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PROTO-TRANS-EURASIAN: WHERE AND WHEN?

Martine Robbeets

A centuries old controversy

Explaining linguistic diversity in East Asia is among the most important challenges of ethno-linguistics. Especially controversial is the question about the ultimate unity or diversity of the Trans-Eurasian languages. The term "Trans-Eurasian" was coined by Lars Johanson and myself to refer to a large group of geographically adjacent languages, stretching from the Pacific in the East to the Baltic and the Mediterranean in the West (Johanson & Robbeets 2010: 1-2). As illustrated in Figure 1, this grouping includes up to five different linguistic families: Japonic, Koreanic, Tungusic, Mongolic, and Turkic. I distinguish "Trans-Eurasian" from the more traditional term "Altaic", which can be reserved for the linguistic grouping consisting of Tungusic, Mongolic and Turkic languages only. The question of whether these five families descend from a single common ancestor has been the topic of a longstanding debate, for an overview of which I refer to Robbeets (2005: 18-29). The main issue is whether all shared forms are generated by horizontal transmission (i.e. borrowing), or whether some of them are residues of vertical transmission (i.e. inheritance).

In Robbeets (2005), I showed that the majority of etymologies proposed in support of a genealogical relationship between the Trans-Eurasian languages are indeed questionable. Nevertheless, I reached a core of reliable etymologies that enables us to classify Trans-Eurasian as a valid genealogical grouping. The evidence consists in regular sound correspondences, shared basic vocabulary — especially common basic verbs and verbal adjectives— and common verb morphology (Robbeets 2014, 2015). As a result, the Trans-Eurasian hypothesis is gradually gaining acceptance in the literature. Shared innovations in phonology, vocabulary and morphosyntax suggest the classification of the Trans-Eurasian family, given in Figure 2.

New questions are emerging from the above classification: What populations corresponded to the speakers of proto-Trans-Eurasian? Where and when did these people originally live? When did the language family separate into its main branches? What triggered the expansion of the daughter languages? In which directions did the dispersals go? And, how did the daughter languages move to their present locations? In what follows, I intend to address these questions, taking

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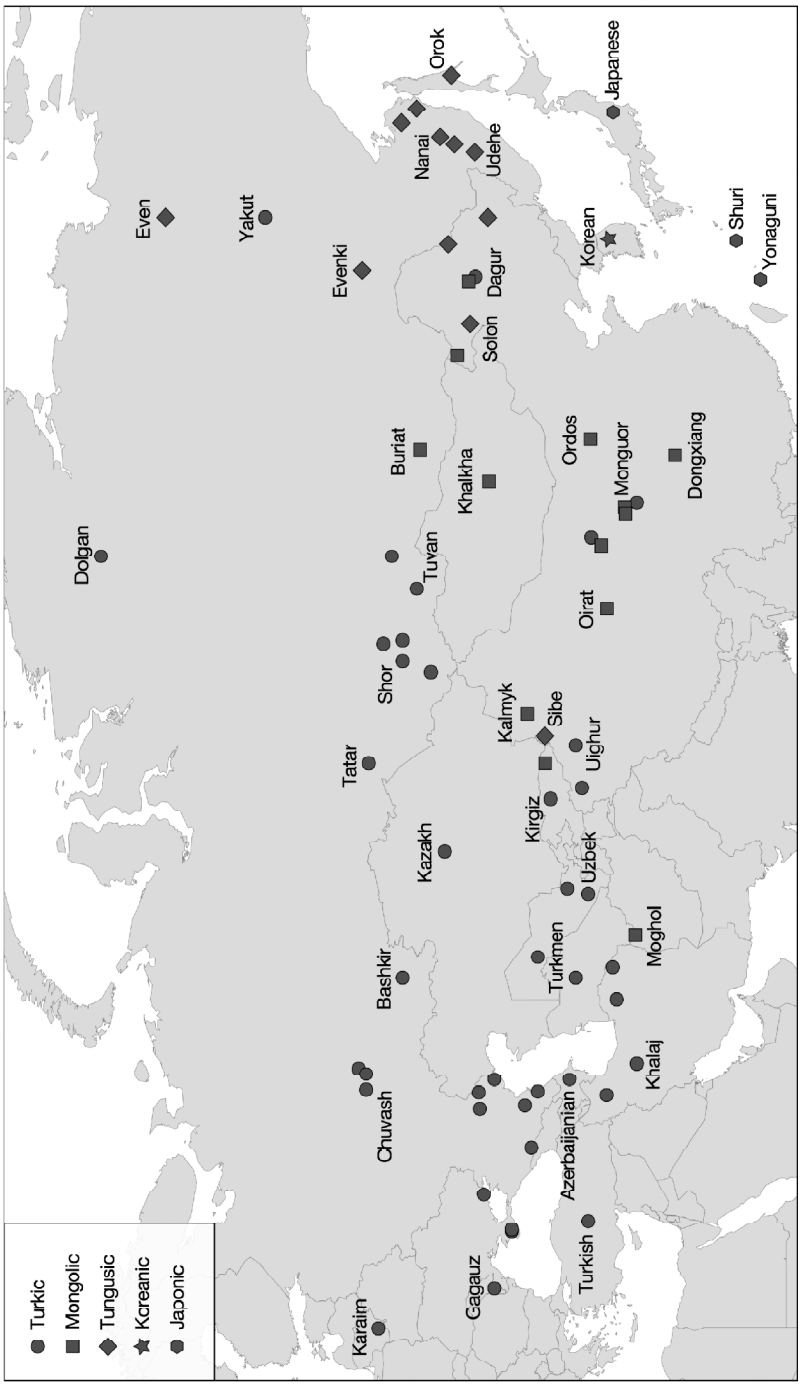

Figure 1: Distribution of the Trans-Eurasian languages (generated with WALS tools)

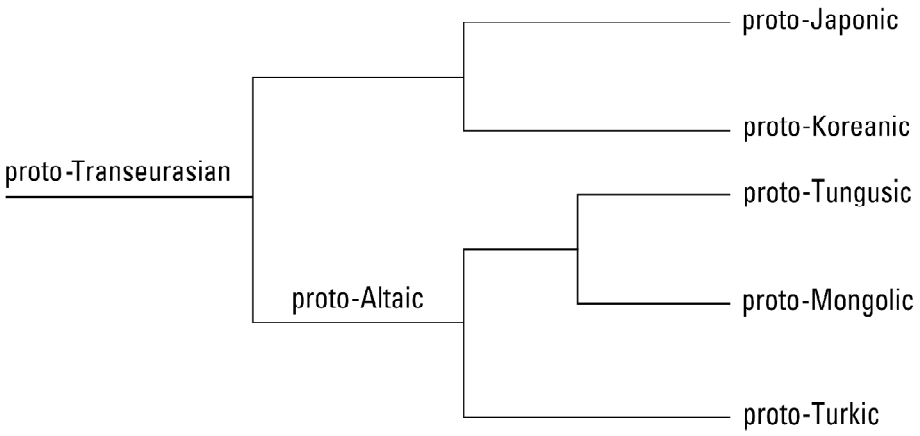

Figure 2: Classification of the Trans-Eurasian languages as proposed in Robbeets (2015)

the Farming/Language Dispersal Hypothesis (FLDH) for the Trans-Eurasian languages into consideration. This hypothesis, proposed by Renfrew (1987), Bellwood & Renfrew (2002), Diamond & Bellwood (2003) and Bellwood (2005a, 2011), posits that many of the world's major language families owe their dispersal to the adoption of agriculture by their early speakers. Subsequent population growth steadily pushed the new farmers and their language into wider territories, displacing the languages of preexisting hunter-gatherer populations. Since East Asia is home to one of the world's nine homelands of agriculture (Diamond & Bellwood 2003: 597), farming might seem an obvious explanation for this region's major language expansions. It has indeed been suggested that the Austroasiatic, Sino-Tibetan and Austronesian families spread at different times and over different geographical ranges from agricultural homelands in China (e.g. Bellwood 2005b, Blench 2008, Sagart 2008, Sagart 2011, Fiskesjö & Hsing 2011, van Driem 2012, Heggarty & Beresford-Jones 2014).

