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HUMAN REMAINS FROM THE MORAVIAN GRAVETTIAN: THE DOLNÍ VĚSTONICE 35 FEMORAL DIAPHYSIS

ABSTRACT: A recently identified isolated proximal femoral diaphysis from the Moravian Gravettian site of Dolní Věstonice I, Dolní Věstonice 35, is described. It is among the larger individuals known for the European earlier Upper Paleolithic, and it presents a marked gluteal buttress, a large pilaster, proximal anterior diaphyseal curvature, moderate anteversion, and variably rugose muscular markings. It is notable for its relatively low midshaft percent cortical area and moderate diaphyseal robusticity.

KEY WORDS: Human paleontology – Early modern humans – Upper Paleolithic – Europe – Postcrania

INTRODUCTION

During excavations in the 1920s and 1930s at the earlier Upper Paleolithic (Gravettian) site of Dolní Věstonice I, Karel Absolon (1945) unearthed a massive amount of macro-mammalian osteological remains, including numbers of diaphyseal sections. From among the resultant collections in the Moravské zemské muzeum, the proximal half of a hominid right femoral diaphysis has been identified. The femoral diaphysis is not itself labelled, but it was stored with a similar length of mammoth rib on which is written "D. Věst. 1930," and it exhibits a state of preservation similar to that mammoth specimen. Moreover, since the only archaeological and fossiliferous levels at Dolní Věstonice are Gravettian, it is very likely that the Dolní Věstonice 35 femoral diaphysis derives from these archaeological levels. This has been confirmed by direct radiometric dating of the specimen. This specimen, Dolní Věstonice 35 (DV 35), therefore represents an additional hominid individual from the extremely rich archaeological levels of Dolní Věstonice, Moravia, Czech Republic.

ARCHAEOLOGICAL CONTEXT AND DATING

The sites of Dolní Věstonice and neighbouring Pavlov have yielded one of the richest complexes of earlier Upper Paleolithic (Pavlovian – a regional variant of the earlier phases of the more widespread European Gravettian) sites, with a tremendous richness of technological, artistic, faunal and site structural remains (Absolon 1945, Klíma 1963, 1991, 1995, Svoboda 1991, 1994, Svoboda *et al.* 1995, 1996). These sites have also furnished six associated partial skeletons (Dolní Věstonice 3 and 13 to 16, plus Pavlov 1) and several dozen isolated human remains (Pavlov 2 to 28, Dolní Věstonice 1, 2, 4 to 12, 17, 23 to 53) (Vlček 1991, 1997, Jelínek 1992, Trinkaus *et al.* n.d.).

The Dolní Věstonice I site was systematically excavated by Absolon during the 1920s and 1930s (with the discovery of the Věstonice "Venus" in 1925) and by Klíma in the late 1940s and early 1950s (Klíma 1963), with additional excavations and geological work being carried out by these and other workers (see Svoboda *et al.* 1995, 1996). More recently, re-excavation of a portion of the Dolní Věstonice

