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ПРОБЛЕМИ. ГІПОТЕЗИ. УЗАГАЛЬНЕННЯ

MOLODOVO V (UKRAINE): SPATIAL AND CONTEXTUAL STUDY OF GRAVETTIAN LEVELS 10, 9 & 8

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Molodovo V is one of Ukraine's key-sites for the Middle and Upper Palaeolothic. Since its excavation in the 1950's and 1960's, this sequence has been a cornerstone for the chrono-cultural framework in the Dniestr valley and adjacent areas. The site is also an important contributor to the issue of the Gravettian emergence. With radiocarbon dates around 29–28 ka uncal BP, its cultural levels 10 and 9 stand as the first Gravettian occurrence in this region, and as one of the earliest in Europe. However, this early presence of the Gravettian is relatively questionable, as it is challenged by the late Aurignacian presence in the neighbouring site of Mitoc-Malu Galben (Romania) which extends until 27.7 ka BP. Despite the consistency of the sedimentary and paleoenvironmental studies at Molodovo V, the archaeological artefacts did not benefit from extensive studies since the excavations – except for typological classification. This paper thus aims at clarifying the association of the lithic materials with the sedimentary stratigraphy and associated dates. Three types of analyses have been realized to check the conditions in which the cultural levels 10, 9 and 8 were excavated, labelled and attributed: a spatial analysis of the lithic artefacts, a refit analysis focused on inter-levels connexions and a spatial study of the position of the Upper Palaeolithic combustion features. Consequently, it appears that most artefacts from levels 10 and 9, and a majority of materials from level 8, are not reliably associated to the sedimentary stratigraphy and dates. Thus, there is no ascertained Gravettian presence in Molodovo V before its level 8, imprecisely dated between 27.000 and 25.000 uncal BP.

Key words: Upper Palaeolithic, Gravettian, Ukraine, spatial analysis.

Introduction

The site of Molodovo V, located on the Dniestr river in South-Western Ukraine, has been considered for decades as a reference for Middle and Upper Palaeolithic in Ukraine and Eastern Europe in general. This unique multi-layered site embedded in more than 20 meters of loess has benefitted from inter-disciplinary studies (geology, palynology, malacology, etc.), resulting in a body of consistent data to invest several issues related, e.g., to paleo-climate reconstruction and dynamics or cultural variability over time. Consequently, still today, old and new sites from neighbouring areas are often compared to this sequence for chrono-cultural assessment or analytical purposes.

Molodovo V is of particular importance to the specific issue of the emergence of the Gravettian, due to the peculiarly early occurrence of its Gravettian levels 10 and 9 (eds. Ivanova and Tzeitlin, 1987). Even though cultural level 10 is not reliably dated, the above-positioned level 9 provided several radiocarbon dates clearly exceeding 28 ka uncal BP: e.g., 28.100 ± 1000 [LG-15], 29.650 ± 1320 [LG-15] [Иванова, 1987] and 28.700 ± 580 [GrN-27613] [Haesaerts et al., 2003]. If this early position is not unique in Europe [Kozlowski, 2015], it represents a lone case in the middle Dniestr and surrounding areas, where following Gravettian presence never predates 27 ka uncal BP [Noiret, 2007, 2009]. In Molodovo V itself, the cultural level 8 is imprecisely dated between 27 and 25 ka uncal BP

[Иванова, 1987; Haesaerts et al., 2003]. Among the most reliably dated subsequent Gravettian occupations in this region is Korman IV, situated a few kilometres downstream from Molodovo V, and Mitoc-Malu Galben (Romania), located in the Prut valley, about 50 km in a straight line from the Molodovo area. In Korman IV, cultural level 7 is dated at 25.140 ± 350 [LU-586] [Иванова, 1977], and in Mitoc-Malu Galben, the sedimentary unit 7b, in which is set the cultural level «Gravettian I», provided several radiocarbon dates gathering around 26.5 ka uncal BP [Damblon and Haesaerts, 2007; Haesaerts, 2007].

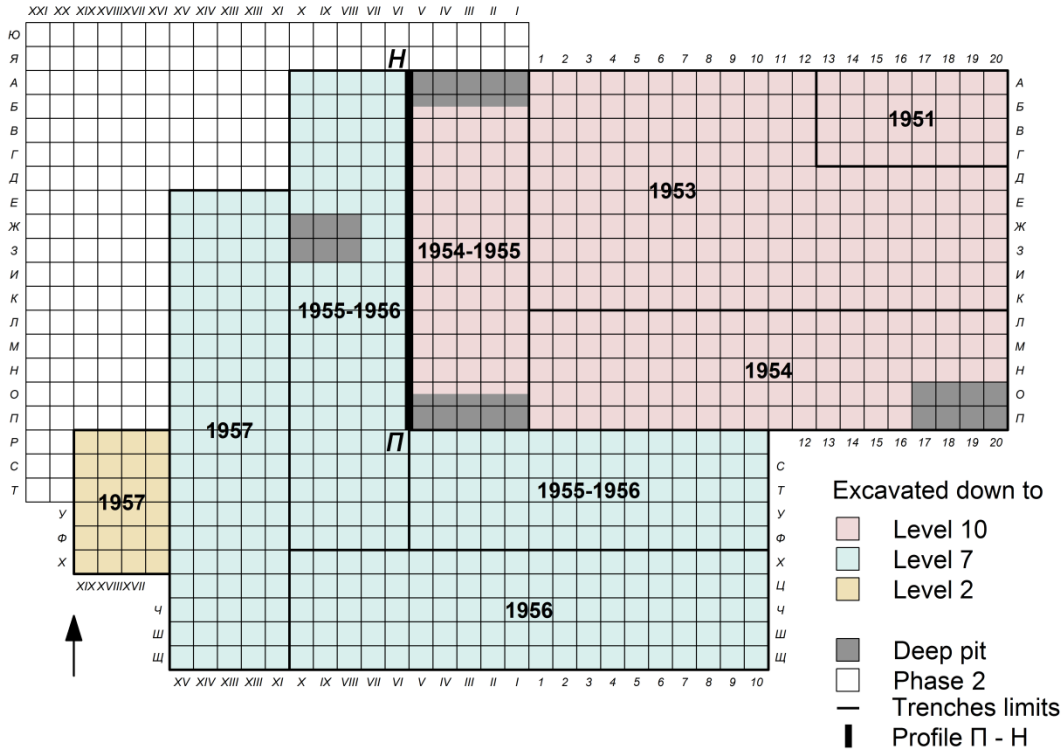

Fig. 1. Molodovo V. Map of the site, 1951–1957 trenches («Phase 1»)
Рис. 1. Молодово V. План дослідженої частини стоянки. Розкопи 1951–1957 рр. («Фаза 1»)

What's more with Molodovo V's early Gravettian is the singular picture it depicts at a regional scale through its association with Mitoc-Malu Galben. Prior to its Gravettian levels, the Romanian site also features some Aurignacian occupations whose last occurrences are dated at 27.7 ka uncal BP [Damblon and Haesaerts, 2007]). As previously noticed by some [Haesaerts et al., 2003; Libois, 2020; Nigst et al., 2021], this situation implies the simultaneous presence of both the Aurignacian and the Gravettian in the same region, an unmatched observation in Europe. The unique status of this situation raises concerns on the validity of its base data: is this the reflect of a real cultural overlap in two closely located sites or the result of some unknown bias in either one or both sites and collections? As these two sites were mostly excavated decades ago – in the 1950's and 1960's at Molodovo V, mostly in the 1980's at Mitoc-Malu Galben – following standards which deeply evolved since then, doubts are legitimate.

Concerning Mitoc-Malu Galben, some multi-disciplinary studies, including stratigraphy review [Haesaerts, 2007; Haesaerts et al., 2003], radiocarbon campaigns (Damblon and Haesaerts, 2007) and archaeological collections restudies [Libois et al., 2019; Otte et al., 2007], have strengthened the

confidence in the late Aurignacian presence it supports. At Molodovo V, such re-investigations have not all been carried out yet. In the last decades, Haesaerts' re-examination of the sedimentary sequence (Haesaerts et al. 2003) has confirmed and refined the site's context and timing, already very well outlined by Ivanova (1987), but only few extensive studies have been led on the archaeological materials since Chernysh's excavations and publications [Черниш, 1961; 1987]. On this matter, the early Gravettian levels still need to be re-evaluated, on typological, technological and spatial grounds, in order to solve any cultural assessment and context concerns about the related artefacts.

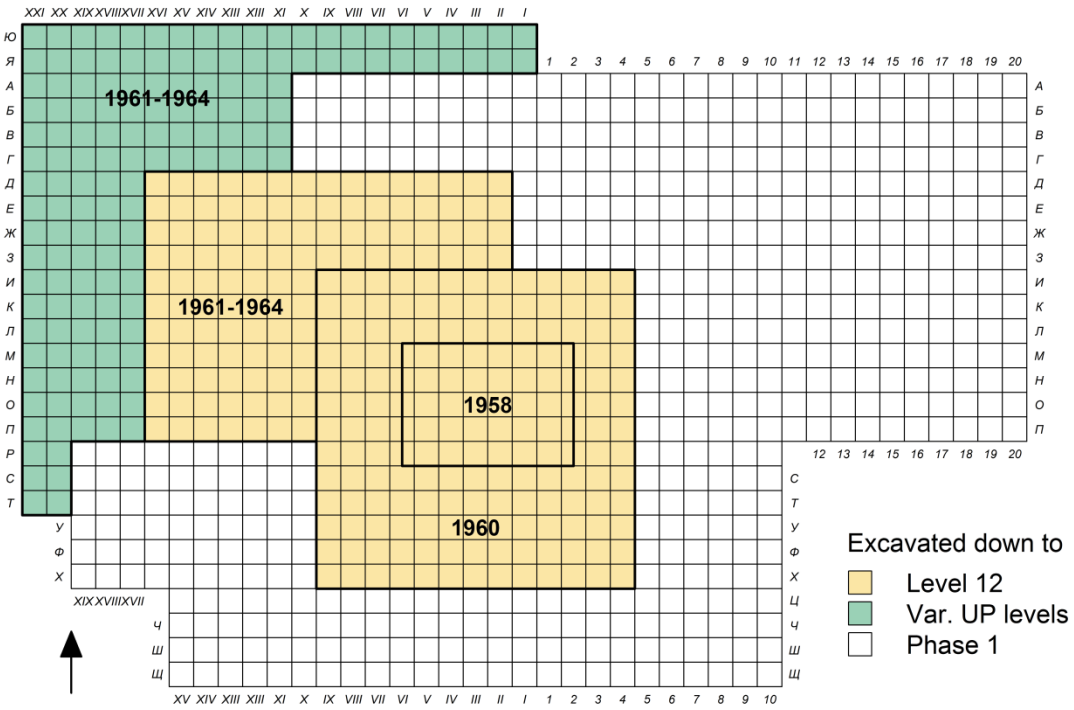

Fig. 2. Molodovo V. Map of the site, 1958–1964 trenches («Phase 2»)
Рис. 2. Молодово V. План дослідженої частини стоянки. Розкопи 1958–1964 рр. («Фаза 2»)

In these circumstances, this paper aims at clarifying the contextual situation of cultural levels 10, 9 and 8 at Molodovo V, following these questions: is the association between the lithic materials and the sedimentary stratigraphy and dates reliable? And if so, what are the implications on associated issues such as the emergence of the Gravettian? Even though level 8 does not relate to the early phase of the Gravettian, its study has been included for comparative purposes with levels 10 and 9.

Site overview, history and methods of excavation

Molodovo V is located on the middle course of the Dniestr river in Tchernivtsi oblast (Ukraine), and is thus situated in close vicinity with the northern borders of nowadays Romania and Republic of Moldova. It is part of a cluster of sites numbered from I to V, among which Molodovo I is as famous as Molodovo V, but for its Mousterian hut structures [Черныш, 1982]. The site is implanted in slope deposits reaching up to 25 metres [Черныш, 1987], on the right bank of the river.

Excavation history

The site was discovered in 1948 by A.P. Chernysh through surface finds [Черныш, 1987]; the Molodovo area was already known to be archaeologically rich, further to works by I. Botez and N. Moroşan in the 1920's and 1930's [Moroşan, 1938]. In 1949, Chernysh realised three unsuccessful test pits in Molodovo V [Черниш, 1961], before carrying out extensive excavations from 1951 to 1964

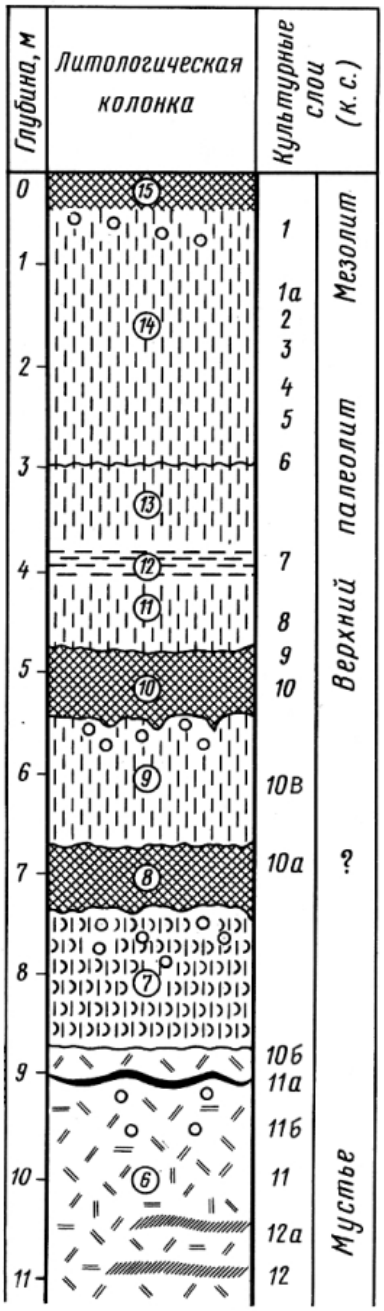

Fig. 3. Molodovo V. Stratigraphic sequence by I. Ivanova (1987; modified by the author)
Рис. 3. Молодово V. Стратиграфія за І. Івановою (за Ivanova, 1987; з модифікаціями автора)

[Черныш, 1987] – with the exception of years 1952, 1959 and 1963. By the end of the excavations, about 970 m² of the modern surface had been dug, and the lowest levels were opened on 256 m².

