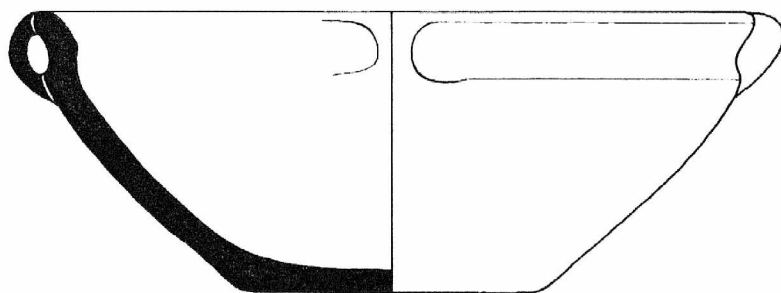


ARCHEOLOGICKÝ ÚSTAV AKADEMIE VĚD ČESKÉ REPUBLIKY V BRNĚ

# PŘEHLED VÝZKUMŮ 1992



BRNO 1996

# GRAVETTIAN AND EPIGRAVETTIAN CHRONOLOGIES IN THE MIDDLE DANUBE AREA

JIŘÍ SVOBODA, Archeologický ústav AV ČR Brno

## Introduction

The territory studied here makes a part of the Eurasian loessic zone. Geomorphologically, it forms a system of passages connecting the Danube valley in the south (Austria) over Moravia (Czech Republic) to the North European Plain (Poland). In frame of the ongoing research project *The Gravettian in South Moravia*, special attention is being paid to chronological aspects of the evolution in this region.

The Upper Paleolithic began with transitional industries such as the Bohunician and the Szeletian (with C 14 dates between 43.000 and 35.000 B.P., SVOBODA and SIMÁN 1989 with tabs. and ref.) and the typical Aurignacian (after 38.000 B.P. at Willendorf II, Haesaerts, pers. comm.). The Gravettian emerges around 30.000 B.P.

Chronological subdivisions of the Gravettian (Pavlovian) were hitherto suggested by KLÍMA (1961), VALOCH (1961), KOZŁOWSKI (1986) and OTTE (1981, 1991). BÁRTA (1987) separated an earlier and a later Gravettian stages in Slovakia, while KOZŁOWSKI and SOBCZYK (1987) named the earlier stage Pavlovian and the later Kostenkian. SOFFER (1993) and GRIGORIEV (1993), on the other hand, talk about a Willendorf-Pavlov-Kostenki-Avdeevo unity. SVOBODA et al. (1994a, 149) repeat the succession of the Pavlovian and the Kostenkian stages of the Gravettian, followed, after 20.000 B.P., by the Epigravettian.

## Stratigraphic Background

Stratigraphically, the period concerned here is principally correlated with a soil formation representing the upper (second) member of the Interpleniglacial soil complex (including Middle Aurignacian and Early Gravettian, with C 14 datings between 32.500 - 29.000 B.P.; HAESAERTS 1990a, SVOBODA 1991), and the deposition of the overlying loess (Upper Aurignacian and Gravettian), until the Last Glacial Maximum (20.000 - 18.000 B.P., SOFFER and GAMBLE, eds., 1990).

At Stránská skála, micromorphological investigation shows that the basal soil ranges typologically between the pararendzines and chernozems. The soil developed within a short time-span, under repeated eolian sedimentation, redeposition and solifluction. In the subsoil, we observed horizontal movements of loams (solifluction) and vertical movements of stones (formation of sorted circles), both prior to the soil formation (CZUDEK et al. 1991).

At Dolní Věstonice II, a stratigraphically identical soil has been classified as a weakly developed pararendzine, mixed with relics of earlier chernozem soils. Again it evolved during a short time-span, under cold and relatively dry climate. Following moister oscillations were responsible for its pseudogleyfication. At the nearby site of Milovice, on a different substrate, this soil corresponds to a weakly developed pseudogley (SMOLÍKOVÁ 1991).

At Willendorf II, a comparable horizon (layer 5) is represented by lenses of humous sediments (HAESAERTS 1990a).

The overlying loess cover was studied in detail by KLÍMA (1958, 1969, KLÍMA et al. 1962) at Dolní Věstonice and by P. HAESAERTS (1990a, b) at Willendorf and Grubgraben. The both authors observed several pseudogley horizons, eolian sand and solifluction layers within the loess. Further excavations at Dolní Věstonice II repeatedly reveal further pseudogley horizons (SMOLÍKOVÁ 1991), obviously representing periods of increased humidity rather than increased temperature.

The Gravettian cultural layer (or complex of layers) at the large Moravian sites (Dolní Věstonice, Pavlov, Předmostí) developed during a long period of limited loess deposition, between 29.000 - 20.000 B.P. The matter originates from anthropogenic activities, and, as show by

SMOLÍKOVÁ, the matrix also includes soil particles. Horizontal movements (solifluction) and other deformations of the layer are visible, but archaeological features such as hearths, pits or human skeletons are little or not affected by these deformations. No vertical differentiation within this layer, that would have a chronological meaning, is observed.

At Willendorf II, on the other hand, excavators were able to separate five stratigraphic levels (5-9) within the same time-period. Thus, all efforts in Gravettian chronology should combine the vertical stratigraphy at Willendorf with the spatial analysis at the Moravian sites (OTTE 1991, SVOBODA 1994).

