Understanding the specific nature of the East Asia Neolithic transition

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ABSTRACT – *The main subject of this article is to define the specific nature of the Palaeolithic-Neolithic transition in East Asia. A comparative analysis of regional East Asian data was run in order to achieve this. As a result, three dissimilar models of the Neolithic transition were distinguished: Meso-Neolithic, Subneolithic, and Neolithic proper. The first and last are similar to their counterparts in the western part of Eurasia, but the Subneolithic is unique for East Asia. Regarding chronology, two stages of Neolithic transition can be clearly recognized in this region. The new Subneolithic type of hunter-gatherer cultures occurred during the first stage around the Sea of Japan. At the second stage, the transition to food production started in central and north-central China. In between, there was a cultural, spatial and temporal gap splitting up the transitional process into two isolated episodes.*

KEY WORDS – *East Asia; Palaeolithic-Neolithic transition; Neolithic; Subneolithic; Meso-Neolithic; origin of pottery*

Razumevanje posebne narave prehoda v neolitik na območju Vzhodne Azije

IZVLEČEK – *V članku razpravljamo o posebni naravi prehoda med paleolitikom in neolitikom na območju Vzhodne Azije. Pri tem smo si pomagali s primerjalno analizo podatkov, pridobljenih na tem območju. Kot rezultat predstavljamo tri različne modele prehoda v neolitik: mezo-neolitik, pod-neolitik in pravi neolitik. Prvi in zadnji sta podobna procesom v zahodnem delu Evrazije, medtem ko je pod-neolitik pojav, značilen le za Vzhodno Azijo. Tukaj lahko na podlagi kronologije jasno razločimo dve stopnji prehoda v neolitik. Sprva se je nova oblika pod-neolitika oblikovala med lovci in nabiralci na območju Japonskega morja. V drugi stopnji pa se začne pridelava hrane na območju osrednje in na severnem delu osrednje Kitajske. Med obema stopnjama je kulturna, prostorska in časovna prekinitev, ki proces prehoda v neolitik deli na dva ločena pojava.*

KLJUČNE BESEDE – *Vzhodna Azija; prehod paleolitik-neolitik; pod-neolitik; mezo-neolitik; izvor lončenine*

Introduction

Recent discoveries provide increasing evidence that many human achievements, previously consid-ered to be a product of the Neolithic agrarian revolution, were made before it happened (*Barnett, Hoppes 1995; Roosevelt 1995; Close 1995; Rice 1999; Jesse 2003; Keally* et al. *2003; Kuzmin 2006; 2010; 2015; Budja 2006; 2016; Jordan, Zvelebil 2009; Huyseco* et al. *2009, Hommel 2012; Gibbs, Jordan 2013; Cohen 2013; 2017*). A huge number of studies have been made to explain the new facts and link them with the traditional point of view, and as a result a new paradigm began to take a shape in

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the literature, radically changing our understanding of the Neolithic (*Zeder 2009; 2011; Fuller* et al. *2011; Finlayson 2013; Özdoğan 2010; 2014; Uchiyama* et al. *2014; Nordqvist, Kriiska 2015; Gibbs, Jordan 2016*). Two statements constitute its core. One of them postulates the multiplicity of the Neolithic forms and their ways of evolving, whereas the second call into question the revolutionary nature of the Neolithisation, since new data indicate that this process was protracted and not as influential as previously considered.

It should be noted these new views are coming rapidly into ascendance, and are recurrently ex-pressed by different scholars and with different rationales. It seems that right now a new Neolithic concept is being formed. Accordingly, the Neolithic turns from a global phenomenon with a single set of innovations into some kind of 'patchwork' phenomenon consisting of many different regional forms. In this vision, the long polycentric process of Neolithic development substitutes the Neolithic burst in a core area with subsequent transmission of the ready-made package of Neolithic innovations beyond its borders.

It is quite understandable that the new perspectives are based to a large extent on data from East Asia, as the Neolithic transition began there with the advent of pottery and ended with the develop-ment of agriculture, while in West Asia, providing a classic case of Neolithic research, this sequence was reversed (*Björk 1998; Bar-Yozef 2011a; Kuzmin 2013; Gibbs 2015; Gibbs, Jordan 2016; Fuller, Stevens 2017*). This indicates a clear discrepancy between the eastern and western pathways of the Neolithic transition. However, does this observation cover all features separating East and West Asia? In this paper, I will attempt to summarize the data concerning this question. My analysis shows that spatio-temporal dynamics of the Neolithic transition and its regional differences also deserve our attention from this point of view.

However, before starting, some preliminary remarks have to be made with regard to the terms and approaches taken in this study. In a broad sense, the Neolithic transition means people's shift from the Palaeolithic to Neolithic way of life. But the understanding of the latter has been changing drastically in recent years. Nowadays the question of what was the endpoint of this process thus arises in almost every research lying in the scope of Neolithic studies. The traditional point of view takes agriculture as the terminus of the Neolithic transition, while another widespread position sees pottery as the endpoint. However, the concept of the multifarious Neolithic seems to infer that there is no one proper answer to this question.

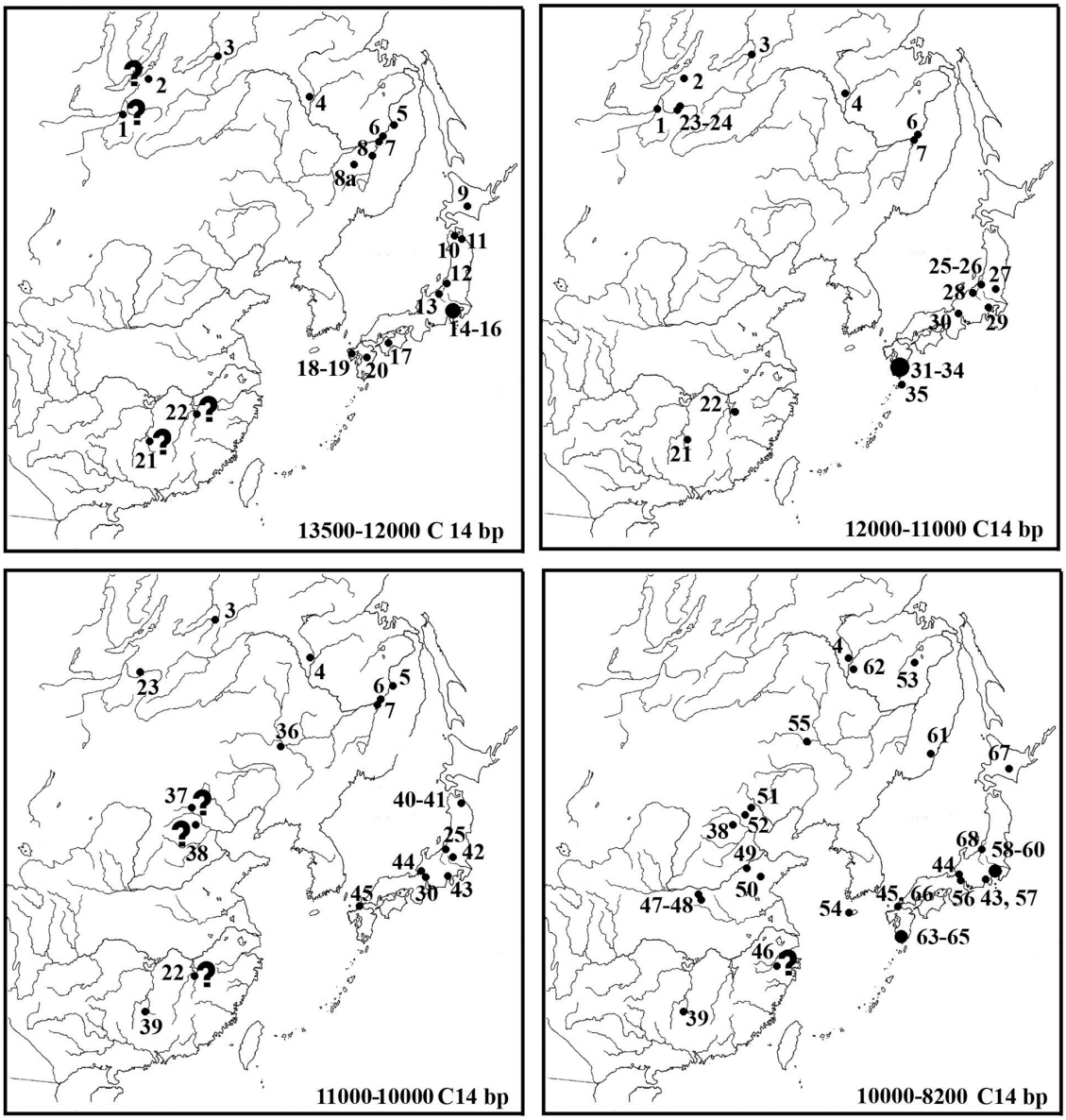
In the present study, I would prefer to avoid the generalizations that hide beneath the question above. First, in my opinion, we have to document and comprehend all possible regional variants of the Neolithic. Therefore, my task here is only to explore what is, in fact, the Neolithic transition in East Asia. However, even in this case it is necessary to define this process at least to outline the dataset relevant to this task. In this way, I propose to abide by the local schemes of interpreting the Neolithic. From this, the Neolithic transition is considered here as moving from what local researchers regard as its starting point to what they understand under the term Neolithic.

