IF AGRICULTURE CANNOT BE RECONSTRUCTED FOR PROTO-SINO-TIBETAN WHAT ARE THE CONSEQUENCES?

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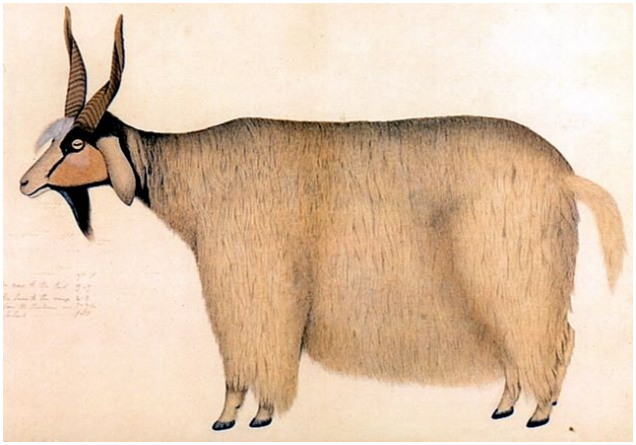

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1. Introduction

Our understanding of the linguistic prehistory of South and SE Asia is strongly connected with claims concerning dates and homelands for its major language phyla. Recent redating of agriculture in India and SE Asia has tended to push the inception of the Neolithic much nearer the present (perhaps only 4200 BP) (Higham 2002, 2004). These relatively short chronologies must be reconciled with the reconstructibility of agricultural terminology in the phyla of the region such as Sino-Tibetan, Austroasiatic, Hmong-Mien and Daic. It is assumed here that the results from linguistic reconstruction should be congruent with known archaeological, ecoclimatic and genetic data; if they are not, then the reconstruction. It is possible to claim that reconstruction is an abstract historical exercise, such that if there is apparently a form for 'trousers' in proto-Tibeto-Burman then it is irrelevant whether that was its original referent. But most linguists would be unhappy with this; they would rather there was some correspondence between their constructs and realworld situations. Alternatively, it can be claimed there has been a systematic semantic shift; that a proto-referent has been discarded in favour of a modern item. Such shifts clearly occur, but usually they leave traces, semantic doubling in some languages or the original referent in conservative cultures. At any rate, historical reconstruction ought surely to be aware that the semantics of proto-forms has to be credible, not merely the phonology and morphology.

Another problematic conflation in the literature is between 'widespread' and reconstructible to the proto-language. Many roots in Indo-European are found in major languages, but are inconveniently absent in Albanian or Hittite. In one version of historical linguistics this is not an objection; these 'minor' languages are presumed to have lost the roots. But this *should* be held to compromise the reconstruction or at least only be considered evidence for a mesolanguage reconstruction. In the language phyla of mainland SE Asia where we have few reliably attested internal nodes, 'widespread' should not be enough for attribution to the proto-language. The absence of attestations in smaller groups may well be crucial evidence of earlier diversity.

Of all the phyla in the region, Sino-Tibetan remains the most problematic. In part this is because the inaccessibility of comparative materials makes assessment of the true situation difficult. Various claims have been made about the reconstructibility of terms for crops and livestock in Sino-Tibetan, but they have rarely been supported with datasets that are sufficiently broad-ranging to be credible. Although such claims have been taken by archaeologists to support the view that Sino-Tibetan was an expansion of agriculturists, this paper will suggest that no such reconstructions are solid and that scattered look-alikes or subgroup reconstructions simply do not constitute evidence for a proto-language. If this is so, then it has important implications for the prehistory of the phylum in terms of its dating and early evolution.

2. Sino-Tibetan

One of the difficulties in reconstructing Sino-Tibetan is the absence of any consensus on its structure. The internal classification of Sino-Tibetan remains highly controversial, as is any external affiliation. Some key questions are;

- whether the primary branching is Sinitic (i.e. all Chinese languages) and the remainder (usually called Tibeto-Burman) or whether Sinitic is simply part of one branch, e.g. Bodic etc. Certainly the distinctiveness of Sinitic is far from proven.
- what are the inter-relations of its branches?
- there are also claims for links with other phyla such as Austronesian (e.g. Sagart).

There are two markedly different views on the table, shown in the Figure 1 and Figure 2;

Figure 1. Sino-Tibetan according to Matisoff (2008)

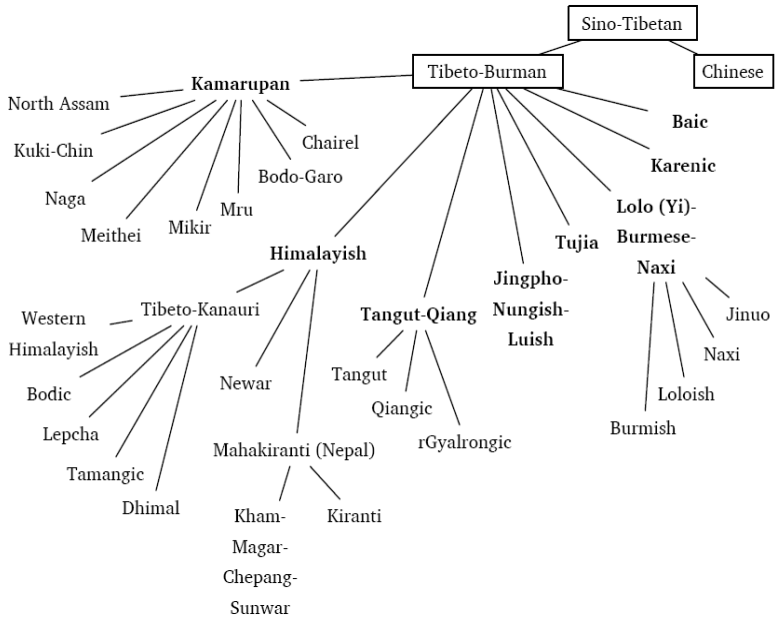
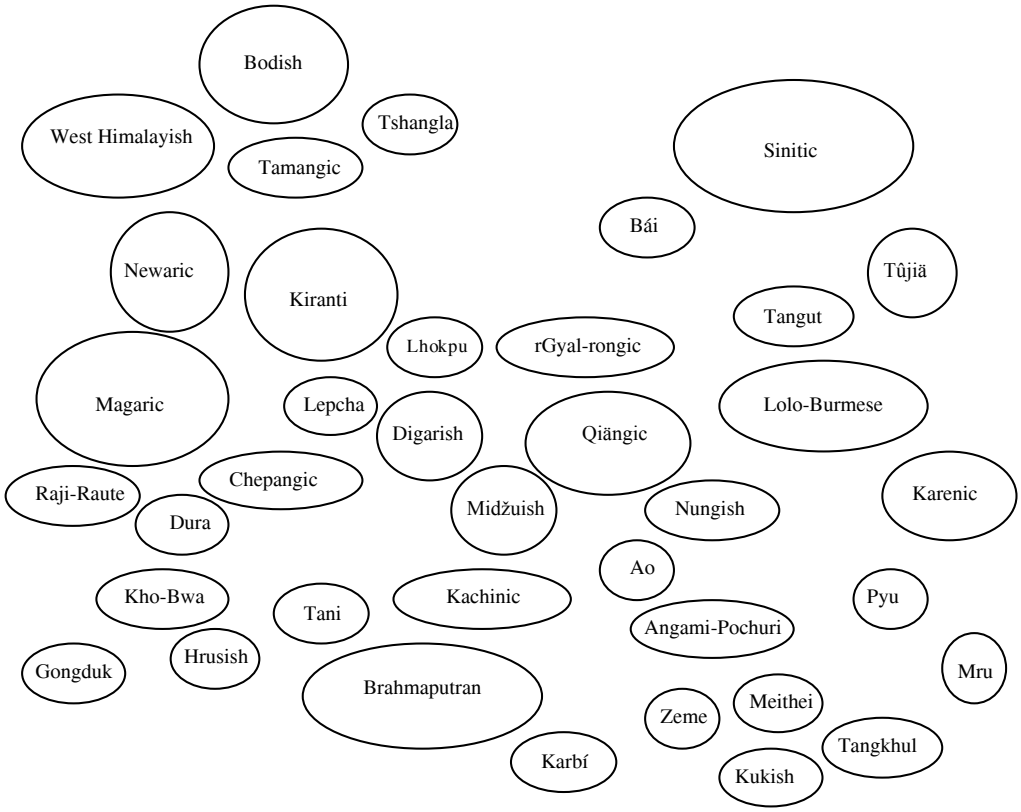