My contribution has the following organization. In section 2, I will explore the archaeological context, summarizing what is known about the development of Neolithic cultures in the region of Southern Manchuria and beyond. In section 3, I will analyze a number of common linguistic items linked to subsistence, taking into account inherited as well as borrowed similarities. In section 4, I will provide an outline of what genetics can tell us about a possible genetic relationship between Japanese and other Trans-Eurasian populations. Finally, by way of conclusion, I will propose a possible scenario for the location, timing and separation of proto-Trans-Eurasian, by synthesizing linguistic, archaeological and genetic evidence in a single approach.

What archaeology tells us

Millet agriculture as the subsistence mode

From Chinese historical records such as the *Shiji* ('Records of the Grand Historian' 109-91 BC.), the *San-kuo chih* ('Records of the Three States' 284 AD) and the *Houhanshu* ('History of the Later Han' 5th. Century), we can infer that the Turkic, Mongolic, Tungusic, Koreanic and Japanic languages have all spread to their present-day locations from an area comprising Korea, southern Manchuria and Inner Mongolia. Therefore, even critics of the affiliation of the Trans-Eurasian languages, such as Janhunen (1996) situate the original speech communities of the individual families in the compact area represented in Figure 3.

There is a widespread misconception that, until recently, other subsistence patterns, such as nomadic pastoralism or hunting-gathering, have always been the default mode in the Trans-Eurasian region. Heggarty & Beresford-Jones (2014: 4), for instance, argue that language families in Northern Asia, such as Tungusic, Mongolic and Turkic "fall by definition outside the scope of the language/farming dispersal hypothesis in any case, since agriculture never became the dominant subsistence mode anywhere here until the modern period." However, in the area of southern Manchuria and eastern Inner Mongolia, the predominant basis of life since the 7th millennium BC has been millet agriculture, supplemented by fishing, hunting and gathering in the surrounding woodlands (Shelach 2000: 367, 379-380, Hunt et al. 2008: 9, 14; Weber & Fuller 2008: 69-90, Zhao 2011: 301, Liu et al 2012: 2). In the western part of this region, which is ecologically transitional towards Mongolia, nomadic pastoralism developed as an innovation in the first millennium BC, probably as a response to increasing aridity. The Siberian expansion of the Tungusic speakers, which began only about a millennium ago may have led to a reversion to foraging along with reindeer breeding.

A continuum of archeological cultures

6000-5000 BC. Two subsequent cultural complexes inhabited eastern Inner Mongolia and southern Manchuria in the sixth and seventh millennium BC: the Xinglongwa (ca. 6200-5400 BC) and the Zhaobaogou (ca. 5400–4500 BC) culture. Figure 4 indicates the location of some sites that have been excavated for the Xinglongwa culture, including 6. Xinglongwa, 1. Baiyinchanghan, 8. Chahai and 4. Nantaizi. Xinglongwa was the earliest Neolithic culture in northeast China: it preserves the earliest evidence in the area for permanent habitation of villages, ceramic production and the domestication and cultivation of plants and animals. Zhao (2011: 301) reports the recovery of domesticated millets identified as broomcorn (*Panicum miliaceum*) and foxtail millet (*Setaria italica*), whereby broomcorn millet is more abundant, with about 1400 charred grains found. Combining the results of studies of the plant remains, animal bones, stone

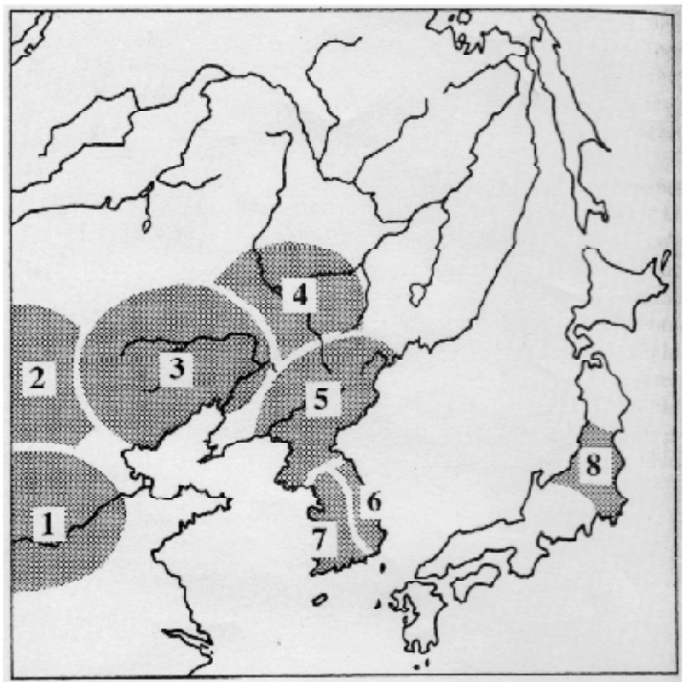

Figure 3: The ethnic groups of prehistorical Manchuria before 1000 BC according to Janhunen (1996: 216): 1. Sinitic; 2. Turkic; 3. Mongolic; 4. Amuric; 5. Tungusic; 6. Koreanic; 7. Japanic; 8. Ainuic

tools and jade artifacts, the subsistence seems to have been millet farming supplemented by hunting and gathering and the pig was probably in the process of domestication.

5000-2500 BC. The Xinglongwa and Zhaobaogou cultures are regarded as the precursors of the Hongshan culture (ca. 4500-2900 BC) and the outlying Neolithic cultures on the Liaodong peninsula, illustrated in Figure 5. In these cultures, subsistence was still based on millet agriculture —both foxtail and broomcorn — in combination with pig raising (Nelson 1994, Guo 1995). These cultures were contemporary with the Yangshao (ca. 5000-2800 BC) and Dawenkou (ca. 4300-2600 BC) cultures of the Yellow River Basin, which have been associated with the homeland of Sino-Tibetan and with remnants of Austronesian presence on the continent (Blench 2008), respectively. Whereas the cultures in prehistoric Inner Mongolia and Manchuria were similar to each other, they were quite different from the Yellow River cultures: they did not rely on rice agriculture and were more advanced in pottery and jade making. Archaeobotanical studies such as Crawford & Lee (2003) and Miyamoto (2009) show that Setaria and Panicum millet

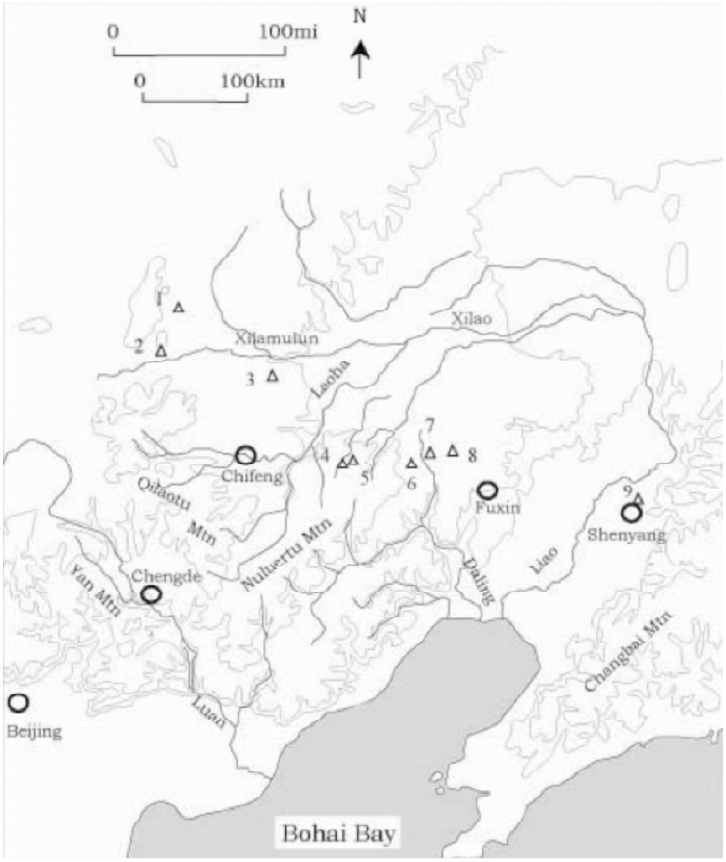

Figure 4: Distribution of the Xinglongwa and Zhaobaogou cultures in North-East China including the sites 1 Baiyinchanghan, 2 Nantaizi, 3 Xiaoshandegou, 4 Nantaidi, 5 Zhaobaogou, 6 Xinglongwa, 7 Xiaoshan, 8 Chahai and 9 Xinle (Anderson 2004)

agriculture has spread from the Liaodong region to the Korean peninsula in the fourth millennium BC.