The first phase of the excavations took place in 1951–1957 (fig. 1). During that period, only the upper part of the sequence was excavated, including Upper Palaeolithic levels 10 to 1 – they are numerically labelled, in ascending order from top to bottom. Year after year, new trenches widened the opened area following a general north-east to south-west extension. Other cultural levels were also discovered after the initial labelling of the cultural levels 10 to 1, resulting in the inclusion of levels 1a and 6a.

Starting from 1958, the fieldwork entered a second phase as Chernysh focused on the excavation of the Middle Palaeolithic levels 12, 12a, 11 and 11б (and upper intermediary levels), first discovered in a deep pit realised in 1955 in the centre of the site. In 1958 and 1960, the excavations mainly spread around this pit (fig. 2). In 1961–1962 and 1964, the site was extended in the north-western direction, in order to enlarge the Mousterian levels. Therefore, to access the lower levels, the upper part of the sequence, including the Upper Palaeolithic levels, was also excavated in the extension.

After 1964, no fieldwork as extensive as Chernysh's were carried out on the site. In 1997–1999, an international team realised some excavations on ~30 m² in the Mousterian levels in the north-western corner of the site [Ситник та ін., 2007; Ситник, 2008].

Stratigraphy and dates

The 1951 trench stands as an exception in the labelling of the cultural levels in Molodovo V, as most materials were attributed to either an 'upper' or a 'lower' cultural level [Chernysh, 1951]. But from 1953, a single attribution system was used, including 16 main cultural levels (fig. 3–4) – from 12 to 1, plus levels 12a, 11b, 6a and 1a. Some 'intermediary' levels, adding up a handful of individual pieces, were also introduced in the succession: 11a, 10в, 10a and 10б. Following typo-technological grounds and radiocarbon dates, levels 12 to 11б are attributed to the Mousterian, levels 10 to 6a to the Gravettian, and levels 6 to 1 to the Epigravettian; levels 1a and 1 were considered as Mesolithic by the excavators (eds. Ivanova & Tzeitlin, 1987), but this attribution has been called into question [Нужний, 2003]. Intermediary levels between the Mousterian and Gravettian levels only include culturally undiagnostic materials, most likely related to the Upper Palaeolithic.

All along the excavations and in subsequent years, the sedimentary stratigraphy was studied by I. Ivanova, who distinguished 15 different sedimentary units ('SU' hereafter) alternating loess bodies and humiferous horizons (fig. 3) [Иванова, 1987], all of them following the main slope towards the Dniestr to the North, as well as a lighter slope to the East.

Contrarily to the cultural stratigraphy, these units were numerically labelled from bottom to the top in ascending order. SU 1 to 5, constituted mostly of loams and sandy loams, were only studied through deep pits and were exempt of any artefacts. The sandy silts from unit 6 include all the Mousterian levels. On top of it, the stratigraphy consists of 4 loess units (7, 9, 11, 13 and 14), alternating with 3 pedological units (8, 10, 12). SU 10 contains the cultural levels 10 and 9, while SU 11 includes cultural level 8, and SU 12 comprises cultural level 7. SU 14 holds cultural levels 6 to 1.

Haesaerts' study [Haesaerts et al., 2003], carried out alongside the 1997–1999 fieldwork, deepened and refined the stratigraphic system elaborated by Ivanova, using the same labels than Ivanova and adding sub-units (fig. 4).

Both Ivanova and Haesaerts realised several radiocarbon dates in the complete sequence. Eighteen radiocarbon dates were realised by Ivanova and Chernysh [Иванова, 1987], covering coherently the sequence from SU 6 to 15, and dating most cultural levels. Most dated samples were charcoals collected in 1961–1962, with the exception of a sample from cultural level 7 collected in 1956, during the excavation of that same level. Haesaerts obtained a total of thirty radiocarbon dates, mostly on charcoals sampled in the north-western corner of the site, but focused on SU 10 to 14, providing a highly consistent set of dates from 32.7 to 17.7 ka uncal BP [Haesaerts et al., 2003, Haesaerts et al., 2013].

Excavation methods

The excavations were carried out following standards and theories of the 1950's Soviet archaeology, i.e., by opening large trenches in order to recover 'floors' and traces reflecting the Palaeolithic life and organisation. Practically, the site's area was divided following a grid system (one-meter squares), labelled with letters from the Cyrillic alphabet in the north-south axis and numbers in the east-west axis (Latin numbers in reverse order in the western part of the grid). In every campaign, a new trench was opened, and cultural levels were successively uncovered and levelled on their complete surface, then described and plotted on horizontal plan. The general depth of cultural levels was measured from a point 0 marked on profiles, which was reported every meter down. For most artefacts, their position record was limited to a square and cultural level attribution. Therefore, these pieces were not precisely plotted, nor located in the sedimentary stratigraphy. Even though some pieces are positioned in the form of crosses on the plans drawn by Chernysh and his team [Черниш, 1961], no clear connection can be established with artefacts in

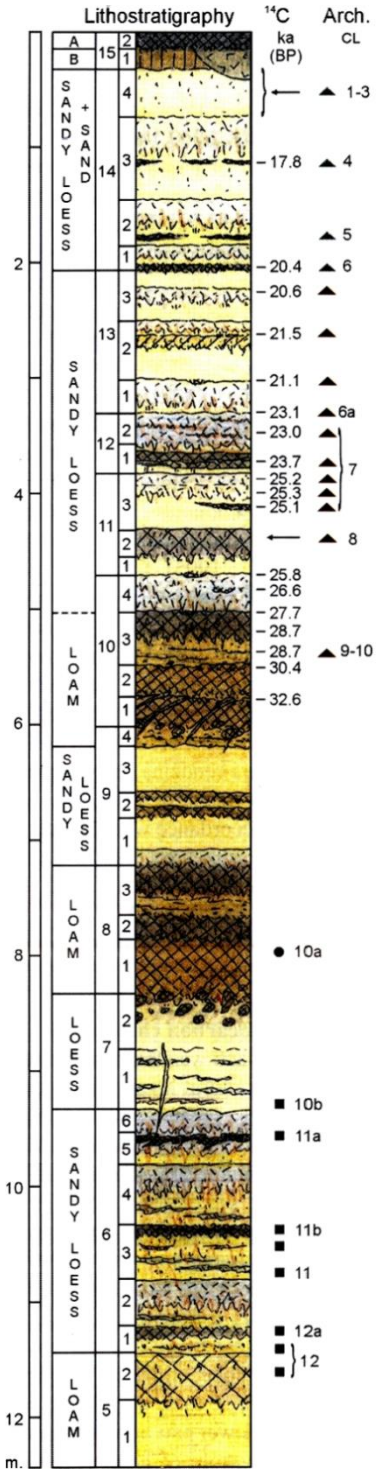

Fig. 4. Molodovo V. Stratigraphic sequence by P. Haesaerts (Haesaerts et al., 2003, p. 167; modified by the author)

Рис. 4. Молодово V. Стратиграфія пам'ятки за П. Езартсом (за Haesaerts et al., 2003, p. 167; з модифікаціями автора)

the collection. Among all archaeological facts, hearths were given a deeper investment in description and recording, due to their assumed importance in reflecting past spatial organisations. Hence, they were precisely drawn on plan and exactly measured in depth, in addition to their attribution to a cultural level.

Methods

In order to check the spatial and contextual integrity of levels 10, 9 and 8, three different analyses were applied to the available data. First, a 'classic' spatial analysis of lithic artefacts' position in plan was realised. In the frame of a wider typo-technological study of levels 10, 9 and 8, all pieces currently in the collection were examined; their ink-marked square and level position, as well as year of excavation, were then databased.

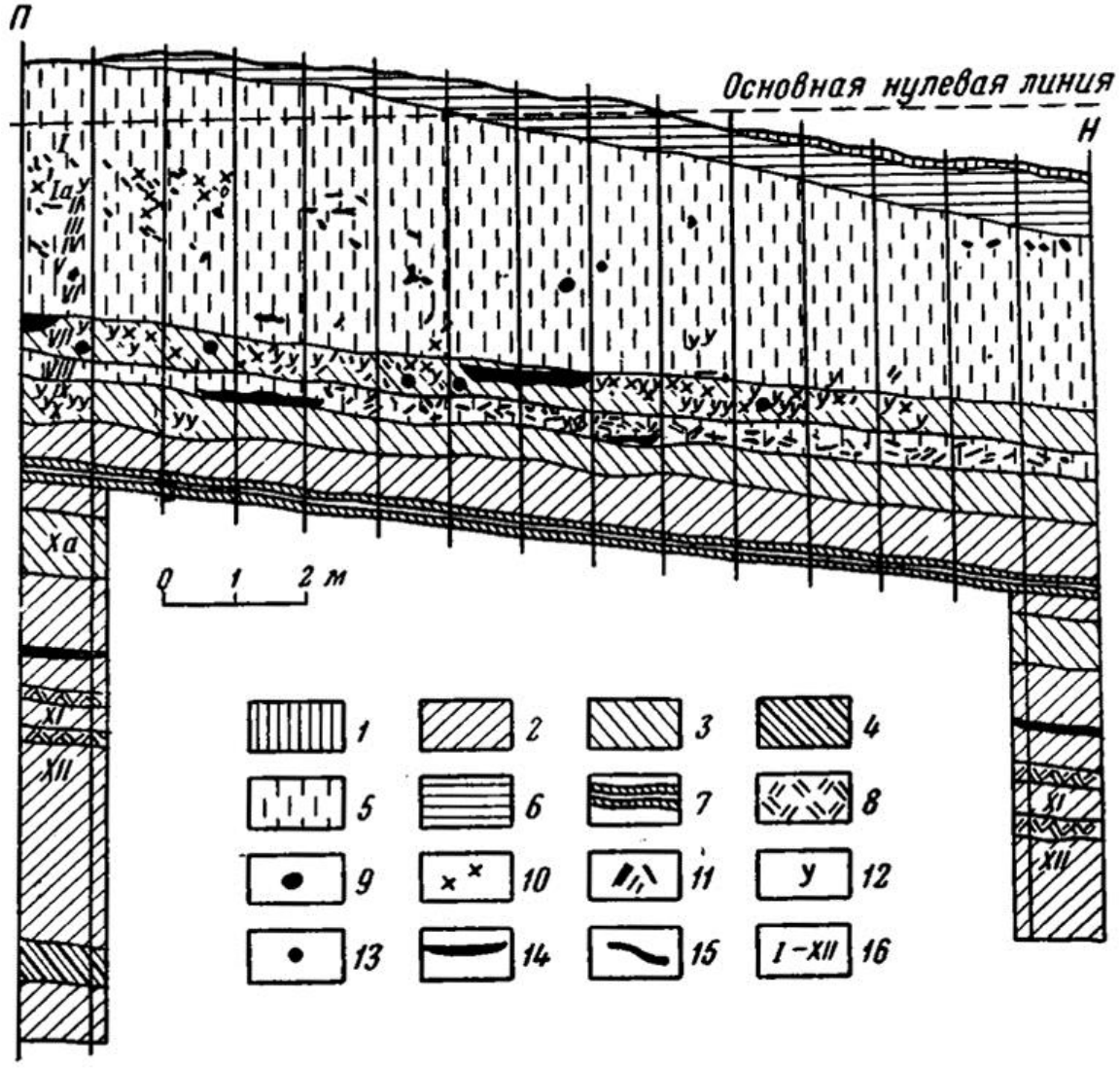

Fig. 5. Molodovo V. Profile П-Н (by Черныш, Иванова, 1959, c. 66)
Рис. 5. Молодово V. Профіль П-Н (за Черныш, Иванова, 1959, с. 66)

This information was used to produce horizontal plans displaying the frequency of artefacts per square meter and year of excavation. A colour and shade code was used to express respectively the year of excavation and frequency of pieces per square. These plans were critically examined to

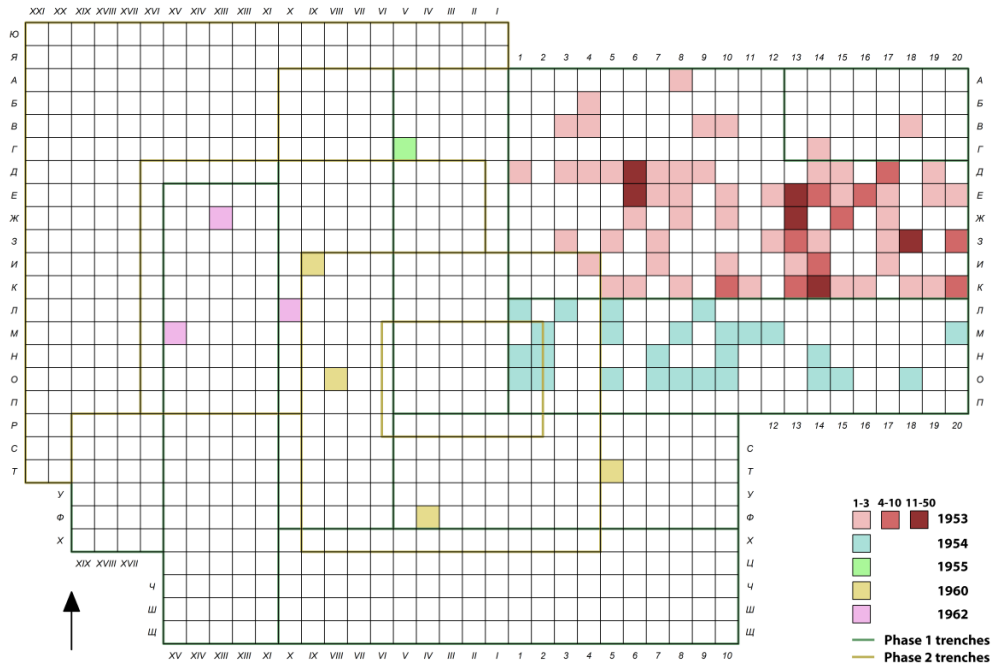

Fig. 6. Molodovo V. Level 10, frequencies of artefacts per square, plan view. Squares are colour coded by year, and shaded by frequency

Рис. 6. Молодово V. Культурний шар 10. План розміщення артефактів за квадратами. Колір відповідає рокам проведення досліджень, а тонування – насиченості квадратів артефактами

