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ORIGINAL ARTICLE

Linguistic evidence supports a long antiquity of cultivation of barley and buckwheat over that of millet and rice in Eastern Bhutan

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Abstract

Little is known about the prehistoric domestication and cultivation of crops in the Eastern Himalayas (eastern Nepal, Bhutan, Sikkim, Arunachal Pradesh), due to a lack of archaeological and archaeobotanical research in the area. This paper reconstructs the lexical terminology for grains in the East Bodish language sub-family in Eastern Bhutan. Historical linguistic methods suggest that the immediate ancestors of the modern East Bodish speakers cultivated buckwheat (*Fagopyrum*) and barley (*Hordeum*) but not millets or rice. Buckwheat was traditionally thought to have been domesticated in Southwest China; however, this research reveals that cultivation (and potentially subsequent domestication) may have taken place among East Bodish language speakers or their ancestors. These findings also pose a challenge for studies which seek to reconstruct millets to ancestral Tibeto-Burman speaking populations.

Keywords Tibeto-Burman · Eastern Himalayas · Millets · Buckwheat · Bhutan

Introduction

One pressing line of enquiry that bears directly on the study of human prehistory and population movements is the domestication of various grains and their subsequent spread across the globe. Little is known about the history of crop introduction and domestication in eastern Nepal, Bhutan, Sikkim and Arunachal Pradesh, as to date archaeobotanical research has not yet been carried out in the area. Within the context of Asia, rice (*Oryza sativa*) and millets (broomcorn millet, *Panicum miliaceum,* and foxtail millet, *Setaria italica*) are the most discussed (see Fuller et al. 2009, for example, for some useful discussion regarding the domestication of rice and Hunt et al. 2008; Barton et al. 2009; Liu et al. 2009; Lu et al. 2009; for discussion of the domestication of millets). Other crops such as buckwheat (*Fagopyrum* spp.) have, however, received less attention. In the eastern Himalayas (eastern Nepal, Bhutan, Sikkim, Arunachal Pradesh), the ethnographic record shows many modern groups making ample use of different species of millet, however the antiquity of their use is unclear due to a lack of archaeological and archaeobotanical investigation in the region. Observations in different communities throughout the eastern Himalayan regions suggest that different groups use a variety of grains as part of their daily diet including, but not limited to, finger millet (*Eleusine coracana*), broomcorn millet, and foxtail millet, in addition to various types of rice (wet and dry), maize (*Zea mays*), barley (*Hordeum vulgare*), bitter and sweet buckwheat (*Fagopyrum tataricum* and *F. esculentum*), amongst others. Recent work (D'Alpoim Guedes et al. 2015; Chen et al. 2015) in Eastern Tibet (the former Tibetan provinces of Kham and Amdo) using modeling and archaeobotanical data suggests that barley and wheat (*Triticum* spp., European domesticates) replaced millets as a staple crop in the second millennium BC in eastern Tibet. The aim of this article is to examine what linguistics contributes to our understanding of the history of grains in the Eastern Himalaya. Specifically, we look at the lexical terminology for grains in the East Bodish language sub-family in Eastern Bhutan. Historical linguistic methods suggest that the immediate ancestors of the modern East Bodish speakers cultivated buckwheat and barley but not millet or rice. The

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origins of buckwheat domestication have traditionally been argued to have been based in Southwest China; however, this research raises a possibility of a new centre of cultivation (and potentially subsequent domestication) among East Bodish language speakers or their ancestors.

Linguistic palaeontology

One line of inquiry into the past is through linguistic palaeontology. Central to the endeavours of linguistic palaeontology is the assumption that words and their forms can be reconstructed, and that direct inferences can be made with regard to the nature of the proto speech community. For example, Mallory (1991) demonstrates that we can attribute stockbreeding to the proto Indo-European community based in part on the fact that forms for 'sheep', 'cattle', 'goat' and 'pig' can be reconstructed to the proto language.

Linguistic palaeontology has been particularly successful in providing insights into Proto-Austronesian-speaking culture's natural world, material culture (including crops and domesticated animals, metals, clothing, cultural practices, etc.) based on lexical reconstructions. For example, Blust (1995) reconstructs words for 'typhoon' and 'snow; ice; frost' for Proto-Austronesian, suggesting that the people who spoke the proto language lived in an environment where there were typhoons and snow, ice or frost (fitting the picture for Taiwan). Based on faunal terms that reconstruct, Blust (1995) shows that proto-Austronesian speakers were familiar with monkeys, squirrels, pangolins and sharks. A considerable amount can also be inferred about Proto-Austronesian speakers' economy. Blust (1995) shows that this culture was familiar with rice agriculture, based on reconstructable words for 'paddy', 'harvested rice' and 'cooked rice'. In addition, they also exploited several millet species. Blust (1995) goes on to reconstruct terms for root crops (such as wild taro, *Colocasia esculenta*), tree crops, domesticated animals, means by which animals were captured (hunting and fishing), food preparation, tools and implements, settlements and housing, clothing, music, social organization, disease and death, and the spirit world.

