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University of Durham

**Landscape, Material Culture and Society
in South East Bulgaria**

by Bisserka Ivanova Gaydarska
Department of Archaeology

Vol. II (3)

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in partial fulfillment of the requirements for PhD in Archaeology**

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Appendix C: GIS Data Analysis

Instruction for the use of the CD-ROM

- The original GIS application has been made in ArcView 3.2a. It contained more than 1,200 individual sample screens displaying the results of the different analyses discussed in detail in the main text. The original GIS model was interactive, allowing some choice to view different sample screens. However, it requires the expensive and relatively complicated ArcView 3.2a software.
- For the purposes of wider access to the data, 506 screens were chosen here to illustrate the results of the GIS analyses and exported into JPEG files. The images were inserted as hyperlinks in the text, which was also converted into hypertext. Microsoft FrontPage was used to change the doc. and jpg. files into html. format.
- Any web browser which is usually a part of the main Microsoft packages is sufficient to access the data on the CD-ROM. The CD contains nine html files (the text of the thesis) with embedded jpg. files, which appear in the text as “CDFigs”. Clicking on the highlighted “CDFig.” should open the desired image. To enable access to the images, it is essential that the 506 images as jpg. files are also stored on the same digital carrier. There are also other jpg. files, which appear under the name *chapter* and which are created automatically by the software for the image files inserted in the paperback copy of the thesis.

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CDFig.226	Visibility from Path Polski Gradets pit site – Polski Gradets tell	pg19
CDFig.227	Gonova mogila elevation	go1
CDFig.228	Gonova mogila slope	go2
CDFig.229	Gonova mogila aspect	go3
CDFig.230	Gonova mogila visibility	go4
CDFig.231	Gonova mogila visibility +2m	go5
CDFig.232	Gonova mogila visibility +4m	go6
CDFig.233	Gonova mogila cost surface	go7
CDFig.234	Gonova mogila logistical network	go8
CDFig.235	Visibility from Path Gonova mogila – Ovcharitsa II	go9
CDFig.236	Visibility from Path Gonova mogila – Aldinova mogila	go10
CDFig.237	Visibility from Path Gonova mogila – Ovchartsı barrow	go11
CDFig.238	Visibility from Path Gonova mogila – Goliamata mogila	go12
CDFig.239	Visibility from Path Gonova mogila – Malkata mogila	go13
CDFig.240	Visibility from Path Gonova mogila – Tcherniova mogila	go14
CDFig.241	Visibility from Path Gonova mogila – Kurdova mogila	go15
CDFig.242	Visibility from Path Gonova mogila – Goliama Detelina flat site	go17
CDFig.243	Visibility from Path Gonova mogila – Manchova mogila	go16
CDFig.244	Visibility from Path Gonova mogila – Taniokoleva mogila	go18
CDFig.245	Path Gonova mogila – Ovcharitsa I	go19
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CDFig.247	Path Gonova mogila – Aldinova mogila	go21
CDFig.248	Path Gonova mogila – Ovcharitsa II	go22
CDFig.249	Path Gonova mogila – Goliamata mogila	go23
CDFig.250	Path Gonova mogila – Malkata mogila	go24
CDFig.251	Path Gonova mogila – Kurdova mogila	go25
CDFig.252	Path Gonova (Taniokoleva) mogila – MIBC1	go26
CDFig.253	Path Gonova (Taniokoleva) mogila – MIBC2	go27
CDFig.254	Path Gonova (Taniokoleva) mogila – MIBC3	go28
CDFig.255	Path Gonova (Taniokoleva) mogila – MIBC4	go29
CDFig.256	Visibility from Path Gonova (Taniokoleva) mogila – MIBC3	go30
CDFig.257	Visibility from Path Gonova (Taniokoleva) mogila – MIBC4	go31
CDFig.258	Visibility from Path Gonova (Taniokoleva) mogila – MIBC1	go32
CDFig.259	Visibility from Path Gonova (Taniokoleva) mogila – MIBC2	go33
CDFig.260	Ovcharitsa I elevation	ovch1
CDFig.261	Ovcharitsa I slope	ovch2
CDFig.262	Ovcharitsa I aspect	ovch3
CDFig.263	Ovcharitsa I visibility	ovch4
CDFig.264	Ovcharitsa I cost surface	ovch5
CDFig.265	Ovcharitsa I logistical network	ovch6
CDFig.266	Path Ovcharitsa I – Aldinova mogila	ovch7
CDFig.267	Visibility from Path Ovcharitsa I – Aldinova mogila	ovch8
CDFig.268	Ovcharitsa I – Site Catchment Analysis	ovch9
CDFig.269	Ovcharitsa II elevation	ovcharitsa1
CDFig.270	Ovcharitsa II slope	ovcharitsa2
CDFig.271	Ovcharitsa II aspect	ovcharitsa3
CDFig.272	Ovcharitsa II visibility	ovcharitsa4
CDFig.273	Ovcharitsa II cost surface	ovcharitsa5
CDFig.274	Ovcharitsa II logistical network	ovcharitsa6
CDFig.275	Path Ovcharitsa II – Aldivova mogila	ovcharitsa7
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CDFig.277	Ovcharitsa II – Site Catchment Analysis	ovcharitsa9
CDFig.278	Aldinova mogila elevation	a1
CDFig.279	Aldinova mogila slope	a2
CDFig.280	Aldinova mogila aspect	a3

CDFig.281	Aldinova mogila visibility	a4
CDFig.282	Aldinova mogila visibility +1m	a5
CDFig.283	Aldinova mogila visibility +3m	a6
CDFig.284	Aldinova mogila visibility +4m	a7
CDFig.285	Aldinova mogila cost surface	a8
CDFig.286	Aldinova mogila logistical network	a9
CDFig.287	Ovcharts barrow elevation	ob1
CDFig.288	Ovcharts barrow slope	ob2
CDFig.289	Ovcharts barrow aspect	ob3
CDFig.290	Ovcharts barrow visibility	ob4
CDFig.291	Ovcharts barrow visibility +5.5m	ob5
CDFig.292	Ovcharts barrow visibility +7	ob6
CDFig.293	Ovcharts barrow cost surface	ob7
CDFig.294	Ovcharts barrow logistical network	ob8
CDFig.295	Path Ovcharts barrow – Barrow Four	ob9
CDFig.296	Visibility from Path Ovcharts barrow – Barrow Four	ob10
CDFig.297	Barrow Four elevation	b1
CDFig.298	Barrow Four aspect	b2
CDFig.299	Barrow Four slope	b3
CDFig.300	Barrow Four visibility	b4
CDFig.301	Barrow Four visibility +2m	b5
CDFig.302	Barrow Four visibility +4m	b6
CDFig.303	Barrow Four cost surface	b7
CDFig.304	Barrow Four logistical network	b8
CDFig.305	Path Barrow Four – MIBC3	b9
CDFig.306	Path Barrow Four – MIBC4	b10
CDFig.307	Path Barrow Four – MIBC1	b11
CDFig.308	Path Barrow Four – MIBC2	b12
CDFig.309	Visibility from Path Barrow Four – MIBC3	b13
CDFig.310	Visibility from Path Barrow Four – MIBC4	b14
CDFig.311	Visibility from Path Barrow Four – MIBC1	b15
CDFig.312	Visibility from Path Barrow Four – MIBC2	b16
CDFig.313	Visibility from Path Barrow Four – KMBC	b17
CDFig.314	Path Barrow Four – Klisselika tell	b18
CDFig.315	Path Barrow Four – Goliamata mogila	b19
CDFig.316	Path Barrow Four – Malkata mogila	b20
CDFig.317	Path Barrow Four – Taniokoleva mogila	b21
CDFig.318	Path Barrow Four – Kurdova mogila	b22
CDFig.319	Visibility from Path Barrow Four – Goliamata mogila	b23
CDFig.320	Visibility from Path Barrow Four – Taniokoleva mogila	b24
CDFig.321	Visibility from Path Barrow Four – Kurdova mogila	b25
CDFig.322	Goliamata mogila elevation	gm1
CDFig.323	Goliamata mogila slope	gm2
CDFig.324	Goliamata mogila aspect	gm3
CDFig.325	Goliamata mogila visibility	gm4
CDFig.326	Goliamata mogila visibility +4.20m	gm5
CDFig.327	Goliamata mogila cost surface	gm6
CDFig.328	Goliamata mogila logistical network	gm7
CDFig.329	Path Goliamata mogila – Klisselika tell	gm8
CDFig.330	Path Goliamata mogila – Iskritsa dwelling site	gm9
CDFig.331	Path Goliamata mogila – MIBC1	gm10
CDFig.332	Path Goliamata mogila – MIBC2	gm11
CDFig.333	Path Goliamata mogila – MIBC3	gm12
CDFig.334	Path Goliamata mogila – MIBC4	gm13
CDFig.335	Visibility from Path Goliamata mogila – MIBC2	gm14
CDFig.336	Path Goliamata mogila – Taniokoleva mogila	gm15
CDFig.337	Visibility from Path Goliamata mogila – Taniokoleva mogila	gm16

CDFig.338	Path Goliamata mogila – Manchova mogila	gm17
CDFig.339	Visibility from Path Goliamata mogila – Manchova mogila	gm18
CDFig.340	Path Goliamata mogila – Kurdova mogila	gm19
CDFig.341	Visibility from Path Goliamata mogila – Kurdova mogila	gm20
CDFig.342	Path Goliamata mogila – Goliama Detelina flat site	gm21
CDFig.343	Visibility from Path Goliamata mogila – Goliama Detelina flat site	gm22
CDFig.344	Path Goliamata mogila – Iskritsa pit site	gm23
CDFig.345	Malkata mogila elevation	mm1
CDFig.346	Malkata mogila slope	mm2
CDFig.347	Malkata mogila aspect	mm3
CDFig.348	Malkata mogila visibility	mm4
CDFig.349	Malkata mogila visibility +2m	mm5
CDFig.350	Malkata mogila visibility +3m	mm6
CDFig.351	Malkata mogila cost surface	mm7
CDFig.352	Malkata mogila logistical network	mm8
CDFig.353	Goliama Detelina flat site elevation	gt1
CDFig.354	Goliama Detelina flat site slope	gt2
CDFig.355	Goliama Detelina flat site aspect	gt3
CDFig.356	Goliama Detelina flat site visibility	gt4
CDFig.357	Goliama Detelina flat site cost surface	gt5
CDFig.358	Goliama Detelina flat site logistical network	gt6
CDFig.359	Path Goliama Detelina flat site – Malkata mogila	gt7
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CDFig.361	Path Goliama Detelina flat site – Tcherniova mogila	gt9
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CDFig.364	Visibility from Path Goliama Detelina flat site – Manchova mogila	gt12
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CDFig.370	Tcherniova mogila slope	tch2
CDFig.371	Tcherniova mogila aspect	tch3
CDFig.372	Tcherniova mogila (1) visibility	tch4
CDFig.373	Tcherniova mogila (1) visibility +3m	tch5
CDFig.374	Tcherniova mogila (1) visibility +4m	tch6
CDFig.375	Tcherniova mogila (2) visibility	tch7
CDFig.376	Tcherniova mogila (2) visibility +3m	tch8
CDFig.377	Tcherniova mogila (2) visibility +4m	tch9
CDFig.378	Tcherniova mogila (3) visibility	tch10
CDFig.379	Tcherniova mogila (3) visibility +3m	tch11
CDFig.380	Tcherniova mogila (3) visibility +4m	tch12
CDFig.381	Tcherniova mogila (4) visibility	tch13
CDFig.382	Tcherniova mogila (4) visibility +3m	tch14
CDFig.383	Tcherniova mogila (4) visibility +4m	tch15
CDFig.384	Tcherniova mogila cost surface	tch16
CDFig.385	Tcherniova mogila logistical network	tch17
CDFig.386	Path Tcherniova mogila – Manchova mogila	tch20
CDFig.387	Visibility from Path Tcherniova mogila – Manchova mogila	tch21
CDFig.388	Path Tcherniova mogila – Taniokoleva mogila	tch18
CDFig.389	Visibility from Path Tcherniova mogila – Taniokoleva mogila	tch19
CDFig.390	Path Tcherniova mogila – Kurdova mogila	tch22
CDFig.391	Visibility from Path Tcherniova mogila – Kurdova mogila	tch23
CDFig.392	Tcherniova mogila – Malkata mogila	tch24
CDFig.393	Visibility from Path Tcherniova mogila – Malkata mogila	tch25
CDFig.394	Manchova mogila elevation	m1

CDFig.395	Manchova mogila aspect	m2
CDFig.396	Manchova mogila slope	m3
CDFig.397	Manchova mogila visibility	m4
CDFig.398	Manchova mogila visibility +3m	m5
CDFig.399	Manchova mogila visibility +4m	m6
CDFig.400	Manchova mogila cost surface	m7
CDFig.401	Manchova mogila logistical network	m8
CDFig.402	Path Manchova mogila – MIBC1	m9
CDFig.403	Path Manchova mogila – MIBC2	m10
CDFig.404	Path Manchova mogila – MIBC3	m11
CDFig.405	Path Manchova mogila – MIBC4	m12
CDFig.406	Visibility from Path Manchova mogila – MIBC1	m13
CDFig.407	Visibility from Path Manchova mogila – MIBC3	m14
CDFig.408	Visibility from Path Manchova mogila – MIBC4	m15
CDFig.409	Visibility from Path Manchova mogila – MIBC2	m16
CDFig.410	Path Manchova mogila – Kurdova mogila	m17
CDFig.411	Visibility from Path Manchova mogila – Kurdova mogila	m18
CDFig.412	Path Manchova mogila – Taniokoleva mogila	m19
CDFig.413	Visibility from Path Manchova mogila – Taniokoleva mogila	m20
CDFig.414	Taniokoleva mogila elevation	tn1
CDFig.415	Taniokoleva mogila slope	tn2
CDFig.416	Taniokoleva mogila aspect	tn3
CDFig.417	Taniokoleva mogila (1) visibility	tn4
CDFig.418	Taniokoleva mogila (1) visibility +2m	tn5
CDFig.419	Taniokoleva mogila (1) visibility +3m	tn6
CDFig.420	Taniokoleva mogila (2) visibility	tn7
CDFig.421	Taniokoleva mogila (3) visibility	tn8
CDFig.422	Taniokoleva mogila (2) visibility +2m	tn9
CDFig.423	Taniokoleva mogila (3) visibility +2m	tn10
CDFig.424	Taniokoleva mogila (2) visibility +3m	tn11
CDFig.425	Taniokoleva mogila (3) visibility +3m	tn12
CDFig.426	Taniokoleva mogila cost surface	tn13
CDFig.427	Taniokoleva mogila logistical network	tn14
CDFig.428	Kurdova mogila slope	kb2
CDFig.429	Kurdova mogila aspect	kb3
CDFig.430	Kurdova mogila elevation	kb1
CDFig.431	Kurdova mogila visibility	kb4
CDFig.432	Kurdova mogila visibility +2m	kb5
CDFig.433	Kurdova mogila visibility +3m	kb6
CDFig.434	Kurdova mogila cost surface	kb7
CDFig.435	Kurdova mogila logistical network	kb8
CDFig.436	Path Kurdova mogila – MIBC1	kb9
CDFig.437	Path Kurdova mogila – MIBC3	kb10
CDFig.438	Path Kurdova mogila – MIBC4	kb11
CDFig.439	Path Kurdova mogila – MIBC2	kb12
CDFig.440	Path Kurdova mogila – Iskritsa dwelling site	kb13
CDFig.441	Path Kurdova mogila – Iskritsa pit site	kb14
CDFig.442	Visibility from Path Kurdova mogila – MIBC3	kb15
CDFig.443	Visibility from Path Kurdova mogila – MIBC4	kb16
CDFig.444	Visibility from Path Kurdova mogila – MIBC2	kb17
CDFig.445	Visibility from Path Kurdova mogila – MIBC1	kb18
CDFig.446	Path Kurdova mogila – Taniokoleva mogila	kb19
CDFig.447	Visibility from Path Kurdova mogila – Taniokoleva mogila	kb20
CDFig.448	MIBC aspect	mibc1
CDFig.449	MIBC slope	mibc2
CDFig.450	MIBC elevation	mibc3
CDFig.451	MIBC1 visibility	mibc4

CDFig.452	MIBC1 visibility +h	mibc5
CDFig.453	MIBC1 visibility +h+1m	mibc6
CDFig.454	MIBC2 visibility	mibc7
CDFig.455	MIBC2 visibility +h	mibc8
CDFig.456	MIBC2 visibility +h+1m	mibc9
CDFig.457	MIBC3 visibility	mibc10
CDFig.458	MIBC3 visibility +h	mibc11
CDFig.459	MIBC3 visibility +h+1m	mibc12
CDFig.460	MIBC4 visibility	mibc13
CDFig.461	MIBC4 visibility +h	mibc14
CDFig.462	MIBC4 visibility +h+1m	mibc15
CDFig.463	MIBC1 cost surface	mibc16
CDFig.464	MIBC2 cost surface	mibc17
CDFig.465	MIBC3 cost surface	mibc18
CDFig.466	MIBC4 cost surface	mibc19
CDFig.467	MIBC1 logistical network	mibc20
CDFig.468	MIBC2 logistical network	mibc21
CDFig.469	MIBC3 logistical network	mibc22
CDFig.470	MIBC4 logistical network	mibc23
CDFig.471	Paths MIBC1 Iskritsa site	mibc24
CDFig.472	Paths MIBC2 Iskritsa site	mibc25
CDFig.473	Paths MIBC3 Iskritsa site	mibc26
CDFig.474	Paths MIBC4 Iskritsa site	mibc27
CDFig.475	Visibility from Path MIBC1 - Iskritsa pit site	mibc28
CDFig.476	Visibility from Path MIBC1 - Iskritsa dwelling site	mibc29
CDFig.477	Visibility from Path MIBC2 - Iskritsa pit site	mibc30
CDFig.478	Visibility from Path MIBC2 - Iskritsa dwelling site	mibc31
CDFig.479	Visibility from Path MIBC3 - Iskritsa pit site	mibc32
CDFig.480	Visibility from Path MIBC3 - Iskritsa dwelling site	mibc33
CDFig.481	Visibility from Path MIBC4 - Iskritsa pit site	mibc34
CDFig.482	Visibility from Path MIBC4 - Iskritsa dwelling site	mibc35
CDFig.483	Drama microregion elevation	ger1
CDFig.484	Drama microregion slope	ger2
CDFig.485	Drama microregion aspect	ger3
CDFig.486	Drama microregion visibility	ger4
CDFig.487	Drama microregion cost surface	ger5
CDFig.488	Gerena site logistical network	ger6
CDFig.489	Path Gerena flat site – Merzdumekja tell	ger7
CDFig.490	Path Gerena flat site – Kajrjaka flat site	ger8
CDFig.491	Visibility from Path Gerena flat site – Merzdumekja tell	ger9
CDFig.492	Visibility from Path Gerena flat site – Kajrjaka flat site	ger10
CDFig.493	Merzdumekja tell visibility	me1
CDFig.494	Merzdumekja tell visibility +3m	me2
CDFig.495	Merzdumekja tell cost surface	me3
CDFig.496	Merzdumekja tell logistical network	me4
CDFig.497	Path Merzdumekja tell – Kajrjaka flat site	me5
CDFig.498	Visibility from Path Merzdumekja tell – Kajrjaka flat site	ka1
CDFig.499	Kajrjaka flat site visibility	ka2
CDFig.500	Kajrjaka flat site cost surface	ka3
CDFig.501	Kajrjaka flat site logistical network	ka4
CDFig.502	Visibility from sites	v1
CDFig.503	Visibility from 28 random points	v2
CDFig.504	Visibility from 200 random points	v3
CDFig.505	Visibility from 500 random points	v4
CDFig.506	Visibility from 1000 random points	v5

Appendix A: Illustrations

This appendix contains illustrative material to accompany the text in Volume I. The list of figures is provided at the start of Volumes 1 and 2. The majority of the illustrations derive from publications or site documentation. The set of illustrative material is not a complete record but a representative selection of important and datable finds. On some of the Figures, there is no scale, since it was not provided on the originals. On other Figures, the scale has no numbers but, generally, scales in the plans and profile illustrations correspond to metres, while, in the pottery and artefact illustrations, to centimetres. Since the original publication of materials from the Iskritsa site and the Gudgova tell did not contain a key, none is provided here.

The layers in profiles of the tells contain the identification numbers given them during the excavations, in ascending order, from top to bottom.

Because CoralDraw is unable to provide Slavic accents as published in the German periodical "SASTUMA" for the source of many illustrations, Leštakov 1993 and 2000 is spelt in an Anglicised manner (viz., Leshtakov 1993 and 2000).

The drawings of finds from Klisselika tell and Iskritsa site are made by me and Aneta Petrova and inked in by Jacqui Hutton. The illustration design and layout was made by Chris Bond.

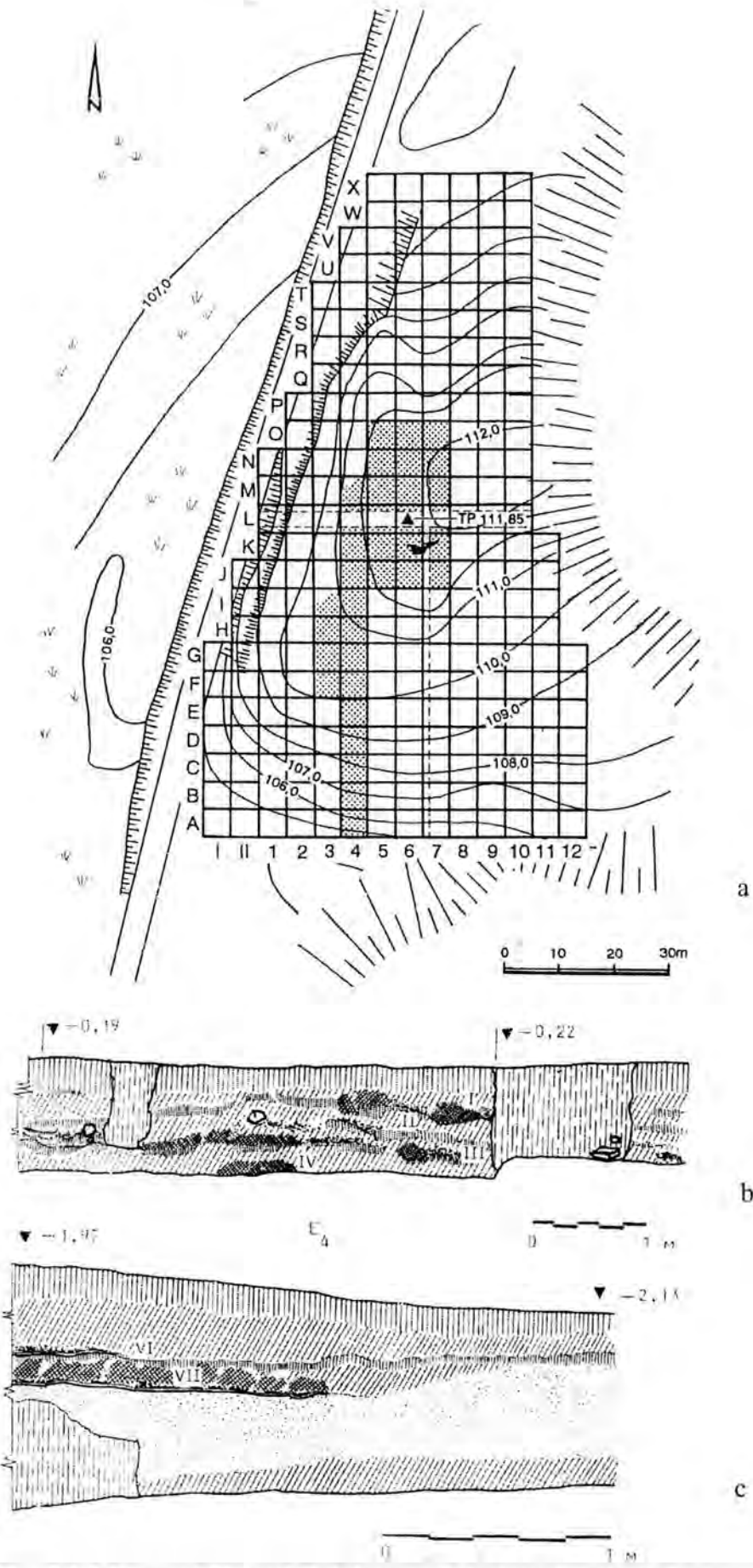


Fig. 5.1.1 General Plan of Galabovo tell and profiles in E4, D4
 Source: Lestakov 1993 (a), Panayotov et al. 1991(b,c)

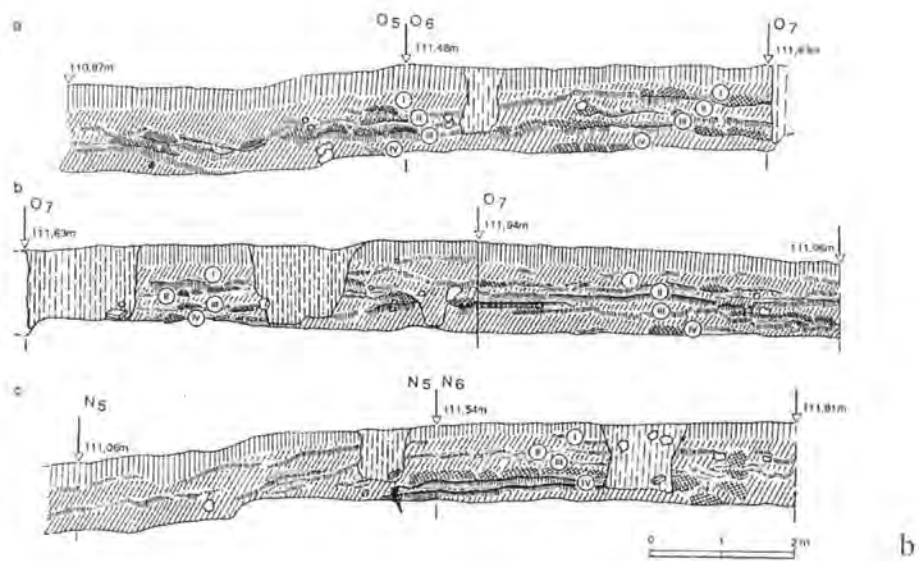
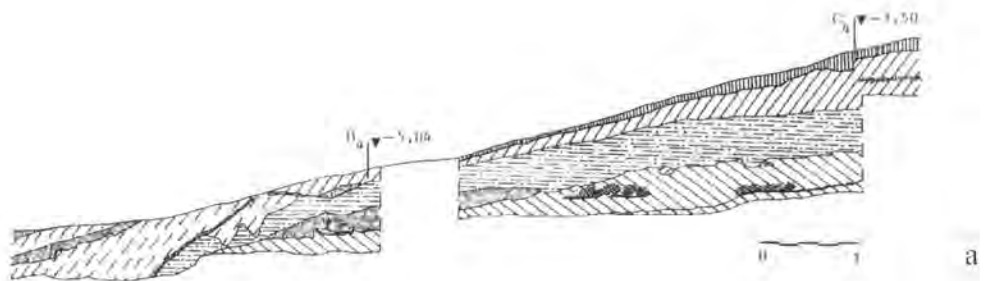
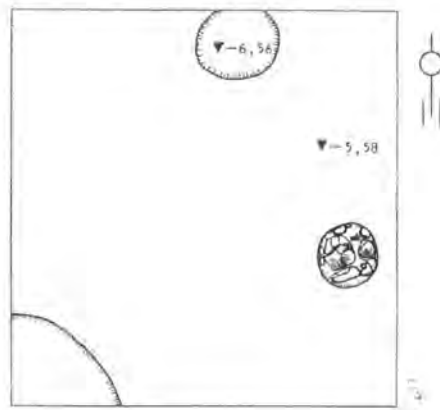
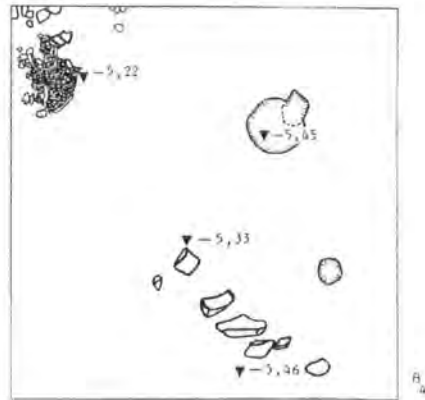


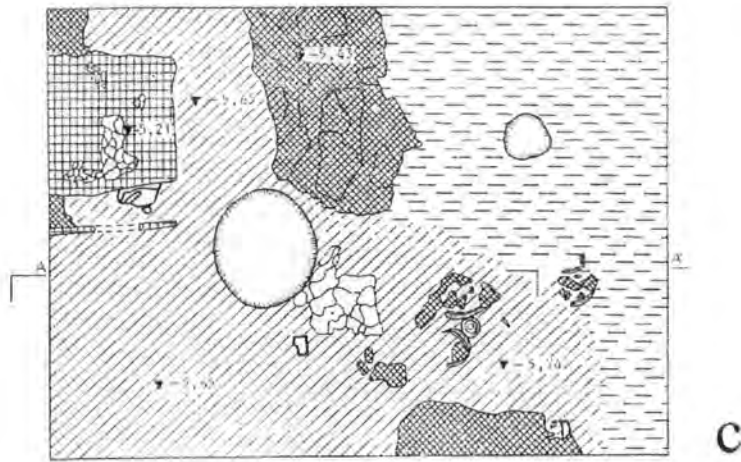
Fig. 5.1.2 Profiles in B4/C4 - Late Copper Age (LCA) and profiles in O5/O6, O7, N5/N6 - Bronze Age (BA) horizons X-XIII
 Source: Panayotov et al. 1991 (a), Leshtakov 1993 (b)



a



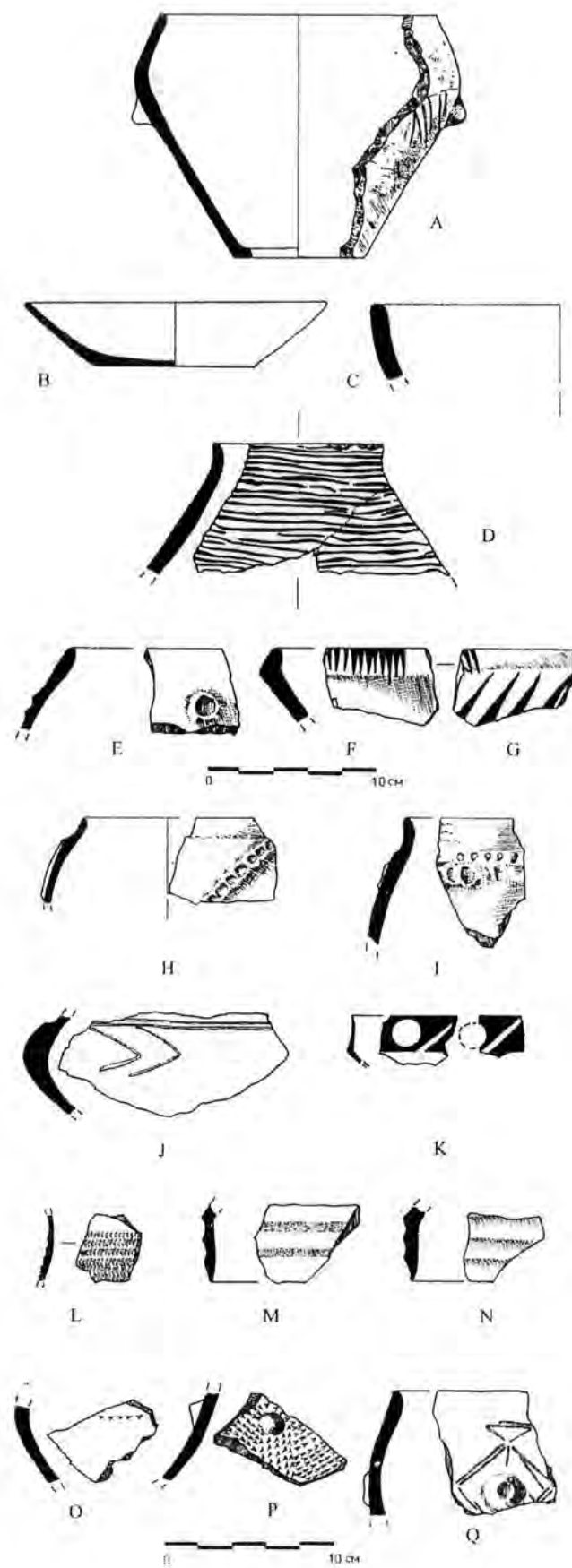
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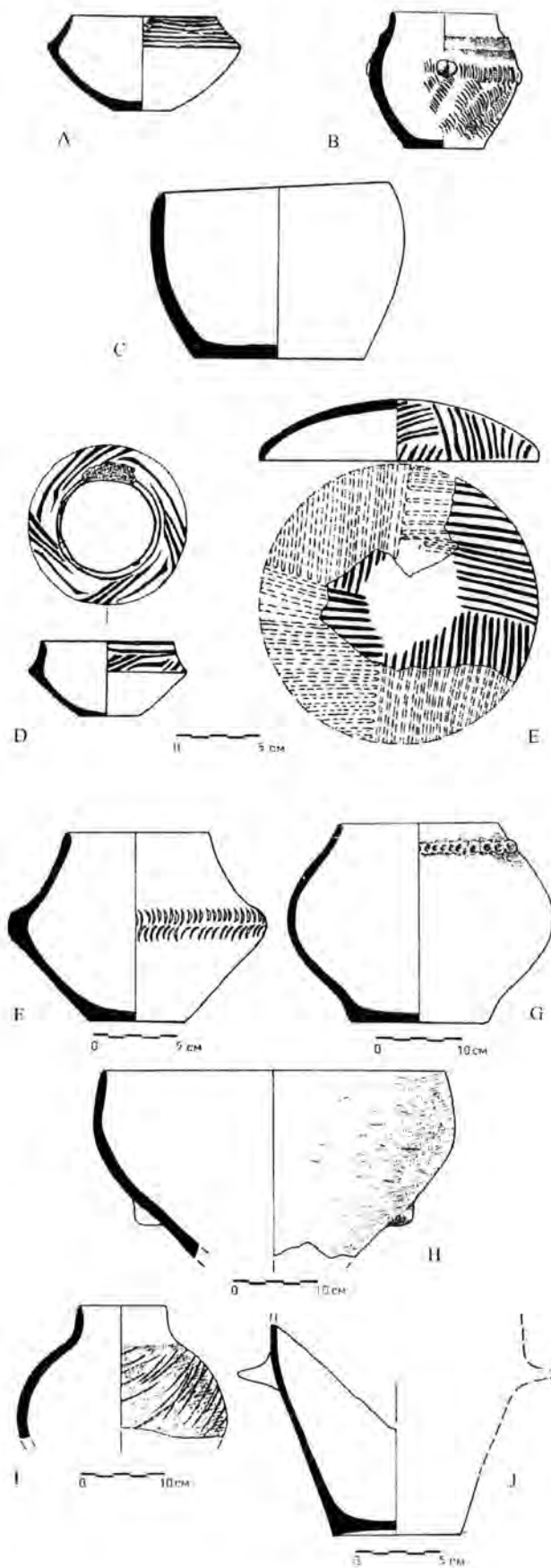
c

Unsurveyed area.

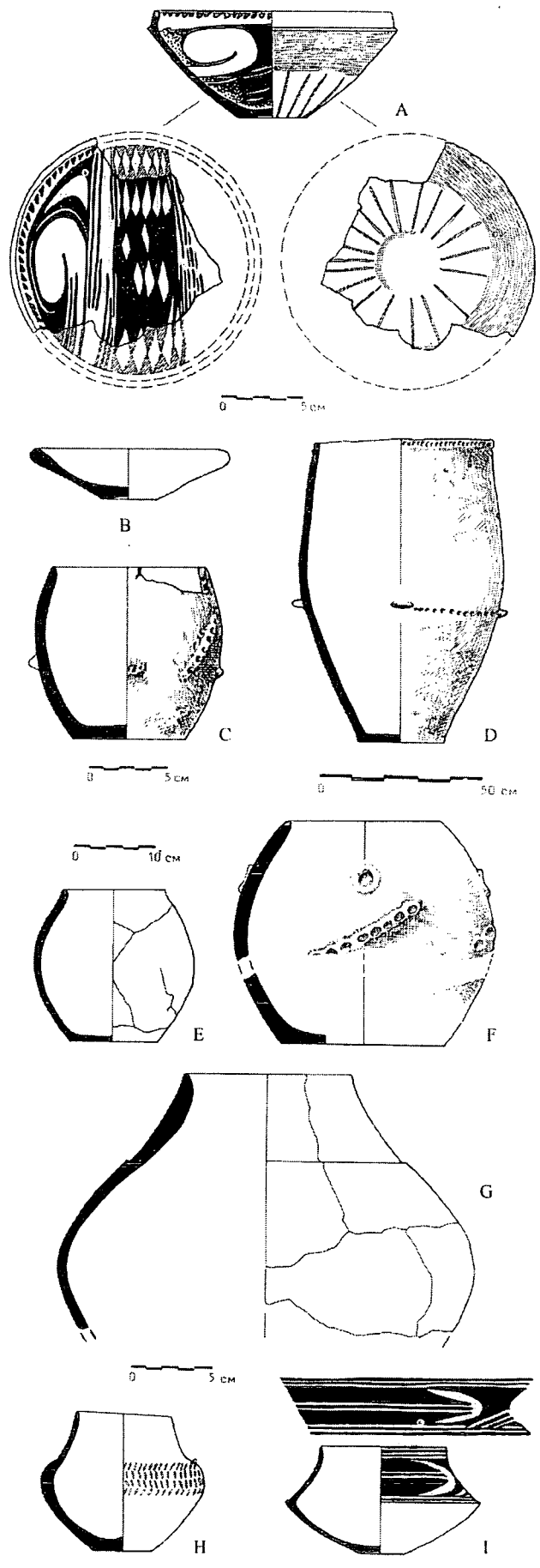
Fig. 5.1.3 Houses from LCA horizons I and II in C4, and a pit from LCA horizon III in B4
 Source: Panayotov et al. 1991



AFig. 5.1.4 Pottery from LCA horizons I-III
 Source: Panayotov et al.1991



AFig. 5.1.5 Pottery from LCA horizons I- II
 Source: Panayotov et al.1991
 407



AFig. 5.1.6 Pottery from LCA horizons I-II
 Source: Panayotov et al. 1991

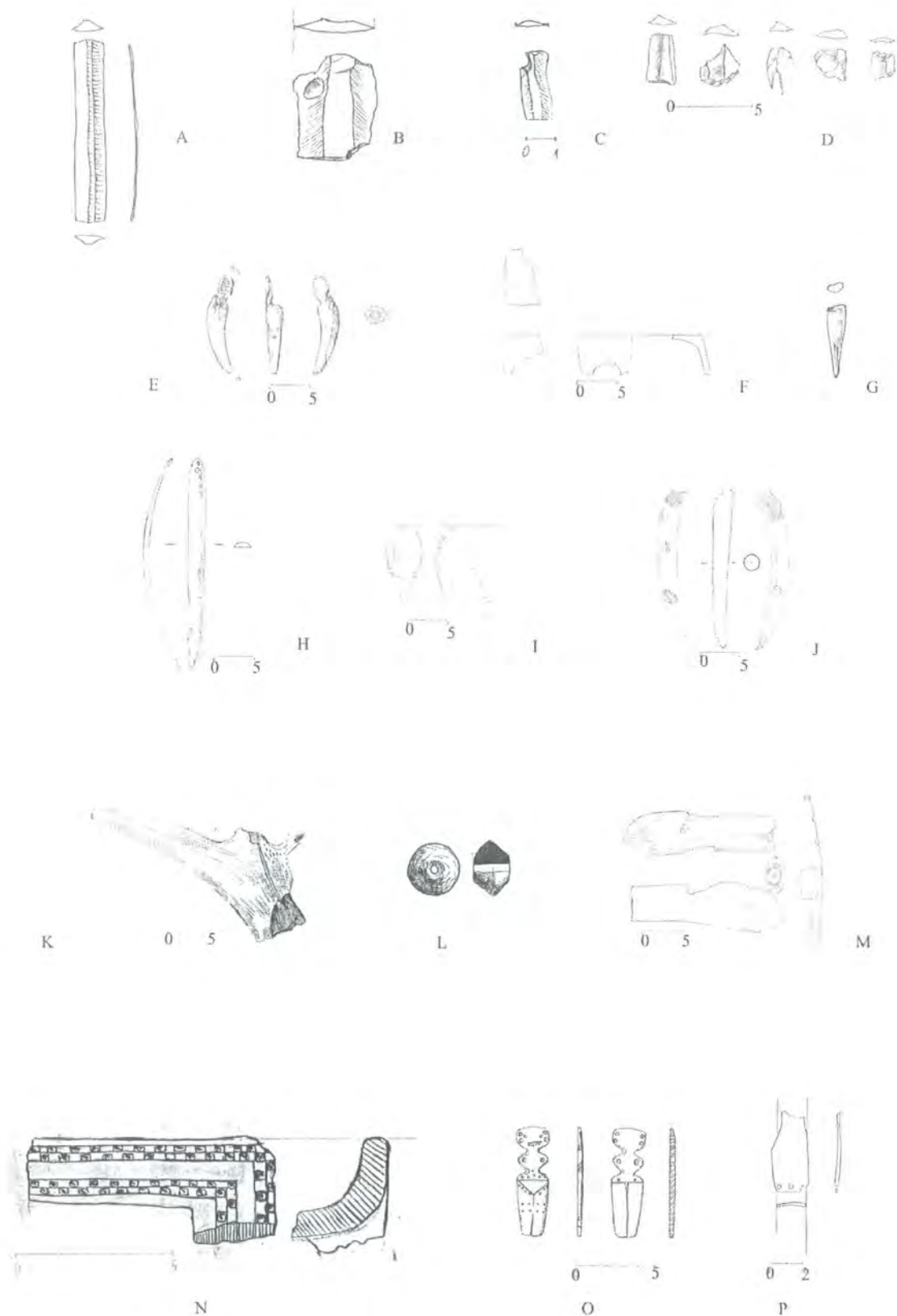
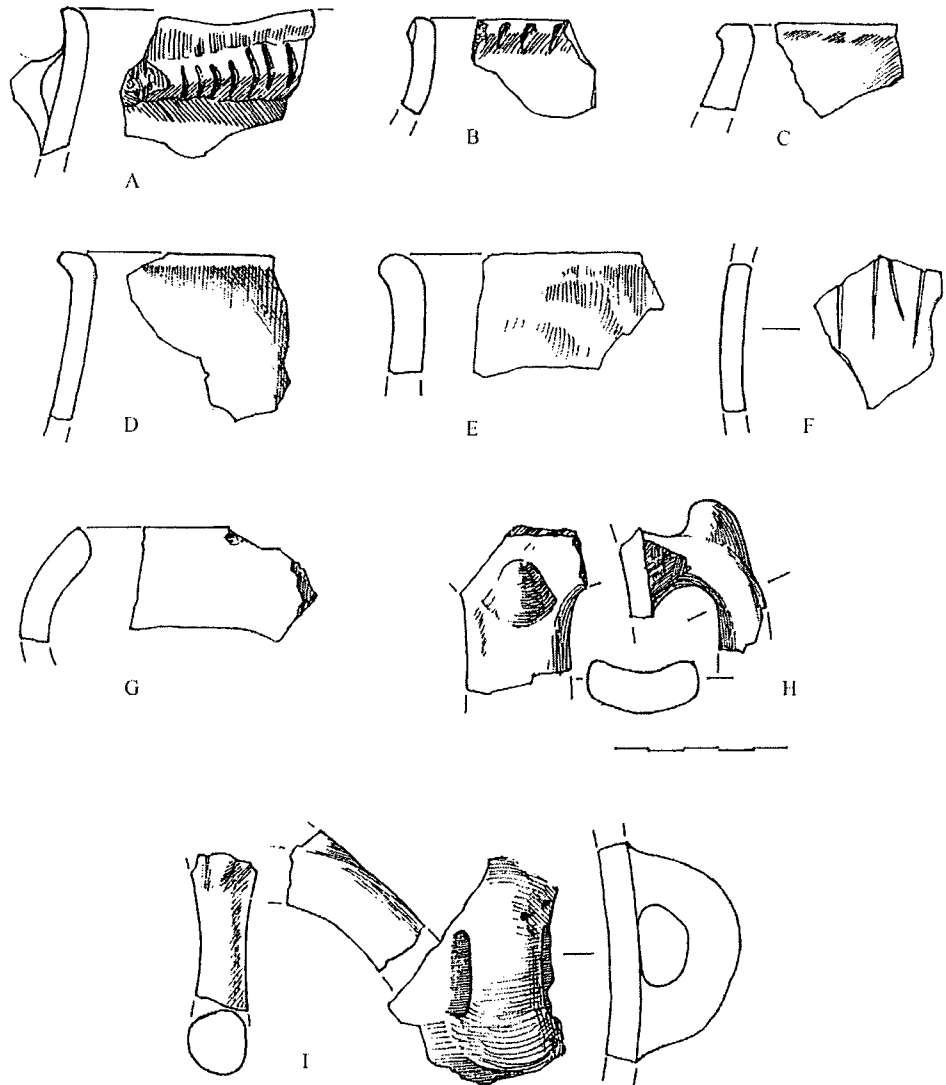
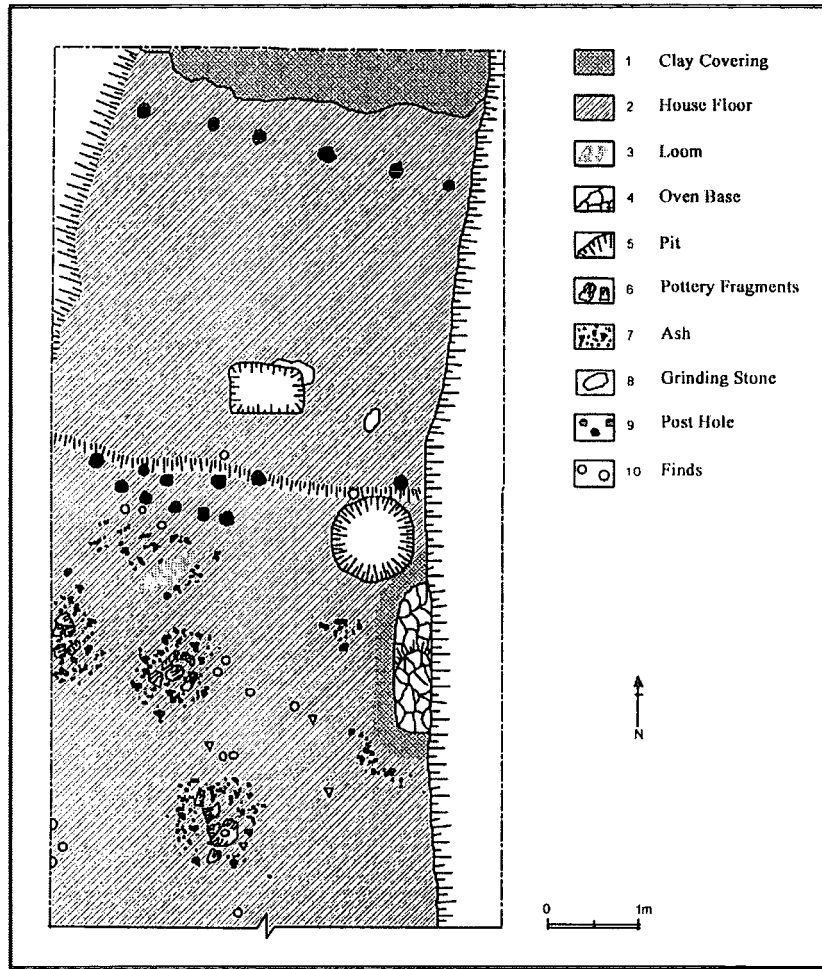