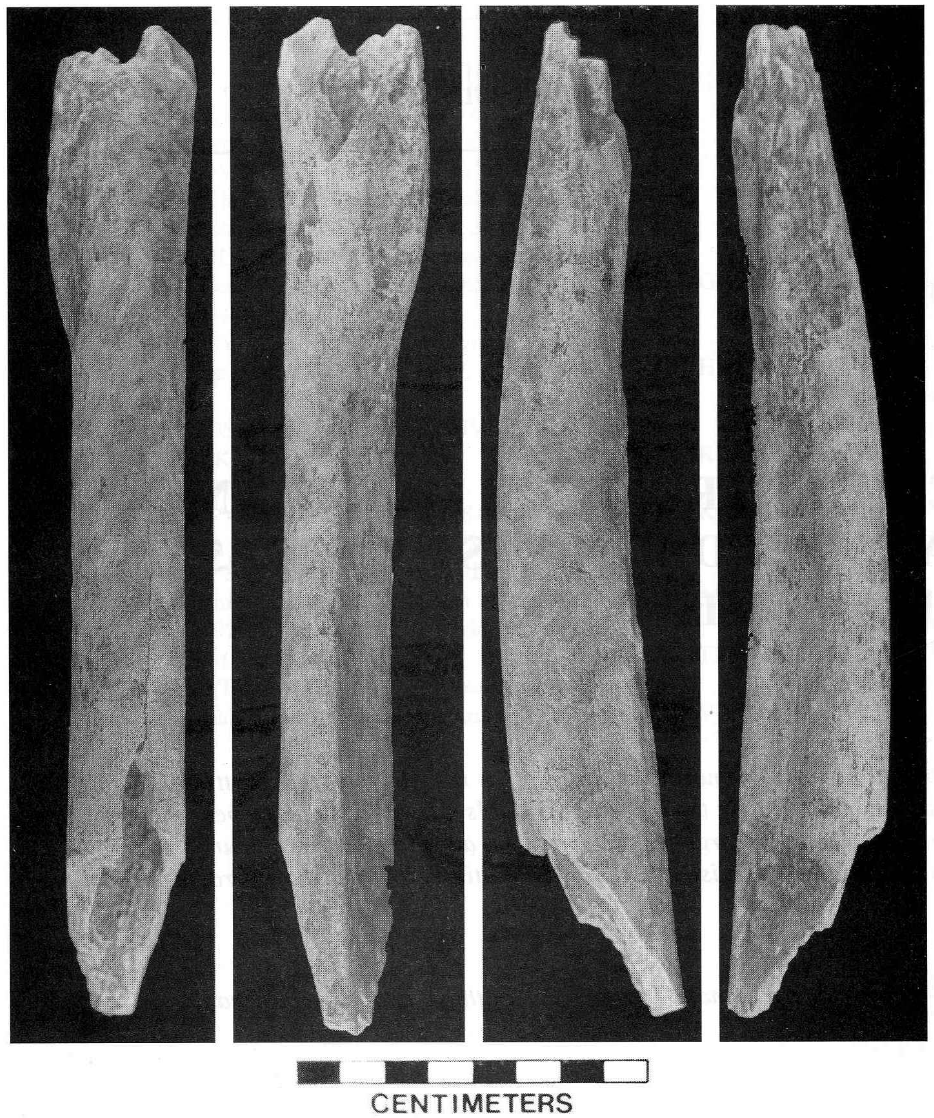


FIGURE 1. Anterior, posterior, medial and lateral views of the Dolní Věstonice 35 femoral diaphysis.

I site provided samples which yielded conventional radiocarbon dates of 29,300 +750/–690 (GrN-18187) and 27,250 +590/–570 (GrN-18188) for the lower and upper cultural horizons in the lower part of the site and 25,950 +630/–580 (GrN-18189) for the cultural horizon in the upper portion of the site (Svoboda 1991, 1995). A similar range of radiocarbon determinations have been obtained for the Dolní Věstonice II site (Svoboda 1995). The deposits yielding these dates are all at some distance from the original deposits excavated by Absolon, and therefore they provide only a reasonable range for the age of the human femoral diaphysis.

In order to position the Dolní Věstonice 35 femoral diaphysis more precisely within the Dolní Věstonice I context and to confirm its derivation from those Pavlovian deposits, the specimen was sampled along the proximal diaphyseal break (not touching the endosteal or subperiosteal surfaces) for radiocarbon AMS dating. A 360 mg sample was drilled from that location on the proximal diaphysis.

Following a simple combustion to establish the approximate level of collagen preservation in the bone, a 238 mg sample was submitted to the standard Oxford pre-treatment for bone. The result was a 1.5 mg sample of carbon in the form of gas, which was measured in the Oxford Accelerator Mass Spectrometer. Measurements of carbon and nitrogen during the pre-treatment process indicated that we were not successful in removing all sources of contaminating carbon. The nitrogen value of the sample ($\delta^{15}N$ = 12.33) is a little high indicating the presence of some contaminating material which is likely to contain some carbon. This inference of minor contamination is further supported by the relatively positive $\delta^{13}C$ value of – 18.8 per mil, which indicates some marine-based protein formation. This could either result from a proportion of marine-based diet in the DV 35 individual during life or to contamination by some extraneous marine-based material, e.g. a fish-based glue. Given the geographical origin of the specimen far from any marine contexts, it is most likely that the obtained radiocarbon

age is slightly too young from twentieth century preservative contamination. Since the resulting age of 22,840 ± 200 B.P. (OxA-8292) is younger than other radiocarbon measurements for the Dolní Věstonice I site, we believe the latter explanation is most likely. Assuming that this is the case, the OxA-8292 determination *ca* 23,000 B.P. should be taken as a minimum age for the DV 35 femoral diaphysis but sufficient to confirm its derivation from the Dolní Věstonice I levels excavated by Absolon in 1930.

THE DOLNÍ VĚSTONICE 35 FEMORAL DIAPHYSIS - PRESERVATION

The Dolní Věstonice 35 femur retains the proximal diaphysis from the cranial end of the gluteal buttress to approximately midshaft (*Figure 1*). The gluteal tuberosity is largely preserved, lacking its most cranial extent, and there is a suggestion of a posteromedial flare for the base of the lesser trochanter and the distal end of the spiral line extending superomedial from the proximal end of the linea aspera. The distal break is an oblique one extending from proximoanterior to distoposterior along *ca* 46 mm of the diaphysis. Maximum preserved length = 246 mm.

The subperiosteal surface bone is well preserved. There is minor root etching, and there is some thin surface spalling along *ca* 84 mm long and up to 13 mm wide of the anterolateral diaphysis. The bone loss, however, is in a region of no usual muscle markings and was sufficiently thin to have little effect on observed subperiosteal bone contours.