Another well-known study examined 77 lexical items from close to 200 Native American languages in order to make inferences about the cultural impact of European contact (Brown 1999). Rather than look to reconstructions, this study examined words for items which were known to come through European contact (such as 'rice', 'chicken', 'soap', 'Saturday') and examined how the languages acculturated the item lexically. The conclusions included the observation that different sociolinguistic patterns led to different acculturation patterns. In the case of both Blust (1995)'s and Brown (1999)'s study, a language's lexicon led to inferences about a culture's past social history.

Linguistic palaeontology has already been put to some use in the Tibeto-Burman language family. Bradley (1997a), for example, compares crop terms in the Burmic subgroup (Lisu, Sani, Lahu, Nosu, Akha, Burmese), specifically identifying terms for 'grain' (as a general term), 'rice', 'millet (*Setaria* and *Panicum*)', 'sorghum', 'buckwheat', 'barley', 'wheat', 'Job's tears' (*Coix lacryma-jobi*), and 'maize'. He concludes that terms for all these, excepting maize, can be reconstructed to Proto Burmic and therefore were also in use by the people who spoke the language, speculating the homeland was in the uplands of current Yunnan province. However, the matter for other groups within Tibeto-Burman is far from settled; while we do find many groups of speakers who are agriculturalists (such as the East Bodish speakers) there remain other groups who are still swidden arboriculturalists (such as the groups described by Blench and Post (2013) in Arunachal Pradesh.

Current hypotheses surrounding Tibeto-Burman crop usage

The existence of a Tibeto-Burman language family was pointed out at least as early as von Klaproth (1823) and linguists have spent nearly two centuries trying to understand the linguistic phylogeny and history of the family. While the relationship of the languages to each other and their historical development has often been contentious, there is little disagreement as to what languages comprise the group. The language family contains over 500 languages, including Tibetan, Chinese, and Burmese, and is known by various names, including Sino-Tibetan, Trans-Himalayan, and Tibeto-Burman. These terms carry with them implicit assumptions about the internal phylogenies of the language families. 'Sino-Tibetan' sees the Sinitic languages as being a primary split off the family while the remaining 'Tibeto-Burman' languages are classified together. The more recent term 'Trans-Himalayan' rejects the primary split of Sinitic as a primary node and further postulates that the homeland of Proto Trans-Himalayan (i.e. Proto Tibeto-Burman/Proto Sino-Tibetan) may be found in the Himalayas, rather than Northeastern China (van Driem 2007b, notes in a footnote that he proposed the term in 2004 as a way to resolve the discrepancies and confusion surrounding the names 'Sino-Tibetan' and 'Tibeto-Burman', p. 266). In this paper we use the term 'Tibeto-Burman' in its original sense; that is, an agnostic statement about internal relations between languages which are presumed to be descended from one ancestor. The name given to this ancestral language is Proto Tibeto-Burman.

It has often been assumed that speakers of Proto Tibeto-Burman were also agriculturalists who cultivated millet, and lived in Northern China, eventually spreading to the Tibetan

plateau. Bradley (2011) concludes that speakers of Proto Tibeto-Burman (using the term 'Sino-Tibetan' to refer to the collection of languages that are here referred to as 'Tibeto-Burman') cultivated both *Setaria* and *Panicum*, reconstructing **tsap* for the former and **lu* for the latter. Zhang et al. (2019), using Bayesian methods, reconstruct a North China homeland for Proto-Tibeto-Burman (using the term 'Sino-Tibetan' to refer to the group of languages captured here by our 'Tibeto-Burman'), also linking the speakers of the proto language to millet farmers in the Yellow River basin. Similarly, Sagart et al. (2019) also find that the family originates with north Chinese millet farmers. Unfortunately, Zhang et al. (2019) do not use the comparative method, for which linguists unanimously agree is the only reliable method to deduce phylogenies for language families. Both Zhang et al. (2019) and Sagart et al. (2019) omit linguistic data from many different subgroups of the Tibeto-Burman languages spoken in the Himalayas, including Kurtöp and the other East Bodish languages. Blench and Post (2013) offer an alternative view, proposing the Proto Tibeto-Burman homeland may have been in the eastern Himalayas, and that the speakers of this language were foragers who exploited the vegetation of the lowland eastern Himalayan region. This proposal is consistent with the notion in linguistics that the centre of diversity is a probably a homeland for a linguistic family. However, like all previous studies, Blench and Post (2013) acknowledge that they are also lacking necessary data. In order to move the field forward, we need to work on reconstructions from the bottom up.

