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New archaeological and geoarchaeological investigations of the prehistoric site of Zecovi, near Prijedor, Bosnia i Herzegovina

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Abstract: The article presents a project of an archaeological assessment of the very significant archaeological site of Zecovi. It is based on multidisciplinary methodological research of the Zecovi and its surroundings. The aim of the research was to determine how the human factor influenced the changes of the existing natural landscape the way how adjusted itself to this landscape. Project implementation was focused primarily to the centre of the site which has a specific shape (*oppidum*, tell, hill-top) and secondary focus was on the immediate and remote surrounding in order to acquire more realistic picture about the landscape in different archaeological periods from prehistory to modern time.

Key words: evaluation, Eneolithic, geoarchaeology, micromorphology, erosion and alluviation

Introduction

The site of Zecovi is known as an Hallstatt fortified site in the Sana River valley near Prijedor that was initially excavated and reported on by Benac in the 1950s[1] (Figs. 1 & 2). The previously excavated area of this site was located on the sloping but more or less flat hill-top oriented north-south at an elevation of *c*. 200m above sea level which forms a natural elongated tump of land in a prominent position overlooking the Sana valley. Benac identified Roman buildings with pottery of the mid-4th century AD located above a 1st millennium BC Iron Age oppidum with a *c*. 2.7m maximum thickness of archaeological deposits present.[2] His hill-top excavations also found extensive prehistoric pottery, including diagnostic sherds of the Bronze Age and Neolithic.

The project reported on here was an evaluation of the whole hill-top area of Zecovi and its immediate surroundings (Figs. 1-5). In particular this project aimed to investigate the nature and extent of prehistoric settlement on the hill-top and any evidence of landscape change. Field survey, test excavations and geoarchaeological investigations of Zecovi and its surrounding area took place on four occasions: in brief evaluation investigations in March 2011 and 2012,[3] in a more intensive way in late September-early October, 2013 as part of the EU-funded Tempus BIHERIT project, and finally a trial trench excavation through the hill-top sequence in September, 2014. The Tempus project investigations enabled an intensive programme of field-walking, test pitting and augering which was supervised by a small team of professional and doctoral student archaeologists from the University of Cambridge, with colleagues and students from the Universities of Banjaluka and Sarajevo taking part, as well as assistance from local organisations and museums. The project has been kindly hosted and assisted by the staff of the Kozara Museum in Prijedor.

The project had three main aims:

- to define the extent, nature and chronology of the archaeology at the site
- to set the site in its wider landscape context
- to use the site and project as a 'field school' to instruct Bosnian students in current field approaches for conducting archaeo-

[1] Benac 1956.
[2] Benac 1956.
[3] French *et al*. 2011; French 2012.

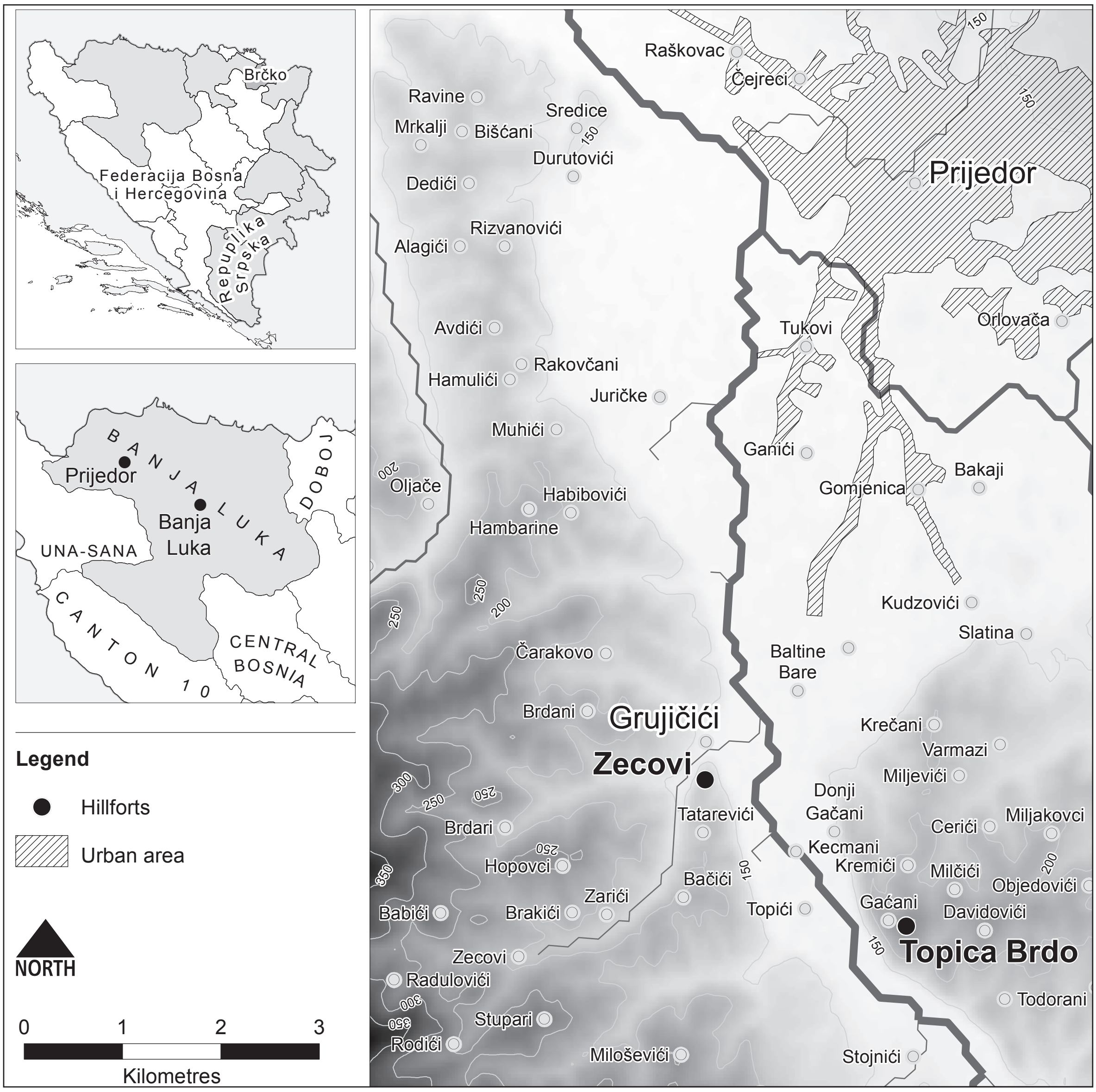


Fig. 1. *Location map of Zecovi near Prijedor, Bosnia i Herzegovina* (D. Redhouse)

logical site evaluations in northern Europe and the UK. This included the use of geophysical, auger and topographical surveys, as well as context-based archaeological recording using the *Manual for Archaeological Excavation*[4] as a guide.

Archaeologically the key questions were:

- What was the date range of human use of the hill-top and 'shoulder' areas of the site?
- How did the use of the 'shoulder 'area relate to the hill-top oppidum?
- What was the nature and extent of prehistoric and Roman activity of the 'shoulder' area?

In order to answer these questions the work formed five separate stages, each designed to contribute information to the wider picture:

- intensive surface fieldwalking for artefact recovery
- intensive hand auger survey to determine the deposit sequences present both on- and off- the hill-top
- comprehensive topographical and magnetometry surveys of the hill-top and 'shoulder' areas
- small scale test excavations, including the re-location of Benac's trench area on the hill-top, with test excavation and sampling of that deposit sequence

[4] Rajkovača 2010.

Fig. 2. *View of Zecovi hill from the floodplain to the northeast* (C. French)

- targeted judgemental soil/sediment sampling of the stratigraphic and occupation horizons observed in the test excavations for micromorphological, magnetic susceptibility and multi-element (including phosphorus/phosphate) analyses, with judgemental selection of charcoal samples for radiocarbon assay from the hill-top and 'shoulder' area test pits.

Methodological approaches

Augering survey

Initial investigations took place primarily through the use of borehole transects using a Dutch hand auger with a 4cm diameter Edleman head with recording by soil/sediment stratigraphic horizon throughout. Three sets of hand auger boreholes were made down- and across-slope at *c*. 10/20m intervals on the northeastern 'shoulder' of the hill-top beneath the oppidum, at *c*. 20m intervals across the oppidum hill-top, and one transect at *c*. 20/50m intervals over a distance of some 250m across the adjacent floodplain eastwards to the River Sana (Figs. 4 & 5; App. 1). On the basis of this augering work, a specific area of midden and occupation material was identified on the northeastern part of the 'shoulder' area below the hill-top which was then investigated by hand-dug 1x2m or 2x2m sized test pits.

Fieldwalking survey

Intensive fieldwalking survey concentrated on the northeastern 'shoulder' of the hill-top as it had been recently ploughed, whereas the rest of the site area was largely under sheep pasture (Fig. 3). Following the establishment of a 20m^2, each grid square was subsequently subdivided into 10m^2. Each square was walked by two people with all surface finds being recovered and bagged by each 10m^2 square. There were two primary types of archaeological material recovered: pottery and slag, but also flint, glass, brick and tile. All bags of surface pick-up finds were taken to Kozara Museum for washing, drying and sorting by category, then each category of finds was counted, weighed, bagged and boxed for storage in the Museum. Then the main types of artefact distributions (for pottery and iron slag) were mapped to illustrate changing densities across the site (Figs. 6 & 7).

Topographical and magnetometry surveys

Topographic survey was undertaken at the hill–fort site of Zecovi (44 degrees 55.575 minutes North, 16 degrees 41.123 minutes East), near Prijedor, Bosnia and Herzegovina (Figs. 1-3). The work was supervised by D.I. Redhouse and E. Bujak and carried out by students of the Universities of Sarajevo and Banjaluka. A Leica TCR805 total station was used to record archaeological and topographical features with respect to a local grid, and a Leica GS08plus GPS antenna stabilised with a GSR111 dual–strut support was used to make observations of 30 minutes in length at four grid points. Three permanent monuments of concrete bearing a steel survey marker were affixed on site for future use (App. 2). The GPS observations were post–processed using Leica GeoOffice version 8.3.

The total station records were transformed from the site grid to Universal Transverse Mercator coordinates (UTM Zone 33 North, WGS 1984) through a scale–invariant 2D linear conformal transformation using the formulae provided by R. E. Deakin at of the School of Mathematical and Geospatial Sciences at RMIT University (http://user.gs.rmit.edu.au/rod/files/publications/COTRAN_3.pdf). The resulting records were imported into ESRI ArcGIS version 10.0, which was used for all subsequent processing and presentation. A ZIP archive containing an ESRI version 10 File Geodatabase of the data created during and after the survey may be downloaded from: www-comp.arch.cam.ac.uk/~dir21/BiH_Zecovi.zip.

The whole hill-top and eastern 'shoulder' area was gridded and surveyed using a Leica EDM to create a topographical and contour plan of the site and its immediate area (Fig. 3). This was followed by geophysical survey using a Geoscan FM-360 fluxgate gradiometer (or magnetometer), with four 20x20m squares surveyed on both the hill-top and 'shoulder' areas. Unfortunately the high frequency of iron slag across the present day ground surface and in the topsoil meant that there was too much magnetic 'noise' to obtain meaningful results. Also, the differential thicknesses of archaeological deposit build-up on the hill-top and hillwash on the northeastern shoulder area also skewed any chance of obtaining reasonable results.

Test excavation

In 2011 and 2012 on the basis of the initial augering survey, three test pit excavations (either 1x1m or 1x2m) were excavated by hand, one (TP1, 2011) to the south of the oppidum on the spine of the hill-top and two (TP4 & TP5, 2012) on the northeastern 'shoulder' slope of the oppidum hill-top (Fig. 3) by Tonko Rajkovača, Charles French, Milenko Radivojac and staff of Kozara Museum. The test pits were excavated by stratigraphic horizon down to the old land surface and weathered bedrock with section profiles recorded at 1:10. Where appropriate large bulk samples were taken for wet sieving, block samples for micromorphological analysis (French 2012), and small bulk samples for geo-chemical analysis (French 2012) and radiocarbon assay.

In 2013, using the 20m^2 grid, a series of eight 2x1m test pits (TP1-8) were excavated at 20m intervals across and down the slope of the northeastern 'shoulder' area under the direction of Gary Marriner (Fig. 3). Although initially the aim was to excavate 12 test pits in a rectilinear pattern over the 'shoulder' area, it was decided instead to focus on the areas of highest finds densities. All eight test pits were excavated by approximately 20cm artificial 'spits' within each stratigraphic unit unless archaeological features were found or the stratigraphy changed. Where stratigraphic changes were found within a 20cm spit, the surface of the next unit was exposed and cleaned in order to expose any features. All features were sectioned, drawn, photographed, planned and where appropriate sampled before excavations continued. The natural at the site was taken to be either the bedrock, a fragmented, iron-rich, mud- or shale-stone, or degraded bedrock in a yellow silty clay matrix. All contexts were then recorded as per the Cambridge Archaeological Unit system, with the east and north facing profiles of every test pit were drawn at 1:10 scale and photographed. Large bulk samples taken for wet sieving, intact block samples for micromorphological analysis, small bulk samples for

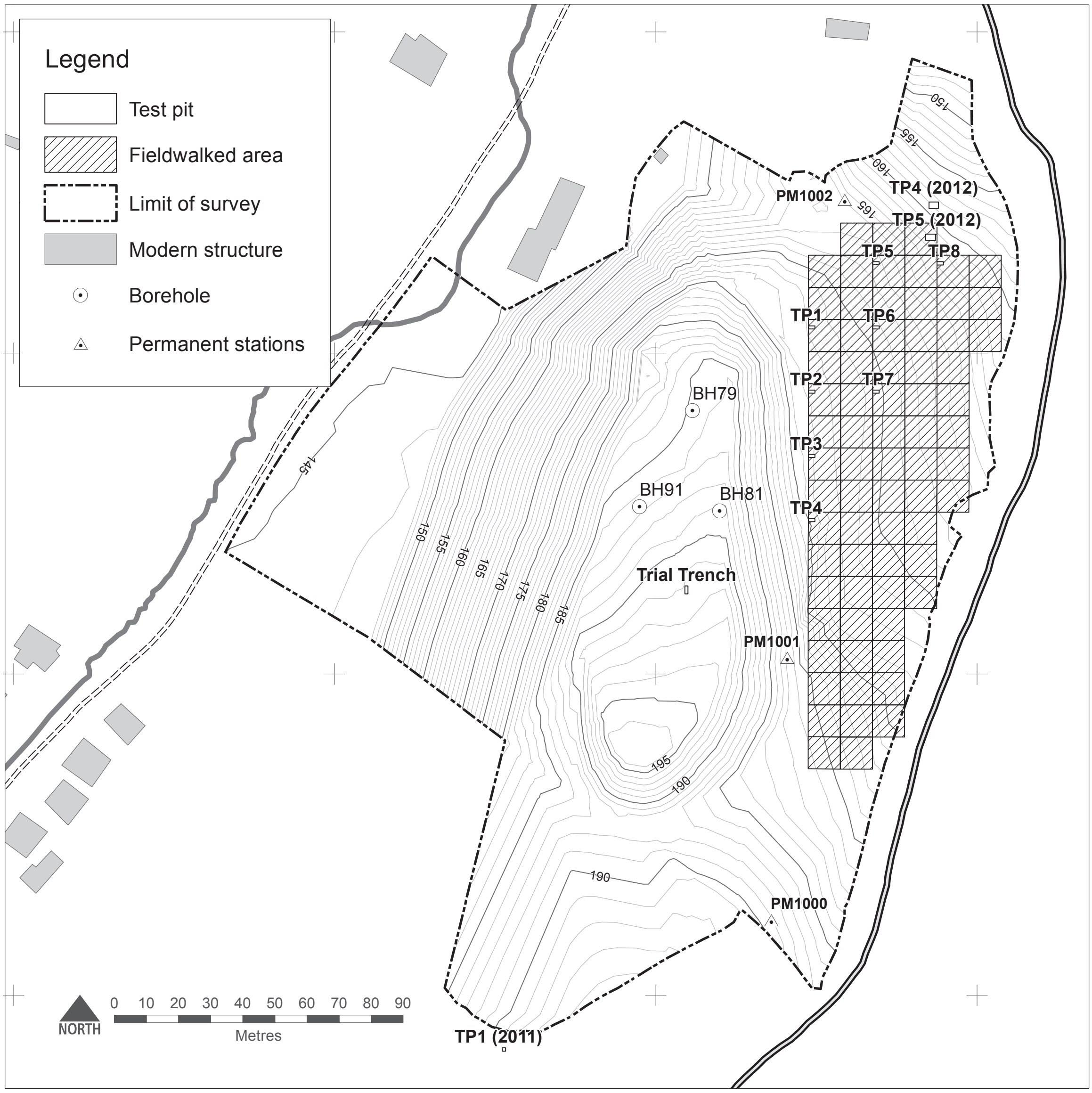


Fig. 3. *Topographical survey of the hill-top and 'shoulder' area, with the fieldwalked area and test pit locations marked* (D. Redhouse)

geo-chemical analysis, and charcoal samples taken for radiocarbon assay on a judgemental basis. AMS radiocarbon dating was undertaken by the Scottish Universities Environmental Research Centre AMS Facility in Glasgow (SUERC), with calibrations made using the OxCal 14 program.

