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Dolní Věstonice: autopodium analysis of the Palaeolithic population

Dolní Věstonice: analýza autopodií paleolitické populace

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Abstract: The autopodium of man (*ossa metacarpalia et metatarsalia, phalanges*) from the Palaeolithic population from Dolní Věstonice (*Homo sapiens sapiens*) was compared with that of Neolithic and mediaeval populations.

Functional anatomy of the dorsal and palmar interossei muscle attachments of the hand and dorsal and plantar interossei muscle attachments of the foot were studied. Opponens pollicis attachments were also studied.

Insertions of these muscles display the same range as the modern human. The middle phalanges of DV XV (DV = Dolní Věstonice) and DV XVI have well-developed flexor sheath ridges. The most developed flexor sheath is shown by individual DV XVI. Metatarsals 5 show the lateral curvature. Incisure on the base of the metatarsal is developed on both left and right metatarsals 4 of DV XV and DV XIV. This incisure corresponds to shape changes of the cuneiform (*os cuneiformes laterale*). Such changes of shape did not limit their movement. Observed variation could be considered an epigenetic sign, influenced by genetic factors. Individuals showing such variation may possibly be related.

Palaeolithic males from Dolní Věstonice are the same as Neolithic males, but are more robust than mediaeval males on the basis of osteometric data. The greatest differences are between Neolithic and mediaeval females. These differences between populations are statistically significant at the 90–99 % level. Marked differences between Neolithic and mediaeval populations, especially females, were established. The above-mentioned differences can be interpreted as the receding of sexual dimorphism and microevolutionary changes which became more pronounced from the Neolithic.

Barnett-Nordin's index revealed reduction of bone material in DV XV as a result of osteoporosis (see also VLČEK 1992). Normal indices occur in other individuals.

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INTRODUCTION

In the evolution of the genus *Homo* the autopodium played a significant role. During the transition from quadrupedalism to bipedalism, there were marked changes in the foot. As a consequence of bipedalism, the longitudinal arch developed, enabling man to walk on hard surfaces. This last evolutionary change occurred more than 4 million years ago. A further consequence of bipedalism was the creation of the hand, together with hand-brain co-ordination.

The Dolní Věstonice site is unique in that it has yielded many complete skeletons of Palaeolithic man. These remains are extremely important from a phylogenetic point of view. The autopodium of man (*ossa metacarpalia et metatarsalia, phalanges*) from a Palaeolithic population (Dolní Věstonice-*Homo sapiens sapiens*) was compared with those of Neolithic and mediaeval populations.

MATERIAL AND METHODS

Samples

The Department of anthropology of the National Museum of the Czech Republic provided samples for analysis. Sixty individuals (30 males and 30 females) are from medieval sites (Rajhrad, Sázavský kostel), 10 (five males and five females) from Neolithic locations (Moravská Nová Ves, Pavlov-Horní Pole, Moravčany). Five Palaeolithic specimens are from the collection of the Department of Paleolithic and Paleoethnology, Archaeological Institute, the Czech Academy of Science, Brno, and Moravian museum, Brno.

Individuals with complete, or nearly complete (see tab. 39), bones of the hands and feet were selected for inclusion in the sample. Adults between 20 and 45 years of age were initially reviewed. The upper age limit was established to avoid degenerative bone changes, the lower limit to ensure skeletal maturity.

Preservation of Palaeolithic population

DV III

Hand remains

The original skeleton could not be studied and I therefore used information from JELÍNEK and TRINKAUS (1997).

Metacarpal 1-right: complete head, palmar and radial diaphysis, with the distal three-quarters of the dorsal and ulnar diaphysis.

Metacarpal 1-left: head and diaphysis in fragments.

Metacarpal 2-right: complete bone with damage to the dorsal head.

Metacarpal 2-left: diaphysis.

Metacarpal 3-right: diaphysis and crushed base.

Metacarpal 3-left: base and diaphysis. Fragmentary head *in situ*.

Metacarpal 4-right: diaphysis.

Metacarpal 4-left: diaphysis and base, the latter abraded palmar.

Metacarpal 5-right: base and proximal two-thirds of the diaphysis.

Metacarpal 5-left: base and diaphysis.

Proximal phalanx 1-left: diaphyseal fragments.

Proximal phalanx 2-left: diaphyseal fragments.

Proximal phalanx 3-right: distal two-thirds of the diaphysis with the head.

Proximal phalanx 4-right: complete, with abrasion to the dorsal base.

Proximal phalanx 5-right: complete, with damage to dorso-ulnar base.

Middle phalanx 2/3-right: complete, with damage to mid-dorsal base.

Middle phalanx 4-right: diaphysis and head.

Middle phalanx 5-right: complete bone.

Distal phalanx 1-left: damaged base, diaphysis and apical tuft.

Distal phalanx 2/3/4-right: complete bone. Most likely from 2 or 3.

Distal phalanx 2/3/4-right: complete bone. Most likely from digit 2 or 3.

Distal phalanx 2/3/4-right: complete with damage to palmar base.

Distal phalanx 5-right: complete bone.

Foot remains

Metatarsal 2-left: complete diaphysis and the base with damage to the plantar articulation.

Metatarsal 3-left: complete diaphysis, base with plantar lateral abrasion, and the crushed head.

Metatarsal 4-left: complete diaphysis, base with damage to its plantar third, and the head crushed into the proximal phalanx.

Metatarsal 5-left: complete bone with surface damage on the cuboid facet and the medial head.

Proximal phalanx 2?-side indet.: complete base with beginning of the diaphysis.

Proximal phalanx 3-left: complete head, diaphysis missing the proximo-plantar third of the surface, and the base largely present but fused to fragments of the metatarsal 3 head.

Middle phalanx 2/3?-left?: complete bone found on the left ilium. Side based on association with left distal phalanx 1.

Distal phalanx 1-left: complete bone with abrasion to the dorsolateral base.

Distal phalanx 2/3?-left: complete bone. Side based on association with left distal phalanx 1.

Distal phalanx 5?-left?: complete bone. Side based on association with left distal phalanx 1.

DV XIII

The data are from the own research of the first author with consideration to TRINKAUS (1999a, b).

Hand remains

Metacarpal 2-left: complete bone.

Metacarpal 3-left: complete bone.

Metacarpal 2-right: complete bone with small damage on the shaft and small abrasion to the lateral side of the base.

Proximal phalanx 2-left: complete bone with small damage to the dorsal base and head.

Proximal phalanx 3-left: complete bone with small damage on the proximal third of the dorsal shaft and on the palmar medial corner.

Proximal phalanx 4-left: complete bone with small damage on the dorso-lateral base and rupture on the palmar shaft.

Middle phalanx 3-left: complete bone.

Middle phalanx 4-left: complete bone.

Middle phalanx 5-left: complete bone.

DV XIV

Hand remains

Metacarpal 2-right: only diaphysis.

Other metacarpal remains cannot be identified.

Proximal phalanx 1-right: complete bone with small damage on the palmar shaft and root etching.

Proximal phalanx 3-right: complete base, the head and two-thirds of the dorsal shaft and on the palmar medial corner.

Proximal phalanx 4-right: complete bone with small root etching.

Middle phalanx 2-left: complete bone with small damage on the palmar shaft.

Middle phalanx 3-right: complete bone.

Foot remains

Metatarsal 1-right: base and two-thirds of diaphysis with root etching.

Metatarsal 1-left: a part of proximal joint surface with medial side of the base.

Metatarsal 2-right: base and two-thirds of diaphysis with root etching.
 Metatarsal 2-left: dorsal half of the base without sides and shaft with root etching.
 Metatarsal 3-right: base and three-quarters of diaphysis with root etching.
 Metatarsal 4-right: base and two-third of diaphysis with root etching.
 Metatarsal 5-right: base and two-thirds of diaphysis with root etching.
 Metatarsal 5-left: base and two-thirds of diaphysis with root etching.
 Proximal phalanx 1-right: complete bone with dorsal corner damage and root etched.
 Distal phalanx 1-right: distal end of bone is broken off because the epiphysis was not attached.

DV XV

Hand remains

Metacarpal 2-right: complete bone with the damage of the palmar head margin.
 Metacarpal 3-left: damaged base and root etched shaft.
 Metacarpal 3-right: base and two-thirds of diaphysis.
 Metacarpal 4-right: complete bone.
 Proximal phalanx 2-right: complete bone.
 Proximal phalanx 3-right: complete bone.
 Proximal phalanx 5-right: head and diaphysis.
 Middle phalanx 2-right: complete bone.
 Middle phalanx 3-right: complete bone.
 Middle phalanx 4-right: complete bone.
 Middle phalanx 5-right: complete bone.
 Distal phalanx 2-5-right: complete bone.

Foot remains

Metatarsal 1-left: complete bone with root etching.
 Metatarsal 2-left: base and diaphysis with root etching.
 Metatarsal 3-right: base and two-thirds of diaphysis.
 Metatarsal 3-left: base and two-thirds of diaphysis with root etching.
 Metatarsal 4-right: complete bone with the head erosion and root etched.
 Metatarsal 4-left: complete bone with root etching.
 Metatarsal 5-left: complete bone with damage to the proximal tubercle and medial head.
 Proximal phalanx 2-right: complete bone.
 Proximal phalanx 3-right: complete bone.
 Proximal phalanx 5-left: complete bone with damage of the base.

DV XVI

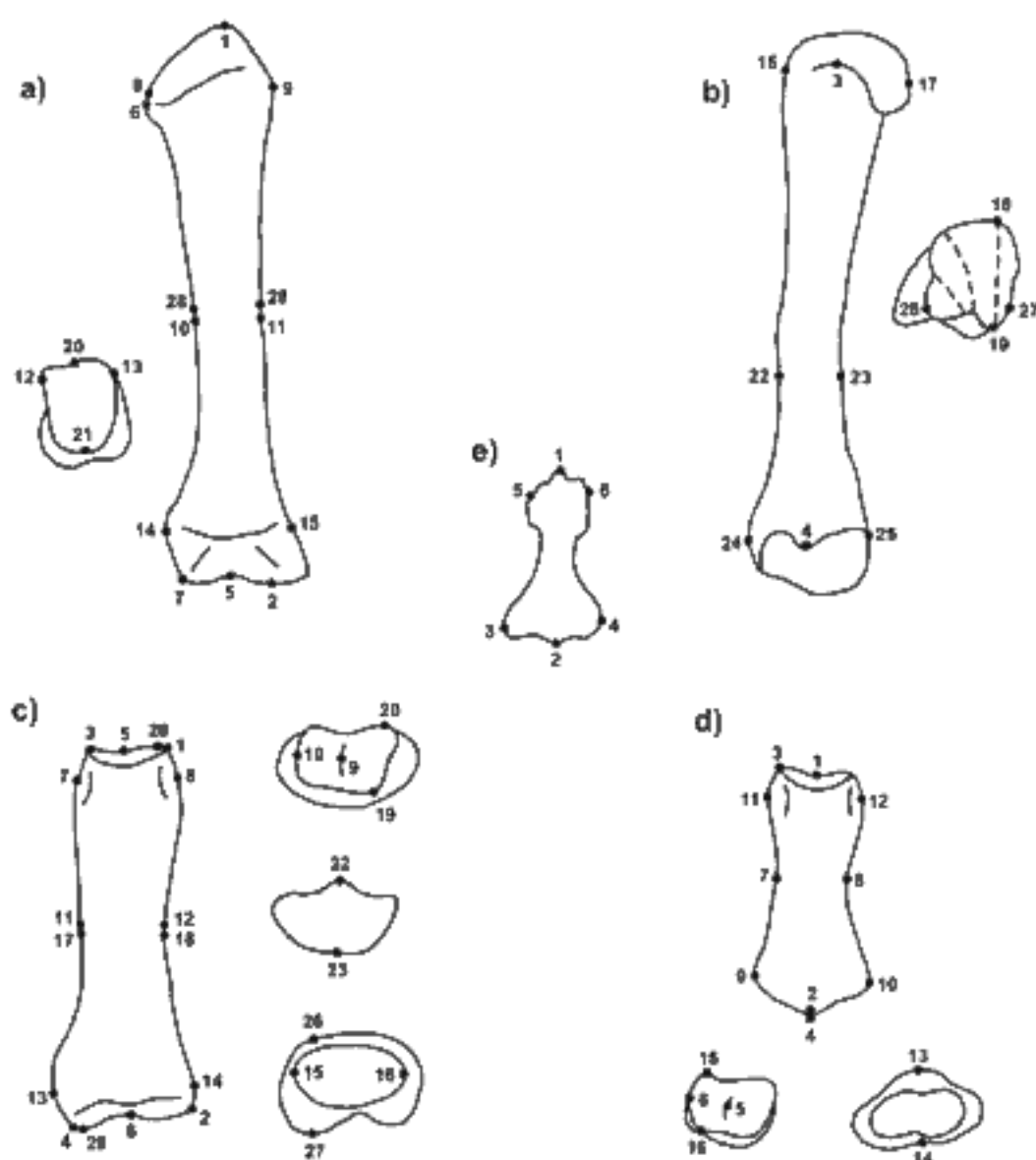
Hand remains

Metacarpal 1-right: diaphysis, head and base with damage of dorsale surface.
 Metacarpal 2-left: diaphysis and base.
 Metacarpal 2-right: complete bone.

Metacarpal 3-left: base and shaft with damage to the dorso-lateral base.
 Metacarpal 3-right: complete bone with damage to the head and base.
 Metacarpal 4-left: complete bone with damage to the dorsal head and dorso-medial base.
 Metacarpal 4-right: diaphysis with lateral side of the base.
 Metacarpal 5-right: lateral side of diaphysis.
 Metacarpal 5-left: complete base.
 Proximal phalanx 1-right: complete bone with damage on dorsal shaft and root etching.
 Proximal phalanx 2-left: only proximal joint surface.
 Proximal phalanx 2-right: complete bone.
 Proximal phalanx 3-right: complete bone.
 Proximal phalanx 3-left: complete bone with damage on the dorso-medial base and dorso-lateral base.
 Proximal phalanx 4-left: complete bone with damage on the dorso-medial base.
 Proximal phalanx 4-right: head and two-third of the diaphysis.
 Proximal phalanx 5-?: only diaphysis.
 Middle phalanx 2-left: complete bone.
 Middle phalanx 2-right: complete bone.
 Middle phalanx 3-left: complete bone.
 Middle phalanx 3-right: complete bone.
 Middle phalanx 4-left: complete bone.
 Middle phalanx 4-right: complete bone.
 Distal phalanges are entire.

Foot remains

Metatarsal 1-right: diaphysis and base.
 Metatarsal 1-left: only midshaft.
 Metatarsal 2-right: base and diaphysis with damage of the base.
 Metatarsal 2-left: diaphysis and base.
 Metatarsal 3-left: diaphysis and base with damage sides.
 Metatarsal 3-right: diaphysis and base without tuberosity.
 Metatarsal 4-left: only diaphysis.
 Metatarsal 4-right: diaphysis and base without tuberosity.
 Metatarsal 5-left: only diaphysis.
 Metatarsal 5-right: base and diaphysis.
 Proximal phalanx 1-right: complete bone with damage around dorsal, medial and lateral base. Fused to distal phalanx 1.
 Proximal phalanx 2-right: complete bone with damage of the base.
 Proximal phalanx 4-right: complete bone with damage of the base.
 Proximal phalanx 5-right: base and plantar diaphysis.
 Middle phalanx 2-right: complete bone.
 Middle phalanx 4-right: base and diaphysis.
 Middle phalanx 5-right: complete bone.
 Distal phalanx 1-right: complete bone. Fused to proximal phalanx 1. Apical tuft medially damaged.
 Distal phalanx 4-right?: complete bone with medio-plantar erosion.
 Distal phalanx 5-right?: complete bone.



1. Measurement procedure of individual autopodium bones (after DUERST-BERN 1926).

Measurement

The following measurements were made using the method of DUERST-BERN (1926).

Metacarpalia, metatarsalia (figs. 1a, b)

- 1) Maximum length (1–2): the straight-line distance from the most proximal point of the joint surfaces of the base to the most distal elevation of the joint surface of the head.
- 2) Lateral length (3–4): the straight-line distance from the external side of the joint surfaces of the head to the lateral process of the joint surfaces of the base.
- 3) Sagittal length (1–5): the straight-line distance between points on the proximal and distal ends running in the Sagittal plane of the bone.
- 4) Medial length (6–7): the straight-line distance from the most medial margin of the joint surface of the head to the external joint surface of the base.
- 5) Maximum width of the distal end of the bone (8–9): the distance from the most lateral point of the base to the most medial point of the base.
- 6) The smallest width of the shaft (10–11): the smallest width between the internal and external sides of the bone.
- 7) Width of the distal joint surface (12–13): the distance of the distal joint surface between the most medial and the most lateral point.

8) Width of the proximal end of the bone (14–15): the distance between the most lateral point of the bone and the most medial point of the proximal end of the bone.

9) Maximum height of the distal end of bone (16–17): the distance from the most dorsal point to the most plantar point of the distal end of the bone.