Chronological relationships between the various settlement units at the large Moravian sites (KLÍMA 1963a, b, 1995; SVOBODA, ed. 1991) were hitherto studied on the basis of stratigraphic observations such as overlapping of slope-slipped loessic blocks (DV I), overlapping of settlement units (unit 1 and 2 at DV II), thickness of the underlying loess separating the cultural layer from the 30.000 years-old soil below (DV I and II), and radiocarbon dating.

The samples for C 14 were measured in the laboratories at Groningen, Prague, Illinois and Lyon. A table of the C 14 datings so far available shows that the data from Groningen (Tab. 1) present usually higher values, a more meaningful developmental pattern, and smaller deviations than data from the other laboratories (Tab. 2). Therefore, we based our effort in chronological comparisons of the Moravian sites on the Groningen data (Tab. 7).

We tried to correlate the C 14 data with the typological evidence emerging from spatial analysis of some sites (Tabs. 5-6), with the changes in lithic raw material selection, and with the environmental data (SVOBODA, ed. 1994a). As a result, it is suggested to separate the Gravettian in two major stages which we may call the Pavlovian and the Willendorfan-Kostenkian. Eventually, the Pavlovian may be subdivided in two substages.

## **Description of the Sites**

### **1. Willendorf II**

At Willendorf II, a continuous loess deposit dated to 30.000 - 20.000 B.P., enabled excavators to separate five stratigraphic layers (5-9), stylistically assigned to the Gravettian. Lithic materials from Willendorf, stored at the Museum of Natural History in Vienna, and published by F. FELGENHAUER (1959), were quantified in terms of typological relationships by A. BROGLIO and G. LAPLACE (1966), subsequently by M. OTTE (1981, 1991), and certain technological observations were added by DROBNIWICZ et al. (1992, 419). Even though the statistical results of these authors are not identical, a basic evolutionary pattern emerges from their data (Tab. 5).

The numbers of endscrapers, burins and backed implements reach their maxima in the lower and upper parts of the sequence (layer 5 and 9). There is an increase of retouched blades in the middle part of the sequence, reaching maximum in layer 8, a very marked increase of pointed blades, with maximum in layer 7, and a smaller increase of sidescrapers in both these layers. Some of the retouch style is elaborate, including artifacts with steep retouch (see FELGENHAUER 1959, figs. 33, 35).

The typologically significant shouldered points of the Kostenki-type do not appear before the layer 9 and an even larger collection of them was collected in the nearby Willendorf I site.

On the basis of the data by ZIRKL (1959, tab. 1) it should be added that a parallel change occurs in the siliceous raw materials, with flint dominating at the base and top of the sequence (layer 5 and 9), and radiolarite in the middle (layers 6-8). With respect to both typology and raw materials, we suggest separation of the Willendorf sequence into three chronological units.

### **2. Dolní Věstonice I**

Dolní Věstonice I is an extended and complex settlement accumulation (ABSOLON 1945, KLÍMA 1963a, 1981). Spatially, it was separated into lower, middle, upper and uppermost parts by KLÍMA, who suggested on the basis of stratigraphy that the lower location is the earliest.

In order to obtain more C-14 dates for various parts of the site, a series of trenches along the site were excavated in 1990 (SVOBODA, ed., 1991, 14). The Groningen dates confirm the earlier age

of the lower location (29.000 - 27.000 B.P.) compared to the other areas (about 25.000 B.P.). A later date (22.250 B.P.), from the Lyon Laboratory, seems less coherent within the chronological context.

A higher proportion of the Moravian cherts (16%) appeared in the lower location, while in the middle and upper locations the foreign materials (flint and radiolarite) almost totally dominate. Typologically the lower location also differs by the presence of a few Aurignacoid tool types (2.5%).

Two assemblages from the middle location were quantified by A. BOHMERS and published in the context of other data by B. KLÍMA (1981). Furthermore, B. KLÍMA (1963a) described in detail typology of two settlement units in the upper and uppermost locations, and of the related mammoth bone deposit. Generally, burins retain a standard representation between 30-40%. The share of the endscrapers is lower (12-18%), and Aurignacoid types are absent. Backed microliths are relatively frequent (8-26%), with numerous microsaws (microdenticulates, 5-7 %) representing the site-specific form.

### 3. Dolní Věstonice II

Due to the intensive recent research, Dolní Věstonice II has the largest (and most variable) series of C-14 dates from the various locations and settlement units. In order to retain some consistency, we decided to evaluate the Groningen data only: again, all of them are higher than 25.000 B.P.

The earliest part of the site is the lower location (the bricketery), dated to 29.000 - 28.000 B.P. (KLÍMA et al. 1962). The industry of unit A (KLÍMA 1987), higher on the northern slope, has a high share of Moravian (Cretaceous) cherts, radiolarites, and certain archaic features, e.g. Aurignacian endscrapers or sidescrapers. The nearby unit B has a standard Gravettian industry with burins, pointed blades and microblades, but equally a high share of Moravian (Krumlovian) cherts. The industry of unit C is microlithic; all these three units are dated around 27.660 B.P. Unit LP/1-4 (SVOBODA 1990), still higher on the northern slope, differs by the absence of backed microliths, and by a higher proportion of retouched blades and pointed blades whose style resembles the middle part of the Willendorf sequence; age of this unit is more recent (26.390 B.P.).