The proximal break of the shaft piece has a large wedge missing from the mid-posterior surface medial of the gluteal tuberosity, lacks bone chips from the anterior surface, and has irregular and rounded breaks to the external surface of the bone extending up to 6.5 mm long from the most proximal point on the piece. Distally, in addition to the oblique break of the diaphysis, there is a small section missing anteriorly. The missing anterior contour, however, can be easily interpolated from the neighbouring subperiosteal and endosteal bone surfaces.

THE DOLNÍ VĚSTONICE 35 FEMORAL DIAPHYSIS - MORPHOLOGY

Materials and methods

Given its association with a European earlier Upper Paleolithic (EUP) technological complex, the DV 35 femur is compared morphometrically to the femora of other European EUP (>20,000 years B.P.) hominids. Of primary interest are those from Dolní Věstonice and neighbouring Pavlov (Jelínek 1954, Vlček 1991, 1997, Vančata 1992, Trinkaus, Jelínek 1997, Trinkaus 1997) and the central European Gravettian sites of Brno, Předmostí and Willendorf (Woldřich 1893, Matiegka 1938, Jelínek 1959). Additional data are included for the western European Gravettian remains from Arene Candide, Barma Grande, Caviglione, Grotte des Enfants, Paglicci, Parabita, and Paviland (comparative data from: Verneau 1906, Cremonesi *et al.* 1972, Mallegni, Parenti 1973, Sergi *et al.* 1974, Formicola 1990, Holt 1999, Trinkaus n.d., pers. meas.), as well as from the earlier Aurignacian human remains from Cro-Magnon, Mladeč and La Rochette (data from: Klaatsch, Lustig 1914, Szombathy 1925, Holliday 1995, Trinkaus pers. meas.). In this comparative sample, DV 3, Grotte des Enfants 5, Parabita 2, Předmostí 4, 9, 10, La Rochette 1 and Willendorf 1 are probably female, Arene Candide IP, Barma Grande 2, Brno 2, Caviglione 1, Cro-Magnon 1, DV 13, 14 , 16, Grotte des Enfants 4, Paglicci 25, Parabita 1, Paviland 1, Pavlov 1 and Předmostí 3, 14 are probably male, and the remainder cannot be reliably assigned gender.

Morphometric comparisons of the DV 35 femur consist of external metrics and cross-sectional geometry. Even though cross-sectional geometric measures (areas and second moments of area) provide more accurate measures of the quantity and distribution of diaphyseal bone and are more amenable to appropriate scaling relative to body mass and limb length (Ruff *et al.* 1993), they are available for only some of the European earlier Upper Paleolithic humans (Trinkaus 1997, n.d., pers. meas., Holt 1999). Consequently, comparisons are also included for external osteometrics, thereby permitting comparisons to a larger sample of individuals (see *Table 1*).

It has been possible to reconstruct diaphyseal cross sections of the DV 35 femur at approximately the midshaft (50% of biomechanical length) and the subtrochanteric (80% of biomechanical length) levels. The 80% position was placed below the distal swelling for the lesser trochanter at the maximum development of the lateral gluteal buttress. The 50% position was determined to be close to the most distal level at which a virtually complete subperiosteal contour is preserved (requiring only trivial completion of the anterior contour). This is a level at which the pilaster appears to be maximally developed. It is also just distal of the level at which the posterolateral surface goes from distinctly concave to flat to minimally convex anterolateral to posterior, a proximodistal diaphyseal morphological shift which frequently occurs near midshaft in femora with prominent pilasters.

The cross sections were reconstructed by transcribing the oriented subperiosteal contours using silicone putty contour molds (Cuttersil Putty-Plus, Heraeus Kulzer Inc.). The anterior, posterior, medial and lateral cortical thicknesses were measured on the original specimen with sliding calipers along the fossilization breaks, using the maximum development of the pilaster to define posterior at midshaft and the maximum development of the gluteal buttress to locate "lateral" at the 80% section. These cortical thicknesses were then used to place limits on the endosteal contour, which was interpolated using the subperiosteal morphology as a guide. The resultant cross sections were oriented using the position of the linea aspera, such that

TABLE 1. Dimensions of the Dolní Věstonice 35 femur and summary statistics for the European earlier Upper Paleolithic comparative sample.