10) Maximum height of the proximal end of the bone (18–19): the distance from the most dorsal point to the most plantar point of the proximal end of the bone.

11) Maximum height of the distal joint surface (20–21): the distance from the most dorsal point to the most palmar point of the dorsal joint surface.

12) The smallest height of the shaft (22–23): the smallest distance from the palmar side to the distal side of the bone in the middle of the bone.

13) Maximum height of the proximal end of the bone (24–25): the distance between the palmar and dorsal edges of the proximal end of the bone.

14) Maximum width of the proximal joint surface (26–27): the maximum distance between the external and internal edges of the proximal joint surface.

15) Height in the middle of the bone (28–29): the distance between the dorsal and palmar sides in the middle of the bone.

Proximal phalanx (fig. 1c)

- 1) Lateral length (1–2): the straight-line distance between the most proximal point of the proximal joint surface on the external half of the bone to the most distal point of the joint surface on the same side of the bone.
- 2) Medial length (3–4): the straight-line distance between the most proximal part of the proximal joint surface on the internal side of the bone and the most distal point of the joint surface on the same side of the bone.
- 3) Sagittal length (5–6): the straight-line distance between the base of the sagittal groove of the distal joint surface and the base of the groove of the proximal joint surface.
- 4) Maximum width of the distal end of the bone (7–8): the distance between the most lateral and the most medial point of the distal end of the bone.
- 5) Width of the middle part of the distal joint surface (9–10): the distance from the external side of the distal joint surface to the middle of the sagittal groove.

- 6) The smallest width of the shaft (11–12): the distance between the external and internal sides of the bone.
- 7) Maximum width of the proximal end of the bone (13–14): the maximum distance from the most lateral to the most medial point of the bone.
- 8) Maximum width of the proximal joint surface (15–16): the maximum measured distance across the widest part of the bone.
- 9) Maximum height of the distal end of the bone (17–18): the distance from the most dorsal point to the most palmar of the bone.
- 10) Height of the shaft in the thinnest part of the shaft (19–20): the distance between the dorsal and the palmar point in the thinnest part of the bone.
- 11) The smallest height of the shaft (20–21): the smallest height of the shaft of the bone.
- 12) Height in the middle of the shaft (22–23): the height in the middle of the bone.
- 13) Maximum height of the proximal end of the bone (26–27): the distance from the most plantar point to the most dorsal point of the proximal end of the bone.
- 14) Maximum length (28–29): the straight-line distance from the top of the condylus of the distal end of the bone to the most proximal end of the bone.

Middle phalanx (fig. 1d)

- 1) Sagittal length (1–2): the distance from the sagittal ridge of the distal joint surface to the sagittal groove of the proximal joint surface.
- 2) Width of the medial part of the distal joint surface (3–4): the distance from the sagittal groove to the edge of the proximal joint surface.
- 3) Height of the shaft (5–6): the distance from the point on the dorsal side to the point on the palmar side in the middle of the bone.
- 4) Maximum length (7–8): the maximum distance from the connecting line of the joint apices of head to the base of the bone.
- 5) Maximum width of proximal end of the bone (9–10): the maximum distance from the base to the external edge of the distal end of the bone.
- 6) Maximum width of the distal end of the bone (11–12): the maximum distance from the internal side to the external side of the distal end of the bone.

- 7) Height of the proximal end of the bone (13–14): the distance from the most dorsal point to the most palmar point of the proximal end of the bone.
- 8) Height of the distal end of the bone (15–16): the distance from the most dorsal point to the connecting line of the most palmar rising point of the head.

Distal phalanx (fig. 1e)

- 1) Maximum length (1–2): the maximum distance from the most proximal point of the proximal joint surface to the most distal point of the distal end of the bone.
- 2) Maximum width of the proximal end of the bone (3–4): the maximum distance between the internal and external points of the topical tuft.
- 3) Maximum width of the distal end of the bone (5–6): the maximum distance between the internal and external points of the distal end of the bone.

Statistical analyses

Average and standard deviation values are shown in Tables 1–24. The two-way t-test (90–99 % significance level) was used to compare median values for mediaeval and Neolithic populations and for Neolithic and Palaeolithic populations. The mediaeval and Palaeolithic populations were not compared because the latter group consists of only five individuals.

Conformity of dispersion was examined by the Levene test. Where conformity of dispersion does not occur, the Mann-Whitney test was used. The statistics are shown in Tables 25–37.

The Barnett-Nordin index

This corticodiaphysis index is determined from measurements on metacarpals 2–4 (BARNETT and NORDIN, 1960, fig. 2) in order to distinguish osteoporosis.

$$\text{Index} = \frac{D-d}{D} \cdot 100 \%$$

where D – external average, d – internal average.



2. Measurement of the Barnett-Nordin index.

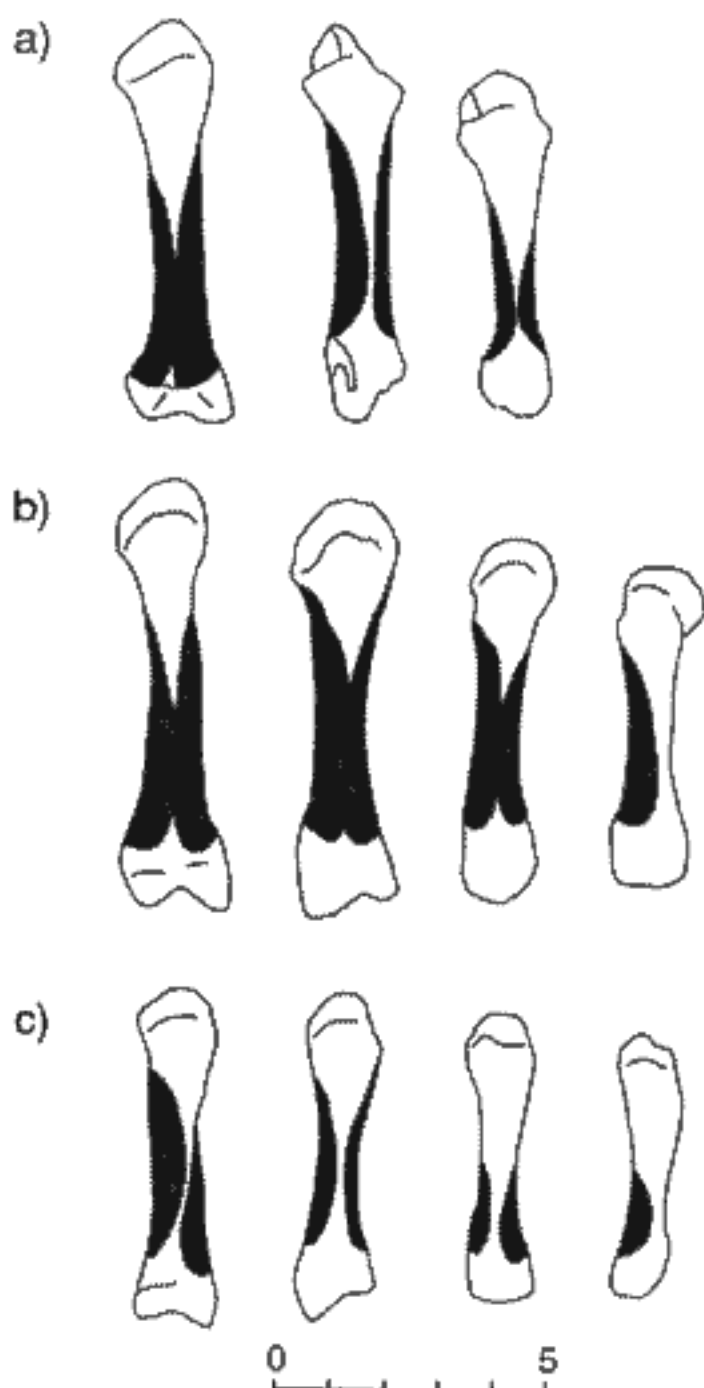
RESULTS

Morphology and functional anatomy

DV III

Hand

Data derived from JELÍNEK and TRINKAUS (1997). The metacarpal bones are notable only for the relative weak-



3. Comparison of the trace of the interosseous (*mm. interossei dorsales*) muscle in specimens from Dolní Věstonice (a), modern human (b) and neandertal man (c). (b) and (c) after VLČEK (1976); (a) FIŠÁKOVÁ.

ness of their muscular markings. There are traces of interosseous muscle origin crests on the middle metacarpal diaphyses, but the *m. opponens pollicis* crest on metacarpal 1 is more of a distinct line than a crest. The *m. abductor digiti minimi* tubercle on metacarpal 5 is small, and there is no trace of an insertion for *m. opponens digiti minimi* on the shaft of metacarpal 5. The base of the right metacarpal 2 exhibits a strongly oblique capitate facet (42°), but the styloid process on the left metacarpal 3 is modest in size and projects only a little beyond the main carpal facet. Both metacarpal 5 bases are radio-ulnar concave and are strongly deviated radially.

The heads of proximal phalanges 4 and 5 are ulnar deviated, whereas the head of the proximal phalanx 3 is deviated moderately radially (JELÍNEK and TRINKAUS 1997).

The flexor sheath attachments on the proximal phalanges are clear but modest in size. These are matched by very small apical tufts on the distal phalanges of all five digits.

Foot

The metatarsal bone includes well demarcated crests on the dorsal diaphysis. The metatarsal 5 has the lateral curvature of the diaphysis and the small size proximal metatarsal tuberosity. The proximal phalanx 3 diaphyseal diameters are unequal. Distal phalanx 1 has a small apical tuft. The apical tuft on the distal phalanx 5 is greatly reduced and shortened.

DV XIII

Hand

There are traces of the interosseous (*mm. interossei dorsales et palmares*) muscle origin crests on the middle metacarpal diaphyses (pl. I/1).

The metacarpal exhibits growth linea. There are clear crests for the attachment of flexors on the proximal phalanges.

DV XIV

Hand

There are traces of the interosseous (*mm. interossei dorsales et palmares*) muscle origin crests on the middle metacarpal diaphyses.

Clear attachments for flexors are seen on the proximal phalanges (pl. I/2); the middle phalanges show well-developed attachments for flexors of fingers (pl. I/2).

Foot

There are traces of the interosseous (*mm. interossei dorsales et plantares*) muscle origin crests on the middle metatarsal diaphyses. On the metatarsal 5 is seen lateral curvature. Incisure is developed on both left and right metatarsal 4.

DV XV

Hand

On the metacarpals 2 and 4 right (pl. II/1) there are the clear traces of the interosseous (*m. interossei dorsales et palmares*) muscle origin crests on the middle metacarpal diaphyses.

Proximal phalanges are unusually long and there are no crests. Middle phalanges (with the exception of middle phalanx 4) do not display crests.

Foot

There are clear traces of the interosseous (*m. interossei dorsales et plantares*) muscle origin crests on all metatarsals. On metatarsal 4 left and right there is the incisure (pl. II/2). This is the same incisure as that of specimen DV XIV. The metatarsal 4 is thickened, but pathological cause could not be demonstrated. On metatarsal 5 there is the lateral curvature. The flexor sheath attachments on the proximal phalanges are not clear.

DV XVI

Hand

There are traces of the interosseous (*mm. interossei dorsales et palmares*) muscles origin crests on the middle metacarpal diaphyses (pl. III/1). There are two crests on the dorsal side of metacarpal. On metacarpal 1 there are clear signs of the muscle origin of *m. interosseous primus* and *m. opponens pollicis* (pl. III/1).

The flexor sheath attachments on the proximal pha-

langes are strongly developed (pl. III/2). The flexor sheath attachments on the middle phalanges are also well developed (pl. II/3). The flexor (*M. flexor digitorum profundus*) sheath attachments on the distal phalanges are clear.

Foot

There are traces of the interosseous (*mm. interossei dorsales et plantares*) muscle origin crests on the middle metatarsal diaphyses (pl. III/3).

The flexor sheath attachment (*m. extensor hallucis longus*) on the distal phalanx is clear. On the metatarsal 5 left and right there is lateral curvature. The joint surface for the articulation with metatarsal 2 is clear.

Pathology

The Barnett-Nordin index was calculated for each individual from the X-ray images (pls. IV/1 and IV/2).

DV XIV: 71.42 %.

DV XV: 50.00 %.

DV XVI: II, III, a IV left 45.85, 57.10 and 40.00 %.

Statistical analysis

Basic statistical value

Average and standard deviation values are shown in Tables 1–24.

Two-way t-test

Metacarpal

The average value for mediaeval and Neolithic males differ in the following dimensions: lateral length, the smallest width of shaft, width of distal joint surfaces, maximum width of the distal end of the bone, maximum height of the distal joint surfaces, the smallest height of the shaft and the maximum height of the proximal joint surface (tab. 25).

The average Neolithic and Palaeolithic males differ in the following dimensions: lateral length, width in the middle of the bone, maximum width of the distal end of the bone, maximum width of the proximal end of the bone and the height of the proximal end of the bone (tab. 26).

Mediaeval and Neolithic females differ in the following ways: maximum length, lateral length, sagittal length, medial length, height in the middle of the bone, maximum width of the distal end of the bone, the smallest width of the shaft, width of the distal joint surface, maximum width of the proximal end of the bone, height of the distal end of the bone and the maximum height of the distal joint surface (tab. 27).

Neolithic and Palaeolithic females differ in the average value for sagittal length and maximum width of the distal end of the bone (tab. 28).

Proximal phalanx

Mediaeval and Neolithic males differ in the following dimensions: medial length, sagittal length, maximum width of the distal end of the bone, width of the middle part of the joint surface, maximum width of the proximal joint surface, width in the middle the bone and the height of the shaft in the thinnest part of the bone (tab. 29).

Neolithic and Palaeolithic populations differ in the following dimensions: the smallest width of the shaft and the maximum height of the proximal end of the bone (tab. 30).

Mediaeval and Neolithic females display differences in the following dimensions: lateral length, medial length, sagittal length, maximum width of the distal end of the bone, width in the middle part of the joint surface, the smallest width in the middle of shaft, maximum width of the proximal end of the bone, maximum width of the proximal joint surface, width in the middle of shaft, maximum height of the distal end of the bone, height in the thinnest part of the shaft, the smallest height of the shaft, maximum height of the proximal end of the bone and the maximum length (tab. 31).

Neolithic and Palaeolithic females do not display statistically significant differences.

Middle phalanx

Differences between mediaeval and Neolithic males are seen in the following dimensions: maximum length, maximum width of the proximal end of the bone, maximum width of the distal end of the bone and the height of the proximal end of the bone (tab. 32).

Neolithic and Palaeolithic males differ in height of shaft (tab. 33).

Mediaeval and Neolithic females differ in the following dimensions: sagittal length, maximum length, maximum width of the proximal length of the bone, maximum width of the distal end of the bone and the height of the proximal end of the bone (tab. 34).

Neolithic and Palaeolithic females differ in sagittal length and the width the middle part of the distal joint surface (tab. 35).

Metatarsal

Differences between mediaeval and Neolithic males occur in the following: maximum length, lateral length, sagittal length and the width in the middle of the shaft (tab. 36).

Neolithic and Palaeolithic differ in the maximum height of the proximal end of the bone (tab. 37).

Statistically significant differences do not occur between mediaeval, Neolithic and Palaeolithic females.

Proximal phalanx

Statistically significant differences do not occur between mediaeval, Neolithic and Palaeolithic populations.