In 2014, a single 2.5x1m trial trench was excavated through the hill-top deposits, using geophysical and augering surveys to target the north-eastern corner of Benac's 1956 excavations (Fig. 3). This was crucial for the retrieval of samples for radiocarbon assay and micromorphological analysis, and for comparison with the archaeological record of the 'shoulder' area of Zecovi hill.

Soil analyses

The soil analysis of five test pit profiles from Zecovi aimed to provide information on the natural regional soil type (from Test Pit 1), and examine a number of Neolithic and Bronze Age occupation deposit sequences in Test Pits 4 & 5 from 2012, Test Pit 4 from 2013, and the thick Neolithic-Roman hill-top sequence first investigated by Benac (1956) in Test Trench 1 (2014). The main stratigraphic horizons of the trench profiles were sampled and analysed using soil micromorphological techniques[5], pH testing, magnetic sus-

[5] Courty *et al.* 1989; Murphy 1986.

Fig. 4. *Location of the boreholes on Zecovi hill-top* (D. Redhouse)

ceptibility[6] and multi-element analysis[7]. The thin sections of the excavation profiles were made and described (see App. 3) using the methods of Murphy[8] and the terminology of Bullock *et al.*[9] and Stoops[10]. Their analysis should reveal the Holocene soil developmental history, particularly that associated with prehistoric settlement activity, and provide complementary data to the palaeo-vegetational and land-use history of the site.

Multi-element analysis (ICP-AES) was performed on a full series of samples through the excavated sequences with selected results presented in Table 2. Although 35 elements were analysed, a much smaller suite of elements is usually considered reflective of human activities in soils. These include barium, calcium, iron, phosphorus (as equivalent to total phosphates), magnesium, manganese, strontium, zinc and copper, whose accumulation is most likely associated with organic debris an especially ash, bone and charcoal in settlements[11], with zinc known to be limited by phosphate with increasing pH[12].

[6] Clark 1996, 99-117.
[7] Oonk *et al.* 2009; Wilson *et al.* 2008.
[8] Murphy 1986.
[9] Bullok 1985.
[10] Stoops 2003.

[11] Wilson *et al.* 2008.
[12] Cresser *et al.* 1998.

Fig. 5. *Location of boreholes across the floodplain* (D. Redhouse)

The borehole survey

S. Taylor, C. French, G. Marriner

The Zecovi hill-top

The soils present on the hill-top of the 'oppidum' have formed on deep anthropogenically derived deposits. It was here during the 1950's that Benac's excavations had revealed deep prehistoric archaeological strata with up to *c.* 2.4m depth of archaeological deposits present on the southern part of the hill-top[13]. These former trenches were visible as large depressions and eroded spoil heaps despite recent ploughing (Fig. 3).

A total of 23 boreholes (79-102) were made on the hill-top area (Fig. 4). The southern part of the hill-top preserved a complex sequence of archaeological deposits and palaeosols which had developed during periods of abandonment, probably since the later Neolithic period. The deepest soil profile measured was *c.* 2.2m deep, a feature which was consistent in the majority of profiles. However it was clear that the northern part of the hill-top had experienced more extensive erosion than the southern half as there were shallow modern soils developed on relatively recent exposures of the shale bedrock. It was unclear whether this erosion had been caused by anthropogenic activity and/or natural processes.

[13] Benac 1956.

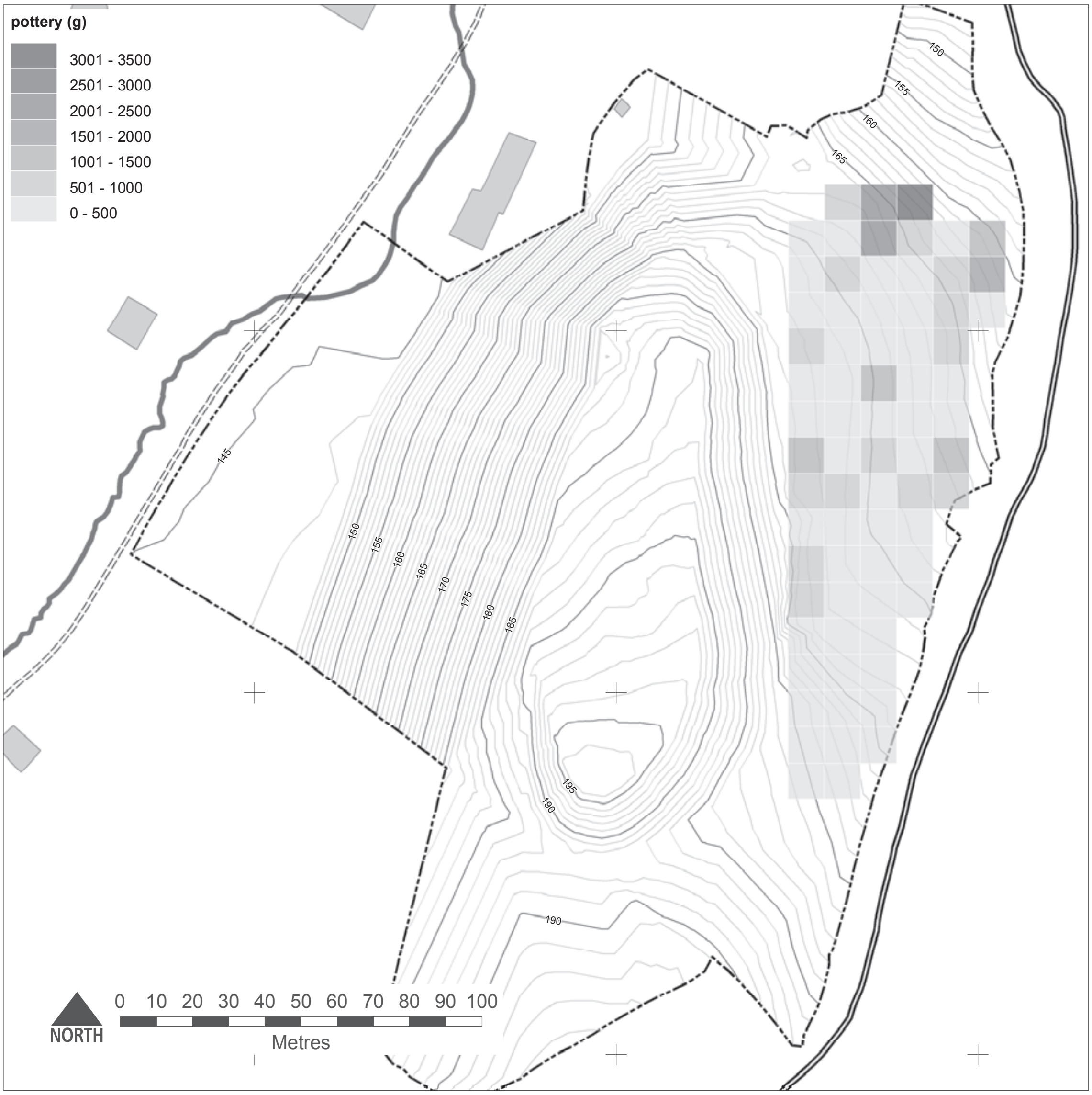


Fig. 6. *Pottery concentrations by* 10m *square from the fieldwalking survey of the 'shoulder' area of Zecovi hill* (D. Redhouse)

In order to characterise this hill-top part of the Zecovi landscape, three borehole profiles will be described which reflect the stratigraphic records revealed in Benac's (1956) excavations as well as our own Test Trench 1 (see below). Soil profile 79 was typical of the soils that had formed on this landscape position. From 0-110cm, a relatively thick A/B horizon had formed showing weak horizonation due to extensive recent ploughing with abundant ceramic and primarily brick fragments. Then there was a lithological discontinuity and then at 110-135cm a buried, dark humose, former A horizon defined. This also contained abundant ceramics, brick charcoal and other archaeological materials indicating that this was a palaeosol formed on a sequence of thick archaeological refuse layers. Below (at 135-165cm) was an earlier organic A horizon with a very high organic content and humose character. This sequence of two superimposed former organic topsoils suggests that there had been considerable organic enrichment through human activities, a process known as cumulisation or soil thickening. At 165-215cm below there was a silt to silty clay loam soil which was indicative of the basal B (or cambic Bw) horizon with some illuvial clay of an *in situ* palaeosol.

Soil Profile 81 was typical of the complexity of soils on the hill-top and the contribution of archaeological material as a parent material for

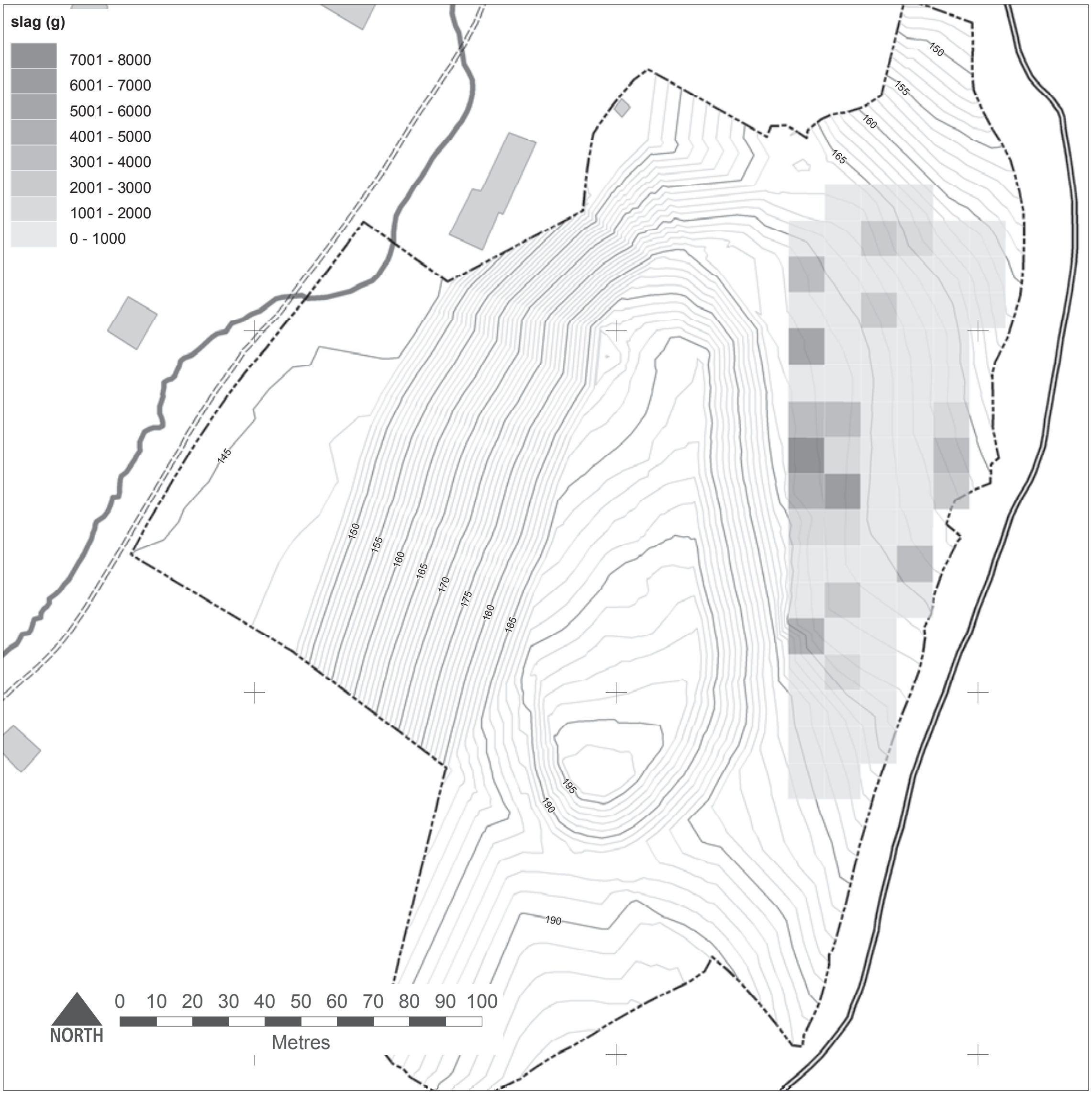


Fig. 7. *Slag concentrations by* 10m *square from the fieldwalking survey of the 'shoulder' area of Zecovi hill* (D. Redhouse)

these soils. The first 60cm was composed of a ploughed topsoil containing abundant archaeological materials indicating that the parent material for this soil was largely allochthonous anthropogenic deposits. Between 60 and 200cm there were nine distinct horizons of archaeological deposits of varying thickness. These had been subject to soil formation processes exhibiting development of properties characteristic of a B horizon. Below this was the *in situ* organic A horizon of a palaeosol that had formed on the underlying shale bedrock. It also contained frequent weathered pottery fragments.

Soil profile 91 exhibited a *c*. 40cm thick humic topsoil with small (<1cm), highly weathered fragments of plaster, brick, charcoal and lime (plaster or mortar?). Between 40 and 112cm there was a reddish/orange silt loam soil with very abundant brick fragments (<3cm) which was probably indicative of a thick horizon of collapsed building material. Below, at between 112 and 136cm there was a highly humic A horizon of an *in situ* palaeosol with abundant charcoal and small fired clay fragments. This former topsoil had formed on *c*. 60cm of layered archaeological deposits. A lithological discontinuity separated this horizon with the underlying buried and gleyed B/C (or B/Cg) at 196cm. This material clearly had formed from the weathering of the shale bedrock with abun-

Fig. 8. *Test Pit* 1 (2011) *outside the site on the hill-top, showing the typical loessic B horizon beneath a modern ploughsoil* (C. French)

dant redoximorphic mottles within this horizon indicative of a fluctuating groundwater table.

The 'shoulder' area of Zecovi hill

In contrast, the 69 borehole profiles recorded over the approximately one hectare 'shoulder' area (Fig. 4) were very different with bedrock depths ranging from *c*. 30 to 140cm. The bedrock was overlain by disturbed and truncated buried soils with possible floor/yard gravelly surfaces above, overlain by variable thicknesses of artefact-rich midden deposits and colluvial topsoil above. In general, these boreholes in combination with the test pit soil profiles show that soil formation processes had been significantly different than those either on the oppidum hill-top or in the floodplain below.

The soils varied from very shallow silt loams developed on the weathered shale bedrock at the base of the hill-top slope in the northern part of the sampling area to deeper colluviated soils, especially in the northeastern part of the field. Most of the profiles were less than 50cm in depth and only a few were greater than 1m in depth. However, test pitting in this area showed that many of the soils/sediment profiles were actually slightly deeper (by *c*. 20-40cm) than the augering survey initially suggested. This was particularly true where dense surface scatters of pottery had been recognised in the northeastern sector of the field (Fig. 6). This was almost certainly because of the stony nature of the subsoil and because in many cases buried structural and building debris had been confused with bedrock.

In general these soils showed very poor development of horizonation. Typically a *c*. 25-30cm Ah/p topsoil overlies a silt loam weathered Bw or B/C weathered bedrock with almost no significant accumulation of clay in the sub-surface horizons. As the slope rapidly dips eastwards, a mixture of silt loam hillwash and organic and artefact-rich midden material form an intervening horizon between the Ah/p and the basal B horizon, which thickens down-slope from *c*. 60-

100cm. There are also possible structural levelling and/or floor surfaces at the basal B and midden contact in some boreholes, especially as seen in Test Pits 4 (2011), 5 (2012) and 8 (2013) (see below) (Figs. 10 & 11).

The Sana River floodplain

A series of 11 boreholes were made across the western side of the Sana floodplain (Fig. 5). These exhibited an homogenous dark brown silty clay loam, thickening in depth from about 50cm at the base of the slope to 2m by the main road and present river channel. These soils are classified as Gleyic Fluvisols, and represent the gradual/seasonal aggradation of overbank flood-derived deposits or alluvium. These brown silt loam to silty clay loam soils are a very valuable farming resource today and are managed by rotating from arable to grass production with a relatively short cycle. A few sinuous/meandering, small stream channels were evident in the farmed, former floodplain area, which hint at a once more active channel system in the recent past. The fast-flowing modern river is quite deeply incised by *c.* 3-4m into the floodplain, and this may be its long-term course, such that the modern floodplain represents a lengthy period of past overbank flooding and the aggradation of eroded soil derived from upstream.

Fig. 9. *Test Pit* 4 (2011) *on the 'shoulder' area showing hillwash over midden material* (C. French)

Fig. 10. *Test Pit* 5 (2012) *on the 'shoulder' area showing possible gravelly surfaces on a truncated old land surface beneath midden material, with structural features cut through the base of the buried soil and into the weathered natural substrate* (C. French)

Fig. 11. *Test Pit* 4 (2013) *on the 'shoulder' area showing the midden material over the layered occupation zones below* (G. Marriner)

Fig. 12. *The partly excavated* 2014 *Test Trench* 1 *through the hill-top deposit sequence located on the northern side of Benac's* 1950s *trench showing floor levels and pit features* (C. French)

The profile in Borehole 109 was typical of the type of deposit sequence encountered in the floodplain. The first 40cm was a ploughed topsoil (Ap) with a silt loam texture. From 40-70cm a fine sand silt loam with very little clay formed a youthful weathered B horizon (or Bw), barely distinguishable from the topsoil indicating that soil formation had had very limited progression. Below (70-130cm) a lower B horizon (or Bw2) silt loam showed an increase in clay with a greater degree of brunification, perhaps indicating a lithological discontinuity from the horizon above and a significant period of landscape stabilisation. Below (130-190cm) there was a gleyed fine sandy loam horizon that was indicative of contrasting fluvial conditions. This horizon had accumulated immediately above a coarse sandy loam (190-220cm) with abundant fine gravels interpreted as the base of a shallow channel deposit.