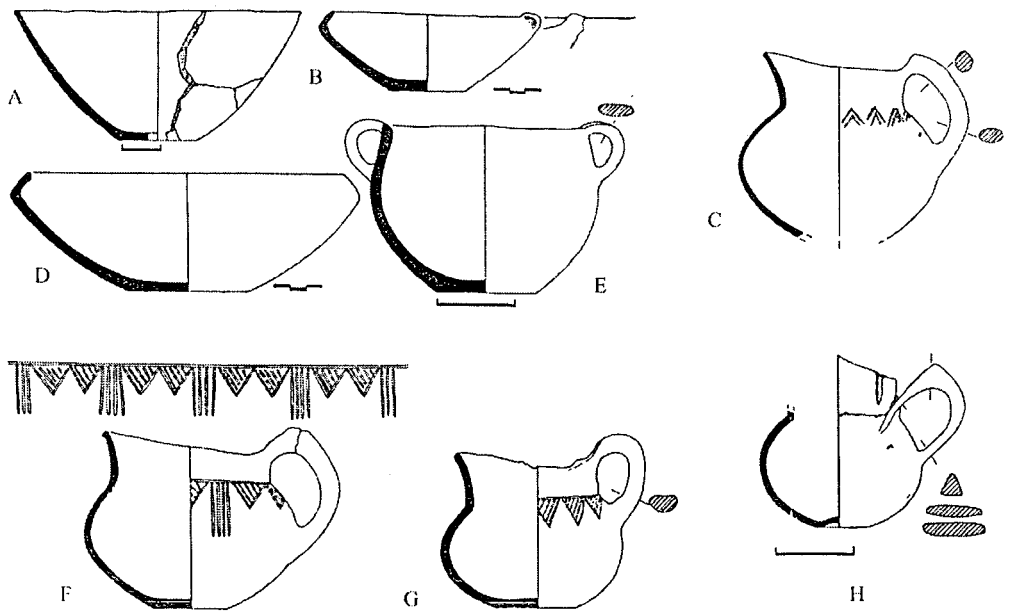
Fig. 5.1.7 Various Artifacts from the CA in Galabovo
 Flint (A - D); bone, horn, antler (E, G, H, J, K, M, O, P);
 clay (F, I, L, N). M 1:1 (B), 1:2 (A, G), 1:4 (L)
 Source: Site documentation



AFig. 5.1.8 Sherds from BA horizon IX
Source: Site documentation

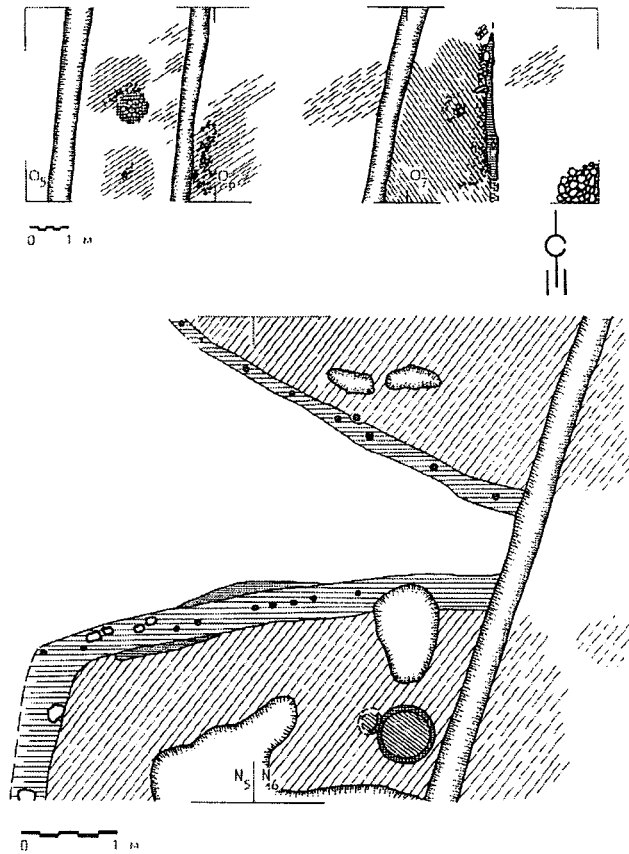






















a



b

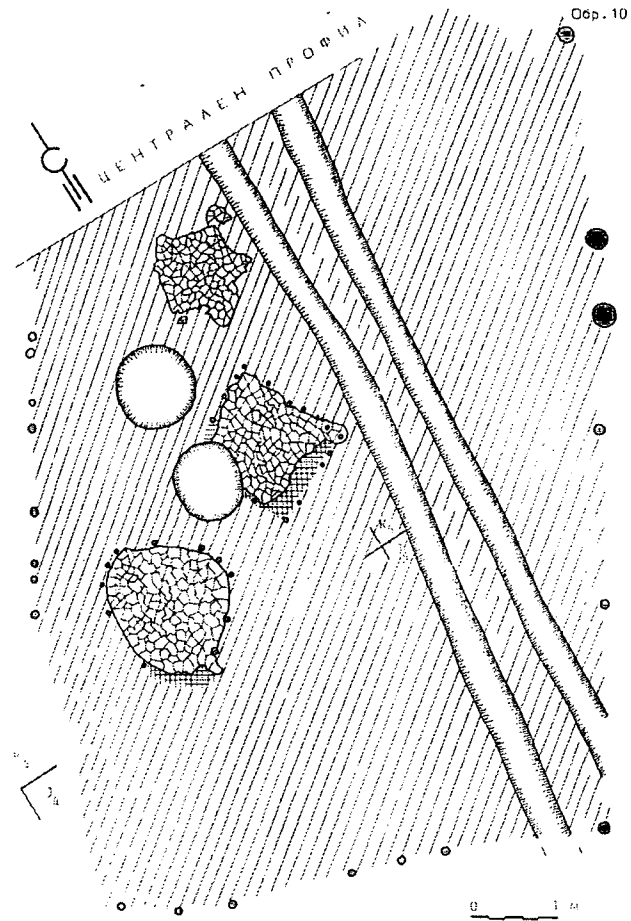
AFig. 5.1.9 House from BA horizon X and pottery from the house
 Source: Leshtakov 2000



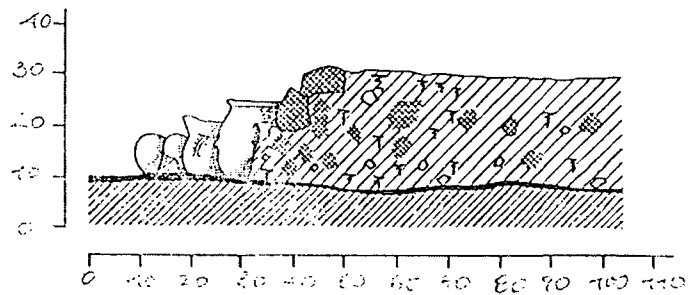
-  Grey - black soil - BA cultural layer
-  Light grey soil - CA cultural layer
-  Destroyed cultural layer
-  Yellow beaten clay
-  White beaten clay
-  Hiatus
-  Ash and charcoal
-  Burnt house rubble
-  Dwelling floor
-  Pit
-  Beaten clay dwelling floor
-  Plastered dwelling floor
-  Plastered base of oven or hearth
-  Pithos base
-  Base of oven or hearth
-  Posthole
-  Stones
-  Vessels
-  Pottery scatter
-  Red - brown clay

A Fig. 5.1.10 Houses from BA horizon X and key for Galabovo illustrations

Source: Panayotov et al. 1991

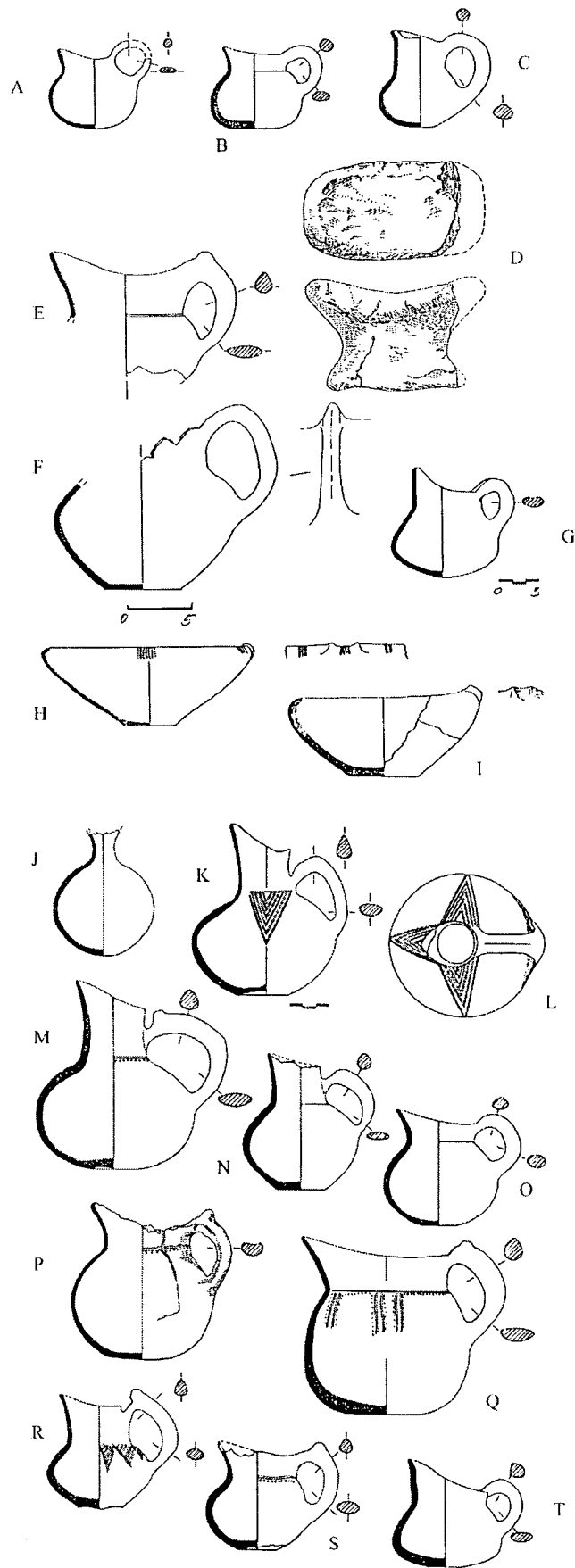


a

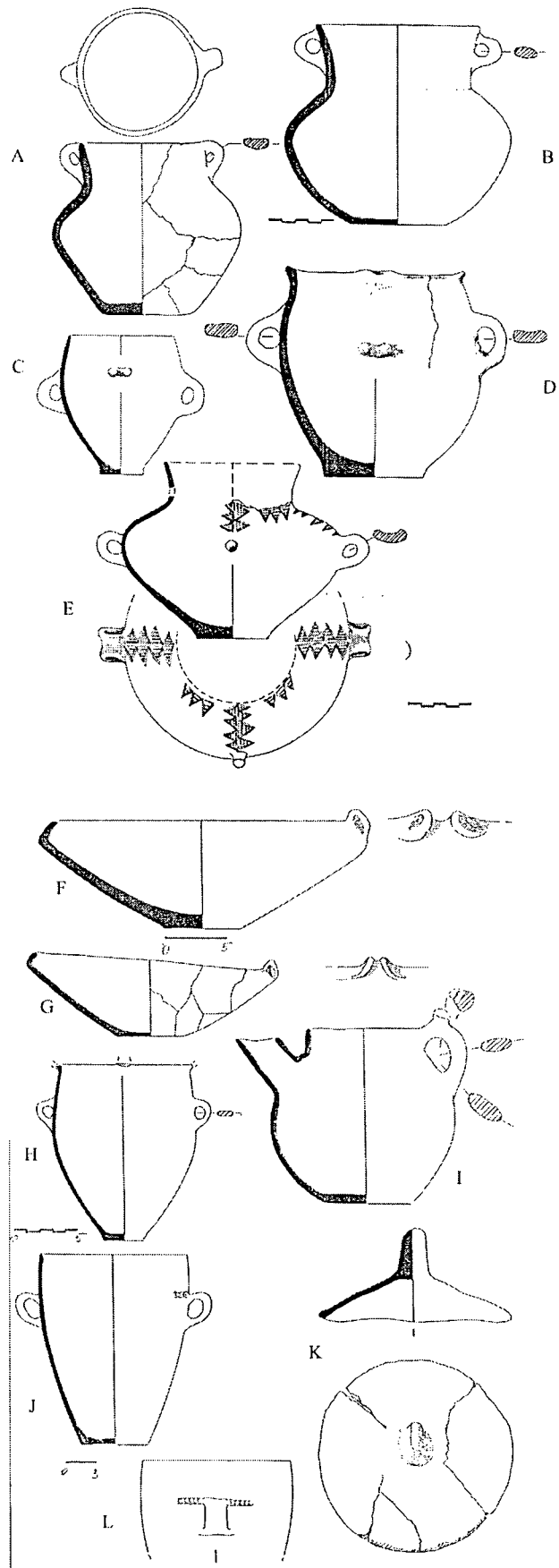


b

A Fig. 5.1.11 House in J3-5/K3-5/L3-5 from BA horizon XI and the pottery depot from the house
 Source: Panayotov et al. 1991 (a), Leshtakov 2000 (b)



AFig. 5.1.12 Pottery from the house in J3 - 5/
 K 3 - 5/L3 - 5 from BA horizon XI
 Source: Leshtakov 2000



AFig. 5.1.13 Pottery from the house in J3 - 5/
K3 - 5/ L3 - 5 from BA horizon XI
 Source: Leshtakov 2000

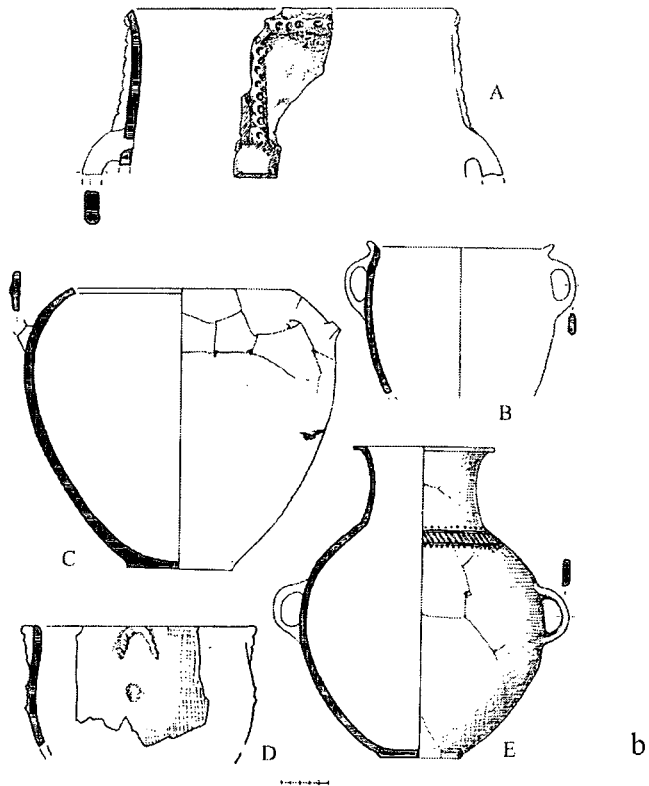
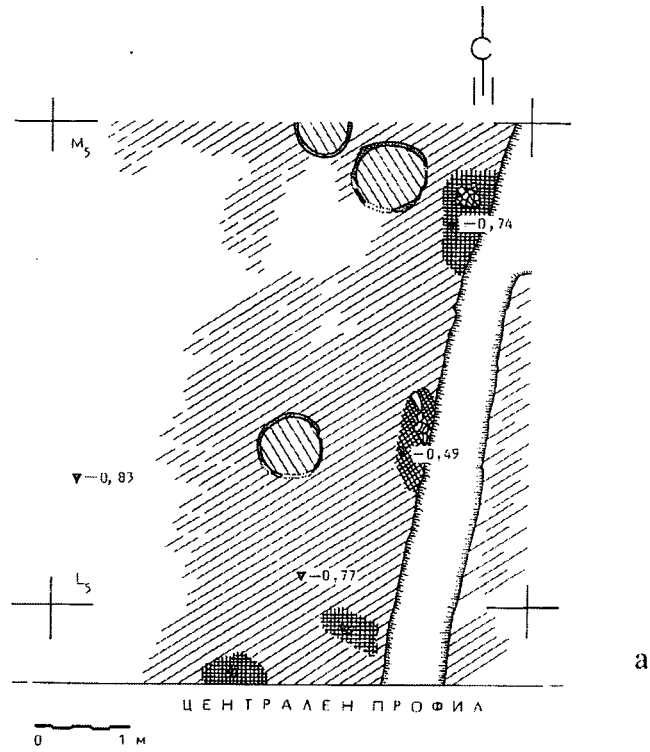
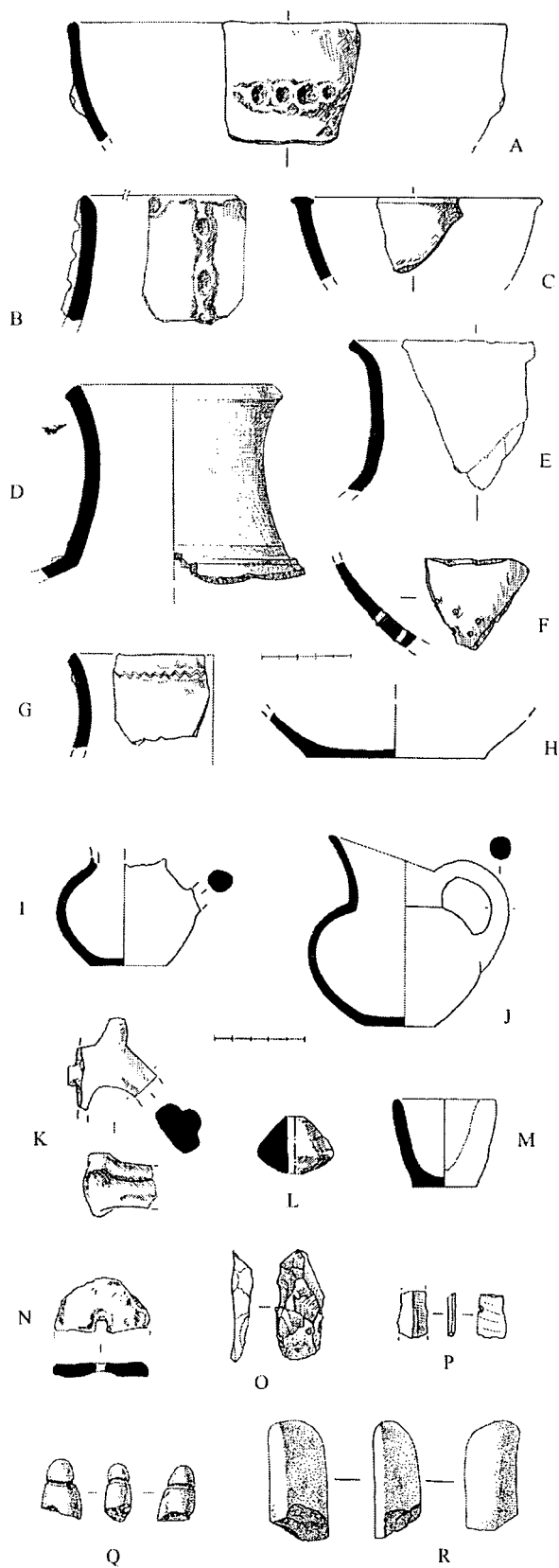


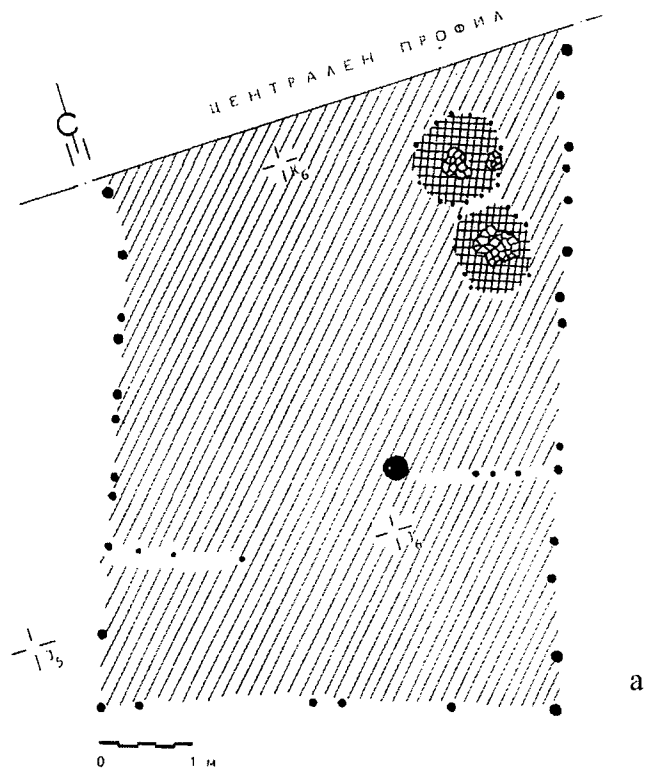
Fig. 5.1.14 House from M4/5 - L4/5 from BA horizon XII and the pottery from the house
 Source: Panayotov et al. 1991 (a); Leshtakov 1993 (b)



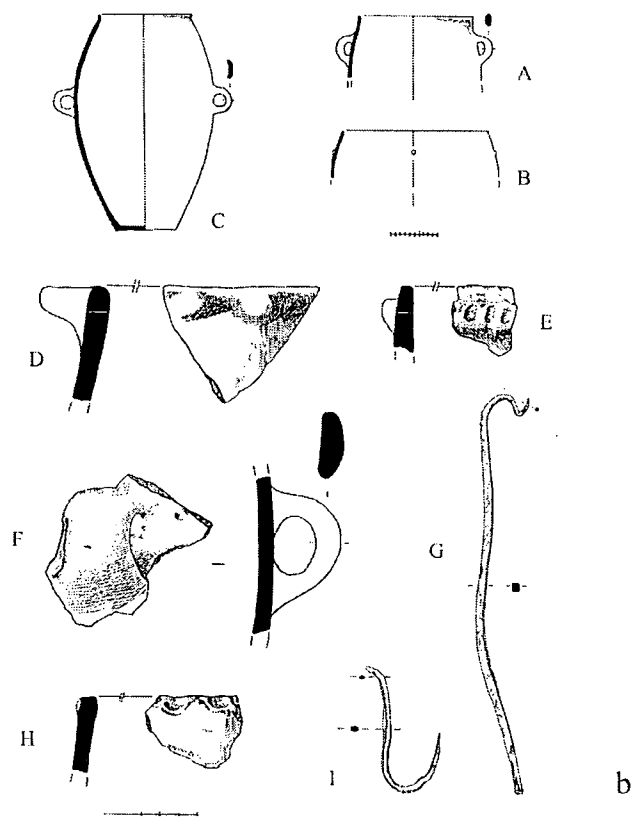
AFig. 5.1.15 Artefacts from house in M4/5 - L4/5
from BA horizon XII

Clay (A - N, Q); flint (O, P); stone (R)

Source: Leshtakov 1993



a

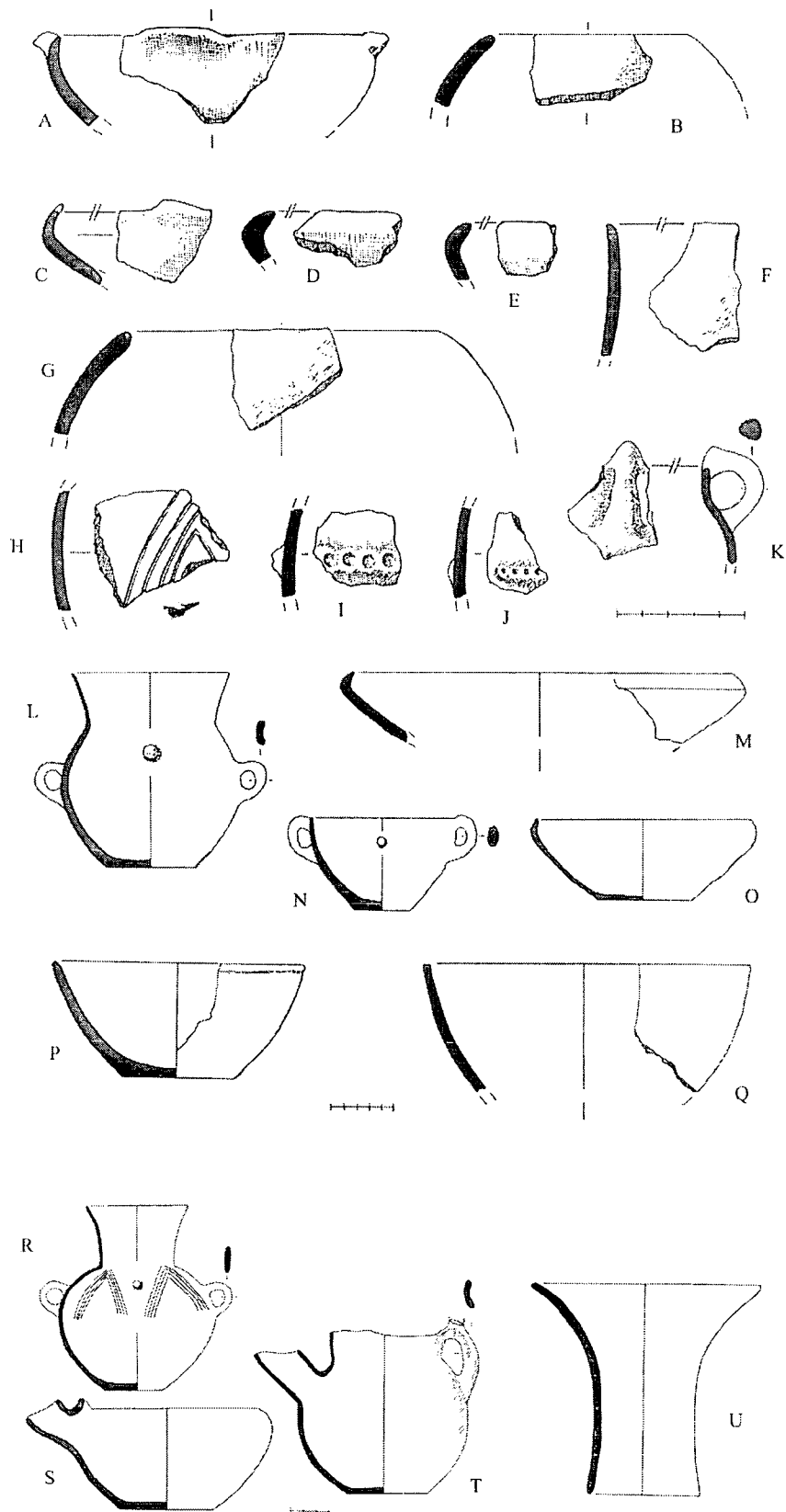


b

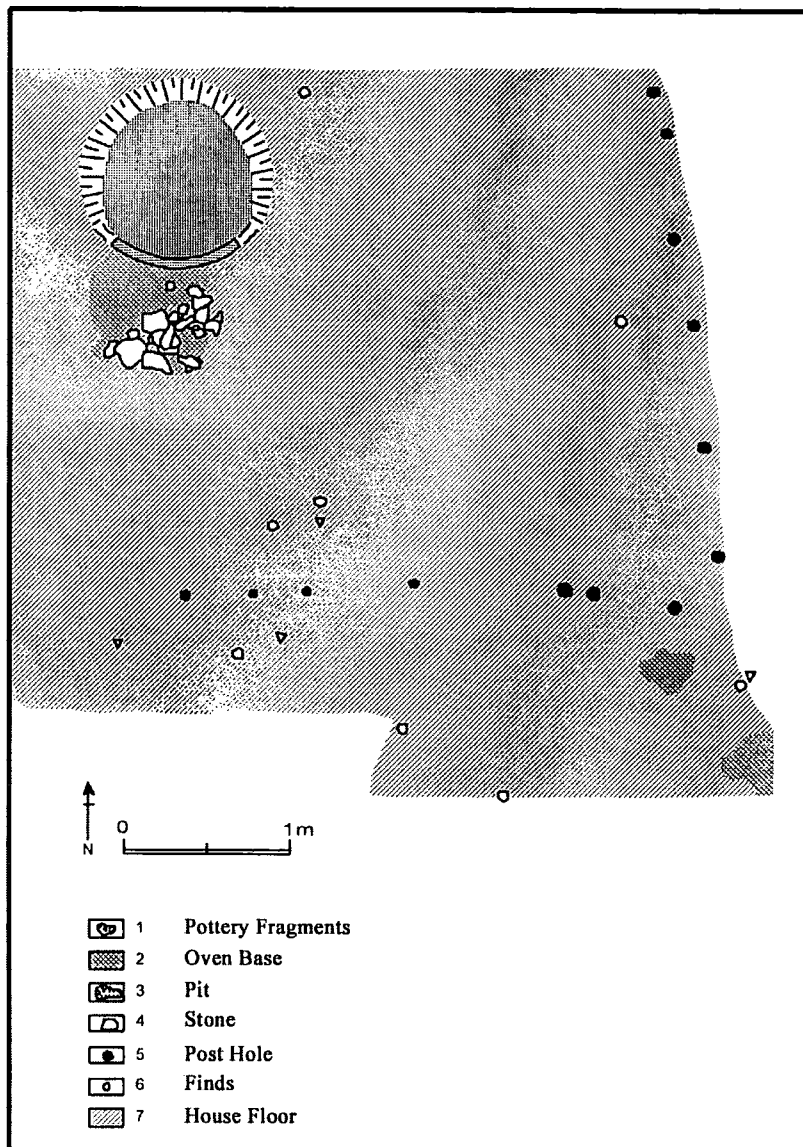
AFig. 5.1.16 House in J5/6 - L5/6 from BA horizon XII and artefacts from the house

Clay (A-H); bronze (I,G)

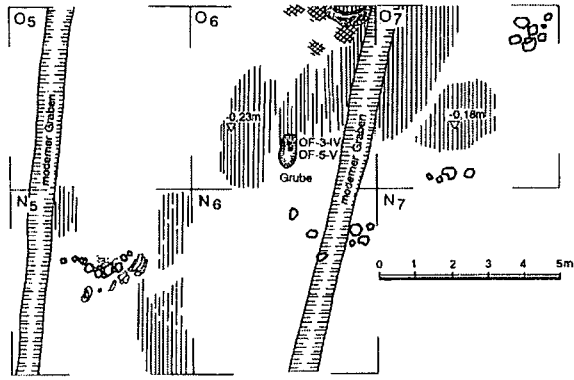
Source: Panayotov et al. 1991 (a), Leshtakov 1993 (b)



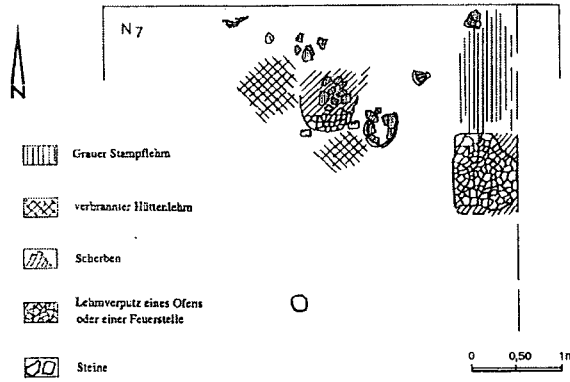
AFig. 5.1.17 Pottery from the house in J5/6 - L5/6 from BA horizon XII (A - Q); MBA pottery(R - U)
 Source: Leshtakov 1993



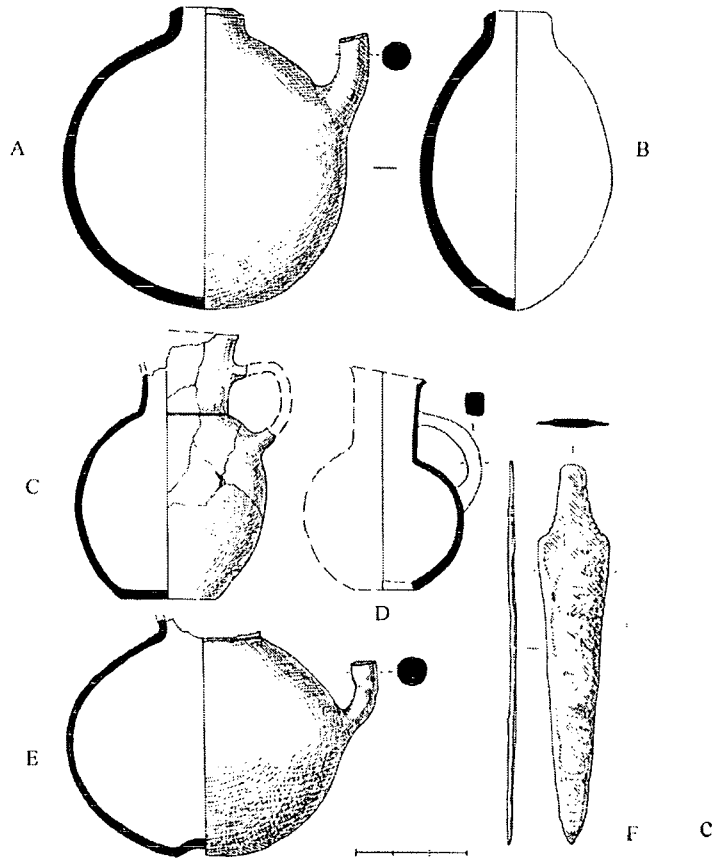
AFig. 5.1.18 House from BA horizon XIV in N7/8 - M7/8
 Source: Leshtakov 2000



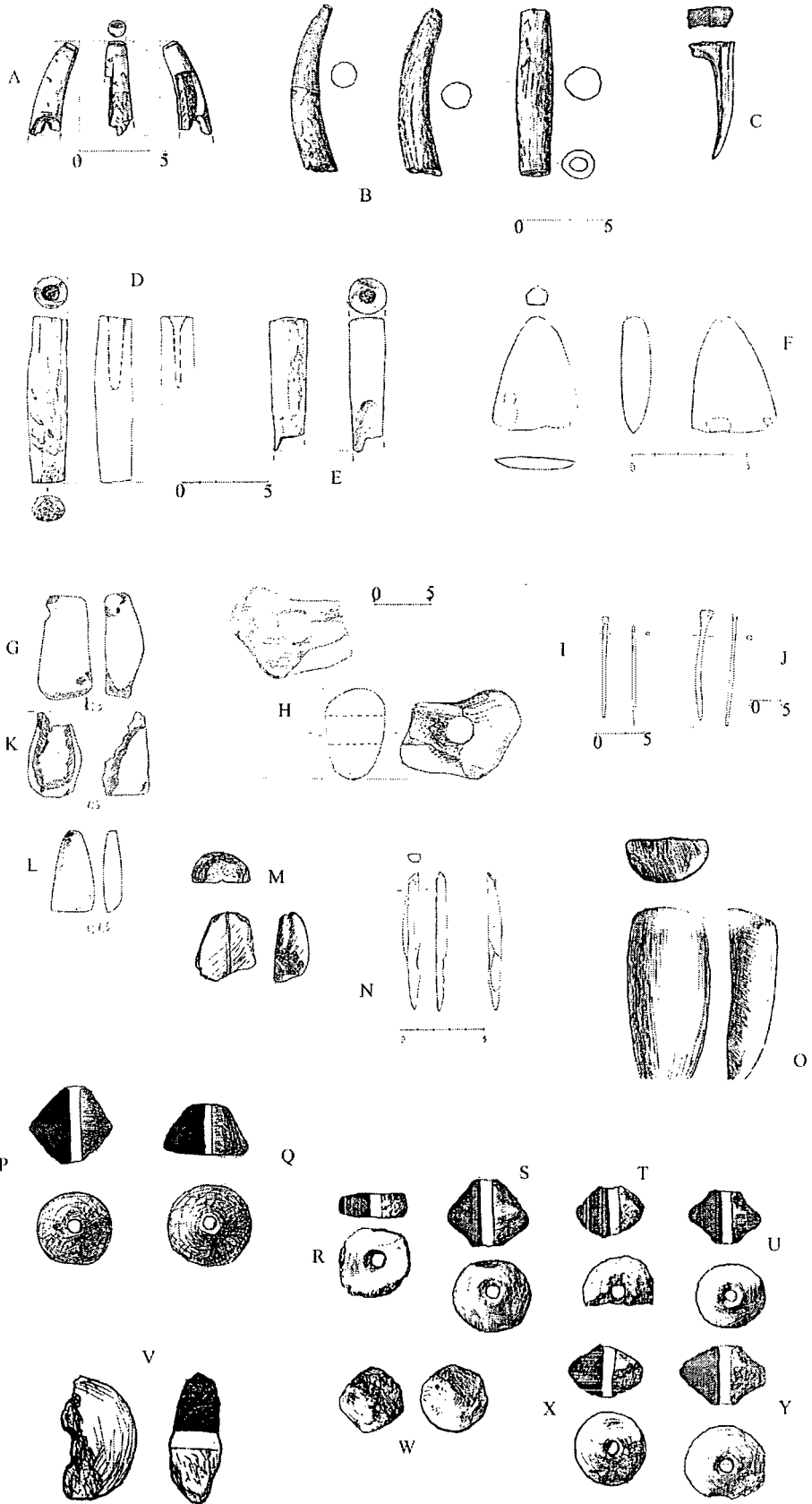
a



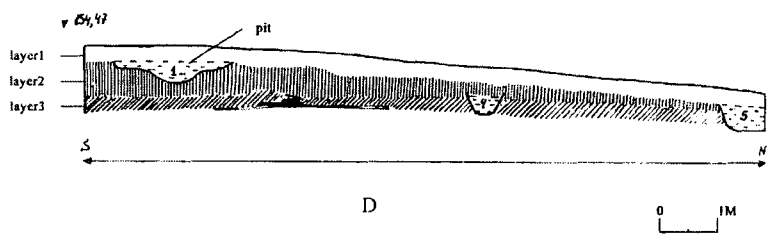
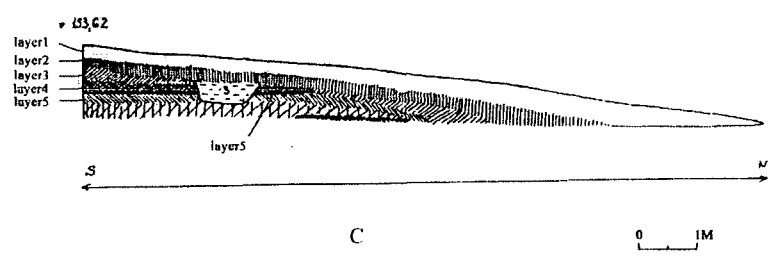
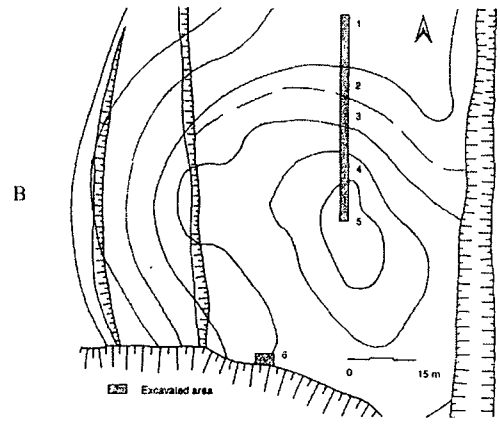
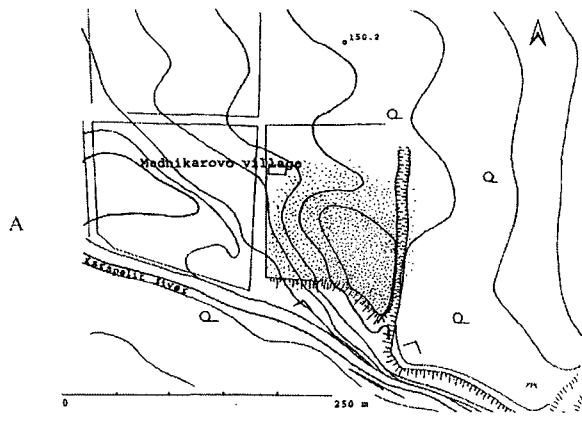
b



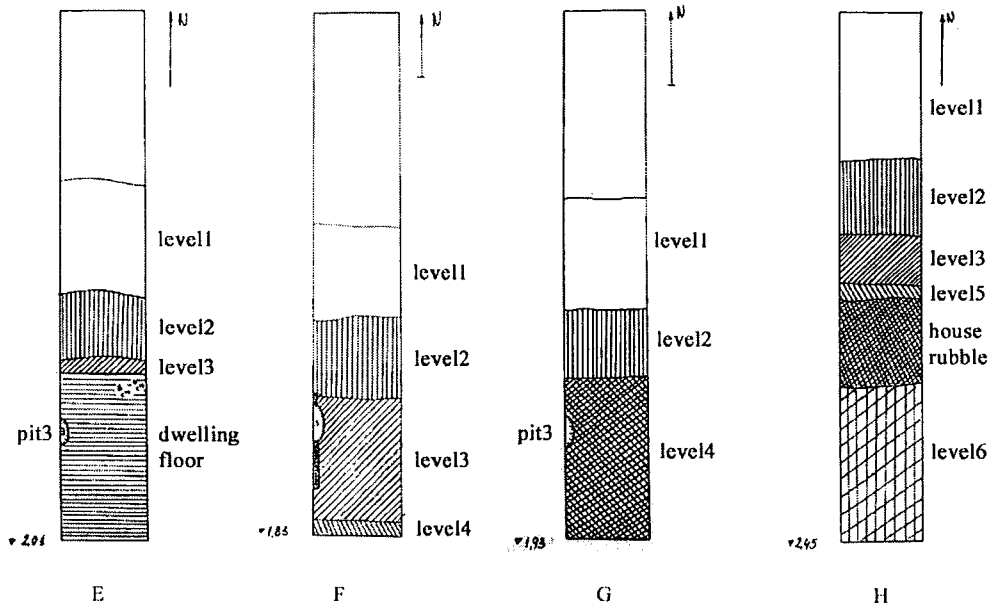
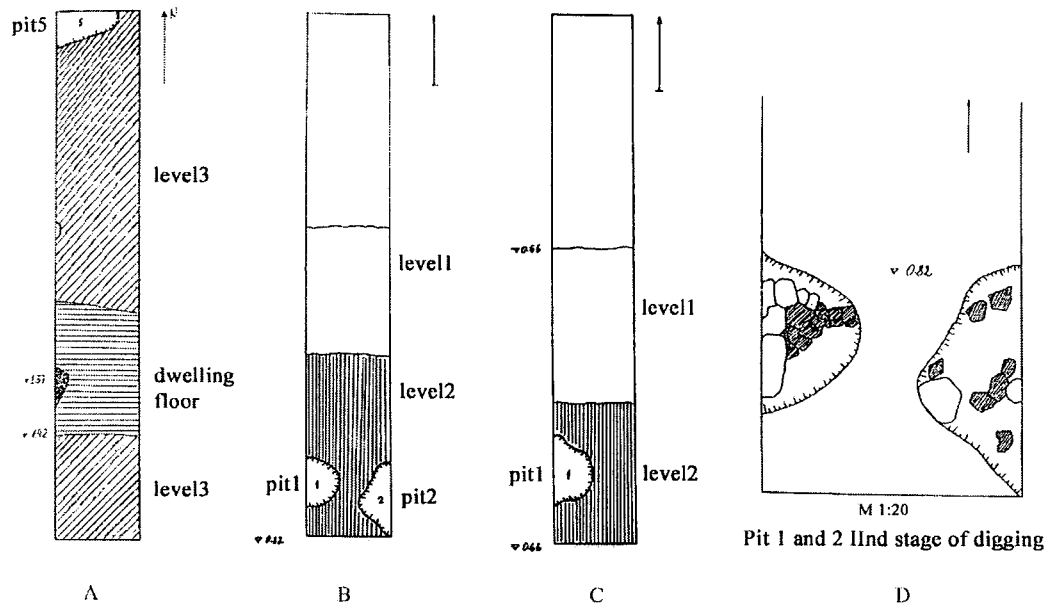
A Fig. 5.1.19 Feature plans from BA horizon XIII;
pottery from BA horizon XIII
 Clay (A-D), bronze (F)
 Source: Leshtakov 1993



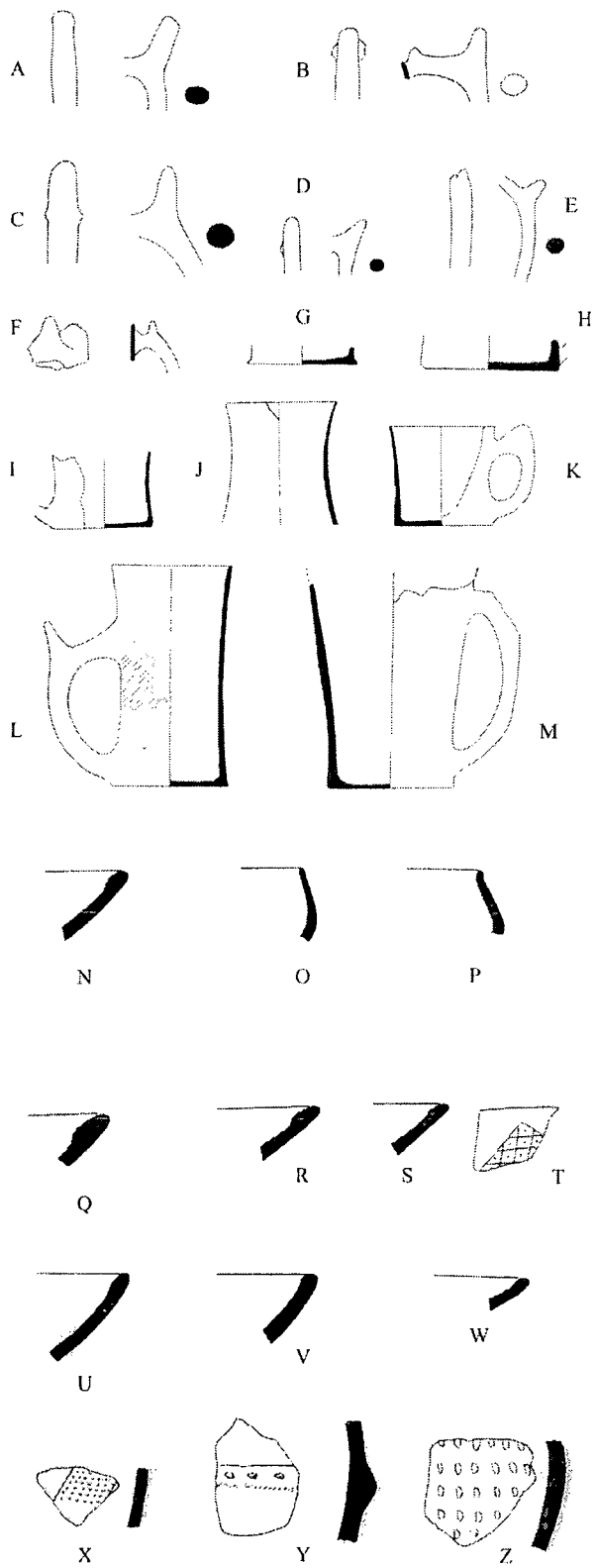
AFig. 5.1.20 Various artefacts from the BA in Galabovo
 Bone, horn, antler (A- E, H - J, N); stone (F, L,O),
 clay (G, K, P-Y). M 1:2 (M, O-Y); 1:1.5 (L)
 Source: Site documentation