Table 1. Basic statistical value

Average										
<i>Metacarpals - female</i>										
<i>Middle Age</i>										
	I	II	left III	IV	V		I	II	right III	IV V
Maximum length	43.8	65.4	65.2	55.5	52.1		44.0	67.2	65.0	54.5 51.9
Lateral length	36.9	58.4	52.1	47.9	47.7		36.2	59.6	53.2	47.1 48.5
Sagittal length	42.8	63.0	61.8	54.9	51.4		43.3	64.6	62.0	55.5 51.2
Medial length	36.6	58.0	54.3	46.7	43.6		36.6	59.0	56.3	46.5 43.5
Max. width of the distal end	14.2	13.5	12.8	11.6	11.1		14.4	13.9	13.7	11.9 11.4
Smallest width of the shaft	10.8	04.4	07.3	06.0	06.9		10.9	07.9	07.8	06.4 07.0
Width of the distal joint surface	12.1	10.4	10.2	09.4	08.8		12.3	10.9	11.0	09.5 09.6
Max. width of the prox. end	14.3	15.6	12.6	10.7	12.1		14.7	15.6	13.0	11.0 13.1
Max. height of the distal end	12.0	13.7	12.6	11.0	11.2		12.5	13.8	12.9	11.0 11.3
Height of the prox. end	12.9	13.9	11.6	08.7	09.3		12.9	14.0	12.5	09.1 09.6
Max. height of the dist. j. surf.	10.8	12.9	12.6	11.5	10.9		11.6	13.1	13.0	11.6 11.1
Smallest height of the shaft	07.6	08.0	08.2	06.8	06.3		07.5	08.2	08.0	06.2 07.1
Max. height of the prox. j. surf.	13.9	15.1	15.2	11.5	10.7		14.9	15.2	15.1	11.8 10.6
Max. height of the prox. end	14.1	15.1	15.1	11.4	10.5		13.9	15.3	15.4	11.3 10.5
Average in the middle of the shaft	11.4	07.6	07.4	06.3	07.2		11.0	08.2	08.0	06.2 07.1
Standard deviation										
<i>Metacarpals - female</i>										
<i>Middle Age</i>										
	I	II	left III	IV	V		I	II	right III	IV V
Maximum length	02.6	03.2	04.7	03.3	03.4		02.8	04.4	05.1	06.2 03.0
Lateral length	01.8	04.7	04.2	05.1	03.3		03.2	04.8	04.5	03.8 03.5
Sagittal length	01.8	02.9	03.9	03.0	03.4		02.9	04.2	04.5	04.9 03.2
Medial length	03.0	03.9	03.7	03.6	03.4		03.0	04.9	05.7	04.1 03.2
Max. width of the distal end	01.9	01.8	01.2	01.7	00.9		01.9	01.7	01.7	01.3 01.1
Smallest width of the shaft	01.0	00.8	00.7	00.8	00.7		00.9	00.8	00.7	02.1 01.2
Width of the distal joint surface	01.7	02.0	02.1	01.8	01.7		01.6	02.0	02.3	01.7 01.5
Max. width of the prox. end	01.7	01.8	01.6	00.9	01.0		01.7	01.8	01.3	01.4 02.1
Max. height of the distal end	01.0	01.6	01.5	01.8	01.0		02.1	01.7	01.9	01.2 00.9
Height of the prox. end	01.5	00.8	01.0	00.8	00.7		01.3	02.2	02.2	01.7 01.4
Max. height of the dist. j. surf.	00.6	00.7	00.8	00.7	00.7		01.5	01.3	01.3	01.1 00.8
Smallest height of the shaft	00.6	00.8	01.0	01.0	01.2		00.8	00.7	01.0	01.3 00.7
Max. height of the prox. j. surf.	02.8	01.4	01.3	01.1	01.2		01.7	03.7	02.7	01.9 01.5
Max. height of the prox. end	01.1	01.7	01.4	01.3	01.0		01.6	01.7	01.4	01.3 01.2
Average in the middle of the shaft	00.7	00.9	00.9	00.6	00.3		00.7	00.9	00.9	00.8 01.1

Table 2. Basic statistical value

Average										
<i>Metacarpals - female</i>										
<i>Neolithic</i>										
	I	II	left III	IV	V		I	II	right III	IV V
Maximum length	46.5	69.4	71.3	57.2	58.8		47.2	71.1	70.6	59.5 56.3
Lateral length	38.7	61.0	55.0	50.0	54.4		38.6	61.8	56.6	47.5 52.9
Sagittal length	43.9	66.8	67.7	56.1	52.8		46.6	66.6	65.0	56.9 55.3
Medial length	35.0	58.0	57.8	49.6	44.8		39.5	58.8	60.6	45.9 47.5
Max. width of the distal end	15.0	14.0	13.0	12.0	11.9		17.5	15.2	13.0	12.2 11.5
Smallest width of the shaft	07.9	07.2	08.0	06.0	06.0		08.6	07.8	05.7	06.5 06.5
Width of the distal joint surface	13.0	13.1	13.0	11.6	10.8		14.2	13.8	11.2	11.8 10.2
Max. width of the prox. end	14.2	16.5	13.1	12.2	12.1		14.2	14.8	12.1	14.2 15.2
Max. height of the distal end	12.2	13.9	13.8	12.0	12.2		14.8	14.7	13.9	12.3 13.5
Height of the prox. end	13.0	14.8	11.4	09.6	09.6		15.4	13.0	11.2	09.6 10.0
Max. height of the dist. j. surf.	12.1	13.8	13.5	12.1	12.5		14.9	14.1	12.5	12.0 11.9
Smallest height of the shaft	07.8	08.1	07.6	06.1	05.9		08.7	09.3	06.6	06.8 07.1

Max. height of the prox. j. surf.	13.8	18.0	15.0	12.0	10.9	15.6	17.9	17.1	12.6	11.7
Max. height of the prox. end	13.9	16.6	16.7	12.9	00.0	15.2	17.1	16.1	12.0	10.8
Average in the middle of the shaft	10.0	07.2	08.3	06.2	06.0	11.6	09.1	08.2	06.1	07.5
Standard deviation										
<i>Metacarpals - female</i>										
<i>Neolithic</i>										
	I	II	left III	IV	V	I	II	right III	IV	V
Maximum length	05.0	00.0	02.9	00.0	05.4	02.9	03.6	02.4	00.6	04.9
Lateral length	02.6	00.0	03.8	00.0	05.1	01.6	04.4	08.6	02.1	04.4
Sagittal length	01.3	00.0	02.0	00.0	00.0	03.2	04.1	03.9	04.2	05.6
Medial length	00.0	00.0	00.0	00.0	00.0	02.1	04.4	04.7	04.1	04.2
Max. width of the distal end	00.0	00.0	00.0	04.0	00.0	02.1	02.1	01.1	01.3	01.4
Smallest width of the shaft	03.0	00.0	00.0	00.0	00.0	00.6	00.6	00.5	00.5	01.3
Width of the distal joint surface	00.0	00.0	00.0	00.2	00.0	01.5	01.2	01.0	01.0	01.0
Max. width of the prox. end	00.0	00.0	00.0	00.0	01.2	04.3	03.0	01.3	01.3	01.5
Max. height of the distal end	00.0	00.0	00.0	00.0	00.0	04.1	00.5	01.1	00.9	00.2
Height of the prox. end	00.0	00.0	02.0	00.0	00.5	02.1	01.0	02.6	00.5	00.4
Max. height of the dist. j. surf.	00.0	00.0	00.0	00.0	00.0	01.4	00.8	01.0	00.7	00.0
Smallest height of the shaft	00.0	00.0	00.6	00.0	01.3	00.1	00.4	00.5	00.8	00.1
Max. height of the prox. j. surf.	00.0	00.0	04.4	00.0	02.8	01.8	00.8	01.7	01.4	00.8
Max. height of the prox. end	00.0	00.0	01.4	01.8	00.0	00.8	01.0	01.2	00.2	01.0
Average in the middle of the shaft	00.0	00.0	00.0	00.0	00.0	00.7	00.9	00.6	00.1	00.6

Table 3. Basic statistical value

Average										
<i>Metacarpals - female</i>										
<i>Palaeolithic</i>										
	I	II	left III	IV	V	I	II	right III	IV	V
Maximum length									61.2	
Lateral length									52.8	
Sagittal length									61.0	
Medial length									53.8	
Max. width of the distal end						13.5			12.8	
Smallest width of the shaft			06.1		05.8				06.8	
Width of the distal joint surface						12.5			11.5	
Max. width of the prox. end			11.5		11.2				12.2	
Max. height of the distal end						12.1			12.2	
Height of the prox. end			10.0		09.2				11.2	
Max. height of the dist. j. surf.						12.0			12.1	
Smallest height of the shaft			07.1		05.0	08.0			07.1	
Max. height of the prox. j. surf.			14.0		08.9				13.1	
Max. height of the prox. end			14.2		09.0				11.9	
Average in the middle of the shaft			07.5		06.5				07.2	
Standard deviation										
<i>Metacarpals - female</i>										
<i>Palaeolithic</i>										
	I	II	left III	IV	V	I	II	right III	IV	V
Maximum length									00.0	
Lateral length									00.0	
Sagittal length									00.0	
Medial length									00.0	
Max. width of the distal end						00.0			00.0	
Smallest width of the shaft			00.0		00.0				00.0	
Width of the distal joint surface						00.0			00.0	
Max. width of the prox. end			00.0		00.0				00.0	
Max. height of the distal end						00.0			00.0	

Height of the prox. end	00.0	00.0	00.0
Max. height of the dist. j. surf.			00.0
Smallest height of the shaft	00.0	00.0	00.0
Max. height of the prox. j. surf.	00.0	00.0	00.0
Max. height of the prox. end	00.0	00.0	00.0
Average in the middle of the shaft	00.0	00.0	00.0

Table 4. Basic statistical value

Average										
<i>Proximal phalanges - female</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Lateral length	28.5	37.8	41.9	39.3	30.6	28.9	38.0	41.9	39.1	30.7
Medial length	27.9	37.1	42.1	39.4	30.7	28.5	38.2	41.9	41.9	38.0
Sagittal length	28.4	38.4	42.3	39.7	30.8	28.7	38.2	42.2	39.6	32.8
Max. width of the distal end	11.4	10.1	11.2	10.8	08.8	11.4	10.4	11.1	10.4	08.6
Width of the mid. p. of dist. j. surf.	04.7	03.6	04.3	04.3	03.9	04.8	03.6	03.8	04.1	03.4
Smallest width of the shaft	08.4	08.8	09.2	08.7	07.5	08.4	09.0	09.1	08.6	07.5
Max. width of the prox. end	14.3	14.6	14.7	13.5	13.3	14.5	14.8	14.8	14.1	13.4
Max. width of the prox. j. surf.	12.0	11.2	12.0	11.4	10.5	12.3	11.7	11.8	11.4	10.8
Width in the middle in the shaft	08.7	08.6	08.9	08.4	07.4	08.6	09.1	09.1	08.7	07.9
Max. height	07.3	06.8	07.6	07.1	05.6	07.5	07.0	07.3	06.8	05.9
Height in the thinnest p. of the shaft	05.6	06.3	07.2	06.4	05.4	05.7	06.3	06.8	06.3	05.1
Smallest height of the shaft	05.3	05.8	06.2	05.7	04.9	05.5	05.5	06.0	05.6	04.7
Max. height of the prox. end	10.4	10.1	11.1	10.6	09.0	10.2	10.4	11.1	11.2	10.2
Maximum length	29.3	38.4	43.2	40.9	31.9	30.0	39.5	43.2	40.5	32.6

Standard deviation										
<i>Proximal phalanges - female</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Lateral length	01.5	02.7	02.7	02.6	02.8	02.9	03.5	02.8	02.6	02.5
Medial length	01.5	02.9	02.7	02.5	02.8	01.7	02.9	02.9	08.0	02.9
Sagittal length	01.3	05.3	02.5	02.5	02.6	01.6	02.9	02.7	02.6	05.9
Max. width of the distal end	00.8	01.9	01.1	01.4	00.9	01.2	01.1	01.0	01.1	00.9
Width of the mid. p. of dist. j. surf.	00.8	00.5	00.9	00.7	00.6	00.9	00.4	00.8	00.6	00.6
Smallest width of the shaft	00.7	01.2	01.3	01.1	00.9	00.7	01.1	01.0	01.0	01.0
Max. width of the prox. end	01.3	01.3	01.3	01.4	01.2	01.2	01.6	01.5	01.5	01.7
Max. width of the prox. j. surf.	01.0	01.0	01.6	01.0	00.9	02.2	01.3	01.1	01.1	01.1
Width in the middle in the shaft	00.9	00.9	01.2	01.0	00.9	01.0	00.9	01.2	01.1	01.2
Max. height	00.6	01.0	00.7	00.6	00.8	00.8	00.9	00.9	00.9	00.9
Height in the thinnest p. of the shaft	00.7	01.2	01.2	00.8	00.4	00.6	01.0	01.0	01.0	00.7
Smallest height of the shaft	00.6	01.2	00.8	00.6	00.6	00.5	00.6	00.7	00.7	00.6
Max. height of the prox. end	00.5	01.3	01.0	01.1	00.9	00.7	01.1	01.1	00.8	01.0
Maximum length	01.4	02.8	02.5	02.6	03.0	01.7	02.9	03.0	02.6	02.6

Table 5. Basic statistical value

Average										
<i>Proximal phalanges - female</i>										
<i>Neolithic</i>										
	I	II	III	IV	V	I	II	III	IV	V
Lateral length	28.8	41.1	45.4	42.2	34.1	29.6	39.4	43.9	41.5	33.4

Medial length	28.9	40.9	46.2	42.0	34.4	29.1	39.6	44.7	41.8	34.0
Sagittal length	28.5	36.6	45.0	42.7	34.1	29.6	39.7	44.7	40.3	33.0
Max. width of the distal end	12.0	11.8	12.6	11.6	09.8	12.9	11.9	12.1	11.8	09.5
Width of the mid. p. of dist. j. surf.	04.0	04.2	05.3	04.9	04.1	04.2	03.3	03.7	04.0	03.6
Smallest width of the shaft	07.5	09.5	10.3	09.6	08.2	08.9	10.0	10.0	09.7	08.4
Max. width of the prox. end	14.2	16.5	16.8	14.4	14.9	16.0	17.1	16.9	15.3	14.0
Max. width of the prox. j. surf.	13.1	12.1	13.9	11.9	11.2	14.6	13.5	13.1	12.5	10.8
Width in the middle in the shaft	08.2	09.5	10.4	09.0	08.1	09.0	10.1	10.4	09.8	08.7
Max. height	07.1	07.3	07.6	07.7	05.5	08.6	08.0	08.2	07.1	06.0
Height in the thinnest p. of the shaft	06.1	06.2	06.8	06.3	05.0	06.2	06.0	06.8	06.7	06.9
Smallest height of the shaft	05.2	06.0	06.2	05.4	05.0	05.1	05.6	06.0	05.6	04.9
Max. height of the prox. end	10.2	11.6	11.9	11.8	10.0	10.7	11.9	12.5	10.9	10.0
Maximum length	29.2	42.0	47.0	44.0	36.6	31.1	41.5	45.6	42.3	33.9

Standard deviation

<i>Proximal phalanges - female</i>	left					right				
<i>Neolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Lateral length	00.0	06.7	03.1	03.6	03.6	03.4	03.5	03.1	02.2	00.0
Medial length	00.0	05.6	00.9	03.5	03.4	01.6	00.0	02.8	02.6	03.5
Sagittal length	00.0	05.7	01.5	01.2	03.3	01.9	02.6	02.3	01.9	00.0
Max. width of the distal end	00.0	00.9	00.4	00.6	00.9	01.3	00.1	00.9	01.4	00.6
Width of the mid. p. of dist. j. surf.	00.0	00.3	00.2	00.9	00.1	01.4	00.0	00.6	00.7	00.6
Smallest width of the shaft	00.0	00.6	00.4	01.6	00.0	01.3	00.3	01.0	01.6	00.0
Max. width of the prox. end	00.0	00.4	01.3	00.8	01.6	01.4	01.3	01.7	02.1	00.0
Max. width of the prox. j. surf.	00.0	00.9	01.6	11.9	00.8	00.8	00.8	00.3	00.7	00.0
Width in the middle in the shaft	00.0	00.6	00.8	01.6	01.3	01.5	00.0	01.2	01.7	00.8
Max. height	00.0	01.7	00.6	00.7	01.3	00.9	01.2	00.7	01.3	00.0
Height in the thinnest p. of the shaft	00.0	00.6	00.4	00.7	00.0	00.1	00.0	00.5	00.2	00.8
Smallest height of the shaft	00.0	00.1	00.4	00.6	00.8	00.6	00.6	00.9	00.6	00.6
Max. height of the prox. end	00.0	00.4	00.4	01.1	00.7	00.3	00.1	00.6	01.0	01.0
Maximum length	00.0	07.1	02.0	03.5	03.3	02.8	02.4	02.4	02.8	03.0

Table 6. Basic statistical value

Average											
<i>Proximal phalanges - female</i>		left					right				
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V	
Lateral length							40.0	45.0			
Medial length							39.9	45.9			
Sagittal length							37.5	45.0			
Max. width of the distal end							12.2	12.2			
Width of the mid. p. of dist. j. surf.							04.0	04.1			
Smallest width of the shaft							09.5	09.2			
Max. width of the prox. end							16.2	14.8			
Max. width of the prox. j. surf.							12.1	12.2			
Width in the middle in the shaft							10.0	09.2			
Max. height							07.7	07.8			
Height in the thinnest p. of the shaft							05.5	06.1			
Smallest height of the shaft							05.5	05.6			

Max. height of the prox. end						11.7	10.6				
Maximum length						41.0	46.0				
Standard deviation											
<i>Proximal phalanges - female</i>		left					right				
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V	
Lateral length						00.0	00.0				
Medial length						06.2	00.0				
Sagittal length						06.6	00.0				
Max. width of the distal end						00.0	00.0				
Width of the mid. p. of dist. j. surf.						00.0	00.0				
Smallest width of the shaft						01.0	00.0				
Max. width of the prox. end						00.0	00.0				
Max. width of the prox. j. surf.						00.0	00.0				
Width in the middle in the shaft						01.3	00.0				
Max. height						00.7	00.0				
Height in the thinnest p. of the shaft						00.0	00.0				
Smallest height of the shaft						00.0	00.0				
Max. height of the prox. end						00.6	04.8				
Maximum length						06.9	00.0				