Bhutan and the East Bodish languages

Very little is known about the prehistory of the Eastern Himalayas. Aside from a few finds of stone adzes, we know virtually nothing about the prehistory of Bhutan (Penjore 2017). To date only indirect evidence has been applied to understand the origins of farming in the area. A study using pollen cores argued that by circa 4,280 ± 130 cal BP, humans cut down forests in northwestern Bhutan, and had begun to replace these with fields of crops as evidenced by the presence of cereal pollen (barley) and over-grazing and trampling, which was interpreted as evidence of yak pastoralism (Meyer et al. 2009). Meyer et al. (2009) speculate that those prehistoric inhabitants migrated south from higher elevations on the Tibetan plateau. Historical reports begin only in the past 1,500 years, with Tibetan chronicles detailing the invasion of Tibetans into Bhutan, coercing the indigenous people there to become Buddhists (Hoffman 1975). We are still very far from knowing what effects this and the remaining unknown past has had on shaping the current ethnolinguistic picture.

Of the 19 languages in Bhutan, seven belong to the 'East Bodish' family of the larger Tibeto-Burman family. The term 'East Bodish' was first used by Shafer (1954) to identify a cluster of languages which appeared to be closely related to Tibetan, but were not Tibetic languages, or direct descendants from Old Tibetan. As shown in Hyslop (2013), the East Bodish languages are lexically united by a set of numerals and a few other core vocabulary items. East Bodish languages are spoken in Central and Eastern Bhutan (e.g. Bumthap, Kurtöp, etc.), the adjacent region in Tibet (e.g. Dzala) and some languages in Arunachal Pradesh (e.g. Dakpa). The general understanding in the field has been that the parent of East Bodish languages would have been a sister language to Old Tibetan, making the modern day East Bodish languages 'cousins' to the Tibetic languages (e.g. Bradley 1997b), including Dzongkha, the national language of Bhutan and the only language, other than English, taught in the schools. Of course, it is also possible that the apparent similarity between East Bodish and Tibetic languages could be attributed to language contact. The exact placement of East Bodish within Tibeto-Burman remains unknown, a fact which is compounded by the dearth of published research on East Bodish languages. Figure 1 presents a possible relationship of the East Bodish languages within the context of Tibeto-Burman. The 'Western' branch of the family is one of several primary branches from the Proto language.

The East Bodish language group comprises seven languages which are spoken in an area that ranges from the shared Indian-Bhutan border, just north of the point where the Brahmaputra river turns south into Bangladesh, as far east as the Indian state of Arunachal Pradesh, and north into Tibet. This region spans elevations of as low as 300 m in the south, and upward of 7,000 m in the North. Inhabited areas range from 300 m to approximately 4,000 m (see Fig. 2).

Considering first the languages in southern Bhutan, Khengkha is spoken by approximately 40,000 speakers. Chamberlain (2004) presents a phonological analysis and proposed an orthography but otherwise very little Khengkha data has been published. Adjacent to the Khengkha's northwestern region is the Hengke language, spoken by

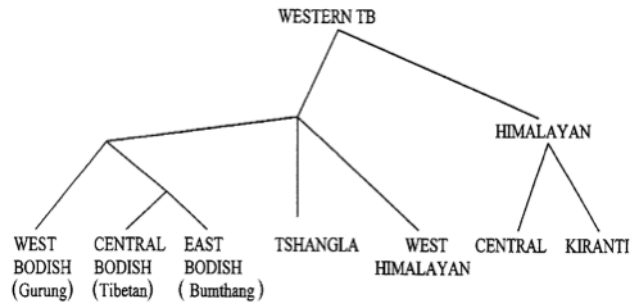

Fig. 1 Proposed location of East Bodish languages within Tibeto-Burman (Bradley 1997b, p 3)

