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THE RECORD OF CHANGES IN THE MIDDLE PALAEOLITHIC SETTLEMENT ZONE OF THE BIŚNIK CAVE

ABSTRACT: The Biśnik Cave, situated in the region of the Niegowonice-Smoleń Range in the middle part of the Kraków-Częstochowa Upland is an example of a cave site with preserved multi-level sequences of a Middle-Palaeolithic settlement. The complex structure of the Biśnik Cave currently consists of: the main chamber, a side chamber, a side shelter, the area under the overhang, at least three entrances and the presence of flint artefacts, hearths and animal bones of post-consumption character in almost all layers. The structure enabled the survey of changes in the location of the cave habitation during the Middle and Upper Pleistocene.

In the oldest layers 19abcd, 19 and 18 the clusters of artefacts and hearths in the main chamber were mostly located in its far end and near the fossil entrance E3. The subsequent layers underwent gradual changes in the location of traces of human habitation at the cave. In layers 15–14, the latter are present near the currently used entrance to the main chamber E1, which began to be used then and in the area under the overhang. During the deposition of layers 13 and 12, the area under the overhang and the passage from the side shelter to the side chamber were intensively used. At the same time the main chamber was uninhabited. Between layers 11–5 traces of habitation appear in the main chamber. Their size indicates intensive settlement in this part of the cave. The area under the overhang was also intensively used. Hearths and flint artefacts in this place were situated at a considerable distance from the entrance to the main chamber of the cave (E1).

It seems that the reason for varied location of hearths and campsites could have resulted from the altering morphology of the cave and the accompanying shelters, which in turn affected their availability resulting from different climatic processes.

KEY WORDS: Middle Palaeolithic – Settlement area – Biśnik Cave.

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INTRODUCTION

The study of spatial diversity of cave settlement has rarely been a subject of a separate publication. In central Europe there are cave sites with preserved primary planigraphic layout, the research of which has been subsequently published. They include above all: Kůlna Cave (Valoch 1988, 2011, Neruda 2011, Neruda, Nerudova 2014), Obłazowa Cave (Valde-Nowak *et al.* 2003) and Biśnik Cave (Cyrek 2002, Cyrek, Sudoł 2009, 2010, Cyrek *et al.* 2010, 2014, Cyrek, Grelowska 2012, Cyrek 2013). The three latter sites with multi-level Middle Palaeolithic sequences of settlement enable diverse possibilities of interpretation, which result from a detailed planigraphic analysis. The Biśnik Cave is a good example of this.

A complex structure of the Biśnik Cave (*Figure 1*), which currently consists of the main chamber, side chamber, side shelter and the area under the overhang, has at least three entrance holes (*Figure 2*). The presence of flint artefacts in almost all layers of the cave made it possible to investigate the changes in the location of its habitation during the Middle and Upper Pleistocene.

MATERIAL AND METHODS

Due to the complex morphology of the Biśnik Cave, it is very difficult to reconstruct mutual spatial relationships between different areas of the cave in a fixed period of time. At the present stage of our research the relationships can be only partially explained. Therefore, while interpreting Palaeolithic finds from the point of view of their link with particular phases of the cave habitation, the priority was given to the analysis of artefacts present in a given layer and found within the boundaries of particular parts of the cave system, preserved until this day (main chamber, side chamber, side shelter, area under the overhang). In this way artefact assemblages have been reconstructed, which would correspond to single phases of the habitation of separate cave fragments. They were subsequently compared with similar assemblages from the other sections of the cave. This method of research made it possible to distinguish subsequent phases of the cave habitation, taking into account the spatial aspect.

The most significant condition which enabled this kind of analysis was the systematic and consistent excavations over the period of 20 years, during which subsequent places were unearthed. As a result, the area of 280 square metres was unearthed (*Figures 3, 4*). It

bore traces of multi-phase Middle Palaeolithic settlement of diverse ranges (Cyrek 2002, 2013, Cyrek *et al.* 2014).

Another important factor was the interdisciplinary character of the research, which enabled the reconstruction of environmental conditions, in which particular layers underwent sedimentation, which in turn influenced the character and range of the settlement.