The Borehole 114 profile is typical of an alluvium over a deep channel fill sequence. Here there was 140cm of greyish brown silt loam (again with very little clay) over another 100cm of grey-brown mottled silty clay alluvial overburden, with a further 200cm of greyish green (reduced) silty clay riverine deposits below that have infilled a palaeo-channel and have accumulated on basal coarse bedded sands and fine gravel of the channel base. Recent fieldwork using mechanical coring equipment by the Arhej team has confirmed the presence of this palaeo-channel to be some 80-100m in width and 3.5-5.15m in depth. This palaeo-channel appears to be followed by the route of the modern stream adjacent, and is present as a large meander loop situated at the base of the northjeastern slope of Zecovi hill, and has been extensively sampled for palynological and stratigraphic analyses.

The fieldwalking survey

Gary Marriner and Tonko Rajkovača

The results of the systematic gridded fieldwalking collection were very informative, especially as this area of sheep pasture had been ploughed just one month before the surface collection exercise. Unfortunately, the adjacent hill-top and floodplain areas are no longer ploughed and it was not possible to adequately fieldwalk those areas, so only the fieldwalking of the 'shoulder' area is reported on here.

Comparisons by weight of pottery sherds and slag fragments showed clear differences across the 'shoulder' area. For example, there were large concentrations of pottery at the northeastern end of the fieldwalked area (Fig. 6), and distinct concentrations of slag along the eastern edge of the area (Fig. 7). Pottery concentrations ranged from none to 5,000 grams per 10m grid square, and slag from 0-7,350 grams per 10m grid square. An appraisal of the pottery types was made (see Jašarević below), with a few small finds also recovered such as spindle whorls. The abundant slag fragments are probably largely derived from the locally attested earlier 20th century exploitation of the iron-rich bedrock which outcrops along the eastern edge of Zecovi hill and is today still seen along the local roadside cutting.

The archaeological investigations

Tonko Rajkovača, Gary Marriner, Charles French and Milenko Radivojac

The test pits and trial trenches excavated in 2011-14 are described below. The detailed profile descriptions are given in Appendix 1.

Test Pit 1 (2011) was excavated adjacent to borehole 16 on the same hill-top spine about 75m to the south of the oppidum (Figs. 3 & 8). It revealed much slag, prehistoric pottery and one quernstone base. The soil profile was composed of *c.* 18cm of modern ploughsoil overlying a *c.* 60cm B horizon of silty clay loam which became more yellowish brown and mottled with depth, all developed on a reddish brown silty clay weathered bedrock (or B/C). This profile is indicative of the soil profiles on the remainder of the hill-top to the south away from the archaeological zone, and is a silt and clay-rich, strongly iron-mottled silt loam soil derived primarily from the weathered bedrock itself. The main horizons of this profile were sampled for soil micromorphological and geo-chemical analyses (see below).

Test Pit 4 (2012) was excavated next to borehole 22 on the 'shoulder' slope below and to the east of the oppidum hill-top (Figs. 3 & 9). It produced very large quantities of prehistoric artefacts, particularly diagnostic Neolithic and Bronze Age pottery, flint, burnt clay, animal bone, and charcoal, with considerable amounts of iron slag on the modern ground surface, but yielded a radiocarbon date from charcoal at a depth of 130cm of 2361+/-29 BP or 519-384 cal BC (at 94.7% probability; GU38007). This test pit exhibited a thin (*c.* 10-15cm) organic topsoil over a *c.* 20-50cm reddish-orangey brown, finely aggregated silty clay loam with numerous included artefacts. This was developed on a thick (*c.* 35-45cm) deposit of dark grey to black organic silty clay with abundant included artefacts, which graded into a *c.* 25-30cm greyish brown silty clay with much charcoal and numerous artefacts. This horizon in turn graded into a grey gravelly silty clay at *c.* 130cm above a calcareous, chalky bedrock at a maximum depth of *c.* 145cm. The latter is an unusual calcareous substrate, unlike the weakly acidic clays and loessic silts found more or less consistently across the rest of the survey area.

This test pit profile sequence represents a weathered B horizon of an *in situ* palaeosol with a thick midden deposit above, all buried by colluvial slumping. The midden deposit is certainly anthropogenic in origin and could represent either the dumping of settlement debris and its incorporation on the *in situ* soil profile, or some down-slope overland transport of soil and archaeological materials, or it may be in or on the edge of a large archaeological cut feature. Only further and larger scale excavation could answer this, but the auger survey in the vicinity of this test pit suggests that the area of intensive archaeological build-up of settlement debris beneath colluvial deposits is confined to a relatively small area, over an area of *c.* 40x50 metres. The main horizons of this profile were sampled for soil micromorphological and geo-chemical analyses (see below). Two spot samples of wood charcoal from the lower part of the occupation/midden

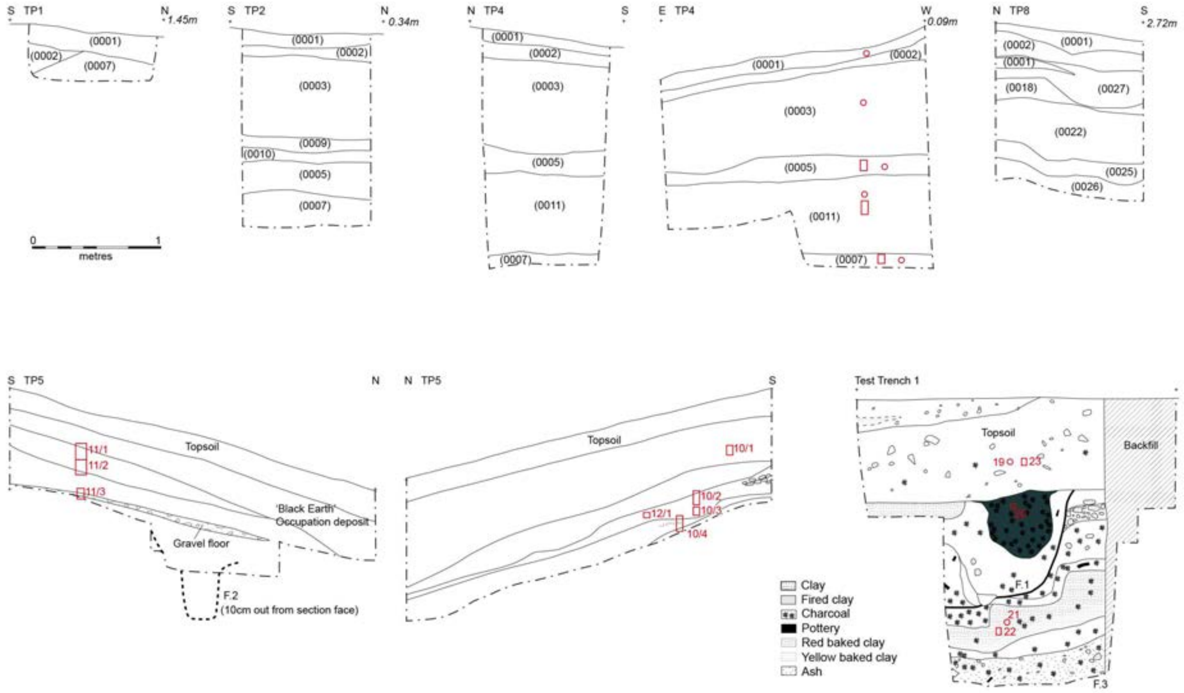


Fig. 13. *Selected sections from* TP5 (2012)*,* TPs 1, 2, 4 *and* 8 (2013)*, and Test Trench* 1 (2014)*. The red circles indicate the position of geo-chemistry samples, the red rectangles indicate the position of thin section micromorphology block samples* (V. Herring)

zone at *c.* 115 and 120cm down profile were also taken for radiocarbon assay.

Test Pit 5 (2012) was also excavated on the northeastern flank of the hillslope 'shoulder' situated downslope from Zecovi hill-top (Figs. 3, 12 & 15). This trial trench excavation revealed a thick occupation deposit containing abundant Neolithic and Bronze Age period artefacts (App.1). At the contact with the old ground surface there were thin (*c.* 2-8cm) horizontal spreads over less than a square metre of area of either fine, yellowish gravel and/or grey silt with abundant fired clay and charcoal fragments. These may well be 'floors,' or at least prepared surfaces. Inbetween these possible 'floors' there was more accumulation of humic, fired clay, charcoal and pottery-rich silt loam which also probably represent occupation deposits. At the very bottom of the profile under these surfaces/floors there was one rectangular post-hole cut into the hard rock geology. Accordingly, a series of seven soil blocks were taken for micromorphological analysis and small bulk samples for geo-chemical characterisation from the east- and west-facing profiles of this trial trench.

In 2013, a series of eight 1x2m test pits were opened on the 'shoulder' area of the site (Figs. 3, 11 & 13). An initial transect of four test pits were excavated north-south along the base of the oppidum. A further three, 20m to the east, and a final one, a further 20m to the east, were excavated.

Test Pit 1 exhibited a shallow, disturbed profile of about *c.* 20-25cm silt loam ploughsoil over a clay-rich degraded/weathered natural.

Test Pit 2 was 1.5m deep and exhibited a more complex stratigraphy than was evident in TP1 (Fig. 13). Beneath a similar depth of ploughsoil there was an horizon of approximately 60cm of dark brown silty clay loam with frequent small, sub-angular stones and occasional slag fragments. This is a hillwash deposit that has been subject to some agricultural mixing in the past. Below were two layers of similar material but paler and more orangey in colour, probably also relating to phases of colluvial deposition. Beneath these horizons there was a compact, pale brown clay silt loam with very few small angular stones and rare charcoal flecks, which is the B horizon of an *in situ* buried soil. The natural degraded bedrock was revealed at a depth of 1.5m below the ground surface.

Test Pit 3 exhibited a similar profile to TP2 to a depth of *c*. 1-1.2m, at which depth two features were observed. On the eastern edge of the test pit there was a small ditch (F4) which was *c*. 55cm deep. The fill of the ditch was of a similar composition to the buried soil which survives on the spine of natural between ditch F4 and the pit F1 to the west, suggesting that it had naturally filled in with this material. Pit F1 had straight, vertical sides and a flat bottom. Its fill contained a large number of angular/sub-angular large stones and buried soil material, so perhaps was partly deliberately backfilled.

Test Pit 4 is similar to the profiles seen in TP2 and 3 but exhibited a better developed occupation zone and buried soil profile at a depth of *c*. 100-180cm (Figs. 3, 11 & 13). This test pit profile exhibited a *c*. 75cm accumulation of stony, highly organic silt loam hillwash and midden material overlying multi-layered occupation deposits and a basal buried soil. The buried soil comprises two horizons, a *c*. 15-20cm upper horizon of pale brown silty clay over another 60-65cm of pale greyish brown silty clay with occasional gritty inclusions and rare larger stones. At a depth of approximately 1.8m the natural degraded bedrock was reached. Although no buried A horizon survives in this profile, it does appear that there is survival of upper and lower B horizon material over a weathered B/C substrate. Test Pit 4 was sampled for micromorphological analysis of the buried soil and interface with the natural. In addition, samples for geo-chemical and particle size analysis were taken from the main stratigraphic layers.

Test Pit 5 was similar to TP1 in terms of its shallow two-horizon stratigraphy. Beneath the modern ploughsoil was *c*. 35-40cm of stony silt loam colluvium on the weathered natural. Plough-scars were evident in the upper surface of the weathered substrate at a depth of *c*. 50cm showing the depth of recent ploughing practices.

Test Pit 6 shows again that soil profile is shallower along the middle of the 'shoulder' area with a depth of *c*. 50-55cm, although there is greater depth of the profile here than at either TP1 or TP5. Additionally a *c*. 50cm deep, small circular pit (F3) defined at its base which was filled with a stony silt loam similar to the overlying colluvial material. Another small feature (F5) was excavated in TP6, but this is likely to be the result of animal burrowing.

Test Pit 7 exhibited a ploughsoil over a *c*. 70-95cm depth of stony silt loam hillwash that had accumulated on the degraded natural or B/C over a depth of *c*. 100-110cm. In the western edge of the trench, a post-hole (F2) defined approximately 40cm below the surface, cut into the colluvium and therefore relatively modern.

Test Pit 8 exhibited a different profile more akin to Test Pits 4 and 5 from 2012 with a complex stratigraphy that is probably related to multiple phases of prehistoric human occupation (Figs. 3 & 13). The topsoil was a dark brown, organic-rich sand silt, beneath which was a *c*. 10-20m thick lens of colluvium. Below were multiple layers of very loose, dark black/brown fine sandy silt extending to a depth of *c*. 100cm which were rich in fine charcoal and bone fragments. A bulk sample was taken of this organic midden deposit for environmental analysis. Towards the base of the profile at *c*. 100-115/120cm there was a zone of 'micro-lenses', consisting of alternating layers of dark brown, blackish brown and paler brown, very loose silty sand. The basal horizon at *c*. 115/120-130cm was a pale yellow/white silty sand dominated by phytolith material which may be the remains of some kind of organic floor level. This hypothesis is furthered by the presence of a possible building foundation trench about 40cm in width located in the eastern part of the base of the trench. Samples were taken for micromorphological study, geo-chemical and particle size analysis, and also to test for the presence of phytoliths.

In 2014, test excavation (TT1) of a complete sequence through the hill-top revealed a very deep and well preserved set of archaeological deposits. The trial trench was situated to just clip the backfill of the Benac's trench (Figs. 3, 12 & 13), and indeed did so with the western corner of the test pit in Benac's back-filled trench, but the remainder of the 2m long trial trench excavated through *in situ* archaeological deposits. The upper part of the sequence was composed of a *c*. 28cm thick dark brown silt loam with abundant stone and fired clay fragments throughout beneath the modern turf line. This could be the stabilised upcast from Benac's trench that effectively became the post-1956 topsoil/ploughsoil. Below this is a further *c*. 34cm of similar brown silt loam with abundant artefact inclusions. This is so thoroughly well mixed that it could have been ploughed in the past. At 82-85cm down-profile, there was a clear surface of *in situ* fired clay. The remainder of the profile also comprised *in situ* archaeological horizons and pit fills for a further depth of *c.* 1.65m (to a total depth of *c.* 2.7m; see App. 1). At a depth of *c.* 215-225cm in the western end of the trial trench, there appears to have been a remnant of the buried soil/old ground surface preserved from disturbance by the cutting of pits. The latter was sampled for micromorphological, physical and elemental analyses, as was the mixed loam/archaeological deposit overburden, and another possible surface at 180-190cm down-profile. Charcoal for radiocarbon assay was taken at 210-220cm down-profile from the upper contact of the possible old land surface, and yielded a radiocarbon date of 4067+/-29 BP or 2680-2548 cal BC (at 65.7% probability; GU38006).

Soil analyses

The hill-top areas

Test Pit 1 (2011) examined the hill-top ridge, about 100m to the south and outside of the oppidum hill-top, and Trial Trench 1 (2014) investigated the hill-top deposit sequence adjacent to Benac's 1956 trench (Figs. 3, 8 & 12).

Test Pit 1 (2011)

The pH values within the oppidum deposit sequence were all circum-neutral to weakly calcareous with values ranging from *c.* 6.2-6.7, but outside the site to the north the pH was more calcareous (*c.* 7.6-7.7) (Table 1). In all cases, the magnetic susceptibility values were low (Table 1). The latter suggests that there was no actual burning *in situ*, even if there were abundant fragments of fired clay throughout the archaeological sequence. What is noticeably enhanced are the barium and phosphorus values, corroborating the settlement organic refuse accumulation and feature fill aspects of the deposits, especially wood ash and rotting vegetal matter, with the high manganese values attesting to the frequent sesquioxide mottling of both the soils and archaeological deposits.

Two samples were taken for micromorphological analysis from the *c.* 43cm thick soil profile beneath the modern topsoil. Both samples were a very fine sandy silt clay loam with a vughy to pellety structure (Fig. 15a) with only the slightest hint of a very weakly developed fine irregular blocky soil structure. Dusty or impure clay predominated within the groundmass giving a striated to reticulate aspect, with dusty clay coatings increasingly lining the voids down-profile, often as crescentic infills (Fig. 15b). In addition there were common, very fine sand-size fragments of pure clay throughout, which are probably a weathering product of the local bedrock.

The abundant very fine quartz sand and silt component is indicative of some aeolian or loessic input to the weathering complex that this soil formed on. The strong and reasonably well organised clay component also suggests that a good degree of soil development and stability had existed in the past. But the illuvial dusty clay coatings within the voids down-profile testify to the disturbance to the upper part of this profile through modern ploughing, rather than past human activities. Thus the palaeosol appears to be a reasonably well-developed argillic brown earth with a strong loessic component that has undergone much recent disturbance.