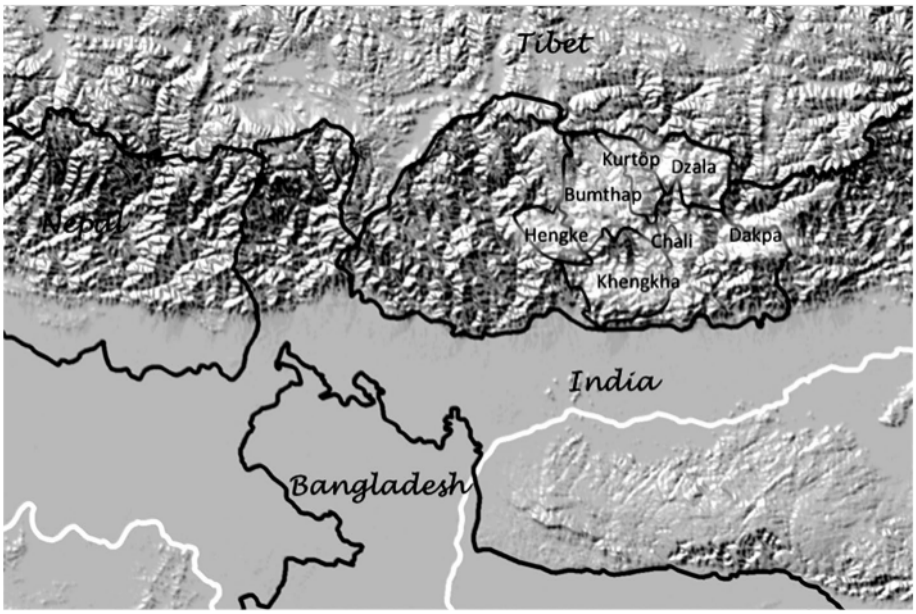

Fig. 2 Approximate location of East Bodish languages

approximately 15,000 speakers. There is considerable diversity within this group, such that people from some regions may not necessarily understand each other. However, in the absence of detailed descriptive work form several villages, it is not possible to argue for or against an analysis that would divide this group into more than one language. Aside from data presented here and in Hyslop (2013, 2014), Hengke data have only appeared in Nishida (2009) and Bosch (2016).

Immediately east of the Hengke region is Bumthap, a language with approximately 30,000 speakers. A grammatical sketch of Bumthap has recently been made available in English (van Driem 2015). Kurtöp has received the most attention, with several articles and theses, including a full reference grammar (Hyslop 2017). Dakpa and Dzala are spoken on the eastern edge of the East Bodish region. Dakpa has perhaps 50,000 speakers spread across Bhutan, Tibet, and Arunachal Pradesh while Dzala has perhaps 40,000 speakers, primarily in Bhutan and Tibet. Hyslop and Tshering (2010) offers some data and analysis on Dakpa and van Driem (2007a) presents data for both and offers the observation that the two seem to form a subgroup within East Bodish (a claim also substantiated in Hyslop 2013). The smallest language in the family is Chali, with approximately 1,000 speakers. Other than the few lexical items presented here and in Hyslop (2013, 2014), Chali is completely undescribed.

It is apparent that there is little work on the subfamily as a whole, but Hyslop (2013) does provide evidence that links the languages together into one family and Hyslop (2015) lays out some of historical phonology and sound changes that account for the modern languages.

Time depth and homeland of East Bodish

An important question when dealing with studies of the past is that of time depth. However, an unfortunate fact of historical linguistics is the inability for it to produce an accurate time scale. Languages change at different rates, under different influences, and via different mechanisms and as such it is impossible to confidently date when a posited proto language would have been spoken. However, linguists can use philology and history (when available), archaeological data (when we are confident of the link between the prehistoric people and the language) and a general sense of internal diversity to offer rough estimates of time depth. Taking the East Bodish family, we can start with its close relative, the Tibetic languages. As modern Romance languages are derived from Latin, the modern Tibetic languages are derived from Old Tibetan. Tibetan was first written down in the 7th century AD and thus we can say the parent language to the modern Tibetic languages must be at least approximately 1,300 years old. Because we know the East Bodish languages separated from Old Tibetan before Old Tibetan was written down, we know that Proto East Bodish must have been spoken more than 1,300 years ago.