The majority of settlement units in the highest part of the site (KLÍMA 1995) and on the western slope (SVOBODA, ed. 1991) date around 27.000 B.P, their industries are made of imported flint and radiolarite, and they are typologically characterized by the dominance of burins and backed implements (Tab. 6). Nevertheless, the triple burial seems slightly more recent (26.640 B.P.), as well as unit 1. including the male burial (around 25.500 B.P.). The specific position of unit 1 is confirmed also by spatial relationships, by refittings (ŠKRDLA 1994), and by typological difference (the number and variability of backed implements, mostly microlithic, increased markedly).

### 4. Pavlov I

B. KLÍMA (1963b) has suggested that the extensive area of Pavlov I site, with a number of features and settlement units, may be generally separated in two parts a and b. With results of the archaeological and environmental analyses of the 1952-1953 area now in hand (part of the b-area, SVOBODA, ed., 1994), the main task of ongoing studies is to analyse an area from the opposite a-area. We selected the 1957 excavation (including the male burial), clearly differing by a higher share of radiolarite and by the presence of marginally retouched tools.

Actually, Pavlov I has six C 14 dates: five from the b-area (excavations 1953, 1956) and one from the a-area (excavations 1957), but all fall within a relatively short time-span between 25.000 - 26.700 B.P.

By the composition of flint and radiolarite, and the dominance (double or even a higher proportion) of burins over endscrapers, the hitherto analyzed samples correspond to other Gravettian assemblages of the Austrian-Moravian-Silesian territory. The percentage of microlithic backed implements and other microliths in the Pavlov I samples, on the other hand, reaches the highest values hitherto recorded. Some microliths, fairly standard in size and shape, are rare or absent elsewhere: the crescents, trapezoids, and triangles. The two analysed samples from Pavlov differ from each other by

a higher proportion of radiolarite and higher frequency of lateral retouches in the 1957 sample compared to the 1952-53 sample.

Points with ventroterminal retouches, recalling the Jerzmanowice type, are present throughout the assemblage, while the shouldered points of the Kostenki type, in their typical form, are absent. All typological elements that could be called Aurignacoid are rare, and leaf-points are represented by a single, atypical fragment.

## 5. Předmostí I

At Předmostí, site I, the Gravettian forms the most important, dense and extended occupation stage (ABSOLON and KLÍMA 1977, KLÍMA 1990, SVOBODA et al. 1994b). The two C-14 dates from B. KLÍMAS excavation place it between 26.000 and 27.000 B.P. As is the case at Dolní Věstonice and Pavlov, the Předmostí site may be in fact a horizontal cluster of separate settlement units, extended over fairly large areas.

One of the characteristic typological patterns at Předmostí is the presence of continual lateral, steep and even scalariform retouch along the edges of artifacts. This is observed on blades, pointed blades and sidescrapers (ABSOLON and KLÍMA 1977: tab. 8-10, 14, 18, 36, 41). Microliths are very rare, which may be the result of the absence of sediment floating during the earlier excavations. The retouch, together with a few Aurignacoid types, led various researchers to suspect an Aurignacian intrusion. On the basis of recent analyses, the "Předmostí style" may rather be compared to the middle part of the Willendorf sequence.

Furthermore, the Předmostí materials include at least one shouldered point (VALOCH 1986, fig. 1:25) and a series of less morphologically standard points. This culturally significant tool type correlates a part of this assemblage to the upper part of the Willendorf sequence (layer 9), Petřkovice, Spadzista, and sites in the Váh valley, all dated between 24.000 - 20.000 B.P. It is probable that some of the leaf-points of Předmostí, originally classified as a Szeletian element, date in fact to this Upper Gravettian period, which represents a new stage of their production.

## 6. Other sites

Further important data emerge from excavations at Petřkovice, Předmostí II, Dolní Věstonice III (Tab.1), Alberndorf (TRNKA 1992), Grubgraben (BRANDTNER 1990, MONTET - WHITE, ed. 1990), Milovice (OLIVA 1989), Moravany (HROMADA, KOZLOWSKI et al. 1995), and Stránská skála IV (SVOBODA 1991).

### **Techno/typological Interactions through Time**

In frame of the typological comparisons of the Gravettian and Epigravettian, certain techniques and types show cross-cultural parallels to other cultures and cultural complexes:

1. The Aurignacoid elements. Few thick endscrapers are present in the Early Pavlovian stage (Dolní Věstonice I, II), but Aurignacoid endscrapers and burins, usually of smaller dimensions, reappear later in the Epigravettian (Grubgraben, Stránská skála IV).

2. Derived Jerzmanowician elements. Blade points with ventroterminal retouches were frequent during the Late Middle Paleolithic and Early Upper Paleolithic (Bohunician and leaf-point cultures of the North European Plain). A derived, less richly retouched form, is subsequently recorded from the Pavlovian (Willendorf, Pavlov, Předmostí) and from Kostenki 8-I.

3. Bifacial leaf-points have developed since the Middle Paleolithic to the Early Upper Paleolithic of the area (Szeletian). They were almost absent during the Pavlovian, to reappear in the Upper Gravettian (Petřkovice, Trenčianské Bohuslavice) and in the Late Aurignacian: i.e., in a time slightly preceding the Solutrean of West Europe.

4. The Kostenkian elements. Shouldered points of the Kostenki-type represent the leading fossil uniting the Upper Gravettian of Central and Eastern Europe (Kostenki I-1: 24.000 - 19.000 B.P.).

5. Microblade technique. Some wedge-shaped microblade cores, resembling the ones extending in North Asia around 20.000 B.P., were recently recorded in surface assemblages of the Epigravettian (Pístovice II) and of the Late Aurignacian (Nová Dědina).