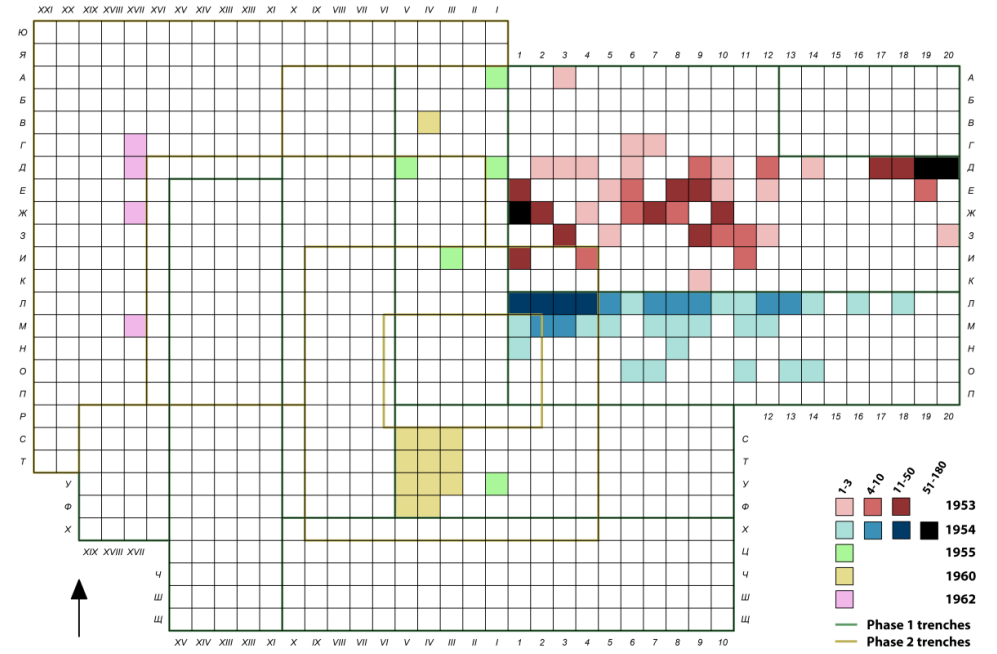

Fig. 7. Molodovo V. Level 9, frequencies of artefacts per square, plan view. Squares are colour coded by year, and shaded by frequency

Рис. 7. Молодово V. Культурний шар 9. План розміщення артефактів за квадратами. Колір відповідає рокам проведення досліджень, а тонування – насиченості квадратів артефактами

understand the spatial position and density of artefacts or concentrations, as well as to spot archaeological biases (e.g., 'trench effect'). The plans published by Chernysh (1961) were not used, due to discrepancies between these plans and our results; these ones were preferred, as our data originates from the materials themselves, and because it matches the information from the collection's official inventories, contrarily to Chernysh's plans.

Second, a refit analysis was carried out on the knapped materials, also realised in the context of a wider typo-technological study. Both intra- and inter-levels connections were sought, but in the frame of this research, the focus has been set only on inter-levels refits, more likely to highlight links between levels. These refits have been reported on plans, alongside the general distribution of materials per level, so as to examine the pattern of refits in contrast to the position of related artefacts.

Finally, a spatial analysis has been applied to combustion features ('hearths'). Given that all hearths excavated during the 1951–1957 period were described by Chernysh (1961), including their horizontal position and depth, this information was databased, allowing to generate plots and projections in 3D.

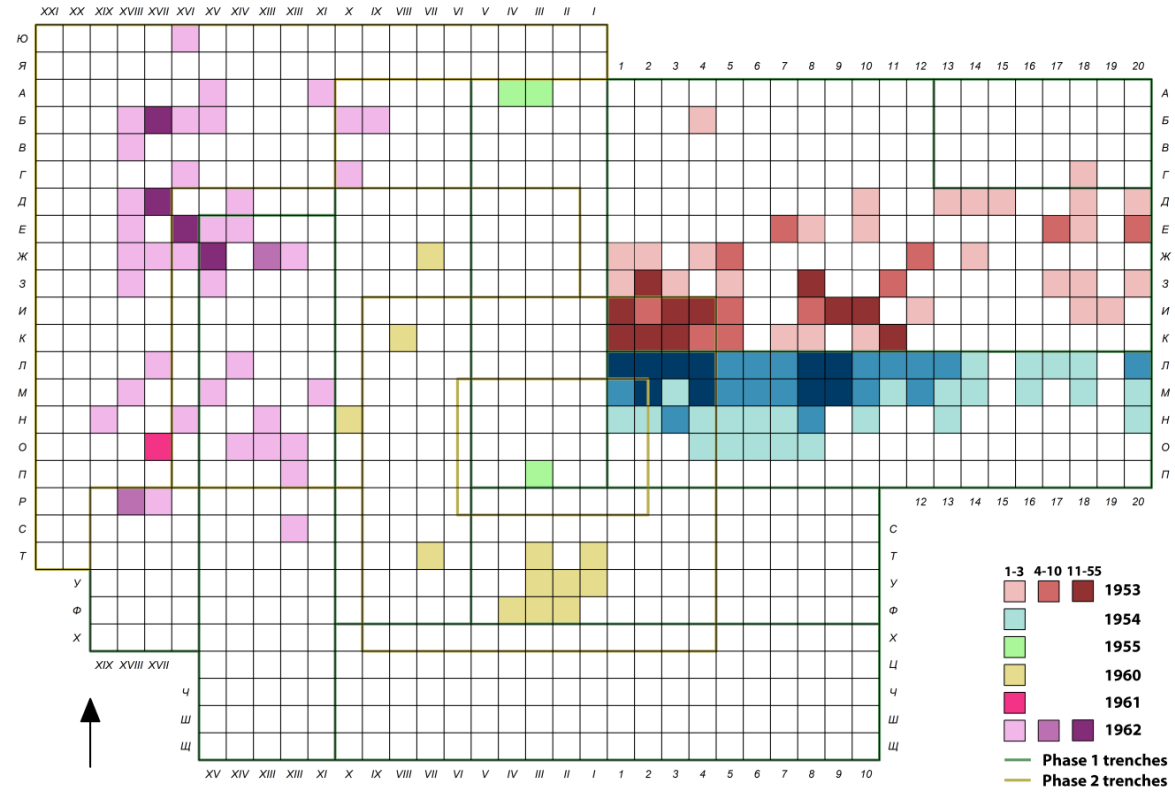

Fig. 8. Molodovo V. Level 8, frequencies of artefacts per square, plan view. Squares are colour coded by year, and shaded by frequency

Рис. 8. Молодово V. Культурний шар 8. План розміщення артефактів за квадратами. Колір відповідає рокам проведення досліджень, а тонування – насиченості квадратів артефактами

For every of levels 10 to 1, horizontal plans and side projections were made, in order to spot any differential positioning depending on the trench. Considering that the sediments' main slope runs from south to north (fig. 5; see fig. 1 for profile position in plan), the projections were produced from an eastern point of view in relation to the site. The focus was set on checking whether every set of hearths by level is sloped, and in which direction.

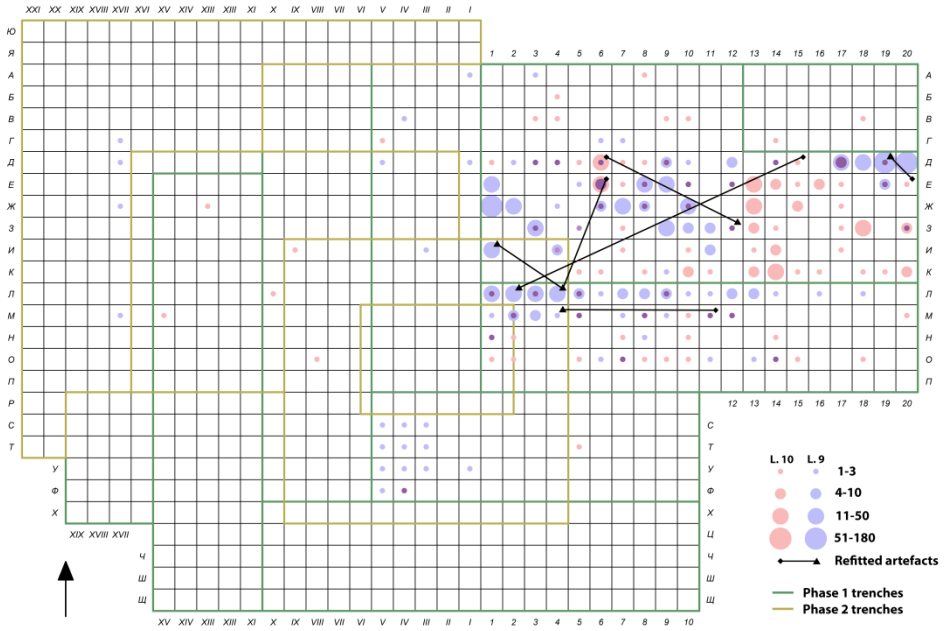

Fig. 9. Molodovo V. Levels 10 and 9, frequencies of artefacts per square and inter-levels refits, plan view. Dots are colour coded by level and sized by frequency. Purple dots result from the superposition of dots in levels 10 and 9
Рис. 9. Молодово V. Культурні шари 10 та 9. План розміщення артефактів за квадратами та «складанки» артефактів з різних культурних шарів. Колір крапок відповідає культурному шару, а розмір – насиченості артефактами. Пурпурові позначки демонструють взаємне накладання артефактів з шарів 10 та 9

Materials

The spatial and refit analysis are based on all lithic materials and other stones curated as level 10, 9 and 8 in the collections of the Department of archaeology at the I. Krypiakevitch Institute for Ukrainian Studies in Lviv (Ukraine). It shall be noted that the collection does not include any materials from the 1951 excavations at Molodovo V. Anyway, these materials were not attributed using the level labelling system started in 1953, and they are not part of the counts later published by Chernysh (1961, 1987). As previously noticed [Noiret, 2009, p. 180–181], counts of materials by levels and types often differ from a publication to the other, however not significantly. Therefore, the subsequent comparison of our counts of the materials to Chernysh's is based on his publication from 1987 [p. 84–85], supposedly more likely to reflect to latest state of the collection prior to our study.

Table 1

Molodovo V: Chernysh's lithic counts for levels 10, 9 and 8 (Chernysh, 1987, p. 84–85)

	Level 10	Level 9	Level 8
Cores	19	33	67
Blades	115	180	338
Flakes	323	710	873
Tools (& used)	47	77	125
Total	504	1000	1403

Concerning level 10, Chernysh reports 504 individual lithic pieces (Table 1), while we could only retrieve 380 artefacts in the collection (Table 2), non-knapped pieces included (e.g., pebbles,

sandstone slabs, etc.). Considering our own inclination to include preforms or tested raw material nodules as cores, the general cores and flakes categories can be considered relatively similar. Tools are less numerous in our count, and unretouched blades are heavily impacted, as we could only find 2 objects of that type. We assume that a box containing all the blades and some retouched pieces was not retrieved in the frame of this study.

Table 2

Molodovo V: Lithic counts for levels 10, 9 and 8, this study

	Level 10	Level 9	Level 8
Cores & core-likes	30	45	88
Blades & bladelets	2	157	265
Flakes & miscellaneous	317	629	574
Tools (formal & informal)	31	48	95
Total	380	879	1022

In level 9, the situation is somewhat alike, as Chernysh reports 1000 artefacts (Table 1), while we retrieved only 879 of them (Table 2). For the same reason than in level 10, the core category is higher in our study. All other classes are lower in our count, but they all are significantly represented compared to Chernysh's numbers.

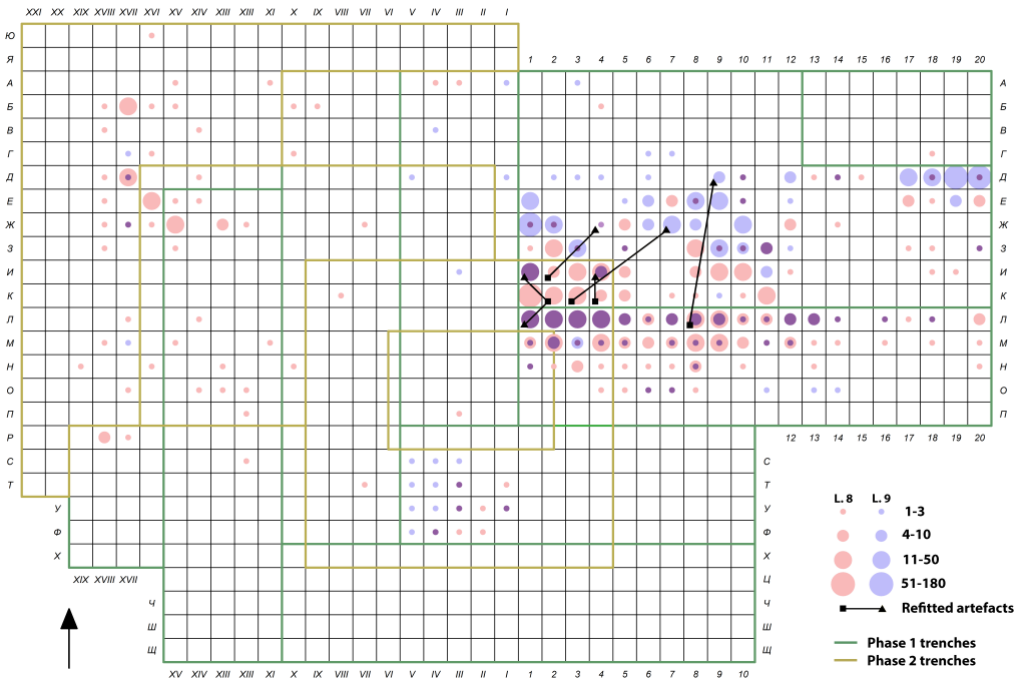

Fig. 10. Molodovo V. Levels 9 and 8, frequencies of artefacts per square and inter-levels refits, plan view. Dots are colour coded by level and sized by frequency. Purple dots result from the superposition of dots in levels 9 and 8

Рис. 10. Молодово V. Культурні шари 9 та 8. План розміщення артефактів за квадратами та «складанки» артефактів з різних культурних шарів. Колір крапок відповідає культурному шару, а розмір – насиченості артефактами. Пурпурові позначки демонструють взаємне накладання артефактів з шарів 9 та 8

Finally, level 8 follows the same pattern, as Chernysh considered 1403 artefacts in this level (Table 1), while we could access 1022 of them (Table 2). Once more, our own count of cores is higher,

and all other categories are lower. The flakes class is the most impacted, as we retrieved 299 objects less than Chernysh accounts.

