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THE EARLIEST POTTERY OF XIANRENDONG CAVE: WHAT DO WE KNOW ABOUT IT?

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Abstract. Xianrendong is a cave site, where the World's oldest pottery was found. According to the results of the 2009 studies, its age was determined in the range of *c.* 17500–16000 BP. This means that pottery appeared in southern China several thousand years earlier than in other regions of East Asia. Such a significant gap, of course, attracts attention and raises certain doubts. The main goal of this publication is to provide a holistic overview of the cave's records and to understand how they correspond to the conclusions reached in 2009. Our analysis shows that there are indeed grounds for doubts. The materials of the Xianrendong cave are very vulnerable to criticism from the archaeological point of view. Studies of different years do not agree with each other, there are too many contradictory details in the reports, which make it difficult to understand both the stratigraphic situation and the appearance of the finds, and the nature of their distribution in the cave's deposits, etc. Many of these shortcomings can be overcome only by carrying out new excavations. In addition, the results of dating in 2009 are also ambiguous. They contradict the typology of the finds, as well as the data about the preservation of deposits, as well as the results of TL dating of the ceramics itself, and only further tangle up the situation.
Keywords: *East Asia, Southern China, emergence of pottery, Xianrendong cave, stratigraphy, chronology, typology, complex analysis, discussion*

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РАННЯЯ КЕРАМИКА ПЕЩЕРЫ СЯНЬЖЭНЬДУН: ЧТО МЫ ЗНАЕМ О НЕЙ?

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Аннотация. Пещера Сяньжэньдун является памятником, где найдена самая древняя в мире керамическая посуда. По результатам исследований 2009 г. ее возраст был определен в интервале 17500–16000 С14 л. н. Это означает, что на юге Китая она появляется на несколько тысяч лет раньше, чем в других регионах Восточной Азии. Столь существенный разрыв, конечно, обращает на себя внимание и вызывает определенные сомнения. Основная задача данной публикации дать целостный обзор материалов памятника и понять, насколько они соответствуют выводам, полученным в 2009 г. Проведенный анализ показывает, что действительно основания для сомнений есть: как археологический источник материалы пещеры Сяньжэньдун очень уязвимы для критики. Исследования разных лет практически никак не согласуются друг с другом, слишком много противоречивых деталей в отчетах, затрудняющих понимание как стратиграфической ситуации, так и облика находок, и характера их распределения в слое, и других моментов. Многие из этих недостатков можно преодолеть уже только путем проведения новых раскопок. Кроме того, неоднозначны и сами результаты дати-

рования 2009 г. Они противоречат типологическому облику находок, а также данным о сохранности отложений и результатам термолюминисцентного датирования самой керамики, что еще больше запутывает ситуацию.
Ключевые слова: *Восточная Азия, Южный Китай, происхождение керамики, пещера Сяньжэньдун, критика источника, стратиграфия, хронология, типология, комплексный анализ, дискуссия.*

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Xianrendong cave is an archaeological site where the World's oldest pottery was found (Fig. 1). According to the research of 2009, its age was determined to be between *c.* 17500 and 16100 BP (Wu et al, 2012)[1], which means that it appeared in southern China several thousand years earlier than in the other parts of East Asia. Such a significant gap, of course, stands out and raises certain doubts some of which have already been mentioned in the literature (Kuzmin, 2013).

The main goal of this publication is to give as comprehensive review as possible of the Xianrendong cave's materials and to understand how they correspond with the results of 2009.

Brief history of researches

The main excavations of the Xianrendong cave were carried out in the early 1960s by Chinese archaeologists. In those years about 150 m^2 were excavated but only brief and superficial reports were published (Jiangxi Provincial Cultural Relics Administration Committee, 1963; Jiangxi Provincial Museum, 1976). It is probably for this reason, all current views on the site's materials are based on the studies of R. MacNeish undertaken in 1993–1995. He excavated only 6 m^2 but the materials obtained by him were thoroughly analyzed and published in English (MacNeish, Libby, 1995; MacNeish, 1996; MacNeish, Cunnar, Zhao, Libby, 1998; MacNeish, 1999). MacNeish managed to gather a representative collection of artifacts, get a large series of ^{14}C dates, and to develop on this basis a very seminal cultural-chronological scheme. He also was the first who revealed the horizons with the Late Pleistocene pottery in the cave's sediments. However, even his reports did not give a holistic picture.

The main problem is that MacNeish did not correlate the results of his limited works with the previous and much more extensive works of Chinese researchers. Consequently, two pools of sources have been formed and it is almost impossible nowadays to combine them in order to obtain a more complete and profound information about the cave. Researchers of 2009, in turn, did not correlate their data with the all previous ones, except the part associated with the ^{14}C date analysis.

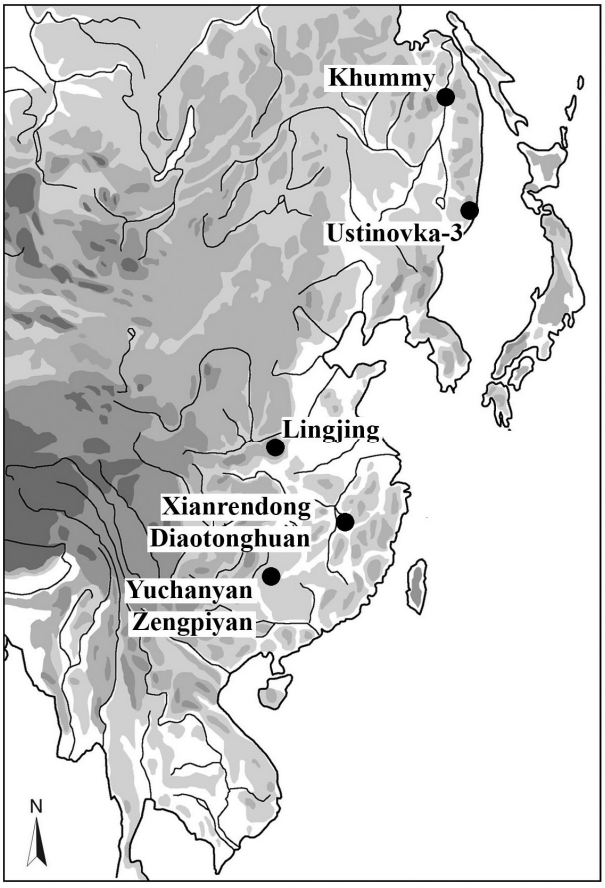

Fig. 1. Map showing sites mentioned in the text
Рис. 1. Карта памятников, упоминаемых в тексте