	DV 35	*EUP (Mean ± SD [N])*
Bicondylar length (M-2) (mm)[1]	((498))	462.7 ± 33.6 [24]
Biomechanical length (mm)[2]	((473))	442.4 ± 31.1 [18]
Proximal AP diameter (mm)[3]	24.3	25.0 ± 2.9 [22]
Proximal ML diameter (mm)[3]	35.0	34.8 ± 3.2 [22]
Midshaft AP diameter (M-6) (mm)	34.9	31.0 ± 4.0 [22]
Midshaft ML diameter (M-7) (mm)	27.6	27.1 ± 3.4 [22]
Gluteal tuberosity breadth (mm)[4]	9.0	9.9 ± 2.2 [13]
50% Total area (TA) (mm^2)	588.4	599.3 ± 98.8 [18]
50% Cortical area (CA) (mm^2)	383.8	457.4 ± 93.1 [18]
50% AP second moment (I_x) (mm^4)	33208	34937 ± 13691 [18]
50% ML second moment (I_y) (mm^4)	20320	23363 ± 7549 [18]
50% Max. 2nd moment (I_{max}) (mm^4)	35131	35488 ± 13570 [18]
50% Min. 2nd moment (I_{min}) (mm^4)	18397	22841 ± 7470 [18]
50% Polar moment (J) (mm^4)	53528	58329 ± 20887 [18]
80% Total area (TA) (mm^2)	585.1	678.1 ± 106.4 [17]
80% Cortical area (CA) (mm^2)	473.1	503.7 ± 98.8 [17]
80% AP second moment (I_x) (mm^4)	23306	30955 ± 11824 [17]
80% ML second moment (I_y) (mm^4)	33261	43319 ± 12947 [17]
80% Max. 2nd moment (I_{max}) (mm^4)	37566	49126 ± 16099 [17]
80% Min. 2nd moment (I_{min}) (mm^4)	19001	25155 ± 8385 [17]
80% Polar moment (J) (mm^4)	56567	74281 ± 23535 [17]
80% Theta	29°	26.7° ± 12.1° [17]

Notes to Table 1:

1 See text for approximation of the lengths of the DV 35 femur.

2 Distance parallel to the mid-diaphyseal axis from the intersection of that axis with the proximal neck (usually just medial of the greater trochanter) to the average of the distal condylar surfaces (Ruff, Hayes 1983).

3 Diaphyseal diameters of the diaphysis taken at the level of the maximum development of the posterolateral gluteal buttress, with the mediolateral (ML) diameter being the maximum posterolateral and anteromedial dimension and the anteroposterior (AP) diameter taken perpendicular to the ML one at the same level.

4 Maximum mediolateral (or posteromedial to anterolateral) breadth of the rugose area of the middle of the gluteal tuberosity (Trinkaus 1976).

the sagittal plane at midshaft is defined by the middle of the linea aspera and the mediolateral midpoint of the cylindrical core of the anterior diaphysis.

The reconstructed and oriented cross sections were then digitized, and cross-sectional geometric parameters were computed using a PC-DOS version (Eschman 1992) of SLICE (Nagurka, Hayes 1980). SLICE computes total and cortical areas (TA, CA), anteroposterior and mediolateral second moments of area (I_x, I_y), maximum and minimum second moments of area (I_{max}, I_{min}), and the angle between the orientation of I_{max} and the mediolateral (x) axis (theta). The sum of the I_{max} and I_{min} equals the polar moment of area (J). The cross sections of the comparative sample which includes specimens from all of the above sites except Brno (due to pathological alteration of the diaphyses), Caviglione and Předmostí, were reconstructed similarly, except that the cortical thicknesses were obtained from biplanar radiographs and then corrected for parallax.

Morphometric comparisons are done using full sample summary statistics for the raw measurements (*Table 1*) and bivariate plots for the external osteometrics and cross-sectional parameters (*Figures 4* to *7*), given the difficulties inherent in using ratios. It is assumed that corrections for relative body breadth (see Ruff *et al.* 1993, Trinkaus 1997) are not necessary, since European earlier Upper Paleolithic hominids appear to have similar body proportions despite relatively linear body forms for Arene Candide IP and Dolní Věstonice 14 (Holliday 1995).

Overall size

The 80% and 50% cross sections are 55 mm and 197 mm respectively distal of the most proximal preserved point on the piece. This results in a distance between the 50% and 80% sections of 142 mm. Assuming that the sections are accurately located and separated by 30% of biomechanical length (average of the distal condyles to

the proximal neck on the diaphyseal axis (Ruff, Hayes 1983), the specimen would have a biomechanical length of *ca* 473 mm. Although this length is employed in the comparisons below, it is realized that small errors in the proximodistal locations of these sections would alter the perceived biomechanical length; plus 5 mm would provide a biomechanical length of 490 mm, and minus 5 mm would provide one of 457 mm. The biomechanical length from the section positions provides an estimated femoral bicondylar length (M-2 Bräuer 1988) of *ca* 498 mm (based on a least squares regression of Late Pleistocene *Homo* femora: FemBicLen = 1.025 × FemBiomLen + 13.21, r^2 = 0.976, df = 20) (these would be 515 mm and 482 mm for plus and minus 5 mm on the section locations).