Figure 2. 'Fallen leaves' model of Sino-Tibetan according to Van Driem (many places)



Both these classifications essentially show large numbers of parallel arrays, with Van Driem being the extreme version of the agnostic view. But however you look at it, the building of a hierarchical model of Sino-Tibetan appears to be a long way off. In terms of internal diversity, the region from the southern flanks of the Himalayas to the Assam region is massively diverse synchronically, with large numbers of small subgroups which appear to be very different from one another. We may have to suppose an original diversity more characteristic of NE Asia or parts of the Amazon. As NE India and adjacent regions open up, we are beginning to understand the enormous linguistic diversity of this region. It has yet to be proven that some groups are Sino-Tibetan at all rather than isolates with an Sino-Tibetan superstrate. Recent reports that the

sago-exploiting Sulung may simply be something else[1]. The supposedly Tani-affiliated Milang emphasise vegeculture and hunting strongly in contrast to the classic image of Sino-Tibetan as a cereal based culture, plus the presence of near-foragers and vegetative cropping systems quite distinct from the classic grain-based model. Was this also the case in the Sinitic-speaking region? Was it once much more diverse but that assimilation of any pre-existing languages has flattened out this diversity? The presumably remnant Tujia and Bai make this seem a very real possibility. Bai, more than Tujia, has so many deep level Sinitic borrowings that its base lexicon is hard to determine.

It is not the case that we can confidently reconstruct *any* agricultural terms to PST, simply because there are no certain attestations in numerous subgroups, especially in the Himalayan and NE Indian branches. Although we can suggest some potential terms (quaisi-reconstructions) attested in well-known branches such as Sinitic, Karenic and Lolo-Burmese, almost all these terms also occur in neighbouring phyla which points to the ease with which they are borrowed. This suggests to sceptical observers that they may also be borrowed between branches of Sino-Tibetan.

If we don't have reliable data for many languages, especially on items that reflect subsistence and can thus potentially be linked to archaeology and palaeoclimatology, and we don't have anything resembling a consensus on internal structure, then reconstructions take on a very provisional character. It should be remembered that Indo-European studies are split in two between the horse pastoralism solution (Anthony 2008) and the Anatolian farming solution (Renfrew many places) which has corresponding implications for dates.

3. The issue of Sinitic

The common name of the phylum, Sino-Tibetan, rests on a presumed division between Sinitic and the remaining languages[2] (Bodman 1980, Handel 1998). Yet this is essentially a cultural hypothesis, the language of a classical civilization contrasted with those of a multiplicity of tribal groups. Many Sinologists previously held that the relationship with Tibeto-Burman was simply an unproven speculation. The division has never been convincingly demonstrated in purely linguistic terms and is often simply assumed without discussion. Major textbooks such as Thurgood and LaPolla (2003) simply pass over the issue. Alternative hypotheses, such as the 'Sino-Bodic' of Van Dreim (1997) have not been treated as a contribution to the debate. But on general grounds this primary division seems an unlikely structure simply because Sinitic is not very diverse when compared with the rest of Sino-Tibetan. Even given the caveats just expressed it must be relatively recent. The more we understand about the morphology of Old Chinese the more it seems to resemble the languages of the Himalayas. Ironically it seems to have taken on 'typical' Sinitic traits as part of the process of entering the Sinosphere, as a result of contact with languages already resident. Analogous processes have taken place in recorded history, with the structural changes to the Austronesian language Tsat or the acquisition of tone by the Austroasiatic Mangic languages.

Sinitic is thus better treated as one of many parallel branches of Sino-Tibetan, one among many competing ethnolinguistic groups that gained the historical advantage. Wherever it originates within Sino-Tibetan, there is a broad consensus that its main spread has been north-south from the millet-growing to the rice-growing areas and that it has assimilated or overwhelmed a diverse *in situ* population.

4. Dates and homelands

Determining the age and homeland of a linguistic phylum depends on several types of evidence coming together. Without adhering to any strict version of glottochronology, it is reasonable to expect there to be some correlation between internal diversity and age. Looking across the world, we now have reasonable dates for the diversification of phyla or subgroups such as Polynesian, Bantu, Mayan or Turkic. These estimates are based on a combination of linguistic trees, reconstructible roots and archaeology in the presumed homeland. Furthermore, these are all branches of families where agriculture can be reconstructed without question. In other words, these allow us to see approximately what level of diversity we should see

[1] Thanks to Mark Post for drawing my attention to this

[2] Even the second part of the binomial, 'Tibetan' refers to a recent subgroup with a very shallow time-depth and was presumably favoured because the perceived classical culture of the Tibetans.

over a period of 3-4000 years, which of course is the approximate age of Sinitic. However, the level of internal diversity in Sino-Tibetan is significantly greater and points to a far older date, perhaps at least 7-8000 BP.