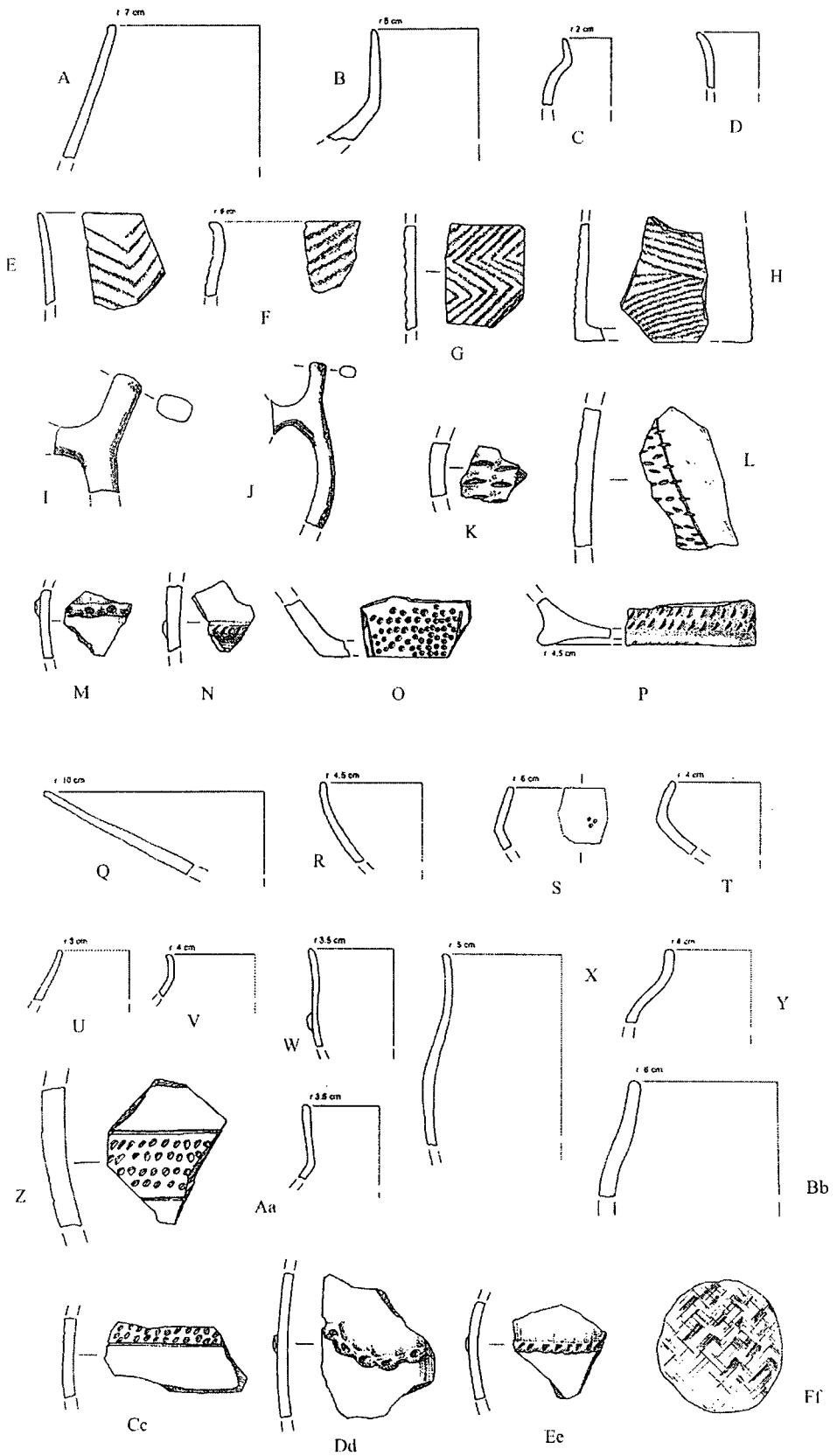
A Fig. 5.4.1 General plans and profiles from Mednikarovo tell
 C: Sondage 3 west profile, layers 1 - 5.
 D: Sondage 2 west profile, layers 1 - 3.
 Source: Site documentation



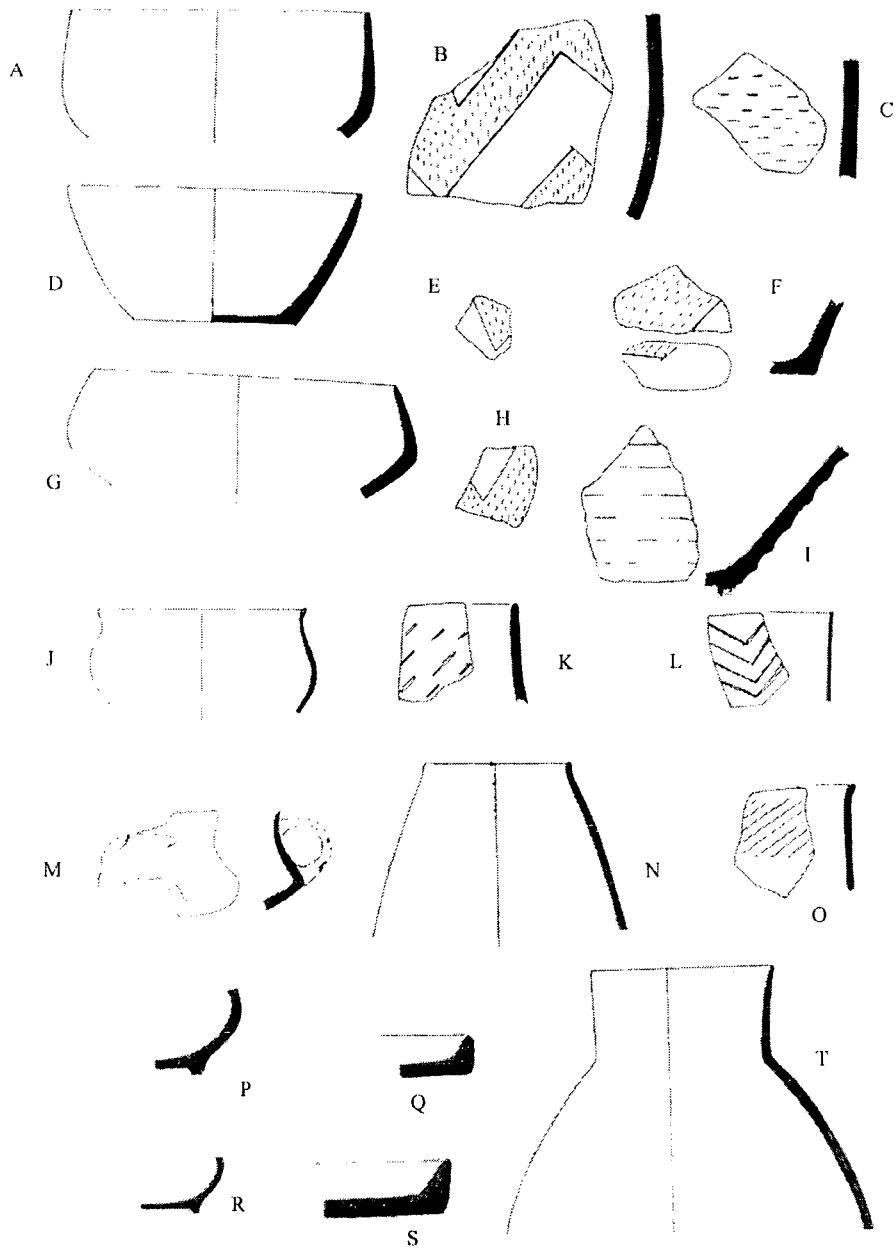
AFig. 5.4.2 Plans from Mednikarovo tell
Sondage 2 (A - D), Sondage 3 (E - H). M 1:50
Source: Site documentation



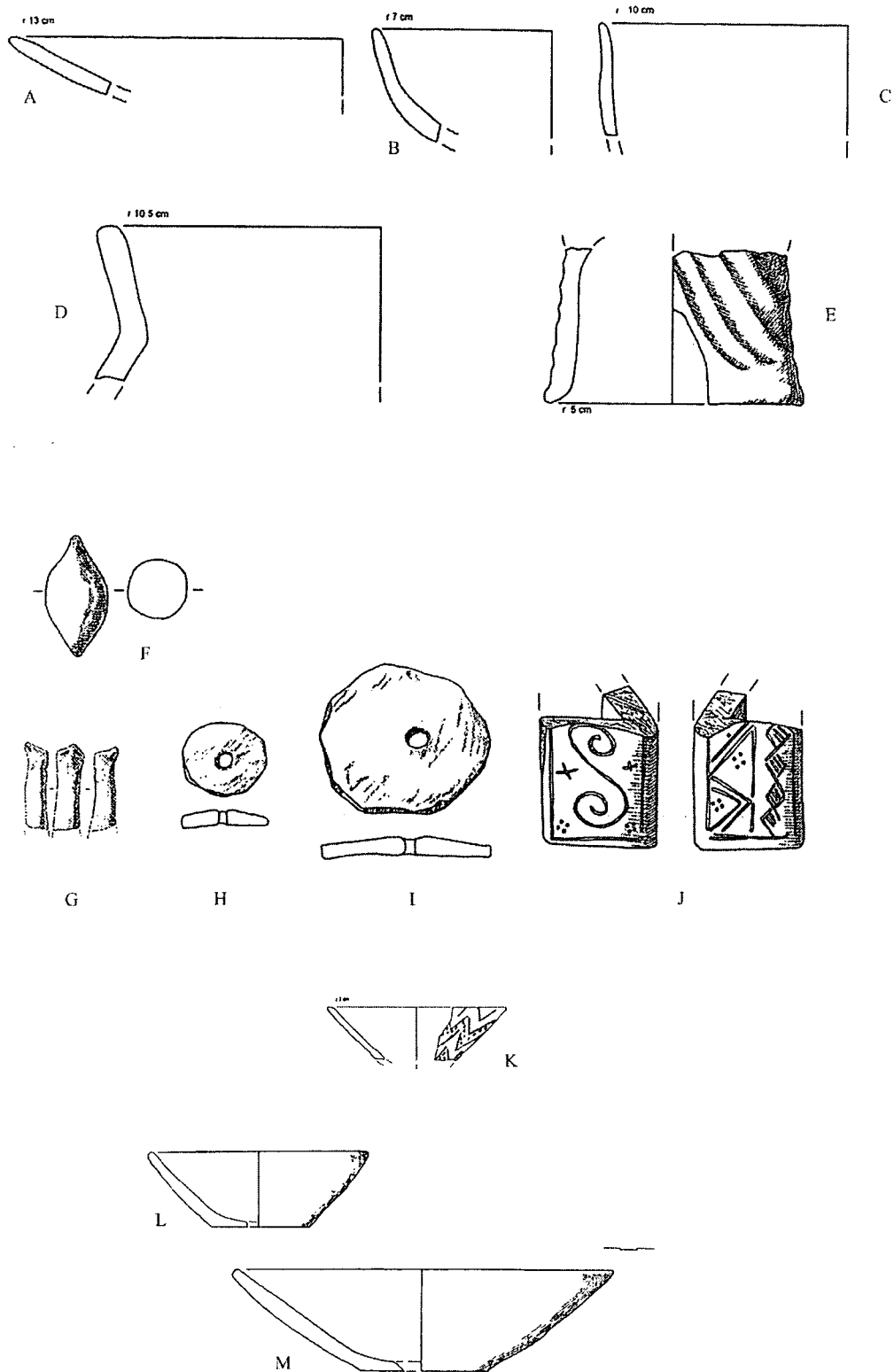
AFig. 5.4.3 Pottery from Mednikarovo tell
 Source: Site documentation



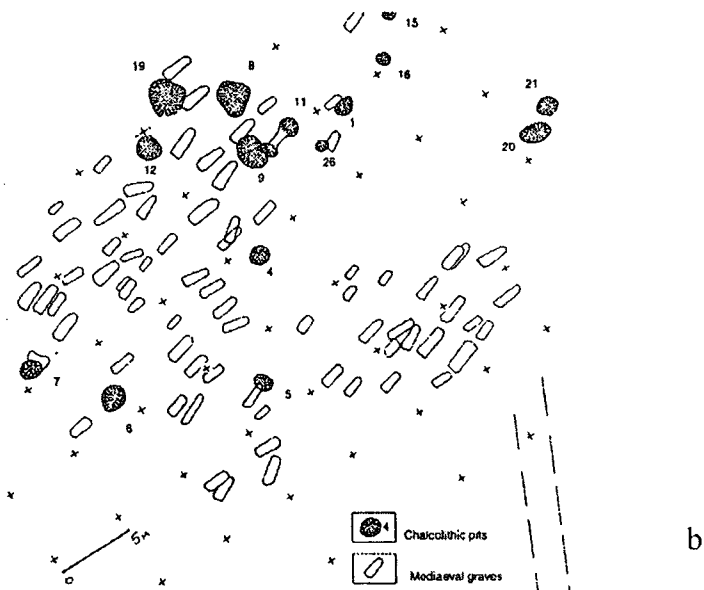
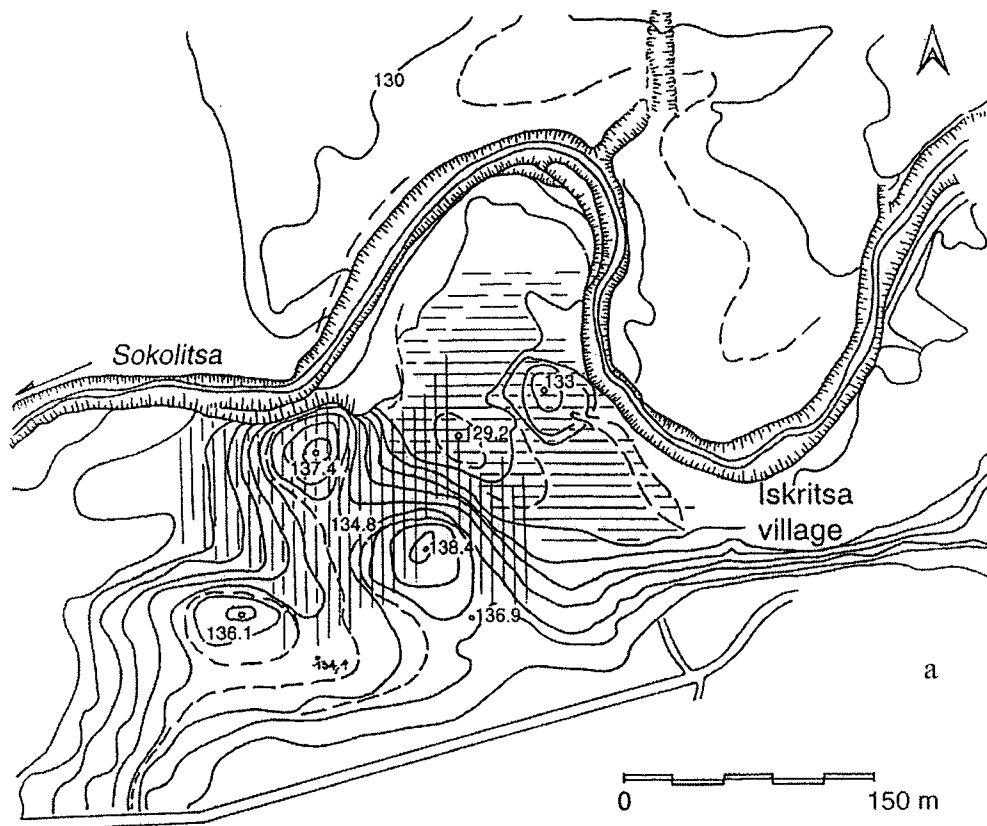
AFig. 5.4.4 Pottery from Mednikarovo tell
 Source: Leshtakov et al. 2001



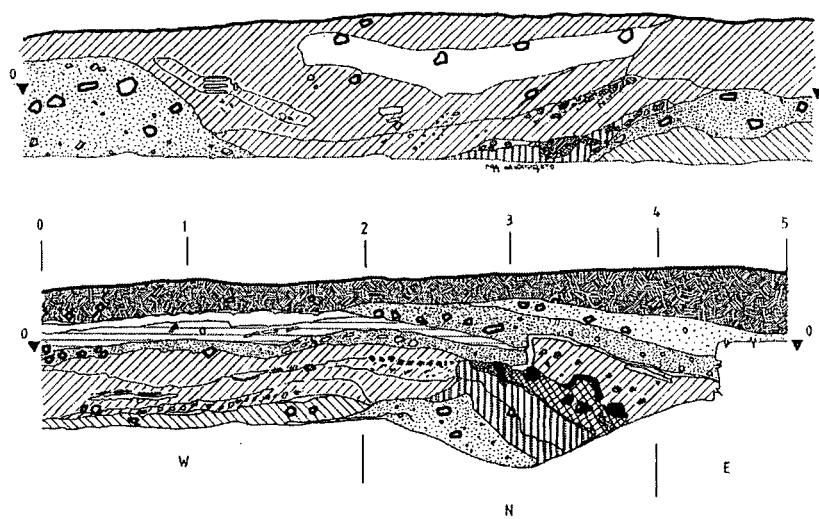
AFig. 5.4.5 Pottery from Mednikarovo tell
 Source: Site documentation



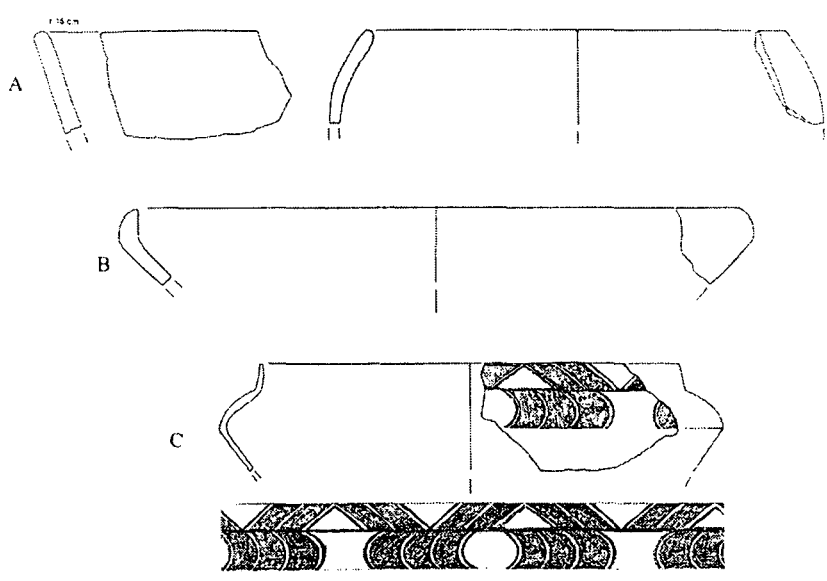
AFig. 5.4.6 Pottery from Mednikarovo tell
 Source: Leshtakov et al. 2001



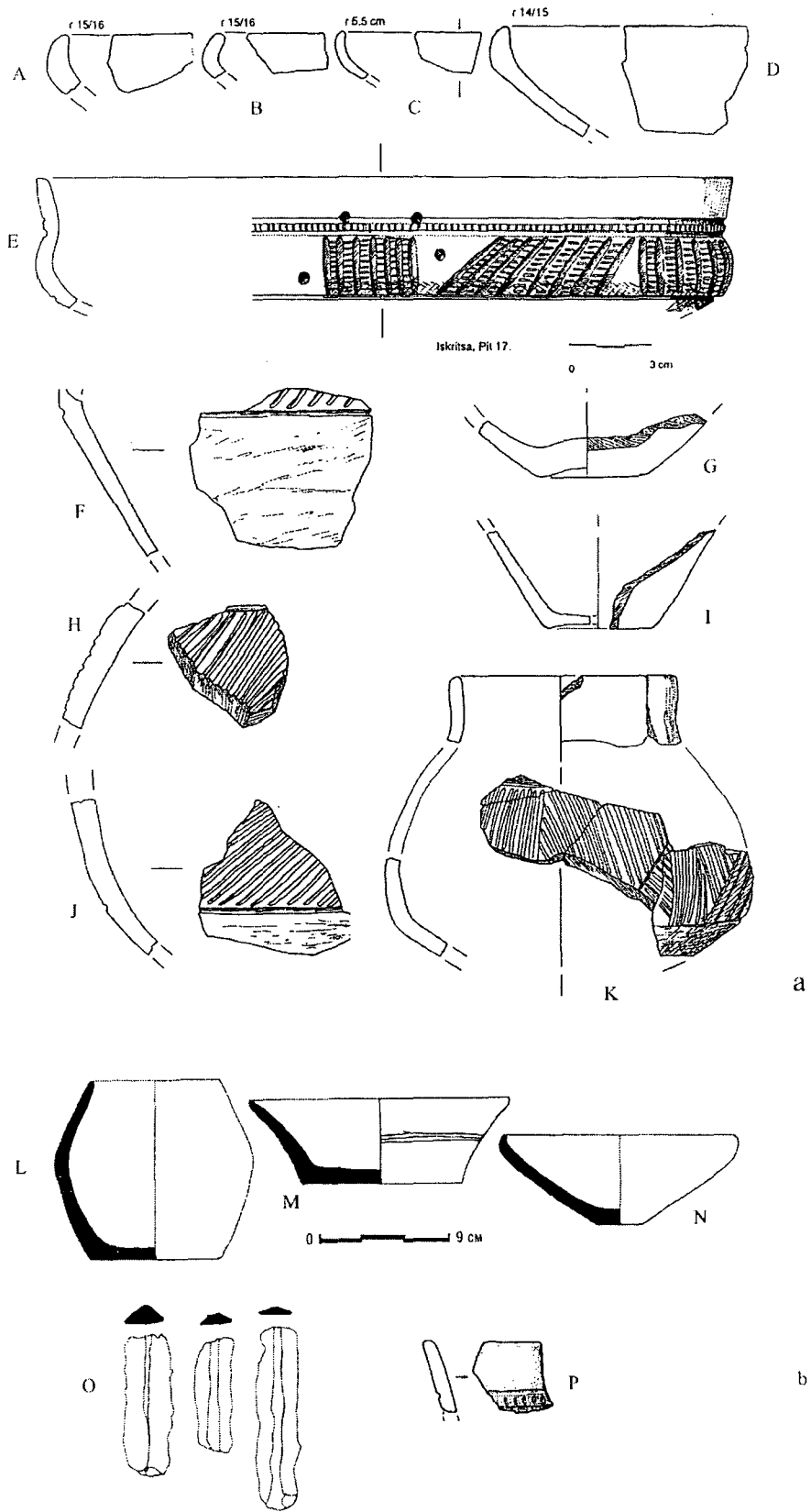
AFig. 5.6.1 General plan of Iskritsa flat site; plan of Iskritsa pit site.
Source: Leshtakov et al. 2001



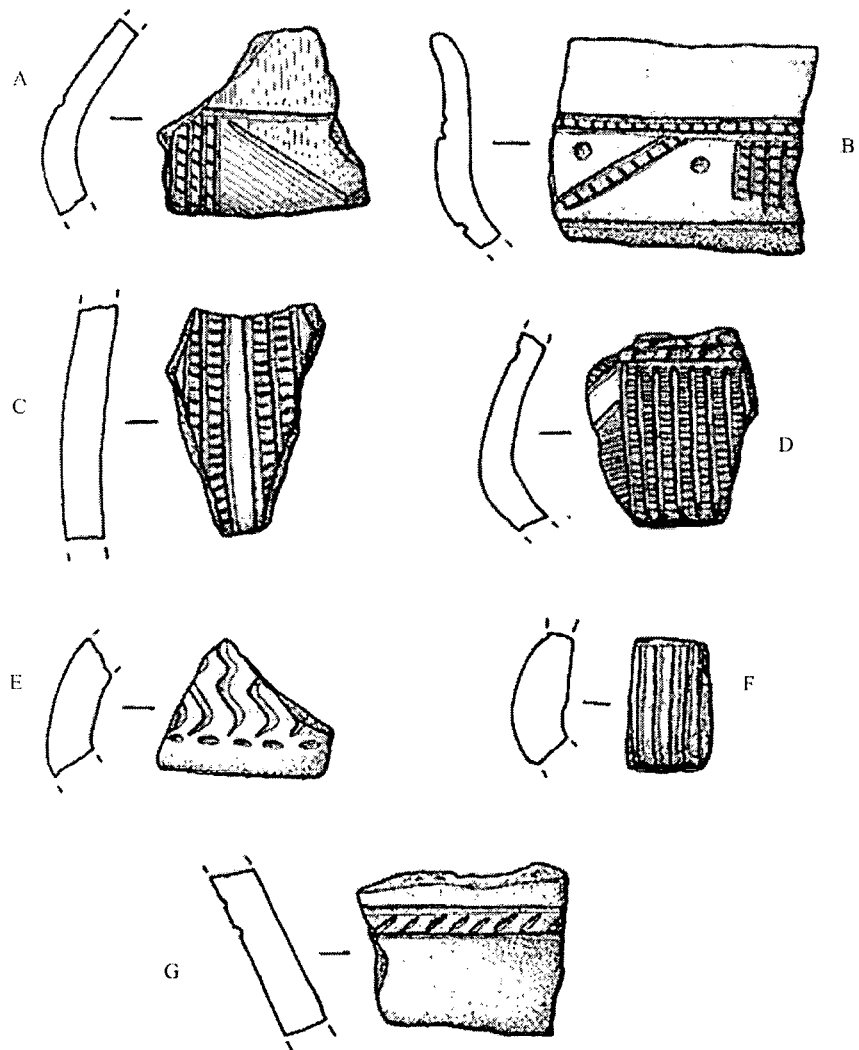
a



AFig. 5.6.2 Profiles and pottery from Iskritsa dwelling site
Source: Leshtakov et al. 2001

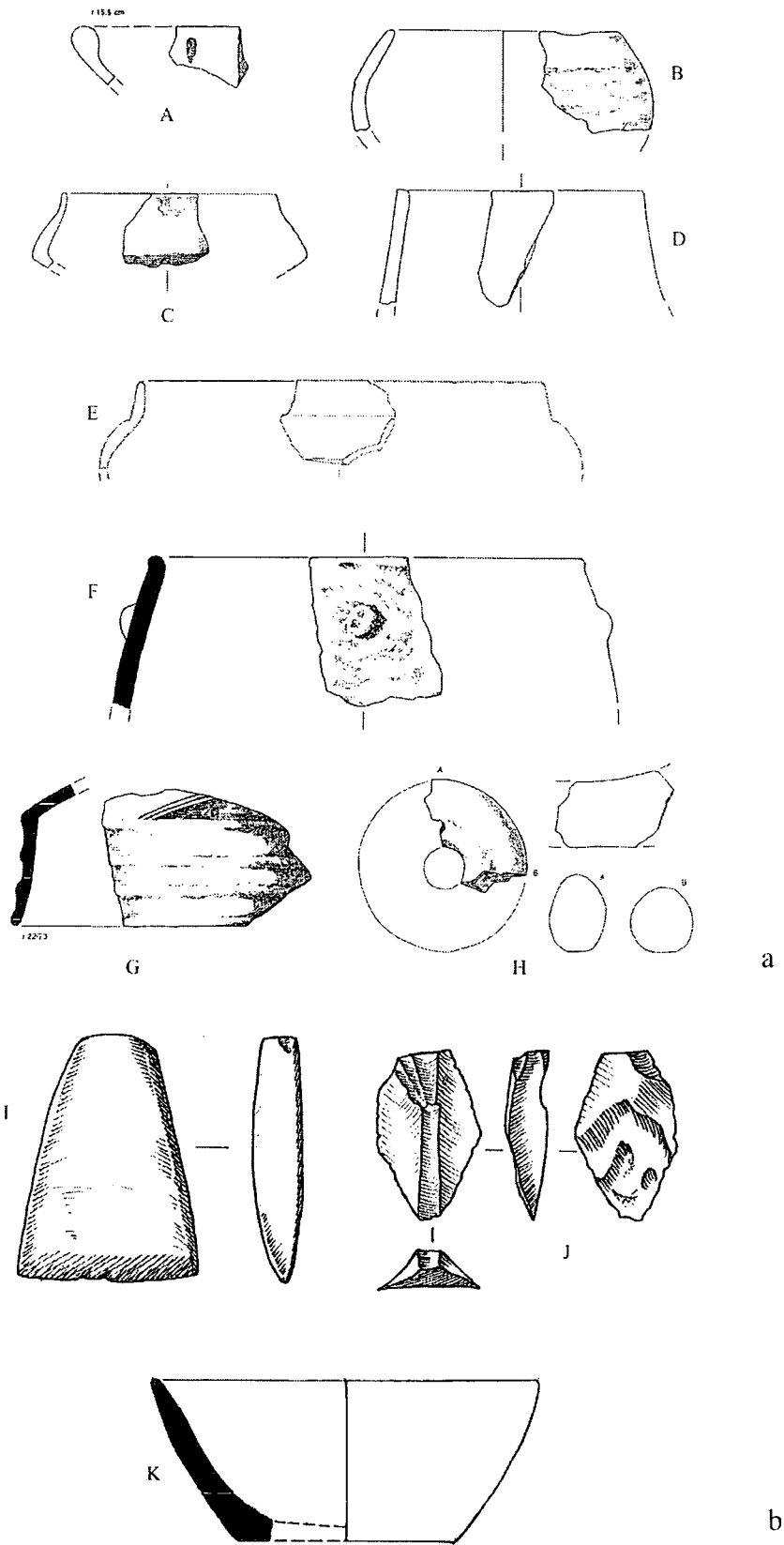


AFig. 5.6.3 Pottery and flint from Iskrița pit site
 Source: Leshtakov et al. 2001 (a); Sheileva 1994 (b)

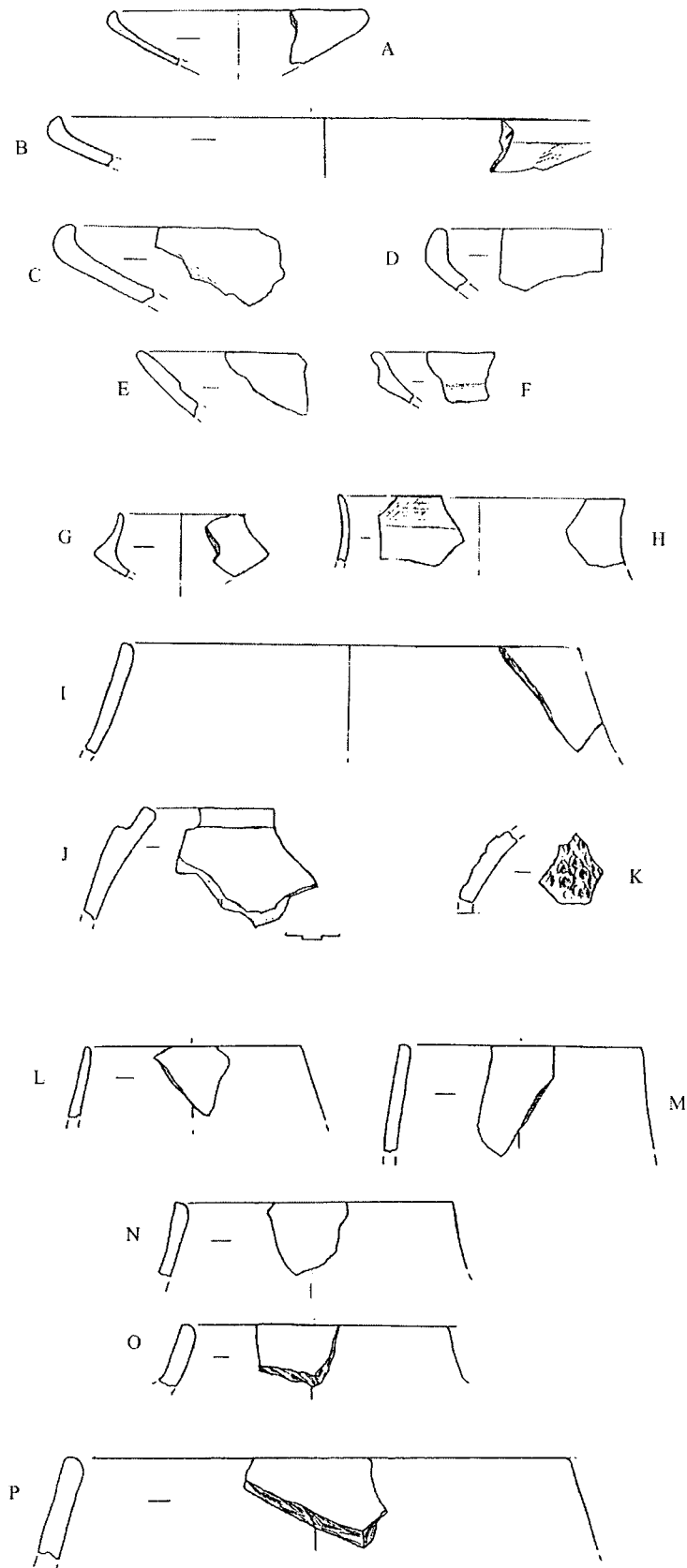


A Fig. 5.6.4 ECA pottery from Iskritsa dwelling site

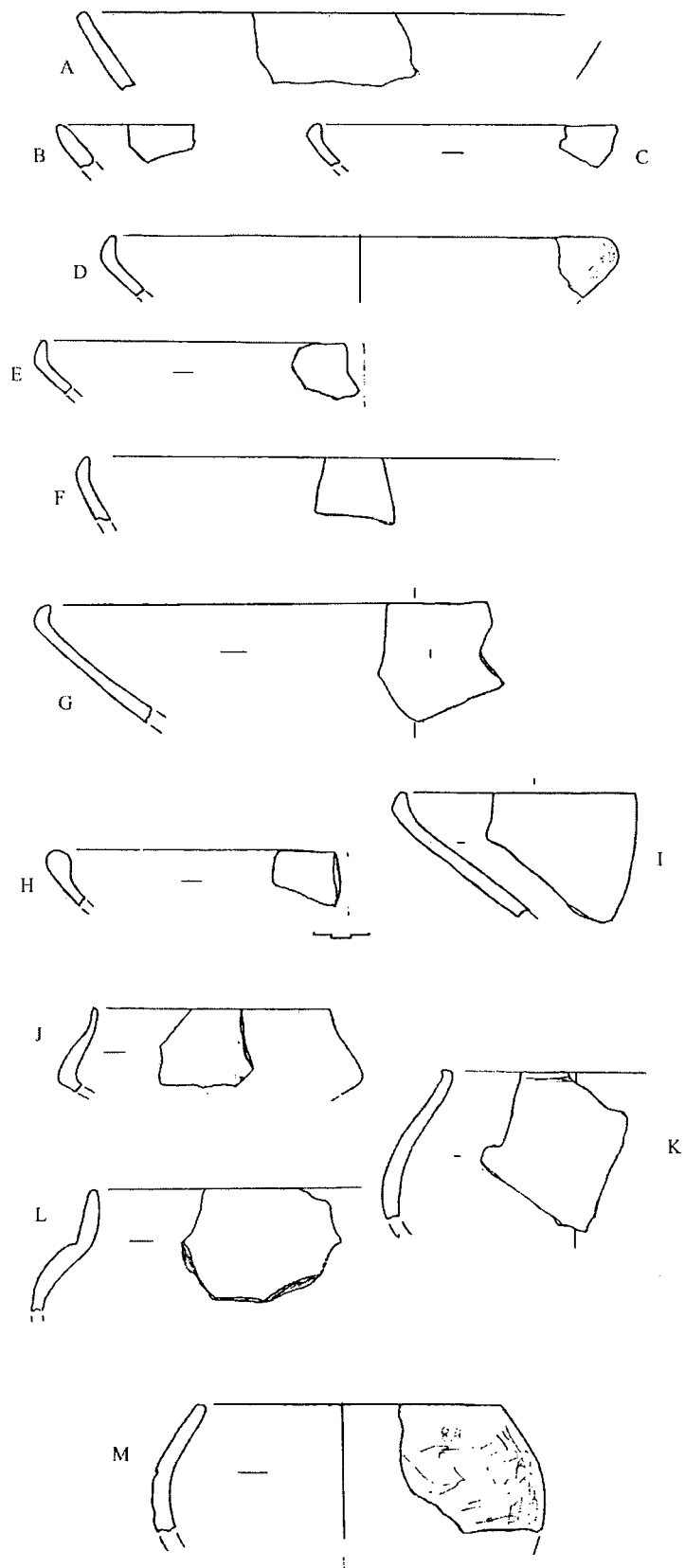
M 1:2



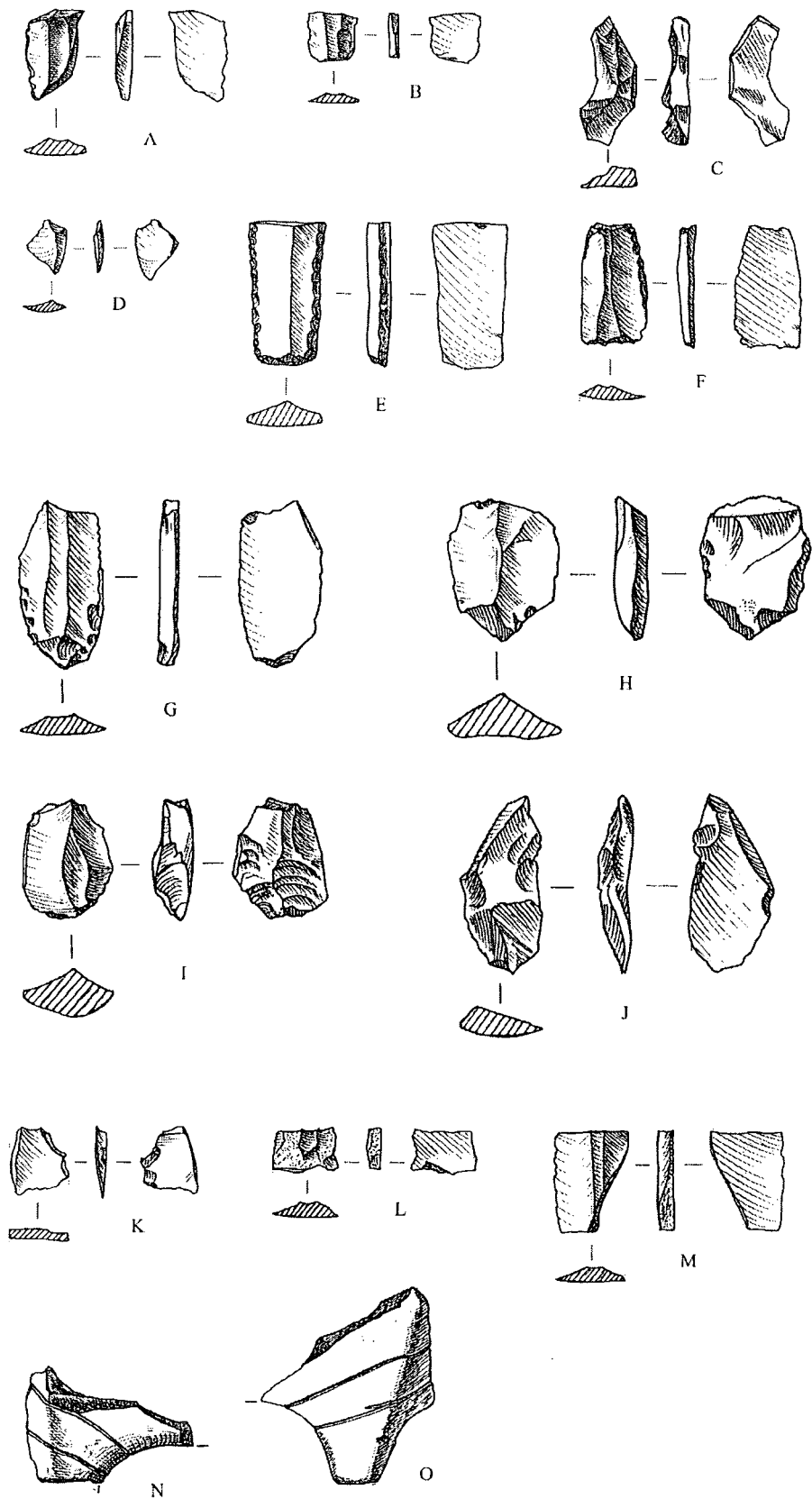
AFig. 5.6.5 Pottery and artefacts from Iskritsa dwelling site
 Stone - I, flint - J
 Source: Leshtakov et al. 2001; Site documentation



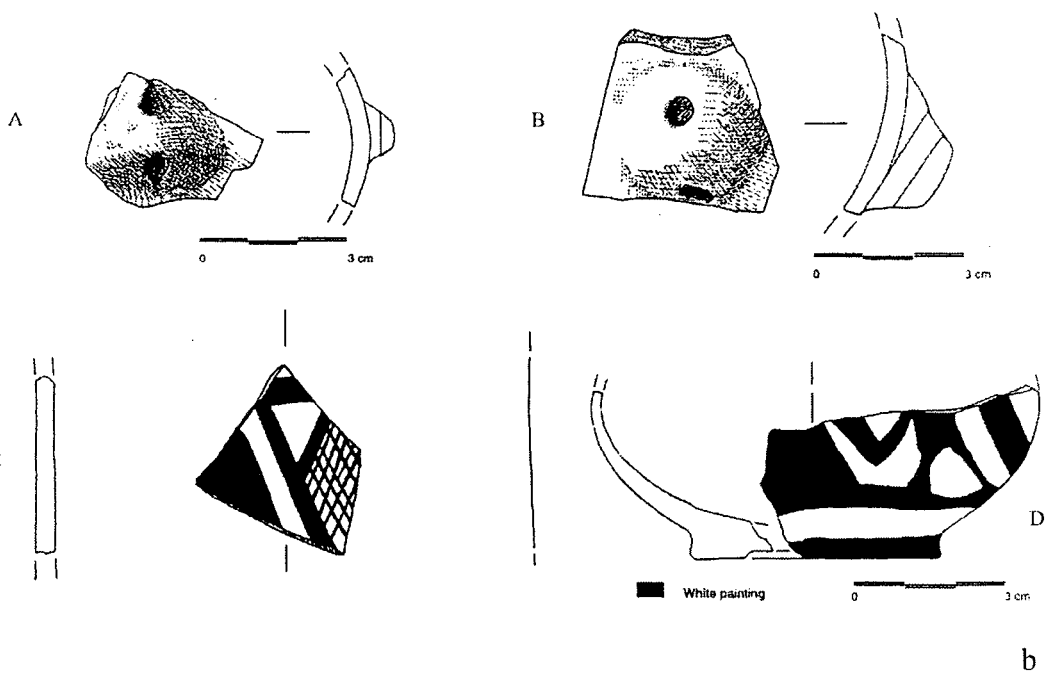
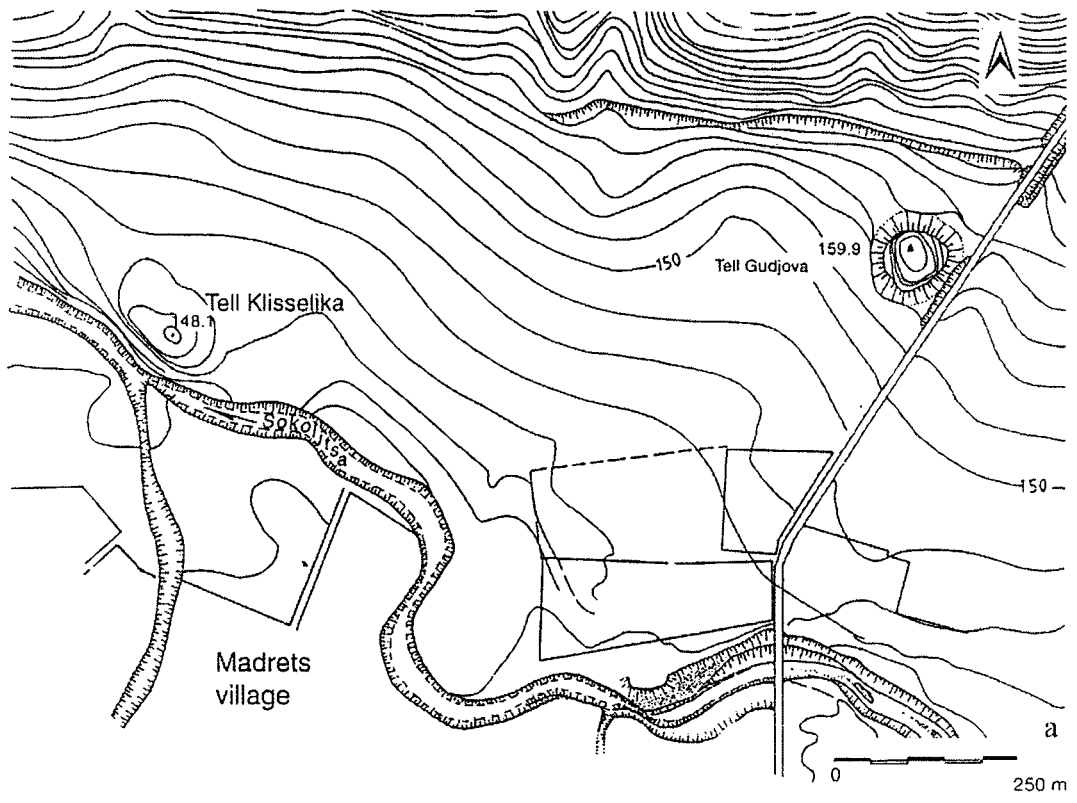
AFig. 5.6.6 Pottery from Iskritsa dwelling site
 Source: Leshtakov et al. 2001



