SECOND ARHEOINVEST CONGRESS

interdisciplinary research in archaeology

Iaşi
7-9 June 2012

Programme and Abstracts

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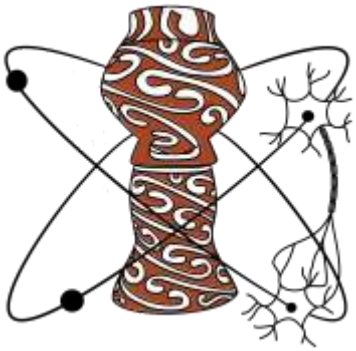
Interdisciplinary Research in Archaeology

June 7th–9th, 2012
Iaşi, Romania



Programme and Abstracts

Editors: Vasile Cotiugă, Ştefan Caliniuc

Organizing Institutions

"Alexandru Ioan Cuza" University of Iaşi
Faculty of History
ARHEOINVEST Platform

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PROGRAM

Joi, 7 iunie 2012

8.30 – 10.00 **Primirea invitaţilor — Corpul H (Casa Catargi)**

10.00 – 12.30 **Ceremonia de deschidere — Sala Senatului Universităţii**

10.00 – 10.10 Mesajul Rectoratului Universităţii „Alexandru Ioan Cuza" din Iaşi, Prof. dr. Dumitru LUCA, Prorector pentru programe de cercetare ştiinţifică şi transfer de cunoştinţe

10.10 – 10.20 Cuvânt de salut din partea Preşedintelui de onoare al Congresului, Prof. dr. Victor SPINEI, membru corespondent al Academiei Române

10.20 – 10.30 Cuvânt de salut din partea Decanului Facultății de Istorie, Prof. dr. Petronel ZAHARIUC

10.30 – 10.40 Cuvânt de salut din partea Directorului Departamentului de Științe, Prof. dr. Tudor LUCHIAN

10.45 – 11.30 Conferință susținută de Prof. dr. Adrian PORUCIUC (Universitatea „Alexandru Ioan Cuza" din Iaşi): *De la arheolingvistică la arheomitologie*

11.30 – 12.00 Lansare de carte: *Société et environnement dans la zone du Bas Danube durant le 5ème millénaire avant notre ère*, editat de Laurent Carozza, Cătălin Bem, Cristian Micu, Editura Universității „Alexandru Ioan Cuza" din Iași, 2011 — prezintă Prof. dr. Nicolae URSULESCU

13.00 – 14.30 **Pauză de masă — restaurantul Hotelului Gaudeamus**

15.00 – 18.30 **Desfăşurarea lucrărilor pe secţiuni**

19.30 – 20.00 **Deschiderea sesiunii de postere — Corpul H (Casa Catargi)**

20.30 **Cocktail oferit de *DAAD ALUMNI CLUB IAŞI***

Vineri, 8 iunie 2012

09.00 – 14.00 **Desfăşurarea lucrărilor pe secţiuni**

14.00 – 15.30 **Pauză de masă — restaurantul Hotelului Gaudeamus**

16.00 – 19.00 **Excursie la Cetatea Neamțului**

20.00 **Cocktail oferit de Platforma *ARHEOINVEST* la Hanu Ancuței**

Sâmbătă, 9 iunie 2012

09.00 – 14.00 **Desfăşurarea lucrărilor pe secţiuni**

14.00 **Închiderea congresului**

JOI, 7 IUNIE 2012

GEOARHEOLOGIE

Moderator: Ion NICULIȚĂ
Secretar: Constantin PREOTEASA

Sala H1 (Casa Catargi)

15.00 – 15.20 Cătălin BEM, Andrei ASĂNDULESEI, *Un model de cercetare neintruzivă. Studii de caz asupra tell-urilor Gumelnița din Muntenia*

15.20 – 15.40 Constantin HAITĂ, *Tell-ul de la Borduşani*–Popină — *petrografia inventarului litic, arii sursă şi conexiunile acestora cu aşezările eneolitice*

15.40 – 16.00 Constantin PREOTEASA, *Observații cu privire la impactul antropic asupra mediului natural exercitat de către comunitățile complexului cultural Precucuteni-Cucuteni-Tripolie în vederea obținerii de suprafețe agricole*

16.00 – 16.20 Robin BRIGAND, Andrei ASĂNDULESEI, Olivier WELLER, Vasile COTIUGĂ, *Analiză spațială pe bază de GIS în eneolitic. Studiu de caz in Moldova*

16.20 – 16.40 Ionuț-Cristi NICU, Gheorghe ROMANESCU, Andrei ASĂNDULESEI, Vasile COTIUGĂ, Silviu GANIA, Radu-Ștefan BALAUR, *Abordări geografice și arheologice interdisciplinare în așezări cucuteniene din bazinul hidrografic Valea Oii*

16.40 – 17.00 **Pauză de cafea**

17.00 – 17.20 József Gábor NAGY, Kovács Zsolt MOLNÁR, Zoltán IMECS, *Transformări socio-economice în nord-vestul Transilvaniei. O abordare interdisciplinară*

17.20 – 17.40 Ion NICULIȚĂ, Vasile COTIUGĂ, Aurel ZANOCI, Mihail BĂȚ, Andrei ASĂNDULESEI, *Sistemul defensiv de la Saharna Mare în lumina datelor arheomagnetice, spaţiale şi a săpăturilor arheologice*

17.40 – 18.00 Alexandru Leonard DOROGOSTAISKY, *Un caz de studiu arheoastronomic: situl de la Valea Alioşu, com. Maşloc, jud. Timiş*

18.00 – 18.20 Vlad-Andrei LĂZĂRESCU, Vlad TURCU, *Anotimpuri ale morții. Date despre o metodă arheologico-astronomică pentru studierea riturilor funerare antice*