Using the density of individual branches to speculate on the homeland of a phylum is fraught with possible errors. The expansion of an individual branch may simply obscure former diversity. Secondary diversification also occurs. Nonetheless, deep divisions between languages in close proximity are at least highly indicative, and in the case of Sino-Tibetan this region is undoubtedly the zone between the southern flanks of the Himalayas and NE India. The use of pseudo-genetic labels such as 'Himalayish' and 'Kamarupan' inevitably give the impression that the component branches fit together. But there is no published case for this and common features in a geographical area are far from proof of genetic affiliation. In other regions of the world, contact linguistics has increasingly demonstrated the extent to which languages can be restructured and relexified through contact, providing initially misleading impressions of their relationships. Such arguments have yet to make a strong impression on Sino-Tibetanists. At the present stage, we should consider the default hypothesis to be a large number of parallel branches which are often strikingly different from one another.

5. The archaeological record

The archaeology of the Sino-Tibetan region is unfortunately highly uneven, especially in respect of archaeobotany and archaeozoology. We are beginning to have a high density of sites in China, and it is possible make statements about the earliest dates for crops and livestock. West of China, only the Tibetan Plateau has some reasonable dates. Nepal and NE India are represented by surface finds and typological assertions rather than stratified excavations. But if the Neolithic of SE Asia and the Indian subcontinent is any guide, agriculture may well be quite late. Certainly the survival into the present of near-foraging cultures in NE India also suggests this.

The archaeology of the Tibetan region is sketchy at best, but Middle Stone Age foragers were reaching the high altitudes as early as 20,000 BP (Zhang et al. 2003). A second phase of occupation, beginning by 7500 BP, is marked by the presence of microliths (Figure 3) and is attributed to seasonal exploitation by foragers (Huang 1994). Permanent human occupation of the Plateau begins by 4-5000 BP (Aldendorfer & Zhang 2004). This is most likely to reflect the domestication of the yak, which would make it possible to exploit the pastures of the Plateau and subsist in the inimical climate all year round (Xuebien et al. 2008).

Figure 3. Microlithic sites on the Tibetan Plateau

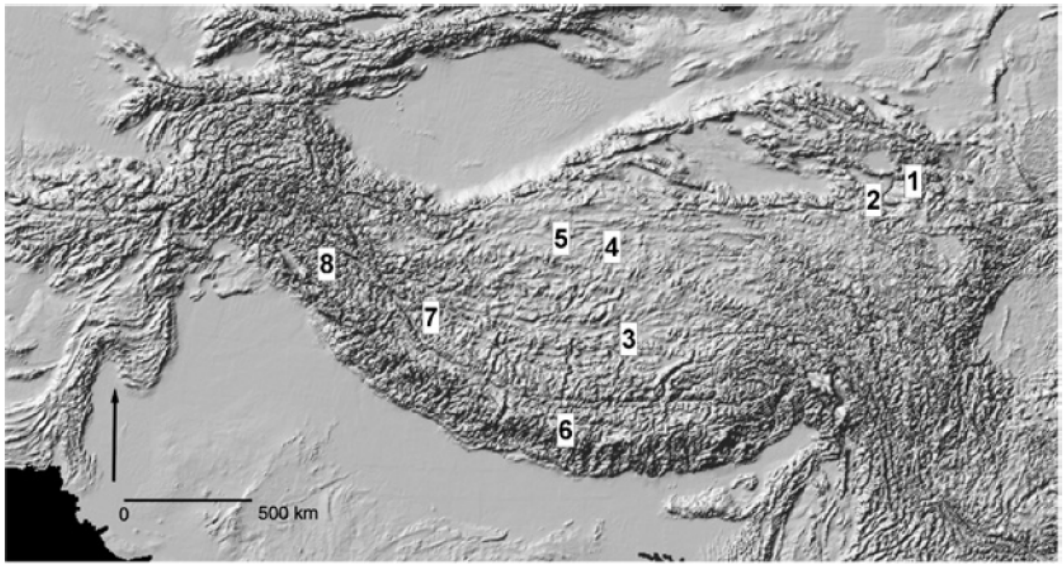


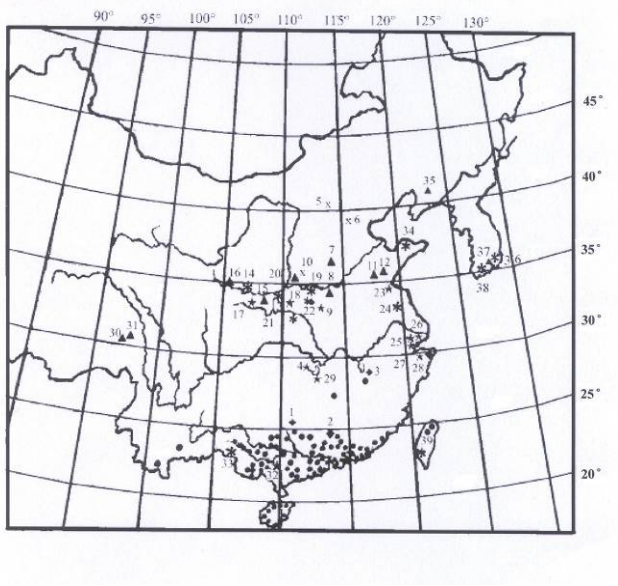
Fig. 7. Location of major microlithic sites on the plateau. 1: Layihai; 2: Dayutai; 3: central Chang Tang sites; 4, 5: northern Chang Tange sies; 6: Zhongba, Nyalam; 7: upper Yarlung Tsangpo sites; 8: Rutog.

6. Early crops

Chinese archaeology has placed much emphasis on rice domestication and very early dates are to be found in some of the literature. Domestic *Oryza sativa* is one of the world's major crops and plays a crucial nutritional and cultural role in societies throughout East Asia. It is generally considered to have been domesticated twice, once in China and once in India (see discussion in Crawford & Chen Shen 1998; Kovach et al. 2007). Rice of Chinese origin is *Oryza japonica* and from India, *Oryza indica*. The likely place of origin of the Chinese rice is the Yangzi and Yellow River basins and the Indian rice the Ganges basin, though this is less certain. There has been considerable work attempting to date the domestication and spread of rice, reviewed in Crawford & Shen (1998), Kovach et al. (2007) and for China in Lu (2005)[3]. Surprisingly, if rice was domesticated twice, in India and in the Yangzi valley, the grains of both seem to have spread and interchanged remarkably quickly.

Normile (1997) reports rice remains before 11,500 BP in Hunan and Hubei in central China and dates of similar antiquity regularly occur in the literature. Jiang & Liu (2006) review a series of dates for this region between 8000 and 13,500 BP. However, Fuller et al. (2008) argue that many of these finds are either poorly dated or refer to wild rice and arise from a misunderstanding of the phenotypic characters of the grain and that true domestic rice only occurs from about 6000 BP onwards. However, as Zong et al. (2007) point out, by 7700 BP there is good evidence for landscape management, through fire and flood control, consistent with paddy cultivation. It is possible that these contradictory views can be resolved by suggesting that China is another place where 'cultivation without domestication' took place over some thousands of years. In other words, through a variety of proto-agricultural techniques, societies were able to increase output and manage risk, but without the breeding strategies that show up as true domestication in grain characteristics. However, the Neolithic in SE Asia is much later, probably 4500-4200 BP. Why doesn't rice spread southwards? Presumably because abundant resources and low population densities meant that foraging remained a rational strategy for much longer.