2500-1000 BC. Through transitional post-Hongshan cultures, Hongshan developed into Lower Xiajiadian culture (2200-1600 BC). As in the preceding cultures, subsistence was based on millet agriculture and animal husbandry. However, the transition from Lower to Upper Xiajiadian (1000-600 BC) culture is marked by the development of nomadic pastoralism. Only at this stage, we find the first evidence for horse-riding in prehistoric Manchuria. Animal husbandry shifted from relying on pigs to relying on sheep and goats and hunted wild animals became part of the diet again. Recent archeobotanical studies such as Miyamoto (2009) and Ahn (2010) show that wet-rice cultivation came to Korea in the late second

millennium BC (1300-1000 BC) via the Shandong and Liaodong peninsulas. This marks the beginning of the Mumun culture (1300 BC-0) in Korea. Rice agriculture was more popular in the central and southwestern regions of Korea than in the southeast, where dry-field crops including millet and soybean remained important.

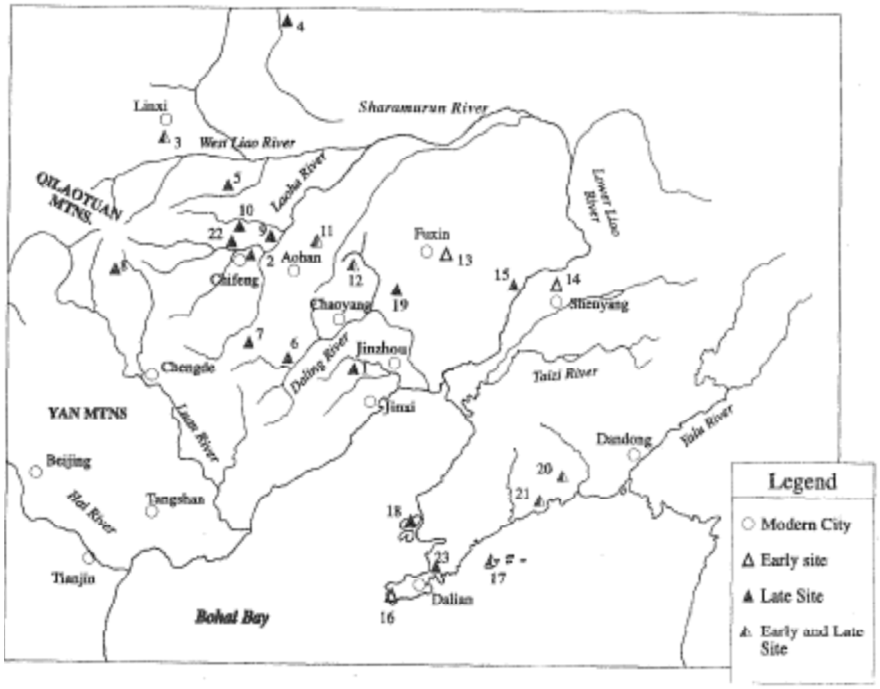

Figure 5: Distribution of the Hongshan culture and other Neolithic cultures in North-East China including the sites 1 Shaguotun, 2 Hongshanhou, 3 Shawozi, 4 Fuhegoumen, 5 Sanxingtala, 6 Dongshanzui, 7 Niuheliang, 8 Weichang, 9 Xiaoheyan, 10 Danangou, 11 Zhaobaogou, 12 Xinglongwa, 13 Chahai, 14 Xinle, 15 Pianbao, 16 Guojiacun, 17 Xiaozhushan, 18 Santang, 19 Hutougou, 20 Houwa, 21 Beiwutun, 22 Xishuiquan, 23 Dajuzi (Guo 1995: 26)

1000 BC-0. On the Japanese Islands the so-called Jomon-Yayoi transition started from around 1000 BC (Hudson 1999, 2002, Haruhari & Imamura 2004, Fujio 2011). The Jomon people occupied a middle ground that is neither hunting and gathering nor broad-scale agriculture: although they relied on hunting, fishing and collecting nuts and berries to survive, they also cultivated barnyard millet, soybean, bottle gourd, hemp and adzuki bean on a small scale (Crawford 2011). The transition to the Yayoi period involved the advent of immigrant farmers from the Korean peninsula. It resulted in a drastic agricultural intensification, including the cultivation of wet-rice, millets, barley and wheat (Crawford & Shen 1998,

Crawford & Lee 2003). Apart from various crops, Korean influences included pottery, stone and wooden agricultural tools, remains of domesticated pigs, ditched settlements and megalith burials.

Merging archaeological and linguistic classifications

Starting from the Trans-Eurasian linguistic classification in Figure 2, I made an attempt to correlate the branches and splits in the linguistic tree with the different cultures in the archaeological continuum, described in Section 2.2. A hypothetical correlation between the archaeological and linguistic periodization is proposed in Figure 6.

Assuming that proto-Trans-Eurasian was the language spoken by the Xinglongwa and Zhaobaogou people in the sixth millennium BC, the geographical separation of the subsequent Hongshan culture into riverine groups and coastal groups on the Liaodong peninsula may have resulted into the linguistic split between proto-Altaic and proto-Japano-Koreanic. Western Hongshan groups separating and moving into the steppe, where they developed a pastoralist lifestyle, may be connected with the early separation of the Turkic languages from the Mongolo-Tungusic languages.

The Hongshan people to the east, possibly speaking Mongolo-Tungusic, developed into the millet farmers of the Lower Xiajiadian culture. The transition to Upper Xiajiadian culture is marked by the adoption of a more pastoralist lifestyle and can be tentatively connected with a split between proto-Mongolic and proto-Tungusic speakers.

The coastal farmers on the Liaodong Peninsula, then, brought millet agriculture and presumably language overland to Korea, resulting in a split between the people remaining in Liaodong speaking Japanic and the Late Chulmun (2000-1300 BC) and Mumun (1300 BC – 0) millet cultivators on the Korean peninsula speaking proto-Koreanic. The Japanic speakers moved overseas via Liaodong and Shandong to the Korean peninsula and from there they went to the Japanese Island as the Yayoi immigrants, starting around 1000 BC. Based on this hypothetical scenario, I propose to calibrate the relative chronology obtained from linguistics with absolute datings provided by archaeology, as indicated in Figure 6.

What linguistics tells us

Cognate subsistence terms?

The comparison of lexical items relating to subsistence can shed further light on the hypothetical scenario above. Indeed, sharing a subsistence term in form and meaning implies that the corresponding item was either known by the speakers of the common ancestral language or that it was borrowed from one language into another. Cognate subsistence terms are words referring to crops, animal husbandry,

agricultural technology, food production activities or secondary products that correspond in form and meaning because they have been inherited from a common ancestral form. There are only few acceptable etymologies for subsistence terms that involve Japanese and other Trans-Eurasian languages, but a possible candidate for cognacy is a term that combines the meaning 'seed' and 'millet', given in (1).