18.20 – 18.40 Alexandru BERZOVAN, Liviu MĂRUIA, Andrei STAVILĂ, *Putere şi control în epoca regatului dac (sec. î.Hr.–sec. I d.Hr.). Studiu de caz: utilizarea programelor GIS în analiza relaţiilor dintre fortificaţiile şi aşezările situate la pătrunderea Mureşului în Câmpia Aradului*

18.40-19.00 Iulian Marius ŞCHIOPU, Sergiu MATVEEV, Delia LUPU, Victor MOLDOVEANU, Iulia POSTICĂ, Natalia BEREBIUC, *Studiu de teren pentru reperarea şi obţinerea de coordonate GPS a mănăstirilor din Țara Făgăraşului distruse în secolul al XVIII-lea*

19.00-19.20 Dragoş CIOLACU, Vlad RACHIERU, *Orașul în ruină și ruina în oraș. O privire a arhitectului asupra monumentului de arheologie*

19.20-19.40 Sergiu MUSTEAȚĂ, Alexandru POPA, *Arheologie nondestructivă: de la aspectele legale la cele practice*

19.40-20.00 **Discuţii**

INVESTIGAŢII FIZICE ŞI CHIMICE

Moderator: Nicolae BUZGAR
Secretar: Viorica VASILACHE

Sala H2 (Casa Catargi)

15.00 – 15.20 Eugen S. TEODOR, Migdonia GEORGESCU, *În căutarea semnăturii chimice: argile din Dobrogea*

15.20 – 15.40 Maria GEBA, Nathalie HUET, Ana-Maria VLAD, Senica ȚURCANU, Codrin LĂCĂTUȘU, *Decorul ceramicii Cucuteni: o cercetare arheometrică*

15.40 – 16.00 Roxana BUGOI, Philippe SCIAU, Dragomir POPOVICI, Anne BOUQUILLON, *Investigații arheometrice ale unor pigmenți din epoca cuprului*

16.00 – 16.20 Mihai GRĂMĂTICU, Dumitru BOGHIAN, Silviu Gabriel STROE, Traian Lucian SEVERIN, Sorin IGNĂTESCU, *Noi analize arheometrice pe un lot de fragmente ceramice și microgranule de pigment mineral descoperite în situl cucutenian de la Fetești–La Schit, com. Adâncata, jud. Suceava*

16.20 – 16.40 Ion SANDU, Dumitru BOGHIAN, Viorica VASILACHE, Sergiu-Constantin ENEA, *Analize fizico-chimice pe probe de pigment mineral provenite din așezarea cucuteniană de la Buznea, com. Ion Neculce, jud. Iași*

16.40 – 17.00 **Pauză de cafea**

17.00 – 17.20 Philippe SCIAU, *Investigarea atmosferei de ardere a ceramicii vechi prin studiul stării de oxidare a ionilor de fier*

17.20 – 17.40 Otis CRANDELL, Cristian POPA, *Exploatarea și procesarea rocilor silicioase la Piatra Tomii, jud. Alba*

17.40 – 18.00 Senica ȚURCANU, Andrei Ionuţ APOPEI, Andrei BUZATU, *Determinări petrografice asupra industriei pietrei șlefuite din așezarea cucuteniană de la Ruginoasa–Dealul Drăghici*

18.00 – 18.20 Viorica VASILACHE, Dumitru BOGHIAN, Ion SANDU, Sergiu-Constantin ENEA, *Analize fizico-chimice asupra a două artefacte de bronz descoperite la Boldești, com. Todirești, jud. Iași*

18.20 – 18.40 Cătălina CHIOJDEANU, Bogdan CONSTANTINESCU, Daniela STAN**,** Ernest OBERLÄNDER-TÂRNOVEANU, *O primă tentativă de analiză statistică a monedelor geto-dacice de aur si argint*

18.40 – 19.00 Octavian CIOBANU, *Vizualizarea interactivă a modelelor 3D cu ajutorul programelor Microsoft Word şi PowerPoint*

19.00 – 19.30 **Discuţii**

Postere

Daniela-Afrodita BOLDEA, Mirela PRAISLER, *Studiu comparativ al tehnicilor spectroscopice aplicate în analiza pigmenţilor minerali*

Bogdan RĂȚOI, Mihai BRÂNZILĂ, Victor ȘABLIOVSCHI, Cristina BALAN, Laurențiu URSACHI, Mircea OANCĂ, Cristian ONEL, *Analize petrologice asupra unor unelte de piatră din situl calcolitic de la Codreni, jud. Vaslui*

Carmen PAVEL, Florin CONSTANTIN, Cosmin I. SUCIU, Roxana BUGOI, *Examinări ale obiectelor arheologice folosind un tomograf de raze X*

Marian COSAC, George MURĂTOREANU, Alexandru RADU, Rodica ION, *Argumente privind utilizarea bitumului la fixarea în suport a unor utilaje litice din perioada timpurie a epocii bronzului în regiunea Subcarpaţilor de Curbură*

VINERI, 8 IUNIE 2012

ETNOARHEOLOGIE ŞI ARHEOLOGIE EXPERIMENTALĂ

Moderator: Vasile COTIUGĂ
Secretar: Roxana-Gabriela CURCĂ

Sala H1 (Casa Catargi)

09.00 – 09.20 Nicolae URSULESCU, *Modalităţi de reconstituire a vieţii spirituale a comunităţilor preistorice prin metode ale arheologiei experimentale şi senzoriale*

09.20 – 09.40 Dragoş GHEORGHIU, *Experimente cu instrumente calcolitice de lut utilizând tirajul aerului*

09.40 – 10.00 Felix-Adrian TENCARIU, *Olari şi olărit în Moldova. Perspective etnoarheologice*