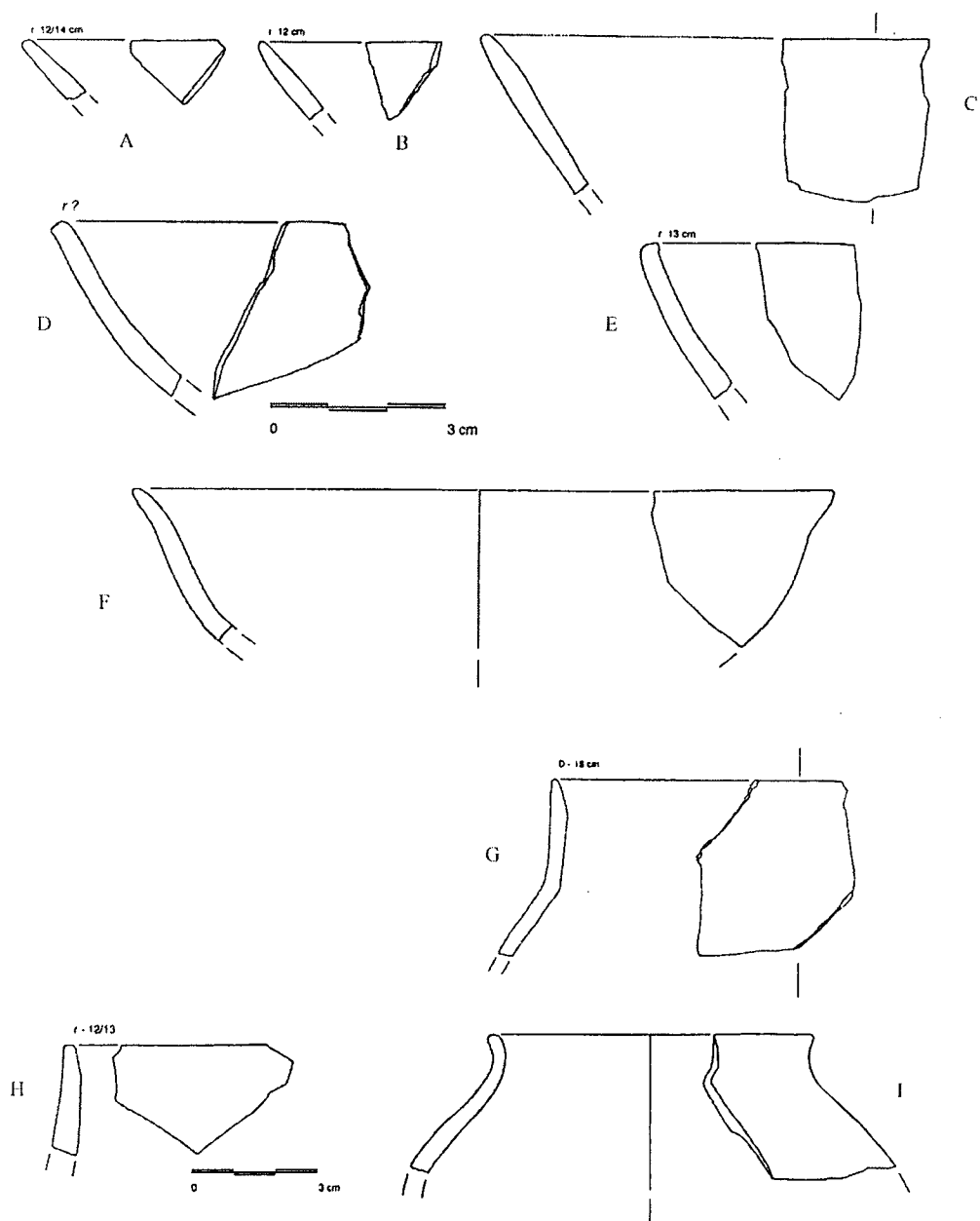
AFig. 5.6.7 Pottery from Iskritsa dwelling site
 Source: Leshtakov et al. 2001



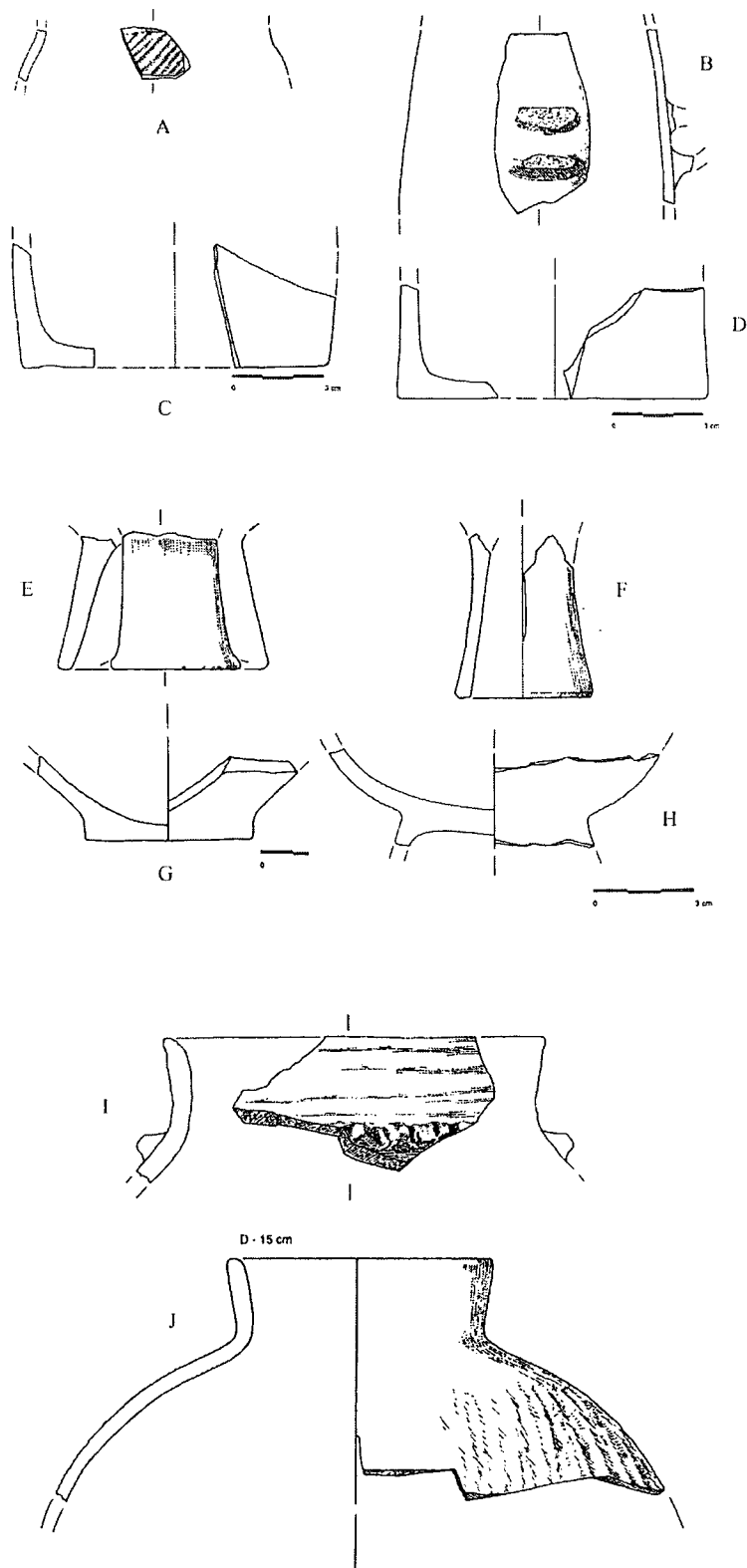
AFig. 5.6.8 Flint (A - M) and Altars (N, O) from Iskritsa dwelling site
 Source: Site documentation M 1:2



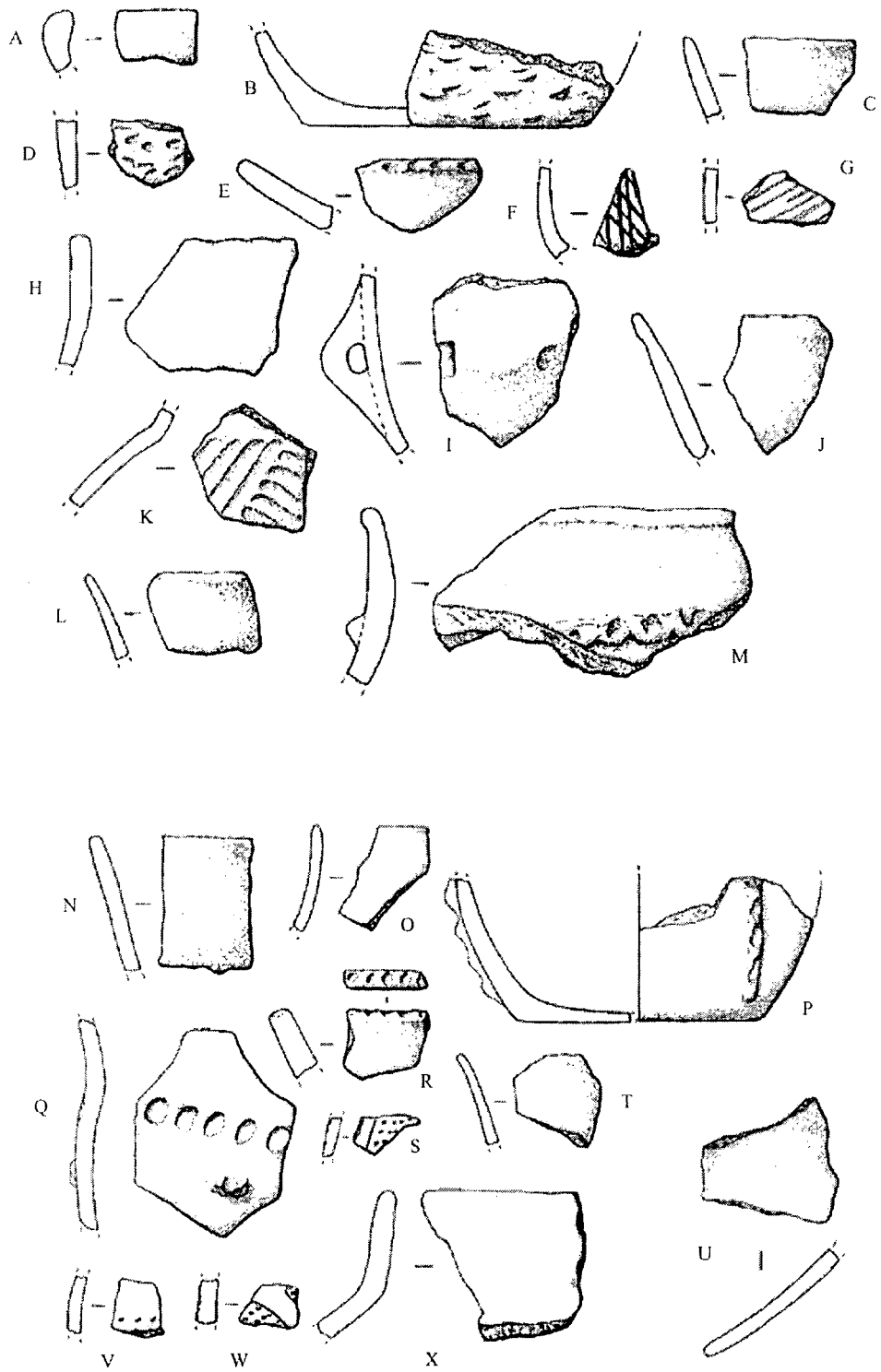
AFig. 5.7.1 General plan of Klisselika tell; pottery from the tell
 Source: Leshtakov et al. 2001



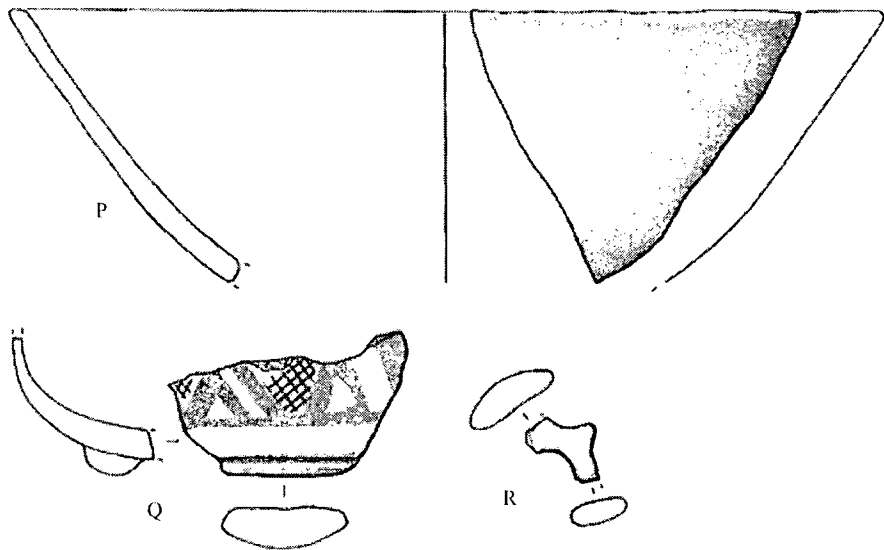
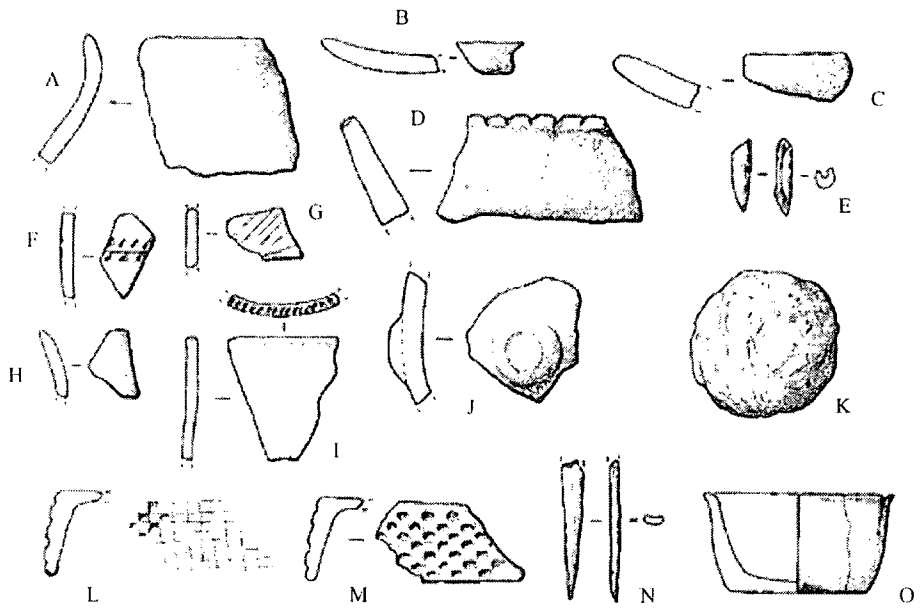
A Fig. 5.7.2 Pottery from Klisselika tell
 Source: Leshtakov et al. 2001



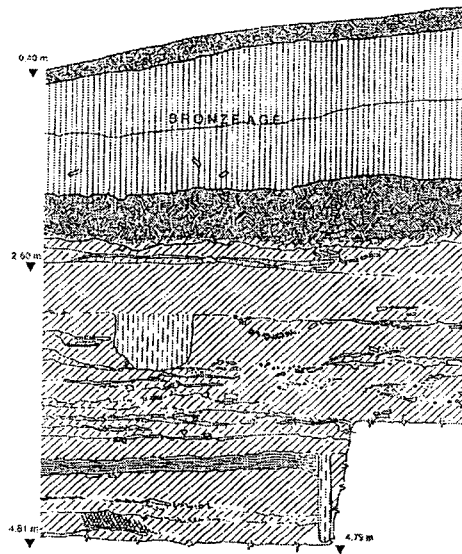
A Fig. 5.7.3 Pottery from Klisselika tell
 Source: Leshtakov et al. 2001



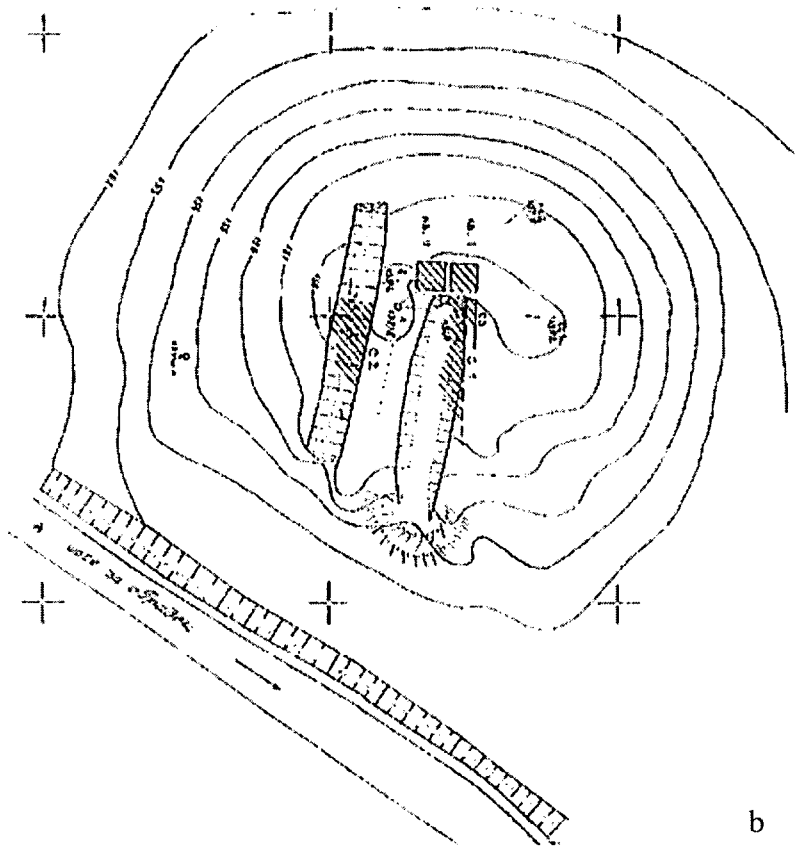
AFig. 5.7.4 Pottery from Klisselika tell
M 1:3



AFig. 5.7.5 Pottery and artefacts from Klisselika tell.
 Clay A-D, F-J, L, M, O-R; bone E, N; stone K M 1:3



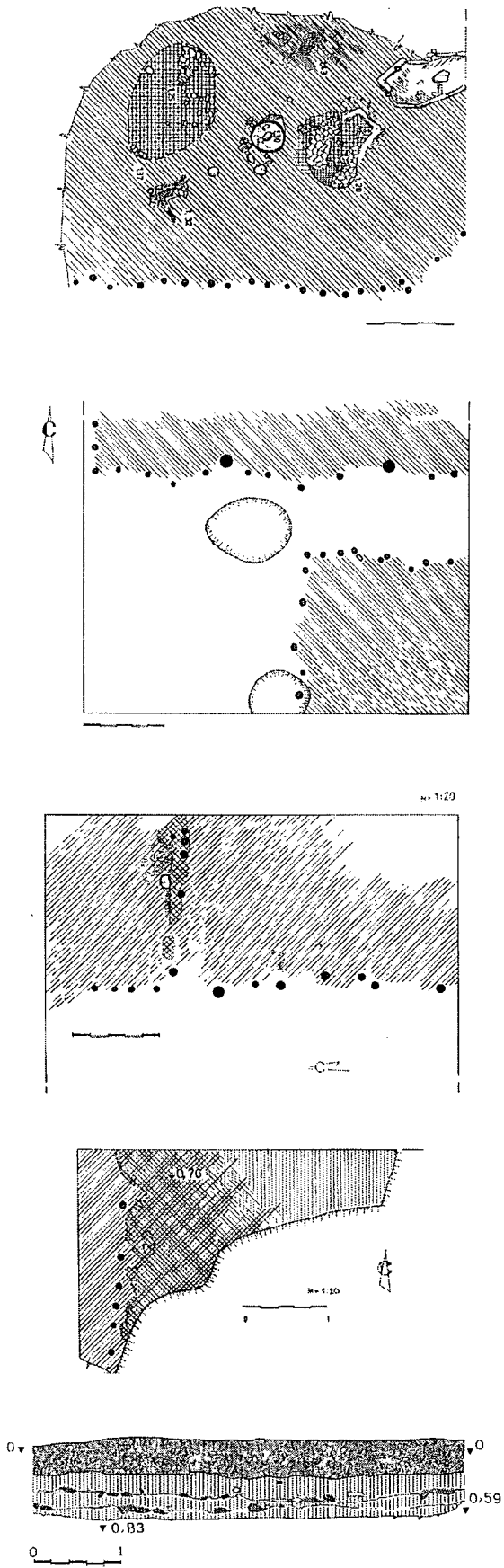
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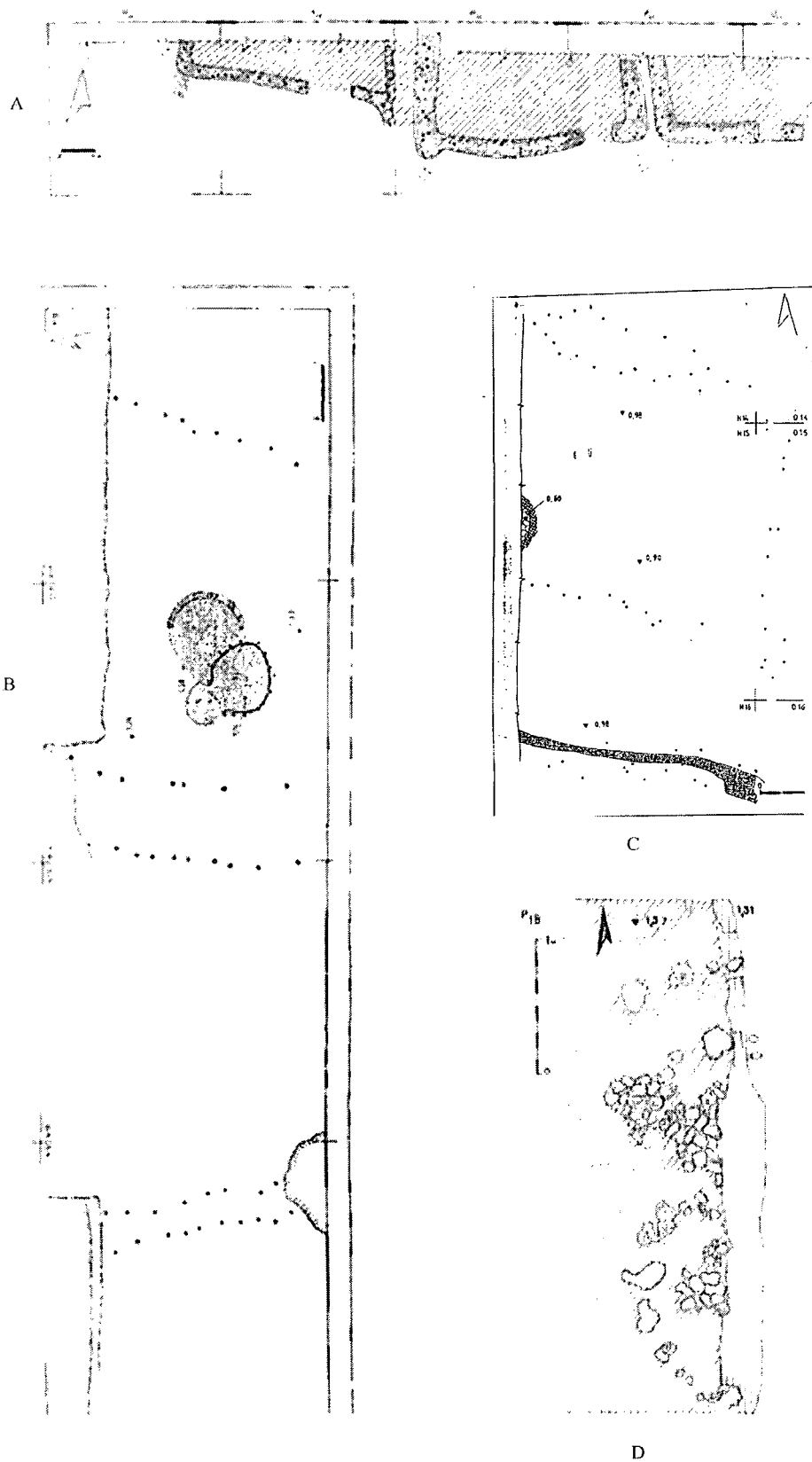
b

A Fig. 5.8.1 General plan and profile of Gudgova tell

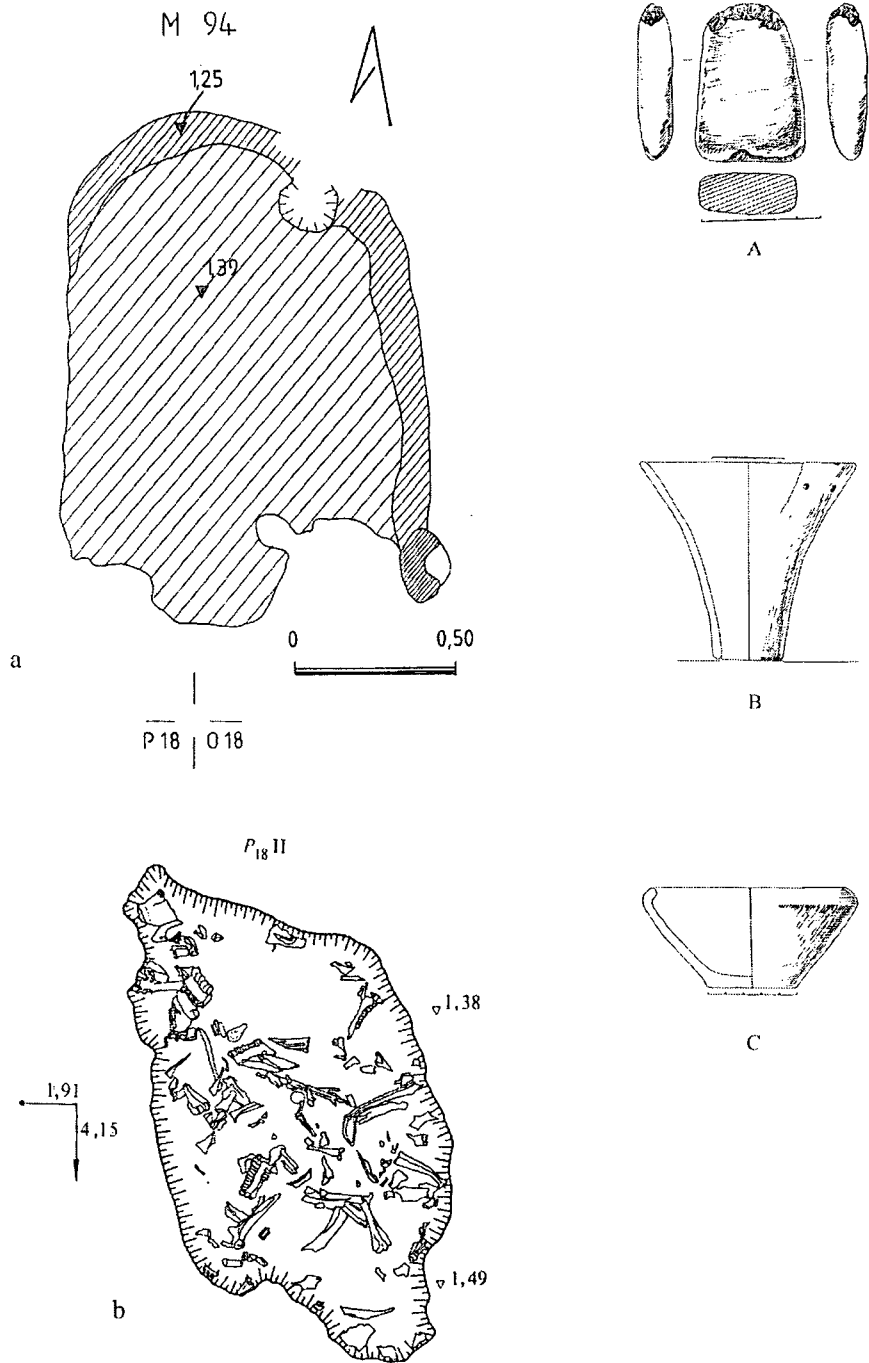
Source: Leshtakov et al. 2001 (a); Site documentation (b)



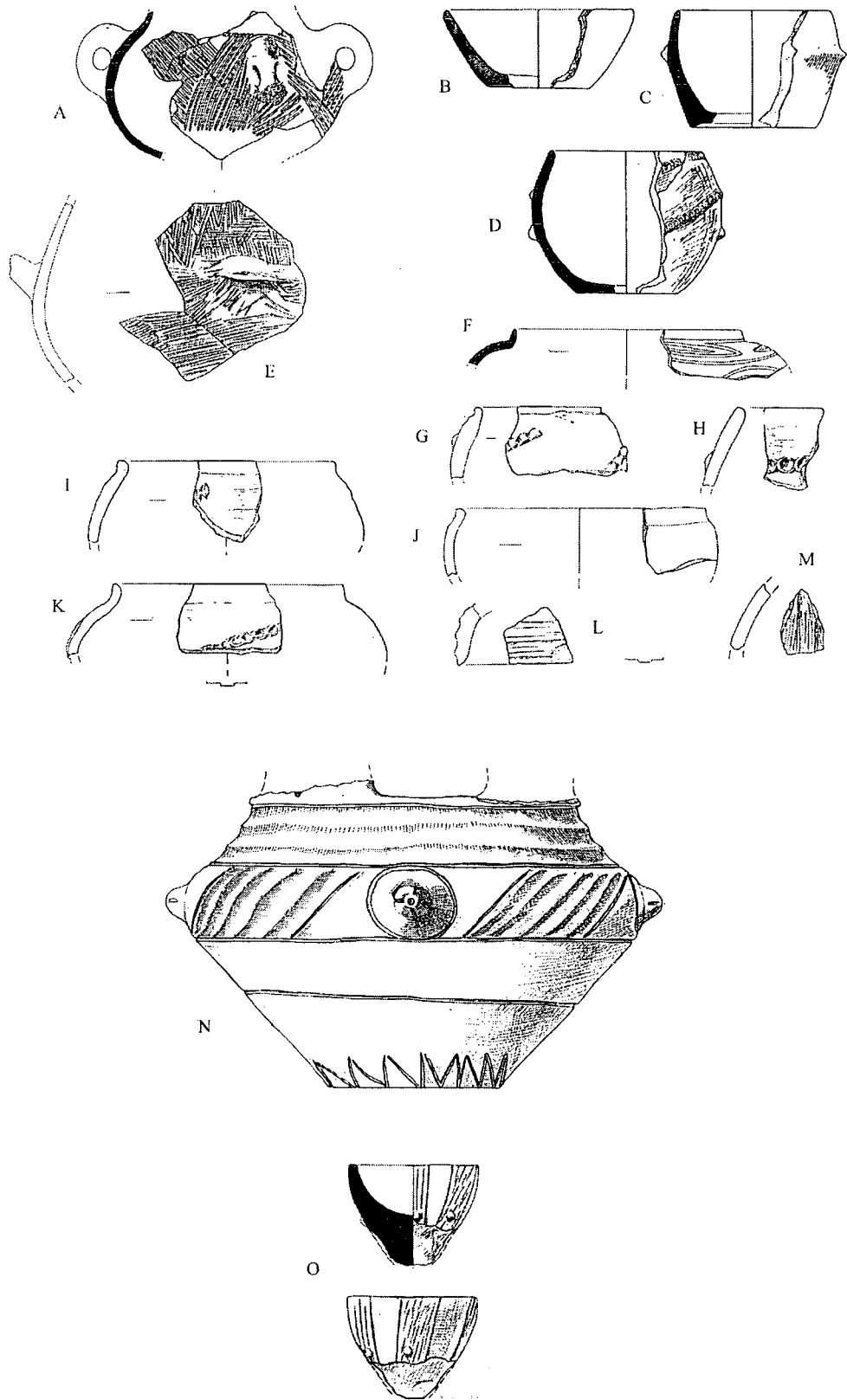
A Fig. 5.8.2 Plans and profile from Gudgova tell
 Source: Leshtakov et al. 2001



AFig. 5.8.3 Plans of houses from Gudgova tell
 Source: Site documentation



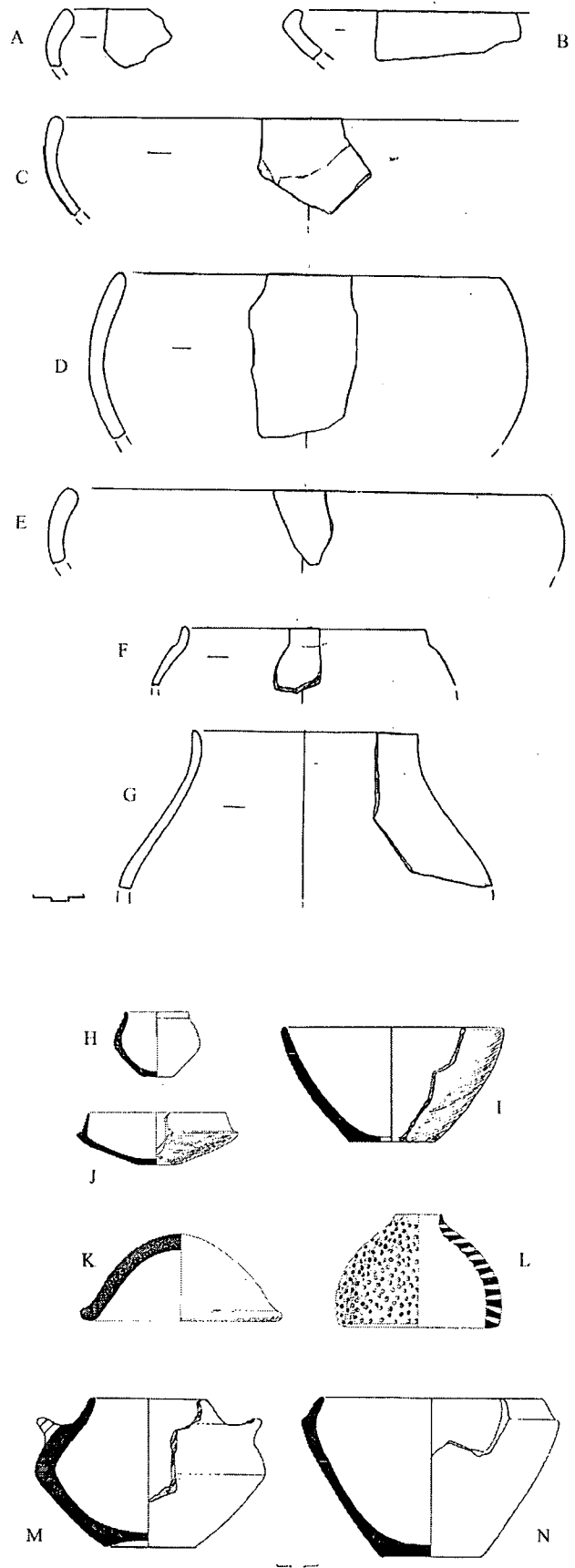
AFig. 5.8.4 BA features from Gudgova tell, objects from a pit in P - 18. Stone - A, clay - B, C
 Source: Site documentation



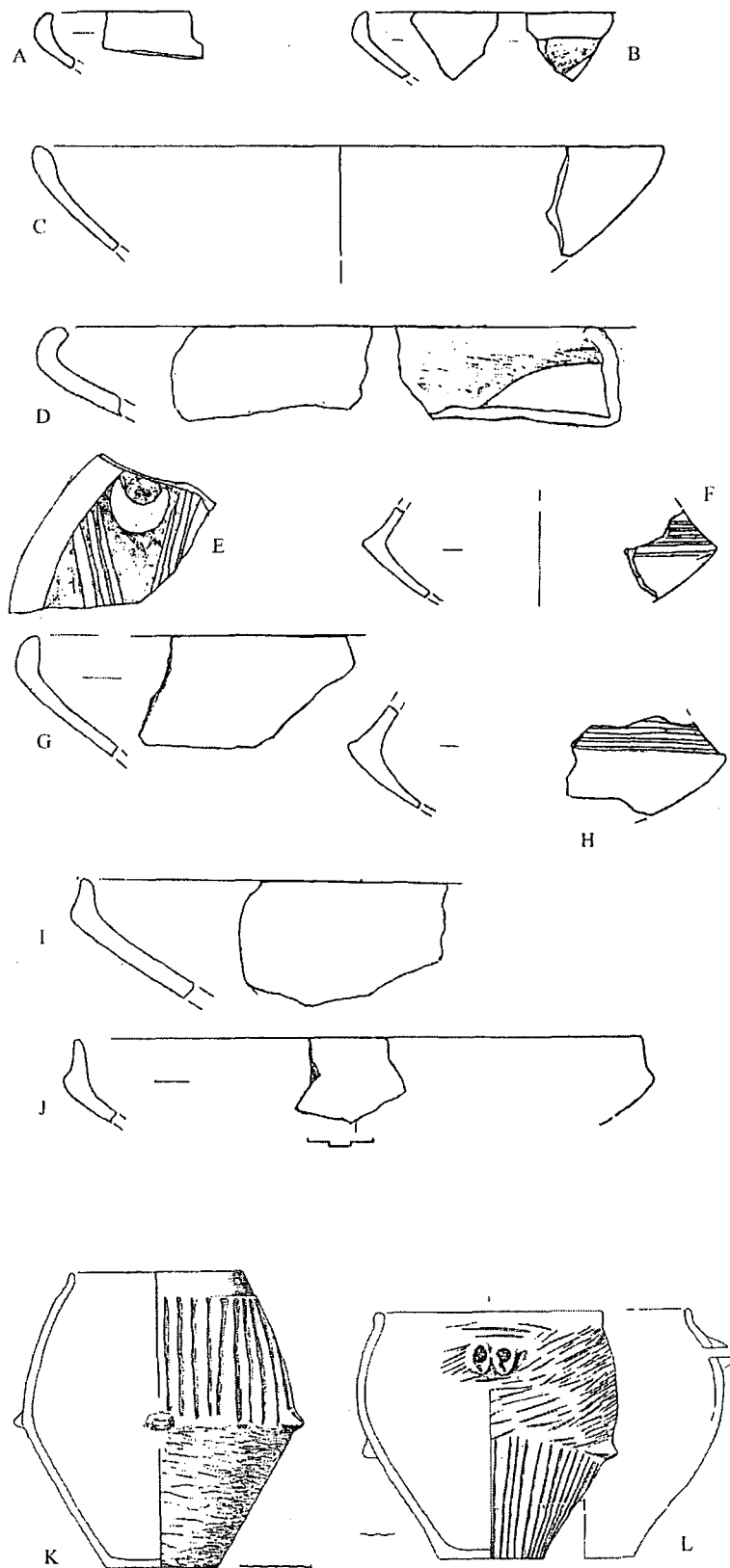
AFig 5.8.5 LCA vessels from Gudgova tell

Source: Todorova (n.d)(A - M); Site documentation (N, O)

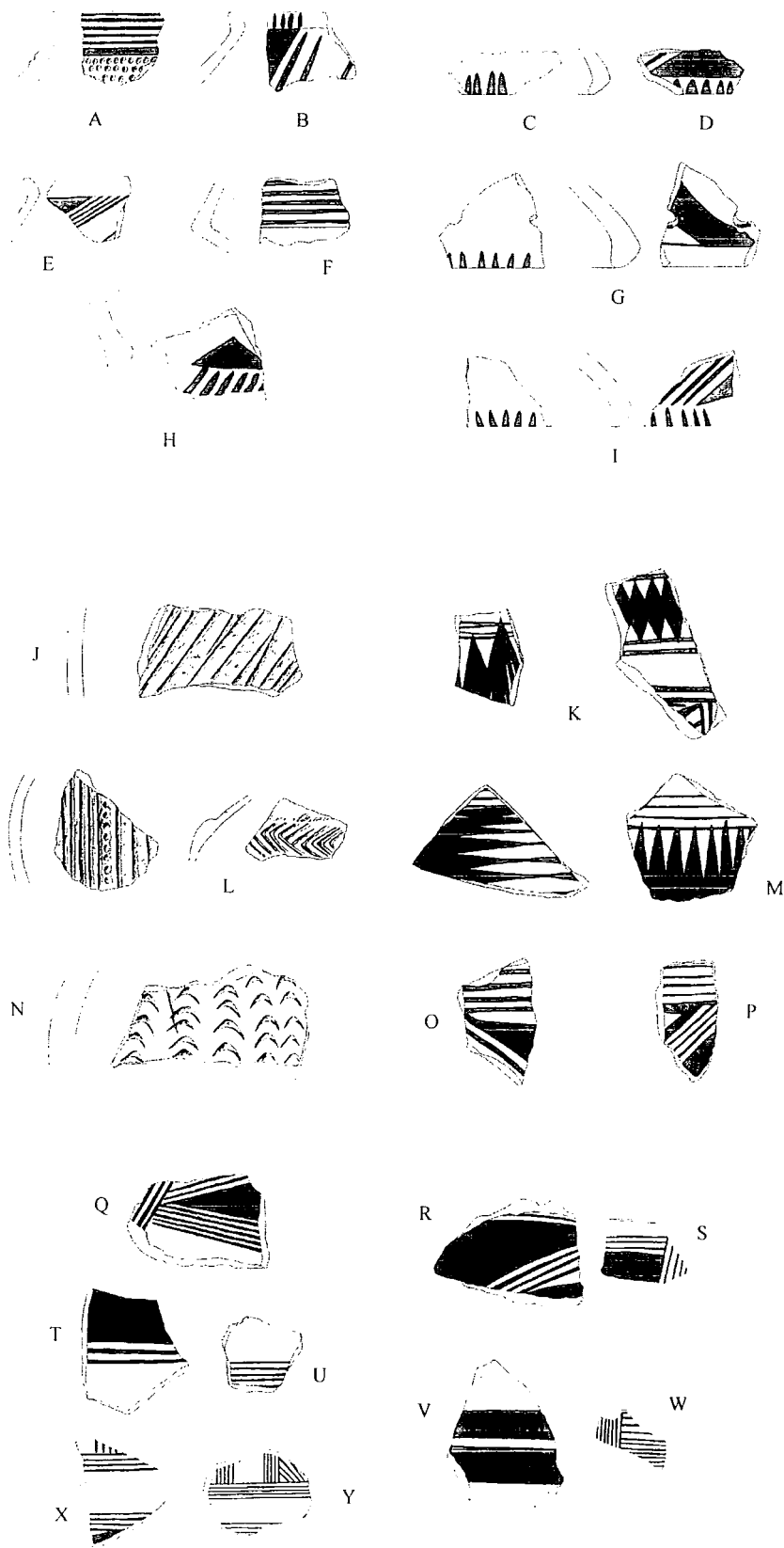
M 1:3 (A - N), 1:2 (O)



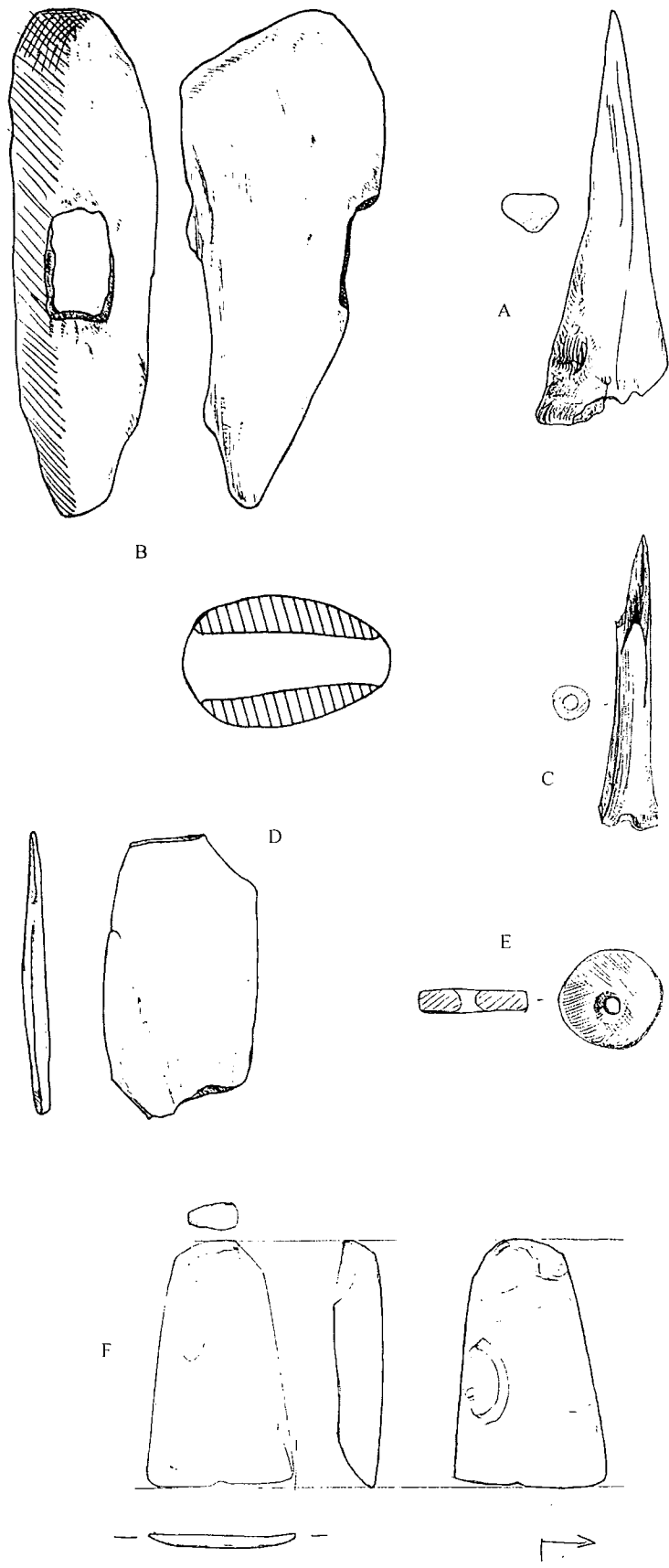
AFig. 5.8.6 LCA vessels from Gudgova tell
Source: Todorova (n.d.)