Table 7. Basic statistical value

Average										
<i>Middle phalanges - female</i>										
	left					right				
<i>Middle Age</i>	I	II	III	IV	V	I	II	III	IV	V
Sagittal length		23.8	28.2	25.1	18.1		24.1	28.3	26.5	19.5
Width of the mid. p. of dist. j. surf.		03.7	33.4	03.7	03.4		03.3	03.7	03.4	03.1
Average of the shaft		08.2	08.4	07.1	07.1		06.7	07.4	06.5	06.7
Maximum length		24.6	28.4	26.3	18.5		23.6	28.1	27.4	20.1
Max. width of the prox. end		12.1	13.0	11.0	10.1		11.7	12.6	12.1	10.4
Max. width of the distal end		09.0	09.7	09.2	07.4		09.5	09.7	09.1	08.0
Height of the prox. end		08.5	09.0	08.6	07.7		09.5	08.7	08.1	07.0
Height of the distal end		05.2	05.3	04.7	04.2		05.5	06.0	09.6	05.1
Standard deviation										
<i>Middle phalanges - female</i>										
	left					right				
<i>Middle Age</i>	I	II	III	IV	V	I	II	III	IV	V
Sagittal length		02.4	02.0	01.6	01.0		03.7	01.1	01.6	02.4
Width of the mid. p. of dist. j. surf.		00.9	00.4	00.6	01.0		00.7	00.6	00.5	00.7
Average of the shaft		01.3	01.7	01.6	00.8		02.2	02.3	02.1	01.3
Maximum length		03.0	01.9	01.2	01.3		02.2	03.8	02.1	02.6
Max. width of the prox. end		01.1	01.5	01.3	02.3		01.7	01.2	01.3	01.2
Max. width of the distal end		01.0	01.1	00.5	02.4		00.9	00.7	01.1	01.1
Height of the prox. end		01.3	01.1	00.5	00.6		00.8	01.0	01.0	00.7
Height of the distal end		01.0	00.8	00.5	00.3		00.8	00.7	03.9	00.5

Table 8. Basic statistical value

Average											
<i>Middle phalanges - female</i>						left					
<i>Neolithic</i>						I	II	III	IV	V	right
						I	II	III	IV	V	
Sagittal length								32.0			30.1 27.4 22.8
Width of the mid. p. of dist. j. surf.								03.9			04.2 04.1 04.2
Average of the shaft								10.0			09.2 08.0 08.2
Maximum length								29.2			29.5 29.2 23.8
Max. width of the prox. end								14.0			14.5 13.8 12.9
Max. width of the distal end								11.5			10.2 10.0 09.8
Height of the prox. end								09.0			08.5 07.5 08.9
Height of the distal end								06.2			06.0 05.6 04.9
Standard deviation											
<i>Middle phalanges - female</i>						left					
<i>Neolithic</i>						I	II	III	IV	V	right
						I	II	III	IV	V	
Sagittal length								01.7			00.7 02.0 00.0
Width of the mid. p. of dist. j. surf.								00.5			00.1 00.1 00.0
Average of the shaft								00.7			00.0 01.1 00.0
Maximum length								00.4			00.0 02.5 00.0
Max. width of the prox. end								01.4			00.0 01.0 00.0
Max. width of the distal end								00.7			00.0 00.0 00.0
Height of the prox. end								00.0			00.0 00.4 00.5
Height of the distal end								00.0			00.0 00.9 00.6

Table 9. Basic statistical value

Average											
<i>Middle phalanges - female</i>						left					
<i>Palaeolithic</i>						I	II	III	IV	V	right
						I	II	III	IV	V	
Sagittal length								26.9	32.0	30.0	
Width of the mid. p. of dist. j. surf.								03.0	03.8	03.8	
Average of the shaft								08.5	08.8	08.6	
Maximum length								27.2	32.8	31.2	
Max. width of the prox. end								13.0	13.9	12.8	
Max. width of the distal end								09.5	10.8	09.9	
Height of the prox. end								09.1	10.2	09.5	
Height of the distal end								05.8	07.0	06.0	
Standard deviation											
<i>Middle phalanges - female</i>						left					
<i>Palaeolithic</i>						I	II	III	IV	V	right
						I	II	III	IV	V	
Sagittal length								02.8	03.4	02.6	
Width of the mid. p. of dist. j. surf.								00.0	00.0	00.0	
Average of the shaft								00.0	00.4	00.0	
Maximum length								02.7	03.4	02.7	
Max. width of the prox. end								00.0	00.9	00.4	
Max. width of the distal end								00.0	00.0	00.0	
Height of the prox. end								00.0	00.0	00.0	
Height of the distal end								00.0	00.0	00.0	

Table 10. Basic statistical value

Average										
<i>Metacarpals - males</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	46.9	71.4	68.8	59.3	54.7	47.0	70.8	69.3	58.8	55.1
Lateral length	38.1	62.1	54.3	49.4	51.1	39.2	62.0	55.1	49.5	50.4
Sagittal length	46.6	68.3	65.0	58.4	48.6	46.5	67.4	68.0	57.8	54.8
Medial length	38.6	68.3	65.0	58.4	54.3	38.8	63.7	58.0	49.0	44.6
Max. width of the distal end	15.9	14.7	14.6	13.1	12.1	16.0	15.5	15.1	12.9	12.1
Smallest width of the shaft	12.0	08.4	08.2	06.6	07.5	11.7	08.6	08.4	06.8	07.8
Width of the distal joint surface	13.8	12.4	12.4	11.0	12.4	13.6	12.0	12.5	10.6	10.2
Max. width of the prox. end	16.3	17.7	14.1	12.6	13.7	15.9	18.2	14.3	12.3	13.2
Max. height of the distal end	14.6	15.3	14.4	13.4	12.3	14.4	15.9	15.1	12.5	13.3
Height of the prox. end	14.7	15.9	13.2	10.5	10.6	14.6	16.1	13.4	10.9	10.4
Max. height of the dist. j. surf.	13.5	14.5	13.7	12.7	12.3	13.4	14.3	14.3	12.9	12.0
Smallest height of the shaft	08.8	09.2	09.2	08.0	07.1	09.4	10.4	09.5	07.9	07.7
Max. height of the prox. j. surf.	15.4	16.7	16.3	16.7	16.3	15.5	17.6	16.7	12.4	12.1
Max. height of the prox. end	15.7	17.0	16.5	12.9	11.4	15.6	16.3	16.5	13.3	12.1
Average in the middle of the shaft	12.0	08.6	08.4	07.1	08.0	12.2	08.7	08.7	06.9	08.6
Standard deviation										
<i>Metacarpals - males</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	04.0	04.4	03.1	06.5	02.5	03.1	03.7	03.5	03.6	04.5
Lateral length	04.0	04.2	03.9	04.3	01.9	04.6	04.1	04.2	03.9	04.5
Sagittal length	03.9	03.6	04.0	02.5	01.8	03.4	03.3	09.8	02.1	03.0
Medial length	03.9	05.2	03.1	06.0	01.1	02.9	04.1	03.8	03.1	02.4
Max. width of the distal end	00.9	01.0	00.8	00.8	01.1	01.6	00.9	00.6	00.8	02.0
Smallest width of the shaft	01.4	01.6	01.0	01.0	01.1	01.2	01.5	01.3	01.4	01.1
Width of the distal joint surface	00.7	01.0	00.7	00.8	01.1	01.6	00.9	01.2	00.7	01.3
Max. width of the prox. end	01.7	01.8	01.3	01.3	01.2	01.2	01.4	01.6	00.6	01.1
Max. height of the distal end	02.2	01.5	01.4	01.1	01.2	01.4	01.9	01.5	01.3	01.6
Height of the prox. end	01.9	01.3	01.0	01.4	01.8	01.7	01.9	01.7	01.3	01.1
Max. height of the dist. j. surf.	01.8	01.4	01.9	01.8	01.3	01.4	01.9	01.3	02.0	01.6
Smallest height of the shaft	01.3	01.3	01.2	00.8	00.8	01.4	01.3	01.5	01.1	01.0
Max. height of the prox. j. surf.	00.8	00.9	00.7	00.7	00.9	00.8	00.7	00.9	00.7	01.5
Max. height of the prox. end	01.9	01.8	01.9	01.8	01.2	02.1	01.9	01.4	01.3	01.7
Average in the middle of the shaft	01.4	01.1	01.6	01.8	00.9	02.2	01.2	02.3	01.7	02.1

Table 11. Basic statistical value

Average										
<i>Metacarpals - males</i>										
<i>Neolithic</i>										
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	48.1	72.3	74.0	59.8	59.5	51.2	73.3	70.9	60.8	
Lateral length	40.2	61.8	59.1	50.1	56.0	50.8	70.2	68.3	64.0	
Sagittal length	48.3	68.8	70.6	59.7	58.9	43.0	64.7	58.8	51.3	
Medial length	39.4	62.2	60.7	52.3	56.0	43.8	64.8	61.5	50.8	
Max. width of the distal end	17.6	14.0	15.0	13.4	12.6	17.9	15.6	13.1	14.2	
Smallest width of the shaft	12.1	08.4	08.5	06.5	08.5	09.4	08.6	07.1	06.5	
Width of the distal joint surface	15.6	14.2	13.5	12.5	12.2	14.3	15.1	12.0	13.9	
Max. width of the prox. end	16.9	18.5	15.0	12.9	16.9	14.2	18.7	15.0	12.4	15.4
Max. height of the distal end	14.4	15.1	14.7	13.3	12.6	14.2	15.6	15.9	15.0	
Height of the prox. end	14.6	15.6	13.4	11.3	12.2	14.1	16.6	13.7	10.8	14.5
Max. height of the dist. j. surf.	15.1	14.4	13.8	12.8	13.0	15.1	14.6	13.1	12.2	

Smallest height of the shaft	08.9	09.1	09.1	07.2	06.9	09.9	08.8	09.3	08.5	07.6
Max. height of the prox. j. surf.	17.3	17.6	17.5	13.7	12.9	15.8	19.2	17.9	15.5	13.0
Max. height of the prox. end	16.4	16.6	16.4	12.3	12.9	17.0	17.1	16.7	12.8	13.0
Average in the middle of the shaft	12.5	08.5	08.9	06.7	08.9	13.8	09.2	08.7	06.1	
Standard deviation										
Metacarpals - males										
Neolithic										
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	02.8	02.7	07.4	05.3	01.0	00.0	03.9	03.6	04.8	
Lateral length	02.4	01.3	01.6	04.2	02.8	00.0	03.5	05.6	04.9	
Sagittal length	03.2	03.1	02.2	05.9	00.0	00.0	03.5	04.1	06.3	
Medial length	04.9	03.3	03.0	09.5	00.0	00.0	03.1	06.8	04.1	
Max. width of the distal end	00.6	02.6	01.0	00.8	00.0	00.0	00.7	01.4	04.3	
Smallest width of the shaft	00.1	00.6	01.1	00.7	00.0	01.9	00.9	01.6	04.6	
Width of the distal joint surface	00.2	02.3	01.2	00.6	00.0	01.5	01.4	01.0	01.0	
Max. width of the prox. end	00.1	02.1	01.8	01.1	00.0	01.7	02.1	01.2	01.0	00.0
Max. height of the distal end	02.1	01.9	01.1	00.5	00.0	02.2	00.9	03.0	01.3	
Height of the prox. end	01.8	03.0	01.6	02.2	00.0	01.1	03.4	01.4	02.8	00.1
Max. height of the dist. j. surf.	02.0	00.7	00.7	00.8	00.0	03.7	01.0	00.8	01.0	
Smallest height of the shaft	00.4	00.2	00.4	00.8	00.0	00.1	00.8	00.7	02.7	
Max. height of the prox. j. surf.	00.5	01.5	03.2	01.7	00.0	01.8	01.0	02.1	00.8	00.0
Max. height of the prox. end	01.2	01.7	01.4	01.8	00.0	00.0	01.7	01.4	01.1	00.0
Average in the middle of the shaft	00.5	00.4	00.0	00.7	00.0	00.0	00.4	02.3	01.5	00.0

Table 12. Basic statistical value

Average										
Metacarpals - males										
Palaeolithic										
	I	II	III	IV	V	I	II	III	IV	V
Maximum length		73.2	72.0				73.7			
Lateral length		71.0	61.0				64.7			
Sagittal length		69.8	60.4				70.5			
Medial length		40.3	54.6				67.3			
Max. width of the distal end		15.5	15.0	13.5		17.8	15.1			
Smallest width of the shaft		09.2	08.7	06.7		08.0	07.2			
Width of the distal joint surface		13.4	13.5	12.8		14.0	11.5			
Max. width of the prox. end		18.0	15.9				17.8	14.8	12.2	
Max. height of the distal end		16.1	16.9	13.8		12.1	17.0			
Height of the prox. end		15.2	13.2	11.9			17.0	14.0	11.2	
Max. height of the dist. j. surf.			16.0	13.1		14.2	16.9			
Smallest height of the shaft		08.7	08.4	08.7			08.7	08.2		
Max. height of the prox. j. surf.		18.8	18.6	15.2			16.1	15.8		
Max. height of the prox. end		17.0	15.9	15.3			16.9	15.5	11.0	
Average in the middle of the shaft		07.3	08.5	08.5		13.0	10.0	08.9	07.2	
Standard deviation										
Metacarpals - males										
Palaeolithic										
	I	II	III	IV	V	I	II	III	IV	V
Maximum length		00.0	00.0				01.5			
Lateral length		00.0	00.0				05.0			
Sagittal length		00.0	00.0				00.5			
Medial length		00.0	06.2				01.6			
Max. width of the distal end		02.1	01.4	01.3		00.0	01.1			
Smallest width of the shaft		00.4	00.3	00.0		00.3	00.0			
Width of the distal joint surface		00.6	00.5	01.1		00.2	00.0			
Max. width of the prox. end		00.0	00.0				00.0	00.0	00.0	
Max. height of the distal end		00.0	00.0	01.5		00.0	02.5			

Height of the prox. end	00.0	00.4	00.0		00.3	00.0	00.0
Max. height of the dist. j. surf.		00.0	02.7		00.0	04.1	
Smallest height of the shaft	00.0	00.5	00.2		00.6	00.0	
Max. height of the prox. j. surf.	00.0	00.0	01.8		00.1	00.0	
Max. height of the prox. end	00.0	00.0	00.0		00.1	00.0	00.0
Average in the middle of the shaft	07.3	08.5	08.5		00.0	00.5	00.5 00.0

Table 13. Basic statistical value

Average										
<i>Proximal phalanges - males</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Lateral length	32.3	39.2	42.2	40.3	34.4	31.1	39.9	43.7	40.7	32.8
Medial length	32.0	38.9	44.5	41.9	34.5	31.5	40.0	44.6	40.4	32.8
Sagittal length	32.4	39.1	44.6	41.9	34.5	31.6	39.7	42.7	39.7	32.0
Max. width of the distal end	12.6	11.6	12.3	11.4	09.4	12.6	11.5	12.2	10.8	08.7
Width of the mid. p. of dist. j. surf.	05.0	04.5	04.5	04.3	04.0	04.7	04.1	04.7	04.5	04.0
Smallest width of the shaft	10.0	09.5	10.2	09.6	08.1	09.7	09.9	10.3	09.2	07.6
Max. width of the prox. end	16.8	16.0	16.3	14.5	14.2	16.4	16.3	16.8	16.2	14.9
Max. width of the prox. j. surf.	13.8	12.7	13.0	12.0	11.2	13.6	12.7	12.9	13.8	12.9
Width in the middle in the shaft	10.0	09.8	10.3	09.5	08.9	09.8	10.0	10.2	10.0	08.8
Max. height	08.4	07.9	08.2	07.7	06.7	08.3	07.6	08.2	08.2	07.0
Height in the thinnest p. of the shaft	06.6	06.8	07.7	07.0	05.7	06.3	07.1	07.3	07.1	06.1
The smallest height of the shaft	06.2	05.9	06.8	06.0	05.3	06.0	06.3	06.7	06.6	05.7
Max. height of the prox. end	11.7	11.5	12.3	11.5	10.2	11.6	11.8	11.9	11.3	10.3
Maximum length	33.4	40.7	45.9	43.3	35.5	32.8	41.7	46.0	43.1	35.4

Standard deviation										
<i>Proximal phalanges - males</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Lateral length	03.6	09.8	08.7	03.5	03.6	03.3	02.7	04.4	04.0	03.2
Medial length	03.8	02.6	02.3	03.5	03.4	03.4	02.6	01.8	04.7	03.6
Sagittal length	03.5	02.3	02.3	03.0	01.3	03.2	02.6	08.4	08.9	07.5
Max. width of the distal end	01.0	00.7	00.7	00.6	00.7	00.9	01.0	00.9	02.5	02.2
Width of the mid. p. of dist. j. surf.	01.1	00.4	00.6	00.7	01.2	00.8	01.0	01.0	00.6	00.9
Smallest width of the shaft	01.5	00.8	01.1	00.7	01.7	01.1	01.8	01.4	01.2	01.2
Max. width of the prox. end	01.5	01.2	01.8	00.9	01.1	02.1	03.2	03.6	01.0	01.4
Max. width of the prox. j. surf.	01.1	01.3	01.1	01.1	00.8	01.3	05.2	05.1	00.7	00.7
Width in the middle in the shaft	00.7	01.0	00.9	00.8	00.9	00.8	00.8	01.1	00.9	01.0
Max. height	01.0	00.8	00.7	00.6	00.8	00.8	01.6	01.6	00.5	00.9
Height in the thinnest p. of the shaft	00.9	01.4	01.0	00.7	00.6	00.6	01.0	01.3	00.4	00.6
Smallest height of the shaft	00.5	01.3	00.6	00.6	00.8	00.6	01.0	01.2	00.6	01.0
Max. height of the prox. end	01.0	00.9	00.6	00.8	00.6	01.3	00.8	00.6	03.3	01.5
Maximum length	03.8	02.3	02.1	02.9	02.4	01.4	01.8	03.1	03.3	03.7