A necessary requirement to consider the range of the cave habitation in particular periods is the microstratigraphic analysis, carried out within the boundaries of particular layers. It involved working out the frequency of occurrence of finds in particular surveyed levels, with precise levelling of each artefact. This made it possible to distinguish the levels of their occurrence within natural layers (Cyrek 2013, Cyrek et al. 2014). The number of the artefacts and the depth of their occurrence in particular layers were diverse. Artefacts were deposited in zones (levels) from several to several dozen centimetres deep. On the basis of a threedimensional location of each artefact (with 1cm precision), between one and three levels of the artefacts' occurrence have been distinguished within the boundaries of particular sedimentation layers, separated by levels free of Palaeolithic finds.

Simultaneously, the analysis of the state of the preservation of artefacts has been conducted, which aimed at the comparison of patina, degree of edge smoothing and surface polishing. The features were yet another set of criteria, on the basis of which artefacts were included in cultural assemblages. However, aside from spatial analysis and stratigraphic data, the major criterion was the mutual technological and typological similarity of artefacts.

On the basis of the above features, separate levels (horizons) of artefact occurrence have been interpreted as the remains of subsequent phases of the cave habitation (Figure 5; Cyrek 2013, Cyrek et al. 2014). In some cases, the levels containing artefacts could have been formed as a result of the overlap of subsequent cave habitation incidents, which occurred shortly one after the other. Sometimes, however, artefacts were evenly distributed at the depth of the whole natural layer. In such cases, we most probably deal with the remains of a multiple cave habitation which occurred at some intervals, simultaneously with the formed layer. A vertical location of artefacts within a natural layer is usually connected with the pace of sedimentation. The faster the pace, i.e. the faster the artefacts are covered by the next layer of cave clay, sand or loess after being left on the surface of the sediment, the greater the probability

The record of changes in the Middle Palaeolithic Settlement zone of the Biśnik Cave



FIGURE 1. Biśnik Cave. General view of the Biśnik Rock and its location on the map of Poland (after Cyrek at al. 2014, fig. 1).



FIGURE 2. Map and division of the cave (after Cyrek *et al.* 2014, fig. 2): a, area outside the grid system established over the site; b, area of the sediments in the grid system established over the site; c, contemporary entrance openings; d, fossil entrance openings.

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FIGURE 3. Biśnik Cave. General view of the main chamber (photo M. Sudoł).





FIGURE 5. Chrono-stratigraphy of Palaeolithic assemblages from Biśnik Cave (after Krajcarz, Madeyska 2012, modified).

FIGURE 4. Biśnik Cave. General view of the side chamber (photo Ł. Czyżewski).

that we deal with a thin cultural level, well-isolated from a possible subsequent (younger) phase of habitation. On the other hand, if the pace of sedimentation is slow enough to allow the sediments to be covered by the remains of the last phase of habitation before the next one occurs, then we deal with a mixture of remains of two or more phases of habitation. A situation like this hinders the distinguishing of subsequent levels of the cave habitation, whose remains might be the assemblages of stone artefacts (cultural assemblages). Under such circumstances, we deal with a stone assemblage, which was formed as a result of mixing several other assemblages. However, we should bear in mind another possible reason for such a great thickness of artefact level. It could be caused by post-deposition natural processes, as a result of which artefacts were dispersed within and across the layers' boundaries. That is why the multi-faceted assessment of artefacts from the point of view of their primary and possibly secondary deposition, which would ultimately decide about their allocation to separate cultural assemblages, is of utmost importance.

ARCHAEOLOGICAL REMAINS

A composite spatial analysis of finds from all cultural levels clearly indicates that not the whole area of the cave was inhabited, obviously with reference to the sections that have been unearthed during the excavations and are currently accessible to man. The cave has not been entirely explored. The unexplored fragments are situated further from the entrance holes, on the side of the valley and therefore might not have been intensively inhabited. We cannot rule out the possibility that there were other entrance holes with the remains of human settlement nearby, which are currently covered by sediment (Figure 2). At present there are two accessible entrance holes. The first one (E1 - entrance to the main chamber) was unearthed during the first excavation seasons, whereas the second (E2) was probably never filled with sediment. During the exploration of the lower sections of the alluvium, two other holes were partially uncovered, which were called fossil passages (E3 and E4). The entrances functioned (i.e. were open) in the Middle Pleistocene (OIS 8 - OIS 6), during the sedimentation of



FIGURE 6. Biśnik Cave. Cross section analysis of subsequent phases of habitation within layer 15 (after Cyrek 2013, fig. 21).

layers 19bcd, 19a, 19, 18 and 15 at the cave (Cyrek 2013, Cyrek *et al.* 2014).