[1] All radiocarbon dates were shown in uncalibrated format in this paper.

The stratigraphy of the site is very complicated. Ever since the first excavations, it became clear that it was different in the western and eastern parts of the cave. It is impossible to tell why since only several discrete trenches were opened there. For that reason, the stratigraphy of the cave is presented everywhere separately for the eastern and western parts of the cave but with the same alphanumeric designation. Herewith, the profiles of different excavations vary considerably, even though they come from the same parts of the site. For example, the profile of trench T4 of 1964 contains six layers, however, the additional cutting to it made by MacNeish in 1993 revealed only four layers. Chinese researchers drew the border between the pre-pottery and pottery-bearing layers between layers 4 and 5, while MacNeish placed it inside the layer 3 between its sublayers 3C1b and 3C2. In Chinese reports, layer 3 with the earliest pottery was divided into two sublayers, while MacNeish divided it into six ones. In the meantime, the descriptions of all layers are difficult to compare (Xingcan, 1999. P. 83), and the layers themselves vary in thickness and often have non-horizontal stretching.

All attempts to synchronize deposits from eastern and western parts of the cave also led to the different results. Chinese researchers, for instance, correlated layer 3 in the west trench T4 with layer 4 in the east trench T6 basing on the similarity of their finds (Jiangxi Provincial Museum, 1976. P. 23–35). MacNeish, on the other hand, believed that relics from layer 3 in the west have no analogs in the eastern part of the cave at all (MacNeish, 1996; MacNeish, Cunnar, Zhao, Libby, 1998). Or else, Chinese researchers correlated layer 2 in the east with layer 1B in the west (ibid.), but according to results of 2009 the middle part of layer 2 has to be synchronized with the bottom (!) part of layer 3 in the western part of the cave, i.e. with layer 3C1b with the earliest pottery (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. P. 1699).

There are also numerous witnesses of disturbances of the site's sediments, but their scale, nature, and location remain unclear due to the lack of summary publications. It is known that the late inhabitants of the cave significantly damaged the topmost part of the sediments. In addition, layer 2 in the east was also registered to contain mixed finds: shards of Pengtoushan, Hemudu, and Longshan cultures were found there (Jiangxi Provincial Museum, 1976. P. 23–35). As for the sediments of the western part of the cave, their disturbances are evidenced by the distribution of finds and radiocarbon dates in layer 3, as will be discussed in more detail below. Moreover, some local disturbances apparently occurred in the cave. Like this, in the report for the 1964, it was noted that in the west excavation pit T5 all layers above layer 4 were missing, whereas in the neighboring excavation pit T4 they were well preserved (ibid).

Based to their excavation results, Chinese archaeologists defined two Early Neolithic horizons,

Table 1
Таблица 1

Cultural chronology of Xianrendong cave (following west section)
Внутренняя хронология пещеры Сяньжэньдун (по материалам западной секции)

MacNeish, 1999			Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012[1]	
Phase	C^{14} (b. p.)	Layer	C^{14} (b. p.)[2]	C^{14} (b. p.)[3]
Dayan	17000–12600 / 14000	сл. 5–3C2	24100–17600	24100–15200 (7)
Xian	12600 / 14000–11200	сл. 3C1b	17400–16200	18500–16200 (6)
		сл. 3C1a[4]	16300–13900	16300–13900 (7)
Wang	11800–9500	сл. 3B2–3B1	14600	14600–12400 (2)
Jiangxi	9500–8000	сл. 2	10200	10200 (1)
Wan-Nian	8000–6000	сл. 1	–	–

Notes. 1 – only dates referenced in this paper are shown; 2 – dates adopted in this paper; 3 – all dates including rejected in this paper (total number of dates); 4 – in other works, layer 3C1a was assigned to phase *wang* (MacNeish, Cunnar, Zhao, Libby, 1998. P. 38; Xingcan, 1999).

which materials were very close to each other and differed only statistically by the presence of the great number of polished stone tools and more developed pottery in the upper horizons. According to his research, MacNeish distinguished already six different horizons: two pre-pottery and four Neolithic ones (Tab. 1). However, it must be understood that his scheme reflects only generalized dynamics of human development in the southern part of China, rather than the real sequence of living floors within the cave and artifacts related to them.

To begin with, it should be noted that MacNeish used for his work not only the materials of the Xianrendong cave (they are far from sufficient) but also the materials from the neighboring Diaotonghuan cave, excavated by him in the same years. That is why his scheme represents summarized vision about these two caves, their stratigraphy, and typology. Thus, MacNeish characterized the *Yangtze* phase based on the materials from the Diaotonghuan cave, but the next *Dayuan* phase he described on the ground of both caves records; the *Xian* phase he defined only on the basis of Xianrendong cave materials, but the following *Wang* phase he characterized again using the summary collection of the caves.