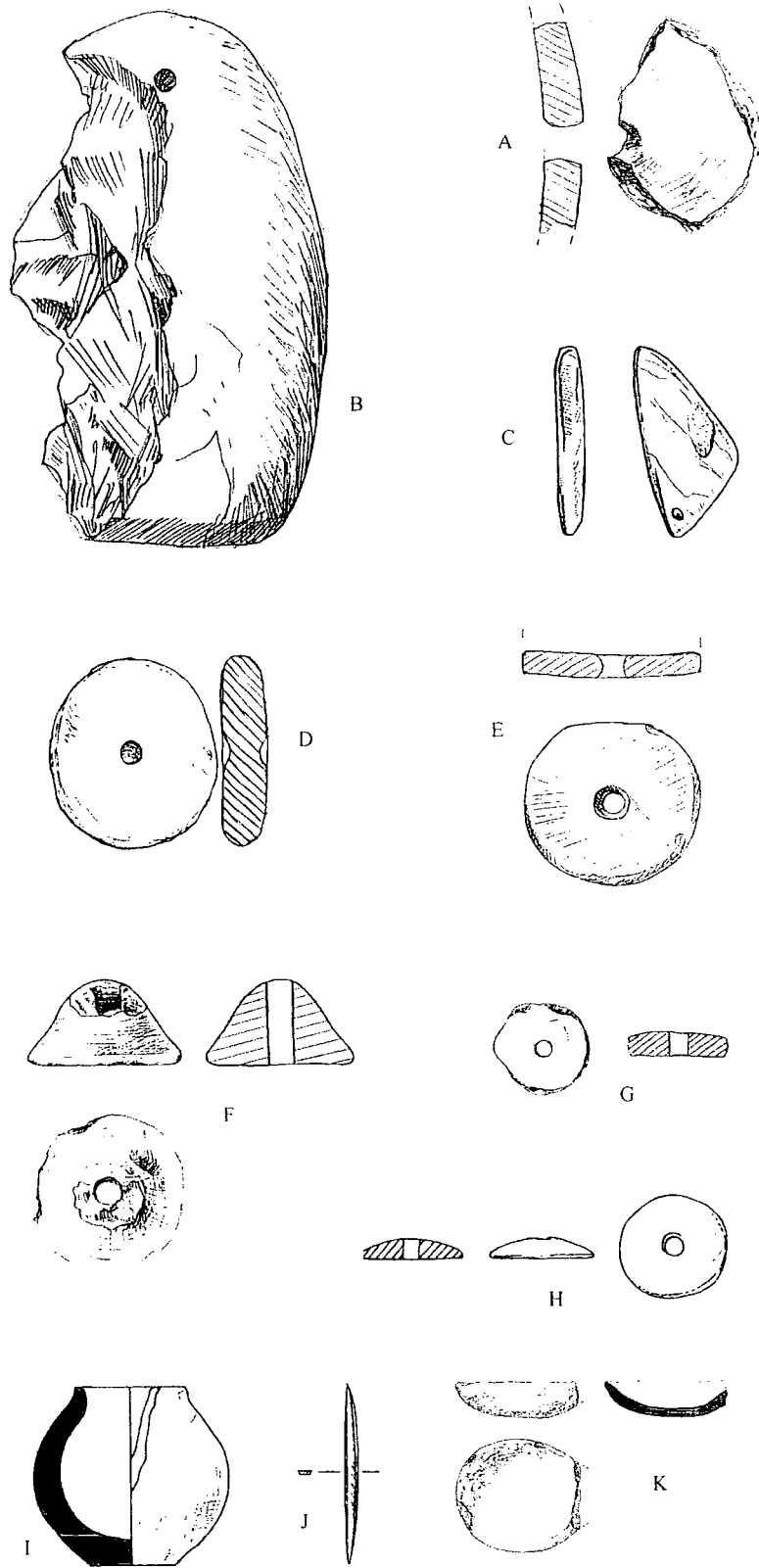
AFig. 5.8.7 LCA vessels from Gudgova tell
 Source: Todorova (n.d.) A-J; Leshtakov et al. 2001 K-L



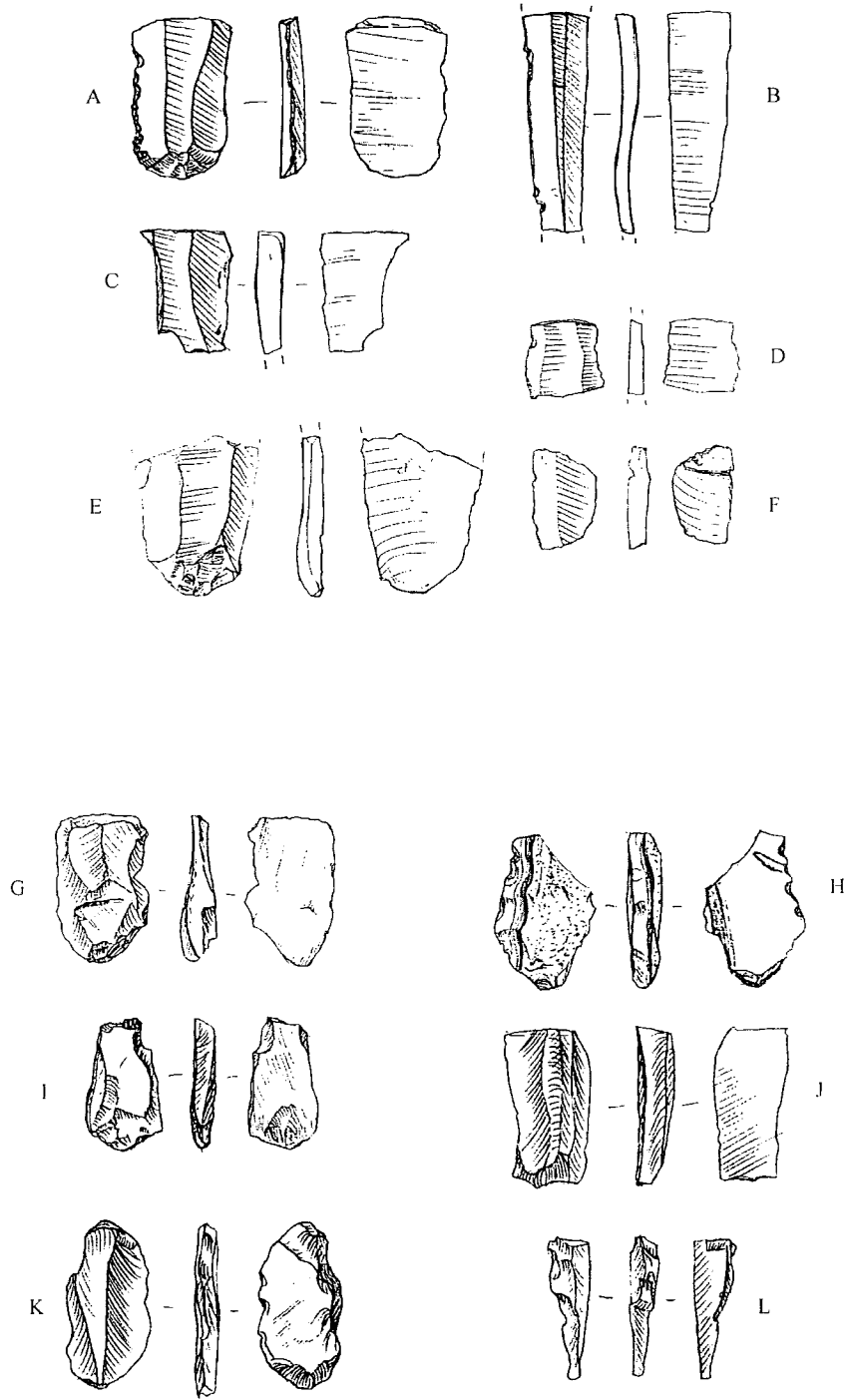
AFig. 5.8.8 LCA sherds from Gudgova tell
 Source: Site documentation M 1:2



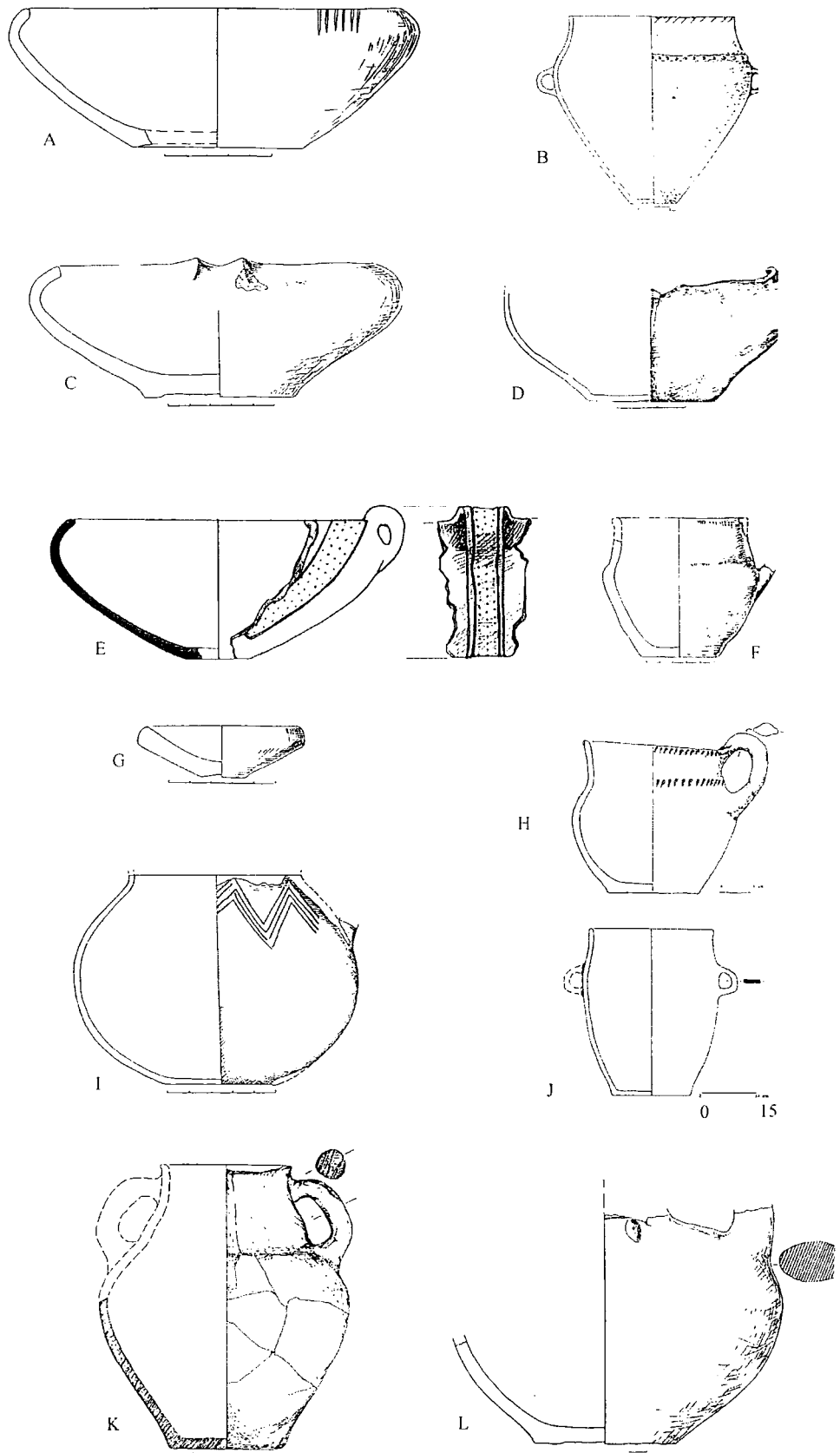
AFig. 5.8.9 Various LCA artefacts from Gudgova tell
 Horn, antler, bone A - D; clay E; stone F M 1:2
 Source: Site documentation



AFig. 5.8.10 Various LCA artefacts from Gudgova tell
 Clay A, B, E, G, I, K; bone C, H, J; stone D M 1:2
 Source: Site documentation

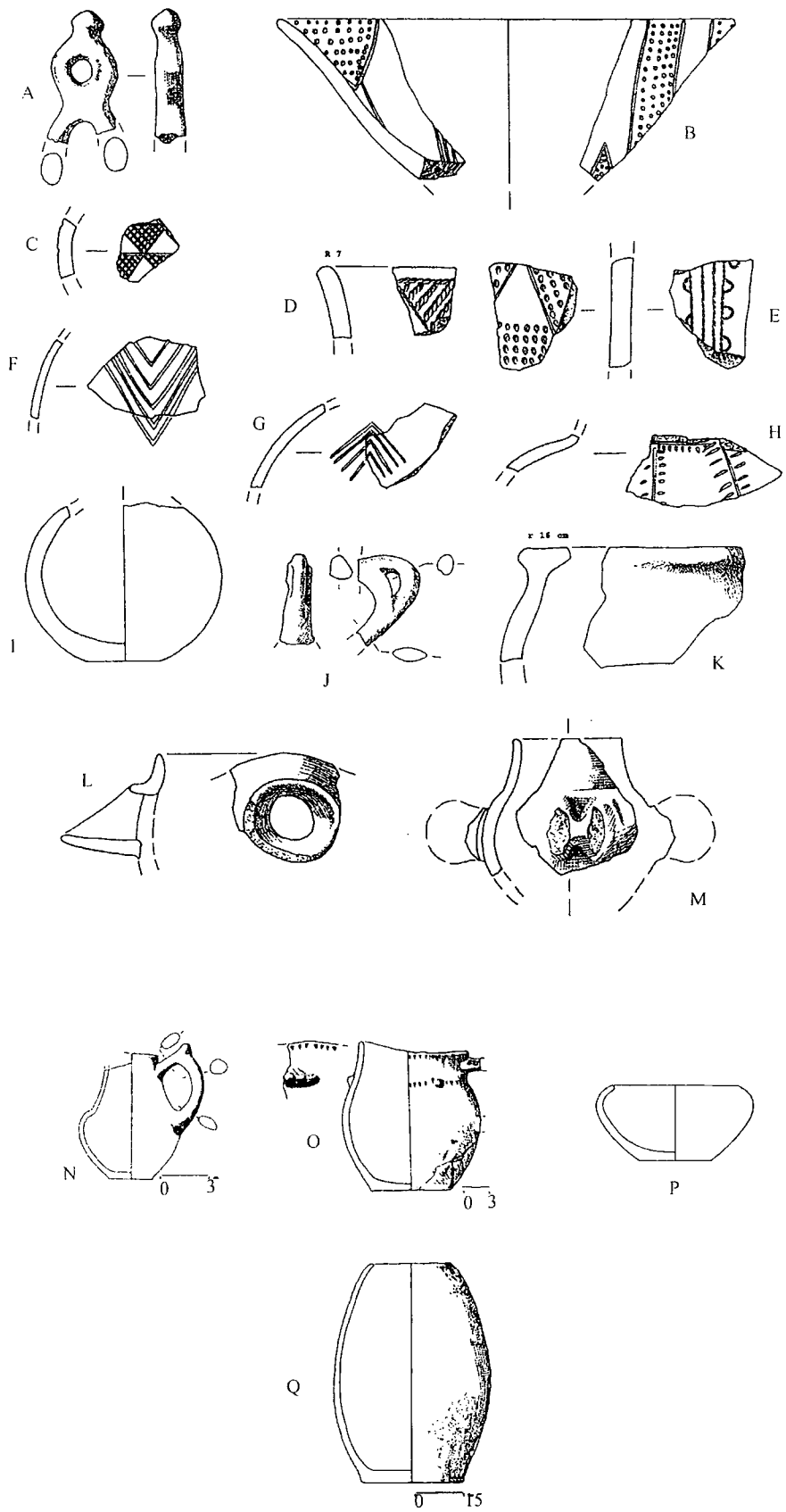


AFig. 5.8.11 LCA flints from Gudgova tell
 Source: Site documentation M 1:2

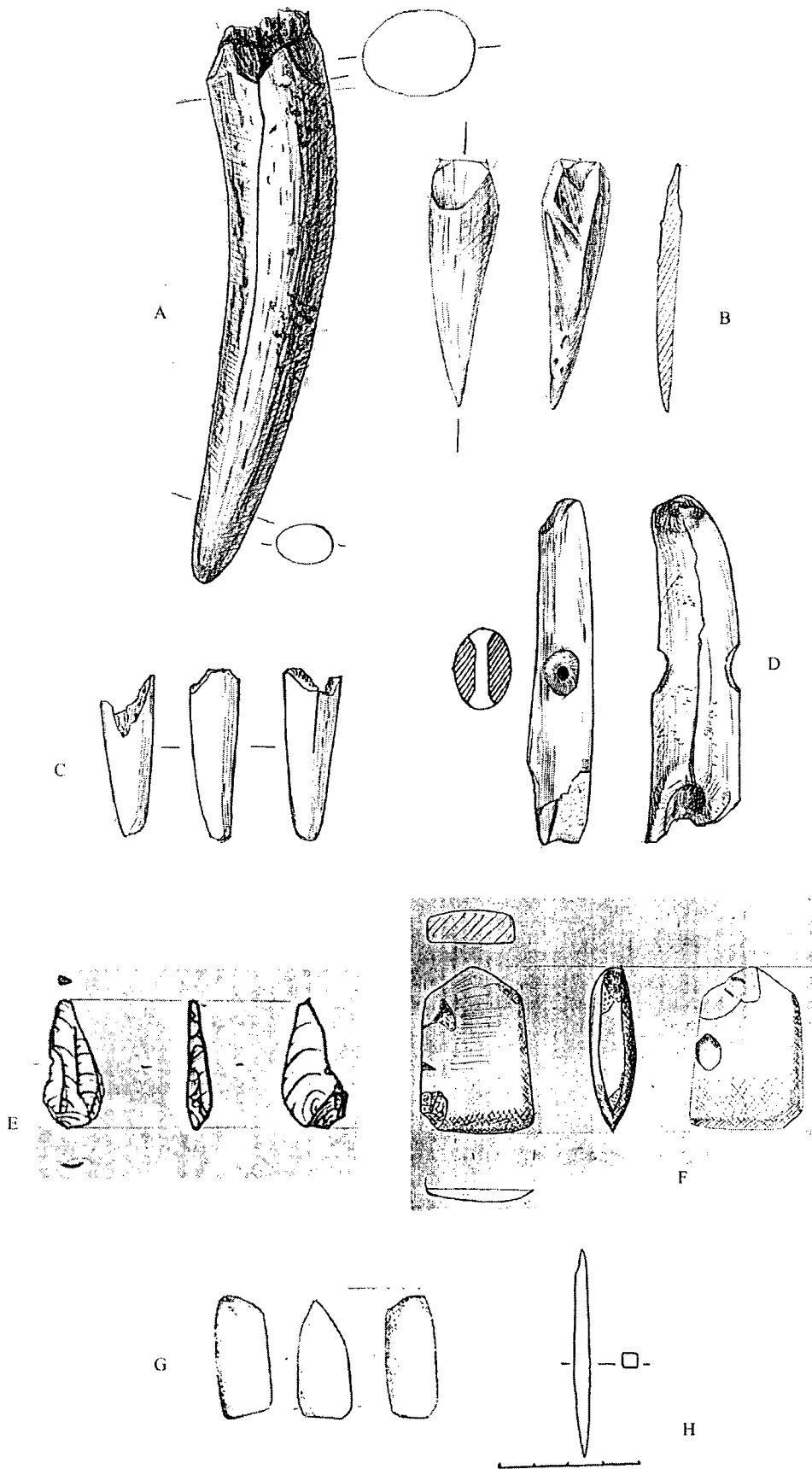


AFig. 5.8.12 BA vessels from Gudgova tell

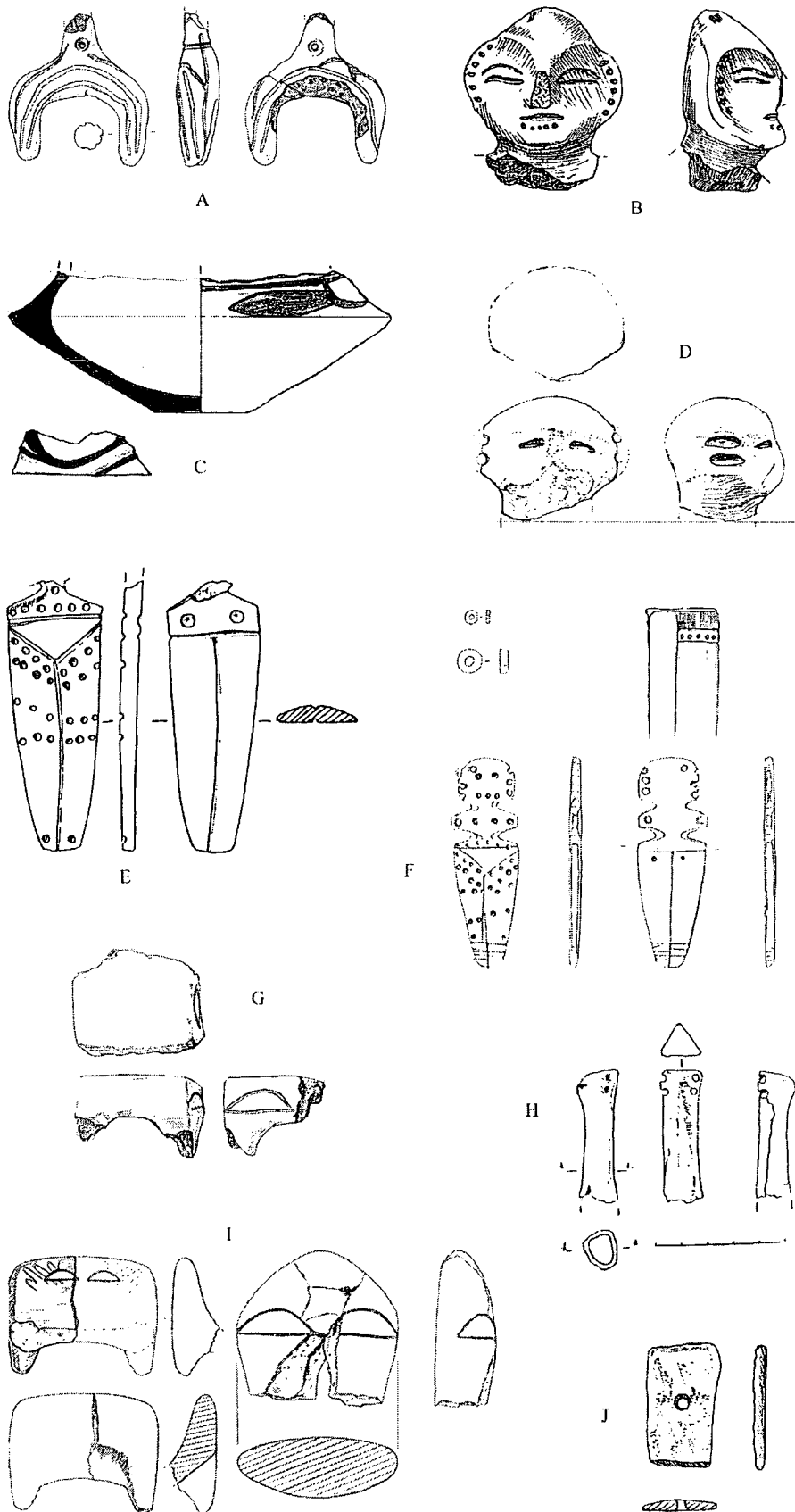
Source: Leshtakov et al. 2001 A-D, F-J; Site documentation E; Leshtakov 1995 K-L



A Fig. 5.8.13 BA vessels and sherds from Gudgova tell
 Source: Leshtakov et al. 2001 M 1:2 (A - M)



A Fig. 5.8.14 Various BA artefacts from Gudgova tell
 Bone, horn, antler A - D; flint E; stone E, G; bronze H
 Source: Site documentation M 1:1 (E), 1:2 (A - D, F, G)



AFig. 5.8.15 Figurines, cult objects and pottery from Gudgova tell
 Source: Leshtakov et al. 2001 A-B, D-E, G-J; Site documentation C, F
 Clay A - D; bone E - F, H, J, K M 1:2 (A - G, J), 1:4 (I)

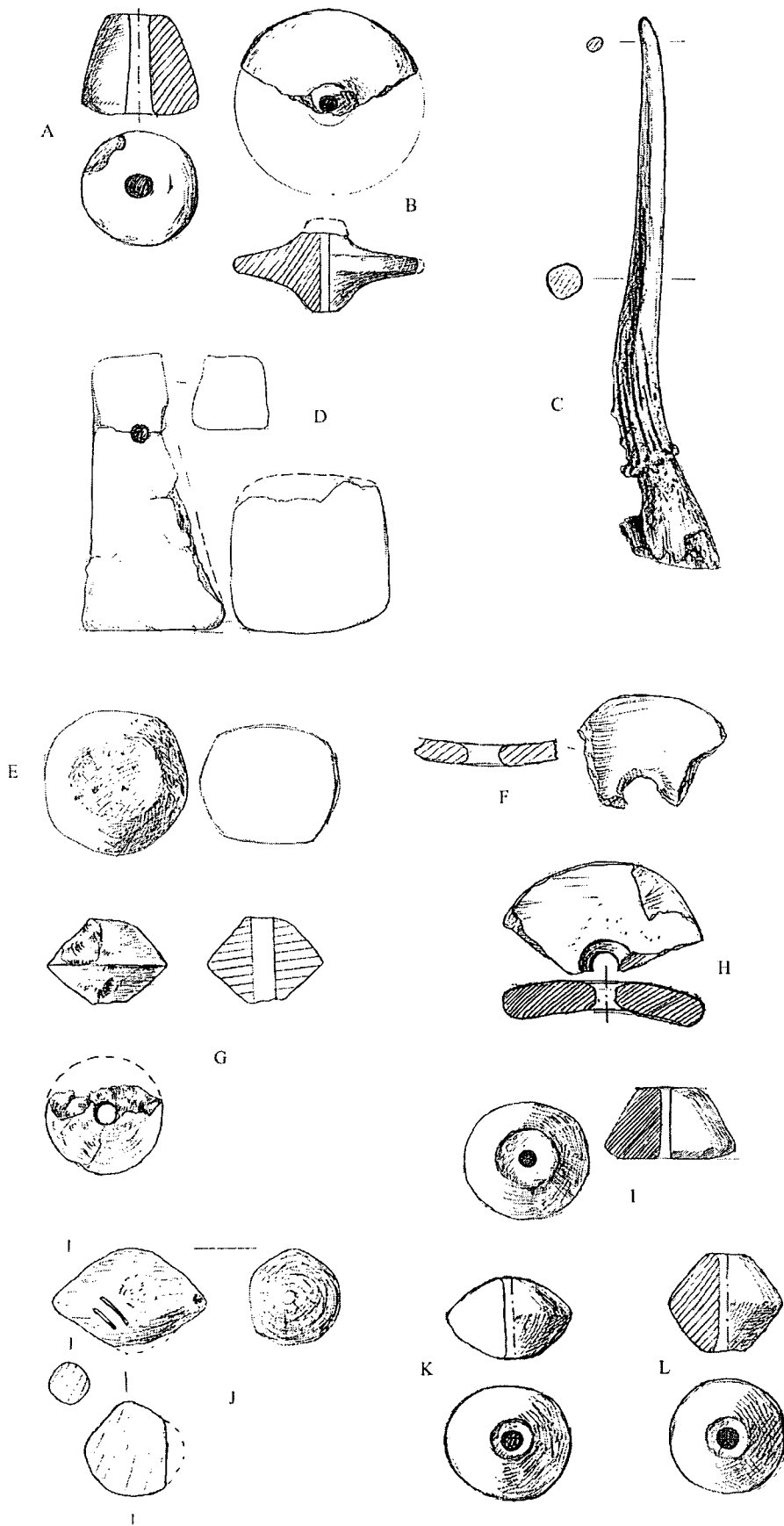
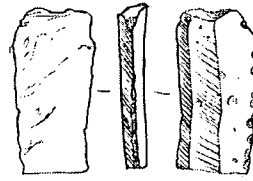


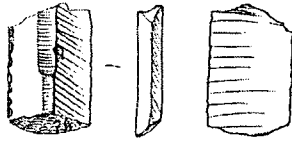
Fig. 5.8.16 Various BA artefacts from Gudgova tell
 Clay A, B, D, F-L; horn C; stone E M 1:2
 Source: Site documentation



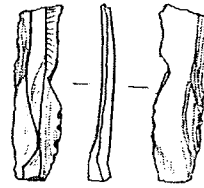
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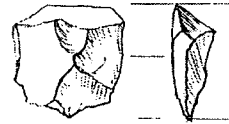
B



C



D



F



G

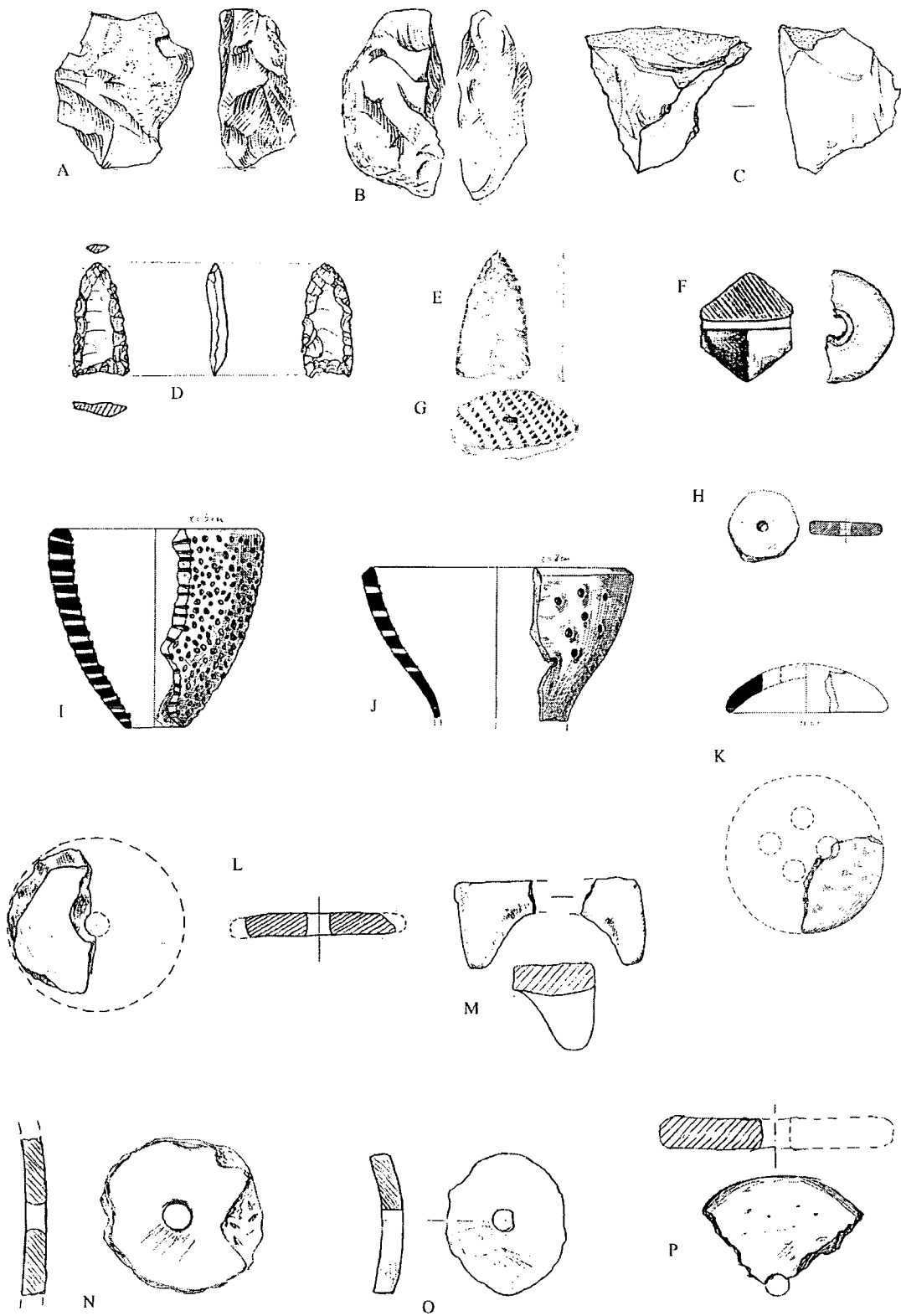


H

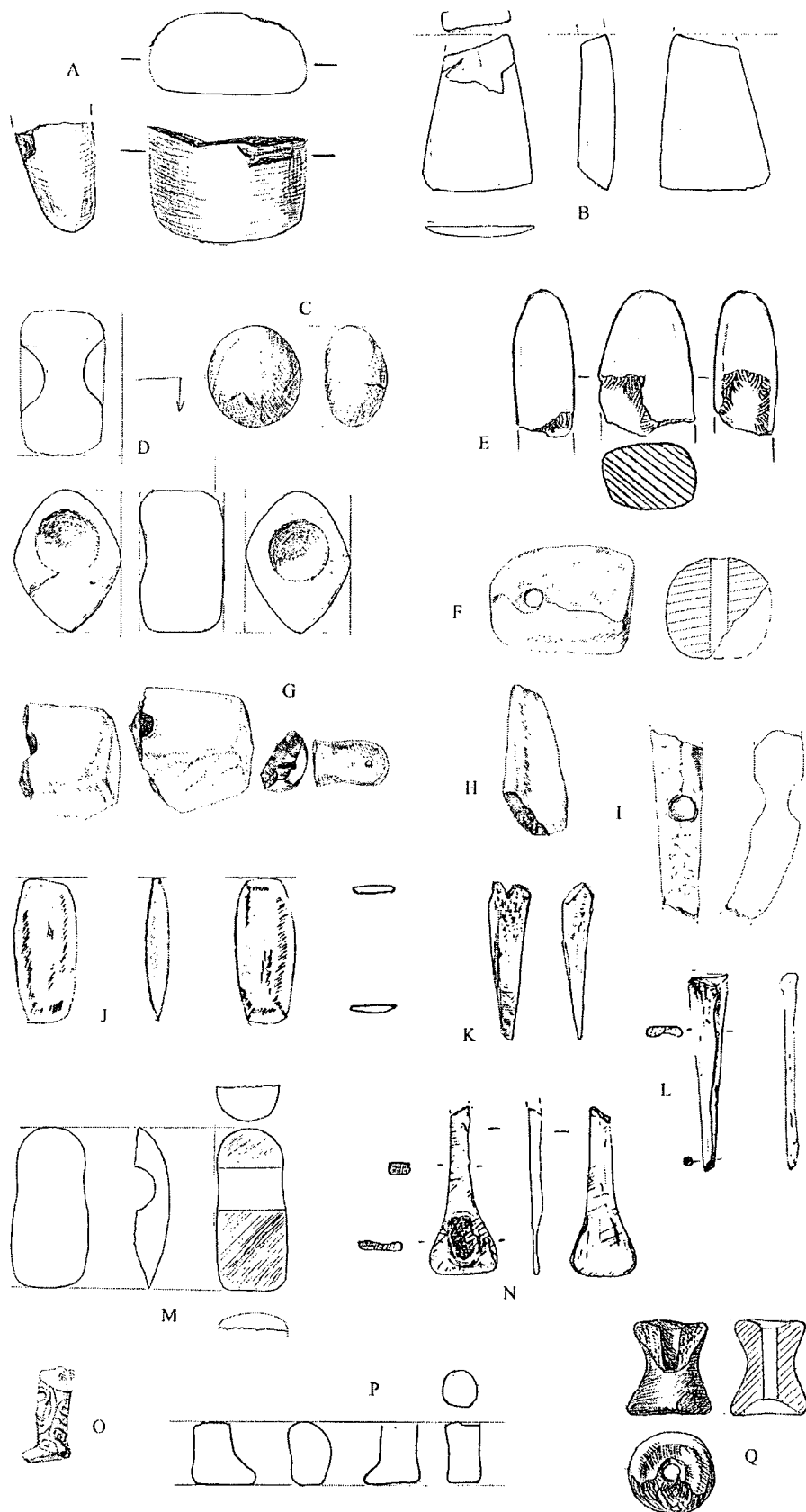


I

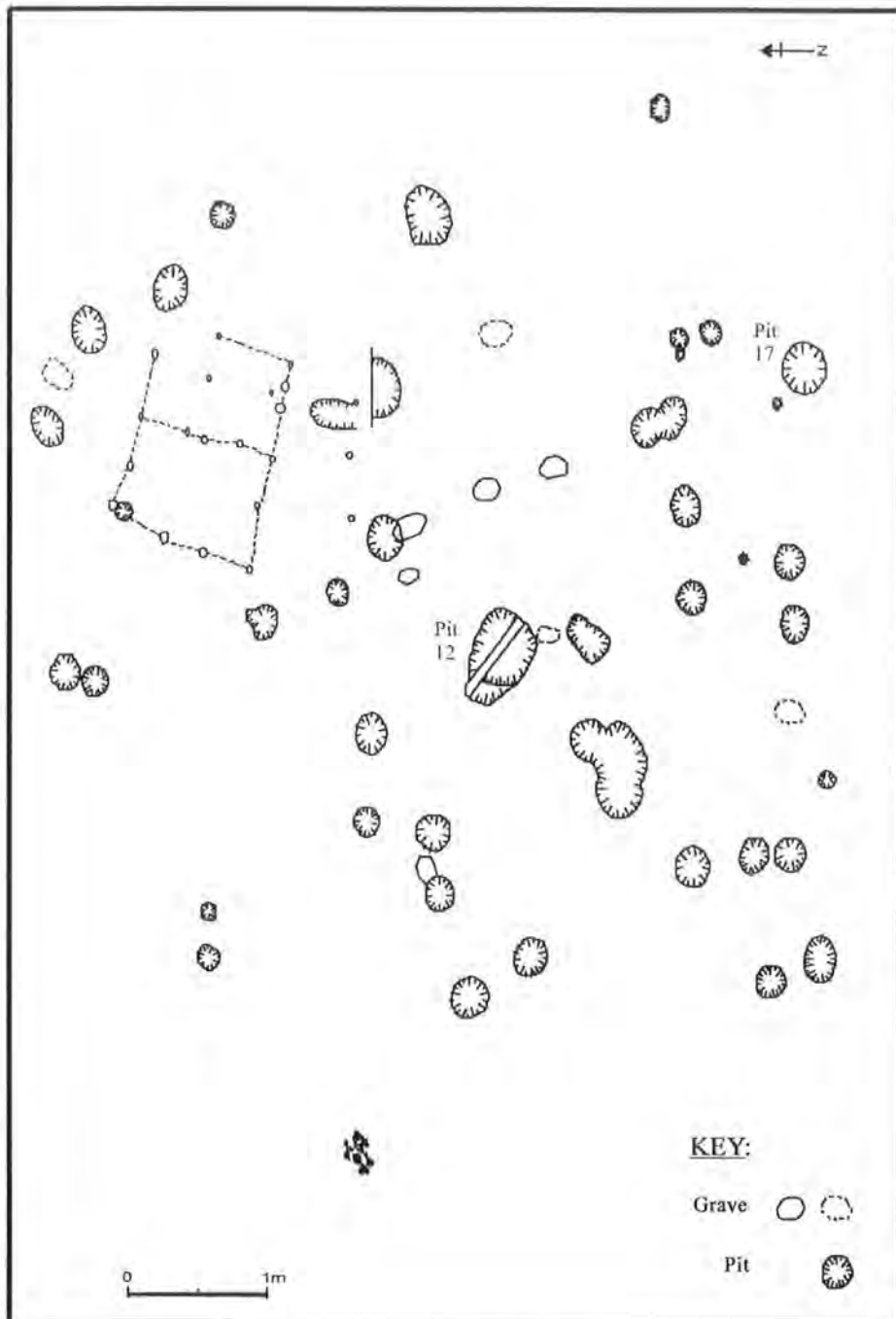
AFig. 5.8.17 BA flints from Gudgova tell
Source: Site documentation M 1:2



AFig. 5.8.18 Unstratified finds from Gudgova tell
 Flint A - E; clay F - P M 1:2
 Source: Site documentation



Afig. 5.8.19 Unstratified finds from Gudgova tell
 Stone A - H, J, M; bone I, K, L, N; clay O - Q M 1:2
 Source: Site documentation



AFig. 5.10.1 Plan of Polski Gradets pit site
 Source: Site documentation

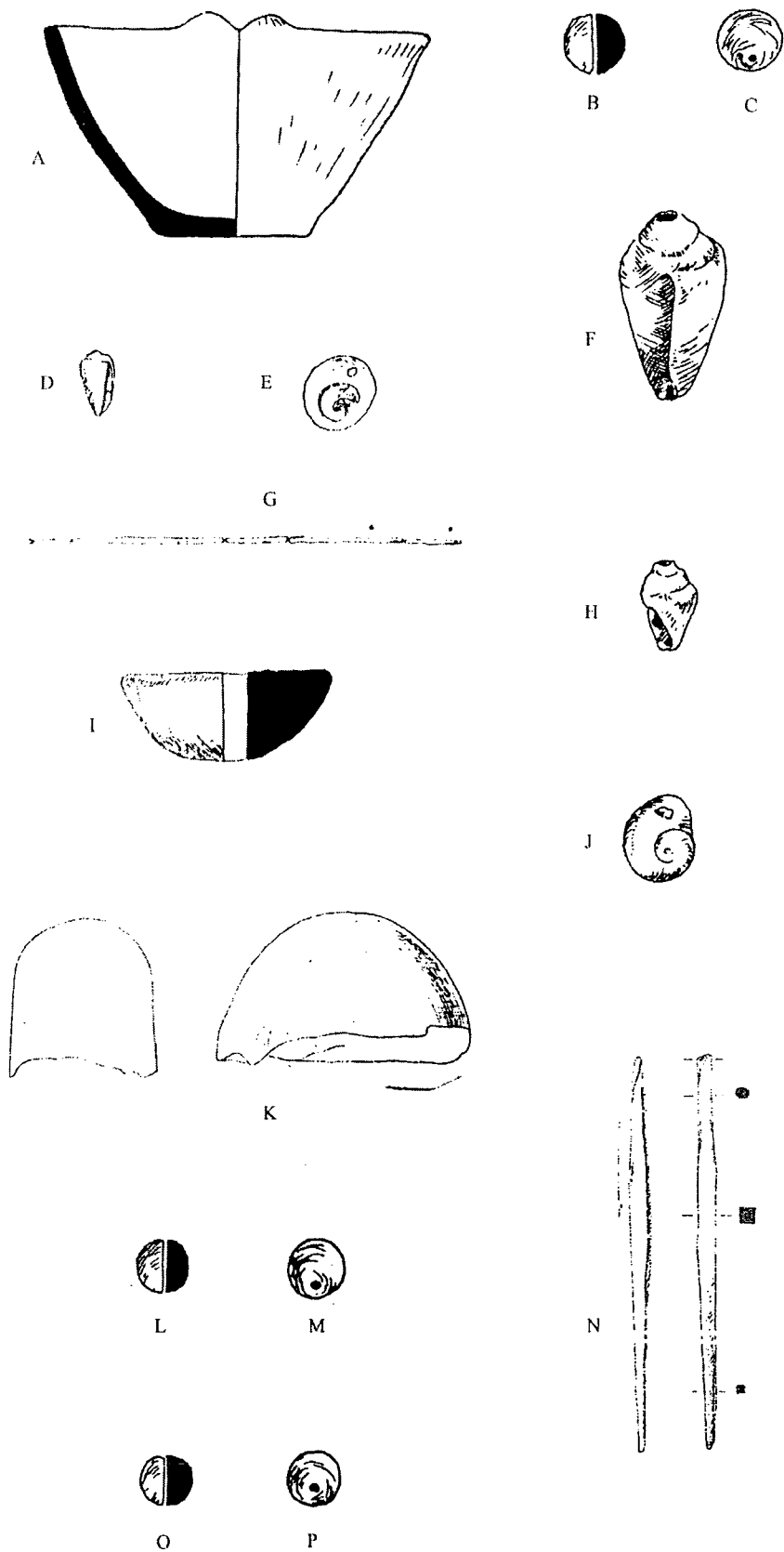


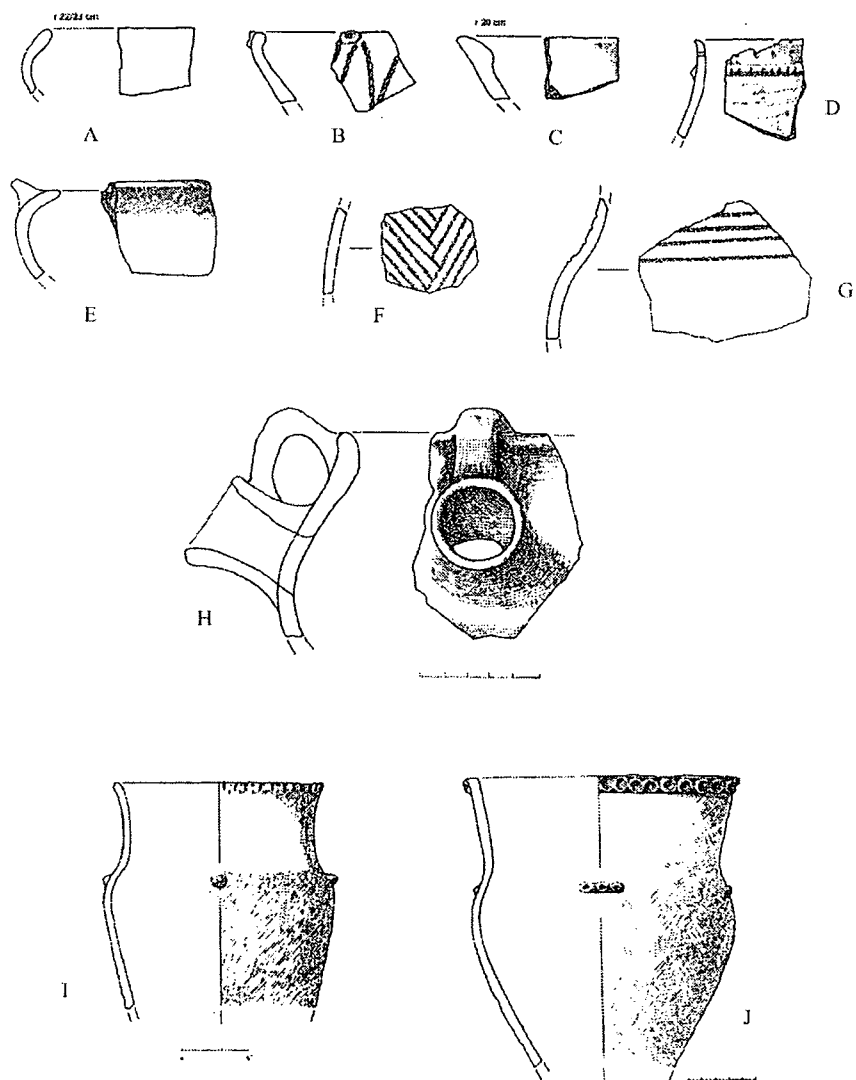
Fig.5.10.2. Objects from pits and graves from Polski Gradets pit site

Clay beads (B, C, L, M, O, P), see shells (F, H, J) - grave 5;

Bone whorl (I), see shell (D), snail (E), bronze needle (G) - grave 6;

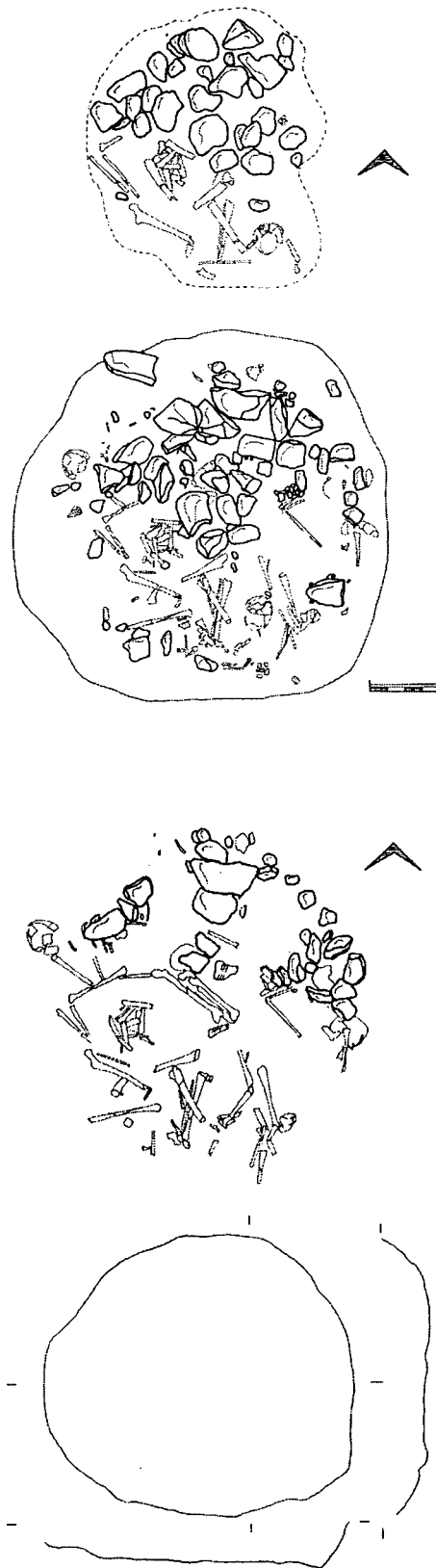
Bronze chisel (N) - grave 3; fragmented stone tool (K), clay bowl (A)