Figure 4. Sites with early rice and millet in China



Source: Lu (2005)

Foxtail millet (*Setaria italica*) is one of the most established crops in the region. Generally thought to have been domesticated in China, its wild ancestor may be *Setaria viridis*. Lu (2005) refers to domesticated foxtail millet in the Beixing assemblage, between the Yangzi and Yellow rivers, ca. 7000 BP, but the oldest directly dated remains of foxtail millet may be at Chengtoushan in Central China at 5800 cal BP (Hiroo et al. 2007). Foxtail millet spreads to Taiwan by 5500 BP and is cultivated by the expanding Austronesians. Figure 4 shows the distribution of sites with early rice and millet in China, taken from Lu (2005).

There are three other cereals in the Sino-Tibetan world which are indigenous to the region and may well be implicated in the early development of subsistence;

[3] The website http://www.carleton.ca/~bgordon/Rice/paper_database.htm provides translations of recent work on archaeological rice in China.

Broomcorn millet	*Panicum miliaceum*
Buckwheat	*Fagopyrum esculentum*
Job's tears	*Coix lacryma-jobi*

Jiang et al. (2008) report a find of Job's tears in a cemetery near Xinjiang dated to 2000 BP.

Wheat and barley were originally a Near Eastern winter crops, which diffused across Central Asia. At Xishanping, in northwest China, wheat and barley, carbon-dated to 2650 BC, have been found (Dodson and Xiaoqiang). Wheat, *xiǎo mài* (小麥), is attested in Old Chinese (麥 *mrə̂k* according to Schuessler 2007) but not barley, *dà mài* (大麥). Starostin (2008) argues the *mrək* root is from Altaic, citing proto-Tungus **murgi*.

Three other cereal crops are of African origin and seem to have been transmitted early to India, where they appear in the archaeological record around 4000 BP (Blench 2003). These are;

sorghum	*Sorghum bicolor*
finger-millet	*Eleusine coracana*
pearl-millet	*Pennisetum glaucum*

They appear to spread rapidly to China after that, probably through the Himalayan corridor as they are referred to in Chinese historical sources.

7. Early livestock

With domestic animals we have a fairly good idea when these appear in the Chinese archaeological record, much less certainty about other Sino-Tibetan-speaking areas. Table 1 shows the earliest dates for the appearance of characteristic species in China.

Table 1. Early livestock in China

Species	Date BP
Dog	Before 10,000
Pig	ca. 7700
Sheep/goat	4400
Cow	4300
Horse	3200
Chicken	?? 3300

Source; Yuan et al. (2008)

We do not have any reliable dated evidence for the yak or the mithun. But the genetic evidence for yak domestication certainly points to the eastern end of the Himalayas (Xuebien et al. 2008). The mithun remains a semi-wild species in NE India managed by the community and presumably may have had this status for a very long period. Evidence for the introduction of the buffalo remains stubbornly late. Corbet and Hill (1992:266) say that it is found only as a domesticated animal throughout the Indo-Malayan region, and claim that it was 'probably domesticated prior to 2000 BC in SW Asia'. Archaeological and linguistic evidence for its diffusion across India and into SE Asia is sorely lacking, however.

Photo 1. Shang Dynasty bronze cattle models

Source: National Museum of China

8. The linguistic record

8.1 General

The presumed area of greatest diversity in Sino-Tibetan is ecologically very variable and ranges from humid tropical forest to high-altitude montane habitats. Cereals are likely to be more associated with drier hill regions, although the introduction of paddy rice would have changed this equation in the lowlands. Typical crops associated with the lowlands would be vegetatively propagated taro, yams (*Dioscorea* spp.) and bananas/plantains (Musaceae). Unfortunately, lowland species are both less well recorded linguistically and harder to find in the archaeological record. For example, many lexical sources refer to 'yam' without further specification and it is difficult to know to what crop this applies. Similarly, there are three recent introductions, cassava, sweet potato and Andean potato, all of which are of New World origin, which are regularly confused with indigenous species. For the most important cereals, foxtail and broomcorn millet, rice and buckwheat, the wild relatives occur in the same geographic region. It is therefore only an assumption that reconstructions refer to the cultivated forms; these cereals were almost certainly gathered wild prior to domestication. Co-associated reconstructions such as 'field', 'hoe' etc. would constitute better evidence for early agriculture.

8.2 Cereals

Table 2 shows a series of widespread roots applied to cereals in Sino-Tibetan;

Table 2.Widespread roots for cereal in Sino-Tibetan

Sino-Tibetan	Gloss	Also
#mei	rice	[also in Daic and Hmong-Mien]
#ʃan	rice	[also in Daic]
#[rə]kaw	rice grain	[also in Austroasiatic and Daic]
#tɕhɯ	paddy rice	[also in Daic and Hmong-Mien]
#tʃɔk	foxtail millet	[also in Mienic and ? Austronesian]

None of these are attested all across the Sino-Tibetan-speaking region and all are found outside Sino-Tibetan. Still they are important evidence for the spread of cereal agriculture subsequent to the diversification of the phylum. Table 3 shows a proposal for the reflexes of one of the primary etyma for 'hulled rice', *#mi*;

Table 3. 'Hulled rice' *#mi* in SE Asian languages

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	Chinese	mǐ (米)	hulled rice	
Sino-Tibetan	Sinitic	Chinese	mí 蘼	millet	
Sino-Tibetan	Sinitic	OCM	*mîʔ		Schuessler (2007)
Sino-Tibetan	Bai	Bai	me^{33}		Allen (2007)
Sino-Tibetan	Loloish	Jinuo	a^{44} $mɛ^{44}$	rice	Sagart (1999)
Sino-Tibetan	Loloish	Gong	$maŋ^{33}$	rice (?< Daic)	Mayuree (2007)
Sino-Tibetan	Loloish	Black Lahu	mi^{33}	paddy rice	Edmondson (n.d.)
Sino-Tibetan	Loloish	Nusu	me^{33} me^{31}		Sagart (1999)
Sino-Tibetan		Dimasa	mai	rice	Matisoff (2003)
Sino-Tibetan		Luoba	a-mə	rice	Matisoff (2003)
Sino-Tibetan	Karenic	Sgaw	me	boiled rice	Matisoff (2003)
Sino-Tibetan	Naga	Garo	mi	rice	Burling (2003)
Sino-Tibetan	Naga	Tangkhul	ma	paddy	Matisoff (2003)
Hmong-Mien	Mien	P-Mienic	$*hmei^{B}$	husked rice	Ratliff (in press)
Hmong-Mien	Mien	Mun of Hainan	mei^{354}	hulled rice	Shintani & Yang (1990)
Hmong-Mien	Mien	Mun of Funing	mei^{53} pe^{31}	hulled rice	Shintani (2008)
Hmong-Mien	Mien	Mien	$*mɑi^{3}$		Wáng Fúshì (1995)
Austroasiatic	Vietic	Vietnamese	mạ	young rice plant	check
Austroasiatic	Bahnaric	Didra	$ʔma:^{T}$	field rice	check
Daic	Kra	Gelao	mpəɯ C2	cooked rice	Ostapirat (2000)