10.00 – 10.20 Cătălin LAZĂR, Vasile OPRIŞ, Theodor IGNAT, *Observaţii privind arhitectura culturii Gumelniţa pe baza unui studiu de arheologie experimentală: rezultatele din 2011*

10.20 – 10.40 Andrei NICIC, *Considerații experimentale privind unele „gropi-cuptoare" din arealul culturii Cozia-Saharna*

10.40 – 11.00 Marius ARDELEANU, *Construirea unui cuptor dacic de ars ceramica — arheologie experimentală la Medieşu Aurit, jud. Satu Mare*

11.00 – 11.20 **Pauză de cafea**

11.20 – 11.40 Marius BARBU, *Arheologie experimentală: prelucrarea osului şi a cornului în epoca romană*

11.40 – 12.00 Carmen MARIAN, Ionela MIHULEAC, *Ipoteze privind modalitatea de formare a amprentelor de textile pe ceramica culturii Cucuteni. Cercetări experimentale*

12.00 – 12.20 Andrea CUMURCIUC, *Ritualuri precreştine ale apei perpetuate în tradiţia populară română*

12.20 – 12.40 Marius ALEXIANU, Olivier WELLER, Robin BRIGAND, Ion SANDU, Gheorghe ROMANESCU, Roxana-Gabriela CURCĂ, Vasile COTIUGĂ, Andrei ASĂNDULESEI, Ştefan CALINIUC, Radu BALAUR, Alexandru BOUNEGRU, *Un proiect CNCS românesc (2011–2014): Etnoarheologia izvoarelor sărate și a munților de sare din spațiul extracarpatic al României*

CRONO-ARHEOLOGIE

Moderator: Nicolae URSULESCU
Secretar: Felix-Adrian TENCARIU

Sala H1 (Casa Catargi)

12.40 – 13.00 Attila LÁSZLÓ, *Datarea radiocarbon și cronologia istorică a timpurilor „protoistorice"*

13.00 – 13.20 Florin STĂNESCU, *Considerații privind problema pseudo-calendarelor atribuite dacilor*

13.20 – 14.00 **Discuții**

SÂMBĂTĂ, 9 IUNIE 2012

BIOARHEOLOGIE

Moderator: Luminiţa BEJENARU
Secretar: Simina STANC

Sala H1 (Casa Catargi)

09.00 – 09.20 Dumitru BOGHIAN, Sorin IGNĂTESCU, Danela MURARIU, Cezar TOMESCU, *Determinări arheobotanice pe loturi de materiale arheologice provenind din așezarea cucuteniană de la Feteşti–La Schit, com. Adâncata, jud. Suceava*

09.20 – 09.40 Valentin RADU, Constantin HAITĂ, Adrian BĂLĂŞESCU, *Noi date de paleomediu din tell-ul eneolitic Borduşani–Popină din zona inundabilă Balta Ialomiţei*

09.40 – 10.00 Cătălin LAZĂR, Monica MĂRGĂRIT, Adrian BĂLĂŞESCU, Mădălina VOICU, *Date privind doua mandibule de Canis familiaris descoperite in așezarea de la Sultana–Malu Roşu, jud. Călăraşi*

10.00 – 10.20 Romeo CAVALERIU, George BODI, *Utilizarea resurselor animale de către comunităţile eneolitice de pe teritoriile de est ale României*

10.20 – 10.40 Diana-Maria SZTANCS, *Date privind utilizarea scoicilor ca podoabe în neoliticul și eneoliticul din Transilvania*

10.40 – 11.00 Corneliu BELDIMAN, *Microscopia tehnologiei antice. Artefacte de corn de cerb şi prelucrarea metalului la Histria*

11.00 – 11.20 **Pauză de cafea**

11.20 – 11.40 Simina STANC, Luminiţa BEJENARU, *Resurse animale exploatate la începutul mileniului II d.Hr. în aşezări din zona cuprinsă între Dunăre şi Marea Neagră*

11.40 – 12.00 Simina STANC, *Date arheozoologice privind resursele animale şi strategia de exploatare a lor de către locuitorii cetăţii medievale de la Beroe*

12.00 – 12.20 Claudia RADU, Beatrice KELEMEN, *Ecuații de regresie folosite în estimarea staturii resturilor arheologice umane — un „review" metodologic*

12.20 – 12.40 Gabriel VASILE, Cătălin LAZĂR, Songül ALPASLAN-ROODENBERG, *Date bioarheologice privind scheletele umane din necropola eneolitică de la Sultana–Malu Roşu*

12.40 – 13.00 Mihai GLIGOR, Mariana ROŞU, *Descărnarea: practică funerară neobişnuită în situl neolitic de la Alba Iulia-Lumea Nouă?*

13.00 – 13.20 Vasilica-Monica GROZA, Angela SIMALCSIK, Georgeta MIU, *Studiul anomaliilor de dezvoltare la populaţia urbană a Iaşului medieval — o necropola din secolul al XVII-lea descoperită în partea estică a Curţii Domneşti*

13.20 – 14.00 **Discuţii**

Postere

Mariana POPOVICI, Simina STANC, Luminița BEJENARU, *Porcul (Sus scrofa domesticus) în așezările neolitice și calcolitice din estul României: abordare din punct de vedere morfometric*

Simina STANC, Luminiţa BEJENARU, Mariana POPOVICI, *Separarea biometrică a resturilor de porc (Sus scrofa domesticus) şi mistreţ (Sus scrofa ferus) identificate in eşantioane aparţinând mileniilor I şi II d.Hr. din estul şi sud-estul României*

Mariana POPOVICI, Simina STANC, *Variaţii morfologice în dentiția porcinelor identificate la Stănceşti, jud. Botoşani (secolele VI–III î.Hr.)*

Simina STANC, Teofil BLAGA*, Exploatarea resurselor animale în aşezarea romană de la Niculiţel: date arheozoologice*