The bicondylar length estimation of 498 mm for the DV 35 femur places it just over one standard deviation above the European EUP mean of 462.7 ± 33.6 mm (*Table 1*). However, the fifteen EUP males provide a mean length of 478.4 ± 28.2 mm, and five of them (Barma Grande 2, Cro-Magnon 1 and 4322, DV 14, and Grotte des Enfants 4) have femoral lengths greater than 490 mm. Three of these EUP males in fact have femoral lengths greater than 500 mm and two of them exceed the higher reasonable estimate of 515 mm for DV 35. Consequently, even though DV 35 is clearly among the longer of the known European EUP femora, it is not exceptional for these generally tall early modern humans.

In contrast, external osteometric measures of overall diaphyseal size (*Table 1*) place DV 35 close to the means for the European EUP sample. Moreover, both of its cortical areas are below the mean EUP values. Since cortical area in part reflects axial loading from body mass, the low cortical areas are unusual given both its midshaft external measurements and estimates of bone length.

External morphology

The DV 35 femur is notable for its combination of a marked and distinct proximolateral gluteal buttress and its prominent pilaster with a wide and rugose *linea aspera*, especially near midshaft.

The anterior diaphyseal surface is a gently mediolaterally rounded surface for most of its preserved length with no distinct muscle markings. It is notable mainly for its clear anterior convexity. It is not possible to determine a standard (Bräuer 1988) curvature index given the absence of the distal half of the diaphysis. However, if a chord is measured on the preserved proximal *ca* 175 mm of anterior shaft contour extending distally from the slight concavity where the anterior greater trochanter blends onto the diaphysis, there is a maximum subtense of 7 mm located 80 mm distal of the proximal end of the chord.

The medial diaphyseal surface exhibits an anteriorly rounded surface which becomes flat along its posterior portion as the pilaster develops distal of the gluteal tuberosity. Toward midshaft, however, the posteromedial surface is slightly concave, largely as a result of a medial projection of the linea aspera and the immediately adjacent

FIGURE 2. Detail of the Dolní Věstonice 35 posterior gluteal tuberosity region.

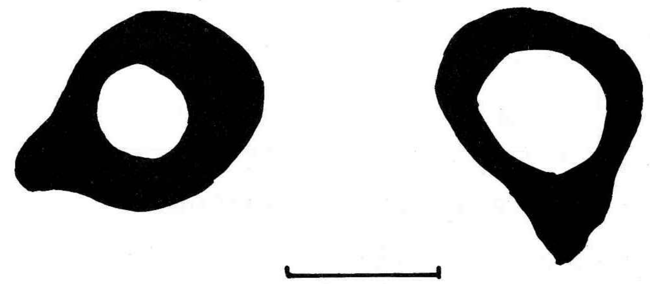
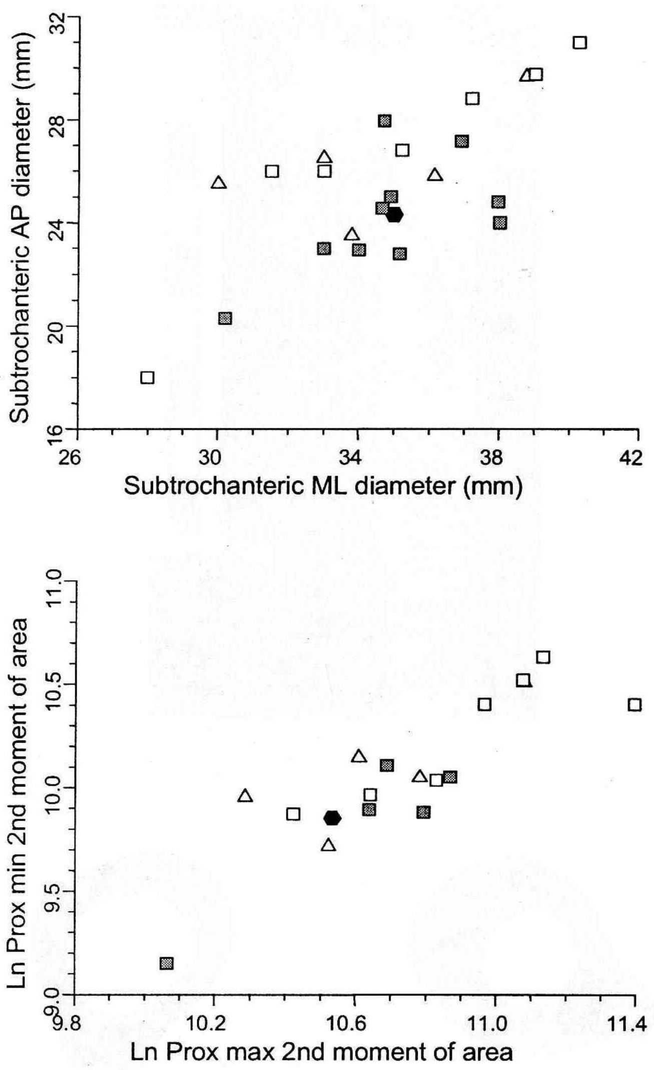


FIGURE 3. 80% (left) and 50% (right) reconstructed cross-sections of the Dolní Věstonice 35 femur, viewed from distal. Anterior is above and lateral is to the left. Scale = 2 cm.

dorsal pilaster. There is a minimal swelling for a medial buttress (see Trinkaus 1976) along the proximal *ca* 90 mm of the diaphysis, which is more palpable than visible.