Phylum	Branch	Language	Attestation	Gloss	Source
Daic	Kra	Lachi	mm	cooked rice	Ostapirat (2000)
Daic	Kra	Paha	ŋaa C2	cooked rice	Ostapirat (2000)
Daic	Kra	Laha	mlaa	cooked rice	Ostapirat (2000)
Daic	Kra	Biao	mii C2	cooked rice	Ostapirat (2000)
Daic	Hlai	Proto-Hlai	*C-mu:nʔ	rice	Norquest (2007)
Daic	Be-Tai	Be	muŋ^{4}	growing rice	Hashimoto (1980)
Daic	Be-Tai	Be	moŋ^{5}	unhulled rice	Hashimoto (1980)
Daic	Tai	Bouyei	maŋ^{5}	rice in child language	Ratanakul et al. (2001)

Discussed in Schuessler (2007: 381). This is clearly of significant antiquity in Sino-Tibetan and almost certainly borrowed in Mienic. The Daic form is only doubtfully cognate.

Foxtail millet **(***Setaria italica***)** names point to an early form, something like *#tʃɔk*. Although Burmese maintains a distinction with *Panicum* millet most languages now use the same word for both crops. Table 4 shows the terms related to *#tʃɔk* in Sino-Tibetan and neighbouring languages;

Table 4. Reflexes of *#tʃɔk* for 'foxtail millet' in SE Asian languages

Phylum	Branch	Language	Attestation	Gloss	Source
Sino-Tibetan	Sinitic	Chinese	sù (粟)	grain	Shintani & Yang (1990)
Sino-Tibetan	Sinitic	Chinese	shǔ (黍)	glutinous millet	
Sino-Tibetan	Sinitic	MC	syowk		
Sino-Tibetan	Sinitic	OCM	*sok		Schuessler (2007)
Sino-Tibetan	Sinitic	OC	*tsik		Sagart (1999)
Sino-Tibetan	Tujia	Tujia	wu^{1} suo^{1}		Brassett & Brassett (2004)
Sino-Tibetan	Nungish	T'rung	tɕaʔ^{55}	millet	Sagart (1999)
Sino-Tibetan	Loloish	Lisu	tʃøʔ^{21}		Bradley (1997)
Sino-Tibetan	Loloish	Sani	tʃɤ̱^{21}		Bradley (1997)
Sino-Tibetan	Loloish	Nosu	tʃi̱^{55}		Bradley (1997)
Sino-Tibetan	Loloish	Akha	ɕa^{55} do̱^{33}		Bradley (1997)
Sino-Tibetan	Burmic	Burmese	ʃaʔ^{5}		Bradley (1997)
Sino-Tibetan	Tibetic	Lhokpu	cək		Van Driem (p.c.)
Sino-Tibetan	Tani	Proto-Galo	*ta-jak	foxtail millet	Post (2007)
Hmong-Mien	Mien	P-Mienic	tsyəi^{A}	millet	Ratliff (in press)
Hmong-Mien	Mien	Mun of Hainan	t'juu^{11}	grain	Shintani & Yang (1990)
Hmong-Mien	Mien	Mun of Funing	tsu^{53}	*Setaria italica*	Shintani (2008)
Austronesian	Formosan	Atayal	basag		
Austronesian	Philippines	Bontok	sabog		Madulid (2001)

Buckwheat (*Fagopyrum esculentum*) is an important crop in the Himalayan region and may well have been domesticated early, but is poorly attested archaeologically and linguistically. The domestication of buckwheat is described in Joshi & Rana (1995) and Ohnishi (1998). It is generally considered to have been domesticated in NW China and to have spread widely through the region. Buckwheat is a high-altitude crop, so etyma often disappear when populations migrate to lowland areas. Buckwheat is the most important crop of the mountain regions above 1600 m a.s.l. both for grain and greens and occupies about 90% of the cultivated land in the higher Himalayas. Table 5 shows terms for buckwheat in East Asian languages;

Table 5. 'Buckwheat' in East Asian languages

Phylum	Branch	Language	Attestation	Comment	Source
Sino-Tibetan	Sinitic	Chinese	qiáo mài (蕎麥)		
Sino-Tibetan	Sinitic	SW Chinese	tɕiau^{31}		Chen (1996)
Sino-Tibetan	Bai	Bai	ky^{21}		Allen (2007)
Sino-Tibetan	Qiangic	Jinghua	tãu tʃə^{13}		Matisoff (2003)
Sino-Tibetan	Qiangic	Qiang	ʤuɑʁɑ		LaPolla (2003)
Sino-Tibetan	Qiangic	Taoba	tõ^{35} tɕi^{35}		Matisoff (2003)
Sino-Tibetan	Loloish	Lisu	gwa^{21}		Bradley (1997)
Sino-Tibetan	Loloish	Sani	qɒ^{21}		Bradley (1997)
Sino-Tibetan	Loloish	Lahu	ɣa^{53}		Bradley (1997)
Sino-Tibetan	Loloish	Nosu	ŋgɯ^{33}		Bradley (1997)
Sino-Tibetan	Loloish	Akha	ɣa^{21}		Bradley (1997)
Hmong-Mien		PHM	*ɟæu	? < Chinese	Ratliff (in press)
Hmong-Mien	Hmong	White Hmong	cey		Ratliff (in press)
Hmong-Mien	Mien	Mun of Funing	hao^{53} ga^{53}		Shintani (2008)
Austroasiatic	Mangic	Bugan	thuŋ^{31} go^{31}		Li (1996)
Daic	Tai	Dehong	ɕiau^{42}	? < Chinese	Chen (1996)
Daic	Tai	Kam	əu^{31} ɕoŋ^{453}		Burusphat et al. (2000)

The linguistic evidence is somewhat exiguous but points to two foci of spread, one from Chinese, the other from an unknown source language in the Himalayas. Bradley (1997:164) reconstructs 'buckwheat' in Niish as **ŋga*^{2} with regular correspondences. Sun (1991: 560) also proposes cognates in Qiang of Guichong as well as Ersu, Naxi and Bai.