Senica ȚURCANU, *Utilizarea scoicilor de apă dulce ca suport pentru realizarea obiectelor de podoabă cucuteniene*

Vasilica-Monica GROZA, *Cercetări antropologice privind populaţia urbană a Iaşului medieval — o necropolă din secolul al XVII-lea situată în partea estică a Curţii Domneşti*

Iulia LUPAN, Beatrice KELEMEN, Bianca IANC, Cornelia OCHIŞ, Mircea Teodor CHIRIAC, Octavian POPESCU, *Studiu al comunităţilor bacteriene din biserica de lemn din complexul monahal Nicula, jud. Cluj — abordare metagenomică*

PROGRAMME

Thursday, 7th June 2012

8.30 – 10.00	**Registration at Secretariat — Building H (*Casa Catargi*)**
10.00 – 12.30	**Opening Ceremony — the University Senate Hall**
10.00 – 10.10	Address by Professor Dumitru LUCA, PhD, Vice-rector for Research and Innovation, "Alexandru Ioan Cuza" University of Iaşi
10.10 – 10.20	Welcoming remarks by Professor Victor SPINEI, PhD, corresponding member of the Romanian Academy, Honorary President of the Congress
10.20 – 10.30	Welcoming remarks by Professor Petronel ZAHARIUC, PhD, Dean of the Faculty of History
10.30 – 10.40	Welcoming remarks by Professor Tudor LUCHIAN, Head of the Department of Science
10.45 – 11.30	Keynote lecture by Professor Adrian PORUCIUC, PhD ("Alexandru Ioan Cuza" University of Iași): *From archaeolinguistics to archaeomythology*
11.30 – 12.00	Book launch: *Société et environnement dans la zone du Bas Danube durant le 5ème millénaire avant notre ère*, edited by Laurent Carozza, Cătălin Bem, Cristian Micu, Editura Universității „Alexandru Ioan Cuza" din Iași, 2011 — presented by Professor Nicolae URSULESCU, PhD
13.00 – 14.30	**Lunch — Gaudeamus restaurant**
15.00 – 18.30	**Congress — Parallel sessions**
19.30 – 20.00	**Poster exhibition — Building H (*Casa Catargi*)**
20.30	**Cocktail offered by *DAAD CLUB ALUMNI IAȘI***

Friday, 8th June 2012

09.00 – 14.00	**Congress — Parallel sessions**
14.00 – 15.30	**Lunch — Gaudeamus restaurant**
16.00 – 19.00	**Excursion to Neamț Fortress**
20.00	**Cocktail offered by the *ARHEOINVEST* Platform at 'Hanu Ancuței' Inn**

Saturday, 9th June 2012

09.00 – 14.00	**Congress — Parallel sessions**
14.00	**Closing ceremony**

THURSDAY, 7TH JUNE 2012

GEOARCHAEOLOGY

Chairman: Ion NICULIȚĂ
Secretary: Constantin PREOTEASA

H1 Hall (*Casa Catargi*)

15.00 – 15.20 Cătălin BEM, Andrei ASĂNDULESEI, *A non-invasive research model. Case studies regarding Gumelnița tells from Muntenia*

15.20 – 15.40 Constantin HAITĂ**,** *The tell from Borduşani–Popină — petrography of lithic inventory, source areas, and their connections to Chalcolithic settlements*

15.40 – 16.00 Constantin PREOTEASA, *Few remarks concerning the human impact on the natural environment exercised by the communities of the Precucuteni-Cucuteni-Tripolye cultural complex for obtaining agricultural surfaces*

16.00 – 16.20 Robin BRIGAND, Andrei ASĂNDULESEI, Olivier WELLER, Vasile COTIUGĂ, *GIS-based spatial analysis in Chalcolithic. Case study in Moldova*

16.20 – 16.40 Ionuț-Cristi NICU, Gheorghe ROMANESCU, Andrei ASĂNDULESEI, Vasile COTIUGĂ, Silviu GANIA, Radu-Ștefan BALAUR, *Interdisciplinary geographical and archaeological approaches in Cucutenian settlements from the Valea Oii River watershed*

16.40 – 17.00 **Coffee break**

17.00 – 17.20 József Gábor NAGY, Kovács Zsolt MOLNÁR, Zoltán IMECS, *Socio-economic changes in central north-western Transylvania. An interdisciplinary approach*

17.20 – 17.40 Ion NICULIȚĂ, Vasile COTIUGĂ, Aurel ZANOCI, Mihail BĂȚ, Andrei ASĂNDULESEI, *The defensive system from Saharna Mare in the light of the spatial, archaeomagnetic, and archaeological excavation data*

17.20 – 17.40 Alexandru Leonard DOROGOSTAISKY, *An archaeoastronomic case study: the site from Valea Alioşu, Maşloc village, Timiş County*

17.40 – 18.20 Vlad-Andrei LĂZĂRESCU, Vlad TURCU, *Seasons of Death. Towards an archaeological-astronomical method for studying ancient burial rites*

18.20 – 18.40 Alexandru BERZOVAN, Liviu MĂRUIA, Andrei STAVILĂ, *Power and control in the Dacian kingdom's period (1st century BC–1st century AD). A case study: using GIS software in analysing the relationship between fortifications and settlements located at the entry of the Mureş River in the Arad Plain*

18.40 – 19.00 Iulian Marius ŞCHIOPU, Sergiu MATVEEV, Delia LUPU, Victor MOLDOVEANU, Iulia POSTICĂ, Natalia BEREBIUC, *Field research on tracking and obtaining the GPS coordinates of the monasteries destroyed in the 18th century in Ţara Făgăraşului*

19.00 – 19.20 Dragoş CIOLACU, Vlad RACHIERU, *City in ruins and ruins in the city. An architect's look at the archaeological monument*