Laterally, the bone is dominated proximally by a prominent gluteal buttress (*Figure 2*). It begins proximally cranial to the fossilization break, is slightly convex in anteroposterior profile for 30 to 35 mm, then curves medially strongly to blend in with the posterolateral diaphysis at the level of the proximal *linea aspera*. Its total preserved length is 88 mm, and it probably originally extended proximally to a length of *ca* 95 mm.

In lateral view the gluteal buttress is slightly convex anteriorly, and it gives the impression of curving posteriorly at its distal end. However, given the indication of a strong anterior femoral curvature on the specimen, it is likely that its orientation was close to the coronal plane of the



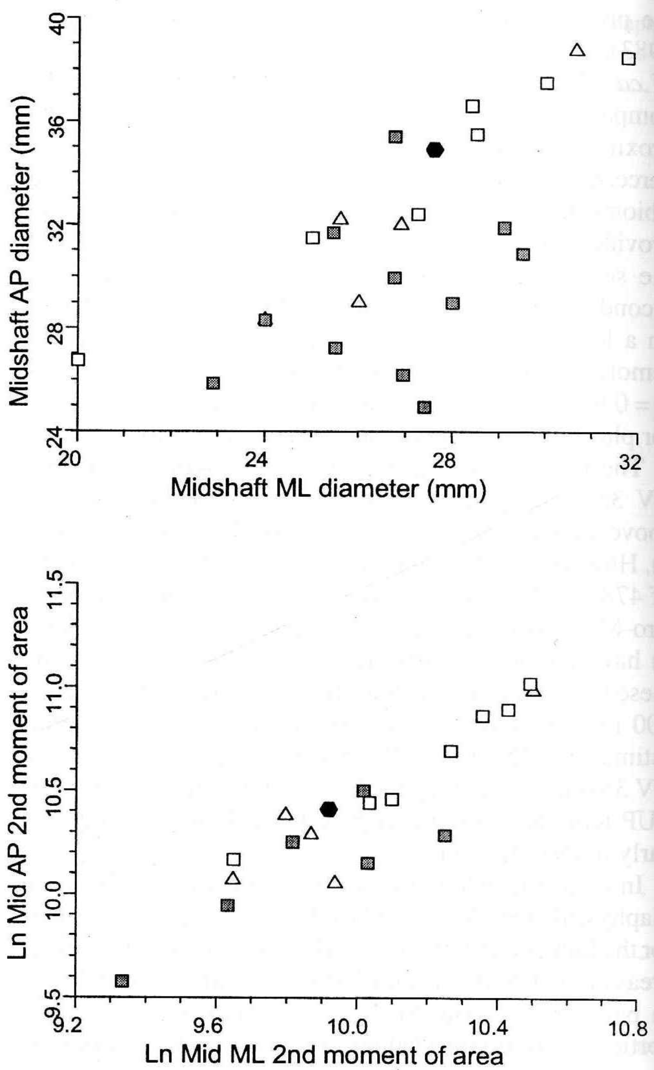


FIGURE 4. Bivariate plots of AP versus ML diaphyseal diameters for the subtrochanteric (proximal) shaft (above) and minimum (≈AP) versus maximum (≈ ML) cross-sectional perpendicular second moments of area for the subtrochanteric (80%) level (below). Solid hexagon: Dolní Věstonice 35; gray squares: central European Pavlovian specimens; open squares: western European Gravettian specimens; open triangles: Aurignacian specimens.