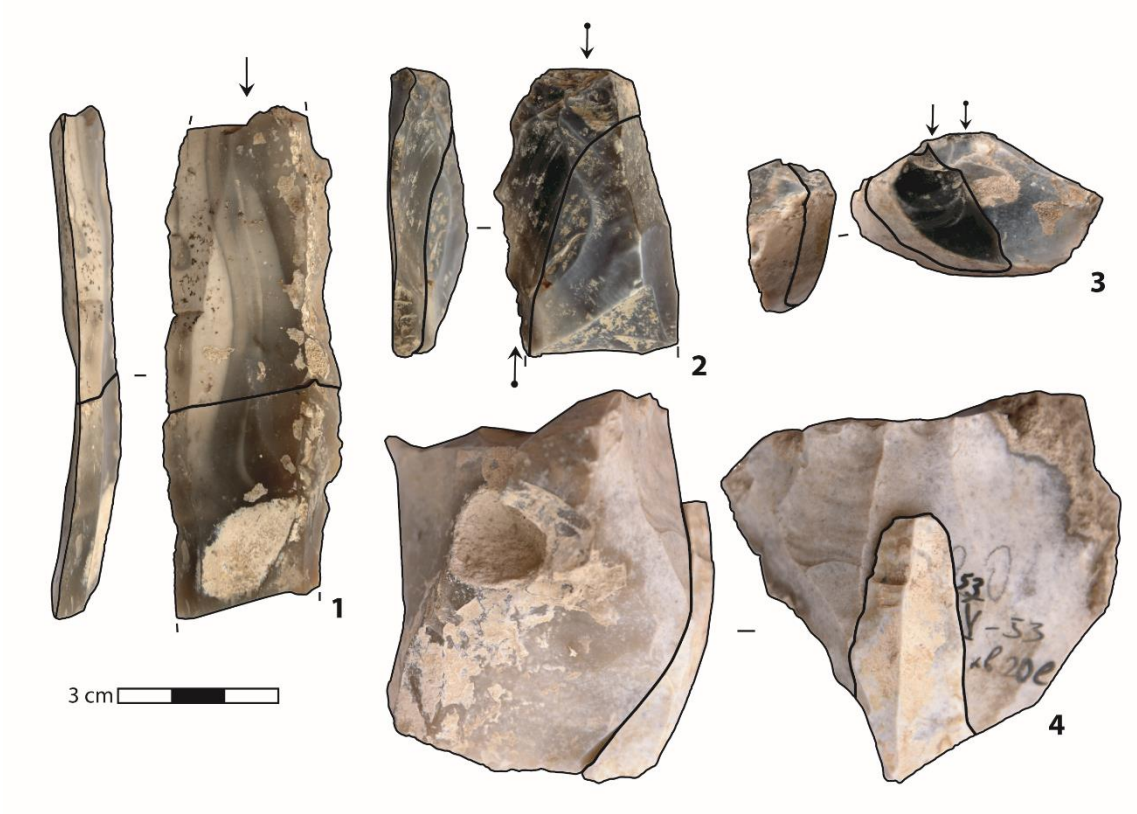

Fig. 11. Molodovo V. Examples of inter-levels refits. *1–2* – Levels 9 and 8 refits; *3–4* – Levels 10 and 9 refits
Рис. 11. Молодово V. Приклади «складанок» артефактів з різних культурних шарів. *1–2* – з шарів 9 та 8; *3–4* – з шарів 10 та 9

In sum, we retrieved 75.4 % of the level 10's collection, 87.9 % of level 9, and 72.84 % of level 8. Considering these numbers and the fact that discrepancies are most likely curation-related in regard to typological classification, we assume that these proportions are sufficient for further spatial and contextual studies.

Results

Spatial frequency of stone and lithic artefacts

The general distribution of artefacts per year of excavation (Table 3) reveals that materials from levels 10, 9 and 8 were mostly retrieved from specific trenches. All three levels taken together, 62.12 % (n = 1417) of the studied materials were found in 1953. The 1954 year comes in second place with a proportion of 25.95 % (n = 592). The 1955–1962 period provided the remaining 11.92 % (n = 272) of artefacts; however, we can note that most of them (n = 207) are some level 8 materials uncovered in 1962. Considering that yearly trenches are located in precise parts of the site, the sole attribution of materials to years of excavation shows that these objects are unevenly distributed within the site.

Out of 380 artefacts attributed to level 10, 295 had a readable ink labelled square position, representing 58.53 % of the total amount of materials reported by Chernysh, and 77.63 % of studied materials in this level.

Table 3

Molodovo V: Lithics' frequency per year of excavation and level, for levels 10, 9 and 8, this study

	1953	1954	1955	1956	1960	1961	1962	Total	Total 1953–1954	Total 1955–1962
Level 10	337	33	2	0	5	0	3	**380**	370	10
Level 9	649	198	6	0	21	0	5	**879**	847	32
Level 8	431	361	5	1	16	1	207	**1022**	792	230

The frequency of artefacts per square is reported on figure 6. Artefacts from 1953 located in the 1951 trench result from ink marking mistakes; the explanation is similar for, e.g., the artefact in square 5T, and occurs also in levels 9 and 8. Materials are overwhelmingly originating from the 1953 and 1954 trenches, contrarily to materials found during years 1955, 1960 and 1962, clearly in neglectable quantity. Even though lithics from the 1954 trench are spread on most of its surface, finds only occur in low density per square (33 artefacts for 100 m^2); this is not due to the exclusion of some materials due to unreadable ink marking, as all 1954 materials are here positioned on plan. In the 1953 trench, the complete absence of objects in line P is unexplainable. It shall also be noticed the presence of some high-density square in the 1953 trench, such as 6Д-6E or 13E-13Ж, suggesting that some concentrations of artefacts might have been preserved in an *in situ* related position. On the contrary, a 'trench effect' is partly visible between 1953 and 1954, especially in the К-Л profile in lines 13 to 19.

Table 4

Molodovo V: Total count of the 1953–1957 hearths separated in two sets of excavation years: 1953–1954 and 1955–1957. Based on data from Chernysh (1961)

Level	1953–1954	1955–1957	Total level
1	2	7	9
1a	3	7	10
2	4	7	11
3	13	3	16
4	10	4	14
5	9	4	13
6	15	7	22
7	14	33	47
8	7	3	10
9	7	0	7
10	7	4	11
Total	**91**	**79**	**170**

Concerning level 9, 85.4 % of all reported artefacts, or 97.16 % of studied pieces, could be positioned in a precise square. The pattern following trenches is similar to level 10 (fig. 7), as most materials originate from 1953 and 1954. We can however notice an additional low-density cluster from the 1960 excavations. The 'trench effect' between 1953 and 1954 is clearly visible, as materials from 1954 are grouped in the north-western corner of that trench (especially in squares 1Л to 4Л) while the concentration of objects have no continuation in nearby 1953 and 1955 trenches.

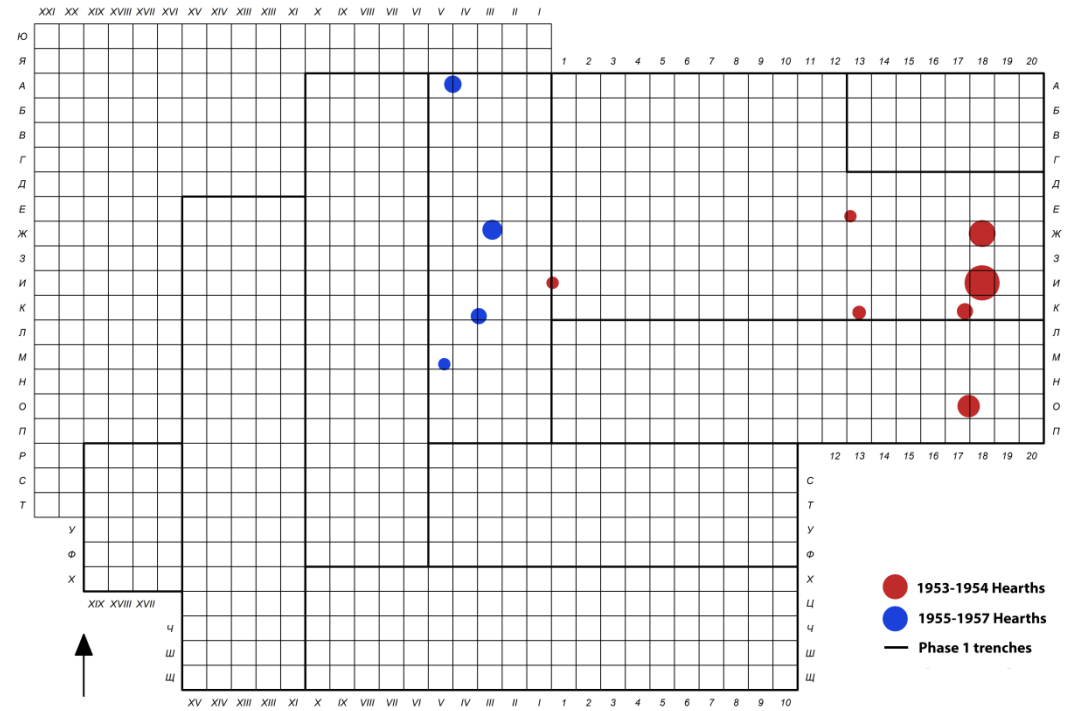

Fig. 12. Molodovo V. Level 10, 1953–1957 hearths, plan view
Рис. 12. Молодово V. Культурний шар 10, вогнище на ділянці розкопу 1953–1957 рр., план

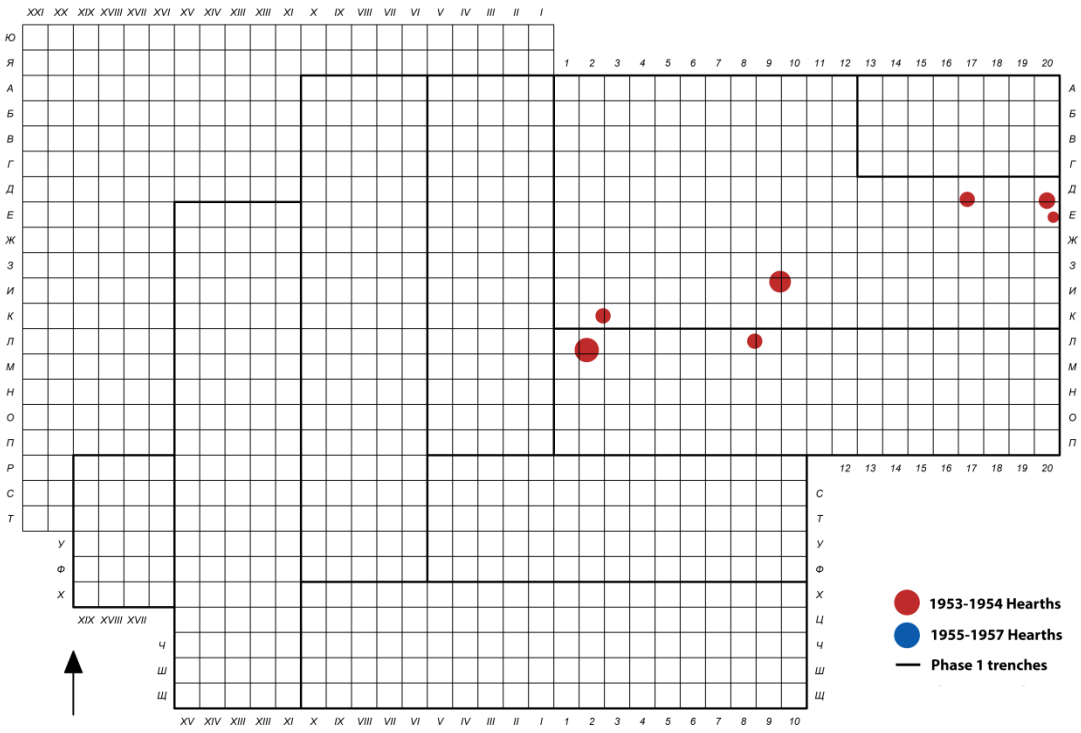

Fig. 13. Molodovo V. Level 9, 1953–1957 hearths, plan view
Рис. 13. Молодово V. Культурний шар 9, вогнище на ділянці розкопу 1953–1957 рр., план

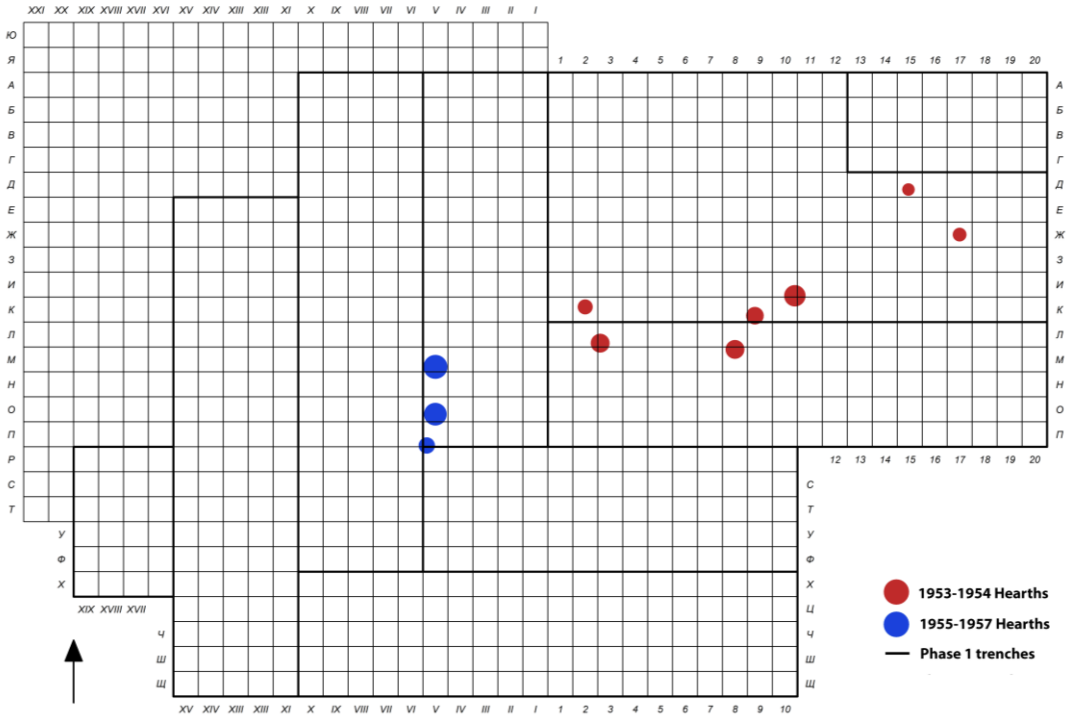

Fig. 14. Molodovo V: Level 8, 1953–1957 hearths, plan view
Рис. 14. Молодово V. Культурний шар 8, вогнище на ділянці розкопу 1953–1957 рр., план