19.20 – 19.40 Sergiu MUSTEAȚĂ, *Non-destructive archaeology: from the legal to the practical issues*

19.40 – 20.00 **Discussions**

PHYSICAL AND CHEMICAL INVESTIGATIONS

Chairman: Nicolae BUZGAR
Secretary: Viorica VASILACHE

H2 Hall (*Casa Catargi*)

15.00 – 15.20 Eugen S. TEODOR, Migdonia GEORGESCU, *Searching for chemical fingerprint: clays from Dobrudja*

15.20 – 15.40 Maria GEBA, Nathalie HUET, Ana-Maria VLAD, Senica ȚURCANU, Codrin LĂCĂTUȘU, *Decoration on Cucuteni ceramic: an archaeometrical research*

15.40 – 16.00 Roxana BUGOI, Philippe SCIAU, Dragomir POPOVICI, Anne BOUQUILLON, *Archaeometric investigations of Copper Age ceramics pigments*

16.00 – 16.20 Mihai GRĂMĂTICU, Dumitru BOGHIAN, Silviu Gabriel STROE, Traian Lucian SEVERIN, Sorin IGNĂTESCU, *New archaeometrical analysis on a batch of ceramic fragments and pigment samples discovered at the site of Fetești–La Schit, Adâncata commune, Suceava County*

16.20 – 16.40 Ion SANDU, Dumitru BOGHIAN, Viorica VASILACHE, Sergiu-Constantin ENEA, *Chemical-physical analyses on samples of mineral pigments from the Cucutenian settlement of Buznea, Ion Neculce commune, Iași County*

16.40 – 17.00 **Coffee break**

17.00 – 17.20 Philippe SCIAU, *Firing atmosphere investigation of ancient ceramics through the study of Fe valence state distribution*

17.20 – 17.40 Otis CRANDELL, Cristian POPA, *Chert mining and processing industry at Piatra Tomii, Alba County*

17.40 – 18.00 Senica ȚURCANU, Andrei Ionuț APOPEI, Andrei BUZATU, *Petrographic analyses on the polished stone industry from the Cucutenian settlement of Ruginoasa–Dealul Drăghici*

18.00 – 18.20 Viorica VASILACHE, Dumitru BOGHIAN, Ion SANDU, Sergiu-Constantin ENEA, *Chemical-physical analyses of two bronze artefacts discovered at Boldești, Todirești commune, Iași County*

18.20 – 18.40 Catalina CHIOJDEANU, Bogdan CONSTANTINESCU, Daniela STAN, Ernest OBERLÄNDER-TÂRNOVEANU, *A first attempt to statistically analyse Geto-Dacian gold and silver coins*

18.40 – 19.00 Octavian CIOBANU, *Interactive 3D model viewing using the Microsoft Word and PowerPoint software programs*

19.00 – 19.20 **Discussions**

Posters

Daniela-Afrodita BOLDEA, Mirela PRAISLER, *Comparative study of spectroscopic techniques applied in the analysis of mineral pigments*

Bogdan Gabriel RĂȚOI, Mihai BRÂNZILĂ, Victor ȘABLIOVSCHI, Cristina-Gianina BALAN, Laurențiu URSACHI, Mircea OANCĂ, Cristian ONEL, *Petrological analysis of the stone tools from the Chalcolithic site of Codreni, Vaslui County*

Carmen PAVEL, Florin CONSTANTIN, Cosmin I. SUCIU, Roxana BUGOI, *Archaeological objects examination with an X-ray tomograph*

Marian COSAC, George MURĂTOREANU, Alexandru RADU, Rodica ION, *Arguments concerning the use of bitumen as adhesive for hafting lithic tools during the Early Bronze Age in the region of the Curvature Subcarpathians*

FRIDAY, 8TH JUNE 2012

ETHNOARCHAEOLOGY AND EXPERIMENTAL ARCHAEOLOGY

Chairman: Vasile COTIUGĂ
Secretary: Roxana-Gabriela CURCĂ

H1 Hall (*Casa Catargi*)

09.00 – 09.20 Nicolae URSULESCU, *Methods to reconstruct the spiritual life of the prehistorical communities by means of experimental and sensorial archaeology*

09.20 – 09.40 Dragoş GHEORGHIU, *Experiments with Chalcolithic clay instruments using air-draught*

09.40 – 10.00 Felix-Adrian TENCARIU, *Potters and potter's craft in Moldavia. Some ethnoarchaeological inquiries*

10.00 – 10.20 Cătălin LAZĂR, Vasile OPRIŞ, Theodor IGNAT, *Observations about the architecture of the Gumelniţa culture based on a study of experimental archeology: 2011 results*

10.20 – 10.40 Andrei NICIC, *Experimental investigation of the "pit-kilns" from the area of the Cozia-Saharna culture*

10.40 – 11.00 Marius ARDELEANU, *Building a Dacian pottery kiln — experimental archaeology at Medieşu Aurit, Satu Mare County*

11.00 – 11.20 **Coffee break**

11.20 – 11.40 Marius BARBU, *Experimental archaeology: bone and horn processing during the Roman period*

11.40 – 12.00 Carmen MARIAN, Ionela MIHULEAC, *Hypotheses concerning the manner by which textile fabric impressions were created on Cucutenian ceramic ware. Experimental research*

12.00 – 12.20 Andrea CUMURCIUC, *Pagan water rituals in the Romanian local tradition*

12.20 – 12.40 Marius ALEXIANU, Olivier WELLER, Robin BRIGAND, Ion SANDU, Gheorghe ROMANESCU, Roxana-Gabriela CURCĂ, Vasile COTIUGĂ, Andrei ASĂNDULESEI, Ştefan CALINIUC, Radu BALAUR, Alexandru BOUNEGRU, *A Romanian CNCS project (2011–2014): The ethnoarchaeology of the salt springs and salt mountains from the extra-Carpathian areas of Romania*