Source: Site documentation M 1:5 (A), 1:2 (I), 1:1 (B - H, J - P)

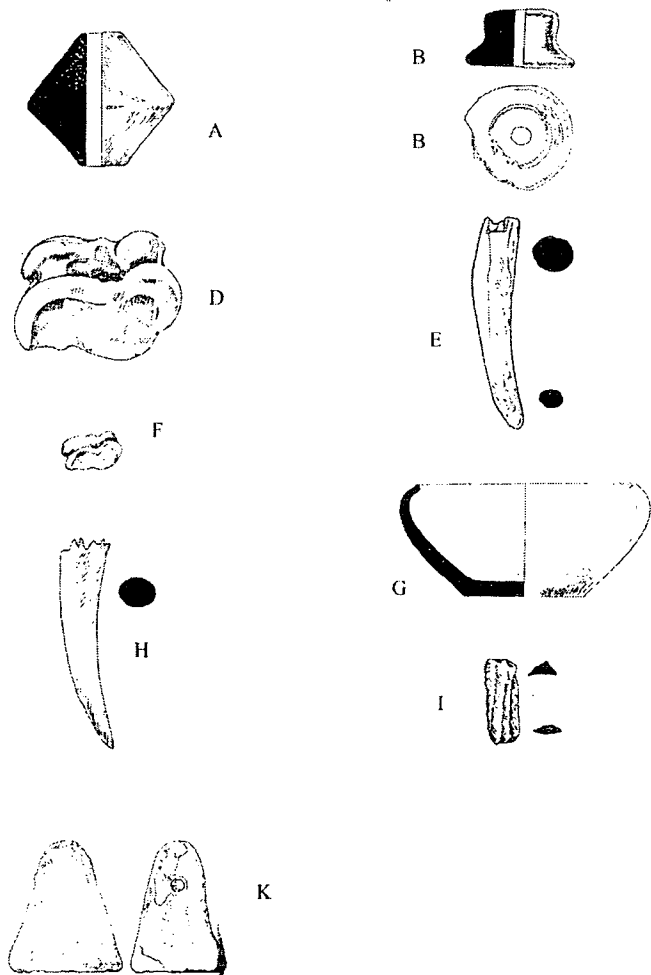
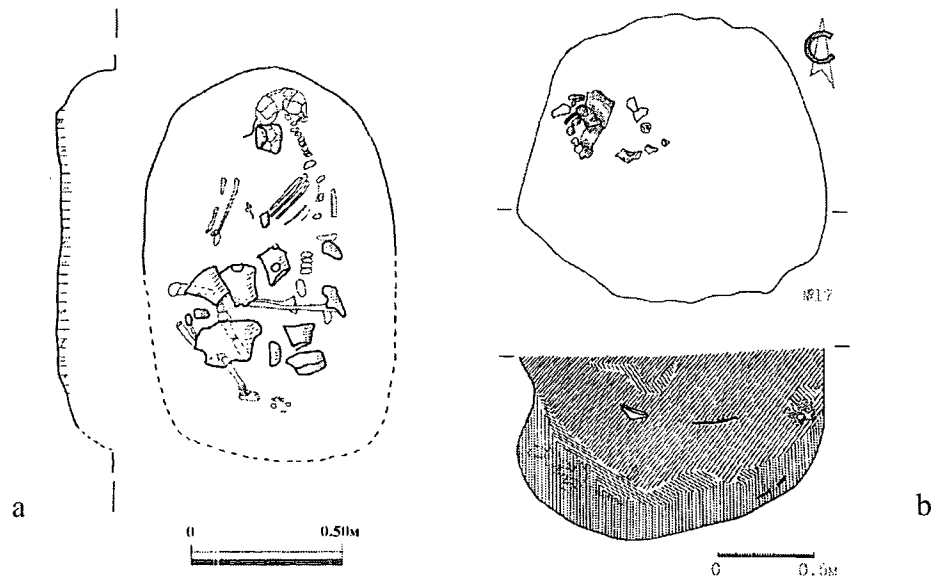


AFig. 5.10.3 BA Pottery from Polski Gradets pit site (H-J) and Polski Gradets tell (A-G)

Source: Leshtakov et al. 2001



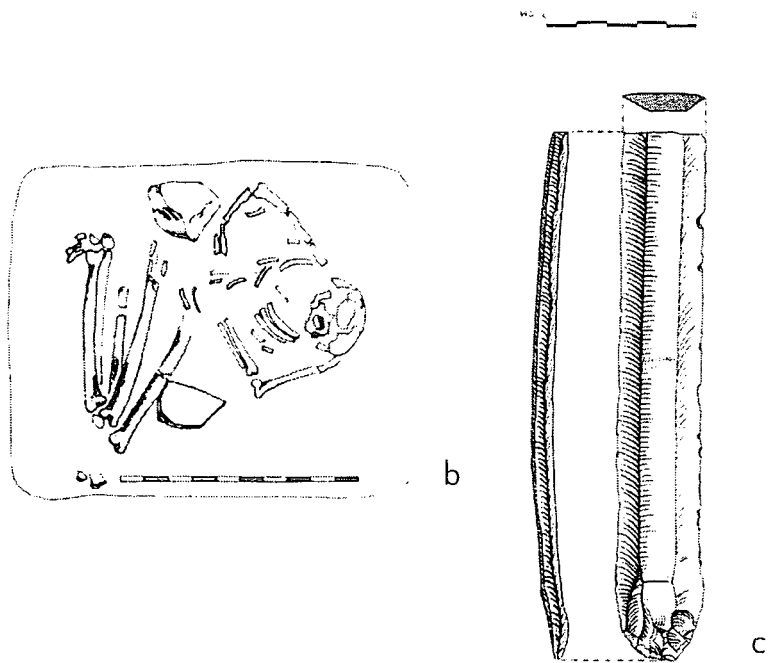
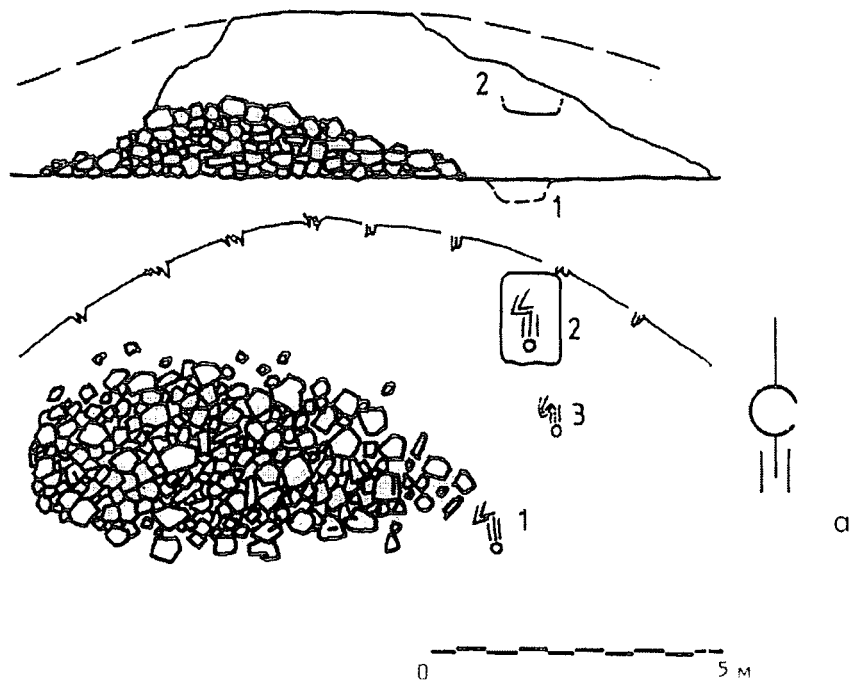
AFig. 5.10.4 Plans of Grave 12 from Polski Gradets pit site
Source: Site documentation



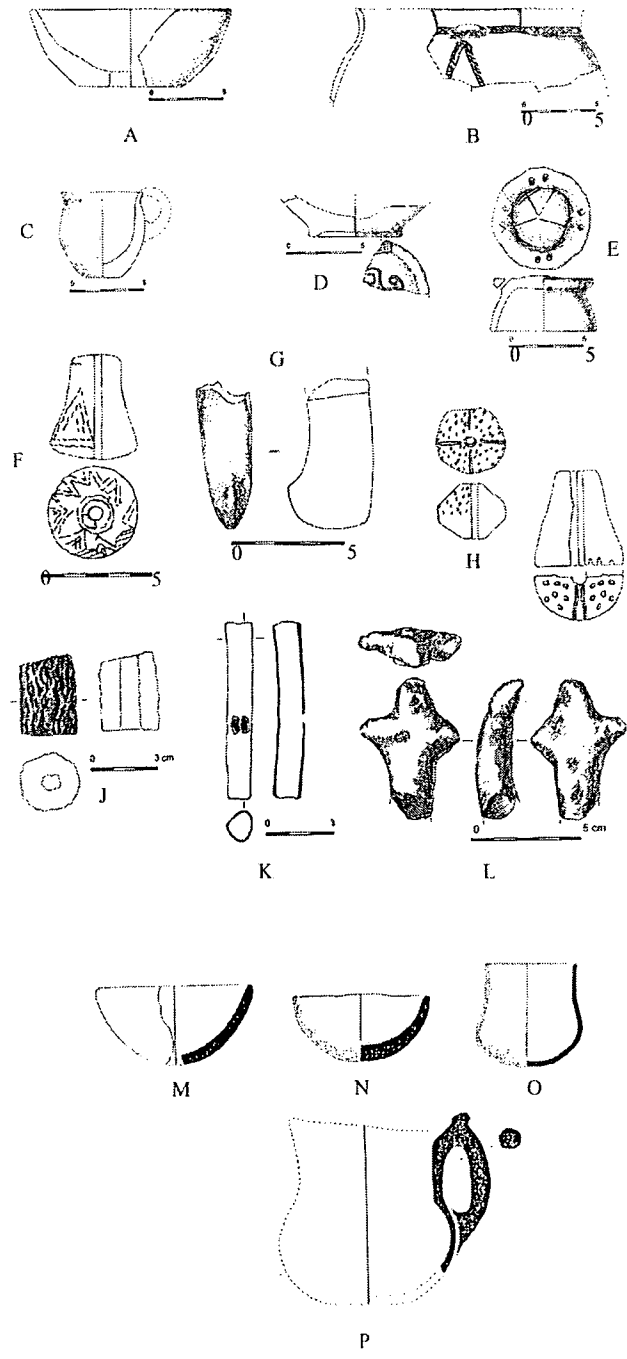
AFig. 5.10.5 Grave 1 (a) and pit 17 (b) from Polski Gradets pit site;
artefacts from the pits

Pit 12 - clay artefacts (A, K), horn tool (E); pit 17 - clay artefact (G),
flint tool (I), bone, horn artefacts (D, H)

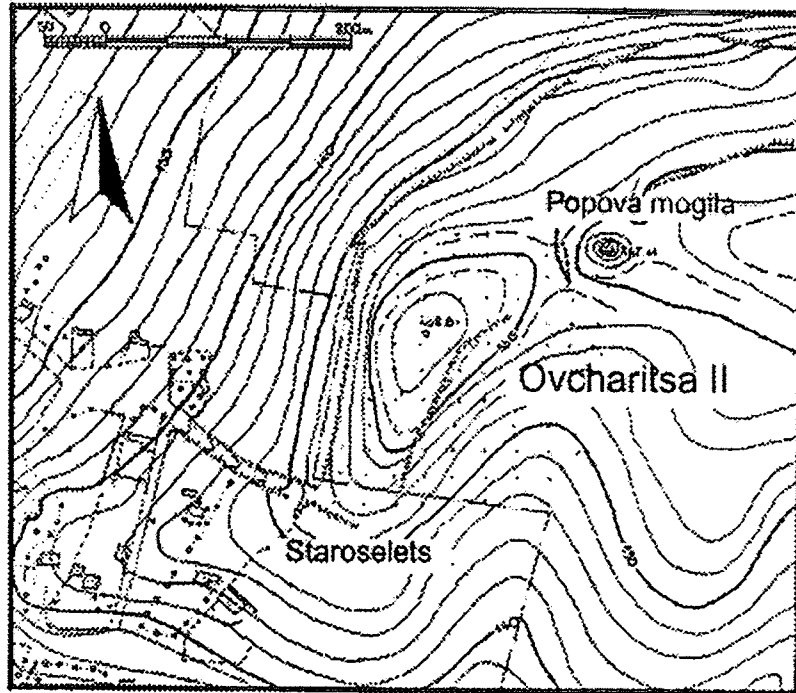
Source: Site documentation M 1:2 (A, D, H), 1:3 (B), 1:4 (E, I), 1:5 (G), 1:6 (K)



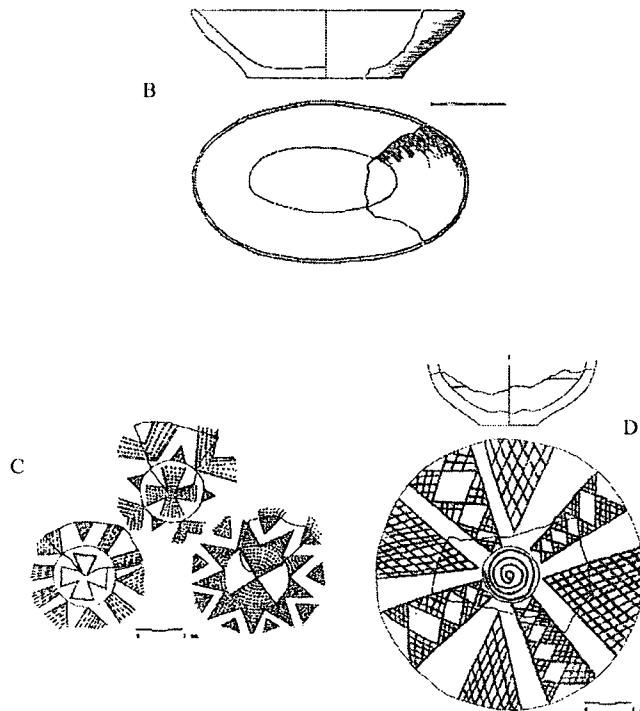
AFig. 6.1.1 Plan of Gonova mogila - (a), Grave 2 - (b), the obsidian blade from Grave 1 - (c)
 Source: Kunchev 1991



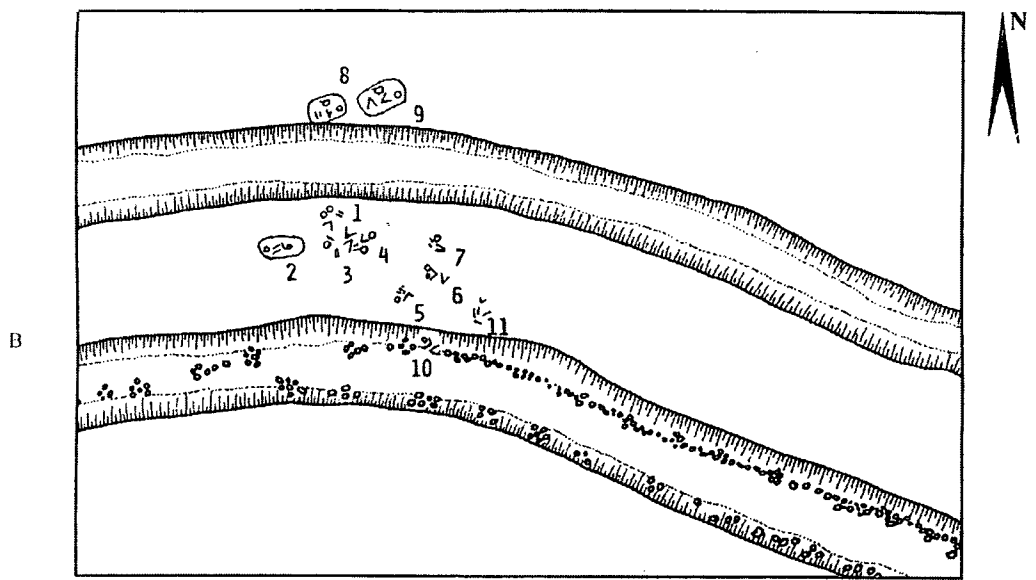
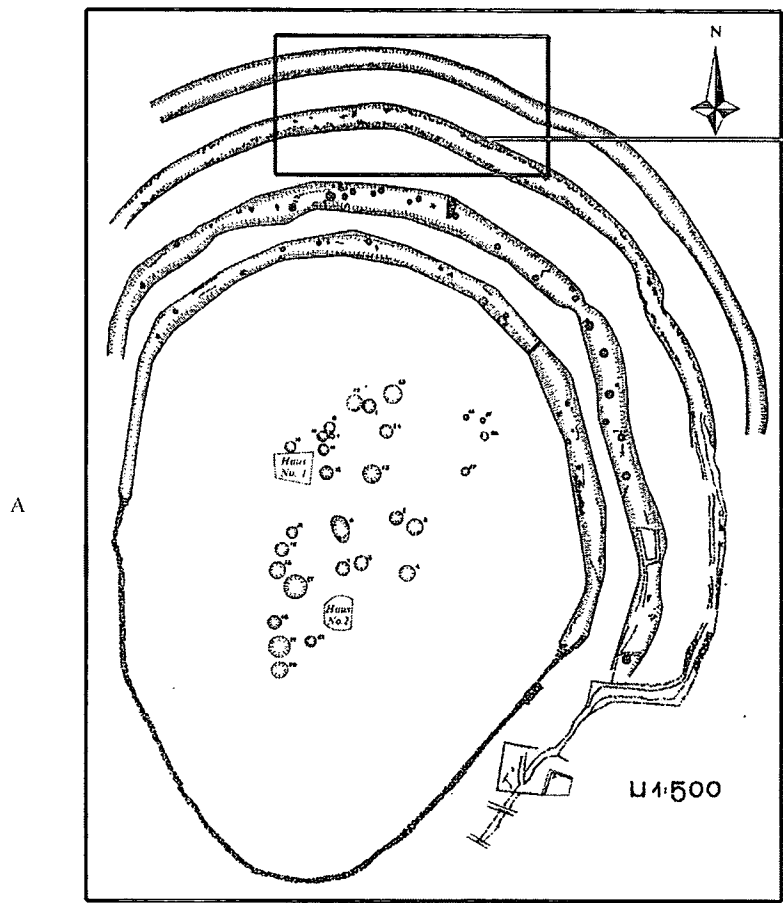
AFig. 6.2.1 Pottery and artefacts from Ovcharitsa I flat site
 Clay A- F, H, I, L, M - P; antler J, bone K
 Source: Leshtakov et al. 2001 A-L; Site documentation M-P



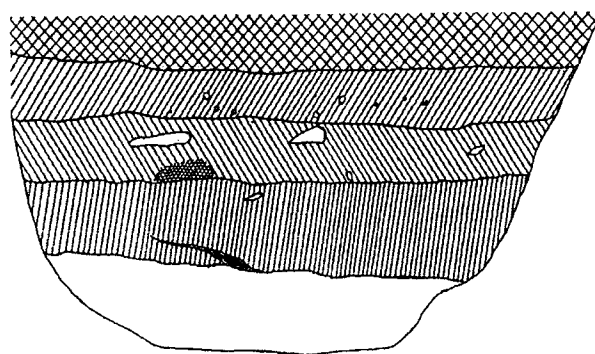
A



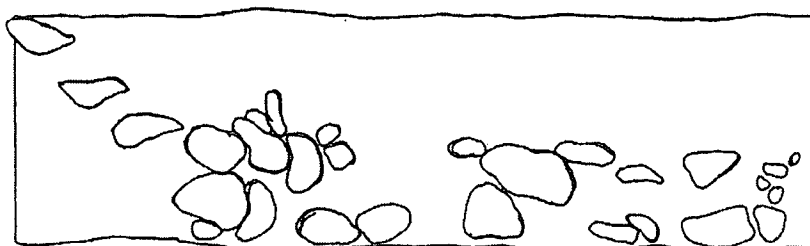
AFig. 6.3.1 General plan of Ovcharitsa II enclosure;
pottery from the site
Source: Leshtakov et al. 2001



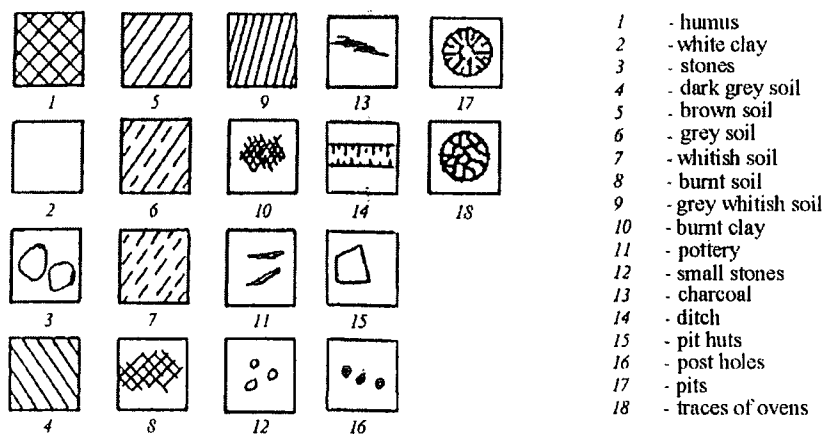
AFig. 6.3.2 Plan of the EBA enclosure and the LBA cemetery in Ovcharitsa II site
 Source: Kancev and Kanceva-Russeva 1996 (A), Kuncheva-Russeva 2000 (B)



a

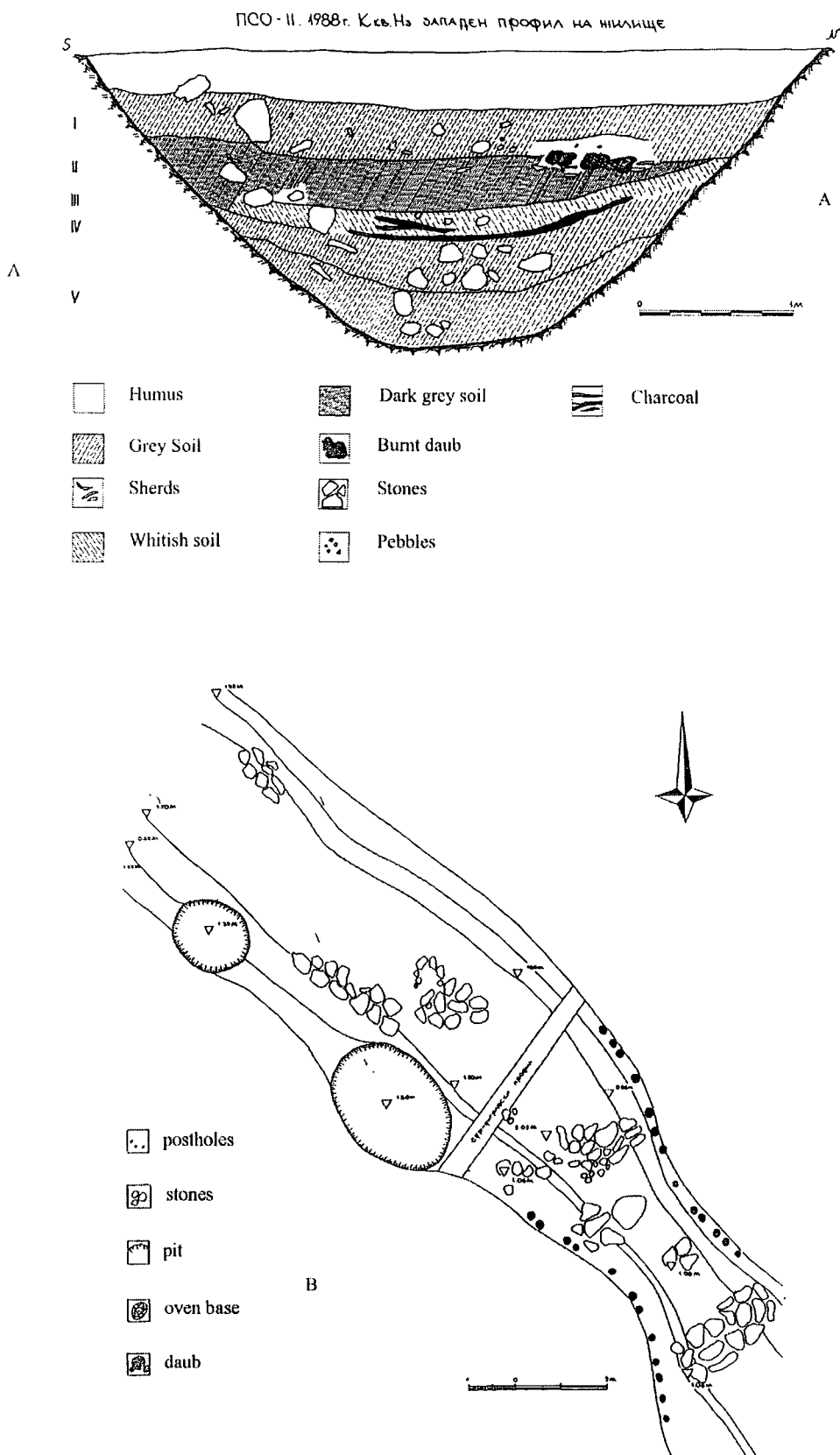


b



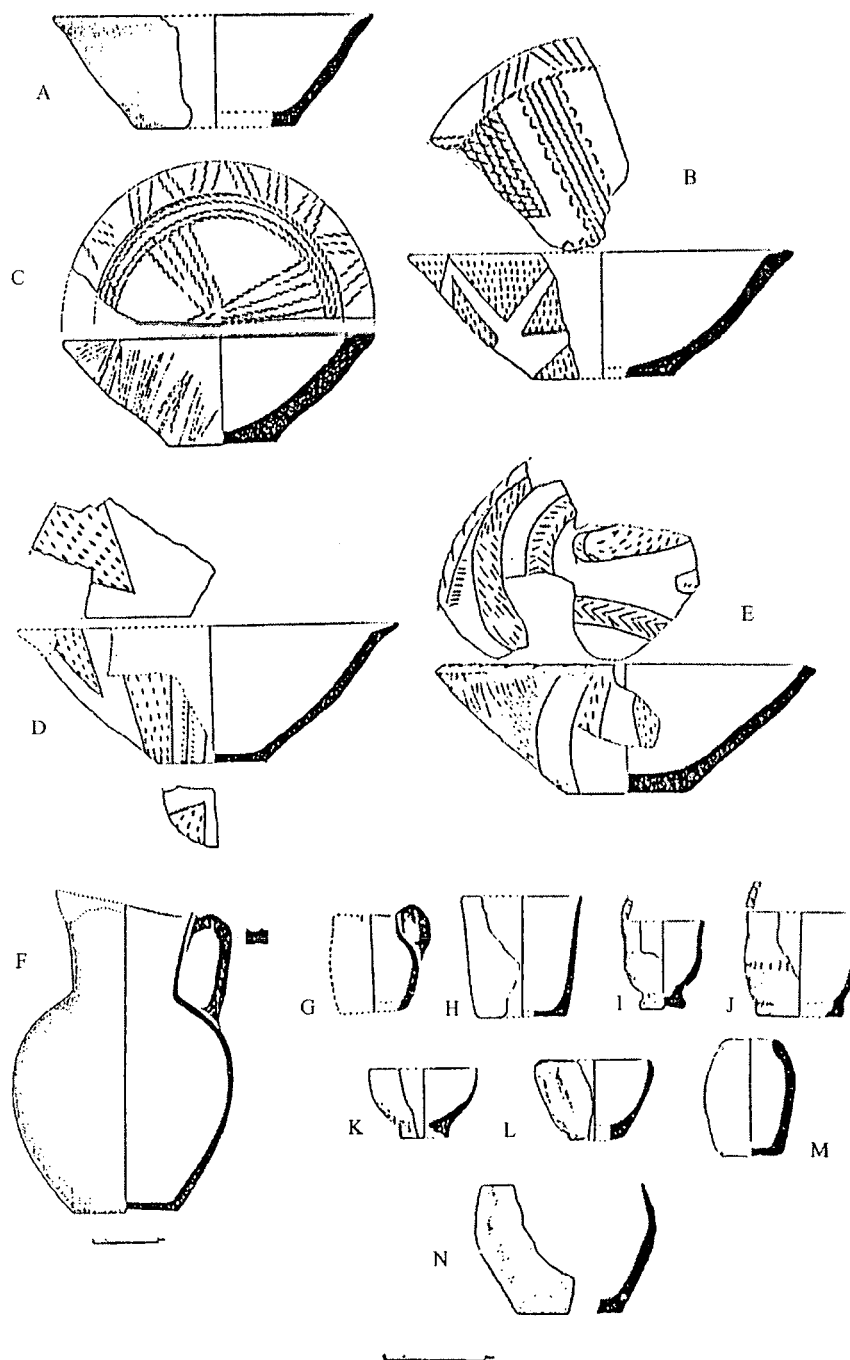
AFig. 6.3.3 Profiles of the ditch and the stone wall from Ovcharitsa II; key for the illustrations from Ovcharitsa II

Source: Kanchev & Kancheva-Russeva 1996



A Fig. 6.3.4 Profile and plan of the “chain dwellings” at Ovcharitsa II

Source: Site documentation (A); Kanchev and Kancheva-Russeva 1996 (B)



AFig. 6.3.5 Pottery from Ovcharitsa II enclosure

Source: Leshtakov et al. 2001 (C; E); Site documentation (A, B, D, F-N)

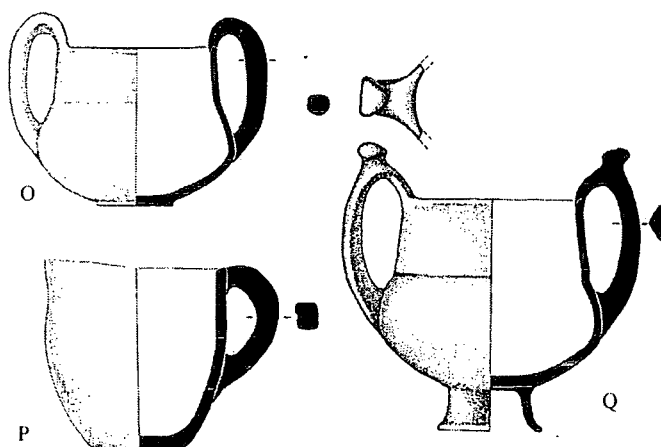
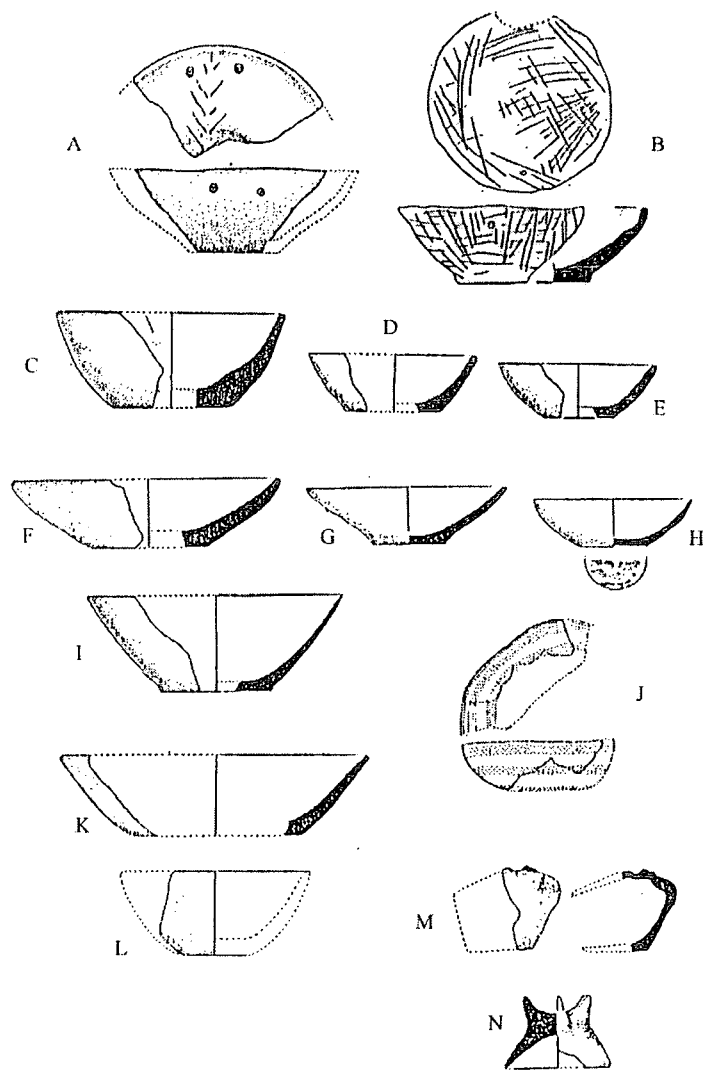
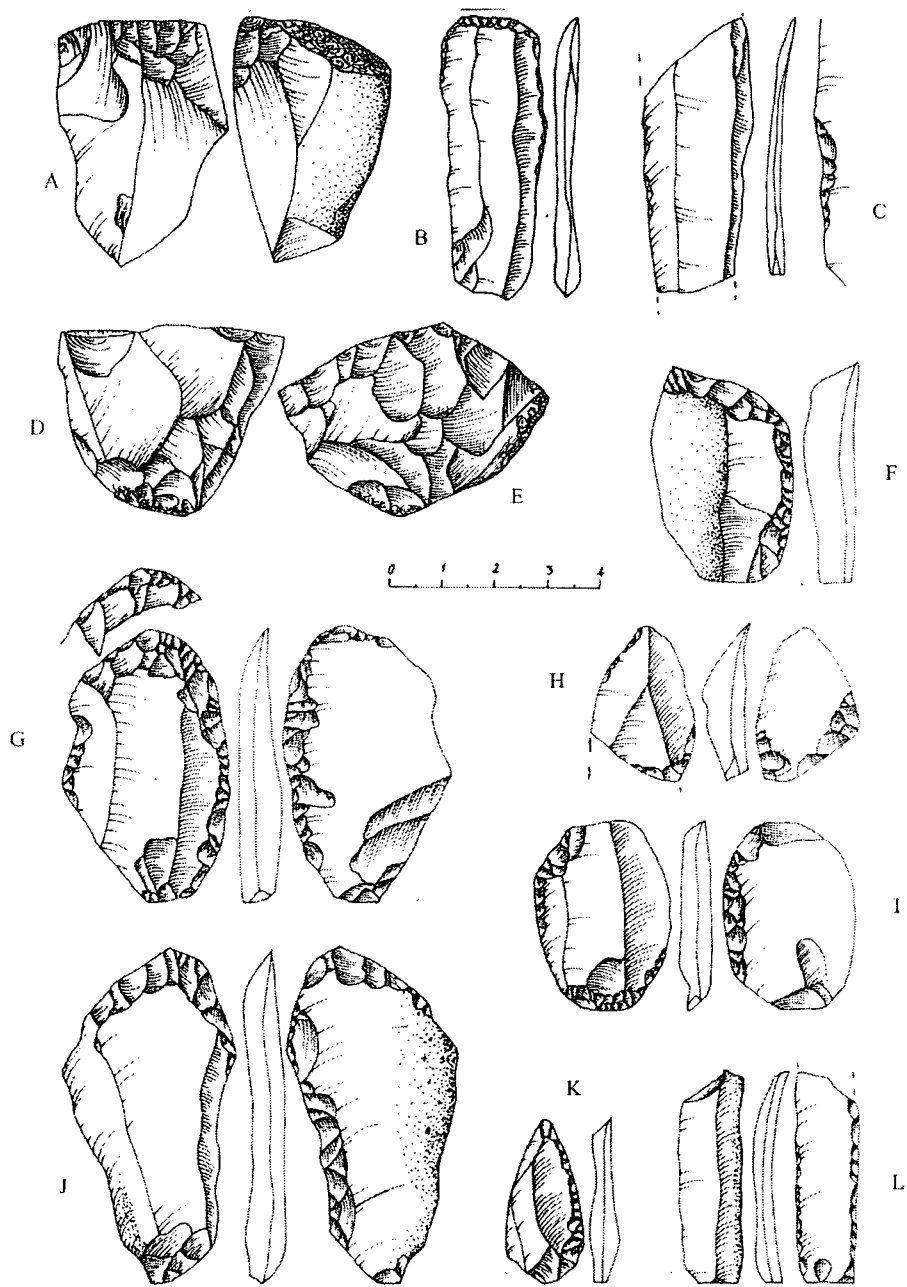
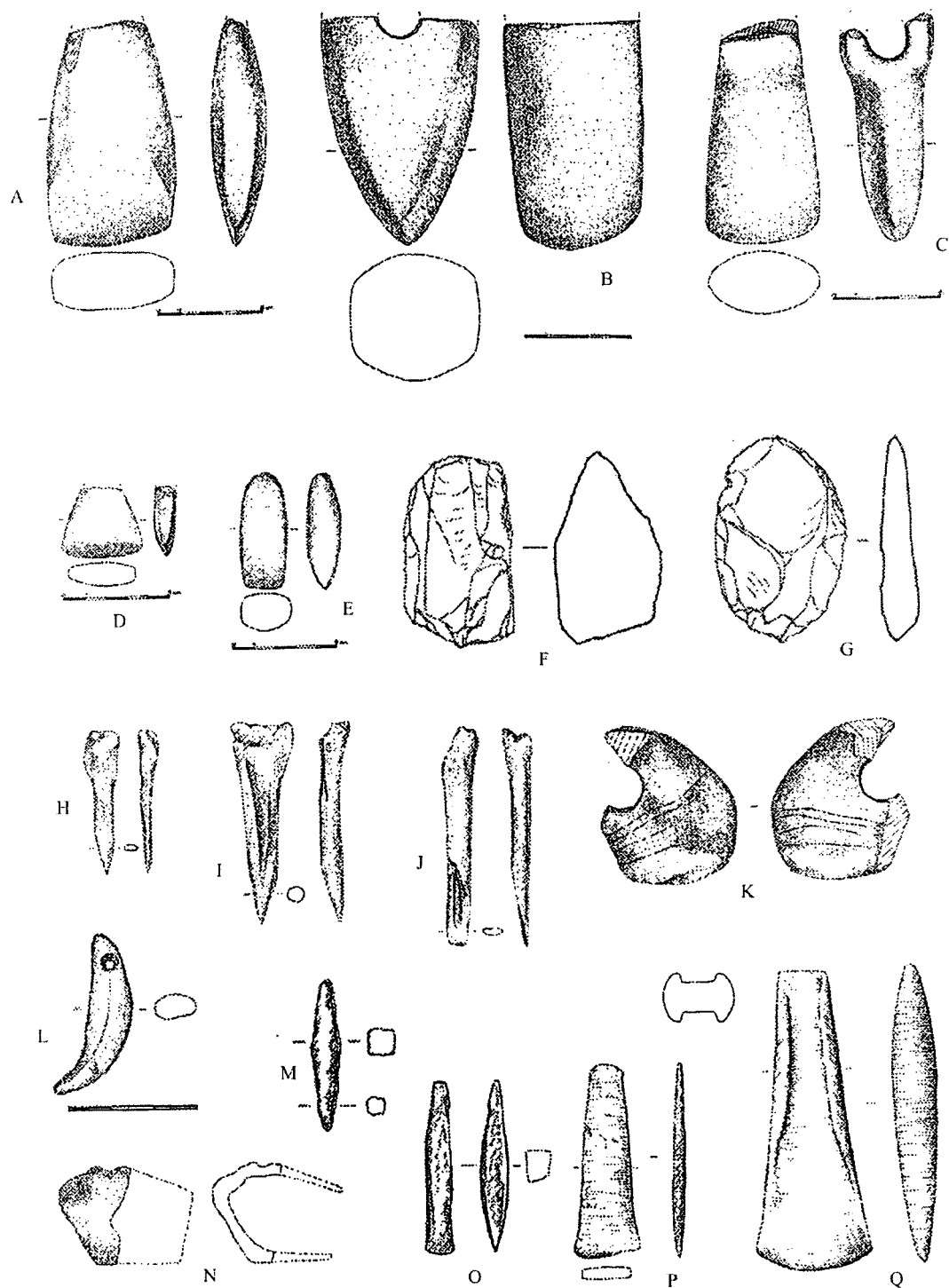


Fig. 6.3.6 Pottery from Ovcharitsa II enclosure
 EBA pottery (A - N); LBA pottery (O - Q)

Source: Site documentation (A - N), Kuncheva - Russeva 2000 (O - Q)



AFig. 6.3.7 Flint artefacts from Ovcharitsa II enclosure
 Source: Zlateva- Uzunova 2003



AFig. 6.3.8 Various artefacts from Ovcharitsa II enclosure
 Stone A- E, flint F - G, bone and antler H - K, metal M, O - Q, clay L, N
 Source: Leshtakov et al. 2001

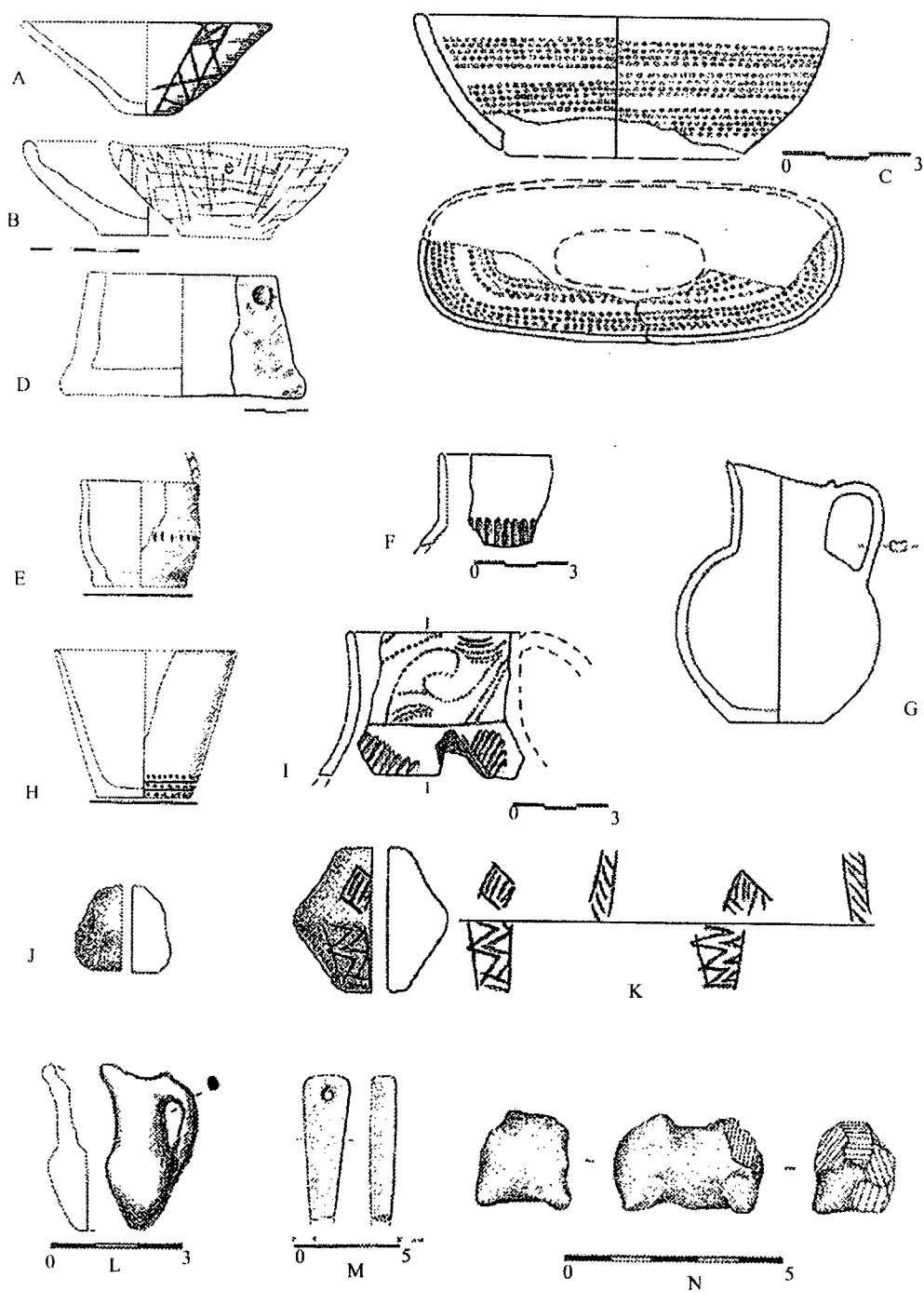
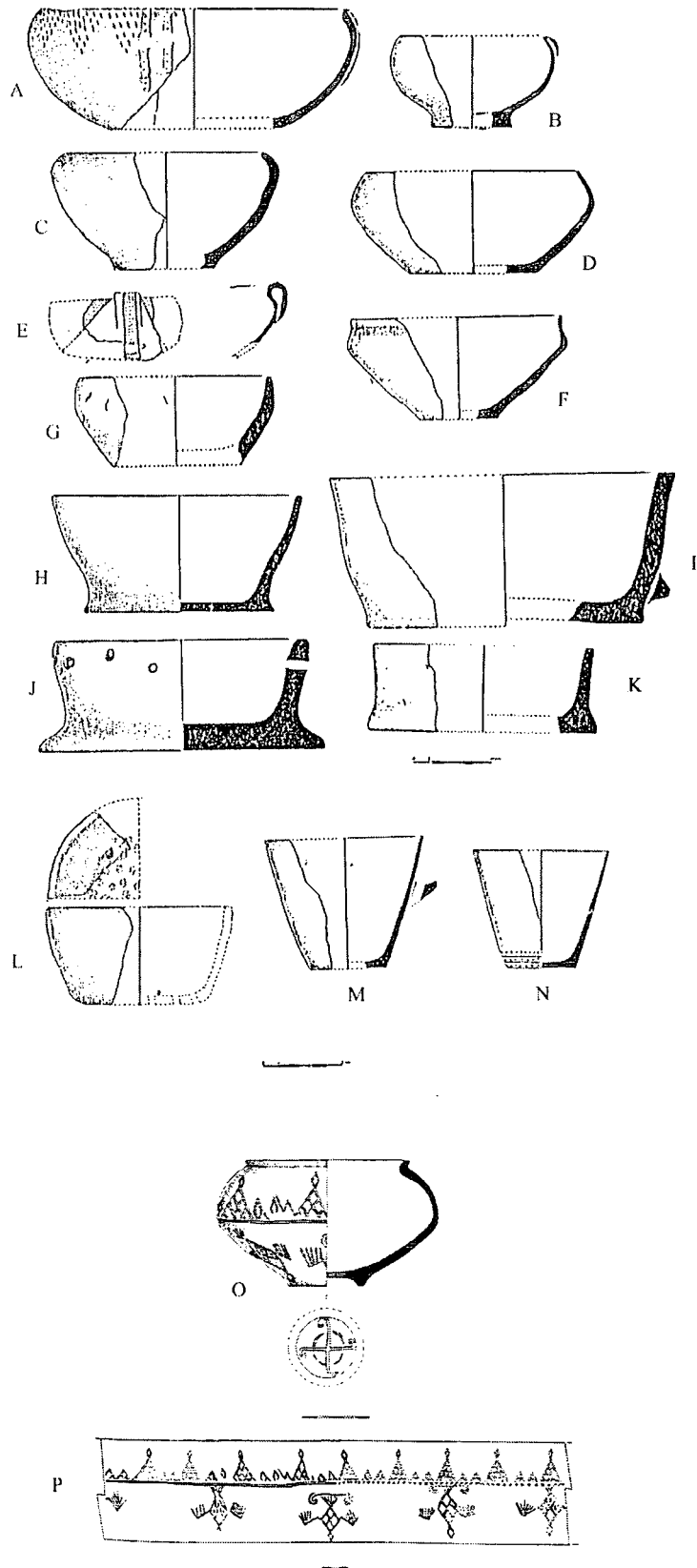