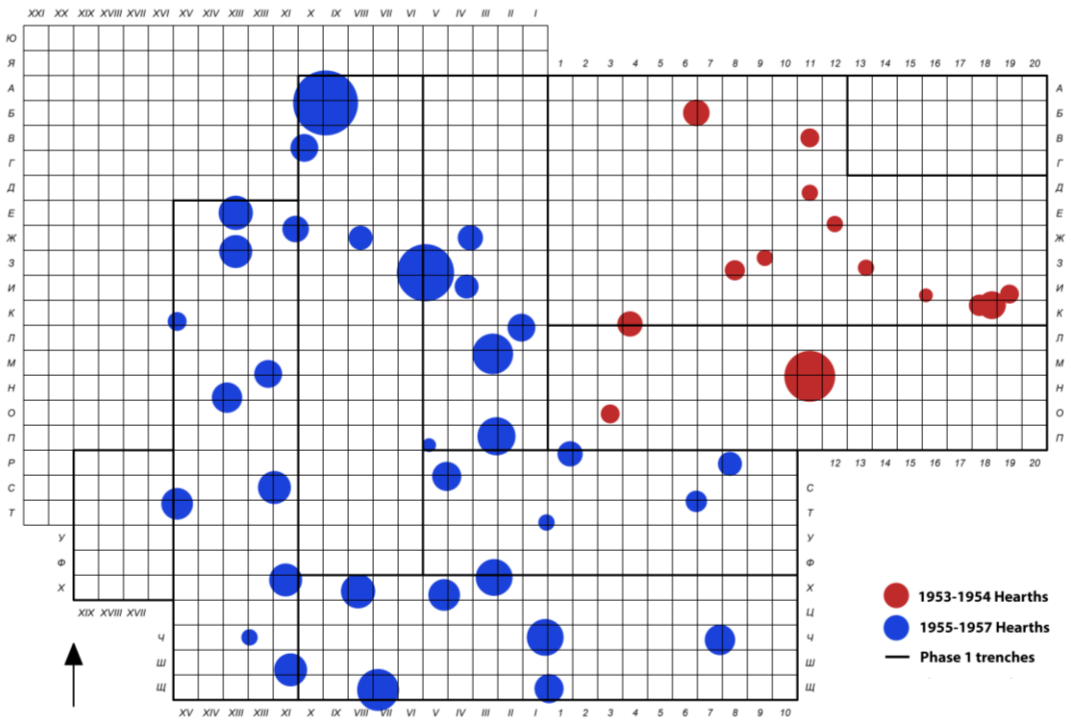

Fig. 15. Molodovo V. Level 7, 1953–1957 hearths, plan view
Рис. 15. Молодово V. Культурний шар 7, вогнище на ділянці розкопу 1953–1957 рр., план

On that matter, the configuration in trench 1953 is quite irregular: the К line is empty (except a single artefact in square 9К) and concentrations of artefacts have questionable patterns. Indeed, some high-density squares are surrounded by empty squares, especially in lines 1 to 4 and Е to И, an unexpected situation considering the disposition in the rest of the trench.

Level 8 had 886 positioned artefacts, representing 60.87 % of Chernysh's total or 86.69 % of studied materials. Once more, several trenches, related to specific years, present more materials (fig. 8): trenches 1953, 1954 and 1962. A low-density cluster of objects from 1960 is present in the same area than level 9. Quite the opposite, concentrations in the 1953 and 1954 trenches tend to join at their common limit, especially in their western part. A 'trench effect' is however visible, but particularly between the 1953–1954 concentration and the 1955 trench. The 1962 artefacts have a more scattered pattern, including some high-density squares.

Some observation can also be made by confronting the disposition of artefacts from two subsequent levels. Plotting both levels 10 and 9 tend to show no or little superposition between these levels, in the 1953 and 1954 trenches (fig. 9). Except in 6Е and 17Д, most high-density squares from level 10 or 9 do not coincide with more than a handful of artefacts from the other level. When the same comparison is done between levels 9 and 8 (fig. 10), the situation is quite similar in the 1953 trench, but not in the 1954 one. In this first case, it can specifically be noticed that the dispositions of artefacts interlock practically without superposition, the only clear exception being square 1И.

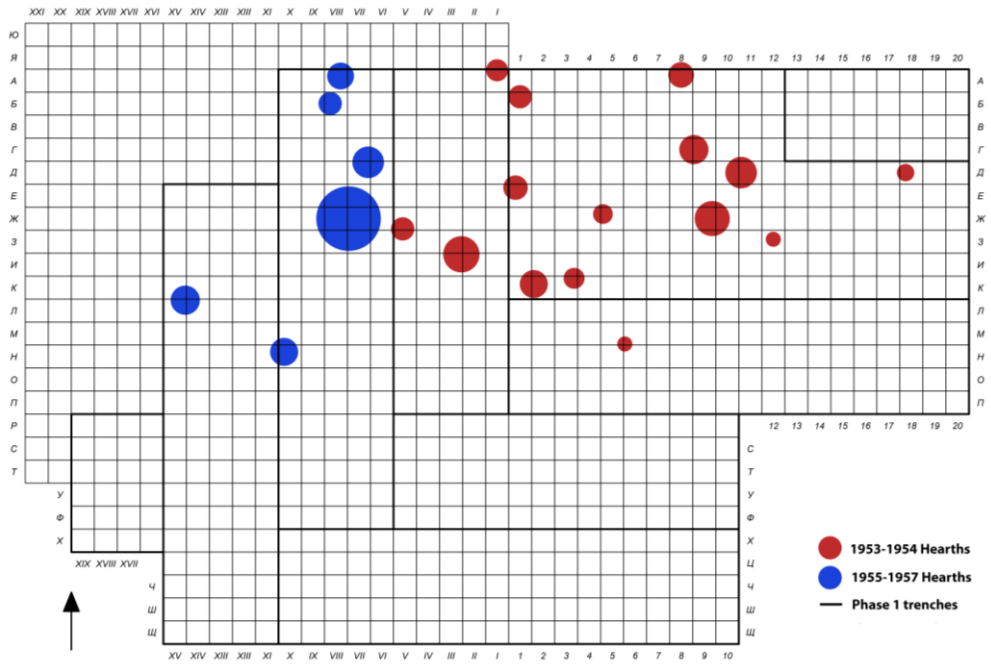

Fig. 16. Molodovo V. Level 6, 1953–1957 hearths, plan view
Рис. 16. Молодово V. Культурний шар 6, вогнище на ділянці розкопу 1953–1957 рр., план

Squares 4И and 11З give the same impression, but this is due to the categorisation of frequencies: in square 4И, there are 4 and 28 artefacts in levels 9 and 8 respectively, and in 11З, both levels have a quite limited amount of materials, with 6 and 5 artefacts in levels 9 and 8. On the contrary, artefacts from both levels clearly superpose in the north-west corner of the 1954 trench and the Л line.

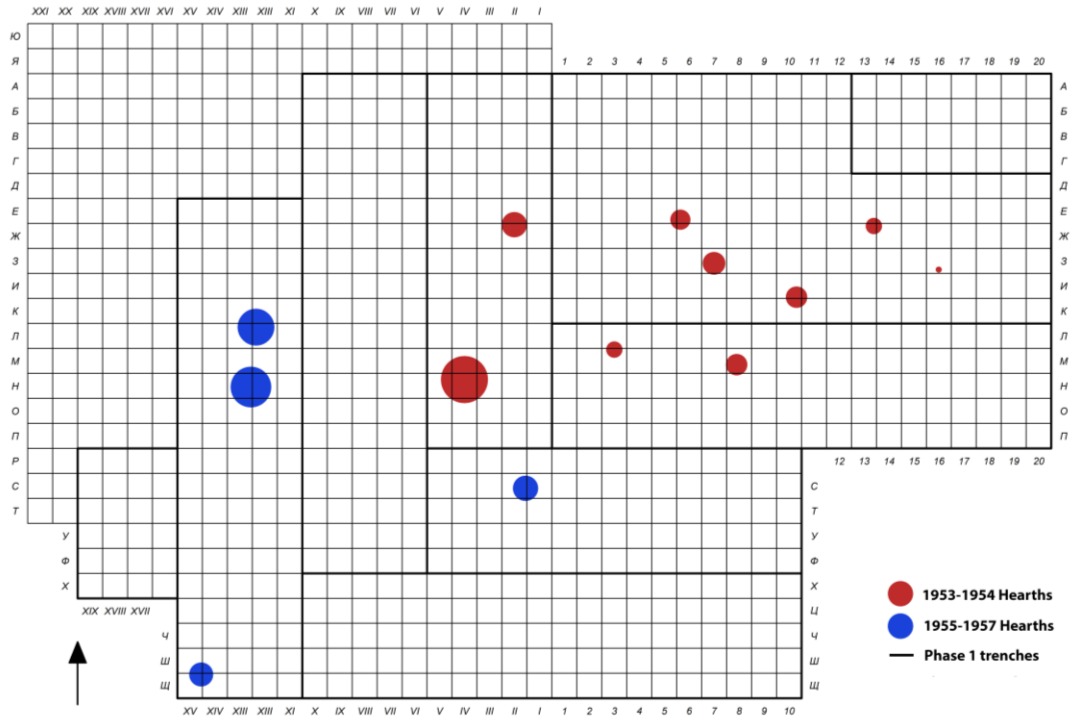

Fig. 17. Molodovo V. Level 5, 1953–1957 hearths, plan view
Рис. 17. Молодово V. Культурний шар 5, вогнище на ділянці розкопу 1953–1957 рр., план

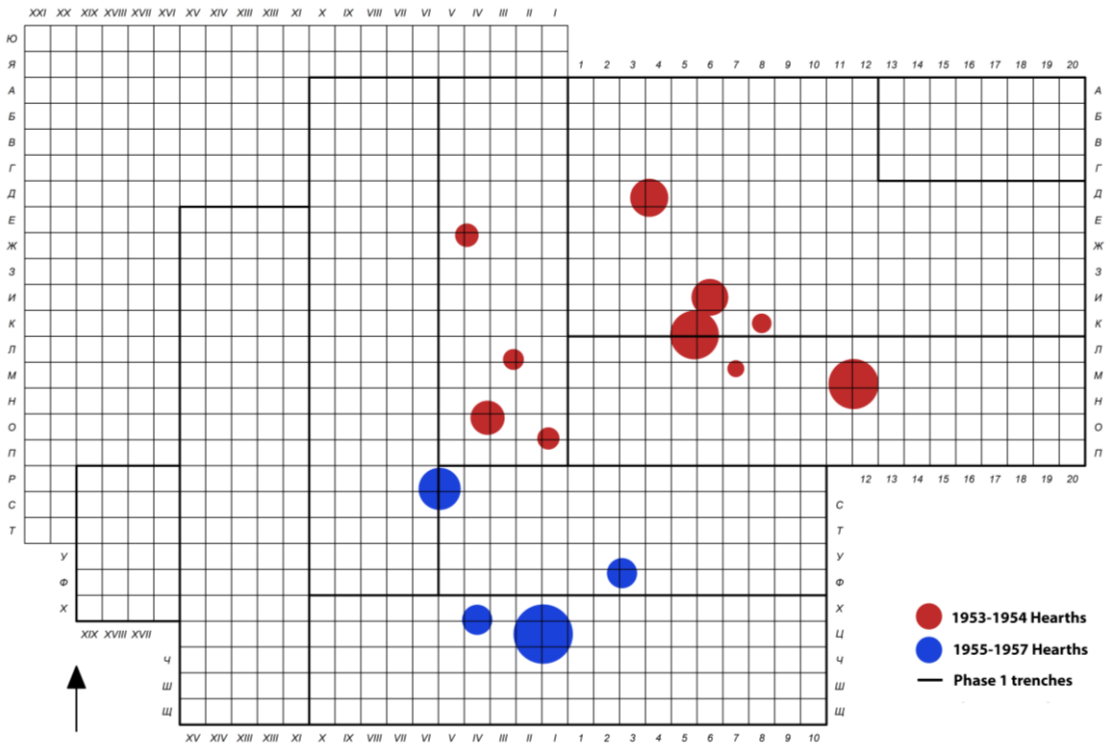

Fig. 18. Molodovo V. Level 4, 1953–1957 hearths, plan view
Рис. 18. Молодово V. Культурний шар 4, вогнище на ділянці розкопу 1953–1957 рр., план