Occurrences of these techniques and types may reflect continuity of a tradition (Jerzmanowician types in the Pavlovian, Aurignacian types in the Epigravettian), a direct interaction (migration or acculturation - Kostenkian types in the Upper Gravettian) or common Paneuropean or Eurasian tendencies in technological and stylistical concepts (bifacial leaf-points in the Upper Gravettian, microblade technique in the Epigravettian).

## Outlines of Chronology

### 1. The Early Pavlovian stage (30.000 - 27.000 B.P.)

Earliest Gravettian in the Middle Danube territory is documented at Willendorf II (layer 5), Dolní Věstonice I (lower part of the site) and II (majority of the settlement units). The industries are dominated by burins, backed implements and endscrapers. Burins are about twice as numerous as endscrapers, number of geometric microliths is usually lower. Rarely, some of the endscrapers may possess high, Aurignacian-like shapes.

The imported silicites (flint and radiolarite) generally predominate, but local materials (Moravian cherts) still occur in certain assemblages (lower parts of Dolní Věstonice I and II).

Environmental context of this stage, dating to the end of the basal soil formation (e.g. humous lenses in layer 5 at Willendorf II, HAESAERTS 1990a) and to the beginning of the loess deposition, is little known. Pollen analyses from the basal soils at Stránská skála and Dolní Věstonice II suggest a temperate climate with steppe-like vegetation (SVOBODOVÁ 1987, 1991a).

### 2. The Evolved Pavlovian stage (27.000 - 25.000 B.P.)

This chronological stage was observed in layers 6-8 at Willendorf II, at Dolní Věstonice I (middle and upper parts of the site), Dolní Věstonice II (certain settlement units and both burials), Pavlov I (all hitherto analyzed materials) and Předmostí (larger part of the industry). The rich bone industry documents unity of this stage (KLÍMA 1994). Judging by lithic typology, one may observe separation into two facies each with a particular style. The first one, represented by Willendorf II, Předmostí, Dolní Věstonice II - unit LP/ 1-4, and partly the a-area at Pavlov I, is characterized by elaborate marginal, steep or scalariform retouches on blades and flakes, by retouched pointed blades, and by some typical sidescrapers.

The second facies found at Dolní Věstonice I, II (with the exception of unit LP/ 1-4), and most characteristically at Pavlov I (b-area), can be differentiated by a rarity or absence of marginal retouch, and by an abundance of microliths such as crescents, trapezoids and triangles, while Dolní Věstonice is rich in denticulated microsaws.

The points with ventroterminal retouches, derived from the Jerzmanowice-type, are present in the both facies. On the other hand, the bifacial leaf-points seem absent during this stage.

The two imported siliceous materials now predominate almost totally, and at certain sites (Willendorf II, a-area at Pavlov I) we observe a remarkable increase of radiolarite.

Stylistic differences between the Předmostí style on the one hand, and Dolní Věstonice - Pavlov style on the other, are observed in art as well (SVOBODA 1995). The Dolní Věstonice - Pavlov style is characterized by slightly curved linear decoration, figural representations of animals and humans in ceramics, and sophisticated but simple abstractions carved in ivory. The Předmostí style is more geometric (including a female drawing in the same style).

The landscape was partly covered by wooded areas with conifers and accompanying deciduous trees including certain more pretentious species (RYBNIČKOVÁ and RYBNIČEK 1991, SVOBODOVÁ 1991a, b, OPRAVIL 1994, MASON et al. 1994). After R. MUSIL (1994), the animal composition (mammoths, reindeer, foxes, wolves and hares) fits well into such landscape reconstructions.

### 3. The Willendorffian-Kostenkian stage (24.000 - 20.000 B.P.)

This Upper Gravettian stage is represented by the sites of Willendorf I, II (layer 9), Předmostí (a hypothetical recent stage) and Petřkovice. Outside the Austrian-Moravian-Silesian territory, the sites of West Slovakia (Moravany-Lopata, Nitra-Čermán, Trenčianské Bohuslavice) should be added, as well as Spadzista in Poland, and Molodova, layer 7, in Ukraine. The most important typological



feature uniting all these assemblages is the appearance of shouldered points of the Kostenki-type, showing linkage to Eastern Europe typical for the period. Therefore, J. K. KOZŁOWSKI and K. SOBCZYK (1987) call this stage Kostenkian.

Some sites also have bifacial leaf-points (Trenčianské Bohuslavice, Předmostí, Petřkovice). During a time period slightly preceding development of the Solutrean in West Europe, these implements should no more be considered a Szeletian reminiscence, but rather an expression of a new wave of leaf-point production. Marginal, sometimes steep retouches on the artifacts and the decrease in number of microliths recall the former Předmostí style rather than Dolní Věstonice.

In the decoration, G. P. GRIGORIEV (1993, 55) underlined the presence of small crosses lineary distributed along the ribs of implements, uniting Willendorf II (layer 9), Kostenki 1 (layer I) and Avdeevo. Some of the sites yielded female figurines (Willendorf, Moravany, Petřkovice). The first two mentioned figurines also have striking analogies in East Europe (Kostenki 1-I, Avdeevo).

In the faunal evidence of this period MUSIL (1994) observed an increase in the number of deer, elks, reindeer and bovinds. It appears that such a fauna requires a slightly different landscape. Even if the paleobotanical evidence for this period is still scarce, the situation at Předmostí (samples 6-7, SVOBODOVÁ in SVOBODA et al. 1994b) suggests a decrease in arboreal pollen (31% - 16%) and an increase in heliophilous plants.