8.3 Livestock

Table 1 give the earliest archaeological dates for livestock in China, Table 6 shows some widespread roots for livestock species, with quasi-reconstructions;

Table 6.Widespread roots for livestock in Sino-Tibetan

Sino-Tibetan	Gloss	Also
#mariŋ	horse	all phyla
#ŋwV	cow, ox	[also in Daic and Austroasiatic]
#brak	pig	[also in Austronesian]
#tʰɛŋ	pig	[also in Hmong-Mien and Austroasiatic]
#khui	dog	all phyla
#kaay	chicken	all phyla

The case of the horse is particularly interesting, since it is highly salient archaeologically and its dates of introduction well-attested. The exact location of the domestication of the horse still remains controversial as it rather depends on the interpretation of bit-wear on the teeth (Anthony 2008). However, the best guess is the Pontic-Caspian region at about 4800 BC (Anthony 2008: 200). There is every reason to think that pastoral peoples, herding horses and other species have been on the northern borders of China for a long period. Archaeological evidence for horses is largely confined to China, where they appear rather suddenly in the archaeological record at ca. 3300 BP (Yuan et al. 2008). They are typically found in association with chariots, which very much corresponds to the context of their spread from the west. This route corresponds well with the linguistic data, pointing to a established lexeme in Altaic languages which is probably borrowed into Sinitic and other Sino-Tibetan languages several times and spreads south into other language phyla as well as west into Indo-European. Table 7 shows the distribution of this primary widespread regional lexeme, *#mariŋ*;

Table 7. Reflexes of *#marin*, 'horse' in Eurasian languages

Phylum	Branch	Language	Attestation	Comment	Source
Altaic	Mongolic	Mongolian	morin		
Altaic	Tungusic	Tungus	murin		
Altaic	Koreanic	Korean	mar (말)		
Altaic	Koreanic	Middle Korean	mol		
Japonic	Japonic	Japanese	uma (うま)		
Sino-Tibetan	Sinitic	OCM	*mrâʔ		Schuessler (2007)
Sino-Tibetan	Sinitic	OC	*mraag (马)		Zhou (2002)
Sino-Tibetan	Sinitic	Chinese	mǎ (馬)		
Sino-Tibetan	Bai	Bai	mɛ^{33}		Allen (2007)
Sino-Tibetan	Tujia	Tujia	meŋ^{3}, ma^{4}		Brassett (2004)
Sino-Tibetan	Nungish	Trung	mɯ^{31} gɯ^{53}		Matisoff (2003)
Sino-Tibetan	Tibetic	Written Tibetan	mrâŋ		
Sino-Tibetan	Loloish	Sida	mi^{11} ũ^{11}		K & S (1999)
Sino-Tibetan	Loloish	Lahu	mû		Matisoff (2006)
Sino-Tibetan	Loloish	Nusu	mrɨ^{31}		Bradley (1997)
Sino-Tibetan	Loloish	Akha	maN^{3}		Bradley (1997)
Sino-Tibetan	Loloish	Phu Ka	mu^{31}		Edmondson (n.d.)
Sino-Tibetan	Loloish	Mantsi Muyang	moŋ^{31}		Edmondson (n.d.)
Sino-Tibetan	Loloish	Lhaovo	myoŋ L		Sawada (2004)
Sino-Tibetan	Loloish	Burmese	mraŋ		Bradley (1997)
Sino-Tibetan	Loloish	Burmese	myĩ မြင်း		MLC (1993)
Sino-Tibetan	Kachinic	Jingpho	gùmrà		Maran (1979)
Sino-Tibetan	Kuki-Chin	Lai	ràŋ		VanBik (2007)
Sino-Tibetan	Luish	Cak	`mraŋ	< Burmese ?	Bernot (1966)
Sino-Tibetan		Chepang	sěraŋ		Matisoff (2003)
Hmong-Mien		PMH	myæn^{B}		Ratliff (in press)
Hmong-Mien	Mien	Mun of Hainan	maa^{31}	< Chinese	Shintani & Yang (1990)
Hmong-Mien	Mien	Mun of Funing	ma^{53}	< Chinese	Shintani & Yang (2008)
Hmong-Mien	Mien	Biao Min	ma^{4}		Solnit (1985)
Hmong-Mien	Mien	Pa Hng	mɦi$^{42(4)}$		Wang & Mao (1995)
Austroasiatic	Khmeric	Khmer	maa ម៉ា		Headley et al. (1997)
Austroasiatic	Vietic	PV	*m-ŋəːʔ		Ferlus (ined.)
Austroasiatic	Vietic	Thavung	mɑɑ^{2}		Ferlus (1996b)
Austroasiatic	Vietic	Vietnamese	ngựa		Ferlus (ined.)
Austroasiatic	Vietic	Malieng [Kha Pong]	maŋəː^{3}		Ferlus (ined.)
Austroasiatic	Vietic	Tho	ŋia^{4}		Ferlus (ined.)
Austroasiatic	Palaungic	Rianglang	məraŋ		
Austroasiatic	Palaungic	Proto-Waic	*mrɒŋ		Dif1980
Austroasiatic	Khmuic	P-Khmuic	*hmbraŋ		Premsirat (2002)
Austroasiatic	Khmuic	Phong	ɾma		The (2000)
Austroasiatic	Khmuic	Khabit	maa	< Daic	K & S (1999)
Daic	Tai	Lu	ma^{11}		K & S (1999)
Daic	Tai	Lao	hmaa H1		K & S (1999)
Daic	Tai	Lao	mâː ม้า		Kerr (1972)
Daic	Tai	Shan	maa^{5} ၼၢ်		Moeng (1995)
Daic	Kra	Buyang	ŋaa		Ostapirat (2000)
Daic	Be-Tai	Be	ma^{5}	? < Chinese	Hashimoto (1980)

Phylum	Branch	Language	Attestation	Comment	Source
Daic	Tai	Aiton	maa^{3}		M & T (2001)
Nahali		Nahali	mav		
Dravidian	South	Tamil	mâ		
Indo-European	Germanic	English	mer [mare]		
Indo-European	Germanic	Icelandic	marr		
Indo-European	Celtic	Old Irish	marc	horse	
Nilo-Saharan	Eastern Sudanic	Ajang Nubian	mala	mare	Jakobi (p.c.)

This pattern undoubtedly reflects the spread of horse culture both east and west from a locale in Central Asia; linguistic geography points strongly to Mongolic speakers. Janhunen (1998) pointed out that its absence in Turkic suggests that it is not an Altaic root, but a series of ancient loanwords. Japanese is probably also a borrowing from Sinitic, but Korean would have been derived directly from an Altaic source. Whether English is genuinely cognate is a matter for conjecture, but it is not impossible. Hmong-Mien borrows it from an unknown source, apparently not Chinese, but presumably a language with –r-, which later weakens to –y-.