Furthermore, it is known that the MacNeish's scheme was mainly based on the cross-dating. He obtained a large series of radiocarbon dates, however, almost all of them were rejected by him as unrealistic: they correlated poorly with the typology of the caves' finds. MacNeish linked the earliest pottery with two very first ceramic phases – *Xian* and *Wang* – that were replaced by the *Jiangxi* phase. In the meantime, he pointed out that the *Xian* phase pottery does not have any analogs in any other Chinese archaeological sites, including the Diaotonghuan cave. He also found that the *Wang* phase pottery was very close to the pottery of the Yuchanyan cave and that the pottery of the Pengtoushan culture is close to the pottery of the *Jiangxi* phase (Fig. 2).

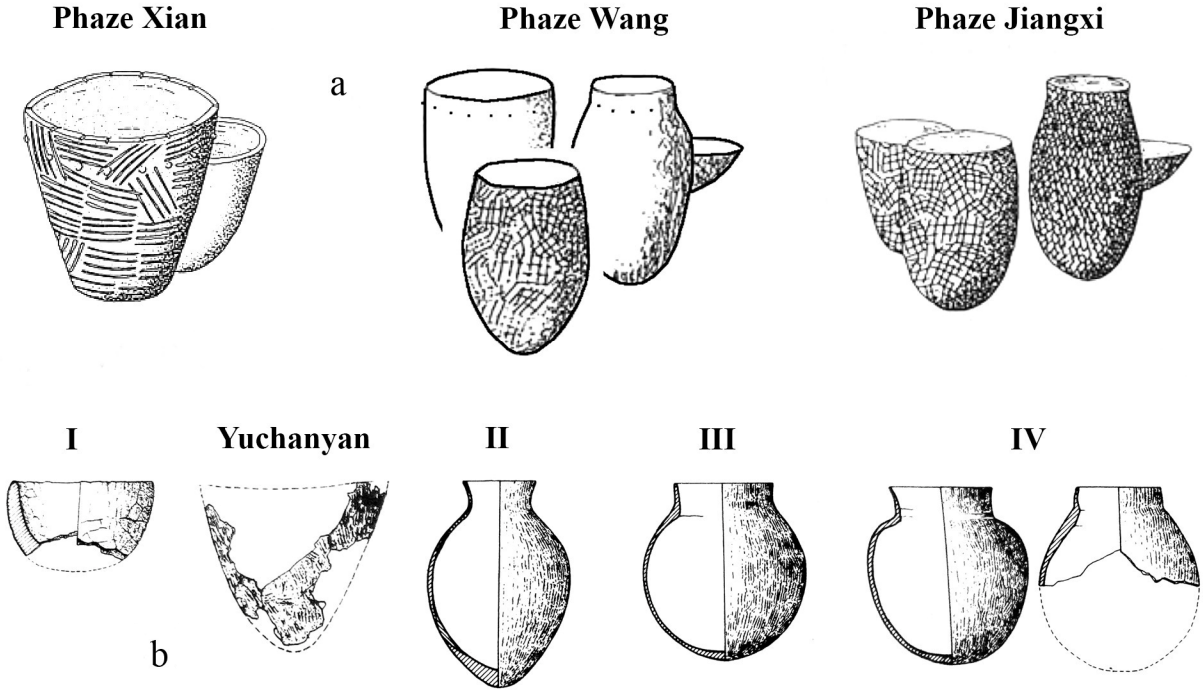

Fig. 2. Different schemes of early pottery dynamic in the southern part of China: *a – developed by MacNeish following Xianrendong and Diaotonghuan caves (MacNeish, 1999.); b – developed by IACASS following Zengpian and Yuchanyan caves (Institute of Archaeology, Chinese Academy of Social Sciences, 2003. P. 687–689), numeric symbols point to the cultural-chronological horizons of Zengpiyan cave*

Notes. That according to MacNeish, pottery from Yuchanyan cave is similar to Xianrendong pottery of the *Wang* phase (MacNeish, 1999. P. 39).

Рис. 2. Схемы эволюции ранних образцов керамической посуды на юге Китая: *a – разработана Р. Макнишем по материалам пещер Сяньженьдун и Дяотунхуань; b – разработана по материалам пещер Цзэнпиянь и Юйчаньянь, цифрами указаны культурно-хронологические горизонты обитания в пещере Цзэнпиянь*

MacNeish established the time when pottery appeared at Xianrendong based on the analogies between the *Xian* phase pottery and the pottery from Russian sites Ustinovka-3 and Hummi (stripe-marked surfaces, simple morphology and molding, temper, low-temperature firing etc) (MacNeish, Cunnar, Zhao, Libby, 1998. P. 59). In his opinion, only one ^{14}C date of Xianrendong corresponded to these analogies, i. e. 12530 ± 140 (BA95145), and it was accepted. For later horizons, he admitted dates obtained in the 1960s: for the *Wang* phase – 10870 ± 240 (ZK-39), for the *Jiangxi* phase – 8825 ± 210 (ZK-92).

The analysis of the finds distribution in the deposits of the Xianrendong cave, however poorly correlated with MacNeish's phases. According to his data, the graph clearly shows three distribution maximums in the western and two in the eastern parts of the cave (Fig. 3).