It also has to be added that East Asia is extremely extensive and diverse in both cultural and climatic terms. For this reason, in order to make out the shared features of the Neolithic transition in this vast area it is necessary first to define its regional peculiarities. My analysis shows three regional models of the Neolithic transition can be clearly recognized in East Asia: the Subneolithic in the Sea of Japan area, the Neolithic proper in central and north-central China, and the Meso-Neolithic in the Circum-Baikal region. Other territories did not generate any special forms of the Neolithic transition and might be characterized as laggards in this context (*Eerkens, Lipo 2014*).

Thus, further in this article regional data will be first presented so that they reflect a general sequence of the Neolithic transition in each of the three areas mentioned, and then an attempt to designate a region-wide scheme will be made. Finally, the assessment of this scheme will be done in comparison with the general pattern of the Neolithic transition according to its classical understanding registered in West Asia and implied the shift to farming.

Regions around the Sea of Japan

The Sea of Japan basin introduces the first model which is related to forming sedentary hunter-gatherer-fisher cultures, and therefore it can be defined as Subneolithic. A wide range of innovations emerged here during the course of the Neolithic transition. A little later, they will constitute the hallmark



1 - Ust'-Kyakhta-3; 2 - Krasnaya Gorka; 3 - Ust'Karenga; 4 - Gromatukha; 5 - Khummi; 6 - Gasya; 7 - Goncharka-1, Novotroitskoe-10, Osinovaya Rechka-10, 16; 8 - Xiaonanshan; 8a - Taoshan; 9 - Taiso-3; 10 - Oday-Yamamoto-1; 11 - Kiwada; 12 - Kubodera-Minami; 13 - Seiko-Sanso; 14 - Gotenyama; 15 - Tsukumino-Kamino-2; 16 - Manpukuji; 17 - Kamikoroiwa; 18 - Fukui; 19 - Senpukuji; 20 - Kawayo F; 21 - Yuchanyan; 22 - Xianrengdong; 23 - Studyonoe-1; 24 - Ust'-Menza-1; 25 - Unoki-Minami; 26 - Jin; 27 - Nozawa; 28 - Nakamachi; 29 - SFS; 30 - Aitani-kumahara; 31 - Tsukabaru; 32 - Sojiyama; 33 - Shikazegashira; 34 - Higashi-Kurotsuchida; 35 - Sankakuyama-1; 36 - Houtaomuga; 37 - Yujiagou; 38 - Nanzhuangtou; 39 - Zengpiyan; 40 - Kushibiki; 41 - Takihata; 42 - Saishikada-Nakajima; 43 - Kuzuharazawa-4; 44 - Torihama; 45 - Obaru D; 46 - Shangshan; 47 - Lingjing; 48 - Lijiagou; 49 - Zhangmatun; 50 - Bianbiandong; 51 - Zhuannian; 52 - Donghulin; 53 - Yamikhta; 54 - Gosanri; 55 - Shuangta; 56 - Awazu-kotoi; 57 - Ikeda B; 58 - Hanawadai; 59 - Natsusima; 60 - Musashidai; 61 - Ustinovka-3; 62 - Chernigovka-na-Zee; 63 - Kakuriyama; 64 - Nagasakohira; 65 - Kivaki; 66 - Matsukida; 67 - Taiso-6; 68 - Kurohime

Fig. 1. Spatio-temporal distribution of pottery-bearing sites during the Neolithic transition (based on ^{14}C dates run on charcoal, bone or pottery charred crust). In the Japanese archipelago only the main sites have been marked due to their immense number.

of the 'northern' Neolithic and partly of the agrarian one. Three phases can be traced in the development of this scenario of the Neolithic transition.

The first phase is marked out by the sudden emergence of just three cultures of an absolutely new type: Incipient Jomon in the Japanese archipelago, Osipovka culture in the Low Amur River, and the Gromatukha culture in the Middle Amur River (Fig. 1). Even the very first sites differed significantly from the surrounding Upper Palaeolithic ones, but over time these differences became more and more pronounced, and to the end of this phase the whole suite of Neolithic novelties was already engendered.

The data from the Japanese archipelago, which is the most studied of all three areas examined in this paper, shows in detail the course of the Neolithic transition during this phase (*Keally 1991; Kenrick 1995; Imamura 1996; Mizoguchi 2002; Sato, Tsutsumi 2002; Keally* et al. *2003; Habu 2004; Kobayashi 2004; Pearson 2006; Kanner 2009; National Museum of Japanese History 2009; Kanomata 2010; Nakazawa* et al. *2011; Sato* et al. *2011; Nishida 2002; Kudo, Kumon 2012; Craig* et al. *2013; Morisaki, Sato 2014; Seguchi 2014; Morisaki* et al. *2015; Lucquin* et al. *2016; Sato, Natsuki 2017; Morisaki, Natsuki 2017; Otsuka 2017; Ikawa-Smith 2017; Kanner, Taniguchi 2017; Morisaki* et al. *2018*).

The new type of sites came into existence on the north of the Paleo-Honshu Island just before the Bølling-Allerød warming. Soon after, the fast proliferation and at the same time enhancement of the new culture began. During this process, the highly evolved toolkit arose looking rather precocious or outpacing the time. It includes pottery, the rejection of microblade techniques in favour of a less demanding flake industry, the rejection of composite tools and shift to simple stone tools with facial secondary processing, partly polished axes and adzes, bifacial tools used as spearheads and arrowheads, new types of cutting and scraping tools, and abraders.

The appearance of this package of novelties took place against the background of changes in subsistence strategies and in a way of life as a whole, but in this field the transition did not keep up such a fast pace. At the current stage of knowledge, relocation of residential camps to the margins of rivers or lakes, reducing the dependence on stone raw materials of high quality, thickening of cultural depositions, expansion of social networks, and to some extent ascending the ritual behavior scale indicate these changes and signalize the outset of sedentarization process and moving to a broader economy.