Conventional wisdom has it that the pig was domesticated in the Near East around 9000 BP and also in Asia at a similar date, as the ancestral wild forms are separated by more than half a million years (Jones 1998; Giuffra *et al.* 2000). Larson et al. (2005) proposed multiple centres of pig domestication in Eurasia with at least one in southeastern Asia. The domestic pig (*Sus* sp.) is virtually an iconic livestock species for the region, appearing in the archaeological record well before the other major large domesticates. Unlike the semi-arid species such as cattle, horses and sheep, which had to adapted to the more humid climate in SE Asia, pigs thrive in an extraordinarily wide range of habitats. Wild pigs occur throughout this region, and may well have been domesticated multiple times. As a consequence, it is not necessarily the case that archaeozoological reports of *Sus* can be taken to indicate domestic pig, unless there is additional contributory evidence. In China, the evidence for domestic pig goes back to approximately 8000 BP (Yuan et al. 2008)). As with 'dog', Chinese has two distinct words, *bā* (豝) and *shǐ* (豕) and both have related words within Sino-Tibetan and in other phyla. The *bā* word, at least in its Old Chinese form, seems to have very widespread relatives across Central Asia as well as down into humid regions. Table 8 shows reflexes of *#brak*, 'pig';

Table 8. Reflexes of *#brak*, 'pig' in East Asian languages

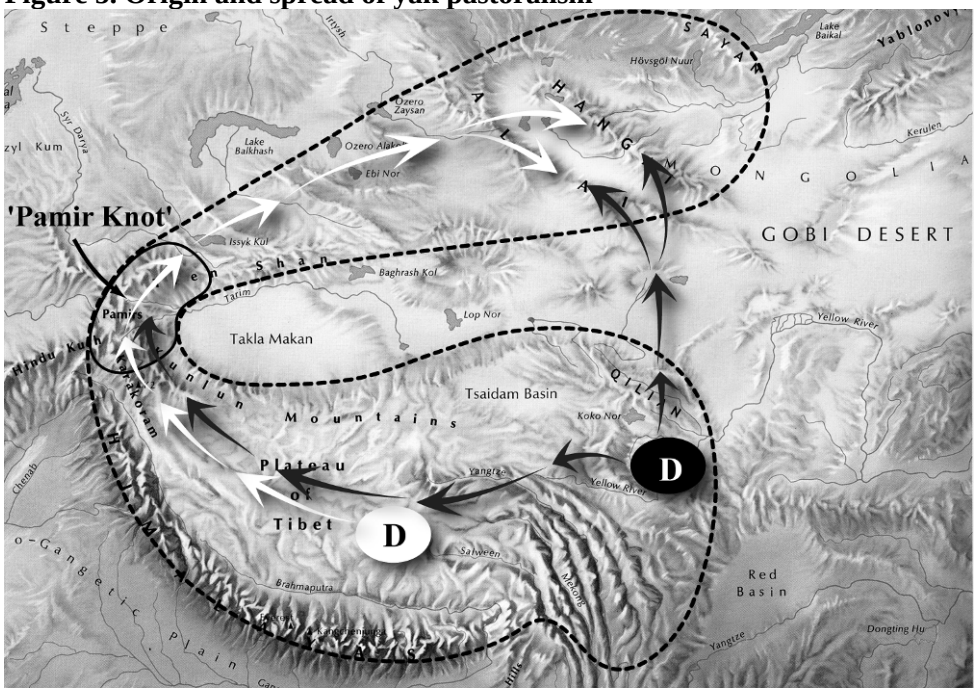
Phylum	Branch	Language	Attestation	Other	Source
Sino-Tibetan	Sinitic	Chinese	bā (豝)		
Sino-Tibetan	Sinitic	OCM	*prâ		Schuessler (2007)
Sino-Tibetan	Qiangic	Qiang	pie		LaPolla (2003)
Sino-Tibetan	Qiangic	Dayang	ptʃhŏ		Matisoff (2003)
Sino-Tibetan	Burmic	Burmese	weʔ ဝက်		MLC (1993)
Sino-Tibetan	Burmic	Muzi	vji^{21}		Pelkey (2009)
Sino-Tibetan	Burmic	Lhaovo	voʔ F		Sawada (2004)
Sino-Tibetan	Loloish	Phunoi	wɑ^{21}		K & S (1999)
Sino-Tibetan	Loloish	Lahu	và^{ʔ}		Matisoff (2003a)
Sino-Tibetan	Loloish	Akha	a^{3} zaʔ^{3}		
Sino-Tibetan	Loloish	Mantsi Muyang	va^{44}		Edmondson (n.d.)
Sino-Tibetan	Loloish	Nusu	vaʔ^{53}		
Sino-Tibetan	Loloish	Naxi	bu^{31}		Hashimoto (1988)
Sino-Tibetan	Loloish	Mpi	wą^{2}		Nahhas (2005)
Sino-Tibetan	Tibetic	Tibetan	phag		

Phylum	Branch	Language	Attestation	Other	Source
Sino-Tibetan	Tibetic	rGyalthang	phà		Krisadawan (2000)
Sino-Tibetan	Mikir	Mikir	phak		
Sino-Tibetan	Nungish	T'rung	waʔ		
Sino-Tibetan	Kuki-Chin	P-Tangkhul	*ʔa.hwok		Mortensen (2003)
Sino-Tibetan	Kuki-Chin	Lushai	vɔk		Lorain (1940)
Sino-Tibetan	Kuki-Chin	Lakher	vāo		Matisoff (2003)
Sino-Tibetan	Naga	Garo	wak		Burling (2003)
Sino-Tibetan	Naga	Chokri Naga	thəvɔ		
Sino-Tibetan	Luish	Jingpho	wáʔ		Matisoff (2003)
Sino-Tibetan	Luish	Cak	vaʔ		Bernot (1966)
Hmong-Mien	Hmongic	P-Hmongic	mpæ^{C}		Ratliff (in press)
Hmong-Mien	Hmongic	Hmong	npa^{4}		
Hmong-Mien	Mienic	She	pi^{5}		Solnit (1985)
Austroasiatic	Palaungic	Wa	bras	wild boar	

Exploitation and management of wild pigs seems to have been an important early strategy for Sino-Tibetan speakers. Exactly when pigs came into domestication in the western Sino-Tibetan region is as yet unknown. The expanding Sinitic speakers clearly encountered peoples who had already domesticated the pig (and Tujia and Bai speakers met other groups to judge by the distinctive roots in their languages). We can speculate that pig domestication spread westwards from the Chinese heartland at an unknown period.

Another key species in the colonisation of the high-altitude zones is the yak. Yaks appear to be domesticated ca. 5000 years ago, perhaps somewhere around the Xinghai Plateau (Xuebien et al 2008). Figure 5 indicates the likely domestication and spread of the yak on the basis of genetic evidence.

Figure 5. Origin and spread of yak pastoralism



However, terms for yak in Sino-Tibetan languages are frequently conflated with other terms for bovid and no clear pattern of lexemes has yet emerged.