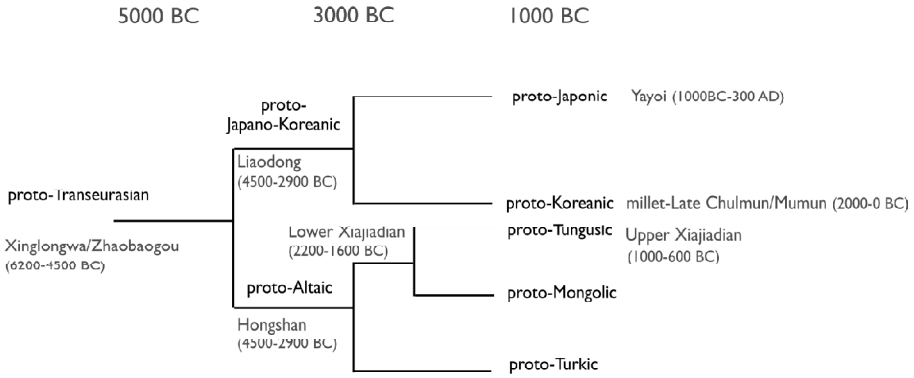

Figure 6: A hypothetical calibration of the branches in the Trans-Eurasian family using archaeological cultures

(1) pTEA **pisə* 'seed, (barnyard) millet'

a. Tungusic: pTg **pise* 'seed, millet'
Ma. *fisen* 'seed, offspring; kin', *fisike* 'millet'
Even *hesen* 'seed, offspring; kin'
Ulcha *pikse* 'millet'
Na. *pikse* 'millet', Kur-Urmi dialect *fisxe* 'millet'
b. Korean: pK **pisi* 'seed' ~ **pihi* 'barnyard millet'
MK *·psi*, K *si:* 'seed', MK *·phi*, K *phi* '(Japanese) barnyard millet (*Echinochloa esculenta*)'

c. Japanese: pJ **piyai* ~ **piyia* ~ **piye* 'barnyard millet'
J hie, OJ *pi̯ye* '(Japanese) barnyard millet (*Echinochloa esculenta*)'

On the basis of the Tungusic forms, I reconstruct pTg **pisə* 'seed, millet'. Since the final nasal in Tungusic nouns such as Even *hesen*, Ma. *fisen* is instable and frequently drops when inflectional suffixes are attached, I do not consider it as a part of the root. Forms such as Ma. *fisike*, Ulcha *pikse* and Na. *pikse* may include a petrified derivational suffix of the shape pTg **-kA*, found in the names of animals and plants.[1]

In Middle Korean, we find MK *·psi* 'seed' in addition to MK *·phi* 'barnyard millet'. The dot preceding the word indicates that the stem is tonic. Tonic, monosyllabic, open stems with aspirate initials followed by a minimal vowel (u, o, i) can be derived from an originally disyllabic root with an initial minimal vowel, i.e. pK **pisi* 'seed' and **pihi* 'barnyard millet'. Since pK **s* can sporadically develop into **h* before high front vowels and in view of the semantic alternation in Tungusic, the forms seem to be formally and semantically related.[2]

Since the vowel type (1 or 2) is not distinguished following glides in Old Japanese, there is no conclusive evidence for the reconstruction of the final vowel in OJ *pi*$_{1}$*ye* 'barnyard millet'. The possibilities are **piyai* ~ **piyia* ~ **piye*.

Admitted that the correspondence between the palatal glide *–y-* in Japanese and the *–s-* in Tungusic and Korean is irregular, the most plausible reconstruction of a common form would be pTEA **pisə*. The shared combination of the two meanings 'seed, millet' seems to imply that the plant was targeted for its seeds in the ancestral language. Although there is no evidence for full domestication of barnyard grass in Northeast China in the Neolithic period, it is known that it formed part of the diet. The narrow range of wild grasses recovered in Neolithic sites in dry farming contexts in North East China indicates that people were selecting the wild ancestor of Japanese millet as opposed to other grasses (Bestel *et al.* 2014: 264).

The introduction of barley and wheat.

Barley

Barley was domesticated in the Fertile Crescent about 8000 BC. Via the Near East and South Asia, it ultimately reached China after 2000 BC but it took several hundred years before it was grown on a serious scale (Boivin *et al.* 2012: 457). The term for 'barley' corresponds across some Trans-Eurasian languages, but there are indications that it was borrowed following an eastward trajectory. Its ultimate source probably lies in a branch of Indo-European such as Eastern Iranian, from where it was borrowed into proto-Turkic and from there further into Mongolic, the Manchu branch of Tungusic and Japanic. The relevant Trans-Eurasian terms are given in (2).

(1) a. Turkic: pTk **arpa* ~ **arba* 'barley'
OT *arpa*, *abra*
Karakhanide OT *arpa*
MT *arpa*
Balkar *arpa*
Karaim *arpa*
Kpak *arpa*
Kum. *arpa*

Tat. *arpa*
Kirg. *arpa*
Kaz. *arpa*
Nog. *arpa*
Bash. *arpa*
Tk. *arpa*
Gag. *arpa*
Az. *arpa*
Tkm. *arpa*
Uz. *arpa*
Uig. *a(r)pa*

Khak. *arba*
Oyrat *arba*
Khalaj *arpa*
Chu. *orba, urpa*
[Sal. *arfa* from Manchu]
[Tuv. *arbay* from Mongolian]

b. Mongolic: pMo. *arbai* 'barley'
WMo. *arbai*
MMo. *arbəi*, *arbăi*, *ārbăi*
Khal. *arvay*
Bur. *arbay*
Ordos *arwă*
Kalm. *arwă, arwā*
Dongxian *apa*
Mgr. *šbə*'spelt'
Mogol *arfɛi, arfā*
c. Tungusic: Manchu *arfa* 'barley, oats'

d. Japanese: pJ **apa* 'foxtail millet'
OJ *apa* 'millet'
J *awa* 'Foxtail millet (Setaria italica)'

The Turkic forms lead to the reconstruction of pTk **arpa* 'barley', but variation with **arba* cannot be excluded on the basis of the alternation in Old Turkic and Chuvash and the Siberian Turkic reflexes. Proto-Turkic can be dated back to before the first century BC.

The voiced alternant pTk **arba* was borrowed into proto-Mongolic, where it was suffixed with an element *–i*, perhaps in analogy with WMo. *bucudai* 'wheat'. Proto-Mongolic can be dated back to before the thirtheenth century AD. The Siberian Turkic form Tuv. *arbay* is a reborrowing from Mongolian.

Since the Tungusic term is only reflected in Manchu, it must have entered after the split of the Manchu branch around the second century AD. The absence of a glide and the presence of a fricative in Ma. *arfa* indicate that it may be borrowed after the thirteenth century from Western Mongolic, i.e. the ancestor of Kalmuck and Oirat. In the thirteenth century, the Oirat moved from the south of Lake Baikal to the Altai region, from where they dispersed over various regions, including Western Mongolia, Manchuria and the Xinjiang, Gansu and Qinghai provinces in China. The Kalmuck were forced to emigrate from their original homeland in northern Xingjiang to the Volga region in the seventeenth century. The Salar Turkic form *arfa* is probably a reborrowing from Manchu.

If OJ *apa* 'millet' is indeed related, the voiceless labial stop in OJ *apa* 'millet' seems to indicate that the form was borrowed directly from pTk **arpa*, which must have happened before the thirteenth century BC before wet-rice, barley and wheat cultivation came to Korea via the Liaodong-Shandong interaction, assumedly with the speakers of Japanic. Moreover, this scenario assumes a semantic shift from 'barley' to 'foxtail millet' in Japanese.