The next set of novelties appeared a bit later during the Allerød warming on the southern part of modern Kyushu. Here, in more favourable climatic conditions, plant gathering, mainly of acorns, became a focus for local people (*Habu 2004; Shibutani 2009; 2011; Kudo 2014; 2015; Noshiro* et al. *2016*). In addition, grinding tools, storage pits, semi-subterranean dwellings, and village-like settlements occurred for the first time here (*Imamura 1996; Habu 2004; Shinto 2006; Pearson 2006; Morisaki, Sato 2014; Izuka, Izuho 2017; Morisaki* et al. *2018*).

It should be noted also that the process of Neolithisation was to a certain extent geographically uneven in the Japanese archipelago. The first Incipient Jomon sites arose on the North of Honshu, *i.e.* on the periphery of areas that were the most mastered by people developing the microblade industries. Moreover, where the microblade industries occurred earlier and evolved more than elsewhere, they persisted the longest. For example, on Hokkaido, the local people refused to adopt pottery and many other innovative changes during this phase, while on the south of Kyushu they conserved only microblade techniques. Moreover, on Hokkaido, and during this phase, the local people refused to adopt pottery and other innovative changes, while on the south of Kyushu people conserved only microblade techniques for a long term.

The archaeological data from the Amur River does not contradict these observations (*Derevyanko, Medvedev 1995; 2006; Lapshina 1999; Kuzmin 2003; 2005; Kuzmin, Shewkomud 2003; Shewkomud, Yanshina 2010a; 2010b; 2012; Yanshina 2008; 2014*). The Osipovsky sites appeared suddenly at the very outset of the Bølling-Allerød warming, and within an area which was not settled at all before. All of them were tied to the mainstream of the Amur River whose water level was 10m higher at that time than today. To the end of the development of the Osipovka culture, we can see semi-subterranean household structures (like pits with unknown purposes, postholes, fireplaces, and possibly dwellings), stationary and portable ritual objects, signs of long-term habitation (*e.g.*, palimpsests of settlement structures), and well established tool assemblages which include pottery and steady series of polished axes, bifacial spearheads and arrowheads, the new types of cutting and scraping tools, and abraders. Unfortunately, the timeline and scope of variety of the Gromatukha culture are poorly studied.

It should be added that throughout the first phase the traditional Upper Palaeolithic cultures continued to develop around of Sea of Japan, but occupying the other areas. Thus, they are known not only in Hokkaido but also in Sakhalin, Primorye, and Korea. Then over time, some of the novelties began to penetrate there, as mainly represented by arrowheads and axes (*Vasil'yevsky* et al. *1997; Kajiwara, Kononenko 1999; Cohen 2003; Vasilevsky 2008; Bae 2010; 2017; Otsuka 2017*).

The second phase (10 000–8000 ^{14}C bp) coincided with the first two or one and half millennia of the

Holocene. It started with the more or less rapid disappearance of three pioneering cultures of the previous phase, though this process was also uneven throughout the region.

On the south of the Japanese archipelago it started slightly earlier under the impact of the Younger Dryas cooling (*Nakazawa* et al. *2011; Morisaki, Natsuki 2017*). The Incipient Jomon camps totally disappeared here during this climatic event. At the same time, to the north, it seems this cooling had not such a damaging influence. On Honshu the number of sites reduced sharply but the Incipient Jomon culture survived, and on this basis the subsequent variants of Jomon culture were formed to further evolve the preceding achievements. During this phase, plant gathering and dwelling pits spread across all Paleo-Honshu while remaining rare. In addition, shell mounds and special fishing equipment (fishhooks, net weights, *etc.*) appeared for the first time at this phase, signalling the final establishment of the new subsistence strategies. However, there were no indications of the previous dynamism.

In the more northern areas, on the contrary, the Younger Dryas cooling coincided with the flourishing of the Osipovka culture occurred at the middle stage of its development. But with the onset of the Holocene, the Gromatukha and Osipovka cultures vanished, leaving no traces (*Shewkomud, Yanshina 2012.231–244*). The latest dates of the former vary within 9680±80 and 9150±80 ^{14}C bp (*Derevianko* et al. *2017*); the latest dates of the latter are 9810±80 and 9430±70 ^{14}C bp (*Fukuda* et al. *2014*) (Fig. 2). Thereafter and somewhere concurrently, a very pronounced gap in the archaeological records occurred along the Amur River and also in Sakhalin, Hokkaido, Primorye, and Korea with only a few exceptions: Ustinovka-3 in Primorye (*Garkovik 1996; Derevyanko, Tabarev 2006*), Yamikhta in the northeast part of the Amur River region (*Fukuda* et al. *2014*), and Taiso-6 in Hokkaido (*Obihiro City Board of Education 2005*). Therefore, it is not known how the subsequent events developed in this area as a whole.

The third phase (8000–5500 ^{14}C bp) comes with appearance across all the given area the fully-developed Neolithic sites or rather Subneolithic (Japan: *Habu 2004; Imamura 1996; Nishida 2002; Matsumoto* et al. *2017; Morisaki* et al. *2018*; Amur river: *Derevyanko, Medvedev 2006; Shewkomud, Kuzmin 2009; Shewkomud, Yanshina 2012.31–244*; Primorye: *Andreeva 1991; Dyakov 1992; Zhushchikhovskaya 2006; Batarshev 2009; Sakhalin: Grishchenko 2011; Vasilevsky, Shubina 2006; Kuzmin* et al. *2012*; see also *Kuzmin 2005*). These inherit the whole set of innovations developed earlier by the groups of Osipovka, Gromatukha, and Incipient Jomon cultures, but differ by the presence of a more pronounced ritual activity, including a regular burial practice, though not in all areas, as well as larger settlements with semi-subterranean dwellings. Subsistence practices become more developed and steady. According to the Japanese data, the economy acquires a complex nature, which makes it possible to efficiently exploit different seasonal resources without permanent residential movement. The shift to food production occurs here many millennia later, in each of the areas at a different time and in a different mode.

Circum-Baikal region

The Circum-Baikal region represents the second model and demonstrates one more way of forming a new type of hunter-gatherer-fisher cultures. Like in the previous case, this process can also be split into several phases. However, some general remarks have to be made before proceeding to describe them in detail.

First, the Baikal region is the only in East Asia where the presence of ceramics in the Late Pleistocene assemblages is still disputed. This greatly complicates an understanding of the general pattern of Neolithic transition in this area. It is not possible to characterize all of the controversial points of this discussion, since they can be found in various publications (*Konstantinov 1994; 2009; Razgil'deeva* et al. *2010; Vetrov 2010; Hommel 2012; Hommel* et al. *2017*).

Secondly, the Neolithic transition in the given area ran with some important differences between two opposite sides of Lake Baikal, *i.e.* Transbaikalia and Gisbaikalia. In the former, during the last millennia of the Pleistocene, the steady and continuous development of human culture is recorded up to the Holocene (*Konstantinov 1994; Buvit* et al. *2016*), whereas in the latter there was a deep recession in the development reflected in a total reduction in the number of sites up to their complete disappearance (*Berdnikova 2012*). The situation, however, changed drastically with the onset of the Holocene. ^{14}C dated sites vanished in Transbaikalia (*Konstantinov* et al. *2016*; see also *Buvit* et al. *2016*), but in contrast the powerful Mesolithic culture arose in Gisbaikalia