Test Trench 1 (2014)

The pH values in the main fills of this trial trench were all circum-neutral, with low magnetic susceptibility values despite the large quantities of fired clay found throughout the deposit sequence (Table 1). Barium and phosphorus values were strongly enhanced, especially in the organic midden-like accumulations in the upper one metre where features do not define.

The soil micromorphological analysis indicated that basic fill matrix was composed of a very fine sandy/silty clay loam with abundant micro-anthropogenic debris throughout (Figs. 14a-d). The fine groundmass was dominated by dusty (or silty) clays, and moderate to strong staining with amorphous sesquioxides. The anthropogenic debris included a few pottery sherds, common fine fragments of fired clay, common very fine to coarse charcoal fragments, minor amorphous iron replaced organic matter and a few aggregates of calcitic ash. The possible buried soil at the base of the sequence (+215cm below ground surface)

Sample	pH	MS Si/g	Ba ppm	Ca %	Cu ppm	Fe %	Mg %	Mn ppm	P ppm	Pb ppm	Sr ppm	Zn ppm
TP1 (2011):												
25-30cm	7.67	5.73	150	0.1	20	3.02	0.53	2010	640	20	10	69
40-45cm	7.77	2.6	120	0.11	18	1.92	0.54	870	880	19	10	67
TT1 (2014):												
50-60cm	6.7	3.59	430	0.76	70	3.34	0.32	2500	4240	28	61	156
80-90cm	6.22	3.3	320	1.68	71	2.8	0.32	1980	6150	18	128	164
180-190cm	6.47	1.29	110	0.37	32	3.71	0.29	1450	1500	29	24	92
215-220cm	6.48	2.06	160	0.41	18	2.36	0.38	1030	1660	11	24	75

Table 1. *pH, magnetic susceptibility and selected multi-element (ICP-AES) analyses from the hill-top test excavations*

exhibited a similar composition to the deposits above, but it did not contain much anthropogenic debris and there was clear stratigraphic break at about 216/218cm, so it is suggested that it is indeed a truncated old land surface.

The soil outside the monument and at the base of Test Trench 1 and the soil comprising the archaeological make-up/back-fill of Test Trench 1 were essentially a similar fine sandy/silty clay loam with abundant clay coatings and infills throughout. This is indicative of the clay-rich subsoil, but also the weathering complex forming stable argillic brown earth soils on this ridge prior to the Neolithic and later settlement activity on the Zecovi ridge. There are comparable prehistoric fill deposits and buried soils at the contemporary site of Topica Brdo in a similar location on the other side of the valley.

The northeastern 'shoulder' area

The pH values of the modern soil/midden/buried soil horizons in the test pit profiles on the Zecovi 'shoulder'area range from *c*. 6.25 to 7.8 (Table 2). The deposits are normally weakly calcareous, becoming slightly more calcareous with depth, with the only circum-neutral pH values found in Test Pit 8.

In the multi-element analysis (Table 2), the topsoil exhibits low phosphate values and therefore suggests an absence of modern fertilisers being used. But, the hillwash and midden deposits above the buried soil exhibit strong to very strong enhancement with phosphorus (P), with enhanced levels of barium (Ba) and manganese (Mn), and slightly enhanced values for iron (Fe), Strontium (Sr) and zinc (Zn) (Table 2). In particular, the phosphorus values are very high, ranging from 5820 to >10,000ppm, which is extraordinary. This suggests that much of the humic material of the profile is composed of rotting organic matter, which accords well with the highly humified organic aspect of the thin sections (see below), and the large amounts of micritic ash and the fine bone fragments present in the middle part of the soil profile. The high organic component could well be derived from bedding material of barn/byre rake-out and stabling, urine-rich deposits. Similarly with barium, the values are reasonably high with a range of 330-510ppm. This suggests that there is a considerable quantity of wood ash in the deposits, no doubt derived from nearby settlement hearths. The strontium and zinc values are also weakly enhanced, and these also are suggestive of plant processing debris (Fleisher and Sulas 2015). Again, this serves to corroborate the high quantities of very fine to fine charcoal, frequent humified and silicified plant remains, and common zones of micritic ash observed in thin section (see below).

The magnetic susceptibility values are generally low (Table 2) and these probably reflect the absence of *in situ* burning, rather than just the inclusion of burnt organic material such as wood ash and the occasional fragments of burnt soil or bone. Nonetheless, there are some very enhanced levels evident in the lower midden and old land surface levels of Test Pits 5 (2012) and 8 (2013), which appear to signify that these levels are indeed old surface horizons and have been exposed, and were probably trampled and had

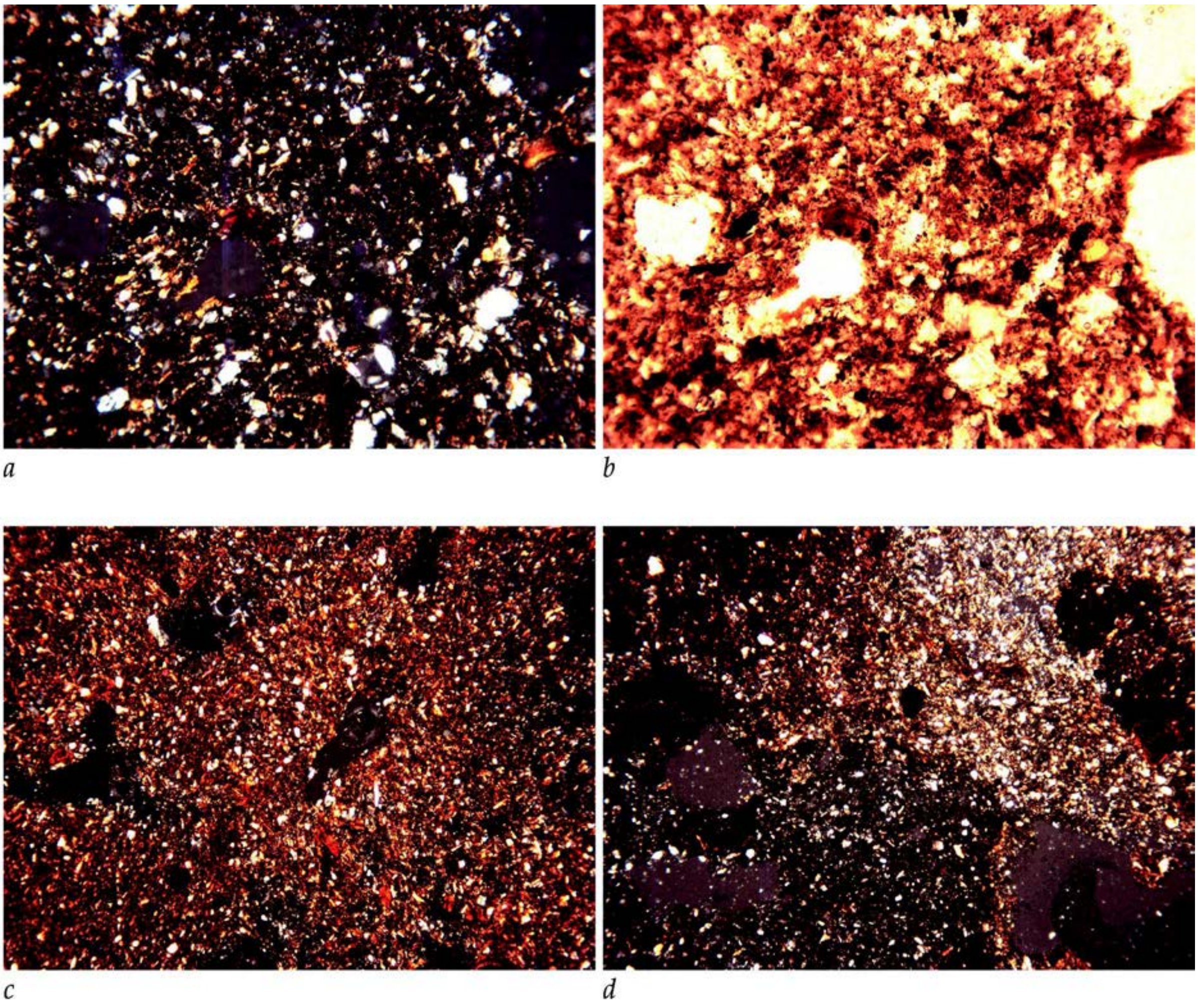


Fig. 14. *Test Trench* 1 *soil photomicrographs* (C. French/D. Redhouse)*:*
a. Photomicrograph of the humic very fine sandy/silty clay loam with dusty clay infills and coatings, Sample 23 *(frame width* = 4.5mm*; cross polarized light); b. Photomicrograph of the humic very fine sandy/silty clay loam with dusty clay infills and coatings, Sample* 23 *(frame width* = 2.5mm*; plane polarized light); c. Photomicrograph of the pure and dusty clays throughout the matrix, Sample* 22 *(frame width* = 4.5mm*; cross polarized light);*
d. Photomicrograph of the mixed feature fill of wood ash (lower half) and the humnified and/or iron stained fine sandy clay (upper half), Sample 18 *upper (frame width* = 4.5mm*; cross polarized light)*

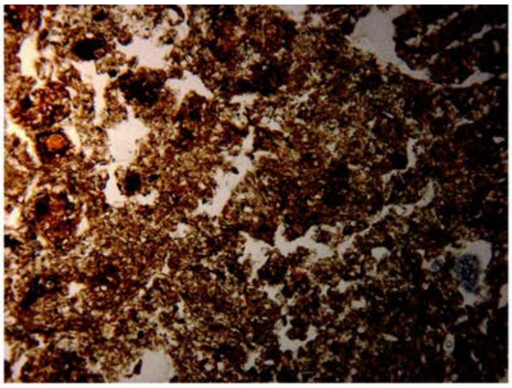
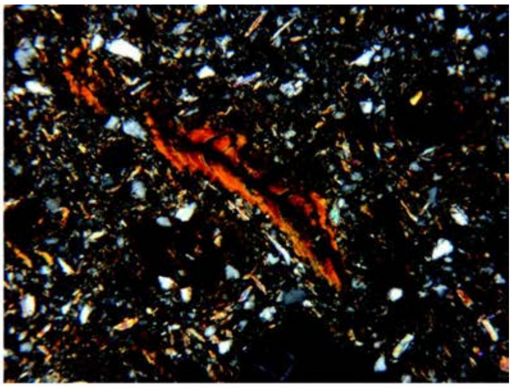
burning activities taking place on them associated with settlement use.

The soil micromorphological analyses

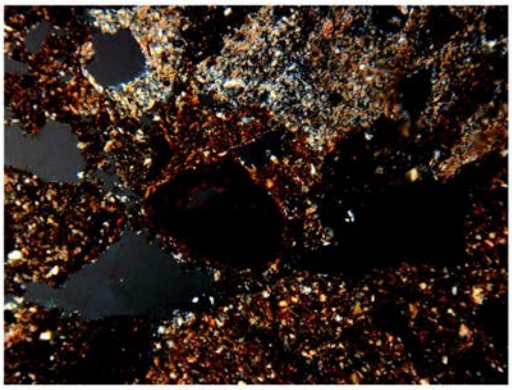
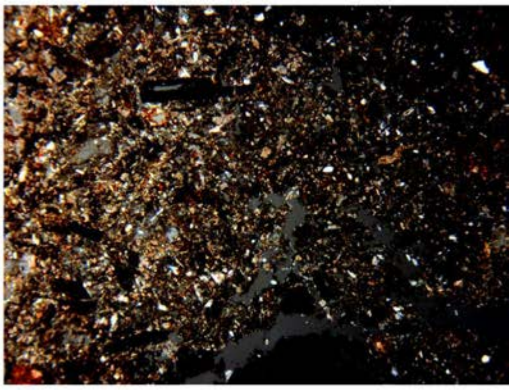
Test Pit 4 (2012 the modern turf line, below which was)

The upper sample from the midden horizon (4/1; 55-69cm) was composed of a heterogeneous mixture of very fine sandy silty clay loam in pellety to irregular aggregates similar to the soil fabric in Test Pit 1 (*c.* 50%), but with the inclusion of wood ash with abundant fine charcoal (*c.* 30%), irregular aggregates of amorphous iron 'cemented' clay and sparite calcium carbonate (*c.* 20%), and rare fragments of burnt and unburnt bone (Fig. 15c).

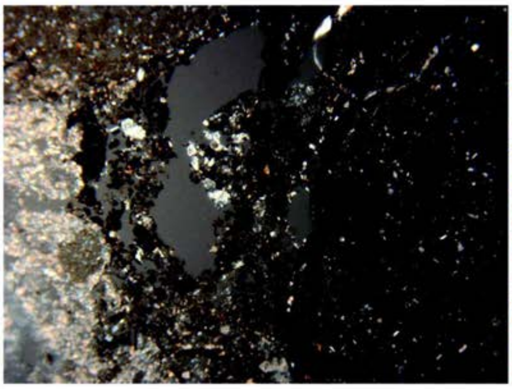
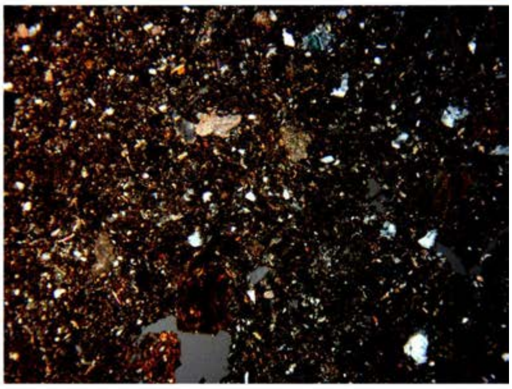
The transitional sample (4/2; 80-92cm) to the underlying buried soil is essentially composed of a similar heterogeneous mixed fabric of calcitic ash with fine charcoal fragments, plant tissue fragments and the very fine sandy silty clay loam soil fabric (Figs. 15d & e). The upper *c.* 7cm of the *in situ* buried soil below is composed of similar material, but which is organised in large aggregates of 1-3cm in size. This is suggestive of much physical disturbance of the upper part of the palaeosol profile.

a *b*

c *d*

e *f*

Fig. 15. *Test Pits* 1 *and* 4 (2011) *soil photomicrographs* (C. French/D. Redhouse)*:*
a. Photomicrograph of the pellety very fine sandy silty clay fabric, Sample 1/1*, Test Pit* 1 *(frame width* = 4.5mm*; plane polarized light); b. Photomicrograph of the reticulate striated fabric with a pure to fine dusty crescentic clay infill of a void, Sample* 1/1*, Test Pit* 1 *(frame width* = 2.5mm*; cross polarized light); c. Photomicrograph of the heterogeneous mixture of very fine sandy silty clay loam in pellety to irregular aggregates, wood ash with abundant fine charcoal and irregular aggregates of amorphous iron 'cemented' clay and sparite, Sample* 4/1*, Test Pit* 4 *(frame width* = 2.5mm*; plane polarized light); d. Photomicrograph of the heterogeneous mixed fabric of calcitic ash with fine charcoal fragments and the very fine sandy silty clay loam soil fabric, upper part of Sample* 4/2*, Test Pit* 4 *(frame width* = 4.5mm*; cross polarized light); e. Photomicrograph of partially humified and calcite replacement of plant tissue, Sample* 4/2*, Test Pit* 4 *(frame width* = 2.5mm*; cross polarized light); f. Photomicrograph of the very fine sandy silty clay loam fabric with included micritic ash and fine charcoal, Sample* 4/3*, Test Pit* 4 *(frame width* = 4.5mm*; cross polarized light)*

Sample	pH	MS Si/g	Ba ppm	Ca %	Cu ppm	Fe %	Mg %	Mn ppm	P ppm	Pb ppm	Sr ppm	Zn ppm
TP4 (2011):												
0-10cm	7.28	4.19	530	4.34	64	2.75	0.48	2480	>10000	20	201	276
30-40cm	8.1	1.95	590	6.12	62	2.66	0.59	2380	>10000	16	266	256
70-80cm	7.85	4.7	250	1.45	49	3.39	0.34	1570	5320	25	76	173
110-120cm	7.82	1.43	220	1.31	55	3.33	0.33	1560	4870	27	61	145
130-140cm	7.71	1.45	220	8.83	60	3.43	0.31	2030	2680	39	32	160
TP5 (2012):												
Pr 10, 0-10	7.83	1.52	380	1.16	68	3.04	0.4	2120	5820	31	105	195
Pr 10, 30-40	7.6	458.4	520	2.96	60	2.32	0.5	2470	>10000	17	233	239
Pr 10, 65-70	7.45	1.53	450	5.25	72	2.03	0.69	1795	>10000	14	255	271
Pr 10, 90-95	7.5	383.5	480	3.91	81	2.64	0.37	2540	>10000	16	218	226
Pr 10, 95-100cm	7.52	383.7	440	3.29	55	2.66	0.34	2290	9580	17	187	204
Pr 11/1	7.35	1.85	500	3.83	82	2.3	0.65	2160	>10000	16	240	285
Pr 11/2	7.3	1.97	510	4.07	83	2.0	0.72	1950	>10000	14	226	267
Pr 11/3	7.4	579.3	330	2.17	57	3.2	0.3	1955	9030	24	163	178
Pr 12, VIII 05	7.5	2.44	510	5.92	64	1.94	0.8	2490	>10000	15	276	280
TP4 (2013):												
TP4/1	7.23	1.34	220	0.83	60	3.43	0.31	2030	2680	39	32	160
TP4/2	7.2	1.56	260	0.92	85	3.58	0.27	2060	2990	41	36	162
TP4/3	7.22	1.56	130	0.4	60	4.32	0.11	1730	1660	33	19	81
TP4/4	7.22	1.55	140	0.42	61	5.65	0.12	2290	2450	39	26	111
TP4/5	7.3	1.55	50	0.14	37	3.31	0.07	1330	420	30	11	39
TP8 (2013):												
TP8/1	6.25	2.55	470	1.92	79	3.29	0.47	2430	>10000	23	153	260
TP8/2	6.5	188.7	390	3.07	76	2.35	0.41	1670	>10000	17	213	266
TP8/3	6.28	111.8	450	2.92	57	2.04	0.41	2600	>10000	14	185	272
TP8/4	6.5	651.2	610	5.01	54	1.95	0.81	3120	>10000	9	270	214

Table 2: *The pH, magnetic susceptibility and selected multi-element (ICP-AES) analyses for Test Pits* 4 *and* 5 *(*2012*, Profiles* 10-12*) and Test Pits* 4 *and* 8 *(*2013*) from the 'shoulder' area excavations*

The lowermost sample (4/3; 120-130cm) is essentially a similar soil fabric to that observed in Test Pit 1 (see above), although there were much less frequent infills of dusty clay in the channels and voids, and also some minor inclusions of the midden-type material such as fine charcoal, bone and plant tissue fragments, and calcitic ash (Fig. 15f).