We can also look at the internal diversity within East Bodish and compare it to the internal diversity within Tibetan. Doing so, we find variation between the East Bodish languages to be greater than what is found within the modern Tibetic languages. Linguistics still does not have a good way to quantify variation but one can say that the variation within the East Bodish languages seems

to be twice or slightly more of what is found in Tibetic languages. Variation in the linguistic sense is found in multiple domains of language. We can find variation in terms of the sounds (number and types of phonemes, for example), in terms of morphology (shapes of words and how they are put together), syntax (how words are combined to make meaning), semantics and semantic shifts, and any combination of these. The field is far from being able to accurately quantify any of these differences across languages.

Although we know languages do not change at a fixed rate, we can make a rough comparison and estimate that the East Bodish languages may be roughly twice as old as the Tibetic languages, or slightly less than that. That would date the language family to be, roughly, approximately 2,500 years old.

A proto language also needs to have been spoken in a location. The modern East Bodish languages are centred on eastern Bhutan and neighbouring regions in Tibet and Northeast India. There is no reason to hypothesize a homeland very far from here. Therefore, we can tentatively postulate Proto East Bodish to have been spoken in Eastern Bhutan or southern Tibet.

Data and reconstructions

With the relevant background information in place, we can turn to the data and examine what reconstructs to Proto East Bodish, lexically, in order to make inferences about the grains cultivated by speakers of the reconstructed language. Figure 3 shows synchronic East Bodish grain terms in all seven languages, represented using the International Phonetic Alphabet. If a cell is left blank, it is because we have not been able to confirm presence or absence of the grain in the speech community. Use of 'N/A' indicates we confirmed the speech community does not use the grain. For example, in the case of Bumthap, we were able to confirm that broomcorn millet is not cultivated in Bumthang (it is cultivated in other regions of Bhutan, including parts of Pema Gatshel, Trashigang, Samdrup Jongkhar, and Monggar, and likely other regions as well); as such 'N/A' is written in the cell. However, we are still researching use of the grain within the Kurtöp speech community and so that particular cell is left blank. Terms that are cognate, or related to each other, are given the same shading. All sound changes discussed below are demonstrated in Hyslop (2013) and expanded upon in Hyslop (2015). Some of the discussion is repeated here for sake of illustration.

Beginning with terms for a recent introduction, 'maize', we see at least three roots used within the languages and it is not possible to reconstruct a term to Proto East Bodish. Dzala, Bumthap, and Khengkha all use the term *aʃam* and the Dakpa term *uʃom* term is clearly derived from the same root. Note that *aʃam* is also the Tshangla form for 'maize'. Tshangla is Bhutan's second largest language in terms of speakers and the *lingua franca* of eastern Bhutan (van Driem 1998). The Chali form *ahamar* may also be related to this root but there is not enough data from Chali in order to ascertain whether or there are regular correspondences between the sounds in the Chali term and the reflex in other East Bodish languages. Kurtöp is the only language to make use of the term *bakc^{h}ukpa*; it is not known where this term originates from. Hengke *geza* is borrowed from Dzongkha *geza*. The fact that a term for 'maize' does not reconstruct is not surprising as maize is a New World crop, only brought to Bhutan within the past 500 years. It is hypothesized that Proto East Bodish was spoken at least two millennia prior

Gloss	Dakpa	Dzala	Kurtöp	Bumthap	Khengkha	Chali	Hengke
'Maize'	*uʃom*	*aʃam*	*bakc^{h}ukpa*	*ɐʃɐm*	*ɐʃɐm*	*ahamar*	*geza*
'Paddy'	*dep*	*dep*	*mras*	*mras;mrat*	*mras*	*tɕaŋbu*	*sem*
'Husked rice'	*depzi*	*depzi*	*c^{h}uŋ*	*ʧ^{h}uŋ*	*ʧ^{h}uŋ*	*tɕ^{h}uŋza*	*tɕ^{h}um*
'Cooked rice'	*to*	*to*	*ipa*	*zama*	*to*	*zumala*	*to*
'Broomcorn millet' (*Panicum miliaceum*)	*c^{h}oŋ*	*c^{h}oŋ*		*N/A*	*jon*	*jon*	
'Finger millet' (*Eleusine coracana*)	*k^{h}re*	*k^{h}re*	*ʧ^{h}e*	*koŋbo*	*koŋko*	*koŋpu*	*ʧ^{h}e*
'Foxtail millet' (*Setaria italica*)	*món*	*món*	*ran*	*N/A*	*ran*	*ran*	
'Wheat' (*Triticum* sp.)	*ko*	*ko*	*go*	*go*	*kar*	*kar*	*kar; zẽ*
'Barley' (*Hordeum vulgare*)	*ná ~ ne*	*na*	*nas*	*nat*	*na:*	*nâ*	*nɛs*
'Bitter buckwheat' (*Fagopyrum tataricum*)	*brem*	*bremo*	*brama*	*branma*	*brama*	*brama*	*brɛm*
'Sweet buckwheat' (*Fagopyrum esculentum*)	*kjabre*	*kjabre*	*cara*	*carae*	*cere*	*tɕara*	*gere*

Fig. 3 Grain terms in East Bodish languages; see text for further explanations

to this and thus we do not expect to be able to reconstruct a form for it. The other grains, however, were in use in Asia at the time Proto East Bodish was spoken.