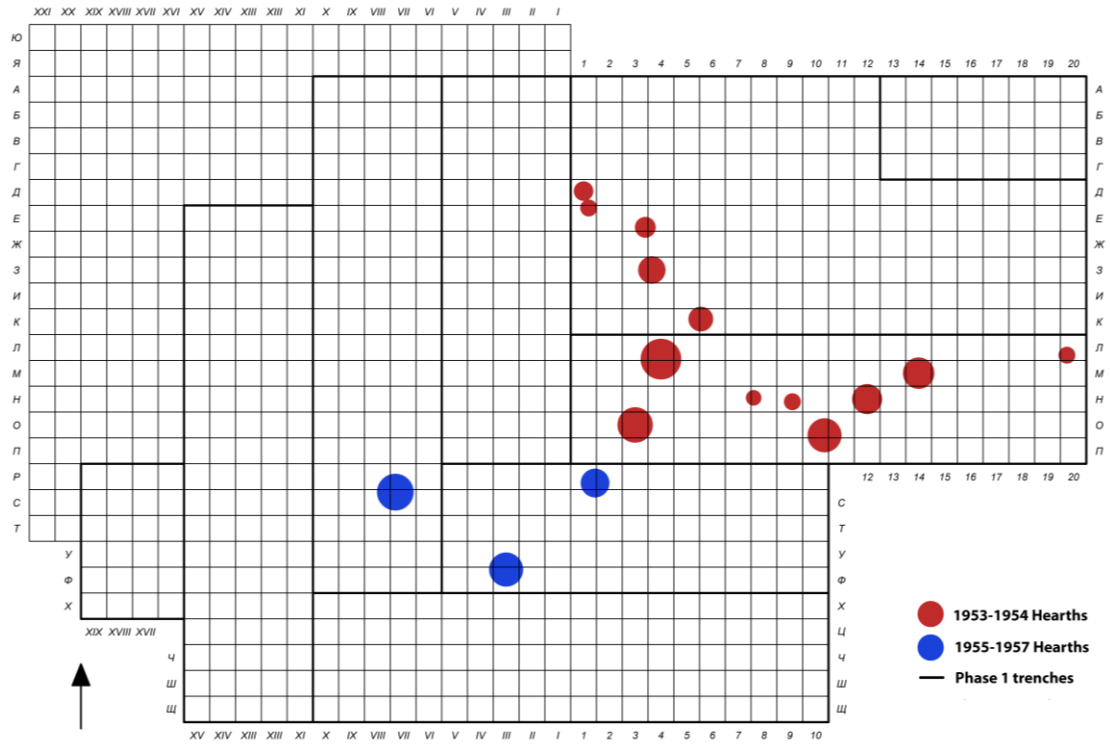

Fig. 19. Molodovo V. Level 3, 1953–1957 hearths, plan view
Рис. 19. Молодово V. Культурний шар 3, вогнище на ділянці розкопу 1953–1957 рр., план

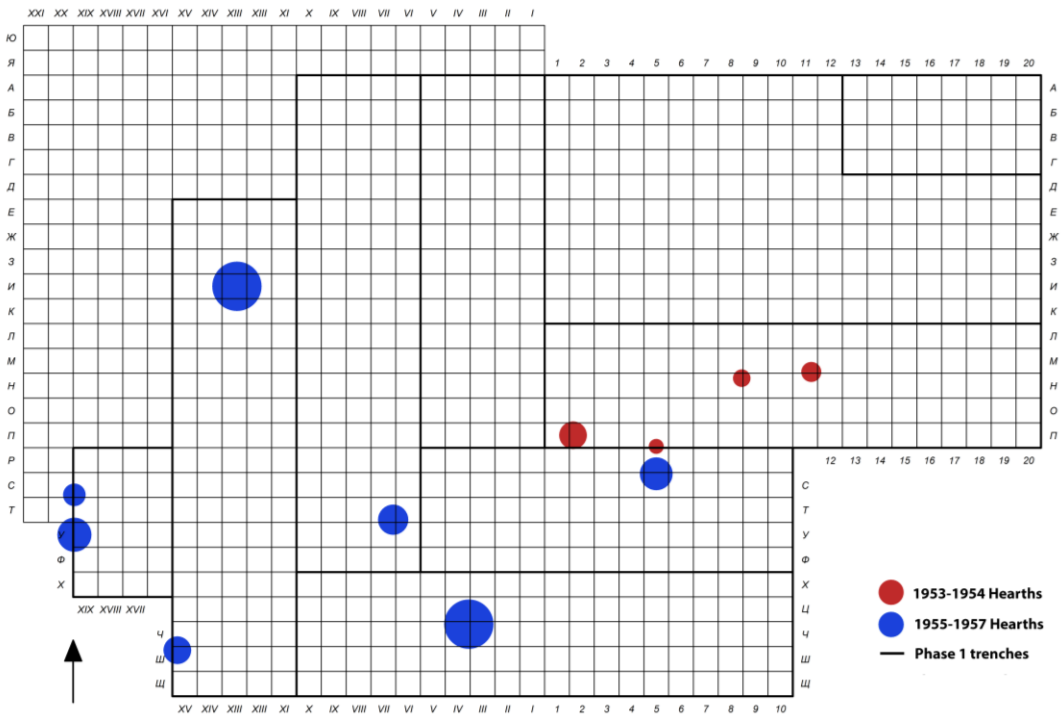

Fig. 20. Molodovo V. Level 2, 1953–1957 hearths, plan view
Рис. 20. Молодово V. Культурний шар 2, вогнище на ділянці розкопу 1953–1957 рр., план

Inter-levels refits

Refits of various types (e.g., breakage, sequence, frost, etc.) were found within and between the levels. However, it should be noted that these refits do not represent an exhaustive list. All trenches considered, a total of 16 intra-level refits were discovered in level 10, 16 intra-level refits were found in level 9 and 22 intra-level refits were found in level 8. However, these will not be detailed here, considering the orientation of the analysis and the lower interest they represent in this frame compared to inter-levels refits.

Five inter-levels refits were found between levels 10 and 9: one is the result from frost cracking and four are sequence refits. Among these are, e.g., the refit of a mesio-distal part of blade from level 9 on a core labelled as level 10 (fig. 11, n 4), or the refit of two cortical flakes (fig. 11, n 3). This last example is the only one showing differential taphonomy, as the flake from level 9 is patined, contrarily to the flake from level 10.

The spatial pattern drawn by these refits is hard to interpret due to the low number of connexions, but it does not seem particular, except by the multiple long-distance refits it includes (fig. 9). Furthermore, two refits involve 1953 and 1954 materials.

Concerning levels 9 and 8, six inter-levels refits were found: two are sequence refits, three result from breakage and one from shattering. For example, one of the sequence refits involves an overshot burin spall on its burin (fig. 11, n 2), and one of the breakage refits include two mesial parts of a blade (fig. 11, n 1). None of these refits present any taphonomic bias.

The spatial pattern is here significant despite the limited number of links (fig. 10), as four of these six refits include a piece from level 8 coming from the concentration of artefacts in the south-west corner of the 1953 trench. Two refits involve 1953 and 1954 materials. No refit was found between levels 10 and 8.

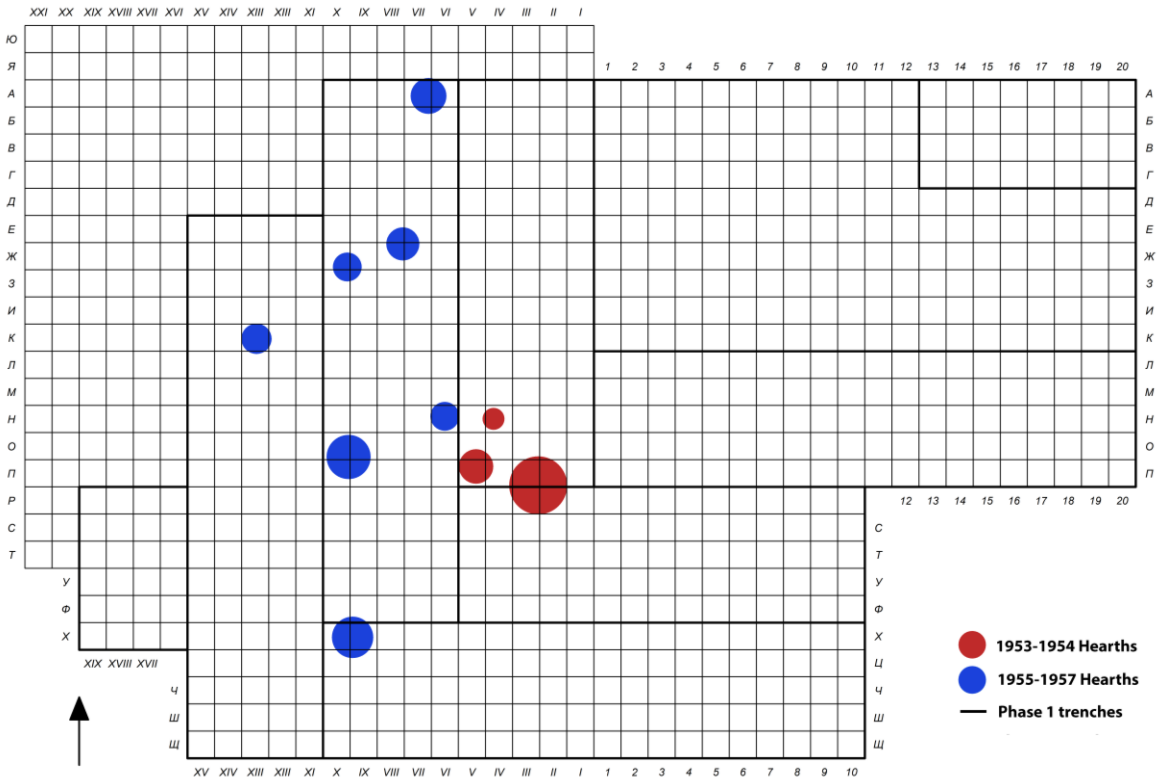

Fig. 21. Molodovo V. Level 1a, 1953–1957 hearths, plan view

Рис. 21. Молодово V. Культурний шар 1а, вогнище на ділянці розкопу 1953–1957 рр., план

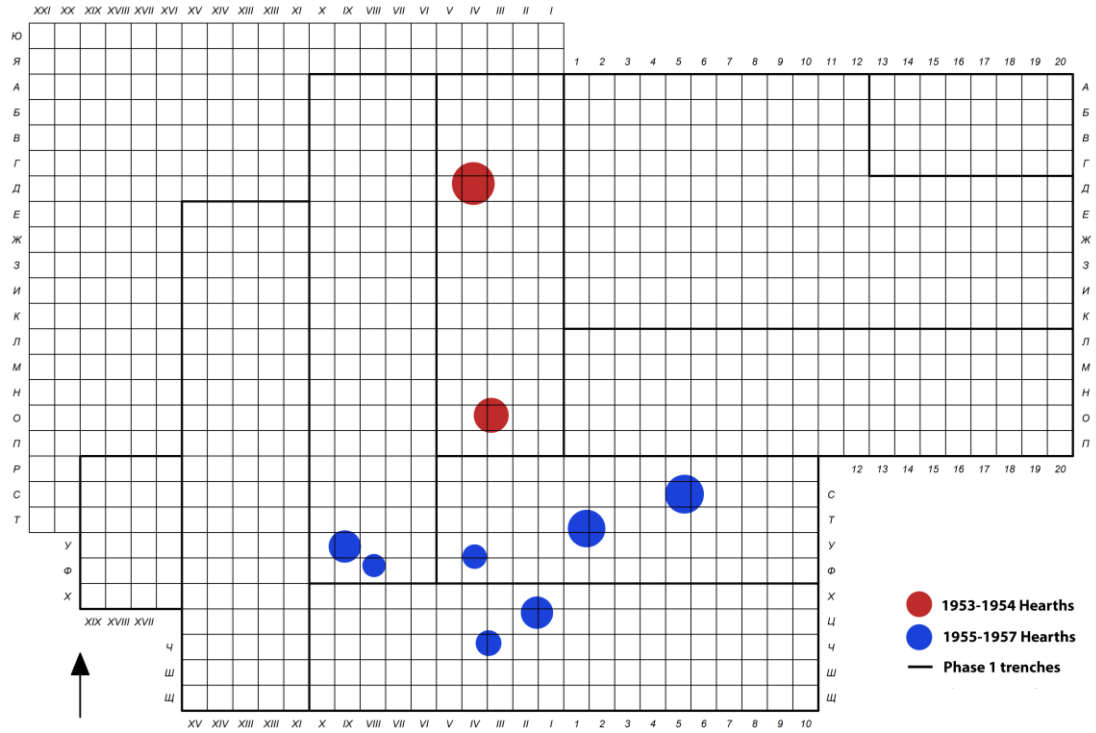

Fig. 22. Molodovo V. Level 1, 1953–1957 hearths, plan view
Рис. 22. Молодово V. Культурний шар 1, вогнище на ділянці розкопу 1953–1957 рр., план

Combustion features' position

The final set of analyses investigating the reliability of data from Molodovo V involves the plotting in plan and side view of hearths as positioned and reported by Chernysh (1961). For every level, hearths were separated in two sets, following their year of excavation: 1953–1954 and 1955–1957 (Table 4). The 1951 fire features were not plotted, as they were not originally labelled using the attribution system used from 1953. The two sets are distinguished between these years due to the peculiar plan pattern of frequencies of artefacts exposed above. Both sets were plotted in plan (figs. 12–22) and following a side view from the east (figs. 23–33) to check whether they follow the sediments slopes, as expected following the numerous descriptions from Ivanova and Chernysh (also see fig. 5). In addition to the fire features, a regression line was drawn for each set in side view, in order to better highlight the general inclination followed by hearths. Even though this line doesn't represent the real slope of the sediments in which the features were embedded, it is expected to reflect their approximate situation and/or the way they were attributed. Considering that this analyse investigates specifically years of excavation (and not levels), it was applied to all of levels 10 to 1, to test whether observations apply to the complete Upper Palaeolithic part of the sequence, and that the situation is not level-related.

Levels 10 to 3 (fig. 12–19, 23–30) reveal a quite identical situation. In most cases, the 1953–1954 materials tend to be positioned horizontally, or close. For that same set, in levels 10, 9 and 3, it can even be noticed that the regression line is oriented from the north towards the south, thus reverse to the expected slope. On the opposite, in levels 6 and 5, the 1953–1954 hearths are slightly sloped from south to north. For the same levels (level 9 excepted), the 1955–1957 hearths all follow a slope oriented from south to north, with various degrees. In the case of levels 6 and 5, the slope degree is higher in 1955–1957 than in 1953–1954.