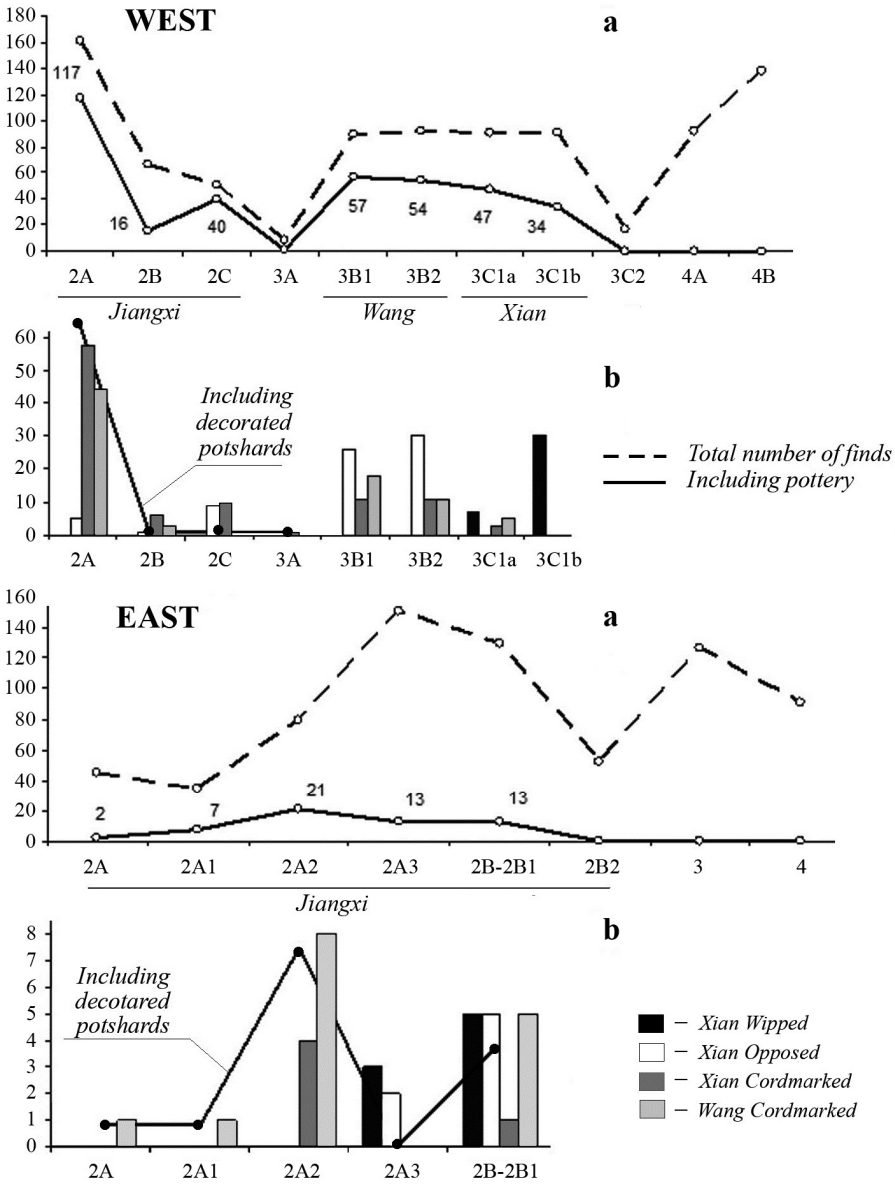

Fig. 3. Distribution of finds (a) and pottery types (b) in the cave deposition

Notes. Total number of finds includes stone artefacts (MacNeish, Cunnar, Zhao, Libby, 1998. Tabl. 1), pottery (MacNeish, 1996. Tabl. 4), and bone, horn and shell items regardless of traces of processing or use (MacNeish, 1996. Tabl. 2–3). Decorated pottery types include Xian Twine, Wang Twine, Xian Criss-Cross, Wang Criss-Cross, Wang Incised. Numbers on the graphs correspond to the total number of potsherds found in each layer, phases are shown after MacNeish's scheme.

Рис. 3. Распределение общего числа находок (a) и основных типов керамики (b) в отложениях памятника

Apparently, these maximums can be correlated with the main horizons of human habitation in the cave, but MacNeish's scheme is more splitted up. Dealing with the west part of the cave from this point of view, we can see that the first maximum corresponds to the pre-ceramic layers and accordingly first two phases of MacNeish's scheme (*Yangtze* and *Dayuan*) should be associated with it. Further, the next maximum forms on the graph a stable plateau tied to layers 3C1b–3B1 with the earliest pottery. The *Xian* (layer 3C1b–3C1a) and *Wang* (layer 3B2–3B1) phases should be relevant to this maximum. In addition, on the top of that, the latest *Jiangxi* phase has to have corresponded to the last maximum linked with layer 2.

The early pottery

The early pottery found in the cave received a very poor and to some part contradictory characteristic. It was too badly illustrated and given different variants of description and classification (Hill, 1995; MacNeish, 1996; Zhang, 1999). D. Hill offered the most detailed characterization of the one; however, he relied only on the finds of the 1993 campaign from the western part of the cave. He distinguished more or less confidently two late assemblages, which have analogies in Hemudu and Longshan cultures, while the earlier pottery had not received such an unambiguous attribution: pots differed by tempers, wall thickness, shapes, and ornaments. As a result, it turned out to be difficult to single out their well-defined and invariable types. The total characteristics of main (!) pottery types given by Hill (Tab. 2).