Thus the whole buried soil profile beneath the midden material has been much disturbed and mixed in the past, probably by physical disturbance and much bioturbation, essentially caused by the soil fauna living and eating the large volume of organic matter deposited on this soil. The palaeosol is a similar argillic brown earth to that observed in Test Pit 1, but includes much fine settlement derived organic remains and wood ash. This thick midden accumulation appears to have incorporated the former organic A horizon of the palaeosol along with hearth rake-out ash material, fine charcoal and plant matter.

Test Pit 5 (2012)

Five thin section samples were taken through the east facing section of Test Pit 5 (Profile 10, samples 1-4 and Profile 12, sample 1) and an additional three block samples were taken from the opposite west facing profile (Profile 11, samples 1-3).

The thick midden deposit (samples 10/1 and 11/1/upper) is characterised by a small aggregated to pellety fine sandy clay loam which is dominated by dusty or impure silty clay, abundant

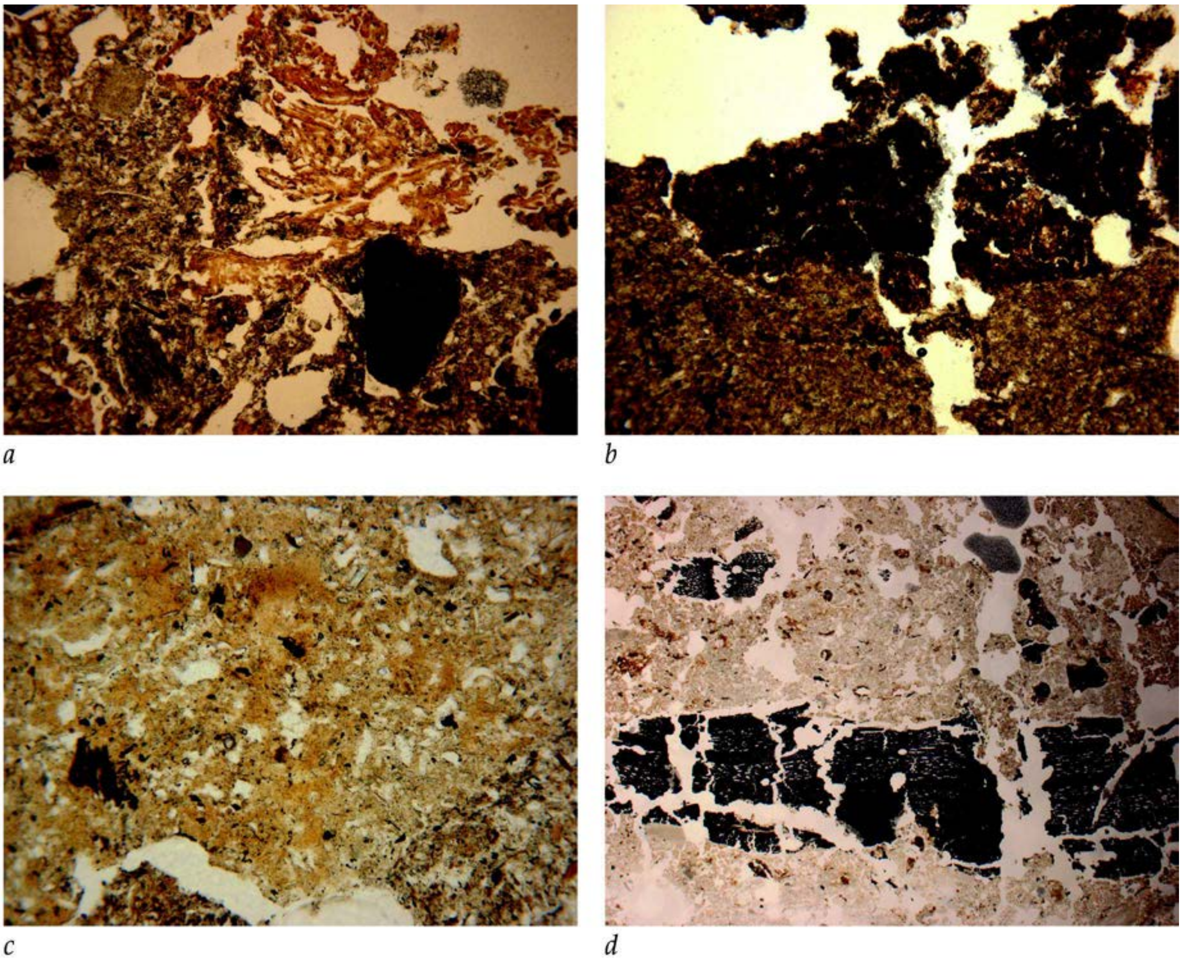
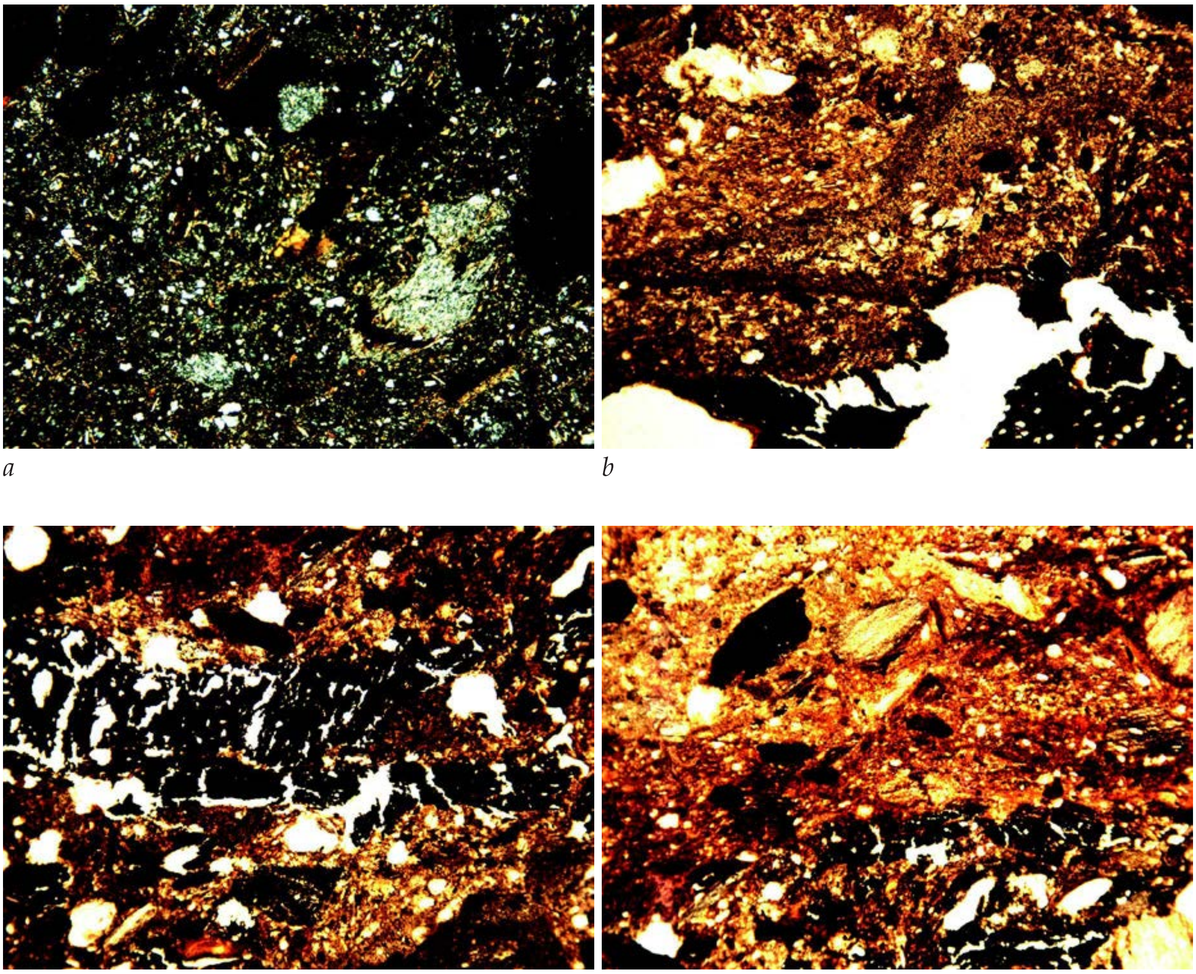


Fig. 16. *Test Pit* 5 (2012) *soil photomicrographs* (C. French/D. Redhouse)*: a. Photomicrograph of micritic ash with abundant fine fragments of uncarbonised and partly humified and silicified plant remains, many phytoliths and recognisable fragments of grass stems and leaves, as well as anthropogenic inclusions of pottery fragments, unfired clay aggregates and degraded bone, sample* 10/3 *(frame width* = 4.5mm*; plane polarized light); b. Photomicrograph of the upper surface contact of the compacted micritic ash and silty clay with the humic silty clay above, sample* 10/4 *(frame width* = 4.5mm*; plane polarized light); c. Photomicrograph of the considerable quantities of included degraded bone (i.e. amorphous yellow areas) in the upper surface contact, sample* 10/4 *(frame width* = 2.25mm*; plane polarized light); d. Photomicrograph of the micritic ash fabric with horizontal organisation of wood charcoal fragments, sample* 10/4 *(frame width* = 2cm*; plane polarized light)*

fine fragments of plant matter and charcoal. It generally exhibits strong fine humic staining and impregnation with amorphous sesquioxides (or iron oxides and hydroxides). The fine plant tissue fragments appear to be the partly silicified fragments of grasses (which could include wheat for example). There are also a few pure clay coatings of some channels, as well as rare small bone fragments, sub-rounded aggregates of fired clay and a few zones of calcitic ash. In sum this appears to be a very humic, fine sandy/silty clay soil that incorporates many fine fragments of various types of anthropogenic debris such as bone and fired/unfired clay.

The possible stabilisation horizon at the base of the midden deposit in sample 10/2 (*c*. 60-73cm) is essentially of a similar composition to sample 10/1 above, but it contains considerable quantities of micritic ash (5-10%) and more pot, bone and plant fragment inclusions, and in particular many phytoliths and recognisable fragments of plant stems and leaves.

The underlying grey horizon at *c*. 73-80cm (samples 10/3 and 12/1) was predominantly composed of micritic ash with abundant fine fragments of uncarbonised and partly humified and silicified plant remains, many phytoliths and recognisable fragments of grass stems and leaves, as



a *b* *c* *d*

Fig. 17. *Test Pit* 4 (2013) *soil photomicrographs* (C. French/D. Redhouse)*: a. Photomicrograph of the sandy/silty clay loam fabric with fine stone, fine charcoal and dusty clay coatings in the groundmass and voids, sample* 0005 *(frame width* = 4.5mm*; cross polarized light); b. Photomicrograph of fine sandy/the finely lensed/laminar wood charcoal, fine stone and organic silty clay loam soil, sample* 007 *(frame width* = 4.5mm*; plane polarized light); c. Photomicrograph of lens of partly humified/partly carbonised wood charcoal, sample* 007 *(frame width* = 2.25mm*; plane polarized light); d. Photomicrograph of wood charcoal and amorphous iron cemented sandy/silt, sample* 007 *(frame width* = 4.5mm*; plane polarized light)*

well as anthropogenic inclusions of pottery fragments and unfired clay aggregates (Figs. 16a & b).

The sample (10/4) taken at the basal contact of the occupation material at *c*. 82-100cm was a compact micritic ash and silty clay with considerable quantities of included degraded bone at its clear upper surface contact (Fig. 16c), with horizontally organised wood charcoal fragments evident beneath (Fig. 16d).

The three samples taken from the midden deposits (samples 11/1 and 11/2) and the possible floor zone at the base of the profile (11/3) exhibit a similar picture to that described above for Profile 10. The midden deposit is characterised by a humic and amorphous iron stained fine sandy clay loam dominated by dusty clay with occasional silty clay infills in the channels as well as abundant included fine fragments of plant matter, charcoal and degraded bone, which rapidly becomes dominated by calcitic ash with abundant phytoliths present in its lower half. The basal contact zone is a similar micritic ash with abundant zones of very degraded bone.

Test Pit 4 (2013)

Three samples were taken from the buried soil sequence in the 2013 Test Pit 4. The buried soil (context 0011) was a very fine sandy/silt loam with common fine gravel and dusty clay throughout the groundmass as partial coatings/infills of the void space. The heterogeneous mixture of components as well as the dusty clay component suggests that this soil has witnessed much disturbance and mechanical mixing in the past. In soil horizon terms, the thick horizon encountered is indicative of B horizon material.

The context 0005 material above was composed of a fine sandy silt loam similar to the buried soil beneath although it was more massive, less porous, more humic and exhibited more dusty clay infills of the voids (Fig. 17a). There is also common very fine and fine charcoal, organic staining of the whole matrix, and occasional sub-rounded fragments of fired clay suggesting that there is much included human occupation-derived material present in the soil matrix. It is suggested that this *c.* 20cm thick zone is a combination of *in situ* organic A horizon material but which has received much intermixed anthropogenic material, and within-soil illuviation of fines (silt and clay) as a result of the disturbance of the bare and open surface above.

The sample from context 0007 was characterised by an upper *c.* 1cm thick zone of alternating, horizontally bedded laminae of carbonised, organic silt and amorphous iron cemented sandy silt (Figs. 17b-d). This grouping of successively finely lensed anthropogenic and soil material is suggestive of occupation accumulations at the contact surface of the weathered B/C substrate. Both larger fragments of wood charcoal were present, along with a common fine 'dust' of very fine charcoal and humified organic matter. If this is indeed the case, it strongly suggests that the soil above is secondary and therefore probably a colluvially deposited deposit which underwent pedogenesis subsequently.

It is clear that this sequence is a variation on the same theme as seen in Test Pits 4 and 5 from the 2012 test excavations. There is much less midden material present, and in particular very little wood ash present, but there is hillwash material developing on an occupation surface, which is located on a very truncated old land surface, when then becomes buried by hillwash and develops into a highly disturbed soil.

Interpretative discussion

The soil micromorphological analysis from the Zecovi test pits indicate that the northeastern 'shoulder' slope profile is mainly comprised of very humic, bioturbated, silty clay loam midden material that is predominantly composed of a considerable thickness of humified and silicified organic matter. This midden material is situated above either possible 'floor' surface levels that are marked by dense deposits of fine-medium gravel, and/or calcitic wood ash, or the remnants of a truncated lower B horizon of a buried soil. The lower 'floor' appears to have also been deposited on midden derived, ash and plant rich material. There is almost no buried soil surviving on much of this slope.

The phytolith and probably grass-stem-rich ash that is the most common matrix forming both the floor levels and the midden material is probably produced by low temperature burning of organic material that preserves the siliceous structures of phytoliths and diatoms[14]. This is entirely consistent with the temperature range of a cooking fire or hearth, around *c.* 500 degrees C or less. It is suggested that much of the midden, and indeed the 'floor' surfaces are actually formed of organic, and in particular grass and wheat, food processing debris, or trampled-in organic floor surfaces composed of reed/wheat stems for example. Indeed this is corroborated by the highly enhanced total phosphorus and slightly enhanced barium, strontium and zinc levels in this profile sequence.

The 'floors' themselves are more of a compacted surface than a constructed floor. They are composed of a dense calcitic wood ash which contains with abundant degraded bone within its surface. This is essentially bone that is halfway to the secondary phosphatic mineral, apatite[15]**.** This is unusual to see, as one would expect good bone preservation given the otherwise calcareous matrix and the well preserved larger bone fragments that were recovered during excavation. This suggests that this material could well have been 'kicking around' on a ground surface for some time prior to its incorporation in the 'floor' matrix, and/or it has been degraded through some other processing activity prior to becom-

[14] McDonnell 2001

[15] Ascenzi 1969, 527.

ing throw-out. This feature will require further investigation through phytolith and macro-botanical analyses.