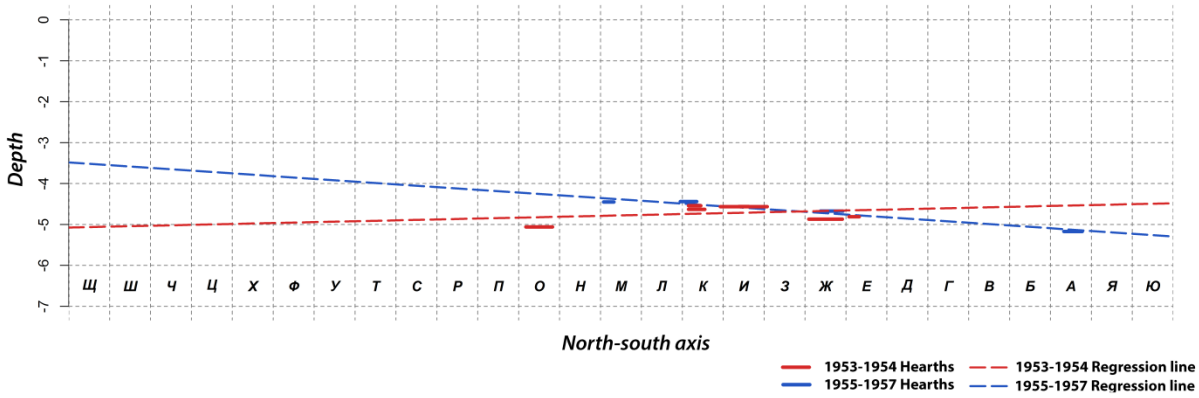

Fig. 23. Molodovo V. Level 10, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 23. Молодово V. Культурний шар 10, вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

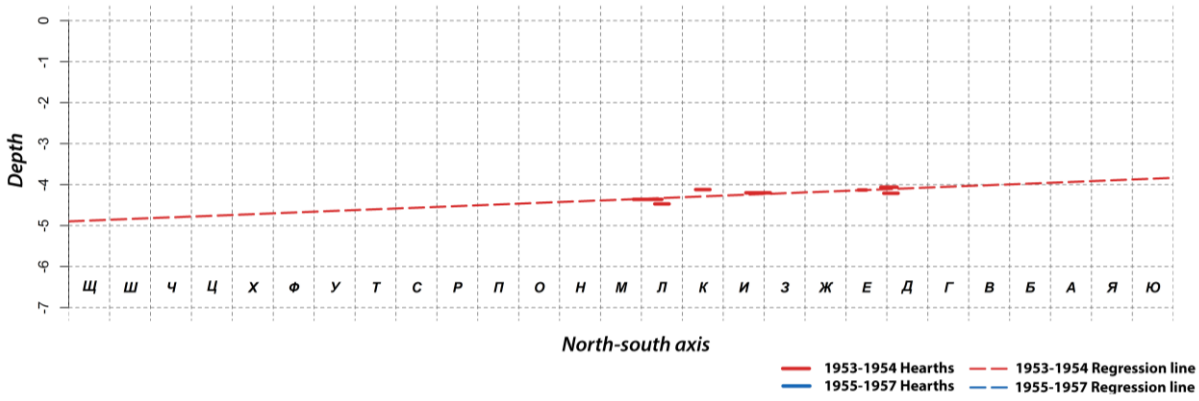

Fig. 24. Molodovo V. Level 9, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 24. Молодово V. Культурний шар 9, вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

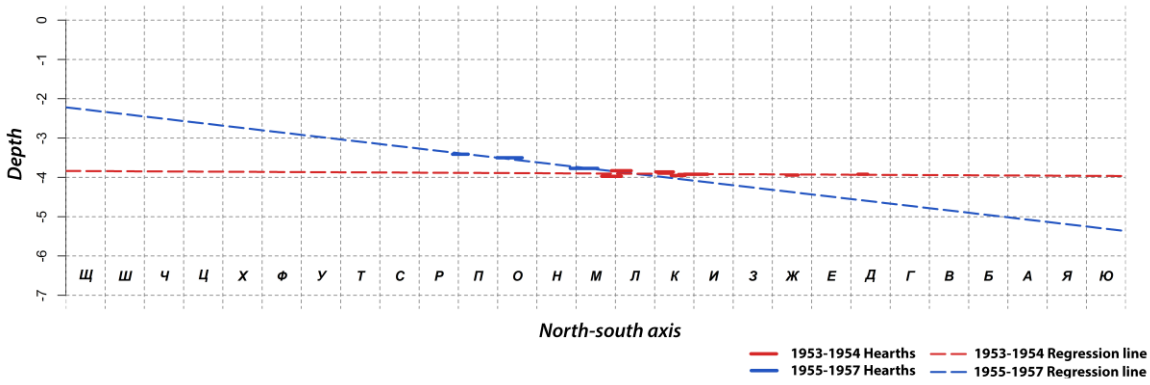

Fig. 25. Molodovo V. Level 8, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 25. Молодово V. Культурний шар 9, вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

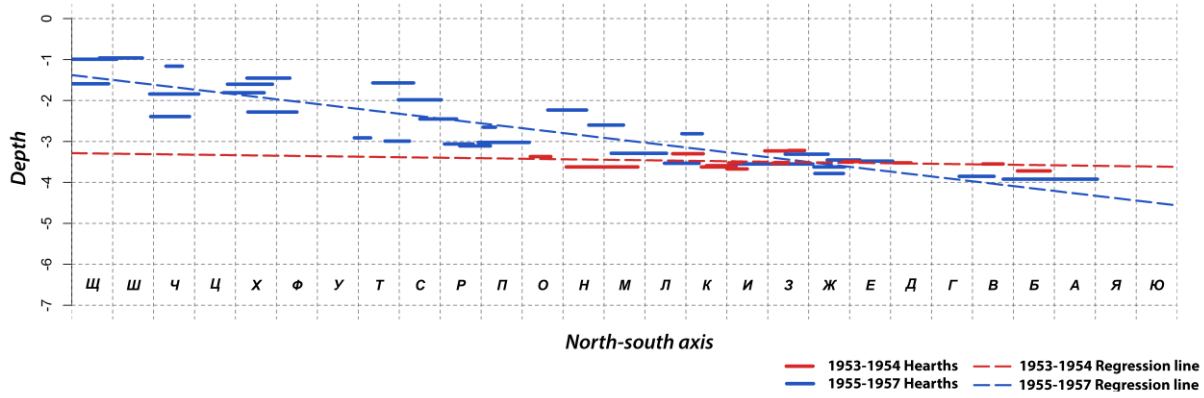

Fig. 26. Molodovo V. Level 7, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 26. Молодово V. Культурний шар 7, вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

Levels 2, 1a and 1 present a different arrangement (fig. 20–22, 31–33). In these three cases, both 1953–1954 and 1955–1957 sets follow a south to north slope, each time quite equivalent in the two sets.

Discussion

All three types of analyses show evidences against the integrity of the materials excavated in Molodovo V in levels 10, 9 and 8. The single fact that a majority of these materials were found during the 1953–1954 campaigns – 97.37 % for level 10, 96.36 % for level 9 and 77.5 % for level 8 (proportions based on studied sample, not on Chernysh's count) – is already unexpected, but not impossible. In the absence of any other evidence, this could have been explained, for example, by a differential preservation of levels depending on the position of materials in the site. However, the distribution of lithic and stone artefacts following their frequency per squares reveals a pattern likely to be related to excavation biases. Indeed, 'trenches effect' are clearly visible at several trenches' limits, in the three levels.

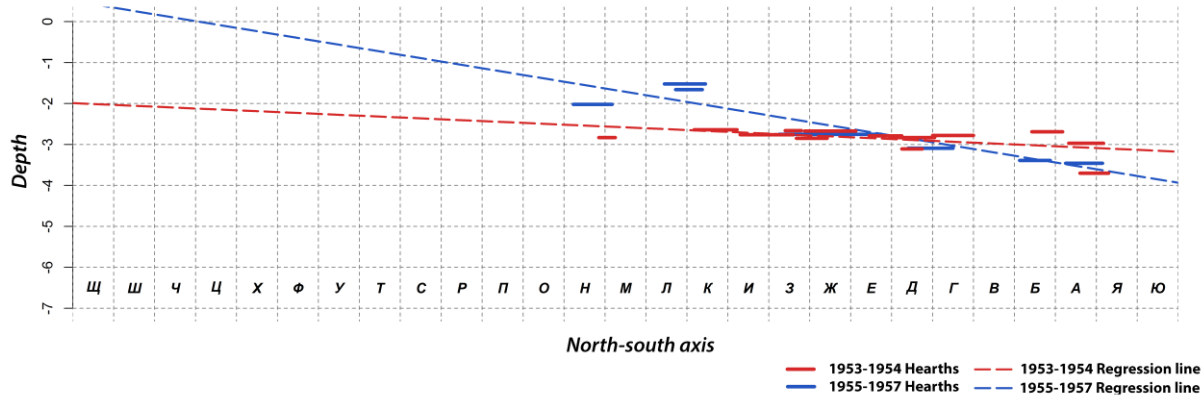

Fig. 27. Molodovo V. Level 6, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 27. Молодово V. Культурний шар 6 вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

The general picture displayed by level 10 is however the least compelling, contrarily to following levels 9 and 8. In addition to the questionable disposition of artefacts in space, these two levels appear to be relatively interlocking. In the southern part of the 1953 trench, materials were predominantly attributed to level 8, and pieces situated in a northern position were for the most part attributed to level 9.

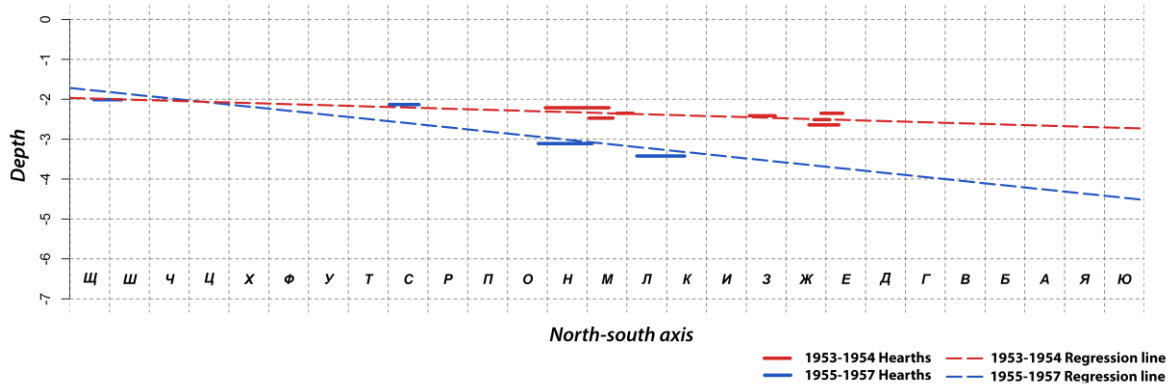

Fig. 28. Molodovo V. Level 5, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 28. Молодово V. Культурний шар 5. Вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

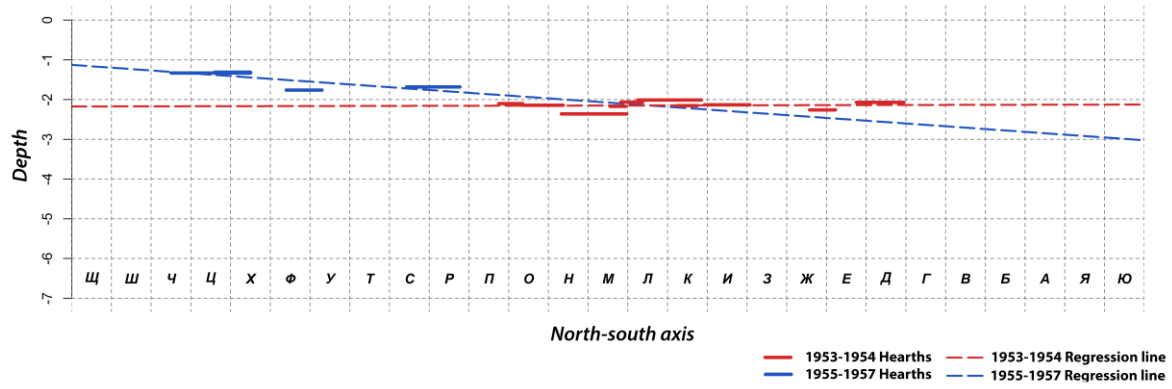

Fig. 29. Molodovo V. Level 4, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 29. Молодово V. Культурний шар 4. Вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

Considering that the surrounding sedimentary units follow a dominant slope towards the north, such a disposition suggests that these sloped materials probably have suffered from a quite horizontal excavation, and thus, from mis-labelling in comparison to the sedimentary stratigraphy. It also suggests that these two cultural levels were probably not as distinct from one another than claimed, despite their theoretical situation in two different SU.

Following the same hypothesis, the focus of inter-levels refits on that area is also consistent, even though the presence of inter-levels refits alone only highlights the presence of some mixing, whatever the cause – natural or archaeological mixing. However, only one of these refits shows a differential taphonomy, suggesting that it could be the result of a natural post-depositional process,

leaving the other refits in an indeterminate situation. If the refits between levels 10 and 9 are difficultly interpretable, refits between levels 9 and 8 tend to corroborate the archaeological bias hypothesis. From a general point of view, even though all the refits that were found do not form an exhaustive list, the fact that 16.92 % of them are inter-levels refits is compelling. Thus, considering that some of these connections would result from the applied field methodology cannot be underestimated.