Filling entrances with alluvium occurred during the sedimentation of layer 15 (younger part of OIS 6). It is proved by a different dispersion of artefacts in the lower and upper level of layer 15 (*Figures 6–10*). The location of artefacts from the upper level is connected with the current entrance hole to the main chamber (E1). On the other hand, artefacts from the lower level are, in terms of their location, connected with the lower fossil entrance (E3). This proves the fact that in the older phase of the



FIGURE 7. Biśnik Cave. Spatial analysis of flint artefacts in layer 15 (drawing by Ł. Czyżewski). Key: a, area outside the grid system established over the site; b, area of the layer in the grid system established over the site; c, contemporary entrance openings (concerns Figures 7–10, 14–18); d, fossil entrance openings (concerns Figures 7–13); e, hearths and treading places with charcoal; 1, cores; 2, tools; 3, preforms; 4, other artefacts; 5, selected bones.

formation of layer 15, in the older level of its habitation, which corresponds to the older level of the cave habitation (assemblage A4a), the bottom entrance hole was still in use. In the younger phase of the sedimentation of layer 15 (assemblages A4b and c), the bottom entrance hole was filled with sediment to such an extent that the role of the entrance was taken over by the upper hole, whose threshold (lower edge) is situated at the level, comparable with the top of layer 15. It indicates that during the younger phase of the cave habitation, the hole E1 was already in use within the boundaries of layer 15.

What was the situation like in the case of other layers, in subsequent levels of the cave habitation?

As a result of partial re-deposition of sediment and artefacts, layer 19 bcd is not a reliable level to carry out a credible planigraphic analysis (Krajcarz, Cyrek 2011).



FIGURE 8. Biśnik Cave. Spatial analysis of flint artefacts in layer 15, level [-485] – [-385] (drawing by Ł. Czyżewski). Key: see Figure 7.

The main remains probably the least affected by postdeposition relocation are hearths, whose location is connected with the fossil entrance E3 (Cyrek 2013, Cyrek *et al.* 2014).

Artefacts found in layer 19a seem to have been lying on a primary deposit (*Figure 11*). Both artefacts and hearths are in terms of their location connected with entrance hole E3.

In the case of layer 19, the composite planigraphy of all artefacts from the layer implies their spatial relationship with the hole W1, which at that time was situated 200 cm above the top of layer 19 (*Figure 12*). On the other hand, the planigraphic analysis of each separate level of the artefact occurrence presents slightly different spatial relationships between the finds and entrance holes (Cyrek 2013, Cyrek *et al.* 2014). And thus, in the lowest level the cluster of flint artefacts and the hearth (C1) are situated directly below the entrance hole (E1) in its close vicinity. This situation enables two interpretations (to the discussion):

E1 was used as a chimney/ventilation hole for a hearth below, and hole E4 was used for entering, hole E1 was used for entering with the use of ladders or ropes. It should be added that a definite majority of postconsumption bone fragments were situated at the far end of the cave.

A small cluster of artefacts (C1), in which almost half of them are retouched tools (knives and denticulate forms), found around the hearth indicates that we deal with a short-lived hunting campsite. This function seems



FIGURE 9. Biśnik Cave. Spatial analysis of flint artefacts in layer 15, level [-360] – [-260] (drawing by Ł. Czyżewski). Key: see Figure 7.



FIGURE 10. Biśnik Cave. Spatial analysis of flint artefacts in layer 15, level [-225] – [-195] (drawing by Ł. Czyżewski). Key: see Figure 7.

to be confirmed by traseological research (Cyrek 2013, Cyrek *et al.* 2014).

In the middle phase of the cave habitation, within the boundaries of layer 19, flint artefacts occurred in the layout with no flint knapping area, and they clearly gathered opposite E3 (Cyrek 2013, Cyrek *et al.* 2014). Also in the next (youngest) phase of the cave habitation, the location of artefacts was linked with E3, which is indicated by their presence, e.g. under a rocky recess, situated underneath the threshold of hole E1, 1 m towards the valley. Thus, it seems that it was the entrance hole E3 with NW exposition towards the valley that was in use by the cave inhabitants during the subsequent phases of the cave habitation, which occurred during the sedimentation of layer 19 (younger part of OIS 7).