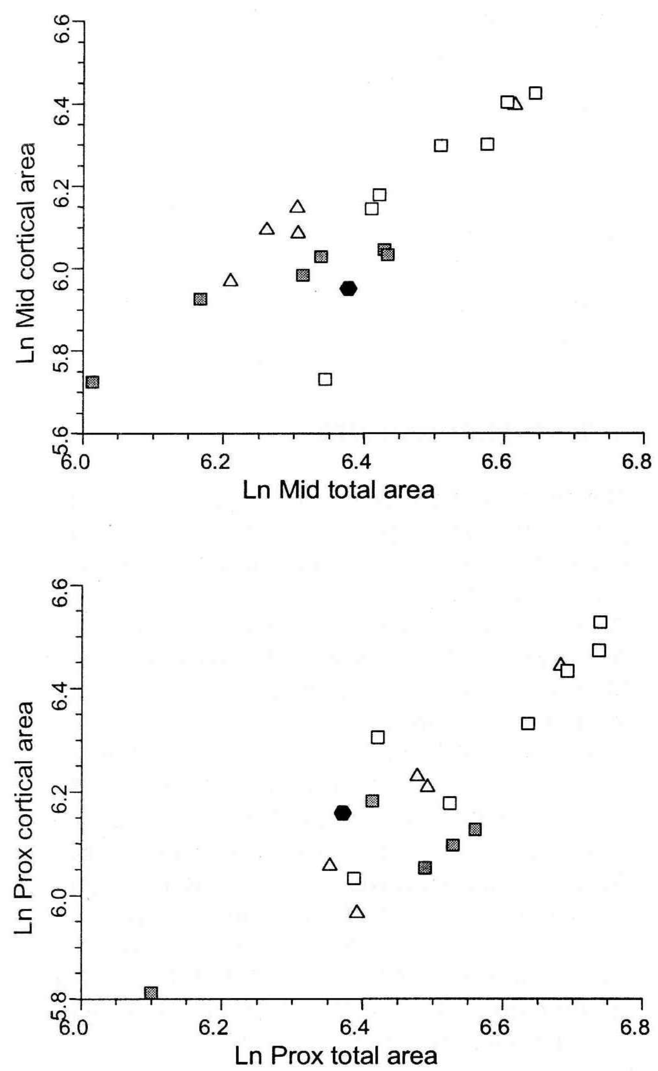
FIGURE 5. Bivariate plots of AP versus ML diaphyseal diameters for the midshaft (above) and cross-sectional perpendicular second moments of area for the same (50%) level (below). Symbols as in *Figure 4*.

longitudinal axis of the diaphysis. The buttress is delimited from the anterior and posterior diaphyseal surfaces by clear proximodistal concavities, or *sulci* (*Figure 3*). Given these concavities, it is possible to measure its anteroposterior thickness at *ca* 12 mm at its proximodistal middle.

The gluteal tuberosity appears, by comparison, to be relatively modest. It is moderately rugose, with no evidence of either a hypotrochanteric fossa or raised medial and lateral margins. Its medial margin blends with the posterior midline muscular markings for *M. adductor magnus* and *M. adductor brevis*. The maximum breadth of the gluteal tuberosity of 9.0 mm is in the middle of the EUP range and slightly below the sample mean (*Table 1*). It is further below a male EUP mean of 10.2 mm (± 1.6 mm, N = 9) if well within its range of variation. An index of gluteal tuberosity breadth to femoral length provides a value of 1.81 for DV 35, which is slightly below the sample of an EUP sample of 2.10 (± 0.44, N = 11).

The lateral diaphyseal surface remains rounded along its anterior half. However, it presents a clear concavity just distal of the gluteal buttress, which then gradually flattens out as it goes distally. It is close to being flat anteroposteriorly at the distal break of the piece.

The proximal *linea aspera* is a slightly raised area, *ca* 13 mm wide at the proximal break, which tapers gradually for its preserved proximal *ca* 60 mm to the beginning of the *linea aspera* proper distal of the gluteal tuberosity. It has a clear division into medial and lateral margins with associated rugosities, and the area between, although raised, is not rugose.



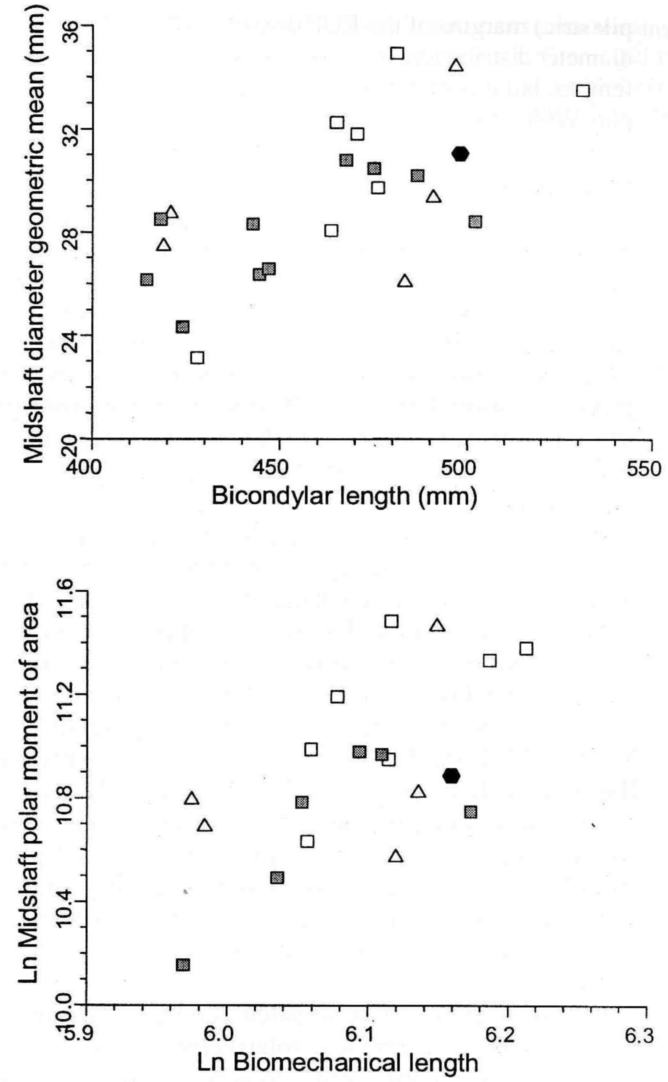


FIGURE 6. Bivariate plots of cortical area versus total area for the midshaft (50% – above) and subtrochanteric (80% – below) levels. Symbols as in *Figure 4*.