CHRONO-ARCHAEOLOGY ARCHAEOLOGY

Chairman: Nicolae URSULESCU
Secretary: Felix-Adrian TENCARIU

H1 Hall (*Casa Catargi*)

12.40 – 13.00 Attila LÁSZLÓ, *Radiocarbon dating and historical chronology of "protohistoric" times*

13.00 – 13.20 Florin STĂNESCU, *Considerations regarding the pseudo-calendars attributed to the Dacians*

13.00 – 14.00 **Discussions**

SATURDAY, 9TH JUNE 2012

BIOARCHAEOLOGY

Chairman: Luminiţa BEJENARU
Secretary: Simina STANC

H1 Hall (*Casa Catargi*)

09.00 – 09.20 Dumitru BOGHIAN, Sorin IGNĂTESCU, Danela MURARIU, Cezar TOMESCU, *Archaeobotanical research on a batch of archaeological materials from the Cucutenian settlement of Feteşti–La Schit, Adâncata Commune, Suceava county*

09.20 – 09.40 Valentin RADU, Constantin HAITĂ, Adrian BĂLĂŞESCU, *New paleoenvironmental data from the Chalcolithic tell Borduşani–Popină from the Balta Ialomiţei floodplain*

09.40 – 10.00 Cătălin LAZĂR, Monica MĂRGĂRIT, Adrian BĂLĂŞESCU, Mădălina VOICU, *Data on two mandibles of Canis familiaris discovered in the Sultana–Malu Roşu settlement, Călăraşi County*

10.00 – 10.20 Romeo CAVALERIU, George BODI, *The exploitation of animal resources by the Chalcolithic communities from eastern Romania*

10.20 – 10.40 Diana-Maria SZTANCS, *New data regarding the use of shells as adornments in the Neolithic and Aeneolithic of Transylvania*

10.40 – 11.00 Corneliu BELDIMAN, *Microscopy of ancient technology. Red-deer antler artefacts and metalworking at Histria*

11.00 – 11.20 **Coffee break**

11.20 – 11.40 Simina STANC, Luminiţa BEJENARU, *Animal resources exploited at the beginning of the second millennium AD in settlements from the area between the Danube and the Black Sea*

11.40 – 12.00 Simina STANC, *Archaeozoological data concerning the animal resources and their exploitation strategies by the inhabitants of the medieval settlement at Beroe*

12.00 – 12.20 Claudia RADU, Beatrice KELEMEN, *Regression equations for stature estimation of archaeological human remains — a methodological review*

12.20 – 12.40 Gabriel VASILE, Cătălin LAZĂR, Songül ALPASLAN-ROODENBERG, *Bioarchaeological data about human skeletons from the Sultana–Malu Roşu Eneolithic necropolis*

12.40 – 13.00 Mihai GLIGOR, Mariana ROŞU, *Defleshing the dead: uncommon burial practice in the Neolithic site of Alba Iulia–Lumea Nouă?*

13.00 – 13.20 Vasilica-Monica GROZA, Angela SIMALCSIK, Georgeta MIU, *The study of development anomalies of the urban population of medieval Iaşi — a 17th century necropolis found in the eastern side of Curtea Domnească*

13.20 – 14.00 **Discussions**

Posters

Mariana POPOVICI, Simina STANC, Luminița BEJENARU, *The pig (Sus scrofa domesticus) in Neolithic and Chalcolithic settlements from Eastern Romania: a morphometric approach*

Simina STANC, Luminiţa BEJENARU, Mariana POPOVICI, *Biometric separation of domestic pig (Sus scrofa domesticus) and wild boar (Sus scrofa ferus) remains identified in sites of the first and second millennia AD from eastern and south-eastern Romania*

Mariana POPOVICI, Simina STANC, *Morphological patterns in the dentition of pigs from Stănceşti, Botoşani County (6th–3rd centuries BC)*

Simina STANC, Teofil BLAGA, *Animal resources exploitation in the Roman settlement from Niculiţel: archaeozoological data*

Senica ȚURCANU, *Freshwater shells as supports for Cucutenian body ornaments*

Vasilica-Monica GROZA, *Anthropological research concerning the urban population of medieval Iaşi — a 17th century necropolis found in the eastern side of Curtea Domnească*

Iulia LUPAN, Beatrice KELEMEN, Bianca IANC, Cornelia OCHIŞ, Mircea Teodor CHIRIAC, Octavian POPESCU, *Study of bacterial communities from the wood church, Nicula monastic complex, Cluj County, Romania — metagenomic approach*

KEYNOTE LECTURE

FROM ARCHAEOLINGUISTICS TO ARCHAEOMYTHOLOGY

Adrian PORUCIUC

"Alexandru Ioan Cuza" University of Iași, Faculty of Letters

What I aim to point out in this presentation is mainly that true interdisciplinary studies fundamentally imply *close collaboration and mutual support*, and not just parallel "multidisciplinary" approaches. In that respect, I chose to refer to my own career only because I consider it to be illustrative of the evolution of interdisciplinary methods throughout the last three decades.

In 1992 I published an article entitled "Problems and Patterns of the SE European Ethno- and Glottogenesis (*ca*. 6500 BC–AD 1500)." For all its flaws, I still consider that article (published in *The Mankind Quarterly*, Washington, D.C.) to be not only my first notable contribution to historical linguistics and to Indo-European studies, but also my beginning in archaeomythology. The central paragraphs of Poruciuc 1992 are about "patterns of historical behaviour" manifest with Southeast European populations throughout eight millennia, and also about the organic ties that unite *language, culture and history*.