We also see several roots when looking at the terms pertaining to rice. Within the East Bodish languages we can identify terms for 'paddy' versus 'husked rice' versus 'cooked rice' even if for some languages 'paddy' and 'husked rice' are homonymous. The form *mras* is found in Kurtöp, Bumthap and Khengkha, perhaps borrowed from a form of Pre-Tibetan (cf. written Tibetan *ḥbras*; see Sagart 2003, who first posits a form **mras* for 'paddy'). Dakpa and Dzala have a different root, *dep*, which also occurs in their word for 'husked rice'. The origin for *dep*, along with Chali *tɕaŋbu* and Hengke *sem* is unknown. Terms for 'husked rice' also vary, involving both the root *dep* and a form with a voiceless palatal or retroflex initial, followed by a high back vowel and velar nasal. Note that the Bumthap and Khengkha forms are probably borrowed, as there is no evidence for native retroflex consonants in either language.

The Bumthap and Chali forms for 'cooked rice' are nominalizations of the verb *zu* 'to eat'. Dakpa, Dzala, Khengkha and Hengke *to* is probably a borrowing from Dzongkha *to*. Kurtöp *ipa* is of unknown origin.

Millet terms also show remarkable variation within the family. Broomcorn millet is not used by all communities who speak East Bodish languages; it is not grown in the Bumthang region and its status in the Kurtöp region is unknown. In the Hengke-speaking region there is variation; for example, millets are not used in Phobjikha but are in regions of lower elevation, such as Tshangkha. Even there, though, the presence or absence of broomcorn millet has not yet been confirmed. Dakpa and Dzala communities use the term *c*^{h}*oŋ* while in Khengkha and Chali the form *jon* is used. Foxtail millet is also absent in the Bumthap-speaking region and in Phobjikha. For Dakpa and Dzala speakers this grain is referred to as *món* while in Kurtöp, Khengkha and Chali foxtail millet is *ran*. Finger millet is the only millet for which all East Bodish languages have a term. We see two different roots in the languages. The Kurtöp and Hengke terms are retroflexed version of Dakpa and Dzala *k*^{h}*re* while Bumthap, Khengkha and Chali all have forms with a root *koŋ*.

East Bodish terms for 'wheat' seem to reflect three different roots. Kurtöp and Bumthap *go* and Dakpa and Dzala *ko* are perhaps related to written Tibetan *gro*. A form *kar* is used in Khengkha, Chali, and some varieties of Hengke, likely borrowed from Dzongkha (the synchronic Dzongkha form for 'wheat' is *kar*, however, the coda —*r* is reconstructable based on the spelling in 'Ucen: དཀར་ <dkar> and compensatory lengthening seen synchronically). The Tshangkha variety of Hengke uses the word *zẽ*, for which no source is currently known.

The lack of common roots for 'maize', 'rice', and millet terms makes reconstruction impossible, suggesting that these crops were not used by speakers of Proto East Bodish. Instead, after the breakup of the family, different language groups adapted new terminology as they acquired the grain. Being able to identify the source of all the disparate terms, and an understanding of how their history reflected adoption of the new grain technology, in each language, would offer considerable support to this hypothesis. However, in most cases this is not known and remains a matter of ongoing work.

While it is not possible to reconstruct maize, rice and millets to Proto East Bodish, we do see evidence in favour of reconstructing 'barley', 'bitter buckwheat' and 'sweet buckwheat'. For 'barley', all East Bodish languages have a monosyllabic form beginning with *n*. The vowel is *a* in all languages except for Hengke and some varieties of Dakpa, for which it is *e*. The sound change *a* > *ɛ* when preceding a coronal is typical for Hengke and so *nɛs* is a regular reflex. Likewise, *s* > *t* in coda position is a sound change in some varieties of Bumthap and Kurtöp and as such the form *nat* in Bumthap is predictable. Not enough is known about the sound changes in the other languages to be certain that the reflexes are predictable but nonetheless we can confidently see that the forms are all derived from the same root, which we tentatively reconstruct as **nas*.