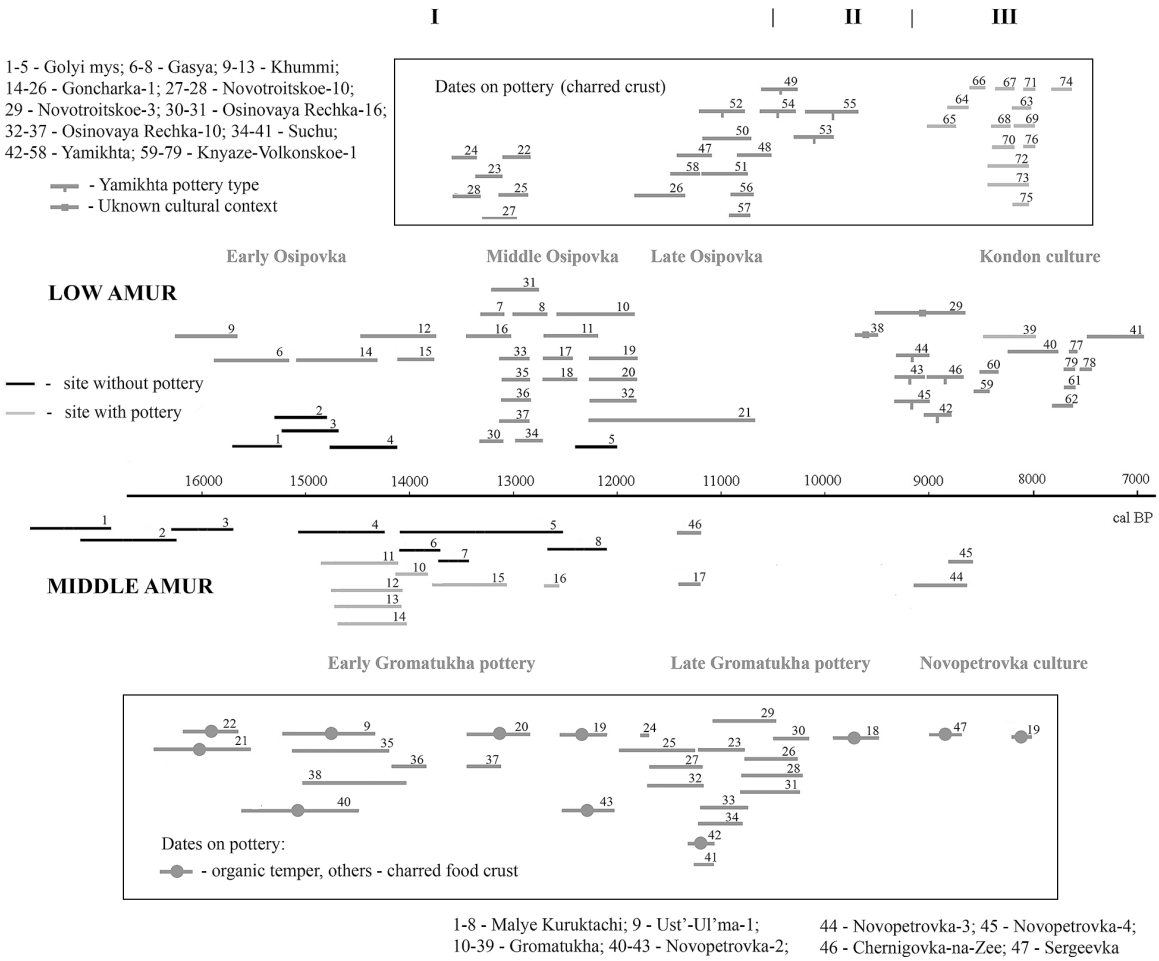


Fig. 2. Schematic representation of the Amur River radiocarbon date database referring to the Palaeolithic-Neolithic transition. Note the gap between the dates of the Gromatukha-Osipovka and the Neolithic site and differences between dates for the charcoal, organic temper, and food crust.

(*Berdnikova* et al. *2014; Losey, Nomokonova 2017*). Due to this feature, the overall picture of the Neolithic transition can be comprehended only if both sides of Lake Baikal will be taken into consideration, though the early pottery is known only in the Transbaikalia, that normally falls into the focus of East Asia Neolithic studies (Fig. 1).

Thirdly, there is increasing evidence the territory adjacent to Lake Baikal was the easternmost point of the influence of the European Upper Palaeolithic (dwelling constructions, anthropomorphous and zoomorphic figurines, burials, *etc.*). It is interesting in this context that this area, in addition, is the only in East Asia where a Mesolithic period very similar to the European one is clearly distinguished (*Kol'tsov 1989; Konstantinov 1994*). The characteristic of this period is the new type of hunter-gatherer-fisher cultures forming at the interstice between the Upper Palaeolithic and the appearance of pottery. These cultures evolved toward the Neolithic quite slowly, holding many Upper Palaeolithic traits and adapting incrementally to new environments and a more mobile way of life. Therefore, this model of the transition to the Neolithic can be labelled under the banner of Meso-Neolithic.

The first phase (12 700–10 300 ^{14}C bp) started with the appearance of pottery in Transbaikalia (*Kuzmin, Vetrov 2007; Razgil'deeva* et al. *2013; Tsydenova* et al. *2017*). It occurred in the assemblages with the microblade industries represented by two traditions based on edge-shaped and wedge-shaped microcores (*Tashak 2005; Tabarev, Gladyshev 2012; Pavlenok 2015; Tsydenova, Piezonka 2015*). The former is called Selenginskaya, and it is considered to be local in origin. The overwhelming majority of sites located in the south of Transbaikalia are attributed to this tradition, and these are concentrated within the Selenga and Chikoy river systems. The second tradition is known as Chikoiskaya, and its origins have yet to be established, with sites mainly in the north of Transbaikalia (see exception: *Moroz 2014a*).

Looking at the data as a whole, one can see in Transbaikalia a rather sharp rise in the total number of archaeological sites coinciding with this phase (*Buvit* et al. *2016.Fig. 2*). From this point of view, it looks like a single episode in the prehistory of this area. The shared trends in cultural development throughout this time also confirm this proposal, as outlined below.

Firstly, a very sophisticated house-building practice known from the earlier Upper Palaeolithic records of Circum-Baikal Asia began to decay at this stage (*Konstantinov 1994; 2001; Aseev 2003; Philatov 2016*). This tendency is clearly distinguished at the multi-layered sites of Transbaikalia, such as Studenoe-1 and Ust'-Menza-1. Here, large, steady in shape multi-fireplace structures represent the earliest of dwellings. They had a clear-cut layout and borders lined with stones. However, by around 13 000 ^{14}C bp they had already started degrading and turned into single-fireplace objects, and with each next horizon of the sites their construction elements were becoming more and more featureless. This tendency reaches its apogee in the horizons with pottery: residential structures here are distinguished solely by the concentration of finds near fireplaces. The general thinning of cultural deposits corresponds to these changes as well (*Konstantinov 1994.150*).

Secondly, some changes in the subsistence strategies also occurred at this phase. To begin with, fish bones and fishing tools appear here for the first time. Thus, fish bones are found in the Ust-Kyakhta-17, layers 2–6 (*Tashak 2005*), Oshurkovo, layer 3, Ust-Menza-1, layers 11–12, 9, Studenoe-1, layers 10–11 (*Konstantinov 1994.148*). Dace, roach, burbot, and pike were identified from bones recovered at the sites located along the Chikoi River. Bone fishhooks were found in the Ust-Kyakhta-3 site (*Aseev 2006*), Ust-Kyakhta-17, layer 3 (*Pavlenok 2015.147*), Studenoe-1, layers 10–11 (*Konstantinov 1994.80–81*). Two bone harpoons were documented as well in layer 3 of Oshurkovo (*Konstantinov 1994.149*). Interestingly, in the horizons with pottery such clear evidence of fishing has not yet been found.