The table shows that only *Xian Wiped* distinctively stands out of the early pottery of the cave because it has not cord impressions. Among the rest of ceramics, one can see ware of more primitive and more developed appearance. Pots with a simple form and cord impressions on the inner and outer surfaces represent the former. It seems *Xian Opposed* should be definitely attributed to this group, and apparently a part of *Wang Cordmarked* and *Xian Cordmarked* (a) (Fig. 4–5). It is important that all these pottery types

Table 2
Таблица 2

Earliest pottery of Xianrendong cave
Ранняя керамика пещеры Сяньжэньдун

Attribute	Xian Wipped, 14 sh.[1]	Xian Opposed, 56 sh.	Xian Cordmarked[2], 72 sh.	Wang Cordmarked, 33 sh.
Temper	White crushed quartzite, 1–3 mm	White crushed quartzite, 1–3 mm	А. White crushed quartzite, 1–5 мм; Б. Rounded quartz grains, natural inclusion – ? < 1 mm	Crushed sherds, 1–7 мм
Shaping	Coiling	Coiling	А-Б. Coiling	Coiling
Surface treatment	Wipping by hand or grass bundle, inside and outside	Two-ply Z-twisted cord impression, vertical outside, horizontal inside	А–Б. Two-ply Z-twisted cord impressions, only outside, vertical, sometimes cris-crossed А. Two-ply Z-twisted cordage impressions, outside with few exception	Two-ply Z-twisted cord impressions, only outside, vertical
Decoration	Single row of punctations just below the rim, notched rims	Single row of punctations just below the rim, notched rims	One (А) or two rows (Б) of punctations between rim and shoulder; sometimes ochre vestiges on the surfaces (Б); in one case incised line of unknown pattern	Absent
Vessel form	Without neck	Without neck	Necked and shouldered	Short-necked
Analogy	Unknown	Unknown	Pengtoushan	Pengtoushan

Notes. 1 – only Xianrendong cave potsherds are counted from (Hill, 1995. Tabl. 4.1); 2 – includind Xian Criss-croos, Xian Incised and Xian Twined.

are similar to *Xian Wiped* in temper and in vessels' mouth design (apertures or indentations on and under rims). The *Xian Cordmarked* (b) type should represent the more developed group of the cave's pottery. These pots have necks, cord and mat impressions on the outer surfaces, traces of ocher or cinnabar painting, carved ornaments, and they are similar to the ceramics of the Pengtoushan culture. MacNeish took into account already all finds of 1993–1995. He attributed the more primitive part of the pottery with cord impressions to the *Wang* phase and the more developed part of it – to the *Jiangxi* phase. Therefore, his views are close to Hill's one, however, there is some discrepancy between their views regarding the pottery distribution (MacNeish, 1996).

If we take the data published by Hill, as the least controversial, we can see that *Xian Wiped* was found only in layer 3C1b, *Xian Cordmarked* – in layer 2, but *Xian Opposed* and *Wang Cordmarked* were spread throughout the cave's deposits starting with layer 3C1a and above. This corresponds well to observations concerning the presence of at least two chronological groups among cord-impressed wares.

Fig. 4. Pot from neolithic layer 3 (trench 3) of Xianrendong cave, excavation of 1962

Notes. Nowaday, it is impossible to correlate it with MacNeish's phases or ^{14}C dates given in 1990–2000 years, but this pot is represent often as earliest pottery of China (foto from: Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S7–S8; first sourse: Jiangxi Provincial Cultural Relics Administration Committee, 1963. P. 7).

Рис. 4. Сосуд из ранненеолитического горизонта пещеры Сяньжэньдун (раскопки 1962 г., сл. 3, траншея 3)

MacNeish presented a more complete but a more diverse picture. According to his data, *Xian Wiped* was found in the western part of the cave not only in the layer 3C1b but also above in the layer 3C1a together with other modifications of pottery. Moreover, in the eastern part of the cave, all types of pottery, including *Xian Wiped*, were found together in layer 2. Thus, we see a pretty disorganized mode of distribution of *Xian Wiped* in the cave's sediments, and it can be indirectly confirmed by the data published in 2012 (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012). In this paper, there are four illustrated samples of *Xian Wiped* founded in the western (!) part of the cave. According to their labeling, three of them were found in layer 2A (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S2, S3, S5) and one in layer 3C1b (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S1). It means that *Xian Wiped* was found not only in layers 3C1b-a but also in layer 2 (see fig. 4–5).

Apparently, one can confidently say that none of the early pottery types does have a strict association to any particular stratigraphic horizon. Therefore, we can conclude that either the site's sediments are actually seriously disturbed, or that the same pottery types were common to all stages of human habitation in the cave, or it can be assumed that current pottery classification is rather formal and does not reflect the natural state of things.

The *Xian* phase

Singling out the lowest horizon with *Xian Wiped* pottery among the cave's stratigraphy became the distinctive feature of MacNeish's works. Two things could indicate him the earlier age of *Xian Wiped* comparing to the pottery decorated with cord impressions. Firstly, it was found solo in the lowest part of the Neolithic group of strata. Secondly, it looked like pottery found in Russian Late Pleistocene sites such as Hummi and Ustinovka-3. In the last case, MacNeish was paying special attention to the fact that *Xian*