Table 14. Basic statistical value

Average										
<i>Proximal phalanges - males</i>										
<i>Neolithic</i>										
	I	II	III	IV	V	I	II	III	IV	V
Lateral length	32.0	41.1	45.5	42.8	35.0	34.0	42.0	44.1	39.7	33.4
Medial length	31.9	40.9	46.3	42.6	35.9	34.2	39.6	44.7	41.8	35.0
Sagittal length	31.1	47.5	46.0	42.7	34.9	34.2	41.0	44.7	42.1	34.0
Max. width of the distal end	13.9	12.3	12.7	12.0	10.0	13.9	12.1	12.7	12.4	10.0
Width of the mid. p. of dist. j. surf.	05.5	04.9	04.7	04.9	04.2	06.0	03.3	04.6	04.1	04.0

Smallest width of the shaft	10.3	09.5	10.3	09.8	08.5	10.0	10.2	10.5	09.8	08.4
Max. width of the prox. end	18.0	16.6	16.8	15.0	15.2	18.0	17.8	17.1	16.2	15.3
Max. width of the prox. j. surf.	15.3	13.5	14.3	13.0	12.9	16.0	15.0	13.3	13.3	11.6
Width in the middle in the shaft	10.4	09.7	10.5	10.2	09.1	10.0	10.2	10.4	10.0	09.8
Max. height	09.3	08.2	08.2	08.0	06.2	09.1	08.8	08.3	08.0	06.3
Height in the thinnest p. of the shaft	06.8	06.7	08.4	06.3	05.5	06.6	06.7	07.0	07.1	05.5
Smallest height of the shaft	06.7	06.2	06.7	05.7	05.0	06.2	05.9	06.3	06.2	05.0
Max. height of the prox. end	12.5	12.0	12.9	12.0	11.0	12.9	14.0	13.0	12.4	12.0
Maximum length	32.3	42.0	47.0	44.1	36.2	36.0	43.0	45.6	43.5	35.3

Standard deviation

Proximal phalanges - males	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Neolithic										
Lateral length	02.8	02.7	02.1	01.1	00.0	00.0	00.0	02.6	05.0	02.6
Medial length	02.9	02.6	03.0	02.0	00.0	00.0	02.5	03.4	05.0	00.0
Sagittal length	02.2	08.5	02.6	03.1	00.0	00.0	00.0	02.1	04.0	02.7
Max. width of the distal end	00.1	00.5	00.3	00.0	00.0	00.0	00.0	00.4	00.6	00.0
Width of the mid. p. of dist. j. surf.	00.4	00.4	00.4	00.7	00.0	00.0	00.1	00.5	00.3	00.0
Smallest width of the shaft	00.4	00.8	01.1	00.4	00.9	00.0	00.0	01.3	00.8	00.4
Max. width of the prox. end	00.1	01.4	01.0	01.3	00.0	00.0	00.0	01.4	00.8	15.3
Max. width of the prox. j. surf.	00.9	00.6	01.2	01.7	00.0	00.0	00.0	01.6	01.4	00.4
Width in the middle in the shaft	00.6	00.6	00.6	00.5	00.0	00.0	00.9	00.7	01.0	00.0
Max. height	00.3	00.5	00.4	00.0	00.0	00.0	00.0	00.3	01.0	00.8
Height in the thinnest p. of the shaft	0.35	00.6	01.5	01.0	00.4	00.0	00.2	00.1	07.1	00.0
Smallest height of the shaft	00.2	00.7	01.0	01.1	00.0	00.0	00.0	00.4	00.7	00.0
Max. height of the prox. end	00.4	01.0	01.4	01.4	00.0	00.0	00.0	01.7	01.2	00.0
Maximum length	03.2	02.6	02.6	01.6	00.0	00.0	00.0	03.2	04.9	03.0

Table 15. Basic statistical value

Proximal phalanges - males	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Average										
Palaeolithic										
Lateral length		42.2	45.7	42.5			40.0	45.5	44.2	
Medial length		40.5	45.2	41.8			39.9	46.7	44.2	
Sagittal length		40.5	45.0	42.2			39.5	46.0	44.0	
Max. width of the distal end		12.2	13.0	12.0			12.4	13.0	11.6	
Width of the mid. p. of dist. j. surf.		05.0	04.6	05.0			04.7	04.1	10.0	
Smallest width of the shaft		10.0	09.8	09.3			10.0	10.3	09.3	
Max. width of the prox. end		14.0	16.2	16.2			16.5	15.9	15.1	
Max. width of the prox. j. surf.		10.8	12.2	12.0			13.4	12.5	12.1	
Width in the middle in the shaft		10.5	10.1	09.0			10.4	10.5	10.2	
Max. height		07.8	07.7	08.3			07.8	08.4	06.8	
Height in the thinnest p. of the shaft		05.5	06.0	05.8			06.0	06.4	05.2	
Smallest height of the shaft		05.5	05.7	05.4			05.8	06.0	05.5	
Max. height of the prox. end		11.2	11.0	11.1			12.0	10.9	12.0	
Maximum length		42.1	46.4	43.2			41.0	47.3	45.0	

Standard deviation

Proximal phalanges - males	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Palaeolithic										
Lateral length		00.0	02.6	00.0			00.0	00.7	00.0	
Medial length		00.0	02.8	00.0			00.0	00.3	00.0	
Sagittal length		00.0	02.8	00.0			00.0	00.1	00.0	
Max. width of the distal end		00.0	00.0	00.0			00.2	00.3	00.8	
Width of the mid. p. of dist. j. surf.		00.0	00.6	00.2			00.7	00.1	07.4	
Smallest width of the shaft		00.0	01.6	01.1			00.0	00.7	01.8	

Max. width of the prox. end	00.0	01.0	00.0	01.0	02.8	00.0
Max. width of the prox. j. surf.	00.0	00.0	00.0	00.6	00.9	00.0
Width in the middle in the shaft	00.0	01.4	00.0	00.0	00.8	00.0
Max. height	00.0	01.1	00.4	00.0	00.6	01.4
Height in the thinnest p. of the shaft	00.0	00.1	00.4	00.1	00.0	00.9
Smallest height of the shaft	00.0	00.6	00.2	00.2	00.0	00.0
Max. height of the prox. end	00.0	02.6	00.0	00.0	00.0	00.0
Maximum length	00.0	02.3	00.0	00.0	00.4	00.0

Table 16. Basic statistical value

Average										
<i>Middle phalanges - males</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Sagittal length	25.6	30.1	27.7	20.6		25.2	28.5	28.9	20.5	
Width of the mid. p. of dist. j. surf.	04.2	03.8	04.2	03.7		03.5	03.0	03.5	03.5	
Average of the shaft	07.9	07.8	08.6	08.4		07.5	07.9	08.0	08.5	
Maximum length	25.5	31.3	28.7	21.1		26.6	29.5	29.4	21.5	
Max. width of the prox. end	09.5	13.3	14.1	12.9		11.1	13.0	13.3	11.5	
Max. width of the distal end	08.4	09.1	09.1	08.2		08.2	09.0	09.2	08.2	
Height of the prox. end	08.9	09.3	08.1	08.7		08.2	08.9	08.0	08.5	
Height of the distal end	05.6	06.1	05.9	04.7		05.0	05.2	06.0	05.4	

Standard deviation										
<i>Middle phalanges - males</i>										
<i>Middle Age</i>										
	I	II	III	IV	V	I	II	III	IV	V
Sagittal length	05.0	02.7	00.2	00.7		03.4	02.1	00.6	01.3	
Width of the mid. p. of dist. j. surf.	00.7	00.8	01.4	00.6		00.5	00.6	00.5	00.6	
Average of the shaft	01.3	01.3	00.7	00.7		01.9	01.8	01.7	00.5	
Maximum length	05.0	02.7	00.2	00.8		03.7	03.1	00.6	01.7	
Max. width of the prox. end	01.1	00.7	00.7	00.5		00.7	00.8	00.8	00.2	
Max. width of the distal end	00.0	00.6	00.6	00.4		01.1	00.8	00.3	00.6	
Height of the prox. end	00.0	00.8	00.6	00.2		01.2	01.5	01.8	00.2	
Height of the distal end	00.0	00.5	00.6	00.6		00.8	00.5	01.6	00.4	

Table 17. Basic statistical value

Average										
<i>Middle phalanges - males</i>										
<i>Neolithic</i>										
	I	II	III	IV	V	I	II	III	IV	V
Sagittal length	23.1	32.0	28.0	20.2		23.0	30.1	27.4	20.8	
Width of the mid. p. of dist. j. surf.	03.1	03.9	03.8	04.0		04.0	04.5	04.3	04.2	
Average of the shaft	08.5	10.0	09.0	08.1		09.0	09.4	08.8	08.2	
Maximum length	23.7	29.5	29.9	20.5		23.9	29.5	29.9	23.7	
Max. width of the prox. end	13.0	16.1	14.1	11.5		12.0	14.5	13.9	12.6	
Max. width of the distal end	10.4	10.9	10.3	09.6		09.6	11.0	10.6	09.2	
Height of the prox. end	08.8	09.9	09.6	07.8		09.1	09.8	09.8	09.0	
Height of the distal end	05.6	06.4	06.2	05.0		05.8	06.5	05.5	00.0	

Standard deviation										
<i>Middle phalanges - males</i>										
<i>Neolithic</i>										
	I	II	III	IV	V	I	II	III	IV	V
Sagittal length	00.2	00.0	00.0	00.7		00.0	01.7	00.2	00.0	
Width of the mid. p. of dist. j. surf.	00.2	00.0	00.0	00.1		00.0	00.6	00.7	00.0	
Average of the shaft	00.8	00.0	00.0	00.1		00.9	00.6	00.0	00.0	

Maximum length	00.3	00.0	02.6	00.7	00.0	00.0	01.6	00.0
Max. width of the prox. end	01.1	00.0	01.6	00.6	00.0	00.0	00.6	00.0
Max. width of the distal end	00.6	00.0	00.1	00.6	00.0	00.3	00.7	00.0
Height of the prox. end	00.9	00.0	00.0	00.0	00.1	00.0	00.2	00.0
Height of the distal end	00.0	00.7	00.0	00.0	00.0	00.9	00.0	00.0

Table 18. Basic statistical value

Average										
<i>Middle phalanges - males</i>					left					right
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Sagittal length		28.4	31.0	30.5			26.9	32.0	30.0	
Width of the mid. p. of dist. j. surf.		04.1	03.5	03.0			04.0	03.9	03.9	
Average of the shaft		08.0	09.0	09.0			08.9	09.0	08.9	
Maximum length		29.0	32.2	31.0			26.4	32.8	31.2	
Max. width of the prox. end		13.5	14.8	13.5			13.8	14.0	13.0	
Max. width of the distal end		09.6	10.8	10.2			09.7	10.2	10.2	
Height of the prox. end		09.0	10.0	09.5			09.2	11.0	10.0	
Height of the distal end		06.2	06.9	05.5			06.0	06.0	05.0	
Standard deviation										
<i>Middle phalanges - males</i>					left					right
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Sagittal length		02.1	00.0	00.0			00.0	00.0	00.0	
Width of the mid. p. of dist. j. surf.		00.1	00.0	00.0			00.6	00.1	00.1	
Average of the shaft		00.7	00.0	00.0			00.1	00.0	00.0	
Maximum length		01.7	00.0	00.0			00.0	00.0	00.0	
Max. width of the prox. end		00.7	00.0	00.0			01.8	00.0	00.0	
Max. width of the distal end		00.5	00.0	00.0			00.3	00.0	00.0	
Height of the prox. end		00.0	00.0	00.0			00.0	00.0	00.0	
Height of the distal end		00.0	00.0	00.0			00.0	00.0	00.0	

Table 19. Basic statistical value

Average										
<i>Metatarsals - female</i>					left					right
<i>Middle Age</i>	I	II	III	IV	V	I	II	III	IV	V
Maximum length	60.2	71.5	66.6	66.1	65.1	60.3	72.6	68.1	66.8	69.9
Lateral length	51.3	55.1	52.0	53.5	58.1	52.1	57.5	53.5	52.3	62.8
Sagittal length	59.2	69.5	66.1	64.7	59.5	58.9	69.9	67.3	65.8	64.9
Medial length	52.2	56.7	52.0	51.2	43.1	51.3	59.3	53.3	53.3	46.3
Max. width of the distal end	19.2	11.1	09.9	09.3	10.2	19.5	11.7	09.8	09.5	10.9
Smallest width of the shaft	12.6	06.7	05.9	06.3	08.4	12.3	06.7	06.0	06.2	08.8
Width of the distal joint surface	18.3	09.8	08.5	08.2	08.5	18.3	09.9	08.6	08.4	09.3
Max. width of the prox. end	18.7	14.7	13.0	12.6	17.8	18.7	15.0	13.3	12.8	19.2
Max. height of the distal end	19.2	14.8	13.7	13.0	13.0	19.5	15.3	14.2	12.7	14.3
Height of the prox. end	15.4	12.7	12.1	10.9	12.2	15.7	13.6	12.0	10.6	14.6
Max. height of the distal joint surf.	19.0	14.3	14.3	13.3	12.2	19.2	14.7	14.4	13.1	12.9
Smallest height of the shaft	11.9	07.9	07.8	07.8	07.5	12.1	08.2	08.1	08.1	07.6
Max. height of the prox. joint surf.	24.2	18.8	18.3	16.4	15.9	24.9	18.9	18.4	16.7	18.6
Max. height of the prox. end	25.2	19.3	19.3	17.6	13.7	24.3	19.5	17.5	16.1	13.7
Average in the middle of the shaft	12.9	07.4	06.8	06.9	09.6	12.6	07.7	07.3	07.1	10.2

Standard deviation										
<i>Metatarsals - female</i>										
<i>Middle Age</i>										
	I	II	left III	IV	V		I	II	right III	IV V
Maximum length	03.6	04.5	04.8	04.1	05.9		03.2	04.0	04.6	03.9 04.4
Lateral length	03.7	03.1	04.2	05.1	05.0		03.7	04.5	03.5	03.8 05.3
Sagittal length	03.7	03.1	04.6	03.8	04.4		03.1	06.2	04.4	03.9 05.5
Medial length	03.3	04.8	05.3	04.6	02.9		05.5	04.8	04.2	05.5 04.0
Max. width of the distal end	01.1	00.5	00.8	00.6	01.1		01.1	00.6	02.7	02.0 01.6
Smallest width of the shaft	01.8	01.2	00.8	01.0	01.8		03.6	02.7	00.9	00.8 01.9
Width of the distal joint surface	01.6	00.7	00.5	00.9	01.3		01.5	00.7	00.7	00.8 01.1
Max. width of the prox. end	02.6	01.1	00.8	01.2	01.8		02.8	01.1	01.4	01.3 01.3
Max. height of the distal end	01.9	01.8	01.4	01.4	02.6		02.0	01.8	01.6	01.5 03.2
Height of the prox. end	03.0	01.1	01.1	01.9	03.7		05.3	01.9	01.1	01.5 03.0
Max. height of the distal joint surf.	01.5	01.1	01.3	01.2	02.9		01.5	02.1	01.1	01.2 02.2
Smallest height of the shaft	01.8	01.4	01.0	01.3	01.9		02.2	01.3	01.3	01.4 01.2
Max. height of the prox. joint surf.	01.0	00.7	00.8	01.1	00.9		00.9	00.8	00.7	01.1 00.8
Max. height of the prox. end	03.4	03.2	04.4	03.2	03.4		04.1	03.9	02.9	02.5 02.1
Average in the middle of the shaft	03.5	02.3	03.5	02.7	01.6		04.3	03.2	01.5	01.7 01.4