Ultimately, it may be possible to trace this word back to Indo-European $*H_2elb^hi$-*(t-)* 'barley; barley flour', which is an early derivation form pIE $*H_2elb^h$- 'white'. This form is reflected in Greek *alfi* 'barley flour or groats' and Albanian *elp*, *elpbi* 'barley'. Proto-Iranian **arbusā* 'barley', reflected in various eastern languages such as Pashto *orbəša*, Wanetsi *arbasa* etc., may also be relatable and probably served as a model for pTk **arba*. Speakers of proto-Iranian are assumed to have lived in the early second millennium BC in western Siberia and the west Asiatic steppe, expanding as far east as the Upper Yenisei in the Altai mountains. Stretching over Central Asia in the first and second millennium BC, they were in contact with Turkic speakers. (See Pokorny 1959: 29; Doerfer 1965: 24-25; Starostin et al. 2003: 312–313; Rozycki 1994: 20; Robbeets 2005: 198, 475, Róna-Tas & Berta 2011:77-79, Blažek (forthcoming))

Wheat

Similar to barley, wheat was domesticated in the Fertile Crescent area in the Near east around 8000 BC. In China, early wheat finds dating back to 2500–2400 BC have been reported from Gansu in the northwest and Shandong in the east but it was not until after 2000 BC that the crop was grown on a significant scale (Boivin *et al.* 2012: 457).

Based on reflexes such as proto-Celtic **mraki*- 'corn or seed of barley' (e.g. in Old Irish *mraich* 'malt' or in Welsh *brag* 'barley corns, malt'), Luvian *marwali*- 'barley-stem', Hittite *marnuwa(nt)*- 'a kind of beer' and Old Indic *markamaka*- 'a kind of corn', Blazek (forthcoming) suggests to reconstruct pIE $*m̥k$ 'seeds of barley, products derived from barley'. Although the cereal terminology of Iranian is relatively well known, there is no plausible cognate available. A cognate candidate

also lacks from Tocharian, but here cereal terms are not well studied yet. Therefore, it cannot be excluded that a reflex of **mɨ̣k* 'barley' in Tocharian ultimately served as a model for Old Chinese 來 **mə.rˁəkʷ* > **mə.rˁə* 'a kind of wheat' (Baxter & Sagart 2011). Proto-Tocharian is associated with the Qawrighul culture, situated north of the main bend of the Yellow river and south of the Altai in the second millennium BC (Mallory & Adams 1997: 593). Old Chinese is the Chinese spoken from the beginning of written records around 1200 BC to 300 BC, but the word for 'wheat' probably arrived when the crop was introduced, that is between 2500 and 2000 BC.

After 2000 BC, the Old Chinese term probably served as a model for the Tungusic term, which was then before 1300 BC transferred separately into Korean and Japanese. The relevant Trans-Eurasian terms are given in (3).

(3) a. Tungusic: pTg **murgi* < **mirgi* 'barley and similar crops'
Jurchen *mirɣei* 'product of agriculture'
Manchu *mụji* 'barley'
Olcha *muji* 'barley'
Nanai *muji* 'barley'
Solon *mụrgil* 'spring crops, spring-sown field'

b. Korean: pK **milk* 'wheat'
K *mil* 'wheat'
MK *·milh* 'wheat'

c. Japonic: pJ **munki* 'wheat, barley'
J *mugi* 'wheat, barley'
OJ *mugi*$_1$ 'wheat, barley'
Nakijin *muzii* 'barley'
Yonaguni *mun* 'barley'

In contrast with the Altaic cognacy and the direction of the borrowing proposed by Starostin (2008), I assume that Old Chinese **mə.rˁə* was borrowed as pTg **mirgi*. Jurchen, which was the official language of the Jin dynasty (1115-1234) of Northern China and Manchuria, reflects a form **mirgi*, while the other Tungusic languages reflect **murgi*. Both forms are probably related through labial attraction whereby the original high vowel *i* assimilated to the initial labial nasal *m*. The time-depth of proto-Tungusic is before 220 AD.

It was pTg **mirgi* that served as the model for pK **milk* 'wheat'. Middle Korean has a final fricative in *·milh* 'wheat' but it is known that velar lenition (**Ck* > **Ch*) has taken place in **Ck* clusters at an early stage in Korean.[3] It is safe to assume that during the Late Chulmun (2000-1300 BC) and Mumun (1300 BC – 0) period, contacts took place between Tungusic and Koreanic populations since in

that time megalith dolmen constructions were spread from Manchuria to Korea and a bronze culture resembling that of the Lower Xiajiadian culture (2200-1600 BC) diffused from Siberia (Nelson 1993: 159-163; Barnes 1993: 153, 165).

The other Tungusic form pTg **murgi* served as a model for pJ **munki* 'wheat, barley'. It is generally agreed that voiced stops in Japanese derive from prenasalized voiceless stops in Old Japanese and ultimately from nasal clusters (Robbeets 2005: 55-56). Clusters including voiced obstruents such as *–rg-* in pTg **murgi* tend to be borrowed as a proto-Japanese nasal cluster **-nk-*, whereas voiceless obstruent clusters such as pTk **arpa* 'barley' seem to lose the preceding liquid and tend to be borrowed as a plain voiceless obstruent, such as in OJ *apa* 'millet'. The presence of Ryukyuan cognates for the Japanese word indicates that borrowing must have occurred in proto-Japonic, that is at least before the second century BC. It is likely, however, that the borrowing occurred when Japanic was still located in the Liaodong-Shandong interaction area, namely before 1300 BC. (See also Martin 1966: 251, 1996: 37; Starostin et al. 2003: 935; Robbeets 2005: 193, 197, 199, 704).

The introduction of rice

As opposed to the presence of some shared vocabulary relating to dry crops, the Trans-Eurasian languages seem to lack common rice vocabulary. As far as Japanese is concerned, many words relating to rice agriculture can be derived language-internally. For instance, OJ *momi* 'hulled rice', OJ ipi_1 'steamed rice, cooked millet' and OJ *nuka* 'rice bran' seem to be deverbal nouns, from the verbs underlying OJ *mom-* 'rub' , MJ *if-* 'to eat' and OJ *nuk-* 'remove', respectively .

Most deverbal nouns in Old Japanese have been derived by adding the deverbal noun suffix *-i* ~ *ø* to the verb stem (e.g. OJ ko_1pi_2- 'to love' -> ko_1pi_2 'love', OJ $omo_{(1)}p$- 'to think' -> $omo_{(1)}pi_1$ 'thought'; see Robbeets 2015: Section 8.3.1.1), while some others are lexicalized derivations by using the original naked verb root as a nominal form (e.g. OJ *nap-* 'twist, twine' (< pJ **napa-*) -> OJ *napa* 'rope', OJ *tuk-* 'to be attached' (< pJ **tuka-*) -> OJ *tuka* 'bundle'; see Robbeets 2005: 105-106). Hence, OJ *momi* 'hulled rice' and OJ ipi_1 'steamed rice, cooked millet' belong to the former type and OJ *nuka* 'rice bran' to the latter.

The analysis of OJ ipi_1 'steamed rice, cooked millet' along these lines is given in Vovin (1998: 371-372) and Robbeets (2005: 552). Interestingly, parallel formations of 'cooked rice' are found in Old Chinese and Austronesian. Old Chinese 飯**bon?-s* 'cooked rice or millet', for example, is reconstructed a deverbal noun in *-s* from the verb 'to eat' (Baxter & Sagart 2011). Similarly, proto-Sino-Tibetan **ka-n* 'cooked rice', which is reflected in Old Chinese 飡**C.qsan* 'thick gruel of rice' and proto-Tamang ^{B}*kan* 'cooked rice' is reconstructed a deverbal noun in *–n* from a proto-Sino-Tibetan verb **ka* 'to eat' (Sagart 2003: 129-130). Moreover, the

word for 'cooked rice' in some Austronesian languages such as in Yami of Orchid Island is *kanen* 'cooked rice'. According to (Sagart 2003: 130), it can be derived from the proto-Austronesian verb **kaen* 'to eat' and the object nominalizer **-en*.