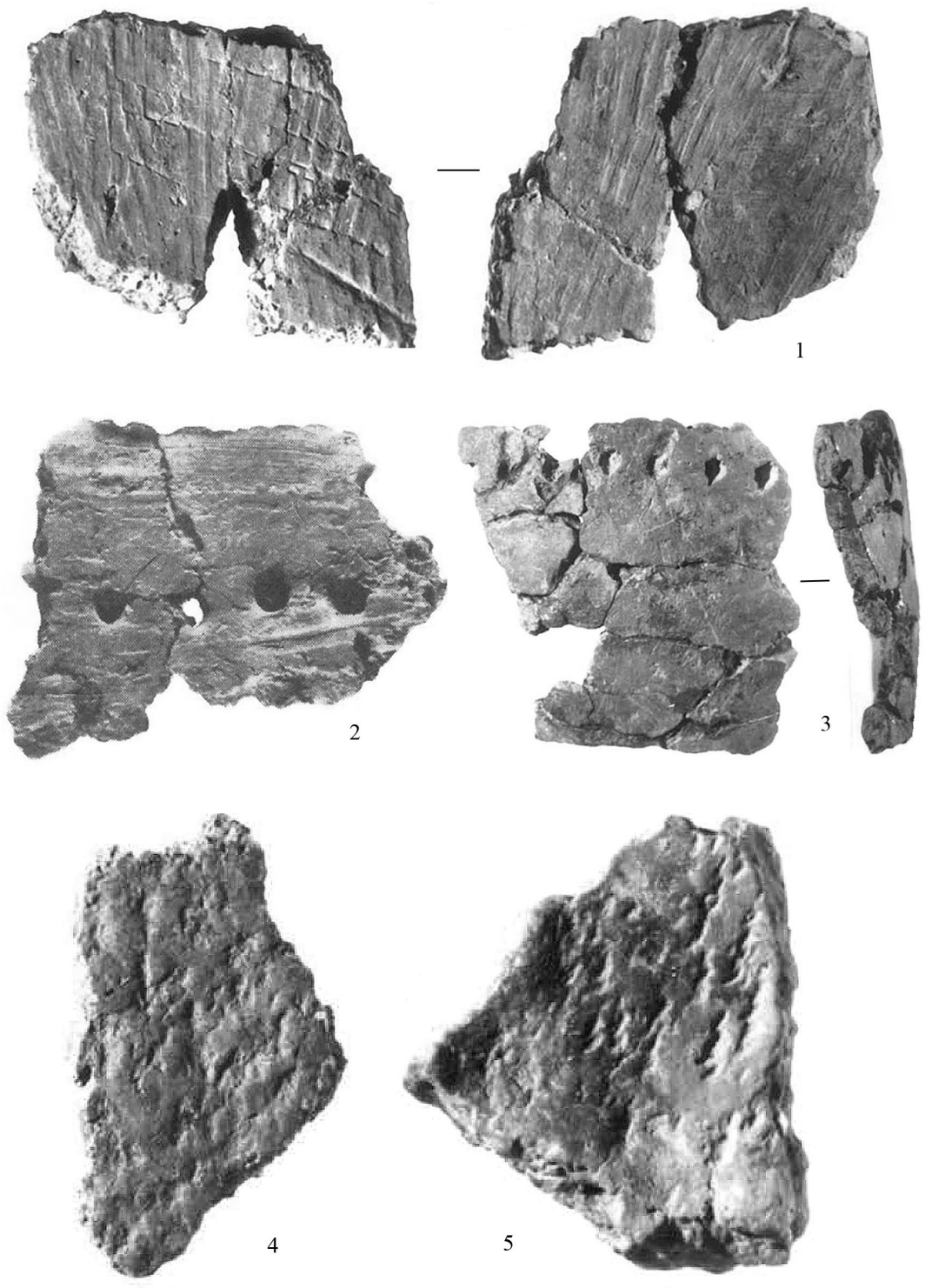

Fig. 5. Early Neolithic pottery of Xianrendong cave (not to scale; year of excavation is unknown): *1 – Xian Wiped, layer 3C1b (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S1; Zhang, 1999. Fig. 6); 2 – Xian Wiped (?), layer 2A (western section of the cave) (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S2; Zhang, 1999. Fig. 7); 3 – Xian plain (?), layer 2A (western section of the cave) (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S3; Zhang, 1999. Fig. 8); 4–5 – sherds with cord impressions, layer 2A2 (eastern section of the cave), it is not possible to assign these sherds to any type of ceramics which were singled out by different authors (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. Fig. S9)*

Рис. 5. Ранненеолитическая керамика пещеры Сяньжэньдун (без масштаба, год раскопок не известен): *1 – керамика Xian Wiped из слоя 3С1б; 2 – керамика Xian Wiped (?) из слоя 2А (западная секция); 3 – керамика Xian plain (?) из слоя 2А (западная секция); 4–5 – керамика с отпечатками веревки из слоя 2А2 (восточная секция), соотнести ее с имеющимися вариантами классификации керамической коллекции памятника не представляется возможным*

Wiped pottery did not have cord impressions but was rubbed by cogged tools. The same reasons gave him grounds for ensuing singling out the *Xian* phase, although, strictly speaking, the cave's materials do not provide sufficient grounds for this.

Comparing the distribution of pottery and other finds in the cave, one can see that *Xian Wiped* and *Xian Opposed* statistically correlate to the first Neolithic peak on the graph, while *Wang Cordmarked* and *Xian Cordmarked* correlate to the second one. The overall picture is rather consistent: the simpler pottery lies in the lower layers and the more developed one lies in the layers above. However, this picture does not provide enough grounds to identify *Xian Wiped* as belonging to a separate cultural and chronological assemblage. The fact that a very small amount of it was found in layer 3C1b below *Xian Opposed* cannot be a sufficient basis for such a conclusion, at least at the current state of affairs.

Excavation pit in the western part of the cave was weensy, leveling and context data were not published, the number of *Xian Wiped* sherds is too limited for statistically reliable observations, how *Xian Wiped* and above laying *Xian Opposed* were spatially distributed is unknown. Under the circumstances and given the fact that *Xian Wiped* was found not only in layer 3C1b but also above, can we exclude that MacNeish just fixed one of the local deviations in the distribution of *Xian Wiped* and *Xian Opposed* inside layer 3? It is all the more possible that there are many contradictions around layers 3C1a и 3C1b in publications. The thickness of layer 3C1b is only 10 cm and it clearly lies inclined. The descriptions of the layer are different, in one case it is characterized as a lens-shaped interlayer (feature 3) at the base of the layer 3C1a (MacNeish, 1996. Fig. 4), in another case, it is described as a separate layer (MacNeish, Libby, 1995). Apparently, it is no coincidence that in one case layer 3C1b is autonomously attributed to the *Xian* phase, but in another case together with layer 3C1a (MacNeish, Cunnar, Zhao, Libby, 1998. P. 38; MacNeish, 1996; MacNeish, 1999). The same radiocarbon dates (see, e. g. BA95145) and the same finds are linking in different publications either with layer 3C1b then with layer 3C1a.