Table 20. Basic statistical value

Average										
<i>Metatarsals - female</i>										
<i>Neolithic</i>										
	I	II	left III	IV	V		I	II	right III	IV V
Maximum length	65.2	69.0	00.0	66.8	67.0		59.9	77.0	69.1	70.6 78.0
Lateral length	54.1	56.8	00.0	53.1	60.0		54.7	65.5	56.2	56.0 72.2
Sagittal length	60.9	67.8	00.0	64.0	61.0		60.0	76.1	72.9	69.4 69.5
Medial length	54.1	52.5	00.0	46.8	45.9		59.6	64.0	53.9	54.0 52.8
Max. width of the distal end	20.3	11.7	00.0	09.2	12.2		21.0	11.4	11.8	10.2 11.8
Smallest width of the shaft	13.4	07.1	00.0	06.5	09.2		12.1	06.0	06.9	07.0 09.2
Width of the distal joint surface	20.8	10.6	00.0	09.5	10.4		20.0	10.6	10.2	09.2 09.2
Max. width of the prox. end	19.9	16.9	00.0	13.9	20.9		19.1	13.2	16.2	13.8 21.2
Max. height of the distal end	21.3	13.8	00.0	13.0	12.0		20.5	16.0	11.9	12.6 12.5
Height of the prox. end	15.5	14.8	00.0	11.9	16.1		16.9	11.2	14.8	09.9 15.1
Max. height of the distal joint surf.	20.4	14.0	00.0	13.4	12.0		20.9	15.5	12.9	13.3 12.2
Smallest height of the shaft	12.6	07.9	00.0	08.6	07.2		12.6	09.0	07.2	08.0 07.0
Max. height of the prox. joint surf.	23.0	20.3	00.0	17.7	21.0		22.6	19.5	19.8	17.4 15.2
Max. height of the prox. end	22.2	20.2	00.0	17.9	13.0		22.5	19.5	19.2	17.3 15.1
Average in the middle of the shaft	14.0	07.2	07.5	08.2	10.1		13.6	07.0	07.0	08.4 10.9

Standard deviation										
<i>Metatarsals - female</i>										
<i>Neolithic</i>										
	I	II	left III	IV	V		I	II	right III	IV V
Maximum length	07.1	00.0	00.0	00.0	00.0		04.3	00.0	00.0	07.6 00.0
Lateral length	05.8	00.0	00.0	00.8	00.0		06.3	00.0	00.0	07.0 00.0
Sagittal length	05.8	00.0	00.0	00.0	00.0		05.6	00.0	00.0	06.3 00.0
Medial length	07.2	00.0	00.0	00.0	00.0		07.6	00.0	00.0	01.8 00.0
Max. width of the distal end	03.9	01.1	00.0	00.1	00.0		01.4	00.6	00.0	10.2 00.0
Smallest width of the shaft	02.0	00.8	00.0	00.5	00.0		02.2	00.0	00.0	00.8 00.0
Width of the distal joint surface	03.9	01.3	00.0	01.1	03.6		01.4	00.8	00.0	01.6 00.0
Max. width of the prox. end	02.7	02.2	00.0	00.0	00.0		00.2	00.0	00.0	03.2 00.0
Max. height of the distal end	01.1	00.0	00.0	00.0	00.0		01.4	00.0	00.0	00.6 00.0
Height of the prox. end	03.6	00.0	00.0	00.0	00.0		01.5	00.0	00.0	02.4 00.0
Max. height of the distal joint surf.	02.3	00.0	00.0	00.0	00.0		01.5	00.0	00.0	00.4 00.0
Smallest height of the shaft	01.3	00.0	00.0	00.0	00.0		00.7	00.1	00.0	02.8 00.0
Max. height of the prox. joint surf.	09.9	01.3	00.0	00.0	00.0		09.3	00.6	00.0	01.0 00.0

Max. height of the prox. end	10.3	01.4	00.0	02.1	00.0	09.3	00.7	00.0	01.1	00.0
Average in the middle of the shaft	06.2	00.0	00.0	01.0	00.0	06.4	00.0	00.0	01.0	00.0

Table 21. Basic statistical value

Average										
<i>Metatarsals - female</i>						right				
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Maximum length	63.9			69.9	70.0				69.9	
Lateral length	58.0			55.8	65.5				55.2	
Sagittal length	61.2			57.5	64.5				67.5	
Medial length	51.9			51.2	43.0				51.3	
Max. width of the distal end	21.1			09.0	09.0				09.0	
Smallest width of the shaft	11.8	07.9	05.9	06.5	09.2			06.0	06.0	
Width of the distal joint surface	21.9			08.9	08.1				08.2	
Max. width of the prox. end	18.0	13.1	13.2	14.8	19.0			13.9	13.5	
Max. height of the distal end	20.0			13.1	10.0				13.0	
Height of the prox. end	14.2	11.1	12.0	13.8	11.5			12.0	13.2	
Max. height of the distal joint surf.	20.0			13.1	12.2				13.1	
Smallest height of the shaft	10.8	08.2	06.8	08.5	07.9			08.5	08.1	
Max. height of the prox. joint surf.	26.2	18.9	19.1	17.0	18.9			20.1	18.0	
Max. height of the prox. end	26.2	18.9	19.0	17.1	12.5			20.0	17.2	
Average in the middle of the shaft	14.0	08.2	06.5	07.5	10.2			08.2	08.5	
Standard deviation										
<i>Metatarsals - female</i>						right				
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Maximum length	00.0			00.0	00.0				00.0	
Lateral length	00.0			00.0	00.0				00.0	
Sagittal length	00.0			00.0	00.0				00.0	
Medial length	00.0			00.0	00.0				00.0	
Max. width of the distal end	21.1			09.0	09.0				00.0	
Smallest width of the shaft	00.0	00.0	00.0	00.0	00.0			00.0	00.0	
Width of the distal joint surface	00.0			00.0	00.0				00.0	
Max. width of the prox. end	00.0	00.0	00.0	00.0	00.0			00.0	00.0	
Max. height of the distal end	00.0			00.0	00.0				0.0.	
Height of the prox. end	00.0	00.0	00.0	00.0	00.0			00.0	00.0	
Max. height of the distal joint surf.	00.0			00.0	00.0				00.0	
Smallest height of the shaft	00.0	00.0	00.0	00.0	00.0			00.0	00.0	
Max. height of the prox. joint surf.	00.0	00.0	00.0	00.0	00.0			00.0	00.0	
Max. height of the prox. end	00.0	00.0	00.0	00.0	00.0			00.0	00.0	
Average in the middle of the shaft	00.0	00.0	00.0	00.0	00.0			00.0	00.0	

Table 22. Basic statistical value

Average										
<i>Metatarsals - males</i>						right				
<i>Middle Age</i>	I	II	III	IV	V	I	II	III	IV	V
Maximum length	65.0	77.3	71.4	72.9	70.7	65.7	77.3	73.2	71.3	70.7
Lateral length	62.4	71.0	71.4	71.0	70.7	56.4	72.5	70.2	69.8	62.6
Sagittal length	62.5	75.4	70.4	68.2	63.3	63.8	74.0	71.2	68.7	64.9
Medial length	56.3	64.2	60.7	56.4	48.8	57.4	63.2	59.6	55.1	46.7
Max. width of the distal end	21.2	11.8	10.7	10.2	11.2	21.7	11.9	10.8	10.7	11.3
Smallest width of the shaft	14.1	07.0	06.3	06.6	09.1	15.0	06.6	06.7	06.8	09.1
Width of the distal joint surface	20.6	11.1	09.4	06.3	06.6	20.6	11.0	09.6	08.6	09.6

Max. width of the prox. end	20.6	11.1	09.4	09.4	09.9	22.3	15.3	14.3	14.1	20.8
Max. height of the distal end	21.5	15.3	13.7	14.5	19.2	16.3	15.1	15.3	13.8	13.3
Height of the prox. end	20.4	15.7	15.2	14.3	13.7	20.9	16.1	15.3	15.1	13.8
Max. height of the distal joint surf.	18.1	14.1	12.7	12.4	14.1	28.1	08.8	09.2	09.1	10.1
Smallest height of the shaft	13.1	09.0	08.8	09.1	09.6	13.5	08.8	09.2	09.1	10.2
Max. height of the prox. joint surf.	26.9	19.7	18.1	18.0	17.6	28.1	20.7	18.0	18.2	18.9
Max. height of the prox. end	26.6	20.4	18.9	18.6	15.0	28.6	20.8	20.3	18.5	15.6
Average in the middle of the shaft	13.9	08.1	07.4	08.0	10.5	15.1	08.5	08.9	08.2	11.6

Standard deviation

<i>Metatarsals - males</i> <i>Middle Age</i>	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	04.2	04.2	03.8	04.1	08.5	03.0	04.7	04.6	04.8	05.6
Lateral length	02.7	02.3	03.2	06.5	07.3	04.2	04.1	03.8	03.6	07.6
Sagittal length	04.1	04.4	04.9	04.6	06.4	03.3	03.0	04.3	04.1	06.9
Medial length	01.4	01.4	00.6	01.1	01.2	04.1	04.7	04.9	04.0	05.4
Max. width of the distal end	01.1	01.0	00.7	00.8	00.8	01.7	01.2	00.9	00.9	01.0
Smallest width of the shaft	01.8	01.1	00.9	00.7	00.8	02.4	01.0	01.2	00.7	00.9
Width of the distal joint surface	00.8	01.8	01.1	00.9	01.3	01.7	01.0	00.2	00.8	01.1
Max. width of the prox. end	01.3	01.9	02.0	01.2	01.4	01.6	01.5	01.8	02.2	01.8
Max. height of the distal end	02.1	01.5	01.5	00.9	01.7	01.4	03.2	01.4	03.2	03.4
Height of the prox. end	03.4	02.4	02.0	01.3	01.7	02.1	02.1	01.9	01.9	03.2
Max. height of the distal joint surf.	02.2	02.4	01.6	01.4	02.2	02.3	02.1	01.3	01.9	02.0
Smallest height of the shaft	01.9	00.8	02.4	01.6	01.4	02.1	01.0	01.8	01.1	02.0
Max. height of the prox. joint surf.	02.2	01.9	00.8	00.9	01.3	04.3	02.7	04.0	01.9	03.8
Max. height of the prox. end	01.2	02.5	03.7	02.5	02.0	02.7	01.5	01.9	01.9	02.4
Average in the middle of the shaft	01.4	00.9	01.4	00.7	01.2	03.6	02.1	03.3	01.5	00.8

Table 23. Basic statistical value

Average										
<i>Metatarsals - males</i> <i>Neolithic</i>	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	66.8	77.5	72.5	70.5	75.3	67.0	79.1	78.0	70.6	78.9
Lateral length	56.8	64.2	56.1	68.2	69.5	59.1	66.0	59.0	56.6	74.9
Sagittal length	64.7	75.1	69.1	68.7	67.8	65.1	79.6	76.5	70.0	76.5
Medial length	58.8	64.3	66.0	53.1	49.5	59.6	68.2	62.0	58.4	53.0
Max. width of the distal end	22.1	12.7	11.0	10.3	12.5	21.8	12.0	14.0	10.9	14.1
Smallest width of the shaft	15.0	08.0	06.8	08.1	10.0	15.7	06.6	08.9	07.4	11.0
Width of the distal joint surface	22.4	11.9	09.2	10.0	12.0	20.4	11.0	11.1	10.0	11.0
Max. width of the prox. end	20.5	19.0	14.1	15.2	22.2	19.9	15.9	16.8	15.4	24.9
Max. height of the distal end	22.1	14.5	16.2	13.8	15.0	22.1	16.1	13.5	13.8	13.8
Height of the prox. end	18.8	15.2	12.8	13.1	16.6	17.7	15.5	16.1	11.3	17.2
Max. height of the distal joint surf.	21.9	14.5	16.0	13.8	14.5	22.6	16.6	15.2	13.4	14.2
Smallest height of the shaft	13.3	08.7	08.5	08.8	09.0	13.7	09.0	08.9	08.4	08.1
Max. height of the prox. joint surf.	28.2	21.9	20.2	18.0	23.3	29.4	21.0	20.5	18.1	22.0
Max. height of the prox. end	27.9	20.4	20.5	18.0	15.5	29.1	20.2	21.0	17.3	15.1
Average in the middle of the shaft	14.9	07.9	07.5	07.3	11.5	15.6	07.5	10.0	11.0	14.0

Standard deviation

<i>Metatarsals - males</i> <i>Neolithic</i>	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Maximum length	03.9	02.7	00.0	00.6	02.1	01.4	03.0	00.0	07.6	00.0
Lateral length	03.7	03.8	00.0	00.0	05.0	01.6	01.4	00.0	02.0	00.0
Sagittal length	02.5	02.9	00.0	00.7	67.5	03.0	03.7	00.0	06.3	00.0
Medial length	03.7	64.3	00.0	03.7	03.5	02.0	05.7	00.0	01.6	00.0
Max. width of the distal end	01.7	01.1	00.0	00.6	12.5	01.1	00.0	00.0	01.0	00.0

Smallest width of the shaft	00.7	00.0	00.0	00.0	00.1	00.3	00.8	00.0	00.6	00.0
Width of the distal joint surface	01.9	00.0	00.0	00.0	00.0	02.1	00.0	00.0	00.0	00.0
Max. width of the prox. end	03.0	00.0	00.0	15.2	00.0	00.1	02.3	00.0	03.3	00.0
Max. height of the distal end	01.8	02.6	00.0	02.1	02.8	01.3	00.1	00.0	03.0	00.0
Height of the prox. end	02.0	02.3	00.0	02.0	03.4	01.7	03.3	00.0	00.6	00.0
Max. height of the distal joint surf.	01.5	02.2	00.0	01.9	01.8	00.9	00.6	00.0	03.5	00.0
Smallest height of the shaft	00.5	00.6	00.0	00.5	02.8	00.7	00.0	00.0	01.2	00.0
Max. height of the prox. joint surf.	04.5	00.0	00.0	00.0	00.4	00.8	00.0	00.0	01.3	00.0
Max. height of the prox. end	04.7	00.0	00.0	00.0	01.0	00.1	00.0	00.0	00.6	00.0
Average in the middle of the shaft	00.1	00.1	00.0	00.3	00.0	00.6	00.7	00.0	04.4	00.0

Table 24. Basic statistical value

Average										
<i>Metatarsals - males</i>						right				
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Maximum length										
Lateral length										
Sagittal length										
Medial length										
Max. width of the distal end										
Smallest width of the shaft		06.2	06.2	06.0		12.5	05.9		07.0	10.1
Width of the distal joint surface										
Max. width of the prox. end		13.8		13.2		16.6	12.4	12.9	15.6	21.0
Max. height of the distal end										
Height of the prox. end		13.5				14.4	11.5	12.8	12.5	14.6
Max. height of the distal joint surf.										
Smallest height of the shaft		08.1	09.0	08.0		12.5	08.1		08.5	09.2
Max. height of the prox. joint surf.		17.0	17.2	18.1		26.4	15.1	17.4	17.4	21.1
Max. height of the prox. end		16.0		19.0		26.4	16.1	17.0	17.9	21.8
Average in the middle of the shaft		08.0	08.0	07.5		14.3	07.0		09.0	12.0
Standard deviation										
<i>Metatarsals - males</i>						right				
<i>Palaeolithic</i>	I	II	III	IV	V	I	II	III	IV	V
Maximum length										
Lateral length										
Sagittal length										
Medial length										
Max. width of the distal end										
Smallest width of the shaft		00.0	00.0	00.0		02.1	00.1		00.0	00.1
Width of the distal joint surface										
Max. width of the prox. end		00.0		00.0		02.3	00.6	00.1	00.8	01.4
Max. height of the distal end										
Height of the prox. end		00.0				03.0	00.7	00.0	01.8	00.8
Max. height of the distal joint surf.										
Smallest height of the shaft		00.0	00.0	00.0		00.4	00.1		00.0	00.5
Max. height of the prox. joint surf.		00.0	00.0	00.0		00.8	01.3	02.3	02.0	01.6
Max. height of the prox. end		00.0		00.0		00.6	00.1	02.8	02.8	00.0
Average in the middle of the shaft		00.0	00.0	00.0		00.0	00.0		00.0	00.0

Table 25. Comparison of the middle value of the dimensions of the metacarpals between mediaeval and Neolithic males. T – value of test criteria, Df – degree of the free, P – reached level. Further are shown reached level of the Levene test of the conformity of the dispersion and reached level nonparametric Mann-Whitney test

Sign	T	Df	P	Levene P	M–W P
p 32	–1.96	21	0.06	0.61	0.12
p 38	–3.02	26	0.005	0.77	0.01
p 63	–2.02	22	0.05	0.15	0.05
p 66	2.06	15	0.05	0.80	0.11
p 71	–2.99	15	0.009	0.91	0.02
p 97	–3.08	14	0.008	1.00	0.1
p 102	–2.08	11	0.06	0.51	0.05
p 113	–2.03	11	0.06	0.40	0.06
p 122	–2.71	14	0.01	1.00	0.1
p 133	–2.21	15	0.04	0.29	0.12
p 143	–3.11	15	0.007	0.41	0.01
p 151	–2.99	18	0.007	0.30	0.03

Table 26. Comparison of the middle value of the metacarpals between Neolithic and Palaeolithic males

Sign	T	Df	P	Levene P	M–W P
p 17	–3.21	4	0.03	0.14	0.04
p 41	–0.33	4	0.74	0.03	1
p 46	–0.9	4	0.41	0.04	0.64
p 66	4.01	3	0.02	0.10	0.08
p 81	–6.2	3	0.008	1.00	0.14
p 132	–3.6	3	0.03	0.95	0.08
p 140	–2.4	3	0.08	1.00	0.13

Table 27. Comparison of the middle value of the dimensions of the metacarpals between mediaeval and Neolithic females