We can more confidently reconstruct both 'bitter and sweet buckwheat' to Proto East Bodish. **branma* remains as *branma* in Bumthap but coda *n* is dropped in the other languages. The sound change *a* > *ɛ* is again reflected in the Hengke form *brɛm* and the loss of the final vowel is also a regular sound change. The change *a* > *e* in Dzala and Dakpa is also reported in Dakpa and Dzala, and as such it is not surprising to see to see forms with *e* in place of *a*. It should be highlighted however, that the Dzala form has a final *o* in place of *a*. This is likely the result of influence from Written Tibetan *bra-bo*. Sweet buckwheat reconstructs as **kjabran*, with all languages showing a reflex except Hengke, which has replaced the native term with the Dzongkha term. *kj*- palatalizes in all East Bodish languages except Dakpa and Dzala. The first vowel fronts in Khengkha and diphthongizes in Bumthap; the motivation for these changes remains unknown. As mentioned above, *a* > *e* is a common sound change in Dakpa and Dzala and is reflected in the second syllable of the reflex. The lack of fronting of the first vowel in the Dakpa and Dzala reflexes is probably due to conditioning environment of the *a* > *e* sound change, which is still a matter of research.

While it is not yet possible to understand all the detailed sound changes which have given rise to the modern East Bodish reflexes for 'barley', 'sweet buckwheat' and 'bitter buckwheat', we can reconstruct a term for the three grains to the parent language shared by modern East Bodish languages with some confidence. Ultimately, of course, we will need to explain all the sound changes in the modern

languages, in addition to the replacement of the Hengke reflex for 'sweet buckwheat' by the Dzongkha equivalent.

The grain terms which we can reconstruct to Proto East Bodish are summarized in Table 1. Because we can reconstruct the grains 'bitter buckwheat', 'sweet buckwheat', and 'barley', we can assume the people who spoke Proto East Bodish were familiar with these crops and made use of them.

Discussion

With very few exceptions, communities of people who speak East Bodish languages in Bhutan cultivate several crops, including maize, rice, millets (broomcorn, foxtail and finger millet), wheat and buckwheat. We have documented terminology for these crops in each language and completed a comparison across the sub-family, reconstructing lexical items where possible. For many crops, disparate roots were in use across the languages, making it impossible to reconstruct the term to Proto East Bodish and, thereby make the inference that people who spoke Proto East Bodish did not cultivate that particular grain. The grains which cannot be reconstructed included maize, rice, all three millets and wheat. Thus, we infer that the modern East Bodish-speaking communities have adopted these crops since the dispersal of the family. Terms which do reconstruct are 'barley', 'bitter buckwheat', and 'sweet buckwheat'; thus, we infer that the people who spoke Proto East Bodish must have cultivated barley and buckwheat.

This finding is interesting for a few reasons. First, the centres of buckwheat domestication are unclear; however, southwest China has been favoured as a centre of domestication (e.g. Konishi et al. 2005; Konishi and Ohnishi 2007; Ohnishi 2009; Hunt et al. 2018). While the range of the wild subspecies of sweet buckwheat (*F. esculentum* ssp. *ancestralis*) is located in Southwest China, the wild progenitor of bitter buckwheat (*F. tataricum* ssp. *potanini*) has a range that covers the Himalayas (Ohnishi 1998a, b; Tsuji et al. 1999). Both species have been postulated to have been domesticated in Southwest China (Konishi et al. 2005; Konishi and Ohnishi 2007; Ohnishi 2009) however as Hunt et al. (2018) points out this has been based on limited genetic analysis of field samples from the area and not based on sampling across the wider Himalayan range of the wild progenitor of bitter buckwheat. While the archaeobotanical evidence of early buckwheat (Xue 2010; D'Alpoim Guedes et al. 2013) supports a centre of domestication for sweet buckwheat in southwest China, it does not rule out additional centres of domestication across the Himalayas, particularly for bitter buckwheat. While the lack of archaeobotanical data from Bhutan and additional linguistic data makes it impossible at present to verify this claim, it is plausible that Bodish speakers may have played a role in its domestication. This idea is supported by the linguistic observation that the base form **branma* refers to the 'bitter' variety while the derived form **kjabran* refers to the 'sweet' variety; perhaps we will find evidence that **kja*- referred to 'sweet' or something similar in the protolanguage.

