the languages have lost nasality as a phonological vowel feature, while four of them have developed contrastive vowel quantity.

Moreover, in regard to the individual Chibchan languages, it has become clear that the vowel systems of many of them are insufficiently studied, because significantly divergent interpretations of certain aspects of the systems have been published. In some cases, the issue is the number of phonemes or secondary features, whereas in other cases, the phonological system is agreed upon, but the phonetic realizations of the phonemes are unclear. The use of distinctive features in this paper is also very simplistic, due to the fact that the allophony that would reveal phonological patterns has still not been described for most of the Chibchan languages. I certainly hope that this outline will serve as an incentive for more elaborate phonetic and phonological analyses of each language. If this happens, the classifications presented here might soon become outdated.

6. References

Abarca González, R. (1985). Análisis fonológico del guaymí movere. *Estudios de Lingüística Chibcha, 4*, 7-46.

Bourland Hawley, D. D. (1975). Un análisis fonológico de cabécar. *Revista de Filología y Lingüística de la Universidad de Costa Rica, 1*(2), 49-68. https://doi.org/10.15517/rfl.v1i2.15030

Catford, J. C. (2001). *A Practical Introduction to Phonetics* (2nd ed.). Oxford University Press.

Centro de Investigación y Documentación de la Costa Atlántica [CIDCA]. (1987). *Diccionario elemental rama*. http://www.turkulka.net/docs/RMA001R035I001.pdf

Chevrier, N. (2017). *Analyse de la phonologie du bribri (chibcha) dans une perspective typologique. Nasalité et géminée module* (Doctoral dissertation, Université Lumière Lyon 2, France).

Constenla Umaña, A. (1981). *Comparative Chibchan phonology* (Doctoral dissertation, University of Pennsylvania, USA).

Constenla Umaña, A. (1982). Desarrollo del estudio diacrónico de las lenguas chibchas. *Estudios de Lingüística Chibcha, 2*, 15-66.

Constenla Umaña, A. (1985). Clasificación lexicoestadística de las lenguas de la familia chibcha. *Estudios de Lingüística Chibcha, 4*, 155-197.

Constenla Umaña, A. (1988). Indicios para la reconstrucción de clasificadores en el sintagma nominal protochibcha. *Revista de Filología y Lingüística de la Universidad de Costa Rica, 14*(2), 111-118. https://doi.org/10.15517/rfl.v14i2.18972

Constenla Umaña, A. (1989). La subagrupación de las lenguas chibchas: algunos nuevos indicios comparativos y lexicoéstadísticos. *Estudios de Lingüística Chibcha, 8*, 17-72.

Constenla Umaña, A. (1991). *Las lenguas del Área Intermedia: Introducción a su estudio areal*. Editorial de la Universidad de Costa Rica.

Constenla Umaña, A. (1995). Sobre el estudio diacrónico de las lenguas chibchenses y su contribución al conocimiento del pasado de sus hablantes. *Boletín Museo del Oro, 38-39*, 13-55.

Constenla Umaña, A. (1998). *Gramática de la lengua guatusa*. Editorial de la Universidad Nacional.

Constenla Umaña, A. (2005). Acerca de la relación genealógica entre las lenguas misumalpas y las chibchenses. *Estudios de Lingüística Chibcha, 23*, 9-89.

Constenla Umaña, A. (2007). *La lengua de Térraba*. Editorial de la Universidad de Costa Rica.

Constenla Umaña, A. (2008). Estado actual de la subclasificación de las lenguas chibchenses y de la reconstrucción fonológica y gramatical del protochibchense. *Estudios de Lingüística Chibcha, 27*, 117-135.

Constenla Umaña, A. (2011). Estado de conservación y documentación de las lenguas de América Central pertenecientes a las agrupaciones jicaque, lenca, misumalpa, chibchense y chocó. *Revista de Filología y Lingüística de la Universidad de Costa Rica, 37*(1), 135-195. https://doi.org/10.15517/rfl.v37i1.2353

Constenla Umaña, A. (2012). Chibchan Languages. In Campbell, L. & Grondona,V. (Eds.), *The Indigenous Languages of South America: A Comprehensive Guide* (pp. 391-440). De Gruyter Mouton.

Constenla Umaña, A., Elizondo Figueroa, F., & Pereira Mora, F. (1998). *Curso básico de bribri*. Editorial de la Universidad de Costa Rica.

Craig, C. G. (1986). The Rama language: a text with grammatical notes. *Estudios de Lingüística Chibcha, 5*, 21-44.

Duanmu, S. (2015). Contrast and Vowel Features. In Raimy, E., & Cairns, C. E. (Eds.), *The Segment in Phonetics and Phonology* (pp. 218-235). Wiley Blackwell. https://doi.org/10.1002/9781118555491.ch10

Forster, D. K. (2011). *Paya kuna. An introductory grammar*. SIL International. https://www.sil.org/system/files/reapdata/52/88/95/52889502165272309191140937197112082328/LCDD_14_Paya_Kuna.pdf

Frank, P. S. (1985). *A grammar of Ika* (Doctoral dissertation, University of Pennsylvania, USA).