Besides, some changes in the design of the composite tools appeared at this phase. In addition to large one-edged shafts for microblades, their smaller-sized variety with a double-edge came into existence, as found at Ust-Menza-1, layer 12, Studenoe-1, layer 11, Ust-Kyakhta-17, layer 3 (*Pavlenok 2015. 147*). It is suggested that they were used for spears or darts (*Konstantinov 1994.184*). At the Studenoe-1, a double-edge shaft was found in the same layer with pottery (layer 9), but not in the upper horizons (*Ibid. 81–84*).

Thirdly, some changes are noted in microblade industries themselves (*Antonova 2012; 2015; Moroz 2014b*). Apart from the ongoing microblade miniaturization, the transition to raw materials of lower quality mentioned in the literature, there was also a change in microcore proportions, the improvement of microblade cutting, and the advent of points known as the Kyakhta type.

It is worth noting that all these features characterize only the sites located in the south of Transbaikalia. On these grounds, researchers combined them in the same cultural and chronological unit with an approximate age of 13–10 000 ^{14}C bp (*Moroz 2014; Pavlenok 2015*). How these observations fit the more northern sites situated in the mouth of the Karenga River remains unclear. In addition, some time seems to pass between the starting of this culture and the coming of pottery, but it is difficult to determine how protracted this timelag was (Tab. 1; *Konstantinov 1994; Kuzmin, Vetrov 2007; Razgil'deeva* et al. *2013*).

Moving people to a more mobile way of life is suggested to be a general tendency of the Neolithic transition in the Circum-Baikal area. This statement is in good correlation with some of the traits above, such as the miniaturization of microblades, simplification of house-building practices, and thinning of cultural deposits, while it does not fit well with others, such as the advent of pottery, birth of a fishing economy, and shift to a raw material of lower quality. This discrepancy stresses the complex nature of the processes happening in the given area in the course of the Neolithic transition.

The second phase started with the onset of the Holocene (10 300–7500 ^{14}C bp). Two main events designate this period. On the one hand, there is evidence signalling the crash of cultural development in Transbaikalia, which was less pronounced in its

	Ust'-Karenga-12	Ust'-Menza-1	Studenoe-1
Pre-ceramic layers	12 880±130–12 710±380	11 820±120–10 380±250	12 330±60–10 775±140
Ceramic layers	12 180±60–10 600±110	11 550±50 (food crust)	10 780±150–10 400±155

Tab. 1. Chronology of pre-ceramic and ceramic-bearing layers of the Transbaikalia Late Pleistocene sites.

very northern part (*Teten'kin 2010*) (Fig. 3). Indeed, the ^{14}C dates of this age are almost absent in the current dataset (*Konstantinov* et al. *2016*; see also *Buvit* et al. *2016*). The few exceptions represent the dates derived from unclear stratigraphic, planigraphical and cultural contexts. On the other hand, multi-layered sites, like the Transbaikalia ones of the previous phase, came into existence in the Gisbaikal (*Berdnikova* et al. *2014; Losey, Nomokonova 2017*). They are considered in the frame of the Mesolithic epoch, which means pottery completely disappeared in the Circum-Baikal region at the second phase.

The early Holocene assemblages of the Gisbaikal are typical for the classic Mesolithic epoch. The sites can be clustered into a few geographically isolated areas. Most of them concentrate on the north and south of Angara Region, and also on the west coast of Lake Baikal, by being tied to the edges of water holes. Their perfect stratigraphy allows tracing the incremental transformation of culture during this phase (*Kol'tsov 1989; Bazaliyskiy 2012; Rogovskoy, Kuznetsov 2013; Bocharova* et al. *2014; Berdnikov* et al. *2014; Berdnikov 2016; Losey, Nomokonova 2017*).

The cultural remains are mainly clustered around fireplaces, forming clear outlined spots. The dwelling-like structures are absent, but pits filled with ash and fish bones have been discovered. Hunting and fishing were the primary subsistence strategies. Faunal remains represent roe and red deer, and much more rarely elk and boar; however, the key tendency of the economic activity was the adoption of fishing. The increase in its significance is seen from the lowest to more and more upper horizons: the number of fish bones and fish tools accrue, simple fishhooks change to more effective composed tools, harpoons of a new design and weights also appear. Sturgeon, pike, burbot were the main objects of fishing. The role of seal was also growing in the course of this phase. The sites tied directly to Lake Baikal are broadly interpreted as seasonal fishers' camps.

The stone industries and tool assemblages also became more advanced, but most novelties arose only at the end of the phase. The progress in prismatic splitting and burin techniques was the principal tendency of that time, although bone and horn processing also flourished. The percentage of blade tools was high. Firstly the mid- and multi-facets burins and then their polyhedric varieties replaced the corner ones. New techniques also emerged: grinding, drilling, bifacial processing. In addition, axes and adzes, including the ones with polished working edges, arrowheads, knives, as well as various decorative pendants appeared to supplement the assemblages.

The third phase (7500 ^{14}C bp and onward) termed Neolithic in local schemes came with the advent of pottery and burials. And once again, some discrepancies between two opposite sides of Lake Baikal can be seen at this time. In Transbaikalia, this phase introduces only burial sites though with no pottery (*Lbova, Zhambaltarova 2009*). Dated habitation sites are still absent here up to approx. 5000 ^{14}C bp, and exceptions, once more, are few and obscure. (*Aseev 2003; Hommel 2012; Konstantinov* et al. *2016*). In Gisbaikal, conversely, pottery and burials penetrated gradually into local assemblages starting yet in the Mesolithic phase (*Weber 1995; Bazaliyskiy 2012; Berdnikov 2016; Berdnikov* et al. *2017*). Thus, single burials appeared at the end of the Mesolithic, while pottery-bearing sites coexisted with the aceramic ones for some time. For this reason, drawing a clear-cut border between the Mesolithic and Neolithic phases is not possible in this region. Besides, the subsistence strategies did not change significantly during Neolithic: deer, fish and seal were the staple foods at that time. The way of life also continued without pronounced changes.

The next noticeable shift in cultural development in the Circum-Baikal region occurred only much later, around 3000 ^{14}C bp. It was related to the arrival of pastoralist practices into this area and the rise the influence of nomadic culture.

Central and North-Central China

The archaeological records of China represent the third model related to the forming of agricultural communities. Since China was the only region in East Asia where the proper Neolithic formed, it has drawn the strongest attention of international scholars. As a consequence, many aspects of the Neolithic transition in China have been reappraised in recent years (*Cohen 2003; 2011; 2013; 2014; 2017; Bar-Yosef 2011a; Zhao 2011; Liu, Chen 2012; Shelach-Lavi 2015; Wagner, Tarasov 2014; Zhuang 2015; Liu X.* et al. *2009; 2015; Liu L. 2015; Lu T. 2010; 2012; Wang* et al. *2016; Lu H. 2017; Stevens, Fuller 2017; Crawford 2017; Chen, Yu 2017; He* et al. *2017*; *etc*.). And again, three phases can be seen in the course of food production forming.