No clear buried soil was present. This could be due to earlier erosion of the palaeosol downslope, perhaps associated with earlier prehistoric human activities, as well as bioturbation that has thoroughly mixed anthropogenic debris throughout with the 'natural' silty clay soil. But, as observed at most sites investigated within the Prijedor region, the natural Holocene soil type appears to be a silty clay loam with a considerable very fine sand and illuvial silty clay component. The very fine sand and silt components are suggestive of a wind-blown loessic component to this clay-enriched or argillic brown earth soil type. This soil would most probably have supported woodland. It would have been moisture retentive and stable as long as it was well vegetated, but as soon as it became cleared this soil would have been easily susceptible to slope erosion processes. Indeed slope erosion or colluvial processes are often seen in the present day landscape leading to both gullying and mass slumping on the hill-slopes and soil accumulation at the foot of slopes. This process would have undoubtedly occurred in the past, especially where there was cleared and or bare arable land extant in the winter months.

An assessment of the pottery

Aleksandar Jašarević

Systematic research of ceramic finds from excavations is one of the most important sources of information about prehistoric societies in traditional European prehistoric archaeology. In most cases, the basic chronological framework for most periods in various regions of Bosnia is based only upon the development of pottery styles.[16] Particularly in areas where metal finds are absent or where metals finds are not preserved as a statistically reliable source material, ceramics serve as a primary source of information, especially as pottery is usually the most common category of finds. A major problem that is regularly encountered is the absence of reliable absolute dates related to stratigraphic contexts to provide reliable pottery chronologies. Besides their basic chronological function, ceramics may also be viewed as multi-functional bearers of information regarding the origins, zones of influence, religious practices, contextual function and/or ethnic associations of people in the past.

Considering all the finds from the fieldwalking and test pits at Zecovi, pottery is the most frequent artefact type present with about one thousand specimens recorded. Such a considerable quantity of pottery is not surprising as pottery production was potentially one of the most important activities of the settlement's inhabitants. The pottery material from Zecovi is indicative of local production of rather uniform quality and technology of manufacture, and largely belongs to vessels for everyday use. There is no imported material, although foreign influences could be discerned on some vessels. It is suggested that 'old' or existing vessel shapes of previous periods were maintained, but also enriched with new and more sophisticated ornamental motifs.

Although Zecovi is one of the most important later prehistoric stratified sites in Bosnia, the new test excavations contained both occupation/midden and hillwash materials that were depositionally mixed. Thus the pottery assemblages were also mixed throughout the profiles and consequently further analysis of ceramics material is possible only on the basis of stylistic and typological characteristics.

The chronological framework for the settlement at Zecovi is so far only determined by the typology rendered by the pottery assemblage. Nonetheless, a basic chrono-typological division of the archaeological material from Zecovi, primarily using pottery, was originally given by Benac[17]. He divided material into five phases, Zecovi I-V, which with some additional changes in certain types is still applied today.[18]

Analysis

A single fragment of Late Eneolithic bowl was found in Test Pit 1 of 2012 from the ploughzone (Fig. 18, Tab 1, 1). This bowl fragment is decorated with the combination of notching and deep engraving which suggests that it belongs to phase C of the Vučedol Culture or its local variants of

[16] Čović 1965; Jamaković / Žeravica 2010; Gavranović 2011.

[17] Benac 1956.

[18] Gavranović 2007, 52-53.

western Bosnia/Hrustovača-type[19]. Such wares have been dated elsewhere to the 3rd millennium BC. This is significant, bearing in mind that there is a large settlement on the Zecovi hill-top adjacent with a very thick cultural layer of late 1st millennium BC date[20]. This may be suggestive of a Late Eneolithic presence elsewhere on the hill-top.

The first larger quantity of typologically diagnostic pottery from the new tests pits belongs to the Late Bronze Age or Vis – Pivnica – Zecovi horizon. The pottery in all test pits exhibits characteristics of a Vis – Pivnica phase, but not in large quantities. The most diagnostic shreds are found in Test Pit 5 (2013) and Test Pit 4 (2012) (Fig. 18, Tab. 1, 2-3). The identified vessel forms include deep conical pots, a fragment of bowl with an inverted twisted rim, cups and beakers, probably with one or two handles (Fig. 19, Tab II, 4). There were also a few spindle whorls and wheels made of fired clay. The most common type of pots exhibit conical walls, a wide mouth with a vertical or slightly inverted rim, and a narrow flat base. A very small number of pithoi fragments where found in Test Pit 5, including rather rare fragments with a twisted rim. The pithoi are generally made from unrefined clay, they have thick walls that are not well polished nor well fired. Their colour varies from light brown, brown to reddish. The pithoi similar to pots could be decorated or undecorated. The ornaments were usually worn on the shoulder and have decoration that mainly consists of engraved lines, mostly hatched triangles or cord impressions. The engravings were made by some kind of sharp tool trailing over the soft unfired vessel surface. The fragments of body and rim do not belong to exceptionally large pots of the kind encountered at Vis and Brdašce, Late Bronze Age sites in northern Bosnia.[21]

Bowls prevail in comparison with other types of vessels. They mostly come in a conical shape with an inverted, twisted or faced rim, small tongue-shaped handles and flat base. They are well made from insufficiently refined clay but their surfaces were better finished and polished, and they were an important element of the household pottery inventory.

The pottery assemblage is generally similar or identical in shape and decoration to the material encountered at many sites elsewhere in the Danube basin, central Bosnia and Slovenia. The pottery of this stylistic and typological phase from Zecovi could be related to the pottery from phase II at Vis near Derventa for example, where there are possible analogies with the beakers that also have cord impressions on the shoulder and body.[22] Very similar material was found in the other parts of northern Bosnia, such as at Vrela, Pivnica, Sredelj, Crkvina near Doboj and Donja Dolina, where the authors date this horizon to the Hallstat B2-B3 period.[23] The pottery assemblage from the settlement at Brdašce, particularly from its later phase, could also be related to the material from Zecovi.[24] Similar decorative elements were used on the pottery from some sites in central Bosnia, that Čović[25] dates to the final Bronze Age. In Podunavlje, this horizon was identified as an Early Iron Age Kalakača horizon.[26]

Black burnished pottery also appears at Zecovi, but in a rather small quantity when compared to elsewhere in the region. It is very important for understanding the evolution of local pottery, based on autochtonous traditions. All relevant finds come from Test Pit 4 (in layers 3-5 & 9). Based on other diagnostic pottery finds from this test pit, they are younger than from the Vis-Pivnica horizon, but older than the Čarakovo horizon. A similar situation was found on other sites like Dobor (unpublished material in Doboj Museum) were luxurious black burnished pottery was also found in small numbers and is most probably a new tradition coming from the Podunavlje sites.[27] Appearances of this type of pottery are important in understanding the dynamics of trade and exchange, not just pottery goods, but also ideas in pottery manufacturing.

The largest quantity of pottery comes from the later phase of the Zecovi-Čarakovo horizon. More then 80% of all pottery finds from all tests

[19] Dimitrijević 1979, 308.

[20] Benac 1959.

[21] Marić 1960/1961, 158; Jamaković and Žeravica 2010, 50.

[22] Marić 1971, 76; Marić 1960/1961, 158-160.

[23] Marić 1960/1961, 161; Benac 1962, 26-27; Marić 1964, 27-29; Gavranović 2011, 7-13.

[24] Jamaković / Žeravica 2010, 50.

[25] Čović 1965, 59-60.

[26] Medović and Medović 2010, 18.

[27] Medović / Medović 2010.

Fig. 18. *Selected diagnostic pottery sherds,* Tab. I (A. Jašarević)

Fig. 19. *Selected diagnostic pottery sherds,* Tab. II (A. Jašarević)

Fig. 20. *Map of Vučedol cultural expansion in its late phase* (after Durman 1983, 1005)

pits belongs to this stage. Large quantities of vessels from Čarakovo phase were made from well refined clay, of fine fabric with thin walls and polished to a high lustre. The vessels are of various colours from light grey to dark grey, brown, black, ochre, reddish-brown, sometimes with darker stains resulting from the firing process. Despite large quantity of fragments only few vessels could be reconstructed, all from a late phase. Pots are of conical shape with wide mouth and narrow base. The rim is flat or horizontally everted. Most of them are of crude manufacture, made of insufficiently refined clay with the addition of sand grains, pounded stone or other organic substances that increased the hardness of walls and prevented breakage during food preparation. Their surfaces were coated with liquified clay that was polished or rather smoothed before firing. There are also other methods of decoration including broom-like strokes and vertical or oblique trailing of the tool over a damp vessel in order to get broad bands. Both undecorated and decorated pots were found in the cultural layers at the site. Undecorated pots are rather scarce, while decorated pots usually have an applied band on the neck with fingertip impressions or short slanting notches. Sometimes, there are similar notches and applied bands with finger impressions also along the rim. The ornamental motifs are rather modest and limited to the use of variously arranged applied bands. There are also horseshoe-shaped applied bands with impressions and combinations of horizontal and vertical bands. It is very interesting that there is a large quantity of well preserved cups, not so much in their quantity but the fact that they are in good condition. They were made from better refined clay, with thin walls. They all come in forms with handles surmounting the rim.

Identical pottery forms and the best analogies for dating these ceramics come from the nearby Late Iron Age necropolis at Čarakovo.[28] The typical forms for this period are bowls and smaller cups with fluting decoration (Fig. 18, Tab.1, 5; Fig. 19, Tab II, 1 & 3). Generally they are close to other pottery finds from sites in northern Bosnia like Sanski Most and Donja Dolina.[29] They represent local production created according to models from the southeastern Alpine region, most probably Dolenjska.[30] The examples from Zecovi and Čarakovo should be somewhat later according to the gently rounded profile and smooth walls, like examples from Sanski which are mostly dated to the 5th or early 4th centuries BC.[31] The most interesting pottery finds belong to the highly polished bowl from Trench 1/2012 layer 1 (Fig. 18, Tab.1, 7), which also can be dated by analogy to the same period of the Čarakovo horizon. Very similar material has been found at the site of Klinac in Croatia dating to the same period.[32]

According to Potrebica the hillforts at Klinac near Petrinja and Pogorelac in Sisak could be a very important link into the complex inter-relations between northern Bosnia sites like Zecovi and the Eastern Alps in the Late Bronze Age to the end of the Early Iron Age.[33] The settlement at Zecovi probably had a very important role in the distribution and transformation of cultural impulses and elements of the material culture between northern Bosnian sites, including Donja Dolina, Dobor, Pivnica and at Kordun, Banija and several Slovenian sites.

The study of pottery material from Zecovi has provided us with the opportunity to reconstruct and comprehend certain cultural dynamics and relations taking place from Eneolithic to historical periods. Pottery represents the most important group of finds for cultural and chronological determination of the settlement at Zecovi. The pottery was mostly fragmented at Zecovi but it was possible to determine their chronological frame of use according to the styles and typologies represented.

Regional archaeological context

Tonko Rajkovača

It is probable that the Zecovi site was part of the Vučedol culture which represents the most significant late Eneolithic culture in southeastern Europe, which has at its peak occupied an even larger region (Fig. 20; Table 3). Although named after the eponymous site of Vučedol (in the vicinity of Vukovar, 6km to the east of Ljubljansko Barje), its original name was the Slavonian culture, a name given by Gordon Childe in 1929 which has remained in use until R.R. Schmidt's publication of 'Die Burg Vučedol'. Owing to its importance, the culture was investigated by a number of archaeologists, the most important being M. Garašanin, A. Benac, N. Tasić, S. Dimitrijević, N. Kalicz and R. R. Schmidt.[34]

The first identified site was Ljubljansko Barje, discovered in Slovenia over 100 years ago.[35] This site also gave it the name Ljubljana culture in the early days, after which the term Ljubljana culture is used for the Early Bronze Age culture in Slovenia. The earliest sites were identified from Slavonia and Srem, where the culture started expanding into the surrounding areas. Except for east Croatia and northern Bosnia, it is found in Vojvodina (Serbia), southern Slovakia, Hungary and lower Austria. The Vučedol site is another important site, practically unknown until 1933, when Victor Hoffiler published a significant assemblage from the site. The third site worth a mention is Zok in Hungarian Baranja.

The Vučedol culture exhibits great regional variety, both in terms of name, possible origins and cultural aspects.[36] Two of the most prominent settlement types are settlements on loess ridges along the rivers (e.g. Belegiš, Neštin, Lovas, Zemun, Vučedol) and those in dominant positions overlooking the area (e.g. Mitrovac). In Slavonia, the settlements are mainly found on loess ridges; while in Bosnia, where the landscape dictates hilly positions, they are mainly in dominant positions overlooking the surround-

[28] Čović 1956, 193-197.
[29] Marić 1964, 39-40.
[30] Dular 1982, 143-144; Potrebica 2003, 225.
[31] Čović 1987, 277; Raunig 1996, 50.
[32] Majnarić-Pandžić 1986, 35-36.
[33] Potrebica 2003.
[34] Marjanović 2003.
[35] Marjanović 2003.
[36] Dimitrijević 1979; Marjanović 2003.

ings as is the case with Zecovi and Topića Brdo in the Sana valley. The Vučedol culture also has strong connections with metallurgy, with sites always being positioned in areas rich in copper ores. It is a well-known that Bosnia and Herzegovina are rich in copper ores, found in form of chalcopyrite.

There are a number of models explaining the development of the culture that have been put forward by a range of archaeologists.[37] For example, these range from a Nordic origin (after Carl Schuchard and R.R. Schmidt), to an eastern Alps origin (after Pal Patay), to a southern origin (after M. Hoernes and G. Childe) to the autochthonous origin model (after J. Korošec, W. Buttler, A. Benac, N. Tasić, B. Jovanović). The latter model argues that the culture has developed from the elements intrinsic to the culture, as well as those from the Baden and Kostolac culture, with moderate influences from the steppe to the east. The separation of the early Vučedol culture and the establishment of the Kostolac culture in Slavonia and northern Bosnia created a way of successfully resolving the problem of the origins of the Vučedol culture.

Dimitrijević was the first to offer a periodization for this culture.[38] According to his chronology, Vučedol culture belongs to the late Eneolithic period, between about 2900 to 2000 BC. Certainly the radiocarbon dates available from the 2014 excavations at Zecovi and Topića Brdo, which centre on about 2500 cal BC, appear to equate very well with this cultural period.

Conclusions

The evaluation of the Zecovi hill-top and its immediate surroundings has added significant knowledge and understanding of how the site may have been used in the past. What is clear is that it is not just the site of a 1st millennium BC oppidum and Roman settlement as Benac discovered in the 1950s, but it has been an extensively used settlement area for at least the previous 2,000 years. There is the distinct presence of an earlier settlement of later Neolithic and Bronze Age date, with hints of earlier Neolithic material present in the pottery record, both on the hill-top itself as well as the 'shoulder' area on the northeastern side of Zecovi hill. In terms of new radiocarbon dates, the base of the deposits on the hill-top area are certainly of mid-3rd millennium BC or later Eneolithic date (2680-2548 cal BC; GU38006), with settlement on both the hill-top and shoulder area continuing into the later 1st millennium BC (519-384 cal BC; GU38007). In addition, an apparently contemporary later Eneolithic settlement site has been discovered and evaluated at Topića Brdo on the other side of the Sana River valley some 2km distant to the southeast, which has revealed thick midden deposits over *in situ* hearths and clay floors with a near contemporary mid-3rd millennium BC radiocarbon date of 3968+/-27 BP or 2573-2453 cal BC (at 95.4% combined probability; GU38005).

The field investigations at Zecovi are suggestive of two distinct areas of prehistoric occupation evidence. The hill-top area, as previously indicated by Benac's (1956) excavations, contains very well preserved, very thick (up to *c.* 2.75m) and extensive occupation deposits over at least the southern half of the hill-top area. The southern part of the hill-top contains an aggrading, tell-like, series of intercutting pits, old land surfaces, floor surfaces and occupation deposits, as well as the probable spread of much of Benac's excavation spoil over a wide area. There has also been widespread mixing effects of more recent plough agriculture affecting the upper *c.* 50-80cm of the profile on the hill-top. These span the period from about 2,500 cal BC to the first few centuries AD with a Roman occupation.

In contrast, on the northeastern 'shoulder' of Zecovi hill, there is a localised area of about 50 square metres of prehistoric occupation deposits preserved beneath a combination of hillwash deposits and later prehistoric (mainly Bronze and Iron Age) midden material. This was a thick, calcareous and much humified, phosphatic-rich deposit composed mainly of abundant, partly charred and partly humified organic remains. In places this is combined with eroded soil and/or buried by *c.* 50-75cm of sandy clay loam hillwash material. Much of this midden is perhaps indicative of plant processing waste, which in Test Pits 4 and 5 (2012) buried two possible former surfaces which appear to have been formed gravel and sand/silt with quantities of included calcitic wood ash and degraded, waste bone. These sur-

[37] Dimitrijević 1979; Marjanović 2003.