In the bottom level of layer 18 (OIS 6), the location of artefacts was similar to the dispersion of younger levels from layer 19 with the cluster in the central part of the main chamber, in the vicinity of three hearths and numerous animal bones (Figure 13) (Cyrek 2013, Cyrek et al. 2014). The location of some flint artefacts is linked with entrance hole E3. Some other artefacts were situated outside the main chamber, under the overhang, in the vicinity of entrance E1, which was then located between 150 and 170 cm above the habitation level. At some distance, in the southern part of the main chamber there were a few scattered artefacts. The presence of several artefacts in the western fragment of the chamber implies that this location may have resulted from the vicinity of the previously mentioned hole E3, with north-west exposition. Although it is now filled with sediment, it



FIGURE 11. Biśnik Cave. Spatial analysis of flint artefacts in layer 19a (drawing by Ł. Czyżewski). Key: see Figure 7.



FIGURE 12. Biśnik Cave. Spatial analysis of flint artefacts in layer 19 (drawing by Ł. Czyżewski). Key: see Figure 7.

may have been in use at that time. On the other hand, the location of three hearths along the western wall, directly under hole E1, which is currently the main entrance to the cave, indicates that it was used as a chimney or ventilation hole (as it was the case in layer 19). The presence of four hearths on a relatively small area (c.a. 6 square metres), with artefacts occurring at a layer 30 cm thick, may indicate several short-lived habitation incidents at the cave. There are some suggestions concerning the activities performed by the cave dwellers, which are provided by the results of traseological and taphonomic analyses. They prove wood and antler processing (Cyrek et al. 2014), as well as boning of cave bear carcass (Cyrek 2013). Wood processing is connected with the presence of a Levallois flake, with traces of usage which prove that it was an element of a composite tool (Cyrek, Cyrek, 2009). The activities were performed inside the cave chamber, which is indicated by the location of tools with appropriate micro-traces of usage and wastes formed during the repair of knives (Cyrek, 2013). In the vicinity of the entrance hole, the reduction of cores took place. The role of two charcoal clusters is puzzling. They were situated under the overhang, 5–6 m from the entrance hole. The lack of bones and flint artefacts may indicate their natural character, or a special function they performed, e.g. driving away wild animals.

As it has already been mentioned, starting with the cultural levels unearthed in the upper sections of layer 15 (OIS 6) the main entrance to the main chamber was entrance hole E1 (Cyrek 2013, Cyrek *et al.* 2014). The life of cave dwellers centred in its vicinity, which is



FIGURE 13. Biśnik Cave. Spatial analysis of flint artefacts in layer 18 (drawing by Ł. Czyżewski). Key: see Figure 7.



FIGURE 14. Biśnik Cave. Spatial analysis of flint artefacts in layer 14 (drawing by Ł. Czyżewski). Key: see Figure 7.

proved by artefact clusters and hearths. All three levels of habitation unearthed in the next layer 14 (Figure 14) occurred in the close spatial relationship with E1, either within the chamber (two older levels), or outside under the overhang (younger level). In layer 14 (OIS 5e) a new settlement phenomenon has been recorded, i.e. the side chamber was inhabited for the first time, which is proved by the presence of over a dozen flint artefacts and several dozen bones in this part of the cave. The lack of a hearth may signify a short-lived, temporary presence of people on the site. There is a noticeable change of location of campsites in the older, middle and the younger phase of the cave habitation (preserved in layer 14). In the older phases the main chamber was occupied, whereas in the younger one the campsites were situated under the overhang, i.e. in front of the entrance to the main chamber. It is a significant change of an habitation site, additionally supported by the presence of three hearths in the younger phase. In the middle phase only one hearth was recorded (at the far end of the chamber), and no hearth was found in the oldest phase. The above differences indicate a functional diversity of campsites, set up in particular places. Obviously this suggestion needs to be re-assessed by means of a traseological analysis, which has not yet been completed. However, the planigraphic difference of particular clusters and the definite composition of the assemblages they consist of, makes it possible to put forward suggestions concerning their functional character. They look as follows:

- cluster C1 consists of campsite remains, where hunted animal carcass was processed and the tools designed for this activity were mended;
- cluster C2 is a place of preparation and reduction of cores as well as the formation of the obtained semiproduct and tools;
- cluster C3 is a trace of campsite activities with the use of denticulate-notched tools;
- cluster C4 is a place of storing cores with a different degree of exploitation.