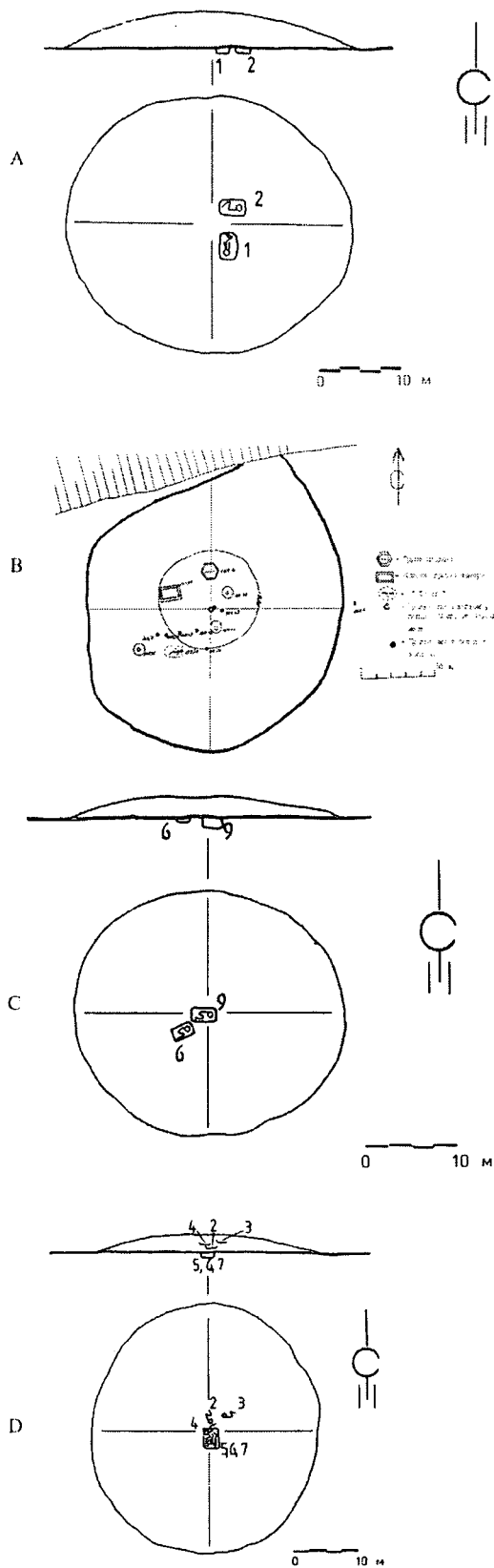
Fig. 6.3.9 Pottery and artefacts from Ovcharitsa II enclosure
 Clay (A - K, N), bronze L, stone M
 Source: Leshtakov et. al 2001



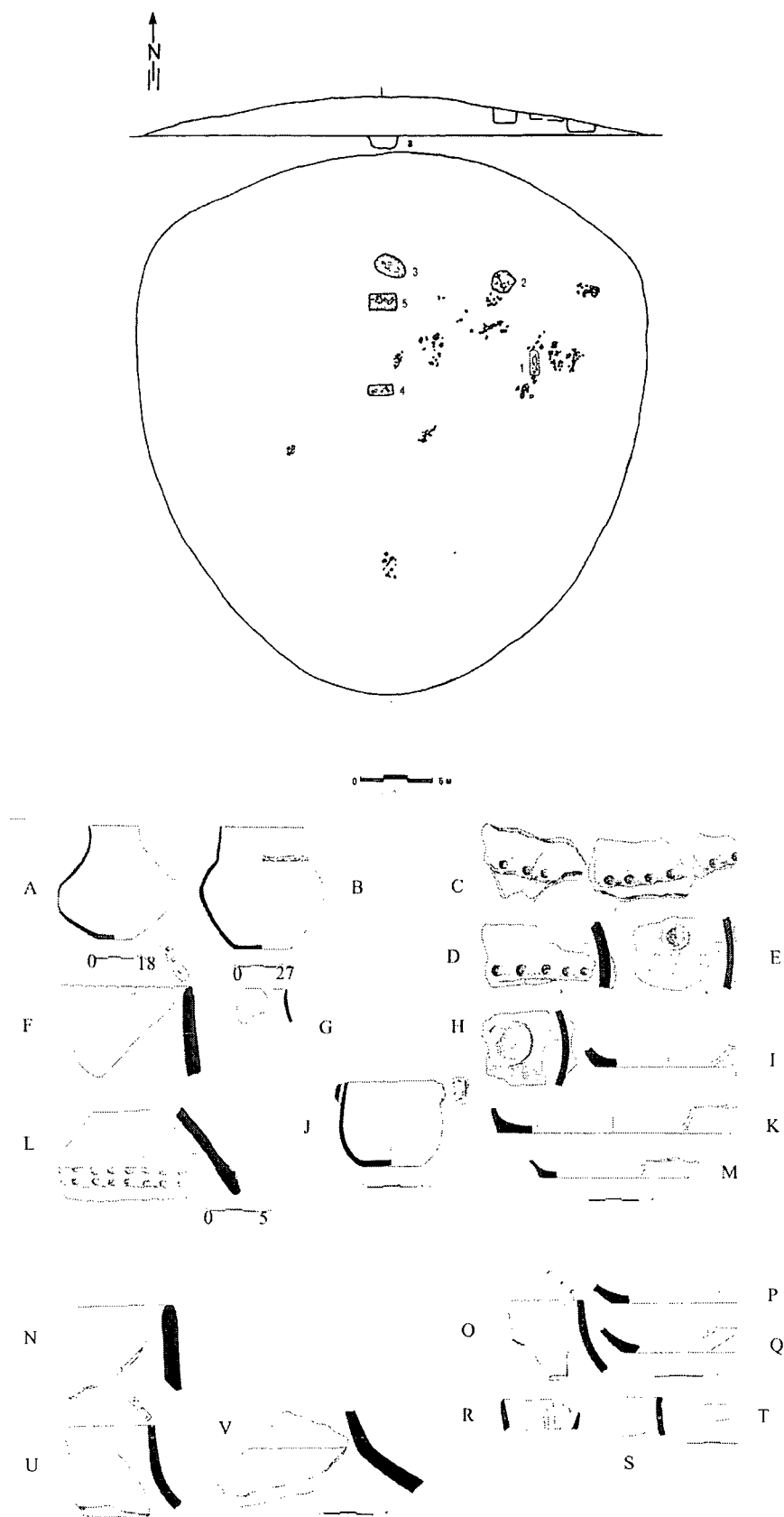
A Fig. 6.3.10 Pottery from Ovcharitsa II enclosure.

EBA pottery (A-N) LBA pottery (O-P)

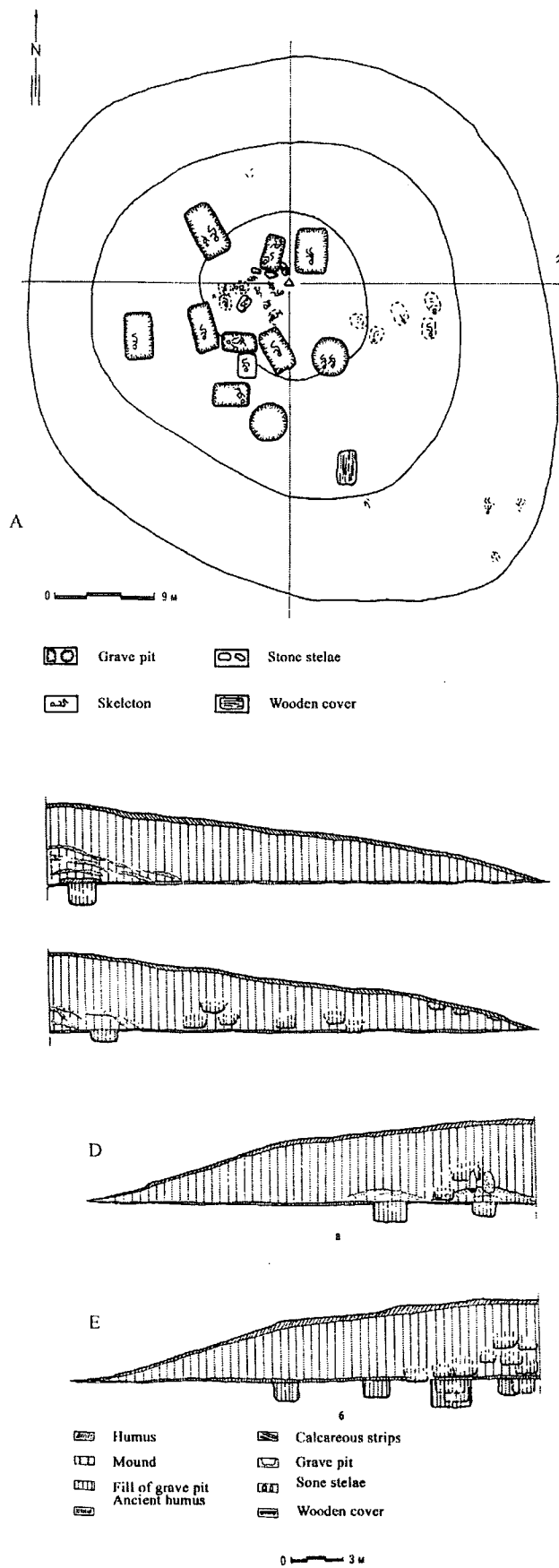
Source: Site documentation A-N; Kuncheva-Russeva 2000 O-P:



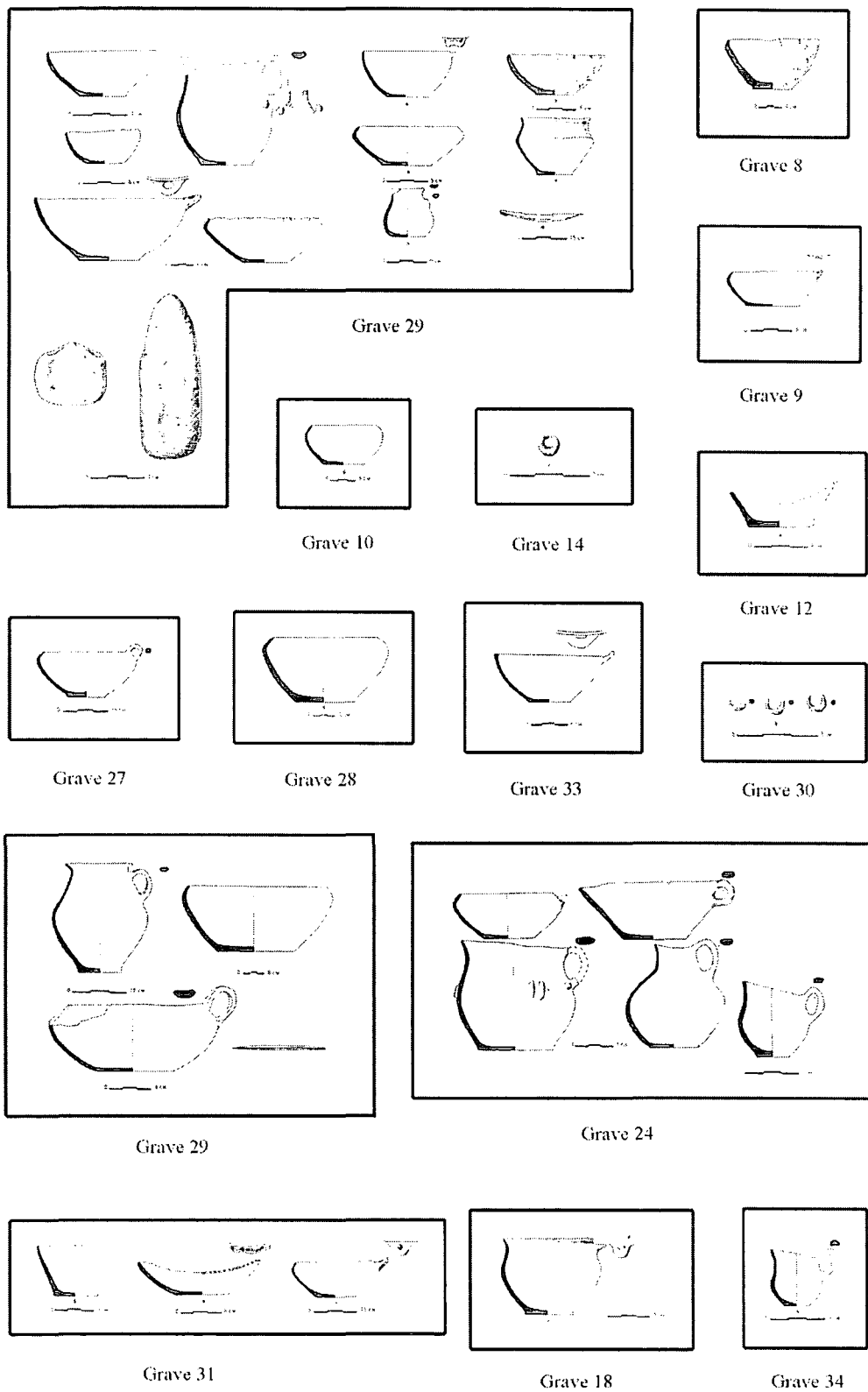
AFig. 6.4.1 Plans of barrows: **A)** Aldinova barrow, **B)** Ovchartsii barrow, **C)** Taniokoleva barrow, **D)** Kurdova barrow
 Source: Kunchev 1991 (A,C - D), Kalchev 1993 (B)



AFig. 6.6.1 Plan of Barrow Four, pottery from the features
 Feature 1 - A, B, F, G, L; Feature 3 - C, D, E, H - K, M;
 Feature 7 - O - T; Feature 9 - N, U - V
 Source : Leshtakov and Borisov 1995



AFig. 6.7.1 General plans and profiles of Goliamata mogila
Source: Kunchev 1995



Afig. 6.7.2. Grave goods from Goliamata mogila
 Source: Kunchev 1995

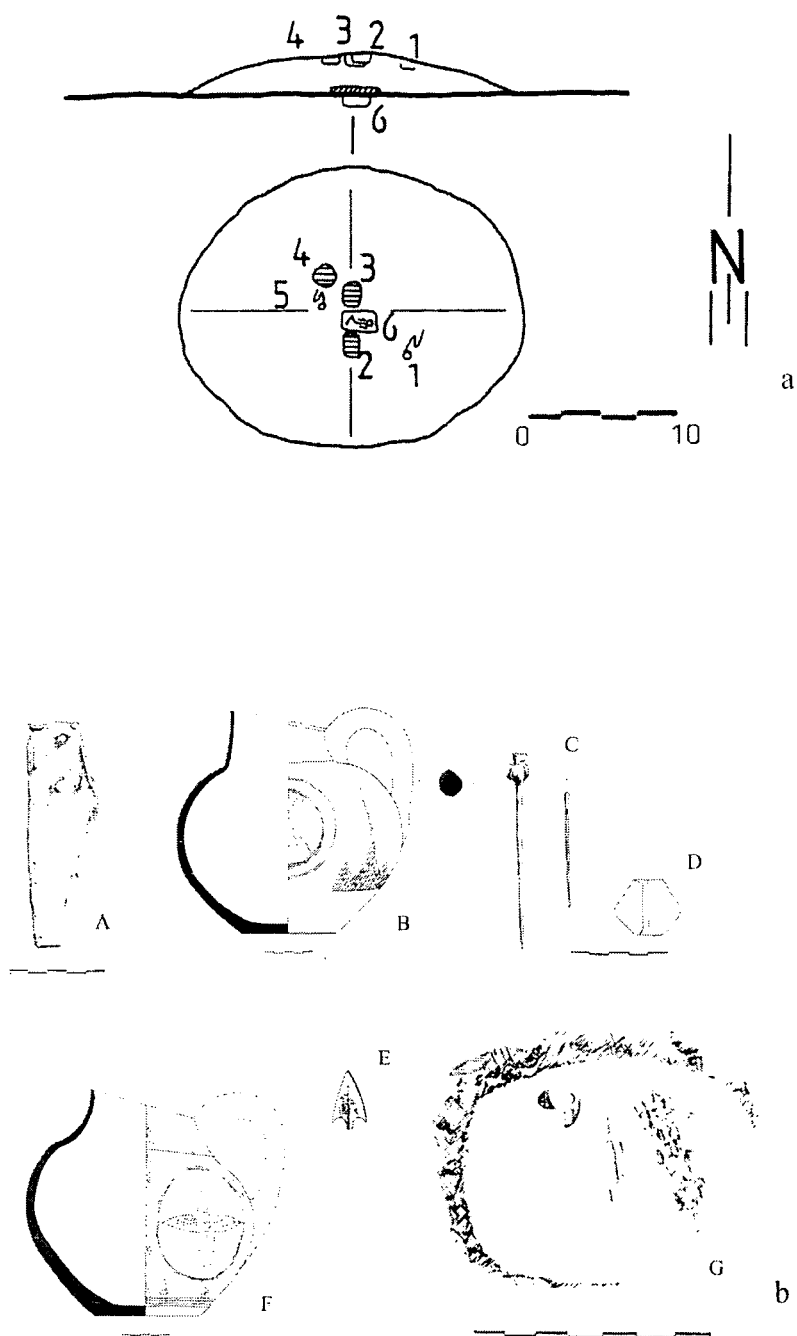
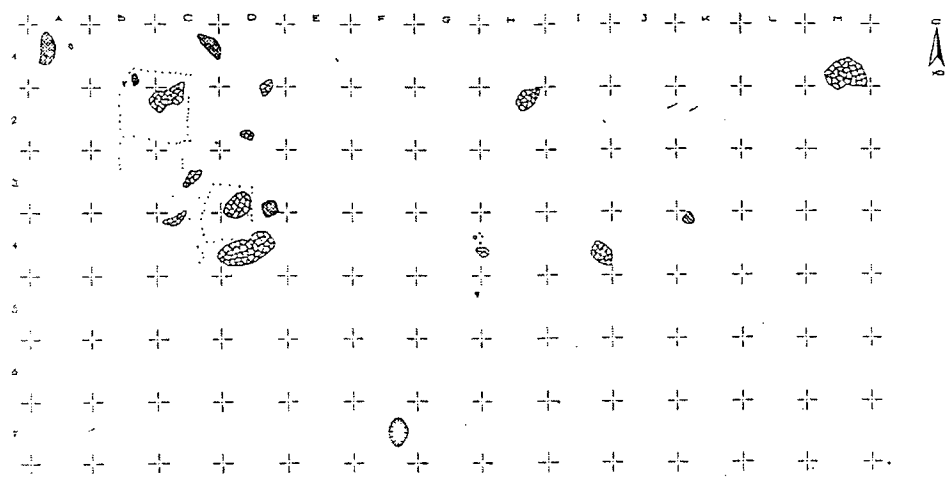
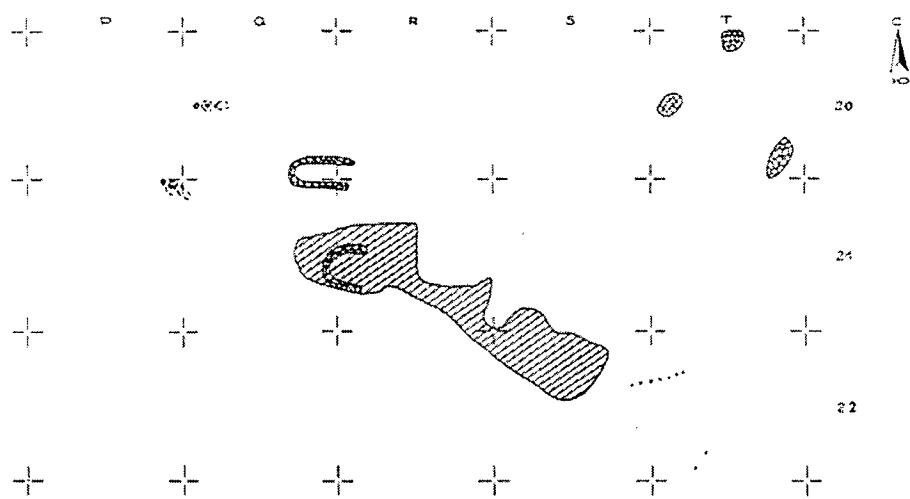


Fig. 6.8.1 Plan of Malkata mogila (a)

Fragment of bronze sword from grave 1 - A; clay jug, a hair pin, unknown object and spindle whorl from grave 2 - B-D; clay jug and bronze arrowhead from grave 3 - F-E; grave 5 - G
Source: Kunchev 1991



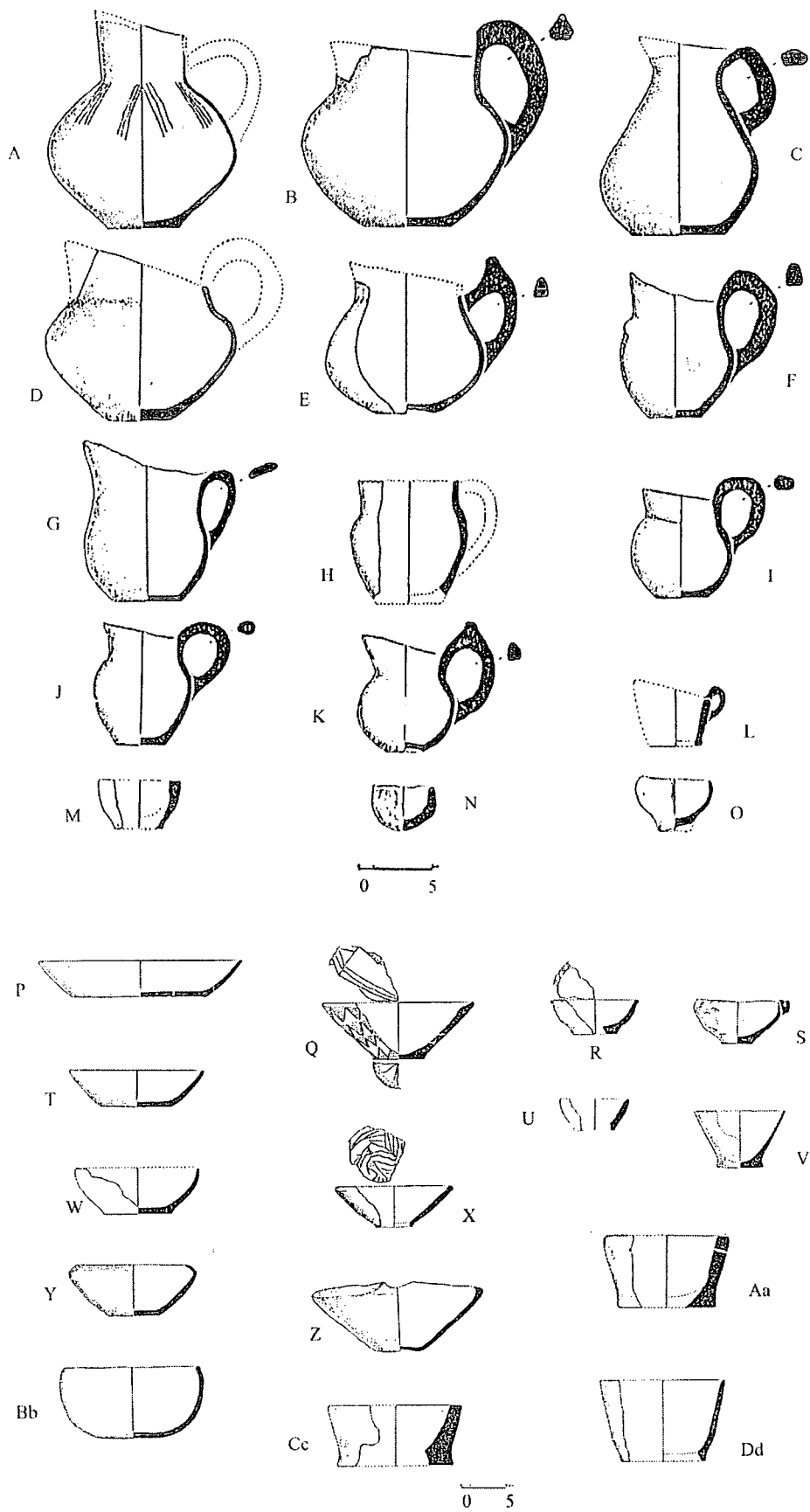
a



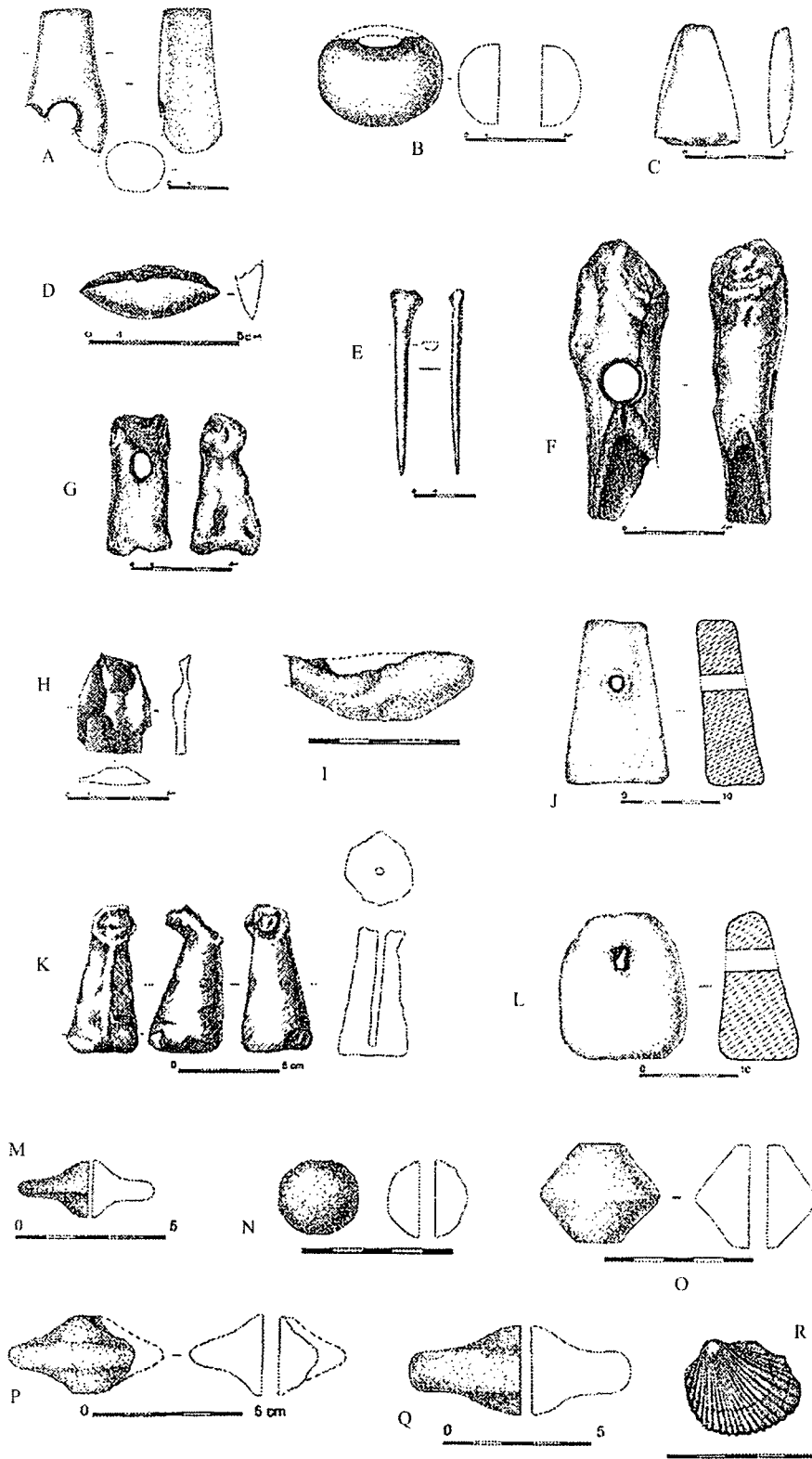
b

AFig. 6.9.1 General plan of Goliama Detelina flat site

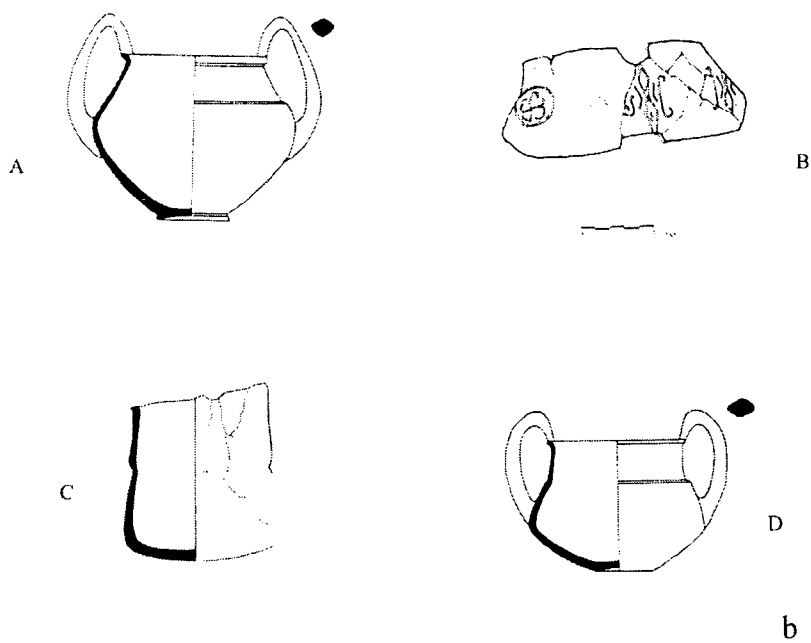
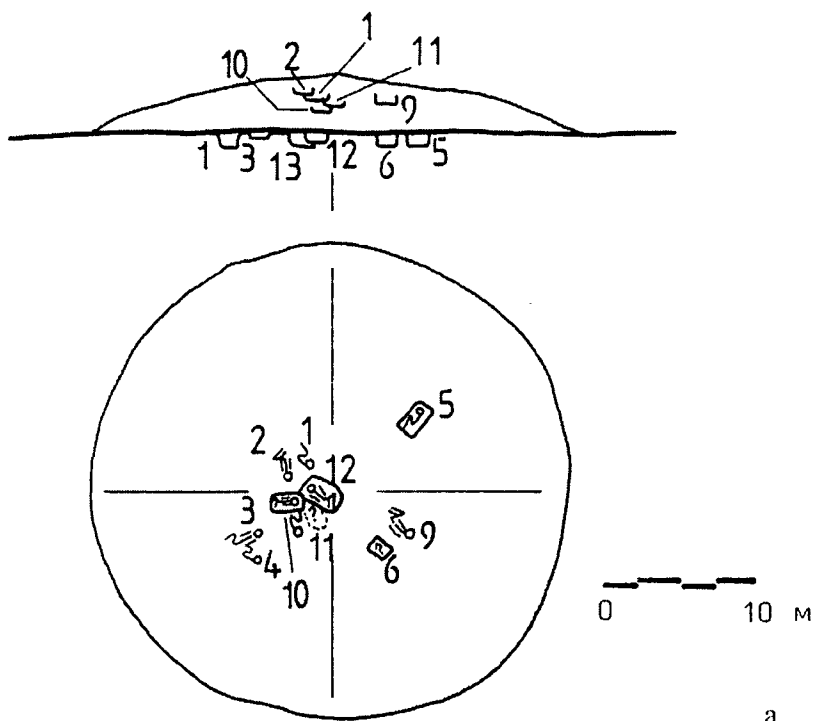
Source: Leshtakov et al. 2001



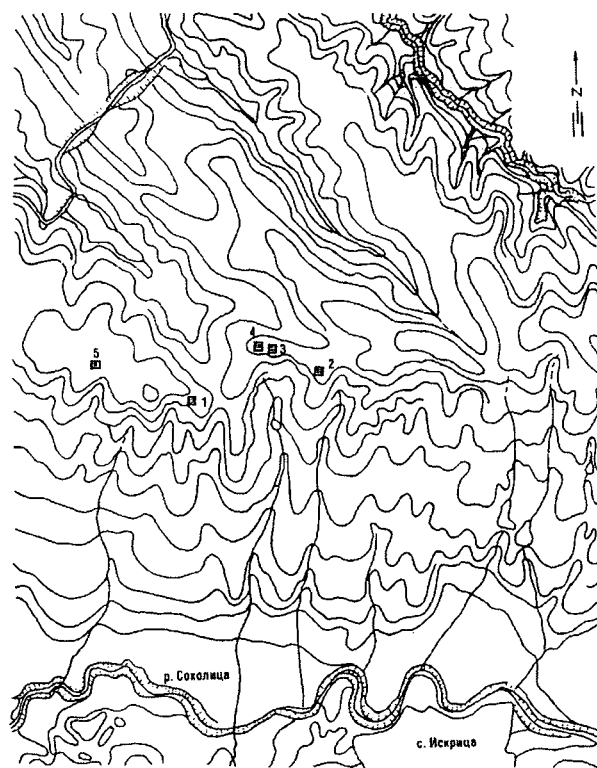
AFig. 6.9.2 Pottery from Goliama Detelina flat site
 Source: Site documentation



AFig. 6.9.3 Pottery and artefacts from Goliamia Detelina flat site
 Stone A - C, bronze D, bone and antler E - G, flint H, clay I - Q, shell R
 Source: Leshtakov et al. 2001

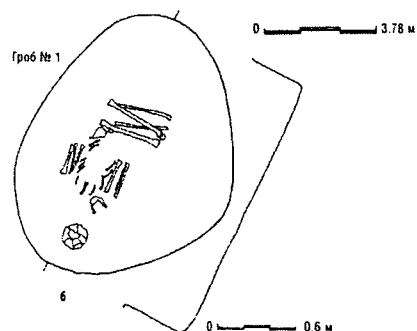
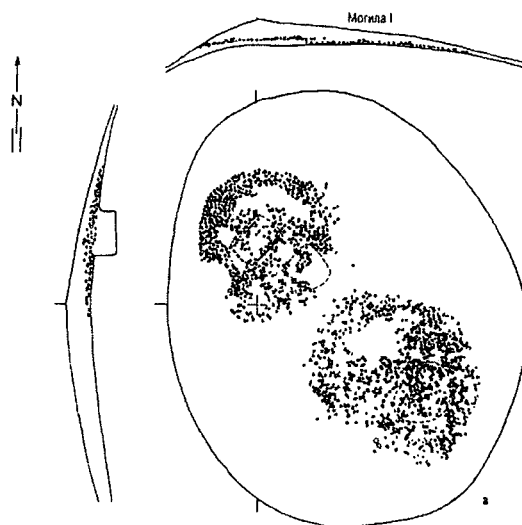


AFig. 6.11.1 Plan of Manchova mogila (a), grave goods (b)
 Grave 1 - A; grave 3 - C; grave 4 - B; grave 5 - D
 Source: Kunchev 1991



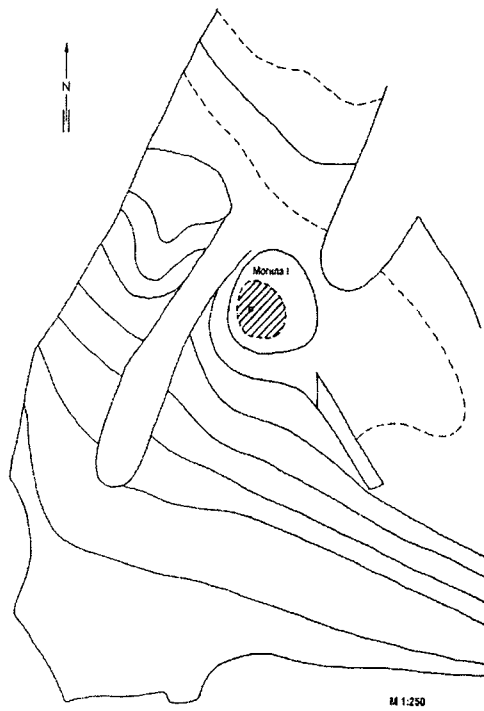
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a

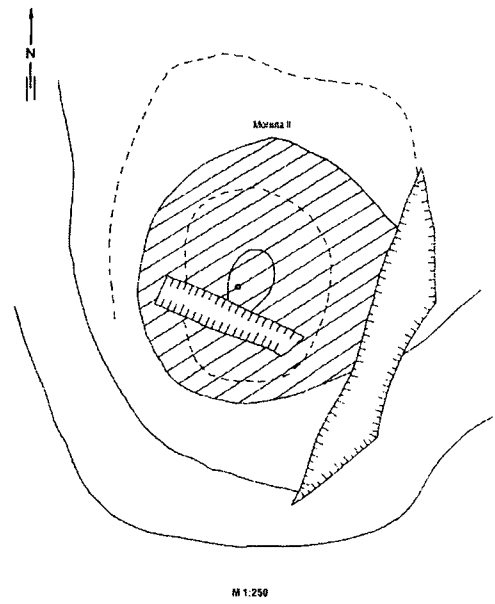


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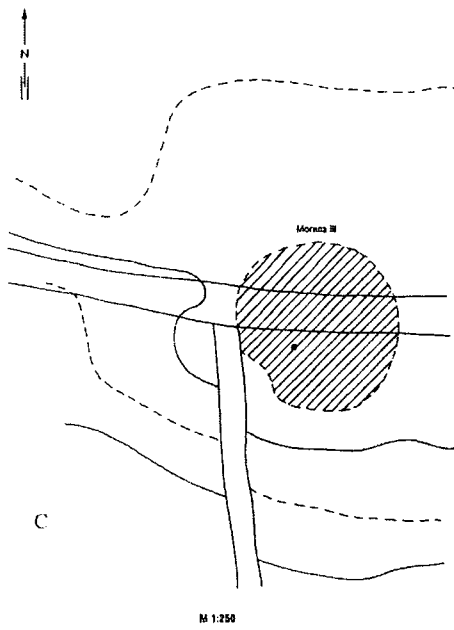
AFig. 6.14.1 General plan of MIBC; MIBC1 grave 1
Source: Panayotov and Alexandrov 1995



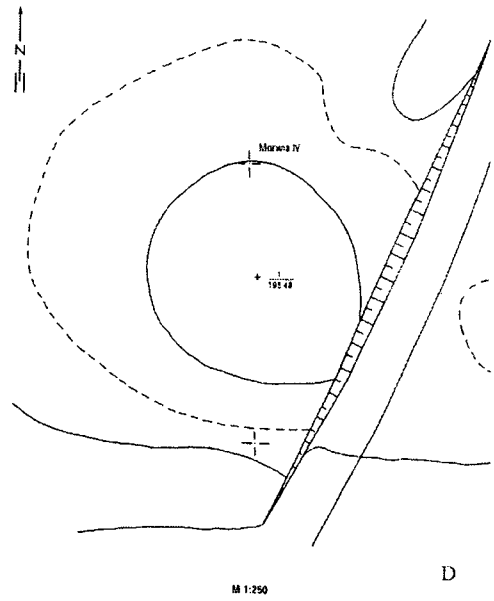
A



B

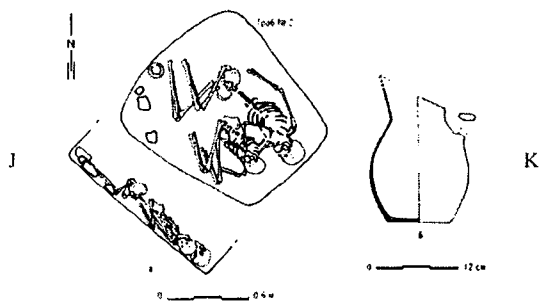
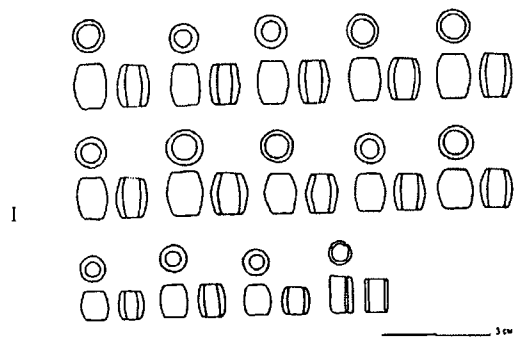
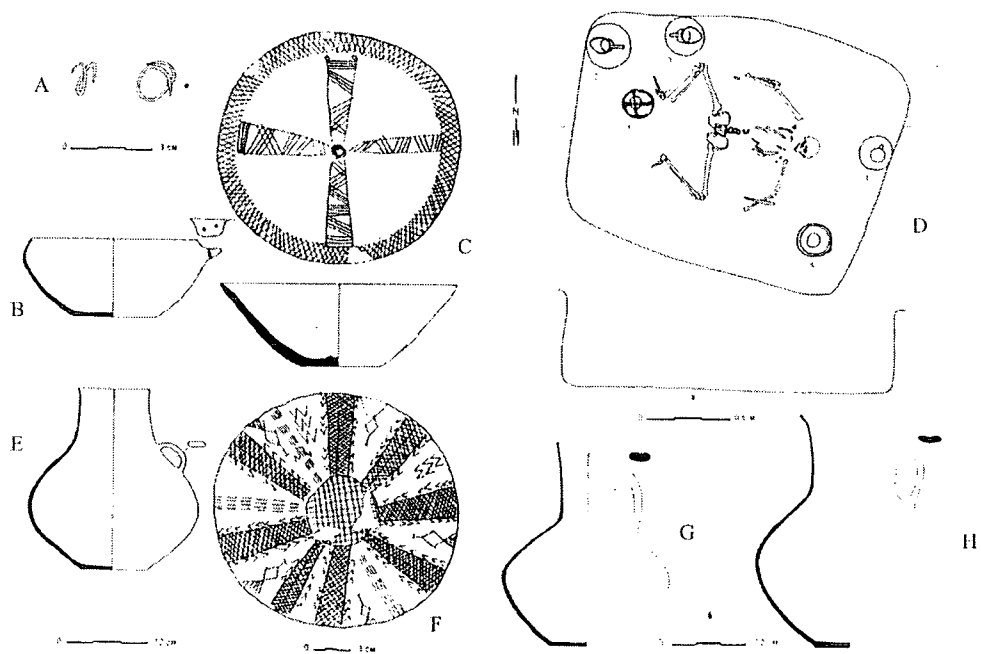


C



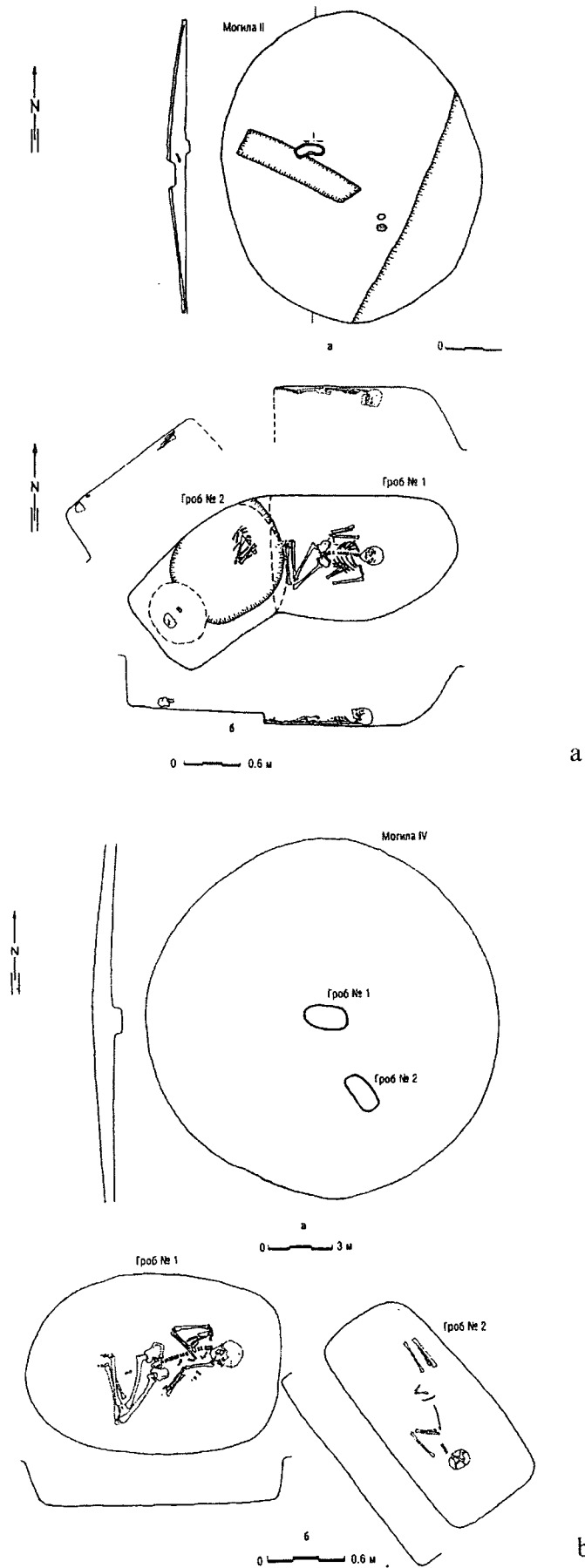
D

**A Fig. 6.14.2 Plans of MIBC: Barrow 1 (A), Barrow 2 (B),
Barrow 3 (C), Barrow 4 (D)**
Source: Panayotov and Alexandrov 1995