Sign	T	Df	P	Levene P	M–W P
p 1	–2.17	23	0.04	0.77	0.11
p 7	–2.11	22	0.04	0.71	0.03
p 8	–2.79	17	0.01	0.37	0.05
p 9	–2.3	21	0.03	0.31	0.1
p 10	–2.97	16	0.009	0.18	0.02
p 11	–2.3	23	0.03	0.59	0.08
p 12	–2.82	22	0.009	0.87	0.01
p 13	–3.33	17	0.004	0.65	0.01
p 14	–4.33	21	0.0003	0.1	0.81
p 16	–1.96	23	0.06	0.59	0.05
p 17	–2.38	22	0.02	0.69	0.02
p 19	–2.09	21	0.04	0.89	0.1
p 22	–2.37	21	0.02	0.41	0.07
p 30	–1.77	21	0.09	0.84	0.21
p 32	–2.1	22	0.04	0.45	0.07
p 37	–3.86	22	0.0009	0.71	0.01
p 38	–3.67	22	0.001	0.53	0.005
p 39	–5.1	18	0.0001	0.5	0.006
p 40	–3.15	21	0.004	0.56	0.01
p 41	–3.5	16	0.003	0.69	0.02
p 42	–2.57	22	0.01	0.84	0.04
p 43	–3.34	22	0.003	0.97	0.01
p 44	–1.98	18	0.06	0.36	0.05
p 45	–2.21	21	0.03	0.58	0.07
p 49	–1.91	18	0.07	0.45	0.04
p 50	–2.24	21	0.03	0.83	0.06
p 51	–2.41	16	0.02	0.18	0.02
p 52	–3.48	21	0.002	0.68	0.01
p 55	–1.77	21	0.09	0.14	0.06
p 57	–3.41	21	0.002	0.96	0.01
p 58	–3.32	22	0.003	0.82	0.01
p 60	–2.77	19	0.01	0.70	0.01
p 61	–2.86	21	0.009	0.91	0.03
p 62	–6.68	14.8	0	0.02	0.007
p 70	–2.2	17	0.04	0.89	0.02
p 74	–1.95	23	0.06	0.38	0.04
p 100	–2.3	14	0.03	1.00	0.09
p 114	–2.06	16	0.05	1.00	0.09
p 115	–1.84	17	0.08	1.00	0.14
p 116	–3.06	15	0.008	0.06	0.02
p 137	–2.4	13	0.03	1.00	0.1
p 144	–2.36	14	0.03	1.00	0.1

Table 28. Comparison of the middle value of the dimensions of the metacarpals between Neolithic and Palaeolithic females

Sign	T	Df	P	Levene P	M–W P
p 29	–8.00	2	0.01	1.00	0.15
p 55	–6.31	2	0.02	1.00	0.17

Table 29. Comparison of the middle value of the dimensions of the proximal phalanx between mediaeval and Neolithic males

Sign	T	Df	P	Levene P	M–W P
k 19	–1.98	16	0.06	0.36	0.08
k 21	–1.85	13	0.08	1.00	0.15
k 23	2.27	22	0.03	0.99	0.03
k 36	–3.04	13	0.009	1.00	0.10
k 37	–1.82	14	0.08	1.00	0.12
k 45	–2.10	13	0.05	1.00	0.10
k 61	–2.69	13	0.01	1.00	0.09
k 62	–2.72	14	0.01	1.00	0.10
k 65	–5.81	14	0	1.00	0.14
k 89	–3.53	15	0.003	0.02	0.15
k 106	–2.66	10	0.02	0.82	0.05
k 116	–2.16	6.3	0.02	0.03	0.47

Table 30. Comparison of the middle value of the dimensions of the proximal phalanx between Neolithic and Palaeolithic males

Sign	T	Df	P	Levene P	M–W P
k 53	12.07	3	0.001	0.21	0.07
k 107	3.68	2	0.06	1.00	0.17
k 127	4.33	2	0.04	1.00	0.17

Table 31. Comparison of the middle value of the dimensions of the proximal phalanx between mediaeval and Neolithic females

Sign	T	Df	P	Levene P	M–W P
k 5	–2.45	13	0.02	0.85	0.06
k 10	–2.12	13	0.05	0.47	0.08
k 13	–1.85	21	0.07	0.47	0.09
k 16	–2.03	16	0.05	0.98	0.06
k 17	–2.27	14	0.03	0.12	0.02
k 18	–1.74	21	0.09	0.27	0.07
k 20	–2.33	13	0.03	0.48	0.08
k 23	–2.2	14	0.04	0.09	0.05
k 28	–2.66	21	0.01	0.43	0.04
k 30	–2.09	13	0.05	0.09	0.04
k 31	–2.04	16	0.05	0.81	0.13
k 32	–2.53	14	0.02	0.63	0.03
k 33	–2.9	21	0.008	0.57	0.08
k 35	–2.33	13	0.03	0.53	0.02
k 37	–2.52	14	0.02	0.61	0.03
k 38	–2.36	21	0.02	0.16	0.04
k 42	–1.78	14	0.09	0.49	0.14
k 43	–2.33	18	0.03	0.84	0.09
k 46	–2.17	17	0.04	0.82	0.08
k 48	–2.09	21	0.04	0.75	0.05
k 62	–2.41	15	0.02	0.08	0.05
k 63	–2.75	21	0.01	0.30	0.01
k 68	–1.74	19	0.09	0.93	0.08
k 69	–1.81	18	0.08	0.07	0.2
k 70	–2.29	13	0.03	0.53	0.08
k 72	–2.82	13	0.01	0.57	0.02
k 73	–3.52	13	0.003	0.12	0.03
k 74	–2.43	14	0.02	0.10	0.12
k 77	–3.43	13	0.004	0.57	0.02
k 78	–2.09	1.2	0.09	0.03	0.01
k 79	–2.20	14	0.04	0.14	0.09
k 83	–4.14	14	0.001	0.16	0.02
k 84	–2.87	14	0.01	0.16	0.06
k 87	–1.87	13	0.08	0.55	0.009
k 88	–3.20	14	0.006	0.11	0.009
k 90	–2.60	12	0.02	0.77	0.08
k 93	–3.16	13	0.007	0.43	0.01
k 97	–3.48	13	0.004	0.59	0.01
k 98	–3.39	14	0.001	0.83	0.01

k 100	-2.50	12	0.02	0.72	0.04
k 102	-4.91	4.3	0.006	0.03	0.02
k 103	-3.16	12	0.008	0.76	0.04
k 107	-1.84	13	0.08	0.94	0.09
k 108	-4.21	14	0.0009	0.80	0.01
k 113	-2.13	11	0.05	0.70	0.05
k 123	-2.04	14	0.06	0.47	0.09
k 132	-3.10	13	0.008	0.11	0.009
k 133	-1.81	14	0.09	0.16	0.08
k 134	-2.77	14	0.01	0.94	0.04
k 135	-2.40	12	0.03	0.81	0.02
k 137	-3.26	12	0.006	0.55	0.02
k 138	-4.49	13	0.0006	0.13	0.01
k 139	-2.76	12	0.01	0.10	0.05
k 140	-3.73	11	0.001	0.08	0.03

Table 32. Comparison of the middle value of the dimensions of the middle phalanx between mediaeval and Neolithic males

Sign	T	Df	P	Levene P	M-W P
p 25	-2.32	3.5	0.09	0.00	0.03
p 38	-6.34	6	0.0007	1.00	0.11
p 48	-4.79	6	0.003	1.00	0.22
p 51	-2.86	13	0.01	0.82	0.05
p 52	-5.01	8	0.001	0.26	0.03
p 53	-2.52	4	0.06	0.91	0.09
p 63	2.61	4	0.05	1.00	0.11

Table 33. Comparison of the middle value of the dimensions of the middle phalanx between Neolithic and Palaeolithic males

Sign	T	Df	P	Levene P	M-W P
p 30	-4.32	2	0.04	1.00	0.12

Table 34. Comparison of the middle value of the dimensions of the middle phalanx between mediaeval and Neolithic females

Sign	T	Df	P	Levene P	M-W P
p 3	-2.61	8	0.03	1.00	0.11
p 18	-3.40	17.4	0.003	0.04	0.03
p 19	-2.55	10	0.02	0.25	0.04
p 26	-2.99	7.2	0.01	0.01	0.04
p 31	-4.21	9	0.002	1.00	0.11
p 37	-1.96	11	0.07	0.37	0.07
p 41	-3.04	9	0.01	1.00	0.11
p 46	-3.04	17	0.007	0.44	0.03
p 47	-3.83	11	0.002	0.80	0.01
p 48	-4.30	5	0.007	1.00	0.13
p 51	-2.72	10	0.02	1.00	0.10
p 57	-2.26	11	0.04	0.64	0.04
p 65	-2.60	15	0.02	0.32	0.006

Table 35. Comparison of the middle value of the dimensions of the middle phalanx between Neolithic and Palaeolithic females

Sign	T	Df	P	Levene P	M-W P
p 9	-10.20	1	0.06	1.00	0.22
p 18	5.50	2	0.03	1.00	0.15

Table 36. Comparison of the middle value of the dimensions

Sign	T	Df	P	Levene P	M-W P
p 1	-2.94	11	0.01	1.00	0.10
p 11	-2.01	11	0.06	1.00	0.10
p 23	-1.90	10	0.08	1.00	0.17
p 27	-2.47	7	0.04	1.00	0.11
p 68	-1.56	11	0.02	1.00	0.10

Table 37. Comparison of the middle value of the dimensions of the metatarsal between mediaeval and neolithic males

Sign	T	Df	P	Levene P	M-W P
p 96	10.58	2	0.008	1.00	0.12

Table 38. Used signs for the individual dimensions of the autopodium

Metacarpal, metatarsal	left	right
Maximum length	p 1-p 5	p 6-p 10
Lateral length	p 11-p 15	p 16-p 20
Sagittal length	p 21-p 25	p 26-p 30
Medial length	p 31-p 35	p 36-p 40
Maximum width of the distal end	p 51-p 55	p 56-p 60
Smallest width of the shaft	p 61-p 65	p 66-p 70
Width of the distal joint surface	p 71-p 75	p 76-p 80
Maximum width of the proximal end	p 81-p 85	p 86-p 90
Maximum height of the distal end	p 91-p 95	p 96-p 100
Height of the proximal end	p 101-p 105	p 106-p 110
Maximum height of the distal joint surface	p 111-p 115	p 116-p 120
Smallest height of the shaft	p 121-p 125	p 126-p 130
Maximum height of the prox. joint surface	p 131-p 135	p 136-p 140
Maximum height of the proximal end	p 141-p 145	p 146-p 150
Average in the middle of the shaft	p 41-p 45	p 46-p 50

Proximal phalanx	left	right
Lateral length	k 1-k 5	k 6-k 10
Medial length	k 11-k 15	k 16-k 20
Sagittal length	k 21-k 25	k 26-k 30
Maximum width of the distal end	k 31-k 35	k 36-k 40
Width of the middle part of the dist. joint surf.	k 41-k 45	k 46-k 50
Smallest width of the shaft	k 51-k 55	k 56-k 60
Maximum width of the proximal end	k 61-k 65	k 66-k 70
Maximum width of the prox. joint surf.	k 71-k 75	k 76-k 80
Width in the middle in the shaft	k 81-k 85	k 86-k 90
Maximum height	k 91-k 95	k 96-k 100
Height in the thinnest part of the shaft	k 101-k 105	k 106-k 110
Smallest height of the shaft	k 111-k 115	k 116-k 120
Maximum height of the proximal end	k 121-k 125	k 126-k 130
Maximum length	k 131-k 135	k 136-k 140

Middle phalanx	left	right
Sagittal length	p 1-p 5	p 6-p 10
Width of the mid. p. of the dist. joint surf.	p 11-p 15	p 16-p 20
Average of the shaft	p 21-p 25	p 26-p 30
Maximum length	p 31-p 35	p 36-p 40
Maximum width of the proximal end	p 41-p 45	p 46-p 50
Maximum width of the distal end	p 51-p 55	p 56-p 60
Height of the proximal end	p 61-p 65	p 66-p 70
Height of the distal end	p 71-p 75	p 76-p 80

Table 39. The number n of the individual bones of the autopodium

Number	left					right				
	I	II	III	IV	V	I	II	III	IV	V
Metacarpals										
female	22	23	21	15	18	9	16	16	14	12
males	22	23	21	15	18	12	19	22	17	15
Proximal phalanges										
female	16	16	14	20	20	12	12	12	12	13
males	13	15	20	15	15	10	15	14	16	14
Middle phalanges										
female	0	4	9	10	4	0	8	16	10	6
males	0	9	12	7	4	0	2	12	4	6
Metatarsals										
female	18	16	12	15	7	22	19	11	18	8
males	23	19	17	22	16	18	15	13	17	13
Proximal phalanges										
female	9	8	6	4	2	8	8	5	1	2
males	12	8	11	10	5	13	11	5	5	4

DISCUSSION AND CONCLUSIONS

Anatomy and functional morphology

Hand

All individuals from Dolní Věstonice show clear traces of the interosseous muscle (*mm. interossei dorsales et palmares*) origin crests on the middle metacarpal diaphyses (pls. II/2, III/2, III/3). These traces are similar to those seen in modern humans (fig. 3). The *m. opponens pollicis* crest on the metacarpal 1 of DV III is more of a distinct line than anything resembling a crest. The *m. abductor digiti minimi* tubercle on metacarpal 5 is small, and there is no trace of an insertion for *m. opponens digiti minimi* on the metacarpal 5 shaft. The base of the right metacarpal 2 exhibits a strongly oblique capitate facet (42°), but the styloid process on the left metacarpal 3 is modest in size and projects little beyond the main carpal facet. Both metacarpal 5 bases are radio-ulnar concave and are strongly deviated radially (JELÍNEK and TRINKAUS 1997).

DV XIII shows a clear growth linea between the epiphysis and diaphysis (pl. I/1) of the metacarpal. This suggests the individual was about 16 years old. The degree of symphysis indicates that this metacarpal has been wrongly attributed to DV XIII and properly belongs to DV XIV.

On the metacarpal 1 of DV XVI there are clear muscle origins of *m. interossei primus* and *m. opponens pollicis* (pl. III/1).

The flexor sheath attachments on the phalanges are clear (pls. II/3, III/1). The flexor sheath attachments on the proximal phalanges by DV III are clear but modest in size. This is matched by very small apical tufts on the distal phalanges of all five digits. The most developed flexor sheaths are seen in individuals DV XV and DV XVI. The good development of these crests is clearly connected with the age of the individuals and with the considerable use of the associated muscles.

Foot

There is lateral curvature on metatarsal 5 in all the individuals. There are clear traces of the interosseous muscle (*mm. interossei dorsales et plantares*) origin crests on the middle metatarsals diaphyses. In DV III the metatarsal 5 has the lateral curvature of the diaphysis and the small size proximal metatarsal tuberosity. The proximal phalanx 3 diaphyseal diameters are unequal. Distal phalanx 1 has a small apical tuft. The apical tuft on the distal phalanx 5 is greatly reduced and shortened, suggesting mild degeneration *ante mortem*.

This curvature is typical only for the modern human. The incisure on the base of metatarsal 4 is seen in DV XIV and DV XV. Incisure is developed on both left and right metatarsal 4 (pl. II/2). This incisure corresponds to shape changes of cuneiform (*os cuneiformes laterale*). Such changes of shape did not limit their movement. Observed variation could be considered an epigenetic

sign, influenced by genetic factors. Individuals showing such variation may have been related (see also VLČEK 1992).

Osteometrical data

Marked differences in the morphology of hands and feet between Neolithic and mediaeval populations, especially in females, were established. The differences are statistically significant at the 90–99 % level. These differences may indicate that substantial sexual dimorphism and microevolutionary changes took place during this period (see also FRAYER 1980, LARSEN 1987, VANČATA 1992).

Pathology

The Barnett-Nordin index was calculated for each individual from the X-ray images.

DV XIV: 71.42 %. This value corresponds to the age of the individual (pl. IV/1).

DV XV: 50.00 %. This value corresponds to females between 45–50 years old, but other information suggest that this individual was only about 20 years of age (pl. IV/1). The exaggerated index indicates reduction of bone material as a result of osteoporosis (see also VLČEK 1992).

DV XVI: II, III, a IV left 45.85, 57.10 and 40.00 % (pl. IV/2).

This work is first to study this problem. It provided very interesting results, which are worth of publication. The interpretation is still open to debate, because further research is needed.

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Dolní Věstonice: analýza autopodií paleolitické populace

(Resumé anglického textu)

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Autopodium (*ossa metacarpalia et metatarsalia, phalanges*) paleolitické populace z Dolních Věstonic (*Homo sapiens sapiens*) bylo porovnáno s autopodií neolitické a středověké populace.

Byla studována funkční anatomie úponů dorzálních a palmárních mezikostních svalů (*mm. interossei dorsales et palmares*). Úpon oponujícího svalu palce (*m. opponens pollicis*) byl rovněž studován. Úpony těchto svalů jsou v rozmezí moderního člověka. Střední prstní články jedince DV XV (DV = Dolní Věstonice) a DV XVI mají zřetelné hrany pro úpony ohybačů (*mm. flexores digitorum*). Rozvoj hran souvisí jednak se stářím jedinců a jednak se zvýšeným zatěžováním odpovídajících svalů.