Frank, P. S. (2008). Gramática de la lengua arhuaca. *Estudios de Lingüística Chibcha, 27*, 7-99.

Gawthorne, L., & Hensarling, G. (1984). Fonología del cogui. In Gawthorne, L., Hensarling, G., Gralow, F., Cook, D., Muller de Young, C., Keels, J., Harms, P., & de Kondo, R. (Eds.), *Sistemas fonológicos de idiomas colombianos* (Vol. 5) (pp. 5-56). Editorial Townsend.

González Campos, G. (2011). Dificultades para normalización ortográfica y problemas de escritura entre los cabécares de Chirripó. *Estudios de Lingüística Chibcha, 30*, 7-35.

González Campos, G., & Obando Martínez, F. (2017). *Fonología y ortografía del cabécar: apuntes dirigidos a maestros de lengua y cultura*. Editorial Universidad Estatal a Distancia.

Headland, E. (1997). *Diccionario bilingüe uw cuwa (tunebo)-español, español-uw cuwa (tunebo) con gramática uw cuwa (tuneba)*. Instituto Lingüístico de Verano and Editorial Buena Semilla.

Headland, P., & Headland, E. (1976). Fonología del tunebo. In Instituto Lingüístico de Verano and Ministerio de Gobierno de la República de Colombia (Eds.), *Sistemas fonológicos de idiomas colombianos* (Vol. 3) (pp. 17-26). Editorial Townsend.

Holmer, N. (1953). Contribución a la lingüística de la Sierra Nevada de Santa Marta. *Revista Colombiana de Antropología, 1*, 311-335. https://doi.org/10.22380/2539472X.1899

Holt, D. (1986). *The Development of the Paya Sound-System* (Doctoral dissertation, University of California, Los Angeles, USA).

Holt, D. (1999). *Pech (Paya)*. Lincom.

Jackson, R. T. (1995). Fonología comparativa de los idiomas chibchas de la Sierra Nevada de Santa Marta. *Boletín del Museo de Oro, 38-39*, 57-69.

Jara Murillo, C. V. (2018). *Gramática de la lengua bribri*. E-Digital.

Kristoffersen, G. (2000). *The Phonology of Norwegian*. Oxford University Press.

Krohn, H. S. (2019). Formantes vocálicos en el ngäbere de Costa Rica. *Káñina, Revista de Artes y Letras de la Universidad de Costa Rica, 43*(1), 45-57. https://doi.org/10.15517/rk.v43i1.36791

Ladefoged, P., & Maddieson, I. (1996). *The Sounds of the World's Languages*. Blackwell.

Landaburu, J. (2000). La lengua ika. In González de Pérez, M. S., & Rodríguez de Montes, M. L. (Eds.), *Lenguas indígenas de Colombia: una visión descriptiva* (pp. 733-748). Instituto Caro y Cuervo.

Lininger Ross, B. (1981). Estudios sobre el guaymí ngäbere: fonología, alfabeto y diccionario provisional. *Revista de Filología y Lingüística de la Universidad de Costa Rica, 7*(1-2), 101-115. https://doi.org/10.15517/rfl.v7i1-2.16065

Llerena Villalobos, R. (2000). Elementos de gramática y fonología de la lengua cuna. In González de Pérez, M. S., & Rodríguez de Montes, M. L. (Eds.), *Lenguas indígenas de Colombia: una visión descriptiva* (pp. 59-71). Instituto Caro y Cuervo.

Maddieson, I. (2013). Vowel Quality Inventories. In Dryer, M. S., & Haspelmath, M. (Eds.), *The World Atlas of Language Structures Online*. Max Planck Institute for Evolutionary Anthropology. https://wals.info/chapter/2

Malone, T. (2006). Tone and Syllable Structure in Chimila. *International Journal of American Linguistics, 72*(1), 1-58. https://doi.org/10.1086/505278

Malone, T. (2010). Nasality and Nasal Prosody in Chimila. *International Journal of American Linguistics, 76*(1), 1-41. https://doi.org/10.1086/652753

Margery Peña, E. (1988). La nasalización en el bocotá de Chiriquí. *Estudios de Lingüística Chibcha*, *7*, 65-73.

Margery Peña, E. (1989). *Diccionario cabécar-español/español-cabécar.* Editorial de la Universidad de Costa Rica.

Margery Peña, E. (1996). Fonología del bocotá de Chiriquí. *Estudios de Lingüística Chibcha, 15*, 7-26.

Mogollón Pérez, M. C. (2000). Fonología de la lengua barí. In González de Pérez, M. S., & Rodríguez de Montes, M. L. (Eds.), *Lenguas indígenas de Colombia: una visión descriptiva* (pp. 219-227). Instituto Caro y Cuervo.