#### 4. Late Aurignacian (Epiaurignacian)

Stratigraphic evidence from Moravian sites (Stránská skála IIa, SVOBODA 1991), certain C 14 datings from Lower Austria (Tab. 3) and typological chronologies based on surface assemblages (OLIVA 1987) suggest that the Aurignacian survived until 20.000 B.P. The raw material base combines local and foreign sources.

According to current scenarios, the Late Aurignacian and Gravettian populations lived side-by-side, but their behavior was of different manner.

#### 5. Epigravettian (after 20.000 B.P.)

Excavations at Grubgraben (Brandtner 1990, Montet-White, ed. 1990), Moravany-Žakovská (HROMADA, KOZŁOWSKI et al.), and at Stránská skála IV (SVOBODA 1991), together with the examination of relatively dense network of related surface sites (SVOBODA et al. 1994a, 155-161) suggest a more important Epigravettian occupation than has previously been supposed (SOFFER and GAMBLE, eds. 1990). Typological composition differs at the various sites. Generally, tools are made on shorter blades (endscrapers, burins), in association with persisting backed bladelets and Aurignacoid elements.

The siliceous material base is more versatile compared to the Gravettian and it combines local and foreign sources, including some imports from rather distant areas.

The paleobotanical evidence is scarce (Stránská skála IV), but there is a strange evidence of more pretentious tree species at Moravany (yew). We observe the disappearance of large mammoth-bone deposits, while the hunting becomes oriented on reindeer (Grubgraben) and horse (Grubgraben, Stránská skála IV).

#### Acknowledgements

Complex presentation of the Pavlov I site, 1952-1953 area, and the ongoing archaeological analysis of the 1957 area, are sponsored by grants from the Grant Agency of the Academy of Sciences of the Czech Republic (project No 090104) and the Grant Agency of the Czech Republic (project No 404/93/2359). Simultaneous fieldwork at Dolní Věstonice and Předmostí is supported by a grant from the L.S.B. Leakey Foundation. I am especially indebted to W.G. MOOK and J. VAN DER PLICHT for new series of C 14 datings.

#### References

ABSOLON, K.

- 1945: Die Erforschung der diluvialen Mammutjägerstation von Unter-Wisternitz an den Pollauer Bergen in Mähren. Arbeitsbericht über das dritte Jahr 1926. Brno.

- ABSOLON, K. and KLÍMA, B.  
- 1977: Předmostí, ein Mammutjägerplatz in Mähren. Academia, Praha.
- BÁRTA, J.  
- 1987: Prínos nových poznatkov slovenskej archeologie ku stratigrafii pleistocénu a starého holocénu. Anthropozoikum N.S. 18, 203-228.
- BRANDTNER, F.  
- 1990: Die Paläolithstation "Grubgraben" bei Kammern. Fundberichte aus Österreich 28, 1989, 17-26.
- BROGLIO, A. and LAPLACE, G.  
- 1966: Etudes de la typologie analytique des complexes leptolithiques de l'Europe Centrale II. Les complexes gravettiens de la Basse Autriche: Willendorf II. Rivista di scienze preistoriche 21, 303-364.
- CZUDEK, T. et al.  
- 1991: Profil IIIa na Stránské skále v Brně. Anthropozoikum N.S. 20, 203-223.
- DROBNIEWICZ, B. et al.  
- 1992: The Gravettian sequence. In: Temnata Cave, Vol. I, Part I. Krakow, Jagiellonian University, 295-501.
- FELGENHAUER, F.  
- 1959: Willendorf in der Wachau. Monographie der Paläolit.- Fundstellen I-VII. Mitt. Prähist. Komm. Österr. Akad. 8/9, Wien.
- GRIGORIEV, G.P.  
- 1993: The Kostenki-Avdecevo archaeological culture and the Willendorf-Pavlov-Kostenki-Avdecevo cultural unity. In: SOFFER, O. and PRASLOV, N.D. (eds.): From Kostenki to Clovis. Plenum, New York-London, 51-65.
- HAESAERTS, P.  
- 1990a: Nouvelles recherches au gisement de Willendorf (Basse Autriche). Bull. Inst. Royal des Sciences naturelles de Belgique 60, 203-218.
- HAESAERTS, P.  
- 1990b: Stratigraphy of the Grubgraben loess sequence. In: MONTET-WHITE, A. (ed.): The Epigravettian site of Grubgraben. ERAUL 40, Liege, 15-35.
- HROMADA, J. - KOZŁOWSKI, J.K. et al.  
- 1995: Complex of Upper Palaeolithic sites near Moravany, Western Slovakia, Vol. I, Moravany-Žakovská. Kraków.
- KLÍMA, B.  
- 1958: Příspěvek k stratigrafii nejmladšího sprašového pokryvu. Anthropozoikum 7, 111-143.  
- 1961: Současný stav problematiky aurignacienu a gravettienu. Arch. Rozhledy 13, 84-121.  
- 1963a: Dolní Věstonice - Výzkum tábořiště lovců mamutů v letech 1947-1952. Academia, Praha.  
- 1963b: Výzkum paleolitického sídliště Pavlov I. Přehled výzkumů 1962, 4-6.  
- 1969: Die grosse Anhäufung von Mammutknochen in Dolní Věstonice. Acta Sc.Nat.Brno III,6. Academia, Praha.  
- 1981: Střední část paleolitické stanice u Dolních Věstonic. Pam. Arch. 72, 5-92.  
- 1987: Zachranovací výzkum nad cihelnou u Dolních Věstonic (okr. Břeclav). Přehled výzkumů 1985, 16-18.  
- 1990: Lovci mamutů z Předmostí. Academia, Praha.  
- 1994: Die Knochenindustrie, Zier- und Kunstgegenstände. In: Pavlov I, Excavations 1952-1953. ERAUL, Liege, 87-150.  
- 1995: Dolní Věstonice II. Ein Mammutjägerplatz und seine Bestattungen. ERAUL 73, Liege.
- KLÍMA B. et al.  
- 1962: Stratigraphie des Pleistozäns und Alter des paläolithischen Rastplatzes in der Ziegelei von Dolní Věstonice (Unter-Wisternitz). Anthropozoikum 11, 93-145.
- KOZŁOWSKI, J.K.  
- 1986: The Gravettian in Central and Eastern Europe. In: Advances in world archaeology 5, 131-200.
- KOZŁOWSKI, J.K. and SOBCZYK, K.  
- 1987: The Upper Palaeolithic site Kraków-Spadzista street C2. Excavations 1980. Prace Archeol. 42. Warszawa-Kraków.
- MASON, S. et al.  
- 1994: Preliminary investigation of the plant macro-remains from Dolní Věstonice II, and its implications for the role of plant foods in Palaeolithic and Mesolithic Europe. Antiquity 68, 48-57.
- MONTET-WHITE, A. (ed.)  
- 1990: The Epigravettian Site of Grubgraben. ERAUL 40, Liege.
- MUSIL, R.  
- 1994: The fauna. In: Pavlov I, Excavations 1952-1953. ERAUL 66, Liege, 169-196.
- NEUGEBAUER-MARESC, CH.  
- 1993: Altsteinzeit im Osten Österreichs. Wiss. Schriftenreihe Niederösterreichs 95/97. St.Pölten-Wien.