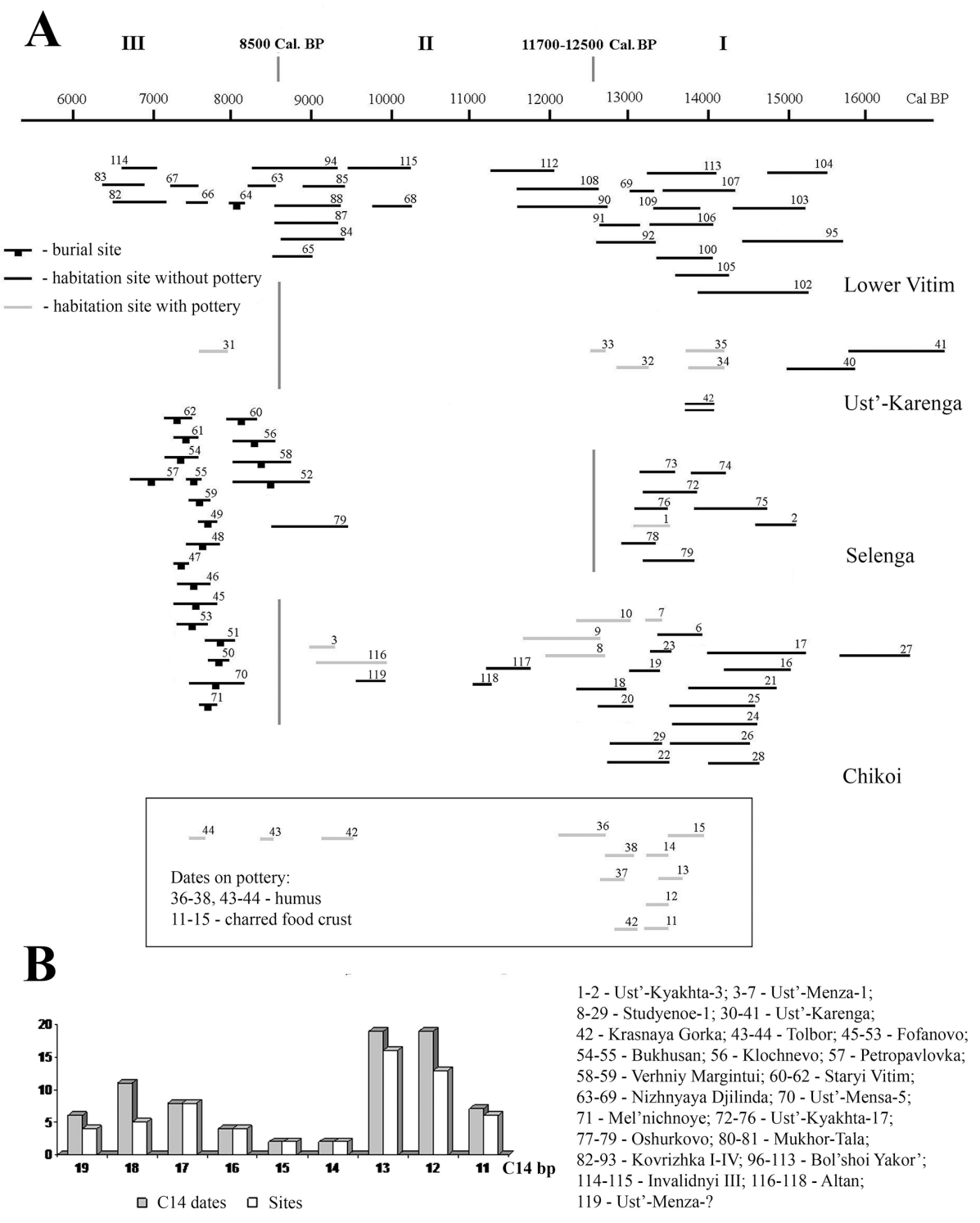


Fig. 3. Schematic representation of the Circum-Baikal radiocarbon date database referring to the Palaeolithic-Neolithic transition (A), and distribution of the number of dates under each millennium (B). Note the rise in the number of sites and dates during the 13th to 11th millennia (B) and Early Holocene gap in the records (A).

The first phase (17/11 000–8200 ^{14}C bp) is marked by the appearance of pottery and some other novelties, but this process proceeded with many differences in North and South China, and possibly asynchronously (Fig. 1).

In South China, a new cultural tradition was formed in the middle reaches of the Pearl River. People continued to dwell in caves and use pebble tools, like their Paleolithic predecessors, but pottery along with partly polished bone and shell tools, and oversized

waste shells evidenced the advent of profound changes in their life. The chronology of this moment is unclear and still under discussion (*Kuzmin 2013a; 2017; Cohen 2013; Cohen* et al. *2017; Izuka 2018; Yanshina, Sobolev 2018*). The recent ^{14}C dating refers it approx. to the Last Glacial Maximum (*Boaretto* et al. *2009; Wu* et al. *2012*), whereas more conservative assessments, based chiefly on cross-cultural comparisons, point out to the Pleistocene-Holocene boundary (*MacNeish 1999; Zhao 1998; Wu* et al. *2005; Chen 1999; Chi 1999*). Later, but how much later it is unknown, isolated burials appeared there as well. Pottery has very distinctive appearances with no resemblance to any other known from that time outside of China (*Yanshina 2017*). So, it seems all the southern sites represent a homogeneous and well-clustered culture. Only a few sites are known outside it's areal, *i.e.* Xianrendong, Diaotonghuan, and Yuchanyan caves located in the juxtaposed Yangtze River basin. Interestingly, they show at the same time the most advanced assemblages: the majority of pottery, all finds of rice, and some progressive traits in stone tool manufacture were registered there.

In the North, emerging of pottery and partly polished stone axes indicates the arrival of the new phase. However, in contrast to the South, these novelties spread across a much wider area and turned to be embedded into at least two different cultural contexts.

The first and the earliest one is represented by the sites dated to the Bølling-Allerød warming and housed at the very north of Manchuria: Taoshan (*Yang* et al. *2017; Zou* et al. *2018*), Xiaonanshan (*Heilongjiang Provincial Museum 1972; Barton 2009*), Houtaomuga (*Kunikita* et al. *2017; Wang, Sebillaud 2019*). Due to their location close to the Osipovka and Gromatukha cultures, pottery and stone tools peculiarities, they have to be considered as part of the Amur River cultures increasingly focusing on fishing (*Kunikita* et al. *2013; 2017*). Thus, these sites might hardly characterize the forming of agriculture in China itself.

The second context is of greater interest from this point of view. It's related to the sites located along the eastern slope of the Loess Plateau, they are limited in number and seemingly reflect small disconnected groups of people. Grinding tools were found at all of the sites, being their only shared trait. In other respects, they were a rather heterogeneous and showed quite different assemblages with varying chronology and degree of 'neolithization'. From this perspective, three kinds of sites might be distinguished there. The earliest one, dated to the Bølling-Allerød warming like on the North of Manchuria, is represented by the Yujiagou site with only one neolithic novelty, *i.e.* pottery. Then, at the very outset of the Holocene or a bit earlier, more 'neolithisized' kind of sites appeared in the Hebei province (Nanzhuangtou, Zhuannian, Donghulin, Yujiagou) (*Liu, Chen 2012; Shelach-Lavi 2015*) and in the upper stream of Huaihe River (Lingjing, Lijiagou) (*Li* et al. *2017*). Finally, sites with assemblages similar to the early Neolithic Houli and Xinglongwa cultures arose in Shandong Province (Zhangmatun, Bianbiandong) (*Wu* et al. *2014; Sun* et al. *2014*) and in the south of Manchuria respectively (Xiaohexi culture sites) (*Wagner 2006*), being dated, however, a little before them.

Their stone assemblages keep the Upper Palaeolithic microblade industries, though at some this was already not the case. The settlement structures differing from the Palaeolithic are registered, but they have no repeated traits. It might be pits filled with ash and organics; fireplaces filled with stones or animal bones, or coal and burnt clay concentrations. Pottery at some instances looks like the ceramics of the Amur River (Yujiagou, Nanzhuangtou), but in others it shares some traits with ceramics of the Jomon culture (Lijiagou) or is featureless and therefore remains without any analogies (Lingjing, Zhuannian, Donghulin).

In general, as opposed to the South, the North sites appear to reflect a rather feeble and dissipated process. At the same time, it cannot exclude that this impression is partly the result of the information scarcity.