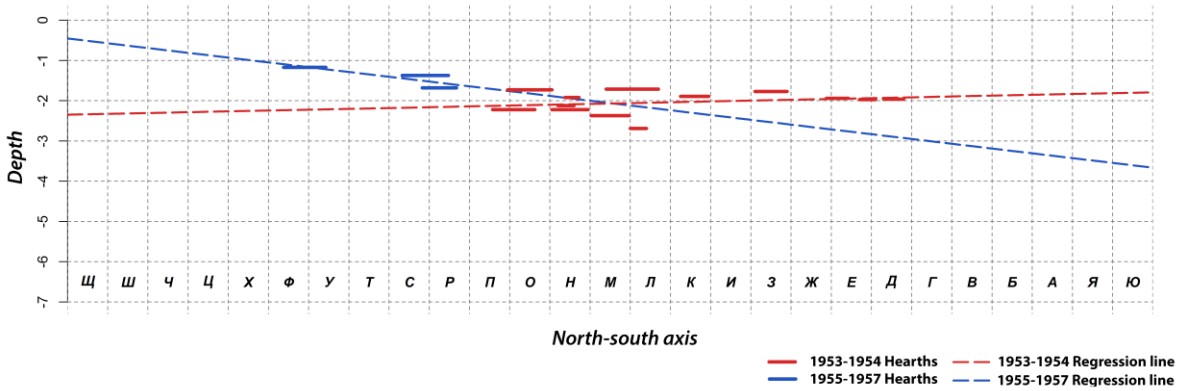

Fig. 30. Molodovo V. Level 3, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 30. Молодово V. Культурний шар 3. Вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

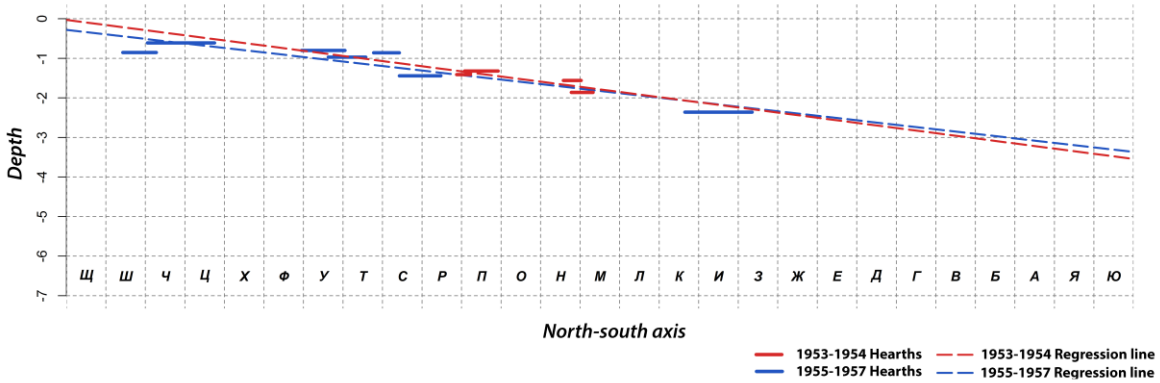

Fig. 31. Molodovo V. Level 2, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 31. Молодово V. Культурний шар 2. Вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

The third set of analyses confirms this observation. With the exception of levels 2 to 1, hearths discovered in 1955–1957 in levels 10 to 3 are all positioned following a slope towards the north, contrarily to combustion features from 1953–1954, mostly on a flat line, or even following a reversed slope. The different status of the three uppermost levels could probably result from their position closer to the modern surface, itself slopier than the archaeological sediments. Exception apart, this likewise suggest that hearths discovered in 1953–1954 were probably excavated in a relative horizontality and attributed to cultural levels without concern for the sediments' slope. Logically,

hearths and artefacts were similarly excavated and attributed to levels, strengthening the hypothesis that lithic artefacts from 1953–1954 were probably not excavated following the sediments' slope in which levels are embedded. Considering the general degree of the slope (approximatively 6°) and the extension of the two trenches (268 m² together), materials from 1953–1954, even though all attributed to specific cultural level theoretically well positioned into the sedimentary stratigraphy, seem to be the result of some mixing of materials coming from different SU.

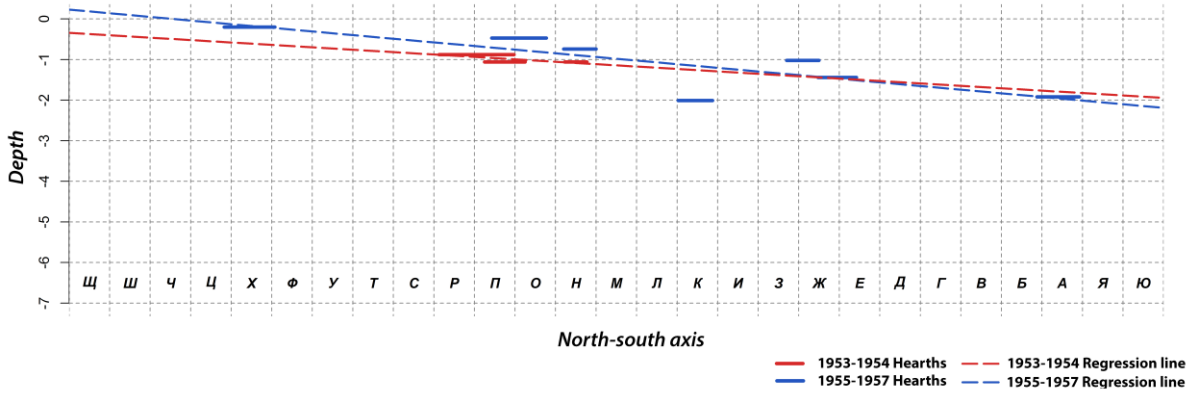

Fig. 32. Molodovo V. Level 1a, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 32. Молодово V. Культурний шар 1а. Вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

This evidence for some mis-attribution and mis-labelling of materials in Molodovo V is thought-provoking, considering the reliability of the site's context study by Ivanova and Chernysh. Most publications testify that the researchers had observed the sloped position of sediments, and therefore that archaeological features were not to be found in a strict horizontality. Concerning the 1953 campaign, Chernysh's fieldwork report to the USSR Academy of Sciences [Черныш, 1953] remains ambiguous on whether excavations were carried more or less horizontally. However, in 1954, Chernysh specifies that the modern surface's slope was steeper than the one of the sediments, thus suggesting he had noticed the obliqueness of sediments, at least by the end of that campaign. Furthermore, it is also mentioned that *«the horizons with cultural remains were not separated by sterile interlayers, since individual finds were found in the intermediate loam layers …»*[1] [Черныш, 1954, с. 2]. This last quote suggests that the cultural layers were not necessarily clearly distinct from one another, even though this is subject to interpretation. The final evidence on this question is the assured absence of Ivanova on the field before 1954. Indeed, the geologist was sent to work on the Dniestr area in 1954 [Ситник, 2015] and isn't credited to the site's study before that year [Черныш, 1987]. Her influence over the site's work and research is to be seen in the association of cultural levels to sedimentary units starting from 1955, and therefore to the critical reduction in the number of artefacts attributed to levels 10, 9 and 8 from that same year.

This conclusion about the archaeological mixing of materials excavated in 1953–1954 in Molodovo V can only be strictly applied to levels 10, 9 and 8. The general position of hearths suggest that the situation might be similar in the uppermost levels, but confirmation of such a situation can only come from further studies of the archaeological materials. However, Nuzhnyi's study (2003) of the layers 6 to 1 from Molodovo V reaches similar conclusions. Based on published fieldwork information (e.g., depth and position of cultural levels) and typo-technological review of toolsets,

[1] *«Горизонты с культурными остатками не отделялись стерильными прослойками, так как* […] *прослойках суглинков встречались отдельные находки»* (Author's translation).

Nuzhnyi highlights severe problems in the identification and labelling of epigravettian levels at Molodovo V. In a similar idea, more recent fieldwork carried out by Sytnyk et al. [Ситник, 2008] in the Middle Palaeolithic levels failed at clearly recovering the intermediary levels, less consistent, highlighting the subjectivity of these attributions.

Concerning radiocarbon dates, this new information does not impact their association to their respective SU, as all samples were collected after the problematic years 1953–1954. The attribution of dates to cultural layers was only carried out through their respective position within the sedimentary stratigraphy. In this case, only the relation between artefacts and sedimentary stratigraphy is called into question.

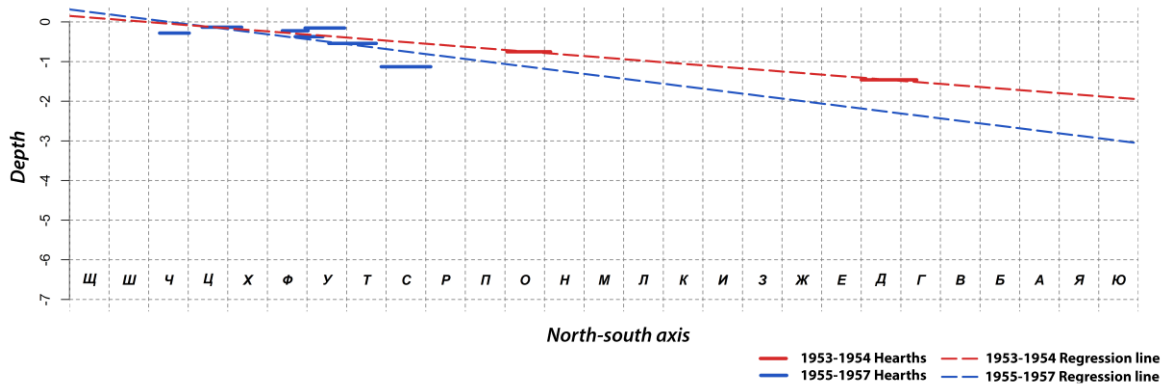

Fig. 33. Molodovo V. Level 1, 1953–1957 hearths and regression lines, side view (from the east)
Рис. 33. Молодово V. Культурний шар 1. Вогнище та лінії регресії на ділянці розкопу 1953–1957 рр., профіль (вид зі сходу)

As the 1953–1954 materials from levels 10, 9 and 8 appear to be unreliable, the number of reliable materials in these levels is massively reduced, as subsequent years of excavation only provided with a short number of stone and lithic objects (Table 1). Level 10 is particularly poor, with a total of 10 artefacts, while level 9 totalizes 32 pieces. Level 10's remaining materials are totally undiagnostic, and level 9 includes some complete blades, cores and retouched artefacts. Both levels can only be considered undefined Upper Palaeolithic, as they do not include any *fossile directeur* or significant artefacts. In level 8, materials can reliably be attributed to the Gravettian, notably based on the presence of backed elements; with 230 artefacts, it includes flakes, blades, blade cores and formal tools. The 1962 set specifically can be considered a reliable assemblage in good association to the sedimentary stratigraphy and radiocarbon dates.

Conclusion

In sum, the three analyses performed on the data from combustion features and lithic artefacts from levels 10, 9 and 8 of Molodovo V bring compelling evidence against the integrity of the 1953–1954 materials of these levels. Thus, these materials cannot be reliably related to the sedimentary stratigraphy and associated radiocarbon dates, as they appear to result from a mix from different sedimentary units. Earlier and later artefacts are thus indistinctly mixed. The remaining materials discovered in years 1955–1962, to be considered as reliably associated to their sedimentary context, are unfortunately in low number. If the remaining level 8 materials are still attributable to the Gravettian, the few artefacts from levels 10 and 9 can only be considered Upper Palaeolithic without further details. Even though these objects are not numerous, their position within SU 10 confirms a human presence at one or several moments between 32.000 and 28.000 uncal BP at Molodovo V. However, only further field investigations could confirm the position, chronology and cultural nature of materials at this period in the site. Despite the fact that most materials are mixed, further work on

the collection is still needed to clarify their cultural and technological nature. Previous works [Libois, 2020], focusing on levels 10 and 9, have already highlighted the lack of Aurignacian technological features and the strict Gravettian signature of the bladelet production, but these results remain preliminary and should be extended to the entire lithic production.

This reconsideration of the Molodovo V evidence impacts the chrono-cultural framework in the Dniestr and Prut valleys at the beginning of the mid-Upper Palaeolithic. For a long time seen as one of the first occurrences of the Gravettian in eastern Europe, the removal of this landmark pushes down the known emergence of the Gravettian in the middle Dniestr and Prut valleys to 27–26 ka uncal BP at the earliest, with the 'Gravettian I' layer of Mitoc-Malu Galben, and maybe the level 8 of Molodovo V. In the current state of research, a 'classic' succession model between the Aurignacian and the Gravettian is of appliance, and the regional cultural overlap situation previously noticed was for the least the result of biased data from Molodovo V. However, the general picture remains blurry, and most sites would benefit from further studies to refine the regional chrono-cultural framework.

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МОЛОДОВО V (УКРАЇНА): ПРОСТОРОВІ ТА КОНТЕКСТНІ ДОСЛІДЖЕННЯ ГРАВЕТСЬКИХ КУЛЬТУРНИХ ШАРІВ 10, 9 ТА 8

Тімоті ЛІБУА

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Молодово V – одна з головних стоянок доби середнього–верхнього палеоліту на території України. Від часу дослідження пам'ятки, що відбувалось у 1950–1960-х роках вона стала опорною для створення культурно-хронологічної періодизації палеолітичних стоянок долини Дністра та навколишніх територій. Ця стоянка також має важливе значення для дослідження проблеми появи граветських індустрій. Згідно з радіовуглецевим датуванням культурні шари 10 та 9 пам'ятки Молодово V мають вік близько 29–28 тис. р. ВР (некал.) і відтак фіксують появу найдавнішої граветської стоянки у досліджуваному регіоні та одної з найбільш ранніх у Європі загалом. Однак питання появи граветських пам'яток досить дискусійне, зокрема, у зв'язку з присутністю пізнього оріньяку серед матеріалів розташованої неподалік стоянки Міток Малу Гальбен (Румунія), що відсуває верхню межу існування оріньяцьких індустрій до 27.7 тис. р. ВР. На відміну від результативних і послідовних ґрунтознавчих та палеогеографічних студій стоянки Молодово V, масштабні розкопки не вплинули на рівень дослідження комплексу артефактів, хоча й дали змогу накопичити матеріали для створення типологічної класифікації. Мета цієї статті – уточненити взаємозв'язки між кам'яними артефактами, стратиграфією відкладів та датуванням. Для того, щоб з'ясувати умови, за яких були розкопані, визначені та інтерпретовані культурні шари 10, 9 та 8 проведено аналіз трьох типів: просторовий аналіз кам'яних артефактів, аналіз рельєфу, зосереджений на виявлені зв'язків між культурними шарами та просторові дослідження розташування решток верхньопалеолітичних вогнищ. У результаті з'ясовано, що більшість артефактів із культурних шарів 10, 9, а також більша частина матеріалів культурного шару 8, не мають надійної кореляції зі стратиграфічними горизонтами або датуванням. Так, відсутні переконливі докази наявності граветських матеріалів у культурних шарах стоянки, давніших за шар 8, що датований приблизно 27.000 та 25.000 р. ВР (некал.).

Ключові слова: верхній палеоліт, гравет, Україна, просторовий аналіз.