Typological observations also indicate the lack of sharp differences between *Xian Wiped* and *Xian Opposed* (see Tabl. 2). The fact that *Xian Wiped* has not cord impressions cannot be of crucial importance. Russian materials directly indicate that the earliest pottery may be characterized by a strong polymorphism in design (Shewkomud, Yanshina, 2012). In particular, it was established that there are not only traces of rough rubbing but also cord impressions on the potsherds of some sites of Osipovka culture (Yanshina, Lapshina, 2008). Moreover, it should be noted that for twenty years since the discovery of *Xian Wiped,* no other sites with similar pottery were discovered in China. Furthermore, there are indications in Chinese literature that pottery with a roughly rubbed surface (“parallel ribbing”) was typical for the early Holocene sites of more southern regions of China (Hung, Zhang, Matsumura, Zhen, 2017).

Therefore, the question arises as to whether the isolation of the Xian phase is justified.

Reseach of 2009 year

As mentioned above, researches of 2009 have changed drastically the whole situation around the Xianrendong cave chronology. New samples for radiocarbon dating were selected from reopened profiles of the cave. In order to exclude completely the possibility of errors caused by displacing of samples, only those of more than one centimeter were selected for dating (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. P. 1699). In the result, a large series of new dates were obtained. Along with the MacNeish's dates, they directly indicated the very early age of the pottery found in the cave. In addition, samples were selected under control of the micromorphological analysis of sediments. According to its results, all layers in the west part of the cave and all pre-ceramic layers in the east were admitted as intact. As for the upper part of sediments in the eastern part of the cave, layers from 2B2 and above were recognized as displaced (“were dumped”) from another part of the site (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. P. 1698; Cohen, Bar-Yosef, Wu, Patania, Goldberg, 2017. P. 42).

Commenting on the results, the researchers emphasized, on one hand, the absence of large-scale dis-

turbances in the cave's deposits, and on the other hand, the coherent distribution of radiocarbon determinations among them: the higher samples lied, the younger they were. The dates that were out of this sequence were rejected as outliers. As consequence, they attributed the dates from layer 3C1b in the west and from layers 2B–2A2 in the eastern part of the cave to the earliest stage of pottery development at the Xianrendong cave: 17420 ± 130 (AA-15005) – 16165 ± 55 (BA10264) and 17460 ± 210 (BA95140) – 16030 ± 55 (BA10263) respectively for west and east. Despite the fact that all these conclusions have become generally accepted, they are still highly questionable.

Firstly, the results of the micromorphological analysis and of the absolute dating conflict in a certain way with each other. The ^{14}C dates of layer 2 in the eastern part of the cave are actually compact and consistent; however, this layer was clearly identified as displaced. How this could have happened given that thickness of this layer is not less than a meter and artifacts found in layer 2 had a mixed nature according to all previous reports. On the contrary, the ^{14}C dates of the western part of the cave, show a wide spread of values, and the strongest one is observed in layer 3 with early pottery. A large number of outlier dates were obtained here, which is well correlated with *Xian Wiped* and *Xian Opposed* distribution in this layer. This situation clearly indicates the disturbance of layer 3, although according to the micromorphological analysis it was admitted as well preserved. Additionally, the general conclusion about the lack of large-scale disturbances in the cave's deposits does not correspond with all previous notions about their presence and about their systemic nature.

Secondly, the association between the ^{14}C dates and the early pottery finds is not accurately established in the researches of 2009, as mentioned earlier (Kuzmin, 2013; Cohen, Bar-Yosef, Wu, Patania, Goldberg, 2017). In the matter, researchers relied on the fact that new dated samples were derived from layers distinguished by MacNeish (Cohen, Bar-Yosef, Wu, Patania, Goldberg, 2017. P. 41). However, given the already mentioned problems with stratigraphy of the cave, there is no certainty that the layers borders established by MacNeish and in the research of 2009 coincide. Chinese researchers also indicate the possibility of such errors (Xingcan, 1999. P. 83; Wu, Deng, Zhang, Li, Peng, Liu, 2005), there are also other intimations on this risk (Cohen, Bar-Yosef, Wu, Patania, Goldberg, 2017. P. 42). The general confusions around layers 3C1a and 3C1b only emphasize this opportunity; moreover, excavations in the cave were apparently conducted without any leveling.

However, there is more to it. The fact that the majority of the ^{14}C dates from layers 3C1b and 3C1a coincides roughly and has a very early age does not automatically mean that all the finds from these layers have also to be associated with these dates. This is exactly why the analysis of ^{14}C dates requires a comprehensive approach, especially at the multicomponent sites. Just at that spot, the context data on the spatial distribution of artifacts in layers 3C1b and 3C1a would be very useful, but we have no them.

The examples are around us. It can be mentioned here another early pottery site, located in China in the middle reaches of the Yellow River. I am talking about the Lingjing site. It was discovered when archaeologists examined the heap of ground dumped out by local people during building a well. The soil featured the homogeneous lithological characteristics, and there were no among finds from this heap any differences, which could be explained by their differing chronology. For this reason, the collection found in the heap had been considered initially as unicomponent, but the results of ^{14}C dating have shown otherwise. Charcoal and bones found here have provided 23 radiocarbon determinations between *c.* 11300 and 11950 BP, but five dates directly obtained from pottery soot turned out to be earlier between *c.* 7890 and 9250 BP (Li, Kunikita, Kato, 2017).

Thirdly, the TL dates of pottery found in the Xianrendong cave also do not correspond to the results of 2009 studies (Wu, Deng, Zhang, Li, Peng, Liu, 2005). Shards were sampled from the layers according to MacNeish's scheme: the Neolithic pottery samples were taken from layer 2–4, the later ones were taken from layer 1. The ^{14}C ages of these shards have confirmed in general assessments of MacNeish made on the ground of cross-dating, though the earliest pottery age turned out to be younger than expected (Tab. 3).