Changes in the subsistence strategies at this phase are the main focus of scholars, since they are looking for the roots of Chinese agriculture. In the southern part of China, these changes were nonetheless the most pronounced in the field of hunter-gatherer activities. Here, the gathering of freshwater molluscs developed and gained impetus. With regard to gathering plants, rice remains were discovered at some of the sites housed along the Yangtze River, but only very few in number (*Zhao 1998; Lu T. 2009; 2010; 2012*). In the northern part of China, conversely, plant gathering started to thrive, as can be seen from increasing number of grinding tools with starch remains of cereal, nuts, acorns and root crops, although hunting seemed to be the main activity (*Liu, Chen 2012; Yang* et al. *2012; 2014; 2015; Liu 2015; Wang* et al. *2016*). It should be stressed here in reference

to the plants found at this phase in both parts of China that their position along the path between wild and domesticated forms remains an open question, but in any case, the practice of plant gathering only started to form as a regular part of the subsistence during this phase.

The second phase (8200–6000 ^{14}C bp) started with the 'sudden' appearance of early agricultural communities, first in the low and middle parts of the Yangtze River, and then in more and more northern areas up to the southern part of Manchuria. Despite the fact that their examination has been ongoing for several decades, in recent years there have been major changes in the assessments in this field. This is due to the fact that the economies of such communities have turned out to correspond to only incipient or low-level agriculture (*Smith 2001*), as indicated by a whole range of data.

Firstly, recent studies revealed that the millet and rice domestication process was only at its very starting point at this time. The earliest remains of these plants found at the sites show either evi-dence that they were at the very beginning of the transformation process, or have questionable status (*Fuller* et al. *2008a; Jones, Liu 2009; Zhao 2011; Barnes 2015; Stevens, Fuller 2017; Crawford 2017*).

Secondly, paleobotanical assemblages point to the fact that millet and rice constituted only a minor part of the people's diets, no more than 20% based on various evidence, whereas nuts, acorns and root crops dominated. Similar results follow from the isotopic studies of North China, showing no more than 20–25% of the diet was from millet (*Li, Chen 2012; Chen, Yu 2017*).

Thirdly, tool assemblages also match well with new assessments, though north and south sites differ in this regard (*Liu, Chen 2012; Chen, Yu 2017*). In North China, apart from the grinding equipment, specialized polished sickle-like knives were also used, and their proportion increased over the time. Such tools has not been registered at all in the lower part of the Yangtze River, while ordinary flint flakes which could be used as sickles are known in its middle stream. In contrast, grinding tools were absent in the middle part of the Yangtze River, but present in its lower course. It is interesting that they markedly differed from the ones being in circulation in North China. Moreover, in both rivers basins there were no special tools for soil preparation (*Fuller* et al. *2008; Makibayashi 2014*).

Fourthly, palynological data also indicate the low-productive nature of farming, albeit indirectly. According to the results of recent studies, at this stage there was no reduction in the area occupied by forests, which is usually observed under intensive agricultural management (*Ren 2007*). The content of coal and weeds remains relatively low as well.

It should be noted it is hard if not impossible to trace any dynamics in the cultural development during this phase. This is especially true when it comes to the process of agriculture evolving, as well as settlements, dwellings and other indicators of lifestyle. They remained almost unchanged throughout the phase up to the stage of the Yangshuo culture, while tool assemblages developed a bit more dynamically (*Liu, Chen 2012; Chen, Yu 2017*).

The third phase (6000–5500 ^{14}C bp and onward) comes with the appearance of much more developed cultures like the Yangshuo, Hemudu, and Daxi. Absolutely all indicators mentioned above changed drastically at this stage (see reviews in *Liu, Chen 2012; Shelach-Lavi 2015*), mirroring as well the establishment of much more intensive agriculture (*Barton 2009; Stevens, Fuller 2017*). Concurrently, there was a sharp increase in the population which is assessed based on the rise in total amount of archaeological sites, their size and the areas occupied by farmers (*Li* et al. *2009; Wu* et al. *2014; Hosner* et al. *2016; Lu* et al. *2018*). Many sources also indicate the rising complication of social life and ritual practices (*Liu 2005; Shelach-Lavi 2015*). Moreover at this phase, although with some delay in the south, we see the spreading of agriculture into new areas due to the growth of its influence and the opportunities to engage in it (*Zhang, Hung 2010; 2013; Fuller* et al. *2007.325–326*).

Such tripartition of the Neolithic transition is not something new, and the specific nature of its three consequent phases are obvious to all specialists. The major problem in this field concerns searching for the roots of Chinese agriculture. The first agricultural communities show only the incipient level of agriculture, but other constituents of the Neolithic package they possessed were already very sophisticated, although their origins still remain unclear.

Thus, the early agriculturalists of China lived in village-like settlements or in proper villages. The biggest of them included tens of dwellings, burials and hundreds of household pits; they were often organized according to a well-defined layout, had pot-

tery kilns, and were enclosed by ditches. Their pottery was of high quality and differed much from the previous types, except that which originated in South China. Its shapes were surprisingly diversified, as they were already well adapted to special functions; their set and painted patterns was typical for farmers over all of Eurasia, but diverged significantly from the vessels of the surrounding hunter-gatherers. Advanced burial practices also appeared at this phase along with other kinds of ritual activity, while less pronounced. The cemeteries were located as a rule near the habitation sites and featured steady ceremonial traits with regard to the shape and disposition of graves, set of grave goods, body position of dead and their orientation, post-mortem manipulations, sacrificial offerings, *etc*.

Distinguishing the Neolithic transition in East and West Asia

For a start, let us look at the general timeline of the Neolithic transition in East Asia. Summing up the above data, we can get the scheme where two stages are clearly distinguished (Fig. 4). The first concerns the forming of more sophisticated and equipped cultures of hunter-gatherer-fishers. It seems this process started earlier and was more fast-paced and more innovative in the Japanese archipelago. Here, we can trace two successive phases of the transition with different suites of the novelties: the first in the north of Honshu and the second in the south of Kyushu (Fig. 4). The second stage concerned the transition to food production, and this process was explicitly concentrated in central and north-central China. Between these two stages, we can also see a cultural, spatial and temporal gap in records splitting up the Neolithic transition into two seemingly isolated episodes. This is why it is hard to conceive it as an incremental and coherent process, as we can observe in West Asia.

Next, we can see that in each of the East Asia regions considered above, the transition to the Neolithic was run according to its own distinctive scenario. In each of the regions we have an individual set of novelties which differs in each case in a special manner from the classical package formed in West Asia. However, if we take East Asia as a whole and consider what specific innovations, where and in what sequence arose during the Neolithic transition, we will see a process that differs little from that is known in the Near East. It will become obvious that the Neolithic transition in both regions had the same vector and went through the same stages: (1) the broad spectrum economy (*Binford 1968; Flannery 1969; Zeder 2012*); (2) low-level food production (*Smith 2001*); (3) the establish-ment of fully developed agriculture, *i.e.* based primarily on domesticated species (*Asouti, Fuller 2013; Stevens, Fuller 2017; Freeman* et al. *2015*).