[38] Dimitrijević 1979.

^{14}C results of Vučedol and Corded Ware samples				
Site, phase	Provenience	Lab no.	^{14}C age	Calibrated range
			(BP)	(BC)
Vučedol culture				
Vučedol	Pit 6/85	Z-1637	4322±100	3077-2787
Vineyard	Pit 2/85	Z-1621	4314±100	3040--2785
Stream	Pit 14/85	Z-1447	4286±120	3040--2703
Pivnica		GrN-8010	4290± 60	3013-2788
Gomolava	Phase IIIb/17	GrN-13167	4210± 60	2910--2699
Hrustovača		GrN-8011	4165± 35	2881-2629
		BlN-564	4125± 80	2882-2581
Topića Brdo	TP2 138-40 cm	SUERC-61557	3968± 27	2573-2351
Zecovi	TP1/F3/ 210-220 cm	SUERC-61558	4067± 29	2850-2489
	TP4 130 cm	SUERC-61559	2361± 29	534-384
Parte	No.16	Z-539	3920±100	2573-2290
	No. 81	Z-540	4010±100	2858-2460
	No. 2	Z-647	4010±100	2858-2460
Vinkovci	Hotel	Z-1817	3809±138	2470--2039
	Hotel	Z-1818	3835±140	2551-2046
Rudine		Z-722	3750±110	2340--2030
Corded Ware culture				
Csepel (Hungary)	Pit2	GrN-6900	3945± 40	2557-2458
	Pit3	GrN-6901	3830± 55	2455-2200
		GrN-9231	3945± 35	2554--2459
Vikletice (Bohemia)	Grave 41	GrN-9379	3940± 35	2552-2458
	Grave 119	GrN-9481	3935± 35	2485-2457
	Grave 58	GrN-9482	3860± 35	2457-2290
Kesocha (Poland)	Grave	K-1836	3880±100	2554--2200
Miernow (Poland)	Barrow2, grave 2	K-1837	3960±100	2590--2340
Krivine-Golovsk (Byelorussia)		GrN-5125	4270± 40	2918-2788
Sitagroi	Phase Va	Bln-877	4170±100	2910--2590
(Greece)	Phase Va	BM-652	3803± 59	2346--2143
Ezero	Phase I/A_1	Bln-725	4120±100	2886--2506
(Bulgaria)	Phase IIA_1	Bln-726	4285±100	3030--2707
	Phase I/A_1	Bln-727	4315±100	3040--2785
	Phase IIB_1	Bln-429	4130±100	2888-2510
	Phase IIB_1	Bln-428	4260± 80	2923-2706
	Phase IIB_1	Bln-427	4365± 80	3095-2912

Table 3. *Radiocarbon dates from the region for the Vucedol culture and Corded Ware* (after Durman 1983)

faces are probably earlier Iron Age (6th-4th centuries BC) in date based on the pottery and one radiocarbon date from TP4 (2012) of 519-384 cal BC (GU38007), and appear to represent *in situ* settlement floor/yard surfaces and structures. The upper structural surface occurs on thin wood ash dominated midden deposits and the lower surface on a truncated and human modified palaeosol. In addition, on the surface and in the upper *c.* 50-75cm of the hillwash/midden deposits there are very large quantities of iron slag. This may be from the Iron Age and Roman periods, but may also reflect much more recent exploitation of the iron-rich bedrock outcropping on the margins of the hill-top.

The evidence from the buried soils and the augering survey of the adjacent floodplain indicates that the Zecovi landscape has been highly modified during the mid-later Holocene period. Initially, weakly acidic, humic and argillic or clay-enriched, brown earth soils developed on the hill-tops, probably under woodland, as in many other places in Europe and Britain at this time.[39] These had already become disrupted by the time of the Eneolithic occupation from the mid-3rd millennium BC, presumably by clearance and associated agriculture. These soils soon became eroded and truncated as a result of human use and activities. In later prehistoric times, most probably in association with the 1st millennium BC occupation of the hill-top and shoulder areas, both soil/organic midden accumulation and soil erosion increased and led to substantial accumulations of either anthropogenic debris and/or hillwash on the eastern flanks of the hill. At the same time, the adjacent floodplain was presumably subject to the aggradation of these eroded soils as overbank alluvial deposits, a process which probably continued throughout historic times (the subject of another current research project by French and Rajkovača). In addition, the deposition of alluvium from human intervention in the Sana catchment probably also led to the burial of an earlier palaeo-channel of the Sana River located at the foot of the Zecovi hill-slope. More recently, but at a time yet to be discovered, the modern river has become incised into this wide, silty clay filled, alluvial floodplain.

In conclusion, this site and landscape has presented the beginnings of a narrative of proto-urban settlement from the mid-3rd millennium BC continuing through the Bronze and Iron Ages to the Roman period in central Bosnia, but only future, grander scale, investigations will provide the detailed elaboration required to answer what the successive Zecovi occupations may actually be comprised of and their economic basis.

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[39] Bridges 1978.

Rezime

Nova arheološka i geoarheološka istraživanja na praistorijskom lokalitetu Zecovi kod Prijedora, Bosna i Hercegovina

Istraživanja samog lokaliteta kao i predjela oko lokaliteta Zecovi su umnogome doprinela našem razumijevanju o istoriji upotrebe lokaliteta i prirodnog okruženja koje mu pripada. Evidentno je da lokalitet nije bio u upotrebi samo u prvom mileniju pr. n. e., kao i u rimskom period (otkriven od strane Benca 1950tih godina), već je bio korišten kao naselje najmanje dva milenijuma ranije nego što se isprva mislilo. Otkriveno je izraženo prisustvo ranijeg naselja, datovanog u period kasnog eneolita i bronzanog doba, uz prisustvo rano eneolitskog materijala u keramičkom asemblažu, kako na vrhu, tako i na padinama sa sjeveroistočne strane brda Zecovi. Novi radiokarbon datumi su proizvedeni: za najranije slojeve sa vrha imamo datume koji nas vezuju za sredinu trećeg milenija pr.n.e. ili za period kasnog eneolita (2680-2548 cal BC; GU38006), pri čemu se okupacija naselja na vrhu i na padinama nastavlja u kasni prvi

milenij pr. n. e. (519-384 cal BC; GU38007). Šta više, naselje sa datumima iz istog perioda (kasni eneolit) otkriveno je i istraženo na lokalitetu Topića Brdo, sa druge strane doline rijeke Sane, neka dva kilometra ka jugoistoku. Na ovom lokalitetu, otkrivene su debele naslage kućnog otpada preko *in situ* ognjišta i glinenih podnica, datovane na sredinu trećeg milenija pr. n. e. (3968+/-27 BP or 2573-2453 cal BC (at 95.4% combined probability; GU38005).

Terenska istraživanja Zecova ukazala su na postojanje dvije izdvojene zone sa tragovima naseljavanja u praistoriji. Predio na samom vrhu, prethodno identifikovan od strane Benca (1956), sadržavo je izuzetno dobro očuvani sloj naselja, velikog prostiranja i debljine do 2.75m, kao i slojeve naseljavanja preko južne polovine prominentne pozicije na vrhu. Upravo ta zona sadrži seriju arheoloških cjelina, naslage nalik telu, jame koje 'sijeku' jedna drugu, tragove podnica, kao i vjerovatne ostatke zemljišta izbačenog za vrijeme Benčevih iskopavanja. Takođe je registrovano i miješanje slojeva zbog oranja koje je imalo uticaj na gornjih 50 do 80 cm profila na vrhu. Ovi slojevi zahvataju period od oko 2.500 godina pr.n.e. do prvih nekoliko stoljeća n. e. rimskog perioda.

U suprotnosti sa ovim, na sjeveroistočnom prevoju brda Zecovi, otkrivena je lokalizovana zona od nekih 50 kvadratnih metara naseljavanja iz praistorije, sačuvana ispod kombinacije slojeva zemlje spranih sa vrha i kasnijih praistorijskih slojeva (uglavnom bronzanodopskog i gvozdenodopskog materijala). Veliki dio ogranskog materijala otkrivenog u ovim slojevima je vjerovatno otpad od proizvodnje žitarica. U jamama (4 i 5) su takođe otkrivene podnice, vjerovatno iz ranije gvozdenog doba (6. do 4. stoljeća pr. n. e.), sudeći po keramičkom materijalu i jednom datumum iz TP4 (2012; 519-384 cal BC (GU38007)), kao *in situ* površine naselja, dvorišta, podnica i kuća.

Rezultati dobijeni analizom bušenja kroz slojeve pohranjenog zemljišta (bivših površina naseljavanja) u obližnjoj dolini pokazali su da je predio oko lokaliteta Zecovi bio modifikovan u srednjem do kasnom holocenu. Isprva nastali kao blago kiselo zemljište, organski i bogato glinom, smeđa zemlja je nastala na vrhu brda, verovatno ispod šume, kao širom Evrope u isto vreme (Bridges 1978). Ovo se mijenja u vreme eneolitskog perioda od sredine trećeg milenija pr. n. e., vjerovatno kao rezultat krčenja šuma i poljoprivrede. Ovo zemljište je ubrzo erodiralo kao rezultat korištenja od strane ljudi. U vreme kasnije praistorije, vjerovatno prvog milenija pr.n.e., akumulacija slojeva na vrhu je porasla, kao i erozija slojeva sa vrha ka dnu, što je dovelo do znatne akumulacije slojeva sa istočne strane brda. Istovremeno, obližnja dolina je poslužila kao predio gde se slojevi mogu slagati, process koji je vjerovatno nastavio da traje i u kasnijim periodima (predmet studije/ projekta koji je još uvek u toku od strane French i Rajkovače).

Konačno, sami lokalitet i predio oko njega izuzetno dobro ilustruju početke proto-urbanog naseljavanja od sredine trećeg milenija pr.n.e. sa nastavkom kroz bronzano i gvozdeno doba, kao i rimski period u centralnoj Bosni. Samo će buduća istraživanja većih razmjera moći da pruže detaljnije odgovore o karakteru naseljavanja i ekonomiji na lokalitetu Zecovi.

Prevela Vida Rajkovača

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New archaeological and geoarchaeological investigations of the prehistoric site of Zecovi, near Prijedor, Bosnia i Herzegovina

Appendix 1: Stratigraphic profiles of the test pits and palaeo-channel borehole 114

2011-12:

<u>Test Pit 1</u> (44 55.613N/16 41.152E)

0-18	brown silty clay loam; modern ploughsoil
18-36	greyish/yellowish brown silty clay loam; lwer A/upper B horizon
36-61	mottled yellowish to greyish brown silty clay loam; lower B horizon
61+cm	orangey/reddish brown silty clay; weathered B/C

<u>Samples taken</u>:

Small bulk samples at 0-10, 25-30, 40-45 and 55-60cm

Micromorphology samples at 13-23 and 41-55cm.

<u>Test Pit 4</u> (44 55.630N/16.41.191E)

0-20	very dark brown to black humic silty clay loam; modern Ah topsoil
20-60	reddish brown, aggregated loam; ?colluvial or made-ground deposit
60-95	dark greyish brown to black silt loam with common charcoal, artefacts, tile, etc.; midden/ occupation deposit
95-120	greyish brown silty clay mixed with fine gravel and common charcoal; ? possible floor/ occupation surface in/on upper B horizon
120-145	greyish brown silty clay with common sub-rounded chalk aggregates; lower B horizon
145+cm	pale greyish white calcareous silt and coarse gravel; B/C substrate

<u>Samples taken</u>:

Spot C-14 sample of charcoal at 115-120cm

Small bulk samples at 30-40, 70-80, 110-120 and 130-140cm

Micromorphology samples at 55-69, 80-92 and 120-130cm.

<u>Test Pit 5</u> (N 44 55.626/E 016 41.186)

East-facing section:

0-25	very dark brown to black humic loam; modern Ah topsoil
25-60	dark brown to black humic loam with common fine fragments of fired clay and charcoal, with abundant prehistoric pottery; midden/occupation deposit
60-73	dark brown silt with common charcoal; midden/occupation deposit
73-80	grey silt with lumps of fired clay and common charcoal; ? possible floor
80-100	dark brown silt with abundant wood charcoal; distinct charcoal lenses at 93-4 and 98-99cm, and large horizontal lumps of fired clay
100-102	grey clay; ? possible floor
102+cm	grey fine gravel and sandy silt; B/C substrate

West-facing section:

0-16	very dark brown to black humic loam; modern Ah topsoil
16-30	dark brown to black humic loam with common fine fragments of fired clay and charcoal, with abundant prehistoric pottery; midden/occupation deposit
30-45	laminar greyish white/ brown silt; possible floor levels
45-75	dark brown silt with abundant wood charcoal; occupation deposit
75-80	yellowish brown fine gravel and pea-grit; ? possible floor
80-100	dark brown silt with abundant charcoal; buried soil
100+cm	weathered stone; B/C substrate

<u>Samples taken</u>:

Charcoal and macro-botanical bulk samples at:

KV3 V 05 occupation deposit

KV6 V 05 occupation deposit
KV2 VIII 05 floor
KV1 XI 05 basal soil level
Small bulk samples from east-facing section at:
0-10, 30-40, 65-70, 90-95, 95-100cm
Micromorphology samples at:
East-facing section (Pr 10): 38-50, 54-66, 74-82 (+ duplicate), 82-100cm
West-facing section (Pr 11): 20-33, 33-46, 57-69cm

2013:

<u>Test Pit 1</u> (Grid square 6000/1000)

0-14	0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil
14-38	0002; dark brown silty clay with minor small stones
20-44cm	0007; pale yellow/orange silty clay loam with common degraded stone bedrock fragments; weathered B/C

<u>Test Pit 2</u> (Grid square 6020/1000)

0-10	0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil
10-18	0002; dark brown silty clay with minor small stones
18-80	0003; dark brown silty clay with frequent small/occasional large (>10cm) stones and occasional slag fragments
80-90	0009; pale brown/orangey brown silty clay with frequent small stones
90-100	0010; pale brown/orangey brown silty clay with frequent small-fine (<2cm) stones
100-125	0005; compact pale brown silty clay loam with minor small stones and rare charcoal fragments; buried soil
125-150cm	0007; pale yellow/orange silty clay loam with common degraded stone bedrock fragments; weathered B/C

<u>Test Pit 3</u> (Grid Square 6040/1000)

0-10	0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil
10-25	0002; dark brown silty clay with minor small stones
25-55	0003; dark brown silty clay with frequent small/occasional large (>10cm) stones and occasional slag fragments
55-113	0010; pale brown/orangey brown silty clay with frequent small-fine (<2cm) stones
113-122	0005; compact pale brown silty clay loam with minor small stones and rare charcoal fragments; spine of buried soil material between two cut features
F4:	
113-180	0020; medium to dark brown silty clay with occasional sub-angular stones (<5cm)
F1:	
120-187cm	0012; pale-medium brown silty clay with common angular/sub-angular stones (<10cm)

<u>Test Pit 4</u> (Grid Square 6060/1000)

0-8	0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil
8-26	0002; dark brown silty clay with minor small stones
26-100	0003; dark brown silty clay with frequent small/occasional large (>10cm) stones and occasional slag fragments
100-116	0005; compact pale brown silty clay loam with minor small stones and rare charcoal fragments; spine of buried soil material between two cut features
116-178	0011; pale brown silty clay loam with occasional fine gravel (<1cm) and rare large stones (>0cm)

178-189cm 0007; pale yellow/orange silty clay loam with common degraded stone bedrock fragments; weathered B/C

Samples taken:

Small bulk samples at 10-20, 40-50, 90-100, 110-120 and 180-190cm

Micromorphology at *c*. 105-112, 125-15 and 180-189cm

Test Pit 5 (Grid Square 5980/980)

0-16 0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil

16-56 0003; dark brown silty clay with frequent small/occasional large (>10cm) stones and occasional slag fragments

56-58cm 0008; orangey/reddish brown silty clay; weathered B/C

Test Pit 6 (Grid Square 6000/980)

0-17 0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil

17-42 0003; dark brown silty clay with frequent small/occasional large (>10cm) stones and occasional slag fragments

42-60 0008; pale yellow/orange silty clay loam with common degraded stone bedrock fragments; weathered B/C

F3:

60-112cm 0016; brown silt with frequent small angular/sub-angular stones (<2cm)

Test Pit 7 (Grid Square 6020/980)

0-15 0001; brown organic silt with occasional small stones (<5cm) and root matt; modern turf and topsoil

15-35 0002; dark brown silty clay with minor small stones
undulating boundary over *c*. 20cm

35-90 0003; dark brown silty clay with frequent small/occasional large (>10cm) stones and occasional slag fragments

90-109cm 0008; pale yellow/orange silty clay loam with common degraded stone bedrock fragments; weathered B/C

Test Pit 8 (Grid Square 5980/960)

0-5 0001; modern turf topsoil

5-26 0002; dark brown silty clay with minor small stones

26-43 0027; pale to mid-brown silt with frequent angular/sub-angular small stones (<5cm)

43-60 0018; dark brown, very friable sandy silt

60-91 0022; brown/yellowish grey friable sandy silt with occasional fine charcoal

91-105 0025; dark brown, friable, ? micro-laminar sandy silt with abundant fine charcoal

105-122/138 cm 0026; pale grey loose fine-medium sand

Samples taken:

Small bulk samples at 40-50, 90-100, 105-115 and 127-135cm

2014:

Hill-top Test Trench 1 (44 55.572N/016 41.132E)

Section 1/2

0-22 dark greyish brown silt loam topsoil

22-48 dark brown silt with common fired clay and stone fragments (<10cm); pre-1956 topsoil/ploughsoil

48-82 brown silt loam with even mix of stone and fired clay fragments and frequent charcoal fragments; mixed soil and archaeological deposits

82-85 horizon of orangey red fired clay; archaeological surface

85-100 brown silt loam with pottery, stone, fired clay and charcoal fragments; archaeological deposit

100-150	dark brown silt loam with abundant charcoal; fill of large pit
150-180	mix of fired clay fragments, brown loam and yellowish brown silty clay subsoil material; archaeological deposit
180-270	dark brown silt loam with pottery and fired clay fragments; archaeological deposit
215-225+	brown silt loam; possible old land surface
270+cm	yellowish brown silty clay; weathered B/C subsoil

Samples taken:
Small bulk samples at 50-60, 80-90, 180-190 and 215-220cm;
Micromorphology samples at: 50-60, 180-190 and 215-222cm;
Charcoal for radiocarbon assay: 210-220cm.