Flint artefacts in layer 13 (OIS 5d) (*Figure 15*) occurred in the area of the whole cave (like in layer 14), especially in the vicinity of both entrances (E1 and E2) (Cyrek *et al.* 2014). This layer in the side shelter contained scattered charcoals opposite the entrance (E2), next to the rock wall, which may have been brought here secondarily. The most intensively used area was the section in the vicinity of the cave entrances, particularly at the end of accumulation of layer 13 in the side shelter. Between layers 12 and 13 near the entrance to the side shelter (E2) several clusters of charcoal have been unearthed at a large number of levels, which are the most

probably the remains of one large hearth. Cave clay found between charcoal clusters was heavily saturated with coal dust. In the vicinity, there were overheated stones, flatly arranged. Strong overheating of the sediment of the previously mentioned stone constructions, as well as the neighbouring limestone walls prove that a fire was burned in this place for a relatively long period of time. Some bones and flint artefacts found within the boundaries or in the close vicinity of the hearth were also overheated. In the microstratigraphy of the hearth at least two layers can be distinguished, which proves that there were at least two phases of fire burning on the site. The location of the largest cave hearth in the wide and high entrance hole of the side shelter enabled the heating of this section of the cave and at the same time ensured good ventilation.



FIGURE 15. Biśnik Cave. Spatial analysis of flint artefacts in layers 13–12 (drawing by Ł. Czyżewski). Key: see Figure 7.

In clusters of layer 13 three situations occurred: 1. tools prevailed over semi-product, 2. there was an equal number of tools and semi-product, 3. there were only tools (*Figure 15*). The latter situation took place around the hearth at overhang in front of the entrance (E1) and at the far end of the side chamber. These were mainly denticulate-notched tools and side-scrapers. Interestingly, out of 10 side-scrapers present in all clusters, 7 were found in the vicinity of the hearth. All this points to a dwelling character of the campsites set up in the described level, and connected with a hunting activity of the Neanderthals around the cave.

Artefacts from layers from 9 to 11 (OIS 5abc) (*Figure 16*) were mainly concentrated in two sections of the cave: the northern (overhang and main chamber) and the south-eastern one (shelter and side chamber) (Cyrek

et al. 2014). In the main chamber flint artefacts are quite evenly distributed along the axis NW-SE. Against this background, a cluster of artefacts opposite the cave entrance (E1) clearly stands out. It is accompanied by small clusters of charcoal. Moreover, a cluster of artefacts recorded in the SE inner section of the cave indicated the connection of this part of the main chamber with the side chamber, which seems to be proved by a planigraphic analysis of early-Vistulian levels, recorded in the side chamber. It is worth emphasising that in the inner sections of the cave only single flint artefacts have been recorded in the area of the side chamber and in SE part of the main chamber. The site area that was in use, connected with the early-Vistulian layers resembles a situation from the previously described Eemian levels. In this case, however, hearths were mainly situated in



FIGURE 16. Biśnik Cave. Spatial analysis of flint artefacts in layers 11–9 (drawing by Ł. Czyżewski). Key: see Figure 7.



FIGURE 17. Biśnik Cave. Spatial analysis of flint artefacts in layer 7 (drawing by Ł. Czyżewski). Key: see Figure 7.

front of the entrance (E1) to the main chamber (under the overhang). This similarity in the spatial exploitation of the cave may be connected with similar climatic conditions during the cave use in the last two phases (last Interglacial period and interstadial of the early Vistulian period). It is proved by a similar structure of fauna, the presence of spruce, larch and pine tree in the hearths, as well as the similarity of flint assemblages.