The parallel formations may be due to universal principles in linguistic structuring, as it seems obvious to use a general term for 'food' for the most common dietary product. However, given the relative concentration of this formation in Sino-Tibetan, Austronesian and Japanese, I do not exclude combinational borrowing across these languages. If that is indeed the case, the recurrent character of the formation in Sinitic, would indicate Old Chinese as the most probable source of diffusion.

In addition, Japanese may have borrowed the word OJ *kome*$_2$ 'dehusked rice' through a para-Austronesian language from Sinitic. The Japanese word goes back to pJ **kəmai*. For Proto-Austronesian, **Semay* 'rice ready to cook ' has been reconstructed and Old Chinese has the reconstruction 糜**C.maj* 'rice gruel; destroy, crush' (Baxter & Sagart 2011: 92).

According to Sagart (2011: 127) it is not unlikely that wet rice agriculture was transmitted to the Japanic people by the Setaria- and rice-based pre-Austronesian Dawenkou culture (ca. 4300-2600 BC) in south Shandong. In his model, Dawenkou farmers spoke a language ancestral to proto-Austronesian, which would have had for 'rice ready to cook ' a cognate of proto-Austronesian **Semay*. If one assumes that the sibilant at the beginning of this word changed to *h*-, a frequent change cross-linguistically, this word is a probable model for pJ **kəmai* 'dehusked rice' given that proto-Japonic had no *h*- sound and treats foreign /h/ as k. Apart from rice agriculture, the practice of tooth evulsion, a puberty rite whereby the lateral incisors are extracted, may also have been part of the contact package. Having originated in Dawenkou in ca. 4000 BC (Han & Nakahashi 1996), the practice was introduced to Japan by Yayoi people (Brace & Nagai 1982: 405). Any Dawenkou or Japanic people left behind in the greater Shandong region after the spread of wet rice agriculture to Korea would have been absorbed by the expansion of Sinitic, without a trace of their languages remaining there.

Although this certainly is a plausible scenario, the ultimate source of borrowing may be reflected by the Old Chinese word 糜*C.maj 'destroy, crush, rice gruel'. Since the meaning 'rice gruel' is likely to be a secondary development of the action 'to crush' and since only the secondary meaning of this word is shared with Austronesian and Japanese, I am inclined to take the Sinitic word as the ultimate model. Diffusion from Sinitic into Austronesian is in contradiction with Sagart's view this word reflects a Sino-Tibetan-Austronesian cognate (Sagart 2011: 126-127).

Under the para-Austronesian contact scenario, the absence of common rice vocabulary between Japanese and Korean would put the split of Japanic and

Koreanic before 2600 BC, the end of Dawenkou culture. Such an early date is in line with the divergent nature of the Japano-Koreanic cognates in general.

The introduction of pastoralism

Although pastoralism was among the subsistence modes on the steppe in the second millennium BC, it had not yet encroached upon the northern edges of East Asia by that time (Barnes 1993: 157). The first evidence for horse-riding in Northeast Asia goes back to the first millennium BC. By that time, two innovations are apparent in Upper Xiajiadian culture sites, namely the presence of animal-style bronzes and the addition of the horse to the faunal repertoire. The scope of sacrificed animals was widened to include the horse as well as sheep and goats and horses became employed for pulling loads and for hunting wild animals. The similarities with regard to the term for 'horse' across the Trans-Eurasian languages are illustrated in (4). However, the fact that the parallels extend to numerous non-Trans-Eurasian languages as well support the observation that the horse was introduced to East Asia in a rapid wave of cultural influence.

(4) a. Mongolic: pMo **morï-n* 'horse'
WMo *mori(n)*
MMo *mori, morin, murin*
Dagur *moryi, mory*
Khalkha *mory*
Buriat *mori(n)*
Ordos *mori(n)*
Kalmuck *mörn*
Oirat *mörn*
Moghol *morin, muren*
Shira-Yughur *mōrə*
Monguor *mori*
Dongxian *mori*
Baoan *more*

b. Tungusic: pTg * *murin* 'horse'
Jurchen *murin*
Sibe *morin*
Manchu *morin*
Even *muran*
Evenki *morin, murin*
Negidal *moyịn*
Solon *morī*
Ulcha *murin*
Orok *murin*

Oroch *muri(n)*
Udihe *muyi*
Nanai *morī*
c. Korean: pK **mol* 'horse'
K *mal*
MK *mol*

d. Japonic: pJ **uma ~ muma 'horse'*
J *uma*
MJ *(m)uma* 'horse'
Miyako *nuuma*,
Yaeyama *nnma*
Hateruma *qman*/*nman*

Janhunen (1998) presents a detailed review of the linguistic evidence with regard to the horse in East Asia. One Indo-European reconstruction for the word for 'horse' is **mark(o)*. It is reflected in proto-Germanic **márx-a-* 'horse' (e.g. in Old Norse *mar-r* 'horse', German *Mähre*, Eng. *mare*, Dutch *merrie*, Danish *mär*, Swedish *märr*, etc. 'steed, female horse') and in proto-Celtic **mark* (e.g. in Irish / Gaelish *marc*, Welsh *march*, Breton *marc'h* 'horse', etc.). There are no Tocharian or Iranian cognates for this root preserved, but it is not unlikely that the word reached East Asia with the speakers of one of these languages.

From there, a word for 'horse' going back to pIE **mark* was probably borrowed into Sinitic, Old Chinese having the reconstruction 馬 *$m^{\varsigma}ra?$ 'horse' (Baxter & Sagart 2011: 88). The Old Chinese word for 'horse' has been transmitted to a number of Southeast Asian languages, such as proto-Burmic **mrang-h* reflected in Burmese *myin-h,* but it was also borrowed into proto-Mongolic.

Given that the Old Chinese final glottal stop was developing into a tonal structure and that proto-Mongolic lacked initial consonant clusters, the closest imitation of the Chinese root in proto-Mongolic probably was **morï*. In the Mongolic languages we find an unstable stem-final nasal element, morphophonologically alternating with zero, that expresses singularity in contrast with plural forms on *-d*. This stem-final *-n* was added to the simple stem, yielding pMo **morï-n*.

It is clear that the direction of the borrowing was from Mongolic into Tungusic rather than the other way around because the proto-Tungusic form **murin* 'horse' is morphologically unsegmentable, while the proto-Mongolic form is a derived form. The Tungusic forms of the shape *morin* are late Ming (1368-1644) borrowings. From Tungusic the word spread to non-Trans-Eurasian languages such as Nivkh, e.g. the terms for 'horse', Sakhalin Nivkh *murng* and Amur Nivkh *mur*.

Old Chinese 馬 *$m^{ʕ}raʔ$ 'horse' was transmitted separately into proto-Korean as **mol* and into proto-Japanese as **(m)uma*. Beckwith (2004) reconstructs the Old Koguryo word **meru* 'colt'. Given the phonological discrepancy, the word cannot be reconstructed back to proto-Japanic, the common ancestor of Koguryo and Japonic.[4] The disyllabic structure and the presence of a liquid rather suggests that the word is a separate borrowing from Mongolic or Tungusic. In the final centuries BC, the Koguryo people were attested in the western part of present-day Liaoning Province, west of the Liaodong Peninsula, where they were in contact with Tungusic, Mongolic, Turkic and Chinese people.