The terms used above are based mainly on the West Asia data. Nonetheless, in East Asia researchers also use them or their equivalents widely, though predominately to interpret the Chinese materials (see, for example, the broad spectrum revolution: *Habu 2004; Lu 2006; Prendergast* et al. *2009; Elston* et al. *2011; Shelach-Lavi 2015.52–66; Morgan* et al. *2017.18*; low level production: *Crawford 2006; Barton 2009; Bettinger* et al. *2010; Liu, Chen 2012.125, 168; Shelach-Lavi 2015. 149; Pan* et al. *2017.366–367*). Herewith, if the concept of low-level production seems in good correspondence with East Asia records, then this might not be so obvious with respect to the concept of a broad-spectrum revolution. This is particularly the case with regard to Japan, Far East Russia, and Transbaikalia, and special research is required to illuminate this question. In the almost complete absence of zooarchaeological and paleobotanical data

STAGE	HONSHU	SOUTHERN KYUSHU	CHINA
I	**13.5-12.0 C^{14}** 16300-13900 cal bp	Axe, adze Arrowheads Pottery Wetstones Polishing Bifacial tools	– – ? – – –
	12.0-11.0 C^{14} 13900-12900 cal bp	Grinding tools Start of acorn economy Village-like settlement Storage pits Pithouse	+ Plant gathering – – –
		Crush Dispersal (?)	Nanzhuangtou, Donghulin
II		**8.2-6.0 (5.5) C^{14}** 9200-6800(6300) cal bp	Moated settlements Burial grounds Rise of ritual practice Pottery kilns Textile Start of domestication Low-level agriculture
			6.0 (5.5)-3.0 C^{14} Full agriculture

Fig. 4. General timeline of the Neolithic transition in East Asia.

reflecting the Terminal Pleistocene in these regions, chiefly technological changes can be used there as the marks of resource spectrum broadening or resource intensification.

Further, on the basis of these observations we can synchronize the events related to the Neolithic transition in both East and West Asia (Tab. 2).

The synchronization shows clearly that the Neolithic transition started in East Asia approximately at the same time as in West Asia, *i.e.* on the eve of the Bølling-Allerød warming, but ended much later. At the dawn of the Holocene, this lag became more noticeable. Despite the early appearance of pottery together with other innovations mentioned above, the domestication process began and ended in East Asia later, and it concerns as well a sedentary way of life, intensive agriculture, and its transmission into new areas occupied by hunter-gatherers.

What were the reasons for this lag? It appears different economic strategies underlay the Neolithic transition in West and East Asia during its first steps. The Natufian culture had a complex subsistence practice, and from the very beginning it had been distinctly specializing in harvesting plant resources (*Weiss* et al. *2004*), but in East Asia this was not the case. Here, in the first instance, a more advanced culture of hunter-gatherer-fishers was established, and only after this did cultures somewhat similar in their economy to the Natufian one appear on the south of Kyushu, but with no time to gain strength since their development was soon interrupted by the Younger Dryas cooling.

This climatic event equally affected the plant gathering in both West and East Asia (*Bar-Yosef 2011b*). In the former, it led to the decline of the Natufian culture, but at the same time to the dissemination of its main achievements. On these grounds, the PPN cultures arose soon after. In East Asia, plant gathering, which had already starting later, was interrupted, and for a much more extended time, including into the Early Holocene. It seems also that on the Japanese archipelago, given its geographical setting, the successful evolution of plant resource specialization into intensive agriculture was *a priori* impossible or at least much more difficult (*Bleed, Matsui 2010*). Perhaps due to these circumstances, in East Asia plant resources fell into the focus of subsistence practices only much later, and in a more relevant place, namely China.

The core-area displacement from the Japanese archipelago and Amur river region to China during the process of Neolithization, most likely, also influenced its pace, and this concerns not only the development of plant gathering itself. In Western Asia we can also see such a displacement, but it was accompanied by a continuity in cultural development, whereas in East Asia it coincided with a deep spatial, temporal and moreover cultural gap.

To date, no clearly expressed cultural links between China and the Japanese archipelago (or Amur River region) are yet visible in the course of Neolithization. The data on the two first Holocene millennia are not within the main research focus, and also remain too scarce. We do not know if there was a relay-like transmission of cultural baggage, or if the early agriculturalists started moving to food production based only on the achievements of their local ancestors. The latter, however, were rather moderate in comparison to those framed in the southern part of the Japanese archipelago. Nonetheless, early agricultural communities appeared to be well-formed in China, and due to the gap mentioned it is still difficult to find the origins of their high culture. This is in sharp contrast to West Asia, where we see an incremental moving to more and more sophisticated cultures.

One more feature becomes obvious when comparing the western and eastern trajectories of the Neolithic transition, and this concerns the so-called Subneolithic cultures. According to most definitions, they possess all, almost all, or some of the Neolithic novelties, except agriculture, though we do not understand the whole spectrum of their varieties. However, it appears our comparative analysis permits us to solidly differentiate them into two main kinds: Meso-Neolithic and Subneolithic. It seems they differ chiefly by the extent of sedentarization as indicated by

	West Asia	Cal bp	East Asia	Cal bp
Broad spectrum economy	Natufian	15000–11500	Proto-Jomon	16000–11500
Low level production	PPN	11500–8200	Peiligang	8200–6800
Intensive agriculture	PN	>8200	Yangshuo	>6800

Tab. 2. Rough synchronization of the main steps of Neolithic transition in East and West Asia.

the presence/absence of village-like settlements. From this, we might see the notional sequence 'Mesolithic- Subneolithic-Neolithic' where pottery distinguishes the Mesolithic and Subneolithic, but agriculture separates the Neolithic and Subneolithic. Besides, it sounds like this partitioning is relevant not only for East Asia, but also for most of Eurasia.

In the West, both Subneolithic and Meso-Neolithic cultures become ubiquitous only after intensive agriculture develops in the Near East. Moreover, it is well known that their advent was caused by the influence of agriculturalists. Conversely, in the East, Subneolithic and Meso-Neolithic cultures arose across the whole area more or less simultaneously with the first low-level agriculture communities. This means that their forming started even earlier. In East Asia, the pioneering hunter-gatherer-fisher cultures of the first stage of the Neolithic transition engendered the whole range of Neolithic innovations, and possibly imparted them to the early agriculturalists, but not the reverse. This fact makes the Neolithic transition in East Asia unique, and not only due to the earlier appearance of pottery. It emerged together with other novelties typical for the Neolithic, Meso-Neolithic and Subneolithic cultures of all Eurasia.

Conclusions

Taking stock of all the above data and considerations, we can reach the following conclusions.

Firstly, there were three dissimilar models of the Neolithic transition in East Asia: the Meso-Neolithic in the Circum-Baikal region, the Subneolithic in the Sea of Japan area, and the Neolithic in China. They vary widely, but at the same time, have an important commonality concerning the suite of Neolithic novelties. In each region we observe their individual set, but it always remains within the frame of the classic Neolithic package. Thus, in light of this pattern, the main question is why the transition to the Neolithic was so similar in different regions.

Secondly, two stages and two centres might be clearly recognized during the Neolithic transition in East Asia. The early stage concerned the so-called broad spectrum revolution leading to the origin of more sophisticated and newly equipped hunter-gatherer-fisher cultures. This process was rather diffuse, but seems to have started earlier and was more fast-paced and more innovative in the Japanese archipelago. At the second stage, the transition to food production started in central and north-central China. There we observe further progressive development toward the Neolithic, and China clearly becomes the centre of the Neolithization process. Between the stages, there is a clear cultural, spatial and temporal gap splitting up the Neolithization process into two isolated episodes. However, a more comprehensive analysis of the records bearing on the first millennia of Holocene is needed to assess whether this gap is artificial or reflects an objective picture

Thirdly, the early emergence of pottery was not the only feature of the East Asia Neolithic transition. Most crucially, it appeared together with other novelties typical for the classic Neolithic package. Moreover, they were all embedded in a process leading to the forming of a new type of hunter-gatherer-fisher culture known in the literature as the Subneolithic. It seems the early dates of pottery acted as a red herring in Neolithic studies, hindering the understanding of this pattern. In addition, this process occurred at the end of the first stage mentioned above, *i.e.* prior to early agriculture. Further, for a long time afterward the relationships between the first agriculturalists and surrounding Subneolithic communities were not like those between the centre and periphery, and this shift happened only after several thousands of years when intensive agriculture had been established.

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