OLIVA, M.

- 1987: Aurignacien na Moravě. Stud. Muz. Kroměřížska.
- 1989: Excavations in the Palaeolithic site of Milovice I (Southern Moravia) in the year 1988. *Anthropologie/Brno* 26, 105-112.

OPRAVIL, E.

- 1994: The vegetation. In: Pavlov I, Excavations 1952-1953. ERAUL 66, Liege, 163-167.

OTTE, M.

- 1981: Le gravettien en Europe Centrale. *Dissertationes archeologicae Gandenses XX*. Brugge 1981.
- 1991: Revision de la séquence de Willendorf. In: MONTET-WHITE, A. (ed.): *Les Bassins du Rhin et du Danube au Paléolithique supérieur*. ERAUL 43, Liege, 46-59.

RYBNÍČKOVÁ, E. and RYBNÍČEK, K.

- 1991: The Environment of the Pavlovian - Palaeoecological results from Bulhary, South Moravia. In: *Palaeovegetational development in Europe*. Pan-European Palaeobotanical Conference Vienna, 73-79.

SMOLÍKOVÁ, L.

- 1991: Soil microscopic investigation of the section at Dolní Věstonice II. In: *Dolní Věstonice II*. ERAUL 54, Liege, 65-74.

SOFFER, O.

- 1993: Upper Paleolithic adaptations in Central and Eastern Europe and man-mammoth interactions. In: SOFFER, O. and PRASLOV, N.D. (eds.): *From Kostenki to Clovis*. Plenum, New York-London, 31-49.

SOFFER, O. and GAMBLE, C. (eds.)

- 1990: *The world at 18,000 B.P., Vol. I, High latitudes*. Unwin Hyman, London.

SVOBODA, J.

- 1990: Sídlení celek LP/1-4 v Dolních Věstonicích. In: *Pravěk a slovanské osídlení Moravy*. Brno, 15-25.
- 1991: Stránská skála. Výsledky výzkumu v letech 1985-1987. *Pam. Arch.* 82, 5-47.
- 1994: The Pavlov site, Czech Republic: Lithic evidence from the Upper Paleolithic. *Journal of Field Archaeology* 21, 69-81.
- 1995: L'art gravettien en Moravie. Contexte, dates et styles. *L'Anthropologie* 99, 258-272.
- (ed.) 1991: *Dolní Věstonice II - western slope*. ERAUL 54, Liege.
- (ed.) 1994: *Pavlov I, Excavations 1952-1953*. ERAUL 66, Liege.

SVOBODA, J. et al.

- 1994a: *Palcolit Moravy a Slezska. Dol.Věst.stud.* 1, Brno.

SVOBODA, J. et al.

- 1994b: *Předmostí after 110 years*. *Journal of Field Archaeology* 21, 457-472.

SVOBODA, J. and SIMÁN, K.

- 1989: The Middle-Upper Paleolithic transition in Southeastern Central Europe. *Journal of World Prehistory* 3, 283-322.

SVOBODOVÁ, H.

- 1987: Pylová analýza půdního horizontu ze Stránské skály II. *Arch. Rozhledy* 39, 383-385.
- 1991a: The pollen analysis of Dolní Věstonice II - western slope. In: *Dolní Věstonice II*. ERAUL 54, Liege, 75-88.
- 1991b: Pollen analysis of the Upper Paleolithic triple burial at Dolní Věstonice. *Arch. Rozhledy* 43, 505-510.

ŠKRDLA, P.