The initial **(m)u-* in proto-Japanese **(m)uma* may have been added, in an attempt to imitate the initial cluster in Old Chinese. The Middle Japanese variant *(m)uma* 'horse' as well as the Ryukyuan cognates Miyako *nuuma*, Yaeyama *nnma* and Hateruma *qman*/*nman* support this idea. In addition, the Japanese imitation of Old Chinese 梅 *$C.m^{ʕ}ə$ 'plum tree' is *ume* 'plum' and it has a similar variant *(m)ume* 'plum' in Middle Japanese. This example seems to indicate that Old Chinese glottalized labial nasal clusters were imitated by way of a prothetic **(m)u-* in proto-Japanese. For the comparison of the term for 'horse' across East Asia, see also Ramstedt 1949: 138; 1957: 79, 141; Doerfer 1963: 507-508; Martin 1966: 248; Miller 1971: 76; Rozycki 1994: 159; Miyake 1997: 194-196; Starostin et al. 2003: 945-46 and Robbeets 2005: 195, 197, 200, 207, 912).

Tozaki *et al.* (2003) suggest that all Japanese horse breeds can be descended from Mongolian horses that migrated through the Korean Peninsula and arrived in Japan about 2,000 years ago. According to the chronicles of both the Kojiki and Nihon Shoki, Silla and Paekche authorities presented the Japanese emperor with horses as a gift between the mid-fourth and mid-seventh centuries, but in Japan there is archaeological evidence for early horse sacrifice before horses became a valued military possession through contacts with the Korean three Kingdoms (Barnes 1993: 231). In the Nihon Shoki it is also stated that horse sacrifice became prohibited. Given the early contacts in the first and second centuries AD between chieftains of various Wo tribes from Japan with Chinese authorities at the commandery of Lelang, established in northern Korea in 108 BC by the Han dynasty (206 BC-220 AD), the historical context leaves room for the horse being imported in Japan geographically, through the Korean Peninsula but linguistically, through contact with speakers of Old Chinese. During the period of Han economic expansion, many Chinese artifacts flowed into the surrounding area's, particularly bronze mirrors, iron, lacquerware, silks along with other bolts of cloths like ramie, hemp, and kuzu, wine, salt, rice and grain (Barnes 1993: 198, 202.)

Integrating paleolinguistic evidence

Common subsistence terms, whether they are inherited or borrowed, can shed some light on the location, timing and separation of the ancestral stages of the Trans-

Eurasian languages. Although only few terms for dry crops can be reconstructed back to proto-Trans-Eurasian, I proposed to reconstruct the term for 'barnyard millet'. Since the Neolithic Xinglongwa and Zhaobaogou people in the sixth millennium BC were targeting the grass for consumption, the reconstruction is in line with the hypothesis that they were the ancestral speakers of proto-Trans-Eurasian.

The terms for 'barley' and 'wheat' are rooted in Indo-European and their eastward trajectory can be followed throughout a continuum of neighboring languages all the way from Europe to East Asia. Whereas the term for 'barley' seems to arrive over proto-Iranian into the Turkic languages and from there separately into proto-Mongolic and proto-Japanic, the term for wheat goes from proto-Tocharian via pre-Old Chinese into proto-Tungusic, and from there separately into proto-Koreanic and proto-Japanic. From the timing of the dispersal of these crops provided by archaeology, we can deduce that the time-depth for the individual proto-languages (proto-Turkic, proto-Mongolic, proto-Tungusic, proto-Koreanic and proto-Japonic) must go back to at least the second half of the second millennium BC. This follows from the fact that proto-Iranian, the model language for 'barley' is dated back to the second millennium BC and that the transfer of the word from proto-Turkic into proto-Japanic must have taken place before 1300 BC. It is also based on the assumption that the term for 'wheat' was introduced in the first half of the second millennium BC in proto-Tungusic and that it was transferred from there into proto-Japanic before 1300 BC, at a time when the languages were still in contact.

If some rice vocabulary is indeed transferred from proto-Sinitic speakers partaining to the Longshan culture (3000-2000 BC) to para-Austronesian speakers belonging to the Dawenkou culture (ca. 4300-2600 BC) and from there to Japanic speakers present in the Longshan-Shandong interaction sphere — but not to Koreanic speakers — this implies that the split between proto-Koreanic and proto-Japonic had taken place already before 2600 BC, when the Dawenkou culture vanished.

The borrowing of the term for 'horse' is representative for a contact situation that is reshuffled by the end of the first millennium BC due to the relocation of proto-Japonic on the Japanese Islands. Whereas pastoralistic terms are extensively borrowed across languages on the east Asian continent such as Turkic, Mongolic, Turkic, Koguryo and Amuric Nivkh, peninsular proto-Koreanic and insular proto-Japonic undergo more direct linguistic influence from Han China and mutually from eachother.

What genetics tells us

As far as the population history of the Japanese islands is concerned, there is a relative agreement that Ainu and Ryukyuan people have shared genetic ancestry

reflecting indigenous Jomon genes, while mainland Japanese people are the result of admixture between indigenous Jomon and immigrating Yayoi from the Korean peninsula (Hanihara 1991, Omoto & Saitou 1997, Jinam *et al.* 2012). The admixture of indigenous Jomon people and Yayoi migrants on the Japanese Islands around 1000 BC is illustrated in Figure 7. The indigenous Jomon evolved from hunter-gatherers crossing paleolithic land bridges and coming from Central Asia, Northeast Asia and Southeast Asia. If we want to find out where the Yayoi immigrants originated, it is thus reasonable to compare genetic material with high frequency in Mainland Japanese but a low frequency in Ainu and Ryukyu to other populations.

Whereas previously the genetic history of East Asia has been largely undertaken with the study of the uniparental markers, i.e mitochondrial DNA and Y-chromosomal DNA, technical advances made over the last years have significantly facilitated studies of autosomal DNA variation. Recent studies of autosomal DNA find that Mainland Japanese is phylogenetically closest to (1) Korean, followed by (2) Tungusic and Mongolic populations in northeast Asia such as Oroqen, Hezhen (Nanai), Dagur, Mongolian and then, followed by (3) the populations in southern China (Jinam *et al.* 2012).

Population-based comparisons of mitochondrial DNA find a maternal connection between Mainland Japanese and other Trans-Eurasian populations,

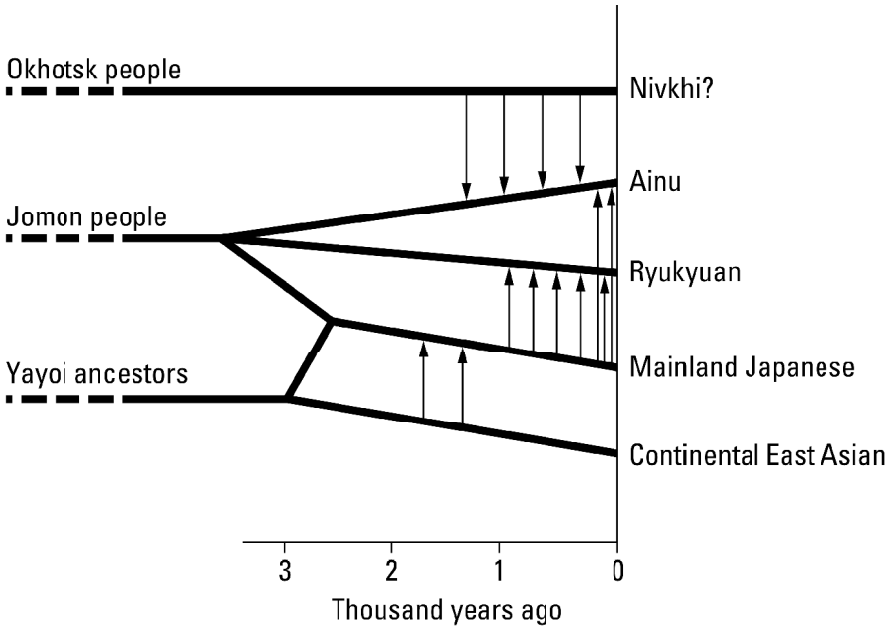

Figure 7: Admixture of indigenous Jomon and Yayoi migrants on the Japanese Islands 1000 BC (Jinam *et al.* 2012: 793)

especially in the subhaplogroup D4 & D5c, the subhalogroups M8a, C, and Z and the Haplogroup M10 (Kivisild *et al.* 2002, Tanaka *et al.* 2004, Gokcumen *et al.* 2008: 286, Dulik *et al.* 2012). Tanaka *et al.* (2004) find that Mainland Japanese have the closest maternal affinity to (1) Koreans (2) Han from Shandong and Liaoning (3) Mongolian, Monguor (Qinghai/Gansu) and Han from Xinjiang and (4) Central Asian Turkic populations such as Uighur, Kazakh and Kirghiz.