FIGURE 7. Bivariate plots of the midshaft external diameter geometric mean versus bicondylar length (above) and the polar moment of area versus biomechanical length (below). Symbols as in *Figure 4*.

The linea aspera extending distaly from the gluteal tuberosity is rounded and smooth, *ca* 6 mm wide. It then gradually becomes increasingly wider, largely as a result of the enlargement of its medial side. At the distal break, near midshaft, it is up to 13.5 mm wide.

In addition, the primary axis of the proximal femur is strongly rotated anteromedial to posterolateral relative to the sagittal plane defined by the position of the pilaster and linea aspera at midshaft. Theta, or the orientation of I_{max} relative to the coronal plane, is 29° for the 80% section. This value is similar to the mean of the variable EUP sample, most of whom have values for this angle between 20° and 40°. All are indicative of anteversion of the femoral head and neck (Ruff 1981).

MORPHOMETRIC COMPARISONS

Diaphyseal shape

These morphological patterns are reflected in comparisons of diaphyseal subtrochanteric and midshaft proportions. Data plots of the subtrochanteric external diameters and maximum versus minimum second moments of area (*Figure 4*) position DV 35 in the middle of the earlier Upper Paleolithic distribution, most of whom are relatively platymeric (Trinkaus 1976). The prominent gluteal buttress of DV 35, although large, is matched by those of other Pavlovian femora (e.g. DV 14), and the overall distribution of bone in the subtrochanteric area is not unusual for these early modern humans. At the same time, the midshaft distributions (*Figure 5*) place DV 35 toward the upper (more pilastric) margins of the EUP distributions. In the external diameter distribution, it is more pilastric than the Předmostí femora, but it is matched or exceeded by DV 3, 14 and 16 plus Willendorf 1.

Diaphyseal robusticity

Comparisons of cortical versus total area provide a contrast for DV 35 between the proximal and mid diaphyseal sections (*Figure 6*). In the midshaft, DV 35 has one of the lowest relative cortical areas, exceeded in this only by Arene Candide IP. In the subtrochanteric region, however, its relative cortical area is at the top of the EUP distribution, exceeded only by Paglicci 25. It is the combination of high proximal versus low midshaft relative cortical area which is unusual for DV 35, more than the proportions within each section.

When the robusticity of the DV 35 femur is assessed using the estimated lengths and either the geometric mean of the midshaft external diameters or the midshaft polar moment of area (*Figure 7*), it appears relatively gracile. Among the central European Gravettian remains, only DV 14 has a more gracile value, although this is approached or matched by the Aurignacian Cro-Magnon 4322 and Mladeč 27 femora plus the very tall Barma Grande 2 specimen. Use of the slightly shorter estimated length (biomechanical length = 457 mm) would place it closer to the middle of the earlier Upper Paleolithic distribution, whereas the slightly longer estimated length (biomechanical length = 490 mm) value would place it among the most gracile of these femora.

It remains unclear to what extent the EUP variation in apparent femoral diaphyseal robusticity is a product of differential lower limb hypertrophy versus contrasting body proportions. Since the degree of femoral diaphyseal robusticity is a product of both relative body mass (determining the baseline loading level on the limbs) and activity levels (influencing additional skeletal hypertrophy) (Ruff *et al.* 1993), the specimens with apparently more gracile femora may be either less hypertrophied or more linear in body build (the latter reducing body mass relative to femoral length). At least DV 14, for whom adequate skeletal remains are preserved, exhibits highly linear body proportions relative to even the rather linear earlier Upper Paleolithic Europeans (Vlček1991, Holliday 1995), and it is possible that some of the other more gracile specimens are similarly linear in body build.

Given these considerations, it remains unclear whether the relatively gracile position of DV 35 reflects a less hypertrophied femur relative to other EUP specimens or one of the more linear body builds for the sample. Without more complete associated remains plus the known variability within the Dolní Věstonice sample (e.g. DV 13 versus DV 14), it is not possible to choose between these two non-mutually-exclusive alternatives.

CONCLUSION

The Dolní Věstonice 35 femoral diaphysis therefore increases our sample of hominid femoral remains from the central European Gravettian, being notable for its pronounced and morphologically distinct gluteal buttress, its pronounced pilaster, its thin cortical bone near midshaft, and its moderately gracile femoral diaphysis. In other features, it is close in morphology to the other known femora of large European earlier Upper Paleolithic individuals.

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