Murillo Miranda, J. M. (2016). *Gramática de la lengua guaymí. Dialecto de Costa Rica: una descripción urgente*. Editorial Académica Española.

Odden, D. (2013). *Introducing Phonology* (2nd ed.). Cambridge University Press. https://doi.org/10.1017/CBO9781139381727

Orán, R. B., & Wagua, A. (2011). *Gayamar sabga. Diccionario escolar gunagaya-español*. Equipo EBI Guna, AECID, MEDUCA and MEF.

Ortiz Ricaurte, C. (1989). La composición nominal en kogui. In *Lenguas Aborígenes de Colombia: descripciones* (Vol. 3, pp. 3-142). Universidad de los Andes.

Ortiz Ricaurte, C. (2000). La lengua kogui: fonología y morfosintaxis nominal. In González de Pérez, M. S., & Rodríguez de Montes, M. L. (Eds.), *Lenguas indígenas de Colombia: una visión descriptiva* (pp. 757-780). Instituto Caro y Cuervo.

Pache, M. J. (2018). *Contributions to Chibchan Historical Linguistics* (Doctoral dissertation, Universiteit Leiden, Netherlands).

Portilla Chaves, M. (1989). Reconstrucción del sistema fonológico del prototerbi. *Estudios de Lingüística Chibcha, 8*, 73-99.

Quesada Pacheco, M. Á. (2008). *Gramática de la lengua guaymí (ngäbe)*. Lincom.

Quesada Pacheco, M. Á. (2019). *Gramática boruca*. Lincom.

Quesada, J. D. (2000). *A Grammar of Teribe*. Lincom Europa.

Quesada, J. D. (2007). *The Chibchan Languages*. Editorial Tecnológica de Costa Rica.

Quesada, J. D. (2012). *Gramática del bocotá*. Abya-Yala.

República de Honduras. (2012). *Gramática pesh*. Secretaría de Educuación.

Sánchez Avendaño, C. (2009). Situación sociolingüística de las lenguas minoritarias de Costa Rica y censos nacionales de población 1927-2000: vitalidad, desplazamiento y autofiliación etnolingüística. *Revista de Filología y Lingüística de la Universidad de Costa Rica, 35*(2), 233-273. https://doi.org/10.15517/rfl.v35i2.1174

Schwartz, J. L., Boë, L. J., Vallée, N., & Abry, C. (1997). Major Trends in Vowel System Inventories. *Journal of Phonetics, 25*, 233-253. https://doi.org/10.1006/jpho.1997.0044

Stendal, C. (1976). Puntos básicos de la gramática del cogui. In Summer Institute of Linguistics (Ed.), *Artículos en Lingüística y Campos Afines* (Vol. 2). Townsend.

Trillos Amaya, M. (1997). *Categorías gramaticales del ette taara: lengua de los chimilas*. Universidad de los Andes, Centro Colombiano de Estudios de Lenguas Aborígenes.

Trillos Amaya, M. (2000). Síntesis descriptiva de los sistemas fonológico y morfosintáctico del damana. In González de Pérez, M. S., & Rodríguez de Montes, M. L. (Eds.), *Lenguas indígenas de Colombia: una visión descriptiva* (pp. 749-756). Instituto Caro y Cuervo.

Wheeler, A. (1972). Proto Chibchan. In Matteson, E., Wheeler, A., Jackson, F. L., Waltz, N. E., & Christian, D. R. (Eds.), *Comparative Studies in Amerindian Languages* (pp. 93-108), Mouton. https://doi.org/10.1515/9783110815009.93

Wilson, J. (1982). El alfabeto bribri. In Margery Peña, E. (Ed.), *Diccionario fraseológico bribri-español/español-bribri* (pp. xv-xxiv). Editorial de la Universidad de Costa Rica.

Zsiga, E. C. (2013). *The Sounds of Language. An Introduction to Phonetics and Phonology*. Wiley-Blackwell.

NOTAS

1 Quesada (2007) and Constenla Umaña (2012) use the same spellings for all the language names except two: Kogi/Cogui and Ika/Ica. In these cases I follow Quesada; that is, Kogi and Ika.

2 For instance, Norwegian; see Kristoffersen (2000, pp. 33-37).

3 In a former reconstruction, Constenla Umaña (1981) postulated three additional vowel phonemes, /ɪ/, /ʊ/ and /ə/, none of which had nasalized variants. This therefore included a tense/lax distinction that is present in several modern-day Chibchan languages.

4 This number corresponds to northern Cabécar. The figures in all the following tables also refer to this variety. In the southern dialects of Cabécar, there are seven basic vowels.

Haakon S. Krohn

Vowel systems of the Chibchan languages*
Sistemas vocálicos de las lenguas chibchenses

Forma y Función
vol. 34, no. 2, e8423, 2021
Universidad Nacional de Colombia.,
ISSN: 0120-338X
ISSN-E: 2256-5469

DOI: https://doi.org/10.15446/fyf.v34n2.88423