Comparisons of Y-chromosonal DNA find that the Haplogroup O-SRY465 is widespread in and almost entirely restricted to both Japan and Korea (Hammer *et al.* 2006). Its higher Y-STR diversity in Korea and the fact that one mutation (47z) arises only in Japan is consistent with the hypothesis that O-SRY465 tracks male lineages that migrated from Korea to Japan. Hammer *et al.* (2006) suggest that the male lineages started to migrate from Korea already around 1800 BC. The entire O haplogroup has been proposed to have southern Chinese origins linked to rice cultivation.

The Y-chromosonal haplogroup N1 is particularly frequent in the Altai region and to a lesser extent in Manchuria and Korea and marginally in Mainland Japanese, while it is absent in Ainu and Ryukyan. This seems to be a haplogroup that connects the Trans-Eurasian populations (Hammer *et al.* 2006, Rootsi *et al.* 2007).

Merging the different perspectives

Integrating the genetic evidence, it thus appears that both autosomal and uniparental DNA indicate a genetic connection between Trans-Eurasian populations, which may be linked to speakers of proto-Trans-Eurasian subsisting on millet agriculture. Moreover, autosomal DNA and Y chromosonal DNA connects Mainland Japanese with Korean populations and derives them from southern Chinese origins in connection with rice cultivation. This is in line a scenario in which Sinitic or para-Austronesian men from the Dawenkou culture on the Shandong Peninsula in the third and second millennium BC transmitted rice agriculture and related vocabulary to the speakers of Japanic in the Shandong-Liaodong interaction sphere, while intermarrying with Japanic wifes and passing down their Y chromosones. Around 1300 BC the Japanic speakers brought in addition to rice agriculture influenced by Sinitic and para-Austornesian, also some borrowed vocabulary as well as Y chromosomal DNA of southern provenance to the Korean Pensinsula, but they maintained their Trans-Eurasian mother tongue and mitochondrial DNA, inherited from the millet farmers.

Conclusion

By way of conclusion, I will return to the questions formulated in Section 1 and provide some tentative answers. First, what populations corresponded to the speakers of proto-Trans-Eurasian? In this article, I developed the hypothesis that they corresponded to the earliest Neolithic cultures in northeast China, namely to the

people of the Xinglongwa and the Zhaobaogou cultures who were cultivating both foxtail and broomcorn millet.

Second, where and when did these people originally live? Given the archeological evidence for these cultural complexes, I assume that the speakers of proto-Trans-Eurasian inhabited eastern Inner Mongolia and southern Manchuria in the sixth and seventh millennium BC.

Third, when did the Trans-Eurasian family separate into its main branches? The first split between Altaic and Japano-Koreanic probably occurred around the mid fifth millennium BC. I proposed to associate it with the separation of the ensuing Hongshan culture into a riverine culture and an outlying coastal culture on the Liaodong Peninsula. The split of Japano-Koreanic into Japanic and Koreanic occurred around the mid fourth century and is associated with the introduction of millets into the Korean Pensinsula.

Finally, in which directions did the dispersals go and what triggered them? I found that millet farming may be an obvious explanation for the initial separation of the Trans-Eurasian languages, before the introduction of wheat, barley and rice agriculture in the second millennium BC and before the development of pastoralism in East Asia in the first millennium BC. Early agricultural dispersal for these languages was probably circumscribed by decreasing rainfall in the west towards present-day Mongolia, decreasing temperature to the north towards present-day Siberia and by the presence of Sinitic and para-Austronesian rice farmers to the south. An exception was provided by proto-Korean that separated from proto-Japanic in the fourth millennium BC and entered the Korean peninsula probably with the spread of millet agriculture. From the end of the second millennium BC a progressive cooling process sat in whereby the climate in Northeast Asia became cooler and dryer. Climatic pressure in combination with population expansion pressure from Sinitic in the South, led the Japanic farmers from the Shandong-Liaodong interaction sphere to migrate to the Korean Pensinsula around 1300 BC and with further increasing aridity, finally to the Japanese Islands in the first millennium BC. The Turkic languages had already separated and started to move westwards into ecologically transitional zones in the fourth millennium but they accelerated their westward spread from present-day Mongolia toward central Asia due to horse riding and pastoralism, replacing Indo-Iranian languages on the Asian steppes and ultimately arriving in Anatolia in the 11th century AD. Other linguistic dispersals such as the Siberian expansion of the Tungusic speakers and the expansions of the Mongolic empire under Jingis Khan are recent in the sense that they occurred in the second millennium AD.

In this way, I hope to have provided a partial answer to the "wheres and whens" of the proto-Trans-Eurasian unity. It is clear that interdisciplinary research of Trans-Eurasian linguistic history has still a long way to go from here. Future research should among others include computational phylogenetic analyses, elaborate paleo-

linguistic investigation, detailed comparative research of Neolithic and Bronze Age cultures in North East Asia and a model-based genetic analysis including comparisons of genome-wide autosomal DNA. Nevertheless, by way of a working hypothesis, it seems reasonable to view the dispersal of the Trans-Eurasian languages within the scope of the language/farming dispersal hypothesis.

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Notes

1. The capital A in the suffix pTg **-kA* represents vowel harmony. The suffix seems to have lexicalized in animal names such as pTg **tasa-ka* 'tiger' (e.g. Ma. *tasxa*, Jurchen *tasxa*, Solon *tasax*), pTg **kumi-ke* 'louse' (e.g. Evk./ Even/ Neg. *kumke* and Evk. *kumikēn* 'insect', Na. *kuŋke*, Ud. *kumuge*, Solon *xuŋkē* and *xumīxe* 'ant'), pTg **inū-ke* 'dog, wolf' (e.g. Evk. *nēkē* 'sable', Even *ŋöke* 'male (of dog, wolf, fox)', Sibe *juxə* 'wolf', Ma. *nìoxe* 'wolf', *nuxere* 'puppy') and in plant names such as pTg **eb-ke* 'heather' (e.g. Evk. *ebkemkirē*, Neg. *epkexin*, Orok/ Oroch *ewxexi*, Na. *opokta* 'hawthorn') and pTg **bolo-ka* (Evk. *boloko*, Neg. *boloxokto*, Na. *boloqto*, Ud. *bolokto*).
2. The development of pK **s* into **h* is reflected in lexical pairs such as MK *hoy-* 'do' and MK *siki-* 'cause to do' and in MK *hoy-* 'be white' and MK *syey-* 'become white (of hair, of face)', whereby the presence of a second high front vowel or palatal glide in the syllable blocked the development.
3. Among others this development can be observed dialectal forms (e.g. dialectal *tolk* for MK *¨twolh* 'stone'), and internal doublets (MK *siphu-* and MK *sikpu-* 'want').
4. I distinguish between Japanic on the one hand and Japonic on the other. Following Janhunen (1996: 77-78, 80-81), I use the term "Japanic" in reference to a genealogical unity that comprises the historical continental varieties of the Japanese language as well as the varieties spoken on the Japanese Islands, including the Ryukyu Islands. The label "Japonic", coined by Serafim, is usually restricted to a branch of Japanic, namely the language family composed of Mainland Japanese and the Ryukyuan languages.

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