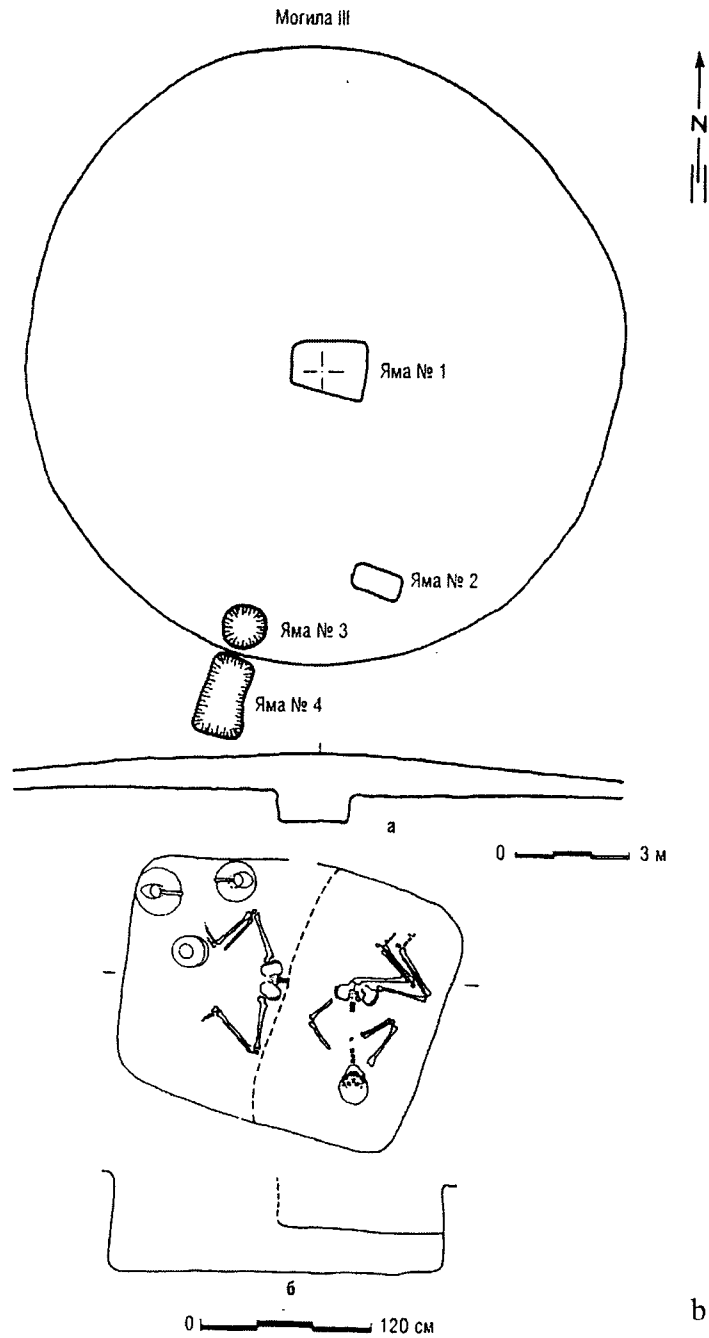
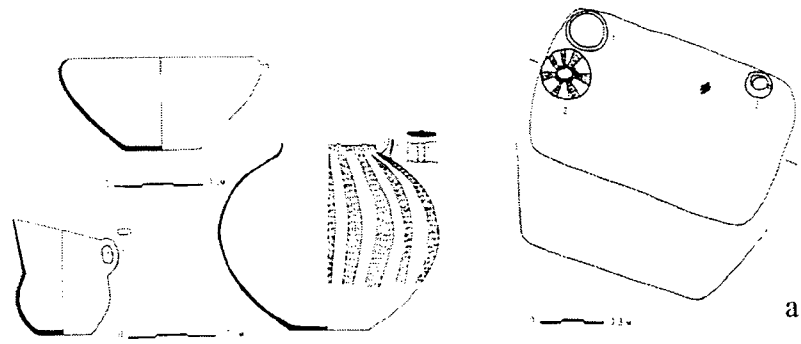


AFig. 6.14.3 Grave 2 from MIBC3(A - H), grave 2 from MIBC1 (J - K), silver beads from grave 1 from MIBC4 (I)

Source: Panayotov and Alexandrov 1995



A Fig. 6.14.4 MIBC2 graves 1-2; MIBC4 graves 1 - 2
 Source: Panayotov and Alexandrov 1995



AFig. 6.14.5 MIBC3 graves 1 - 2 (b) and content of pit N2 (a)
 Source: Panayotov and Alexandrov 1995

Appendix B: Principal Components Analysis

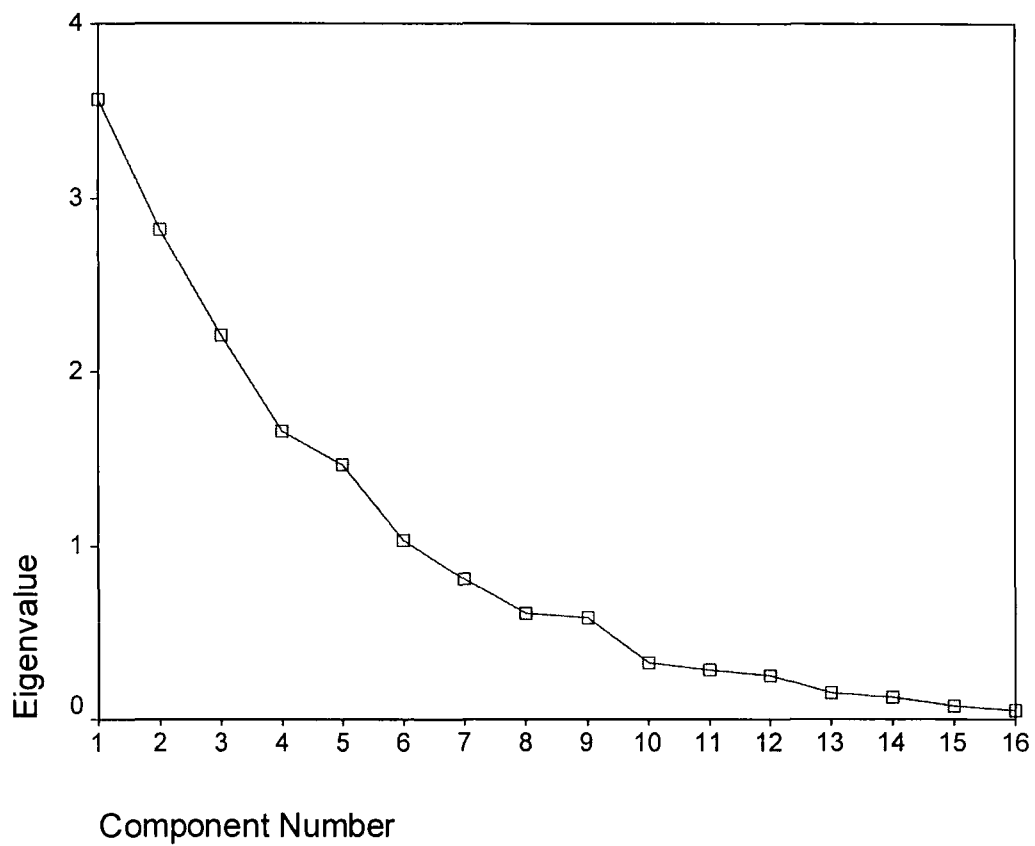
	Sample	C14 BP	CAL BC (1 sigma)	Depth	Mountains		Black Sea coast		Danube plain	Lowlands Upper Thracian plain	Archaeological sites
					low	high	north	south			
1	S1	4000-interpolated	2590 - 2460	245cm						Sadovo	
2	S2	3170	1515 - 1420	192cm						Sadovo	
3	Sr1	7000-interpolated	-	370cm					Srebarna		
4	Sr2	3830	2460 - 2420	150cm					Srebarna		
5	B1	8220	-	130cm		Pirin					
6	B2	6225	5200	110cm		Pirin					
7	B3	3730	2280 - 2240	85cm		Pirin					
8	Sh1	6800	5550				Shabla				
9	Sh2	5950	4900 - 4790				Shabla				
10	Sh3	5650	4580 - 4450				Shabla				
11	Sh4	3070	1420 - 1300				Shabla				
12	D1	5295	4230 - 4190	250cm							Durankulak
13	D2	4150	2920 - 2870	160cm							Durankulak
14	D3	3070	1420 - 1300	75cm							Durankulak
15	K1	9288	-	90cm	Rhodopes						
16	K2	6167	5060	55cm	Rhodopes						
17	K3	5052	3950 - 3780	35cm	Rhodopes						
18	K4	3521	1940 - 1770	20cm	Rhodopes						
19	V1	eneolith	-								Varna
20	V2	beginning of EBA	-								Varna
21	V3	end of EBA	-								Varna
22	A1	6140	5210 - 5050					Arkutino			
23	A2	5680	4660 - 4640					Arkutino			
24	A3	4500	3340 - 3220					Arkutino			
25	A4	3185	1515 - 1425					Arkutino			

**A Table 4.3.1 Calibrated 14-C dates, location and depth for pollen coring sites
(calibration according to OxCal v. 2.18: Stuiver & Reimer 1986)**

	SAMPLES	COLOUR	QUERCU	C.BETUL	C.ORIEN	BETULA	TILIA	PINUS	FAGUS	CORYLUS	ULMUS	CHENOP	ASTERTY	RUMEX	CEREALI	PL.LANC	POACEA	ARTEMIS
1	S1	S	6.00	1.00	.00	3.00	1.00	42.00	1.00	.00	3.00	1.50	10.00	.00	.00	1.00	5.00	1.00
2	S2	S	4.00	1.00	1.00	1.50	1.00	15.00	1.00	1.00	1.00	1.00	10.00	.00	.00	1.00	35.00	1.00
3	Sr1	Sr	35.00	10.00	10.00	10.00	2.00	5.00	2.00	5.00	5.00	3.00	3.80	10.00	.00	6.00	.00	2.50
4	Sr2	Sr	40.00	4.00	5.00	5.00	3.00	7.00	8.00	3.00	2.00	5.00	3.00	10.00	18.00	.00	.00	2.50
5	B1	B	2.00	.20	.00	2.90	.30	13.10	.00	.00	.00	8.50	.00	.00	.00	.00	.00	1.20
6	B2	B	6.10	.40	.00	1.40	1.20	23.60	.60	1.20	.00	2.10	.00	1.20	.00	.00	.00	3.70
7	B3	B	1.30	.50	.00	1.00	.50	43.60	.70	.80	.20	.20	.00	2.90	.00	.20	.00	.00
8	Sh1	Sh	13.00	9.00	3.00	1.00	3.00	.00	3.00	.00	7.50	3.50	4.00	.00	9.00	5.00	15.00	7.00
9	Sh2	Sh	12.00	11.00	3.00	3.00	3.00	3.00	.00	.00	7.00	3.50	3.00	.00	10.00	3.00	15.00	10.00
10	Sh3	Sh	13.00	30.00	3.00	3.00	3.00	2.00	3.00	.00	7.50	4.00	3.00	.00	2.00	.00	10.00	8.00
11	Sh4	Sh	15.00	9.00	3.50	3.00	3.00	2.00	3.50	.00	3.00	10.00	4.00	.00	3.00	5.00	15.00	7.00
12	D1	D	22.90	6.20	4.20	1.40	.70	1.40	3.00	1.40	.70	3.50	.00	1.40	2.10	.00	.00	6.90
13	D2	D	19.60	6.70	.90	1.80	.40	4.90	.00	1.80	.40	.90	.00	.00	.40	.00	.00	4.00
14	D3	D	.70	.70	.00	.70	.00	.00	.00	.00	.00	25.50	.00	.00	.00	.00	.00	5.90
15	K1	K	1.90	.20	.20	6.70	.40	1.70	.10	.00	.70	1.10	.00	1.10	.00	.00	.00	.00
16	K2	K	25.00	.70	.40	3.70	3.30	3.20	.10	2.90	7.30	.20	.00	.50	.00	.10	.00	.00
17	K3	K	22.20	2.30	1.20	8.70	4.90	4.00	.00	7.40	7.40	.50	.00	.10	.00	.00	.00	.00
18	K4	K	11.60	1.10	.40	1.30	.50	8.10	1.50	5.40	3.90	.30	.00	.20	.00	.00	.00	.00
19	V1	V	30.00	3.00	.00	.00	.00	18.00	19.00	5.00	.80	2.50	.00	.00	.00	.00	.00	.00
20	V2	V	15.00	4.50	.80	.70	.00	13.00	5.00	5.00	.80	5.50	.00	.00	.00	2.00	.00	.00
21	V3	V	6.00	1.50	.80	.50	.00	9.00	2.50	7.00	.80	4.00	.00	.40	7.00	1.50	.00	8.10
22	A1	A	45.00	10.00	5.00	.50	.50	3.00	7.50	3.70	3.00	.00	.00	.00	.20	.00	8.00	2.00
23	A2	A	25.00	20.00	15.00	.00	.50	.00	3.70	2.00	4.00	.50	.00	.00	.20	.00	8.30	2.00
24	A3	A	40.00	25.00	8.00	.50	.50	2.00	7.50	1.50	3.00	.00	.00	.00	.20	.00	5.00	2.00
25	A4	A	50.00	5.00	12.00	3.00	.00	1.50	3.00	3.70	3.00	2.00	.00	.00	.20	.00	5.50	5.00

A Table 4.3.2 Raw pollen data by (coded) coring site and assemblage

Appendix B: Principal Components Analysis



A Fig. 4.3.1 Eigenvalues by component

	Mean	Std. Deviation	Analysis N
QUERCUS	18.4920	14.6545	25
C.BETULU	6.5200	7.9347	25
C.ORIENT	3.0960	4.1087	25
BETULA	2.5720	2.5991	25
TILIA	1.3080	1.3952	25
PINUS	9.0440	11.8579	25
FAGUS	3.0280	4.1362	25
CORYLUS	2.3120	2.3594	25
ULMUS	2.8800	2.6732	25
CHENOPOD	3.5520	5.2468	25
ASTERTYP	1.6320	2.9358	25
RUMEX	1.1120	2.7581	25
CERREALIA	2.0920	4.3890	25
PL.LANCE	.9920	1.8108	25
POACEAE	4.8720	8.2152	25
ARTEMISI	3.1920	3.1487	25

ATable 4.3.3 Mean and standard deviation of principal botanical species

Appendix B: Principal Components Analysis

	QUERCUS	C.BETULU	C.ORIENT	BETULA	TILIA	PINUS	FAGUS	CORYLUS	ULMUS	CHENOPOD	ASTERTYP	RUMEX	CEREAIA	PL.LANCE	POACEAE	ARTEMISI
QUERCUS	1.000	.360	.679	.132	.081	-.389	.525	.402	.248	-.311	-.208	.310	.124	-.033	-.107	-.067
C.BETULU	.360	1.000	.573	-.103	.178	-.407	.209	-.192	.452	-.138	-.002	-.055	.056	.101	.242	.359
C.ORIENT	.679	.573	1.000	.092	-.022	-.420	.160	.091	.257	-.184	-.067	.260	.056	.160	.125	.148
BETULA	.132	-.103	.092	1.000	.561	-.152	-.301	.193	.368	-.106	.148	.556	.064	.287	-.171	-.156
TILIA	.081	.178	-.022	.561	1.000	-.233	-.194	.001	.773	-.101	.257	.219	.405	.346	.205	.193
PINUS	-.389	-.407	-.420	-.152	-.233	1.000	-.013	-.101	-.368	-.198	.316	.044	-.190	-.135	-.098	-.393
FAGUS	.525	.209	.160	-.301	-.194	-.013	1.000	.294	-.127	-.111	-.127	.089	.131	-.082	-.069	-.159
CORYLUS	.402	-.192	.091	.193	.001	-.101	.294	1.000	.084	-.279	-.339	.176	-.049	-.053	-.371	-.295
ULMUS	.248	.452	.257	.368	.773	-.368	-.127	.084	1.000	-.258	.175	-.013	.201	.341	.238	.213
CHENOPOD	-.311	-.138	-.184	-.106	-.101	-.198	-.111	-.279	-.258	1.000	-.046	-.022	.081	.120	-.077	.353
ASTERTYP	-.208	-.002	-.067	.148	.257	.316	-.127	-.339	.175	-.046	1.000	.116	.170	.402	.685	.076
RUMEX	.310	-.055	.260	.556	.219	.044	.089	.176	-.013	-.022	.116	1.000	.439	.281	-.249	-.103
CEREAIA	.124	.056	.056	.064	.405	-.190	.131	-.049	.201	.081	.170	.439	1.000	.255	.116	.461
PL.LANCE	-.033	.101	.160	.287	.346	-.135	-.082	-.053	.341	.120	.402	.281	.255	1.000	.320	.365
POACEAE	-.107	.242	.125	-.171	.205	-.098	-.069	-.371	.238	-.077	.685	-.249	.116	.320	1.000	.260
ARTEMISI	-.067	.359	.148	-.156	.193	-.393	-.159	-.295	.213	.353	.076	-.103	.461	.365	.260	1.000

ATable 4.3.4 Correlation Matrix

	Initial	Extraction
QUERCUS	1.000	.852
C.BETULU	1.000	.730
C.ORIENT	1.000	.885
BETULA	1.000	.886
TILIA	1.000	.884
PINUS	1.000	.756
FAGUS	1.000	.789
CORYLUS	1.000	.633
ULMUS	1.000	.891
CHENOPOD	1.000	.713
ASTERTYP	1.000	.879
RUMEX	1.000	.898
CEREBLIA	1.000	.822
PL.LANCE	1.000	.546
POACEAE	1.000	.799
ARTEMISI	1.000	.791

Extraction Method: Principal Component Analysis.

ATable 4.3.5 PCA extraction by main botanical species

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.566	22.290	22.290	3.566	22.290	22.290	2.531	15.818	15.818
2	2.816	17.599	39.889	2.816	17.599	39.889	2.391	14.943	30.762
3	2.211	13.816	53.705	2.211	13.816	53.705	2.294	14.337	45.099
4	1.662	10.389	64.094	1.662	10.389	64.094	2.016	12.602	57.701
5	1.463	9.145	73.240	1.463	9.145	73.240	2.011	12.566	70.266
6	1.034	6.463	79.703	1.034	6.463	79.703	1.510	9.437	79.703
7	.806	5.036	84.738						
8	.611	3.822	88.560						
9	.580	3.622	92.182						
10	.324	2.028	94.210						
11	.282	1.759	95.970						
12	.251	1.566	97.536						
13	.149	.934	98.470						
14	.121	.757	99.227						
15	.075	.470	99.697						
16	.048	.303	100.000						

Extraction Method: Principal Component Analysis.

ATable 4.3.6 Cumulative and total variance by components

	Component					
	1	2	3	4	5	6
ULMUS	.771			.195	-.439	.234
TILIA	.708	-.212	.400		-.274	.319
C.BETULU	.574	.153	-.566	.174	-.106	-.122
PL.LANCE	.564	-.342	.166		.238	-.148
C.ORIENT	.554	.461	-.327	.113	.108	-.484
PINUS	-.554	-.228	.362	.406	.317	
CEREBALIA	.501	-.127		-.354	.478	.440
ARTEMISI	.460	-.388	-.455	-.454		.109
QUERCUS	.456	.765	-.128	.117	.168	
CORYLUS		.665	.325			.283
ASTERTYP	.279	-.619	.184	.488	.370	
POACEAE	.365	-.549	-.316	.493	.144	
FAGUS		.540	-.265	.156	.520	.363
BETULA	.437		.744		-.210	-.288
RUMEX	.348	.252	.571	-.226	.514	-.266
CHENOPOD	-.121	-.354	-.189	-.707	.115	-.158

Extraction Method: Principal Component Analysis.

Table 4.3.7 Matrix of component scores

	Component					
	1	2	3	4	5	6
C.ORIENT	.908				.228	
C.BETULU	.765	.200	.191	.115	-.222	
QUERCUS	.694		-.247	-.234	.226	.442
PINUS	-.590	-.347	.295	-.440		
TILIA		.898	.136		.230	
ULMUS	.315	.878	.124			
ASTERTYP	-.154	.119	.888		.210	
POACEAE	.159	.175	.828		-.234	
CORYLUS		.190	-.563	-.373	.179	.329
PL.LANCE	.110	.278	.436	.283	.430	
ARTEMISI	.207	.215	.205	.801	-.120	
CHENOPOD	-.158	-.265		.755		-.192
RUMEX					.925	.188
BETULA		.463	-.117	-.172	.705	-.362
FAGUS	.220	-.199		-.153		.815
CEREBALIA		.338	.141	.500	.333	.565

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 4.3.8 Rotated (Varimax) component matrix

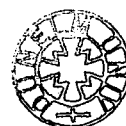
Component	1	2	3	4	5	6
1	.558	.669	.268	.222	.326	.118
2	.463	-.111	-.676	-.407	.137	.362
3	-.519	.297	-.124	-.368	.685	-.151
4	.120	.055	.538	-.792	-.245	.071
5	-.065	-.473	.383	.138	.441	.641
6	-.432	.474	-.138	.052	-.388	.645

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

ATable 4.3.9 Component transformation matrix

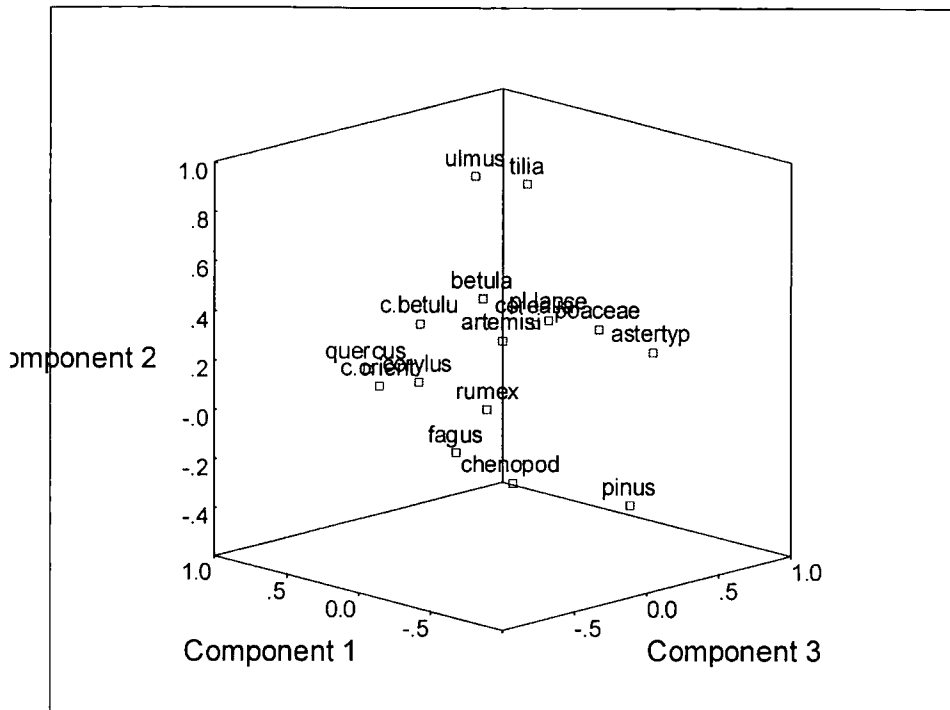
<i>K. Willis' claims</i>	<i>Evidence from Bulgaria</i>
1. Expansion of <i>Pistacia</i> 9000-8000 BP	
<ul style="list-style-type: none"> There was an expansion of <i>Pistacia</i> in Bulgaria 	<ul style="list-style-type: none"> There is a little <i>Pistacia</i> in Bulgaria now and no pollen evidence for <i>Pistacia</i> in the past
2. Change in forest dominants between 8000 – 7000 BP	
<ul style="list-style-type: none"> Suho ezero – reduction in woodlands of <i>Betula</i> and increase in dominance of <i>Quercus</i>, <i>Corylus</i>, <i>Ulmus</i> and <i>Fraxinus excelsior</i> – 8000 BP 	<ul style="list-style-type: none"> The C14 dates for Suho ezero are 10 060 and 2880 so 8000 as given in Willis is interpolated. What the data really show is a fluctuation of <i>Betula</i> during the Early Atlantic, together with a fluctuation of <i>Quercus</i>, whose quantity in most cases is greater than, or equal to, <i>Betula</i>. <i>Corylus</i>, <i>Ulmus</i> and <i>Fraxinus excelsior</i> are present in the Early Atlantic but they are far from dominant. There is an impressive percentage of <i>Tilia</i>. The situation described by Willis for 8000 BP actually equates more or less to the Late Atlantic
3. The increase of <i>C. orientalis/Ostrya</i>, <i>Abies</i>, <i>C. betulus</i> and <i>Fagus</i> in woodlands between 7500 – 5000 BP	
<ul style="list-style-type: none"> Durankulak – 6170 BP - increased abundance of <i>C. betulus</i> in woodlands 	<ul style="list-style-type: none"> According to the new chronology of Durankulak, the date of 6170 BP is rejected by the investigators themselves. Between 420 – 400 cm, the level from which this date came, the percentage of <i>C. betulus</i> is not that high. It has its peaks before and after 420-400cm.
<ul style="list-style-type: none"> Suho ezero - 7000 BP – appearance and increase of <i>Abies</i>, <i>Pinus</i>, <i>C. betulus</i> and <i>Quercus</i> in the woodlands 	<ul style="list-style-type: none"> <i>Pinus</i> is present in the Rila sequence even in the Pre-boreal and gradually increases during the Holocene. In the Late Atlantic, however, <i>Pinus pence</i> appeared and maybe this is the species to which Willis refers. A little later than the onset of <i>Pinus pence</i>, <i>Abies</i> appeared in the sequence – again in the Late Atlantic. If we have to interpolate dates for its appearance, it will be after 6500 BP according to the investigators' chronology. The appearance of both sub-species of <i>Carpinus</i> can also be dated to the Late Atlantic. Their increase, however, is visible in the diagram during the Sub-boreal – e.g., after 5000 BP.

ATable 4.3.10 Evaluation of Willis' (1994) main claims for Bulgarian vegetational history

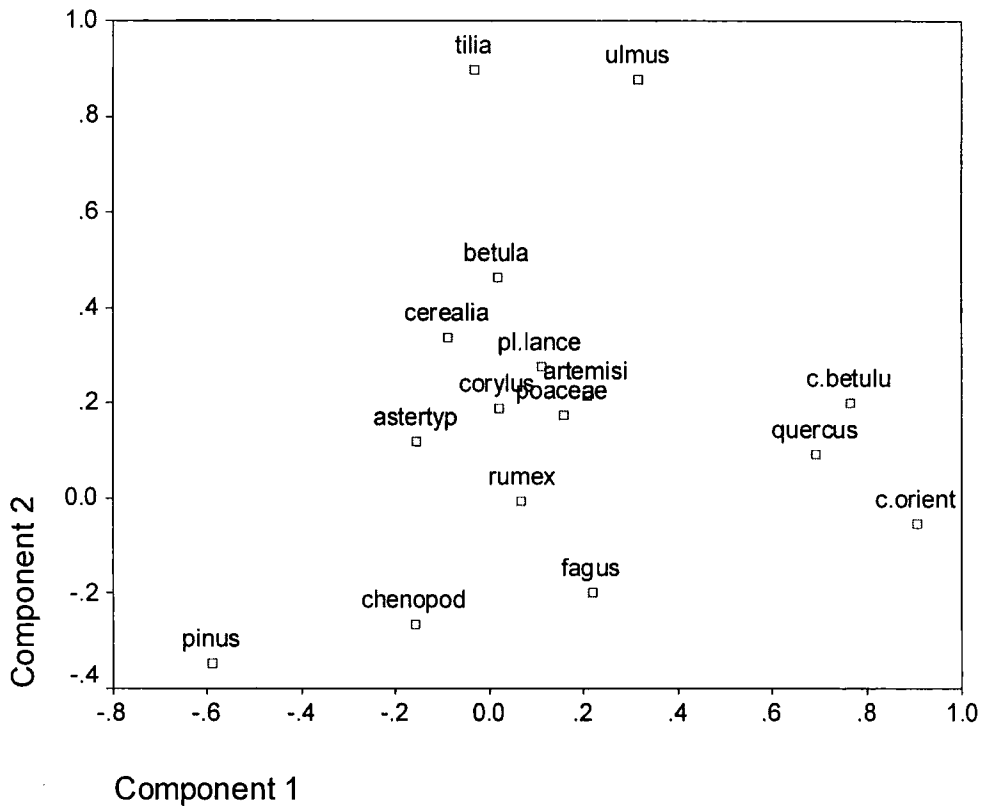


<p>4. Development of present day landscape 4500 – 2000 BP (human impact)</p>	
<ul style="list-style-type: none"> ◦ Durankulak – 6200 BP – reduction in <i>Quercus</i> in woodlands and rise of <i>Cerealia</i>-type, <i>Plantago lanceolata</i> and <i>Polygonum aviculare</i> 	<ul style="list-style-type: none"> ◦ Durankulak is the only coring site close to an archaeological site. Nevertheless, when Willis speaks about changes dating to 4500 BP, she uses examples which are in fact dated much earlier. However, the date of 6200 BP is now refuted in the updated Durankulak chronology. The herbaceous species mentioned by Willis do not develop at the expense of <i>Quercus</i>. Once established, <i>Quercus</i> has a relatively stable development. <i>Cerealia</i>-types, <i>Plantago lanceolata</i> and <i>Polygonum aviculare</i> do not have an immediate effect on the <i>Quercus</i> distribution, which remains stable until the end of the sequence.
<ul style="list-style-type: none"> ◦ Shabla-Ezerets – 6000 BP - reduction in <i>Quercus</i> in woodlands and increase of <i>Cerealia</i>-type, <i>Plantago lanceolata</i> and <i>Polygonum aviculare</i> 	<ul style="list-style-type: none"> ◦ The presumed <i>Quercus</i>/herbaceous plant (<i>Cerealia</i>-type, <i>Plantago lanceolata</i> and <i>Polygonum aviculare</i>) inter-relation in fact appears around 5000 BP, not at 6000 BP, as claimed. Throughout the rest of the sequence, <i>Quercus</i> values remain constant at around 14%, while the herbaceous species vary, while never exceeding 14%.
<ul style="list-style-type: none"> ◦ Suho ezero – 2880 – reduction in mixed woodlands with increase of <i>Fagus</i>, <i>Picea</i>, <i>Cerealia</i>-type <i>Plantago lanceolata</i> and <i>Polygonum aviculare</i> 	<ul style="list-style-type: none"> ◦ After 2880 BP, there is a continued reduction in <i>Quercus</i> woodlands that started in the previous period. While <i>Fagus</i> and <i>Picea</i> did appear and spread after 2880 BP, <i>Cerealia</i>-type pollen is not present in the diagram at all. Instead, tiny percentage of <i>Triticum</i> are visible in the Late Subatlantic period, together with a more substantial spread of <i>Plantago lanceolata</i>.

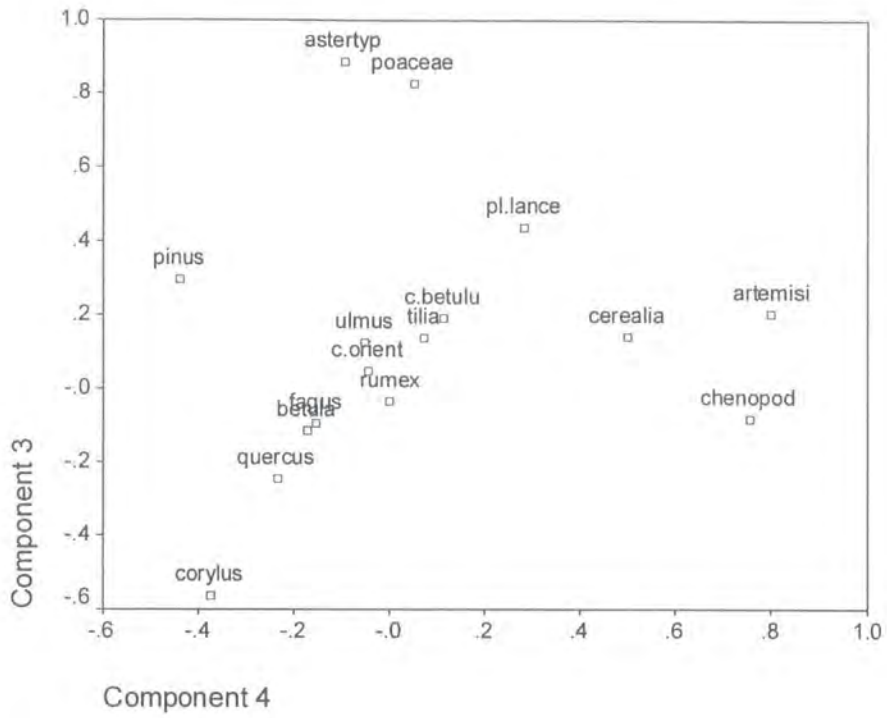
ATable 4.3.10 (cont.)



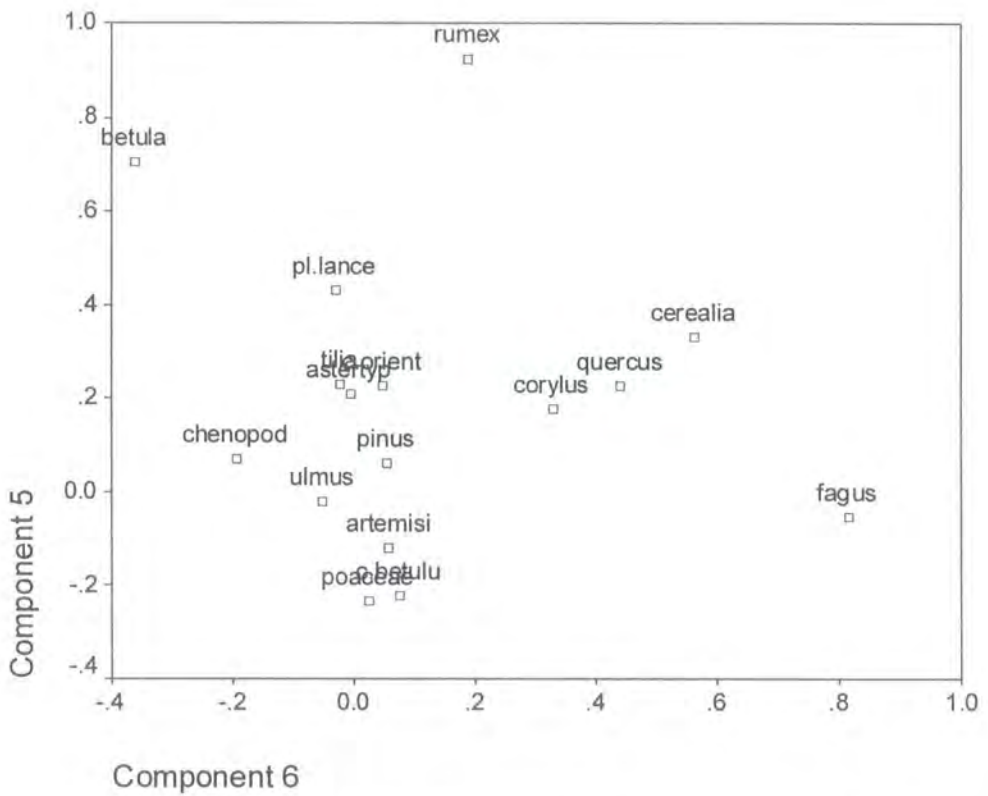
AFig. 4.3.2 Component Plot in Rotated 3-dimensional Space



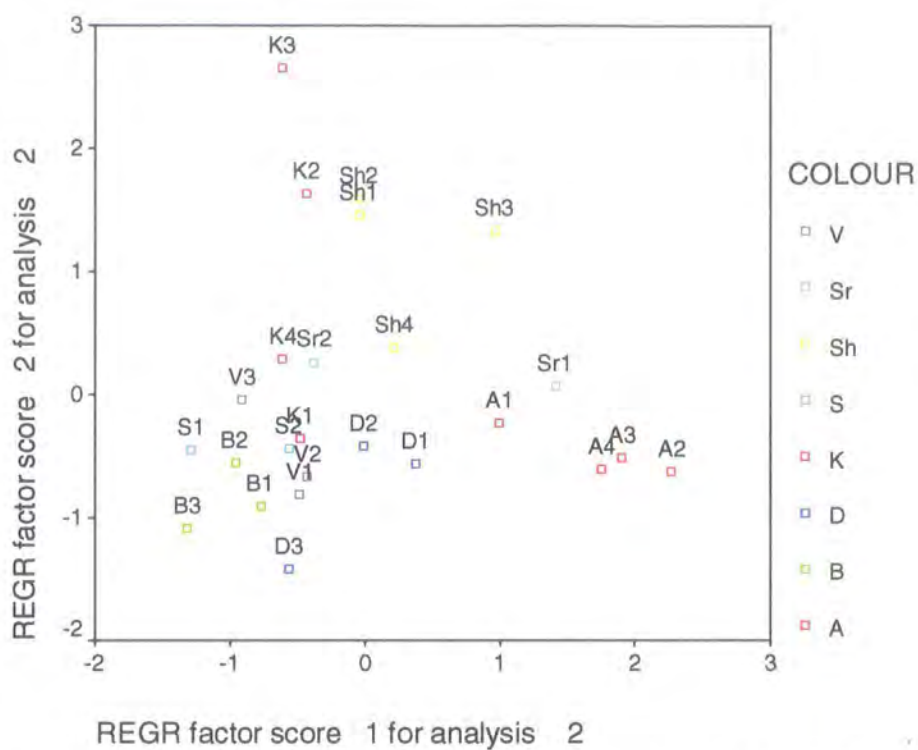
AFig. 4.3.3 Component Plot in Rotated Space – Components 1 and 2



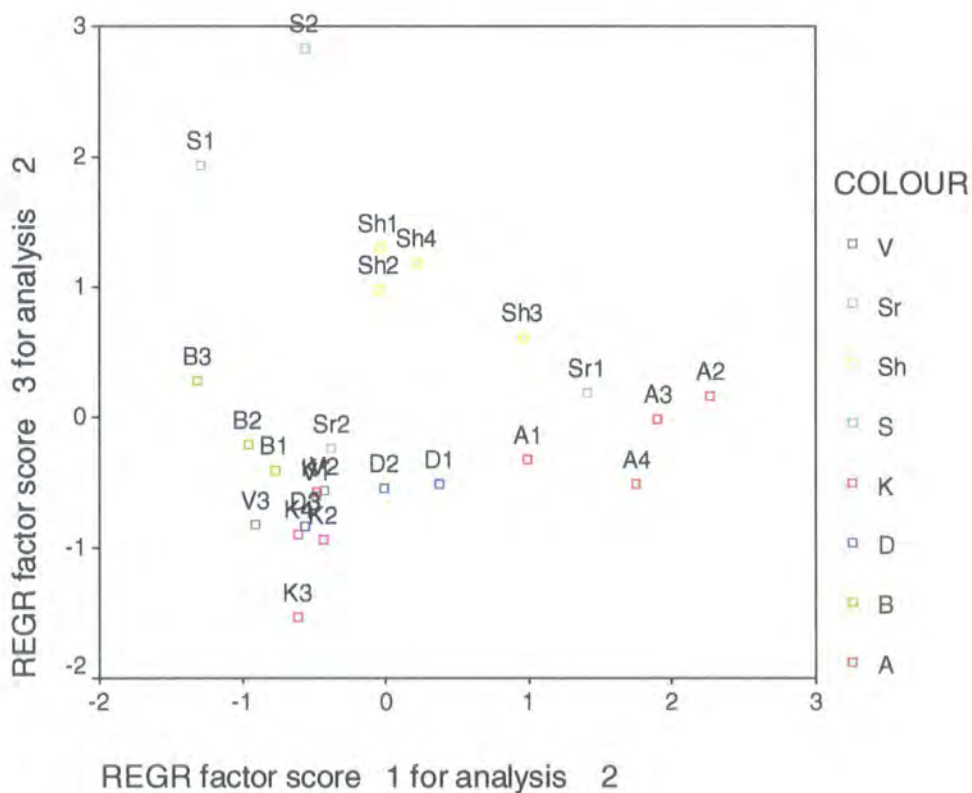
AFig. 4.3.4 Component Plot in Rotated Space – Components 3 and 4



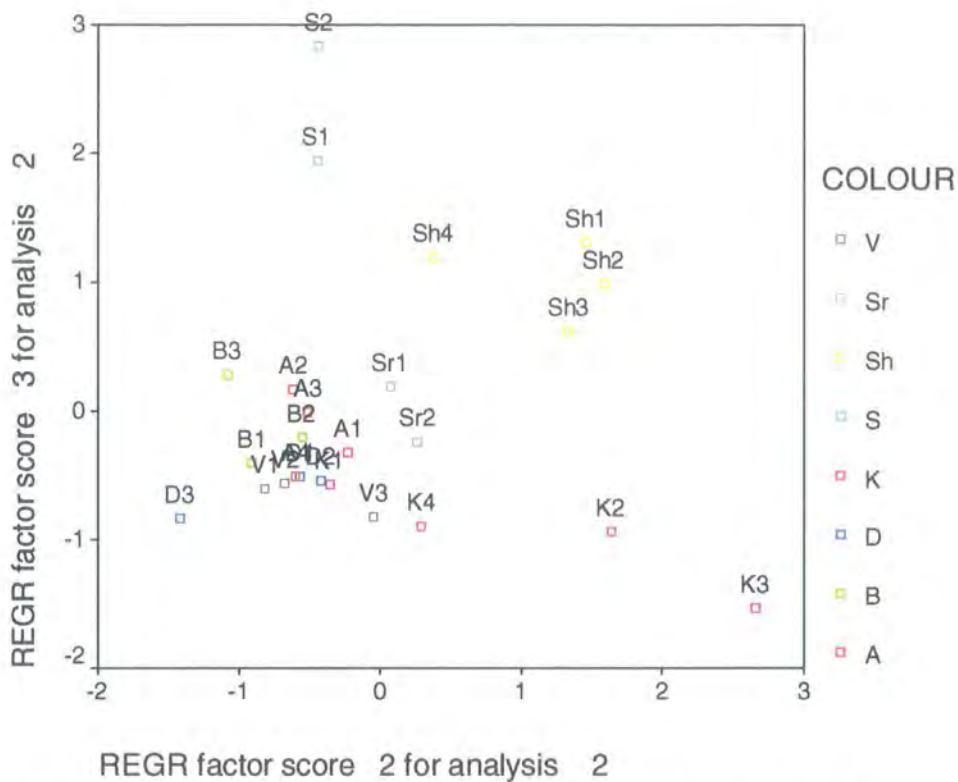
AFig. 4.3.5 Component Plot in Rotated Space – Components 5 and 6



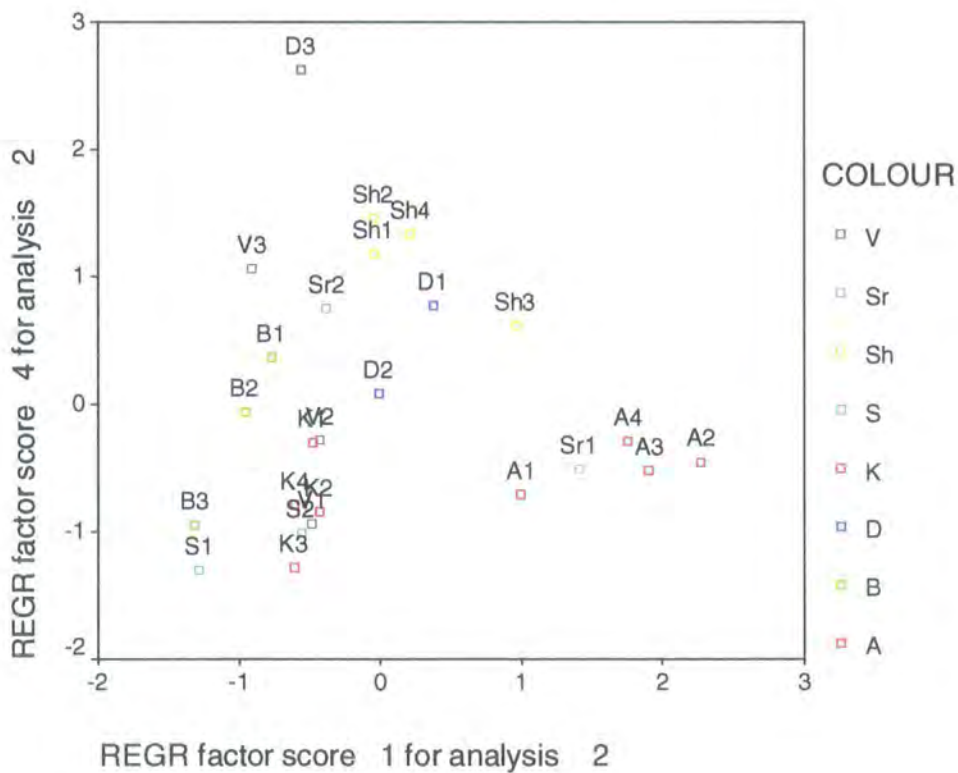
Afig. 4.3.6 Pollen assemblages by principal components 1 and 2



Afig. 4.3.7 Pollen assemblages by principal components 1 and 3



AFig. 4.3.8 Pollen assemblages by principal components 2 and 3



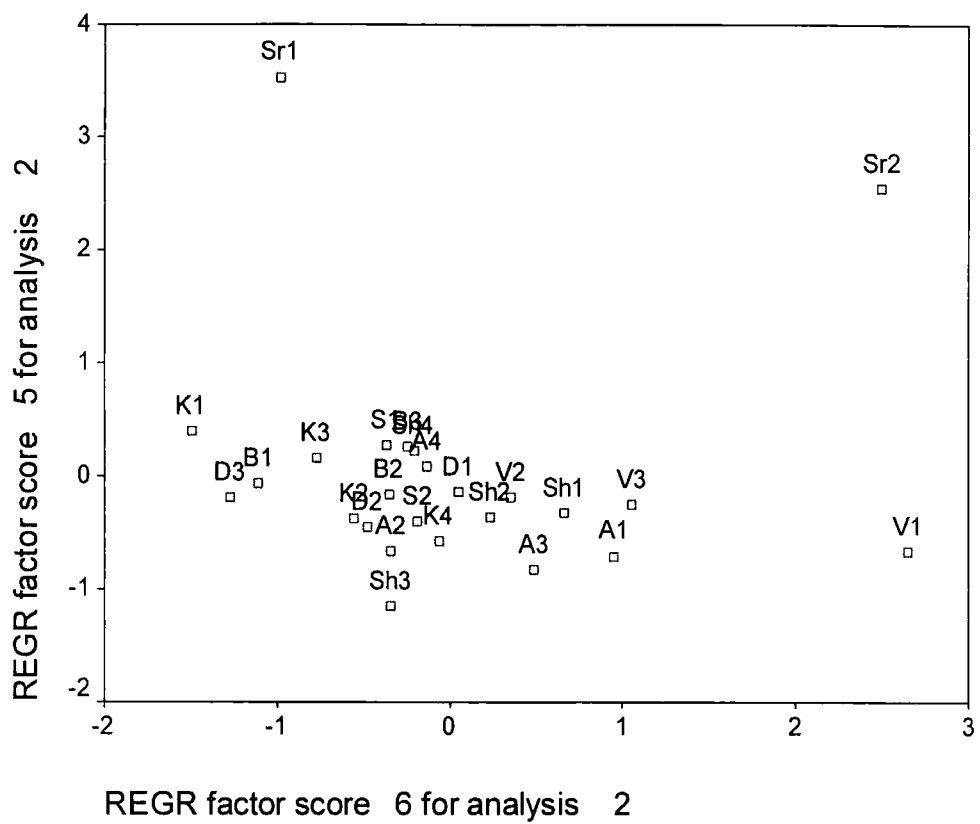


Fig. 4.3.10 Pollen assemblages by principal components 5 and 6