It was in *Thraco-Dacica* where I published some of my notable articles on substrate issues. During the period 1992–2003, as half-post member of *Institutul Român de Tracologie* (IRT – a true interdisciplinary centre), I participated in two International Congresses of Thracian Studies (Constanța 1996 and Sofia 2000), my papers being published in subsequent volumes of proceedings. In 2003 IRT was "dissolved", but I remained in touch with the domain of Thracian studies and I contributed papers to two more congresses in the same field (Komotini 2007 and Istanbul 2011). I mention those participations mainly because, in method, my congress-papers belong to archaeomythology too, since they point out *possibilities of connecting archaeological finds to historical records as well as to mythological and ethnographic facts of Southeast Europe.*

The most notable result of my activity as member of IRT is my volume *Archaeolingustica* (1995), published as monograph IX of Bibliotheca Thracologica. By the three methodologically interrelated studies included in the volume, I aimed to make archaeolinguistics appear as an interdisciplinary enlargement of what I had learned (first from Gheorghe Ivănescu) as *palaeolinguistics*, to which I added a more obviously *interdisciplinary perspective*. The very title of my volume of 1995 was meant to suggest links with archaic languages and cultures, as well as the importance of *archaeology as support for — and confirmation of — linguistic demonstrations*.

After *Archaeolinguistica*, the volume that best reflects my use of interdisciplinary criteria is *Prehistoric Roots of Romanian and Southeast European Traditions,* published by the Institute of Archaeomythology (Sebastopol, California) in 2010. A central idea of the volume is that — under circumstances of total or dominant illiteracy — transmission by word of mouth, from generation to generation, accounts for the spectacular preservation of pre-Christian, pre-Roman, and even pre-Indo-European elements in Romanian folklore, as particular part of Southeast European traditional culture. Special chapters of the volume focus on characters (such as the *dolf*, the aurochs and the lion) that appear in whole cycles of Romanian ritual folklore, or on aspects of what I interpreted as "folk Orphism".

In the introduction to her book of 1989 (*The Language of the Goddess,* p. XVIII), Marija Gimbutas stated: "This volume is a study in archeomythology, a field that includes archeology, comparative mythology, and folklore, and one that archeologists have yet to explore.". To the three disciplines propounded by Gimbutas, I added archaeolinguistics, an addition that turns a triangle into a square. It is exactly a *square basis* (archaeology–mythology–folklore–linguistics) that I consider to be essential for *turning probability into certitude* in the reconstruction of prehistoric and early historical patterns of spiritual life.

GEOARCHAEOLOGY

A NON-INVASIVE RESEARCH MODEL. CASE STUDIES REGARDING GUMELNIȚA TELLS FROM MUNTENIA

Cătălin BEM[1], Andrei ASĂNDULESEI[2]

[1] National Museum of Romanian History, Bucharest
[2] "Alexandru Ioan Cuza" University of Iaşi, ARHEOINVEST Platform

Keywords: Chalcolithic, Gumelnița culture, pluristratified sites, tells, non-invasive methods, conscious destructions.

The plain utilization of certain digital sources/products—orthophotoplans, satellite images of other format—cannot successfully lead to the identification of tell sites, albeit mentioned or not in the dedicated literature. Most of the times, even for the published data, the topographical marks are not able to determine a precise localization, while the verification of satellite images and orthophotoplans may involve the identification of an approximate position, without the possibility of detailing.

On the one hand, a good understanding of the surveyed terrain is mandatory for the identification of tells in aerophotograms. On the other hand, if the area has not been physically accessible, a prolonged aerial photography phase is necessary, although it may not suffice.

In other words, the field surveys designed to pinpoint the sites should became compulsory, as highlighted above. Once the locations are determined, the successive aerial photograms of the investigated areas may eventually successfully lead to the recognition of supplementary elements—for example, the ritual demarcation of the sites or of the exterior habitation.

The tells' building/organization system, in several cases extremely complex—although unitary from a conceptual point of view—require a certain approach. We consider that defining phases of the tells' construction are the precise separation of the future inhabited area, the building of a delimitation "embankment" towards the interior of the settlement by adding material from the neighbouring terraces (not sediments from the meadow deposits), and the erection of successive palisades on rectangular paths. Furthermore, we believe that these stages are, most probably, reiterated every time a Gumelnița community (re)occupies a tell. Thus, for example, some pluristratified Gumelnița establishments have at least two demarcation ditches.

The detailed topographical measurements (especially by means of 3D scanning) and geophysical methods become compulsory instruments for the investigation of such habitation complexes. The possibility of obtaining remarkable results in a short period of time, doubled by the lack of inherent repercussions of such an archaeological investigation on the site's stratigraphical integrity, are advantages great enough not to be overlooked. The multitude of systematic archaeological investigations, most of them poorly financed, leads only to an increase of destructions provoked to pluristratified sites. Most surely, it is time to take into consideration a re-evaluation of the necessity of investigating sites preserved for more than six millennia. Omitting certain research phases should stop being a common practice once and for all.

The problems highlighted above, as well as other ones, will be treated with respect to the reference case studies investigated as part of the Chronos project: Țigănești–*Măgura Calomfirescu*, Trivale-Moșteni–*Blidaru*, Ziduri–*Sub Cetate*, and not only!