- 1994: Refittings. In: *Pavlov I, Excavations 1952-1953*. ERAUL 66, Liege, 27-28.

TRNKA, G.

- 1992: Eine Station des Epi-Aurignaciens in Alberndorf. *Archäologie Österreichs* 3/1, 30.

VALOCH, K.

- 1961: K chronologii palcolitických kultur v Československu. *Anthropozoikum* 9, 15-20.
- 1986: Les questions du pavlovien. *Antiquités Nationales* 18/19, 55-62.

ZIRKL, E.

- 1959: Das Gesteinsmaterial der Artefakte von Willendorf i.d. Wachau, N.Ö. In: FELGENHAUER, F.: *Willendorf in der Wachau*. *Mitt.Prähist. Komm.Österr. Akad.* 8/9, Wien, 98-112.

## Souhrn

Období sledované v tomto příspěvku odpovídá stratigraficky tvorbě svrchní interpleniglaciální půdy (s daty C 14 mezi 32.500 - 29.000 B.P.) a ukládání nadložní spraše, až po období posledního glaciálního maxima (20.000 - 18.000 B.P.). Na základě korelace dat C 14 s prostorovou analýzou velkých gravettských sídlišť a se stratografií ve Willendorfu navrhujeme rozčlenit gravettien do dvou hlavních fází: pavlovské (30.000 - 25.000 B.P., lze dále rozčlenit na starší a mladší) a willendorfsko-

kostěnkovské (24.000 - 20.000 B.P.). Pozdní aurignacien (epiaurignacien) byl zřejmě s gravettienem částečně souběžný. Po roce 20.000 B.P. pak začíná vývoj epigravettienu.

Table 1. Gravettian datings (mostly of charcoal) from Lower Austria and Moravia. The table is based only on Groningen datings (after NEUGEBAUER-MARESCII 1993, HAESAERTS 1990, SVOBODA et al. 1994a, KLÍMA 1995).

GrN 11193	Willendorf II, layer 5	30 500 +900 -800 B.P.
GrN 17803	Willendorf II, layer 6	27 600 ± 480 B.P.
GrN 17804	Willendorf II, layer 7	28 560 ± 520 B.P.
GrN 11191	Willendorf II, layer 8	25 800 ± 800 B.P.
GrN 17801	Willendorf II, layer 8	25 230 ± 320 B.P.
GrN 17802	Willendorf II, layer 8	25 660 ± 350 B.P.
GrN 3011	Krems, Wachtberg	27 400 ± 300 B.P.
GrN 2513	Aggsbach	26 800 ± 200 B.P.
GrN 1354	Aggsbach	25 760 ± 170 B.P.
GrN 11189	Dolní Věstonice I, lower part	31 700 ± 1000 B.P.
GrN 18187	Dolní Věstonice I, lower part	29 300 + 750 -690 B.P.
GrN 18188	Dolní Věstonice I, lower part	27 250 + 590 -550 B.P.
GrN 1286	Dolní Věstonice I, middle part	25 820 ± 170 B.P.
GrN 18189	Dolní Věstonice I, upper part	25 950 + 630 -580 B.P.
GrN 2092	Dolní Věstonice II, brickyard	28 300 ± 300 B.P.
GrN 2598	Dolní Věstonice II, brickyard	29 000 ± 200 B.P.
GrN 13962	Dolní Věstonice II, units A-C	27 660 ± 80 B.P.
GrN 14831	Dolní Věstonice II, triple burial	26 640 ± 110 B.P.
GrN 15276	Dolní Věstonice II, burial DV XVI	25 570 ± 280 B.P.
GrN 15277	Dolní Věstonice II, unit 1	25 740 ± 210 B.P.
GrN 15279	Dolní Věstonice II, unit 2	26 920 ± 250 B.P.
GrN 15278	Dolní Věstonice II, unit 3	27 070 ± 300 B.P.
GrN 21122	Dolní Věstonice II, unit 4	26 970 ± 200 B.P.
GrN 15324	Dolní Věstonice II, southern hearth	27 070 ± 170 B.P.
GrN 15325	Dolní Věstonice II, eastern hearth	26 970 ± 160 B.P.
GrN 15327	Dolní Věstonice II, western hearth	27 080 ± 170 B.P.
GrN 21123	Dolní Věstonice II, unit LP/1-4	26 390 ± 190 B.P.
GrN 14830	Dolní Věstonice II, mammoth deposit	26 100 ± 200 B.P.
GrN 20392	Dolní Věstonice III	24 560 +660 -610 B.P.
GrA 192	Pavlov I, 1953 area (b)	25 530 ± 110 B.P.
GrN 19539	Pavlov I, 1953 area (b)	26 650 ± 230 B.P.
GrN 1272	Pavlov I, 1956 area (b)	26 620 ± 230 B.P.
GrN 1325	Pavlov I, 1956 area (b)	25 020 ± 150 B.P.
GrN 4812	Pavlov I, 1956 area (b)	26 730 ± 250 B.P.
GrN 20391	Pavlov I, 1957 area (a)	26 170 ± 450 B.P.
GrN 6801	Předmostí I, cemetery	26 870 ± 250 B.P.
GrN 6852	Předmostí I, cemetery	26 320 ± 240 B.P.
GrN 19540	Petřkovice, 1953	20 790 ± 270 B.P.
GrA 891	Petřkovice, 1994	23 370 ± 160 B.P.
GrN 14824	Milovice, feature G	25 220 ± 280 B.P.
GrN 14825	Milovice, mammoth deposit D	22 100 ± 1100 B.P.