Fourthly, it should be noted also that there is an extremely high degree of asymmetry in the strati-

Table 3
Таблица 3

TL dates of pottery found in the Xianrendong cave
TL-даты керамики, найденной в пещере Сяньжэньдун

Sample	Layer	Age
WX20	1 (1)	3720 ± 300
WX09	2 (2C, 2B)	7850 ± 700
WX02	3 (3C1a, 3B2, 3B1)	11400 ± 1000
WX01	4 (3C1b)	10900 ± 1000

graphic distribution of the ^{14}C dates of the cave. In the western part of the site, the upper part of deposits (layers 3B2 and all above) is represented by only four dates out of 27 (excluding those of the 1960s), the same, only four dates out of 21 were obtained from the upper layers (layers 2A1–2A) of the eastern trenches. How can this be explained, given that the number of finds in the upper horizons were not much fewer than in the lower ones (see Fig. 3), at least in the western part of the cave? The results of 2009 campaign did not answer this important question, and the next problem appears from this, i.e., they require amending the MacNeish's cultural and chronological scheme as a whole.

According to the final report of MacNeish, the X*ian* phase should include not only layer 3C1b but also layer 3C1a (MacNeish, 1999). Thus, in the light of the research of 2009, the age of the X*ian* phase must be defined between 16340 ± 20 (BA95143) and 13885 ± 55 (BA09875). However, only the ^{14}C dates from layer 3C1b are taking into account when the age of the earliest pottery of the cave is discussing (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. P. 1698–1699; Cohen, Bar-Yosef, Wu, Patania, Goldberg, 2017. P. 41). This can be justified only if we can prove that layer 3C1b and layer 3C1a represent two chronologically discrete episodes of human habitation in the cave, but we cannot do it in view of the current state of the database, as it was shown above. If we take as a basis both horizons, consistent with MacNeish, their age will turn out to be too stretched.

The next *Wang* phase, in the meantime, remains almost without any ^{14}C ages, however, it should be noted that MacNeish associated the most part of early pottery found in the cave namely with this stage. As we know, only three dates represent this phase, they were obtained from the upper part of layer 3 (3B2–3A): bottom-up 12420 ± 80 (UCR-3561, 3B2); 14610 ± 290 (BA93181, 3B1); 12240 ± 55 (BA09894, 3A). The date BA93181 was rejected as intrusive in the original paper as it corresponded to the time range of layer 3C1a, the rest two were not commented there (Wu, Zhang, Goldberg, Cohen, Pan, Arpin, Bar-Yosef, 2012. P. 1699), although they still look the most realistic for the earliest pottery. Yet another ^{14}C date falls into this interval: 12530 ± 140 (BA95145). This date was obtained from layers 3C1a or 3C1b in the 1990s and MacNeish used it to establish the age of the *Xian* phase. However, it was not included in the 2009 summary for some unclear reasons, what was already mentioned earlier (Kuzmin, 2013).

The chronology of the *Jiangxi* phase according to the research of 2009 should be determined between 11840 ± 380 (BA99038) and 10210 ± 50 (BA09891) (layers 2A in the western and 2A1–2A in the eastern parts of the cave). This, obviously, completely contradicts the data of MacNeish and other researchers who associated the pottery of this layer with the Pengtoushan culture that has a well-established and much later chronology. This means that the problem of inconsistency between finds and radiocarbon determinations that MacNeish faced was not resolved in the new research. Besides, if we accept these dates for the *Jiangxi* phase, they can be considered as the top mark of the *Wang* phase and of all continuum of the early pottery in the cave, which lasted around ten thousand years!

The ensuing problem can be formulated as a question. What kinds of pottery and other finds or features should be associated with these three phases of early pottery development? Unfortunately, as I tried to show above, we have no opportunity to solve this question given the current cave dataset. From my point of view, we have more facts in favor of twofold, but not threefold and much less fourfold structure of the early pottery collection of the cave nowadays.

It is necessary to pay attention to another fact. The early pottery collection of the cave is, currently, the most numerous among of all Chinese sites with

similar finds, but at the same time, it has the earliest dates. This poorly correlates with the observations of Japanese archaeologists that the amount of the pottery in the Incipient Jomon assemblages directly depends on their age: the younger it is, the more pottery it contains (Keally, Taniguchi, Kuzmin, 2003). Furthermore, the analysis of technical characteristics of the Southern China early pottery, conducted by Chinese experts, showed that the Xianrendong cave's collection looks even more advanced than the pottery of such later sites as Zengpiyan and Yuchanyan (see Fig. 2, *b*) (Lu, 2012. P. 122). Of course, we cannot always use the data on pottery technological features in order to determine its chronology, but we also cannot reject this argument completely.

Conclusion

Thus, we see that the Xianrendong cave materials are very vulnerable to criticism from an archaeological point of view. There are too many contradictory details in the reports, which hinder the understanding of the stratigraphic situation, the appearance of finds and the nature of their distribution in deposits, etc. Many of these problems could be solved only by carrying out new excavations. It is at least unwise to rely on such a week source when addressing such an important issue as the time of pottery appearance in the World (!), especially when the results are out of the overall picture. The researches of 2009, unfortunately, only exaggerate this problem. If the analysis of the radiocarbon dates was carried out in conjunction with other data, many issues would perhaps be resolved but until that happened, it is too early to approve the results of this research.

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Yanshina O.V., Sobolev A.E. udertook the study, made a generalization, prepared the manuscript for printing, have copyrights for the article and are responsible for its originality.

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