Kosti nohy vykazují rovněž zřetelné úpony dorzálních a planárních mezikostních svalů v rozsahu moderního člověka (*mm. interossei dorsales et plantares*). Páté nártní kosti (*ossa metatarsalia*) vykazují laterální zakřivení. U jedince DV XV a DV XIV je na bázi levé a pravé nártní kosti zřetelný výkroj (*incusura*). Tento výkroj odpovídá tvarovým změnám zevní kosti klínovité (*os cueniforme laterale*). Zmíněný tvar lze hodnotit jako varietu, která neměla vliv na funkci nožní klenby, ani výrazně neomezovala chůzi jedince. Výskyt variety lze považovat za tzv. epigenetický znak, který je dědičně ovlivněný, a proto lze patrně označit tyto dva jedince za blízké příbuzné. Na základě osteometrických dat jsou paleolitičtí muži podobní neolitickým mužům, ale robustnější než muži ze středověku. Výraznější změny v morfologii autopodií můžeme sledovat mezi neolitickou a raně středověkou populací než mezi neolitickou a paleolitickou populací, a to především u žen. Tyto rozdíly mezi populacemi jsou statisticky významné (na hladině významnosti 90–99 %). Zmíněné rozdíly mohou být interpretovány jako snižování pohlavních rozdílů a mikroevoluční změny, které probíhaly z větší části od neolitu. To souhlasí jak s pozorováním VANČATY (1992), tak s pozorováním LARSEN (1987) a FRAYERA (1980). Byl spočítán rovněž Barnett-Nordinův index úbytku kostní hmoty. Největší úbytek kostní hmoty vlivem osteoporózy byl zjištěn u jedince DV XV (viz rovněž VLČEK 1992). U ostatních jedinců jsou hodnoty indexu normální, odpovídající věku jedinců.

Vysvětlivky k obrázkům

1. Osteometrické míry jednotlivých kostí autopodia (podle DUERSTBERNA 1926).
2. Měření Barnett-Nordinova indexu; D – vnější průměr, d – vnitřní průměr.
3. Porovnání úponů mezikostních svalů (*mm. interossei dorsales*) populace z Dolních Věstonic (a), moderního člověka (b) a neandertálského člověka (c). Obrázky b a c jsou převzaty od VLČKA (1979), (a) kresba autorky.

Vysvětlivky k přílohám

Příl. I

1. Záprstní kosti jedince DV XIII (zleva doprava: 3. a 2. levý a 2. pravý). Záprstní kosti vykazují růstové linie (nahore: dorzální pohled a dole: palmární pohled).
2. Základní prstní články a střední prstní články jedince DV XIV. Na základních prstních člancích jsou zřetelné úpony ohybačů. Na středních prstních člancích jsou dobře zřetelné úpony pro ohybače prstů. Nahore: dorzální pohled, dole: palmární pohled.

Příl. II

1. Záprstní kosti jedince DV XV (2. a 4. pravá). Zřetelnou hranu pro úpony mezikostních svalů ve středu kosti můžeme vidět na pravé straně obrázku.

2. Nártní kosti (3.–4. levé) jedince DV XV. Vlevo: dorzální pohled, vpravo: laterální pohled. Na 4. nártní kosti je vidět zřetelný výkroj na bázi kosti. Jsou zde jasné úpony mezikostních svalů (*mm. interossei dorsales*).

3. Střední prstní články jedince DV XVI. Nahoře: 2., 3. a 4. pravé, dole: 2., 3. a 4. levé.

Příl. III

1. Záprstní kosti jedince DV XVI. 1.–5. pravé. Na kostech jsou zřetelné stopy úponů mezikostních svalů (s výjimkou 5. záprstní kosti, která je poškozená).

2. Základní prstní články. Nahoře: 1.–4. pravé, dole: 2.–5. levé. Dorzální pohled.

3. Jedinec DV XVI. Nártní kosti 1.–5. pravé, základní prstní články 1.–4. pravé, střední prstní články 2.–4. pravé a koncové prstní články 1., 3. a 4. pravé. Na nártních kostech jsou zřetelné hrany po úponech mezikostních svalů. Na obou 5. nártních kostech je zřetelné laterální zakřivení.

Příl. IV

1. Rentgenový snímek autopodia jedince DV XIV a DV XV. Vlevo: jedinec DV XIV – 2. záprstní kost bez patologických změn, vpravo: jedinec DV XV – 4. záprstní kost s patologickou redukcí kostního materiálu, která je výsledkem osteoporózy.

2. Rentgenový snímek jedince DV XVI. Záprstní kosti 1.–5. levé a 2.–4. pravé bez patologických změn.

Tabulka 1. Stratigrafická korelace kvartéru jihovýchodní Asie (hlavní horizonty).

Tabulka 2. Významné nálezy fosilního člověka v Číně.

Vysvětlivky k přílohám

Příl. I

1. Sprašová plošina u Luochuanu v Číně. Sprašové pokryvy, silně postižené erozí jsou členěné fosilními půdami. Foto A. Billardová.
2. Sprašová plošina u Luochuanu v Číně. Výrazně vyvinutý komplex fosilních půd ve středopleistocenních spraších. Foto A. Billardová.

Příl. II

1. Svrchnopleistocenní spraš (sprašový sediment) Thu Duc na lokalitě Thu Duc v jižním Vietnamu. Foto V. Šibrava.
2. Pleistocenní červená spraš (sprašový sediment) v nadloží ferikrustové polohy na lokalitě Khon Kaen-Modendang v Thajsku. Foto V. Šibrava.

Příl. III

1. Plio-pleistocenní sedimenty u Ban Khuana v Thajsku. Foto V. Šibrava.
2. Červené sprašové sedimenty v nadloží terciéru nedaleko Kum-pavi v Thajsku. Foto V. Šibrava.

Příl. IV

1. Krajina v okolí Cipenduy v Indonésii s morfologií ovlivněnou pleistocenními lahárovými proudy. Foto V. Šibrava.
2. Odkryv lahárových sedimentů v povrchovém dolu u Cipenduy v Indonésii. Foto V. Šibrava.

Příl. V

1. Letecký snímek povrchových cínových dolů u Ipohu v Malajsii, ukazující také vliv povrchového dobývání na prostředí. Foto V. Šibrava.
2. Povrchový důl v cínonosných pleistocenních sedimentech u Ramundy v Malajsii. Foto V. Šibrava.

Příl. VI

1. Cínový důl u Pantai Remis v Malajsii. Fluvialní a estuarinní sedimenty jsou členěny pleistocenními organickými polohami. Foto V. Šibrava.
2. Spodní poloha fluvialních sedimentů s organickými polohami na lokalitě Pantai Remis. Foto V. Šibrava.

Příl. VII

1. Valounové artefakty datované kolem 31 ka u Kota Rampanu v Malajsii. Foto V. Šibrava.
2. Holocenní organické sedimenty na lokalitě Kelumpang v Malajsii. Foto V. Šibrava.

Příl. VIII

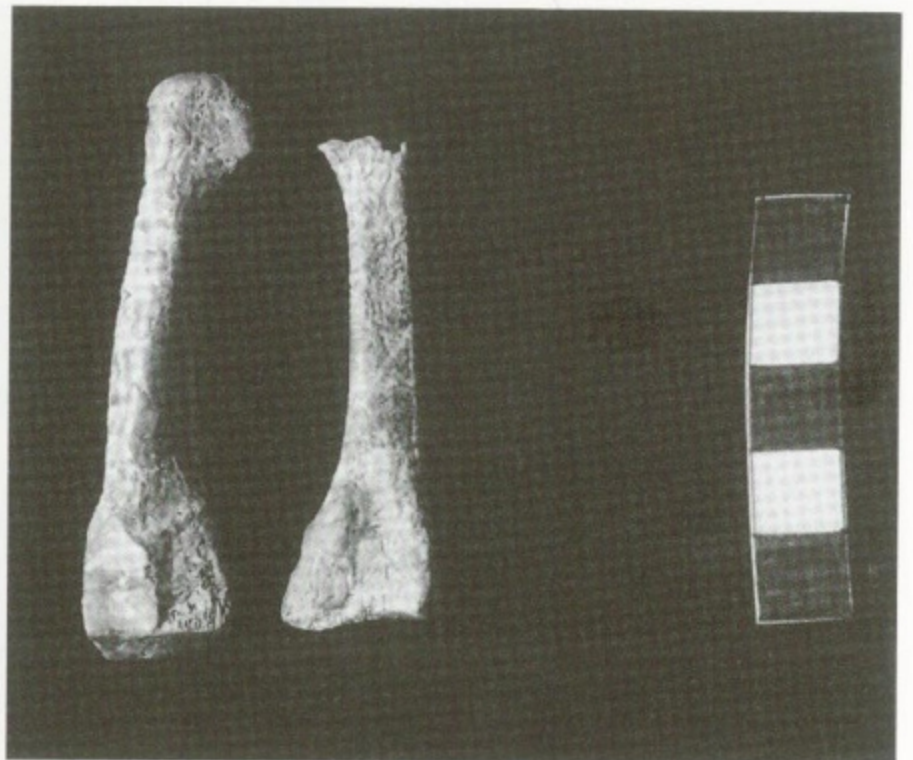
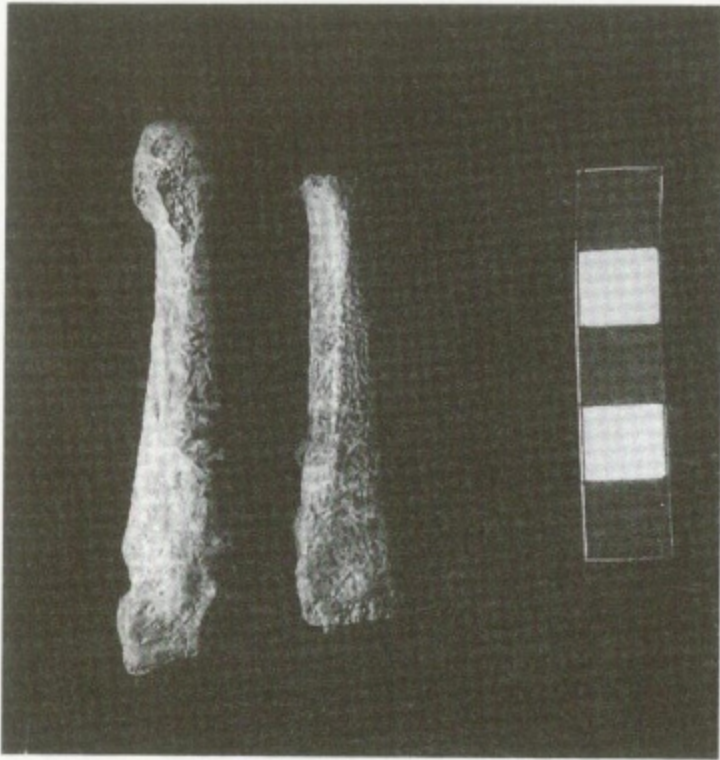
1. Dnešní thajský záliv s mladými holocenními sedimenty. Foto V. Šibrava.
2. Bangkokskej jíla s „tuhým“ pleistocenním jílem ($14\,700 \pm 6\,900$ let BP) v podloží. Foto V. Šibrava.



2. DV XIV proximal phalanges and middle phalanges. On the proximal phalanges are clear attachments for flexors. On the middle phalanges are very well developed attachments for flexors of fingers. Above: dorsal view; below: palmar view.



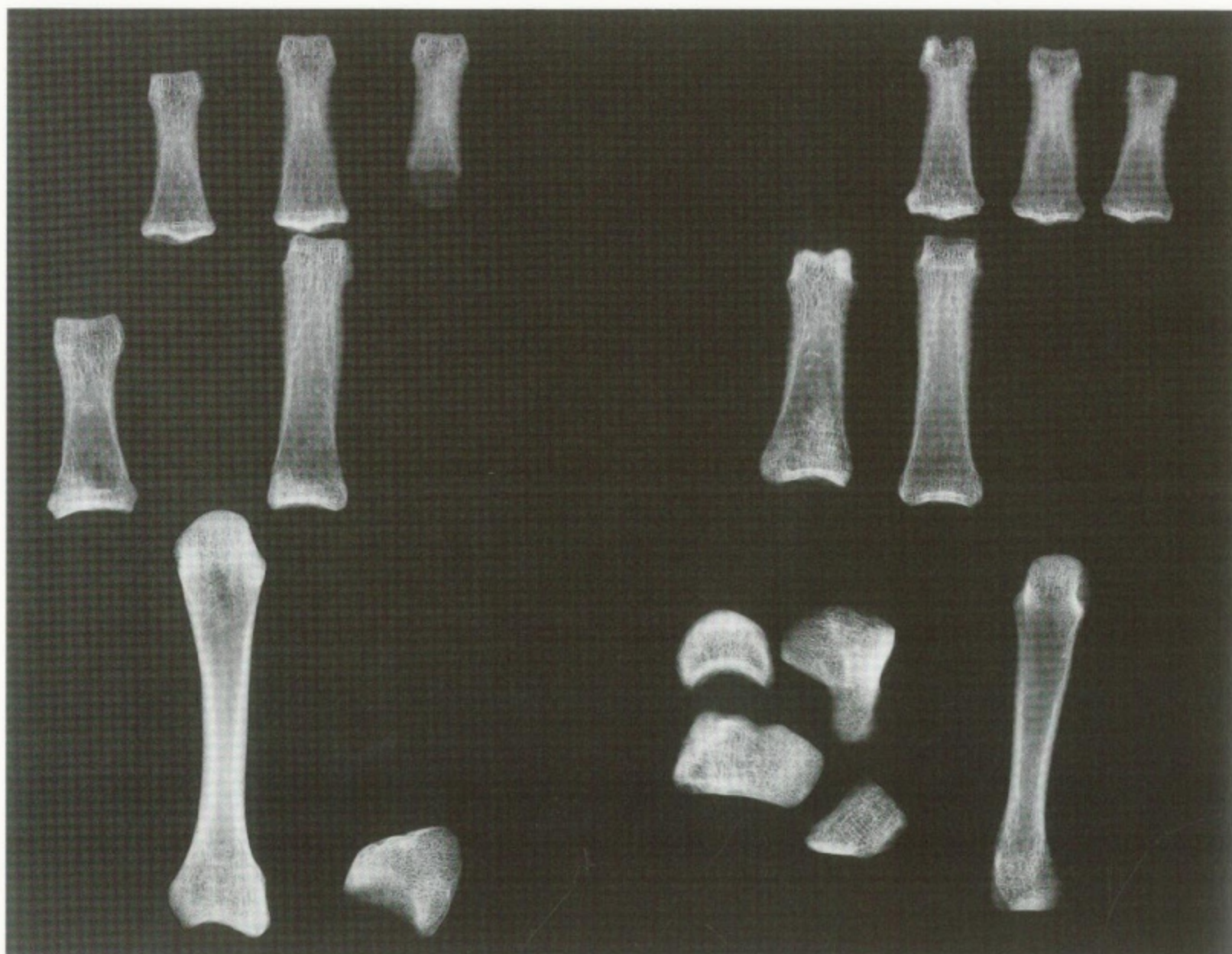
1. DV XIII metacarpals (from left to right: 3 and 2 left and 2 right). The metacarpals exhibit growth linea (above: dorsal view; below: palmar view).



1. DV XV. Metacarpals (2 and 4 right). The clear trace of the interosseous muscle origin crests on middle metacarpal diaphyses may be seen on the right-hand side of the figure.
2. DV XV. Metatarsals 3–4 left. Left: dorsal view; right: lateral view. On metatarsal 4 left there is the incisure on the base of the bone. There are clear traces of the interosseous (mm. *interossei dorsales*) muscle origin crests.
3. DV XVI. Middle phalanges. On the top are 2, 3 and 4 right and below are 2, 3 and 4 left.



1. DV XVI. Metacarpals 1, 2, 3, 4, 5 right. There are the traces of the interosseous muscles origin crests may be seen (with the exception of 5 metacarpal, because this metacarpal is damaged).
2. Proximal phalanges. Above: 1–4 right, below: 2–5 left. Dorsal view.
3. DV XVI. Metatarsals 1–5 right, proximal phalanges 1–4 right, middle phalanges 2–4 right, distal phalanges 1, 3–4 right. There are traces of the interosseous (*mm. interossei dorsales*) muscle origin crests on the middle metatarsal diaphyses. On the metatarsal 5 left and right there is lateral curvature.



1. X-ray images of the autopodium of DV XIV; DV XV. Left: DV XIV – metacarpal 2 without pathological change, right: DV XV – metacarpal 4 with pathological indicates reduction of bone material as a result of osteoporosis.

2. X-ray images. DV XVI – metacarpals 1–5 left and 2–4 right without pathological change.

Photos by M. Nývltová-Fišáková (Pl. II/2) and D. Nývlt (all the other photos)