Table 2. Gravettian datings (mostly of charcoal) from Lower Austria and Moravia from laboratories other than Groningen.

H 246-231	Willendorf II, layer 5	32 000 ± 3000 B.P.
H 2218-1537	Langenlois	25 480 ± 880 B.P.
KN 10c	Langenlois	26 960 ± 1200 B.P.
Ly 1303	Dolní Věstonice I, middle part	22 250 ± 570 B.P.
ISGS 1744	Dolní Věstonice II, unit 1	26 390 ± 270 B.P.
ISGS 1899	Dolní Věstonice II, unit 3	22 630 ± 420 B.P.
ISGS 1690	Milovice	22 900 ± 490 B.P.
ISGS 1691	Milovice	21 200 ± 1100 B.P.
CU 748	Dolní Věstonice II, unit 2	22 570 ± 766 B.P.
CU 747	Dolní Věstonice II, unit 3	24 513 ± 876 B.P.
CU 715	Dolní Věstonice II, mammoth deposit	22 368 ± 749 B.P.
OxA 5971	Předmostí II	25 040 ± 320 B.P.

Table 3. Late Aurignacian datings (bone, antler) from Lower Austria (after NEUGEBAUER-MARESCH 1993). After G. Trnka (pers. Comm), Albernorf now has a large series of datings than indicated here.

GrN 6660	Langmannersdorf	20 260 ± 200 B.P.
GrN 6659	Langmannersdorf	20 580 ± 170 B.P.
VRI 676	Horn, Raabsstr.	23 210 ± 510 B.P.
VRI 1272	Alberndorf	20 500 ± 1400 B.P.

Table 4. Epigravettian datings (bone) from Lower Austria, West Slovakia and Moravia (after MONTET-WHITE, (ed.) 1990, HROMADA and KOZLOWSKI 1995 and SVOBODA 1991).

AA-1746	Grubgraben AL4	18 960 ± 290 B.P.
Lv-1680	Grubgraben AL4	18 400 ± 330 B.P.
Lv-1660	Grubgraben AL3-4	18 170 ± 300 B.P.
Gd 4915	Moravany Žakovská	18 100 ± 350 B.P.
GrN 13945	Stránská skála IV	18 220 ± 120 B.P.
GrN 14351	Stránská skála IV	17 740 ± 90 B.P.

Table 5. Development of significant typological indices in the stratigraphy of Willendorf (in %), after OTTE 1981.

Layer	5	6	7	8	9
Endscrapers	17.8	11.8	6.3	9.4	9.9
Burins	21.5	19.7	6.3	8.2	20.5
Backed implements	8.9	6.6	4.4	6.9	23.7
Other microliths	14.9	-	-	1.7	0.2
Retouched blades	10.4	25.0	21.5	24.5	15.5
Pointed blades	5.9	3.9	33.5	24.5	7.9
Side-scrapers	-	-	1.9	2.1	0.6

Table 6. Change of typological indices, Pavlov I and Dolní Věstonice II.

Unit	Pavlov I/52		Pavlov I/53		DV II/1		DV II/2+3		DV II/LP
	n	%	n	%	n	%	n	%	n
Endscrapers	48	8.1	137	9.2	3	4.5	8	8.2	5
Burins	143	24.1	501	33.5	14	21.2	33	33.7	14
Backed implements	235	39.9	327	21.9	39	59.1	28	28.6	-
Other microliths	66	11.1	208	13.9	5	7.6	7	7.1	-
Retouched blades	13	2.2	69	4.6	-	-	3	3.1	8
Pointed blades	4	0.7	26	1.7	-	-	1	1.0	4
Side-scrapers	4	0.7	10	0.7	-	-	-	-	2
Total tools	593		1494		66		98		40

Table 7. Comparative chronological table of the Gravettian.

B.P.	Willendorf site II	D.Věstonice site I	D.Věstonice sites II, III	Pavlov I: a,b	Předmostí I	Milovice	Petřkovice	Spadzista site C2	Molodova site V
20,000					X		20,790		
21,000					X				
22,000	layer 9					22,100			layer 7: 23,000
23,000							23,370	layer III: 24,040 24,380	23,700
24,000		middle and	site III: 24,560						
25,000	layer 8: 25,800	upper parts: 25,820	1. unit: 25,570- 25,740	25,020-b 25,530-b		25,220			
26,000		25,950	unit LP: 26,390 triple burial: 26,640 majority of units: 26,900- 27,100	26,170-a 26,620-b 26,650-b 26,730-b	26,320  26,870				
27,000	layer 7	lower part: 27,250	units A-C: 27,660					layer IV	layer 9: 28,100
28,000	layer 6		lower part: 28,300						
29,000	layer 5: 30,500	lower part: 29,300	29,000						layer 9: 29,650

## PŘEHLED VÝZKUMŮ 1992

Vydává:	Archeologický ústav AV ČR Brno Královopolská 147, 612 00 Brno
Odpovědný redaktor:	Dr. Jaroslav Tejral
Redakce:	Dr. Lumír Poláček, Marie Cimflová
Překlady:	Dr. Hochmanová-Vávrová
Jazykové úpravy:	Dr. Wolfgang Ender
Kresby:	autoři příspěvků
Na titulním listě:	keramická mísa z Otnic
Tisk:	Tiskárna Gloria, Rosice u Brna
Evidenční číslo:	ÚVTEI-73332
Vydáno jako rukopis:	450 kusů