Of course, the reconstruction of terms for 'buckwheat' does not provide us with definitive evidence that proto East Bodish speakers were the domesticators of buckwheat. We know that language, like culture, can spread across genetic borders. Donohue and Denham (2011), for example, provide a very nice illustration of the different histories told by languages versus genes amongst the speakers of Austronesian languages. Witzel (2005) provides a rich illustration of how language can used to propose hypotheses of prehistoric interaction in Central Asia and northern South Asia in particular. Fuller (2005) proposes different modes of diffusion of foodstuffs, each showing different linguistic consequences, including but not limited to the name being borrowed with the food item. It could indeed be the case that speakers of Proto East Bodish adopted the crop and associated technologies through contact with a different group, just as would be the case with 'barley', a crop we know has its origins further west of the eastern Himalaya. The issue of which linguistic group first domesticated buckwheat is unlikely to be resolved through linguistics alone. Nonetheless, the data presented in this article suggest that proto East Bodish speakers certainly cultivated buckwheat and if they were not the original domesticators of the grain they would likely have had a close relationship with those who did.

Several scholars have hypothesized that millets would have spread across the plateau alongside Tibeto-Burman-speaking populations (e.g. Sagart et al. 2019; Zhang et al. 2019). Our data have shown, however, that at the point Proto East Bodish was spoken, millet and rice were not cultivated. This is congruent with what we know from recent appraisals of the archaeological and archaeobotanical data. D'Alpoim-Guedes et al. (2014, 2015, 2016) argue that while millet agriculture was practiced on the margins of the eastern Tibetan plateau up until roughly 2000 BC, people ceased its cultivation following this date as cooler temperatures made the cultivation of this heat adapted crop impossible. They also argue that it is unlikely that broomcorn and foxtail millet were ever extensively cultivated on the higher altitude plateau, although foxtail millet grains have been found at sites like Karuo (3000–2000 BC, D'Alpoim Guedes et al.

Table 1 Reconstructed East Bodish grain terms

Gloss	Proto East Bodish
'Barley'	*nas*
'Bitter buckwheat'	*branma*
'Sweet buckwheat'	*kjabran*

2013), and later Changuogou (1000 BC, Fu 2001). Of course, it is also possible that these may have been derived through exchange with people in lower altitudes. Cold tolerant barley and to a lesser extent, wheat, became the crops of preference following 2000 BC with barley eventually becoming the crop of choice on the plateau and millets were slowly abandoned. While the presence of barley in Proto East Bodish seems logical given its importance on the plateau following 2000 BC, the addition of buckwheat as a reconstructable word is noteworthy, potentially shedding light on another early centre of buckwheat domestication. To date, there is no directly dated evidence for millet on the plateau following 1000 BC, so it possible that the split between Tibetan and proto east Bodish languages may date to after the abandonment of millet. It is thus possible that the ancestors of Bodish speakers were barley farmers who migrated from the plateau and who began to locally domesticate buckwheat. Our data further supports theories that millets were not extensively cultivated in areas of the plateau aside from its far eastern margins in prehistory.

Summary and conclusions

The East Bodish language family is a subgroup of the larger Tibeto-Burman family, consisting of seven un- or under-described languages in Bhutan and neighbouring regions of Tibet and India. The people who speak East Bodish languages today cultivate maize, finger millet, broomcorn millet, foxtail millet, wheat, sweet buckwheat, bitter buckwheat and rice. However, linguistic palaeontology shows us this has not always been the case. Methods of historical linguistics show us that the speakers of Proto East Bodish only had terms for 'barley', 'bitter buckwheat' and 'sweet buckwheat' and thus cultivated these crops and not the others found today locally. This finding is at odds with what has been reconstructed to earlier stages of Tibeto-Burman (e.g. suggesting there was a shift away from millets and rice at some stage, and then a shift back to those cereals later). However, the archaebotanical record of the Tibetan plateau suggests that rice was never an important crop, and millet was only ephemerally used on the margins of the eastern Tibetan plateau. Barley was one of the two known domesticates to have successfully implanted on the high-altitude plateau following 2000 BC and as a result its reconstruction to Proto East Bodish is thus unsurprising. The reconstruction of buckwheat to Proto East Bodish may reveal another centre of domestication of another key Himalayan crop. Linguistic palaeontology may have revealed a previously unknown centre of buckwheat exploitation (and potentially early cultivation). Future archaeobotanical research in the region should aim to test if the early inhabitants of the Eastern Himalaya played a role in the cultivation and domestication of this important crop.

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