Borehole 114 (N44° 55:599' E016° 41:312')

0–10	brown (10YR3/3) sandy silty clay loam; humic ploughsoil
10-140	dark yellowish brown (10YR3/4) silt loam; upper alluvium
140-230	dark greyish brown (10YR4/2) silty clay loam; lower alluvium as palaeo-channel fill
230–430	dark grey (10YR4/1) silty clay loam; gleyed to strongly gleyed; palaeo-channel fill
430-440+cm	grey (10YR5/1) coarse sand; channel bed

Appendix 2: Topographical survey grid positions

The coordinates of the permanent monuments are recorded below:

	Local easting	Local northing	Local elevation
PM1000	6187.024 m	1011.629 m	218.077 m
PM1001	6105.391 m	1006.819 m	210.749 m
PM1002	5962.707 m	988.999 m	194.767 m

	Latitude (WGS 1984)	Longitude (WGS 1984)
PM1000	44.925201 degrees	16.68575 degrees
PM1001	44.925934 degrees	16.685833 degrees
PM1002	44.927215 degrees	16.686098 degrees

	UTM easting	UTM northing	EGM96 elevation
PM1000	633035.732 m	4976023.45 m	189.199 m
PM1001	633040.608 m	4976105.079 m	181.871 m
PM1002	633058.543 m	4976247.749 m	165.889 m

PM denotes a permanent monument left on site. The latitude and longitude are recorded with respect to the WGS 1984 datum (note that these figures are likely to be markedly different to those determined from local mapping that uses the Bessel 1841 datum). The UTM coordinates are UTM Zone 33 North on the WGS 1984 ellipsoid. The elevations derived from the GPS observations are recorded with respect to a realisation of the EGM96 geoid and are likely to differ significantly from elevations recorded locally with respect to mean sea level.

The total station records were transformed from the site grid to Universal Transverse Mercator coordinates (UTM Zone 33 North, WGS 1984) through a scale–invariant 2D linear conformal transformation using the formulae provided by R.E. Deakin at of the School of Mathematical and Geospatial Sciences at RMIT University (http://user.gs.rmit.edu.au/rod/files/publications/COTRAN_3.pdf). The resulting records were imported into ESRI ArcGIS version 10.0, which was used for all subsequent processing and presentation. A ZIP archive containing an ESRI version 10 File Geodatabase of the data created during and after the survey may be downloaded from: www-comp.arch.cam.ac.uk/~dir21/BiH_Zecovi.zip.

Appendix 3: The detailed soil thin section descriptions

2011-12:

Test Pit 1

Sample 1: 13-23cm

Structure: weakly developed irregular blocky, <5mm; with irregular pellety microstructure, <500um; *Porosity*: 10-15% vughy, irregular to sub-rounded, <0.75mm; few (<5%) irregular lengths of channels, <1cm long, <500um in width, all orientations; *Mineral components*: limit = 100um; coarse/fine ratio = 5/95; coarse fraction: 5% fine quartz, 100-25um, sub-rounded to sub-angular; fine fraction: 40% very fine quartz sand, 50-100um, sub-rounded; 20% silt; 35% clay; yellowish/reddish brown (CPL/PPL); *Organic components*: very few (<2%) very fine charcoal fragments, <100um; *Pedofeatures*: *Textural*: 30% dusty clay in groundmass and as void linings, moderate birefringence, striated to reticulate striated in groundmass, yellowish brown (CPL); 15% pure clay as fragments, <50um, moderate birefringence, yellow (CPL); few (<5%) fine dusty clay crescentic infills of voids, reddish gold (CPL), strong birefringence; *Amorphous*: 10-25% zones of strong amorphous sesquioxide staining with pellety aspect, sub-rounded.

Sample 2: 41-55cm

As for sample 1, except for:

Porosity: less vughy with depth, to 5-10%; *Mineral components*: at base are 5-10% fine channel linings with dusty clay or slickensides, golden brown (CPL); *Amorphous*: common (10-20%) sesquioxide nodules, <2mm, sub-rounded.

Test Pit 4

Sample 1: 55-69cm

Structure: 3 fabrics, heterogeneous, all pellety, <3mm, irregular to sub-rounded; *Fabrics*: 1) *c*. 50% soil fabric as for Sample 1 in TP 1; *c*. 30% calcitic ash with 10% very fine sand, 40% micro-charcoal fragments; 3) *c*. 20% irregular aggregates, <5mm, of amorphous iron cemented clay with sparite calcium carbonate; *Organic components*: 10% fine charcoal, <1mm; few (<2%) burnt and unburnt bone fragments, <1mm.

Sample 2: 80-93cm

Structure: Two horizons/fabrics: *Upper fabric unit* (80-86cm): Same as fabric 2) of sample 1 above; clear contact, but very open and pellety fabric*; Lower fabric unit* (86-93cm): 80% as in Upper fabric unit, with 20% irregular blocky peds of silty clay soil as for the fabric in both samples in TP1.

Sample 3: 120-130cm

Mineral components: 5-10% very fine gravel content, <6mm, sub-rounded; main fabric as for main fabric in both samples of TP1, but with no void infills, and the addition of: rare (<2%) fine bone fragments; <2% sparite; 5% sesquioxide nodules, <500um, sub-rounded; rare (<2%) papules of clay, <1mm; *Organic components*: <2% amorphous iron replaced plant tissue fragments.

Test Pit 5 (KV1)

Profile 10

Sample 10/1, 38-50cm

Structure: small aggregated, irregular to sub-rounded, <5mm, to pellety, <500um; *Porosity*: 5-20% fine channels between peds, <500um wide, <2cm long, weakly serrated, partly accommodated; *Mineral components*: limit 100um; coarse/fine ratio = 10/90; coarse fraction: 5% medium and <5% fine granite and quartz sand, sub-rounded to sub-angular, 100-750um; fine fraction: 15% very fine quartz sand, 50-100um, sub-rounded; 20% fine organics; 50% dusty clay; <5% pure clay; reddish golden brown (PPL), very dark reddish brown (CPL); *Organic components*: very strong dark brown to black humic staining throughout groundmass; 20% punctuations, <50um; 5-20% fine charcoal fragments, <1mm; few (<5%) plant cell tissue fragments (probably of grasses); rare (<1%) very fine bone fragments, <500um; *Pedofeatures*: *Textural*: 50% dusty clay in groundmass, yellowish brown (CPL), weak birefringence; <5% pure clay, in channels and groundmass, reddish gold (CPL), moderate birefringence; *Amorphous*: strong amorphous sesquioxide staining throughout groundmass; *Fabric inclusions*: few (<5%) sub-rounded aggregates of golden (CPL) silty clay with included very fine quartz sand, <750um; occasional (<2%) calcitic ash with very fine charcoal dust in channels.

Sample 10/2, 54-66cm

Structure: small aggregated, irregular to sub-rounded, <5mm, to pellety, <500um; *Porosity*: 5-20% fine channels between peds, <500um wide, <2cm long, weakly serrated, partly accommodated; *Mineral components*: limit 100um; coarse/fine ratio = <10/>90; coarse fraction: <2% coarse granite, 1-2mm, sub-rounded; 5% medium and 2-3% fine granite and quartz sand, sub-rounded to sub-angular, 100-750um; fine fraction: 15% very fine quartz sand, 50-100um, sub-rounded; 20% fine organics and phytoliths; 50% dusty clay; reddish golden brown (PPL), very dark reddish brown (CPL); *Organic components*: very strong dark brown to black humic staining throughout groundmass; 20% punctuations, <50um; 5-20% fine charcoal fragments, <1mm; few (<5%) large charcoal fragments, sub-rounded, <8mm; few (<5%) plant cell tissue fragments and phytoliths (probably of grasses); rare (<1%) very fine bone fragments, <500um; *Pedofeatures*: *Textural*: 50% dusty clay in groundmass, yellowish brown (CPL), weak birefringence; <5% pure clay, in channels and groundmass, reddish gold (CPL), moderate birefringence; *Amorphous*: strong amorphous sesquioxide staining throughout groundmass; *Fabric inclusions*: few (<5%) sub-rounded aggregates of golden (CPL) silty clay with included very fine quartz sand, <750um; few irregular to sub-rounded zones (5-10% of total groundmass) of calcitic ash with very fine charcoal dust, <2mm; rare large pottery sherd fragments, sub-angular, <1.5cm.

Sample 10/3, 74-82cm

Structure: apedal, poorly sorted; *Porosity*: 10% vughs, <1mm, sub-rounded; *c*. 10-20% open vughy, irregular, probably mainly once where organic matter present, now humified and shrunken; *Mineral/organic components*: all fine fraction: 10% very fine quartz sand, 50-100um, sub-rounded; 10% dusty clay; 30% micrite; 20% fine organics and phytoliths; very strong dark brown to black humic staining throughout groundmass; 10% punctuations, <50um; 5-20% fine charcoal fragments, <1mm; few (<5%) large charcoal fragments, sub-rounded, <1cm; few (<5%) plant cell tissue fragments, often clay and iron replaced; few to common (5-10%) phytoliths (probably of grasses); rare (<1%) very fine bone fragments, <500um; brown to dark brown (PPL), very dark reddish brown (CPL).

Sample 12/1 (same context as sample 10/3)

As for ashy matrix of sample 10/3; but with 5% large pottery sherd fragments, <3cm, sub-angular; few (<5%) amorphous iron replaced plant tissue fragments; few (<5%) aggregates of gold (CPL) clay.

Sample 10/4, 82-100cm

Upper unit (82-84cm): as for sample 10/3 above; lower unit (84-100cm): as for sample 10/2 above; but more compact/dense (<5% porosity), with 5% organic dust and few yellow to gold (PPL) degraded bone fragments in an ashy matrix in upper 2cm; and horizontally organised fine charcoal fragments in lower 3cm of slide.

Profile 11

Sample 11/1, 20-33cm

Upper unit (20-26cm): as or sample 10/1; distinct boundary with fine undulations, marked by very fine pure to dusty clay in voids, often micro-laminar, weak to moderate birefringence, and irregular zones of degraded bone; lower unit (26-33cm): mixture of small aggregates of upper unit fabric, *c*. 10% of total groundmass, <2mm, sub-rounded; and 90% of a second fabric which is the same as the lower unit of sample 10/4 above; but with fine speckled to crystallitic b-fabric and few zones of tissue and cell and tissue residues with yellow organic pigment, and few amorphous iron replaced plant tissue fragments.

Sample 11/2, 33-46cm

Components: mixture of *c*. 20% of fabric 1 from sample 10/1 and 80% of the lower ashy fabric unit of sample 10/4; all in irregular to sub-rounded aggregates, <4mm; *Inclusions*: 2% large pottery sherd fragments, sub-rounded, <1cm; rare (<1%) pure clay fragments, <500um, highly birefringent, gold (CPL); <2% fine charcoal, <100um; <1% fine bone fragments, <100um.

Sample 11/3, 57-69cm

As for the main ashy fabric of sample 11/2 above; but with common (10-20%) degraded bone fragments and highly humified plant tissue fragments throughout groundmass.

2013:

Test Pit 4

Sample context 0005

Structure: apedal, massive; porphyric; *Porosity*: 5-10% channels, <4cm long, <500um wide, partly accommodated; <5% vughs, <500um and <1mm, irregular to sub-rounded; *Mineral components*: <10% fine stone/gravel, <4mm, sub-rounded to sub-rectangular; coarse/fine ratio: 20/80; coarse fraction: <5% coarse and >5% medium fine sand-size material and 10% fine quartz sand; fine fraction: 30-40% very fine quartz sand, 50-100um, sub-rounded to sub-angular; 30% silt; 10-15% clay, as 'slivers' of pure clay, gold (CPL), weak birefringence, and as dusty clay in groundmass and lining voids, yellowish/golden brown (CPL), weak to moderate birefringence, few laminar dusty clay infills of voids; few (<5%) sub-rounded aggregates of amorphous iron stained pure to dusty clay, red (CPL/PPL), <1mm; *Organic components*: 10% organic punctuations, <50um; 5% very fine to fine charcoal fragments, <100um; *c.* 20-25% of groundmass stained brown (CPL), reddish brown (PPL).

Sample context 0007

Structure: Main fabric and structure as for sample 0005 above, but with 8.5mm wide zone in middle of slide (at 4-5cm down-slide) as follows:

Above (1-4cm): golden brown fine sandy clay loam with striated dusty clay in groundmass

0-3.0mm:	wood charcoal
3-3.5mm:	brown organic silt
3.5-3.7mm:	golden to reddish brown silty clay with some amorphous iron impregnation
3.7-4.2mm:	brown organic silt
4.2-5.0mm:	golden to reddish brown silty clay
5.0-6.0mm:	mixed, poorly sorted lens of organic silty clay
6.0-7.5mm:	mixed lens of wood charcoal fragments and fine stone
7.5-8.5mm:	reddish brown cemented fine-medium sandy silt

Below (5-9.5cm): golden brown fine sandy clay loam with striated dusty clay in groundmass with one 1-2cm stone fragment and few charcoal fragments

Sample context 0011

Structure: apedal, heterogeneous; porphyric; *Porosity*: 10% channels, <1cm long, <500um wide, partly accommodated; 10-20% vughs, <500um, sub-rounded; *Mineral components*: 20% fine stone/gravel, <8mm, sub-rounded to sub-rectangular, in all orientations; coarse/fine ratio: 30/70; coarse fraction: 10% coarse and 10% medium and fine sand-size material, and 10% fine quartz sand; fine fraction: 30% very fine quartz sand, 50-100um, sub-rounded to sub-angular; 30% silt; 10% clay, as dusty clay in groundmass and partly lining voids, yellowish/golden brown (CPL), weak to moderate birefringence; *Organic components*: 20% organic punctuations, <50um; 20% very fine to fine charcoal fragments, <100um; whole groundmass stained brown (CPL/PPL).

2014:

Hill-top Test Trench 1

Sample 23: 50-60cm

Structure: weakly small aggregated, <1cm; well sorted; *Porosity*: 5% channels, <2cm long, <250um wide, accommodated; *c.* 10% vughs, sub-rounded, <500um; *Mineral components*: c/f ratio: 5/95; coarse fraction: 5% fine quartz sand, 100-200um, sub-rounded to sub-angular; fine fraction: 30% very fine quartz sand, 50-100um, sub-rounded to sub-angular; 30% silt; 60% dusty clay; 5% pure clay; dark reddish to reddish brown (CPL), yellowish/golden brown (CPL); *Organic components*: 15% organic/very fine charcoal punctuations, <50um; 2% fine charcoal fragments, <500um; rare (<1%) large charcoal fragments, <4mm; *Anthropogenic components*: 1 large pottery fragment, 1-3cm; few (5-10%) fired clay aggregates, sub-rounded to irregular, <5mm, orangey red (CPL); *Pedofeatures*: *Textural*: 5% pure clay, in irregular zones in groundmass and aggregates, <500um, strong birefringence, strong extinction, dark gold (CPL); 60% dusty clay in groundmass and coating voids, weak to moderate birefringence, stipple speckled to striated, gold to orange (CPL), orangey brown (PPL); *Amorphous*: moderate sesquioxide impregnation of whole fabric, with 10% irregular zones of strong amorphous sesquioxide staining.

Sample 22: 180-190cm
As for Sample 23 above, except for:
Fabric pedofeature: large irregular zone, *c*. 2cm, of striated fine sandy/silty clay with abundant fine dusty clay in groundmass and as infills, moderate to strong birefringence, reddish orange to gold (CPL), orangey brown (PPL).
Sample 18: 215-222cm
Two fabric units: upper fabric unit (0/1-3cm): as for sample 23 above, with the addition of:
few (<10%) aggregates of humic sandy/silt loam, reddish brown to brown (CPL/PPL); few (<10%) humified and charred organic matter, in irregular zones, <1cm; common fragments of fired clay,<3mm, sub-rounded; few (<10%) irregular zones of calcitic ash with very fine charcoal; lower fabric unit (1/3-10cm): as for sample 23 above, but only weak to moderate amorphous sesquioxide impregnation.