A clear difference in the location of settlement occurred at the bottom level of laminated sands (layer 7), (OIS 4) dating when the main chamber was intensively used, mainly at the entrance (Figure 17). At the far end of the chamber, under the overhang, in the shelter and side chamber there were only single artefacts (Cyrek et al. 2014). The sedimentation of layer 7 is linked with a high water level in the valley, at the bottom of the cave, when the sands were brought to the site by water (Cyrek, Sudoł 2009, 2010). This caused the washing away of the top section of the older cave sediments (layer 8). This incident may have caused the collapse of the walls of the first chamber, situated here on the side of the valley. Its place was occupied by an open area under the overhang and the cave receded. Inside the chamber, near the entrance (E1) and right in front of it, hearths were burned. This was also a place of flint and deer antler processing. Inside the chamber, in one of the side niches there was a storage place of carcass fragments.

This "new" area unearthed in front of entrance E1, under the overhang was intensively used in the next, youngest phase of the Middle Palaeolithic habitation of the cave (layers 4-6, assemblage F) (OIS 3) dating (Cyrek *et al.* 2014). At the site of an intensive campsite activity, in front of the cave chamber (*Figure 18*) there was a stone-bone construction in the form of a windshelter, which shielded the entrance to the chamber. It contained a large number of bone and flint artefacts, as well as traces of fire burning. The feature was probably built in order to extend the dwelling area and protect the inner sections of the cave and the entrance area against the wind (Cyrek, Sudoł 2009, 2010).

DISCUSSION

Analysing particular levels of the cave habitation, we can infer a great role of changes in the accessibility of separate cave sections played for the cave's spatial arrangement (Cyrek *et al.* 2014). It is worth noticing that hearths, which were a constant element of the subsequent phases of the cave habitation, i.e. particular campsites,

were usually located near the cave entrance (*Figure 19*) (Cyrek, Grelowska 2012).

In the oldest layers 19abcd, 19 and 18 clusters of artefacts and hearths in the main chamber were mainly situated in its far end and near the entrance E3. In the subsequent layers we can observe gradual changes in the location of human traces in the cave. In layers 15–14, they are present near today's entrance hole to the main chamber E1, which began to be used at that time, and in the area under the overhang. The period of deposition of layers 13 and 12 was the time of intensive use of the area under the overhang and the passage from the side shelter to the side chamber. The main chamber has no traces of habitation from that period. Between layers 11 and 5 traces reappear in the main chamber. Their size proves



FIGURE 18. Biśnik Cave. Spatial analysis of flint artefacts in layers 6–4 and structure of a wind-shelter (drawing by Ł. Czyżewski). Key: see Figure 7.



FIGURE 19. Scheme of the location of hearths in the main chamber in relation to entrance holes; stratigraphy of the cave. 1, hearths; 2, treading layers with charcoal; 3, entrances; 4, overhang range (drawing by M. Sudoł).

intensive settlement in this part of the cave. The area under the overhang was also intensively used. Hearths and flint artefacts were situated even at a large distance from the entrance to the main chamber of the cave (E1).

It seems that the reason for different location of hearths and usage places could be attributed to the changing morphology of the cave and the accompanying shelters. This could have been caused by different processes connected with climatic changes (Cyrek, Grelowska 2012). Another important cause of a campsite location within the cave was its economic function. However, proving this assumption requires an archaeozoological and traseological analyses, which have not yet been completed (Cyrek 2013, Cyrek *et al.* 2014).

CONCLUSIONS

The presence of hearths and traces of intensive usage in layers from warm and cold periods indicates that the cave was inhabited by human in different climatic conditions. It may also prove that the location of the site was favourable, and the cave itself presented conducive conditions for human habitation in different phases of the Pleistocene. Clusters of artefacts in all settlement levels may be on the whole connected with the neighbouring hearths in particular sections of the site. Statistically, a vast majority of clusters of charcoal and artefacts was located in the main chamber. The second most frequent place of setting up hearths was the side shelter, followed by the area under the overhang. The smallest number of clusters was found in the side chamber. On the basis of the data we can deduce that the main chamber as the furthest and most intensively used area of the cave, required to be lit and heated properly. Flint artefacts and bones which occurred in the vicinity of the hearths prove that different activities were performed near the fire. It can also be mentioned that the location of the usage areas was dependent on cave entrances, differently situated, which functioned in the period between OIS 8 and OIS 3.

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