9. Sino-Tibetan: an alternative model

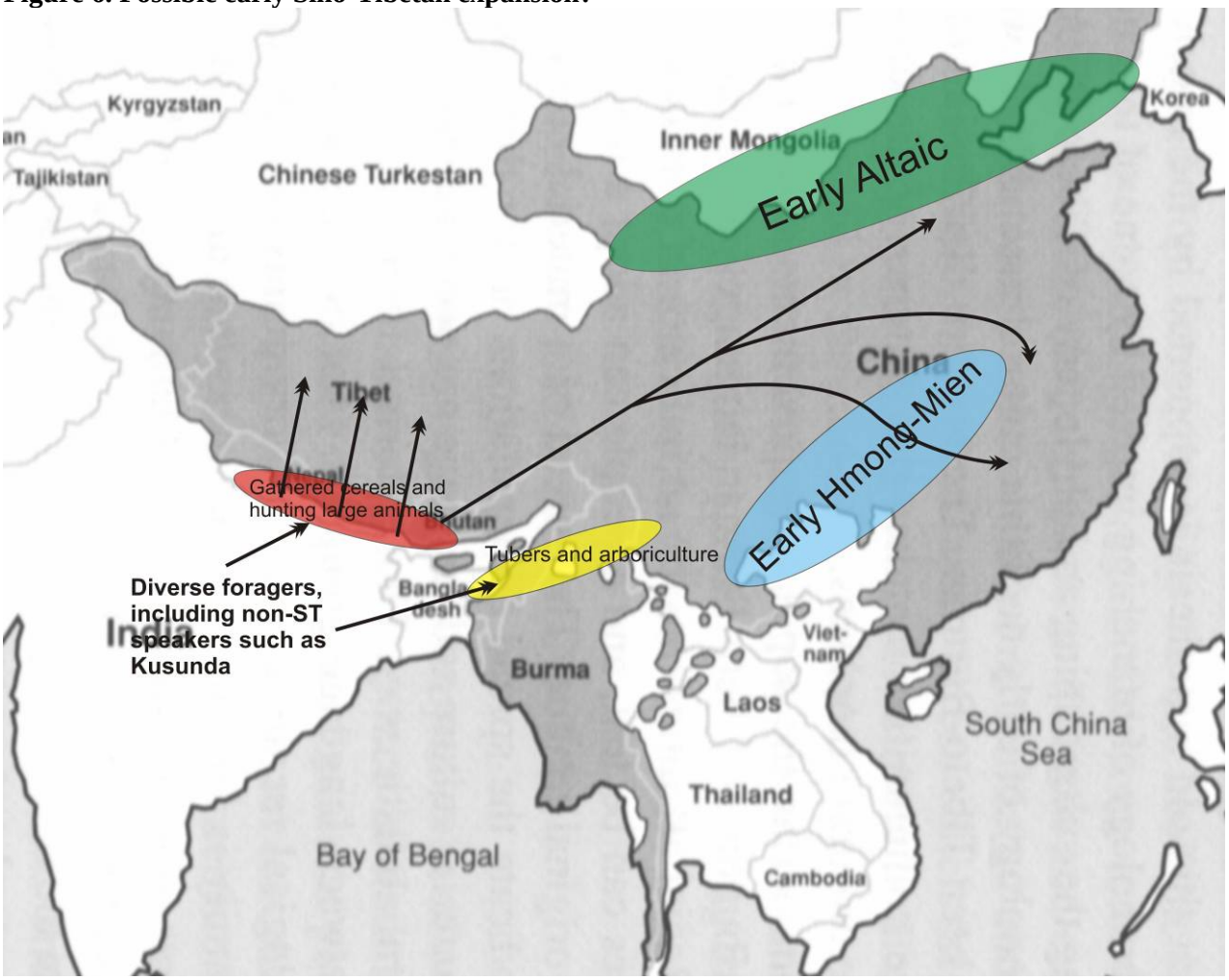
The evidence presented in this paper is marked by absences; lack of cognate reflexes in many of the smaller branches of Sino-Tibetan, lack of evidence for a coherent internal structure and a failure of congruence with

archaeology and genetics. Given this, any hypothesis concerning its spread and diversification must be speculative and subject to revision. However, we can do better than any of the claims presently on the table by presenting an account which at least does not contradict the evidence. With this in mind, the following suggestions are put forward as a model of the evolution of the phylum;

- The earliest speakers of Sino-Tibetan were highly diverse foragers living in an arc between the slopes of the Himalayas and Assam/Arunachal Pradesh up to 10,000 years ago
- Some spoke early Sino-Tibetan languages, others unknown languages now present only as substrates and perhaps surviving as Kusunda
- Seasonal foragers exploit the high Tibetan Plateau from 7500 BP
- Perhaps 6-5000 BP 'livestock revolution' takes place. Yak herders move up and settle the Tibetan Plateau permanently. Pig domestication in China among non-Sino-Tibetan speakers
- These foragers probably began to practise vegeculture (taro, plantains) and arboriculture (sago) (NE India) and animal management (mithun) by 6000 BP
- But 5000 BP diverse early Sino-Tibetan groups spread eastwards to China. Sinitic is not a primary branch but simply one of many migratory groups
- Proto-Tujia, proto-Bai and probably others meet unknown populations (Hmong-Mienic? Austronesians?) with domestic pigs, while also cultivating and beginning to domesticate rice
- Proto-Sinitic speakers encounter early Altaic speakers with foxtail millet and other crops
- The Sinitic languages expand southwards, assimilating or encapsulating many small groups. They encounter Hmong-Mien speakers with rice and switch millet terminology to rice
- Cold zone cereals (buckwheat, foxtail and Panicum millets) are moved from gathering to domestication in the montane areas on the fringes of the Himalayas
- Rice moves up from India but also westwards from China (hence hybridised types) and overlays older cereals where ecologically possible
- Ruminants (cows, sheep, goats) spread downwards into China from Central Asia 4400 BP (? Altaic for small ruminants but not cattle)
- Tibetic speakers undergo a major expansion (when?) assimilating linguistic diversity on the Plateau
- Rice invades the lowland vegecultural zones rather later, pushing taro into residual systems
- Groups such as early Burmic spread southwards, fragmenting Austroasiatic-speaking peoples

Figure 6 shows a highly simplified map of the early phase of this movement;

Figure 6. Possible early Sino-Tibetan expansion?



10. Where next?

Research is developing fast and we can expect further clarifications from many disciplines in the coming years;

- Archaeology is constantly providing us with a better record of early crops and livestock
- Genetics is illuminating human migration and interaction as well as the likely origins and affiliations of domestic plants and animals
- The linguistic record is still full of large gaps as well as unpublished and untabulated data
- We need to be more careful about claims concerning reconstruction especially when they can be cross-checked against external data
- And we need not to stick to fixed ideas about early Sino-Tibetan society which may well derive from Sinosphere models

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[N.B. References need further work, but this includes most of those in the paper]

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