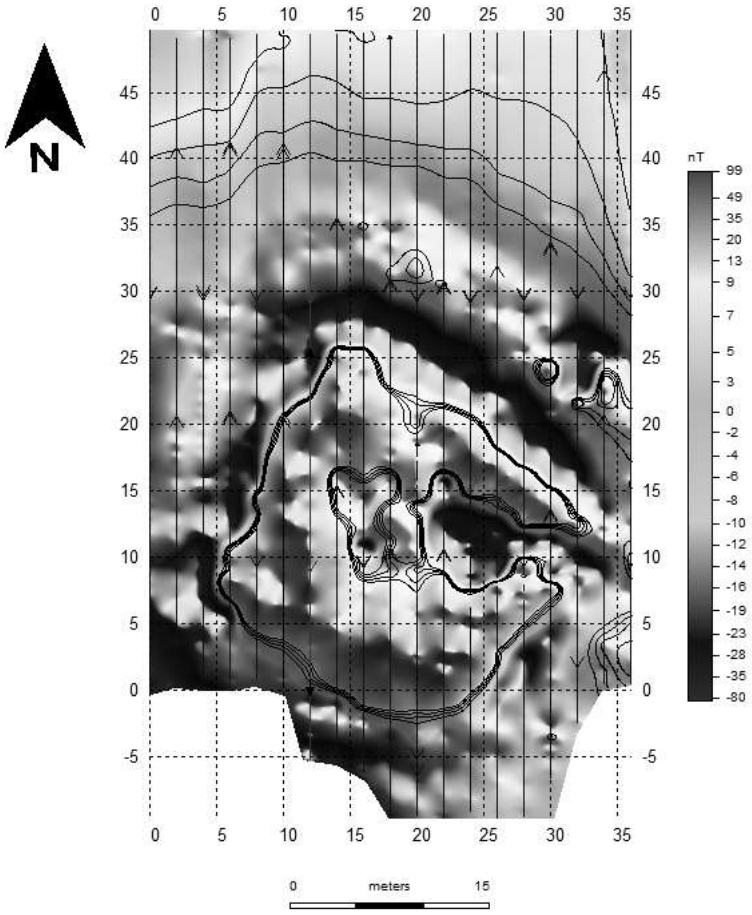

Figure 1. Magnetometric map of the tell from Ziduri–*Sub Cetate*.

THE TELL FROM BORDUŞANI–*POPINĂ* — PETROGRAPHY OF LITHIC INVENTORY, SOURCE AREAS, AND THEIR CONNECTIONS TO CHALCOLITHIC SETTLEMENTS

Constantin HAITĂ

National Museum of Romanian History, Bucharest

Keywords: Chalcolithic, Gumelniţa culture, lithic inventory, petrography, source areas.

The Borduşani–*Popină* tell settlement is located in *Balta Ialomiţei*, the island-like floodplain area of the Danube delimited by the Borcea and the the Ostrov branches, characterized by the presence of numerous lakes, ponds, permanent or temporary channels and higher areas of alluvial accumulation.

The Chalcolithic levels investigated so far are attributed to the Gumelniţa A2 phase, and revealed a very rich and varied lithic inventory, represented by objects made from both chipped and polished stone.

The chipped lithic inventory is composed from various silicolites, of which the "Balkan" flint, characterized by fine texture, massive structure, rarely banded, homogeneity and yellowish ochre colour, is predominant.

The polished inventory is represented by various types of rocks, of magmatic, metamorphic, and sedimentary origin. From these, very important frequencies have the *green schists*, very weakly metamorphosed, from which the majority of grinding stones and polishing tools were made.

The "Balkan" flint is frequent in central Dobrogea, in the form of *chaille* inclusions in carbonated deposits of Jurassic age, with some occurrences near the tell from Hârşova, or in the proximity of the Gumelniţa settlement from Ghindăreşti.

The types of rocks used to fashion the artefacts made from polished stone present occurrences in the entire territory of Dobrogea; the magmatic and of higher metamorphism in the northern zone, the *green schists* and some limestones in the central part, and an entire series of sedimentary rocks in the southern portion. Also, the *green schists* occur in the vicinity of the two mentioned sites.

The settlements of the Gumelniţa culture, viz. Borduşani–*Popină* and Hârşova–*tell*, represent the occupation areas with the longest evolution, as revealed by the stratigraphy of the anthropic deposits, the first one located on an erosion outlier, and the other on the edge of the lower terrace of the Danube.

Considering the absence of rocks occurrences in the area of the alluvial plain, we can suppose the presence of some connections with the source areas, and also of some possible exchange relations with contemporary settlements situated on the right bank of Danube, in Dobrogea, such as Luncaviţa–*Cetăţuie*, Ostrov–*Cetatea Baltina*, Hârşova–*tell* and Ghindăreşti.

FEW REMARKS CONCERNING THE HUMAN IMPACT ON THE NATURAL ENVIRONMENT EXERCISED BY THE COMMUNITIES OF THE PRECUCUTENI-CUCUTENI-TRIPOLYE CULTURAL COMPLEX FOR OBTAINING AGRICULTURAL SURFACES

Constantin PREOTEASA

History and Archaeology Museum of Piatra-Neamţ

Keywords: Chalcolithic, Precucuteni-Cucuteni-Tripolye cultural complex, human impact, economy, agriculture, natural environment.

The present study analyses the impact exercised by the human communities belonging to the Precucuteni-Cucuteni-Tripolye cultural complex on the natural environment taking into account the deforestations aimed at creating new agricultural surfaces. In order to obtain a general view on this phenomenon, the specialists advanced a series of hypothetical numbers regarding its amplitude respectively the cultivated surfaces and the food necessary to the individuals.

The most complex paleo-economic study was made by Vladimir Kruc for a number of 24 Tripolye settlements from the Khristinovka–Špola area; this study was preceded by another one signed by Serghey Bibikov, referring to the settlement from Kolomijščina I (Tripolye CI) and

followed by the work of Bisserka Gaydarska (in fact an analysis based on a GIS) which treats the giant-settlement from Majdaneckoe (Tripolye CI). The starting point of Serghey Bibikov's analysis is the information given by ancient Russian agriculture; he makes a series of analogies with the period of the 16th–17th that corresponds to the Little Ice Age characterized by an increased cool climate, different from that of the Atlantic period, which was warmer and more humid. This fact influences directly the conditions of the natural environment, but also the agricultural yield obtained by the human communities of that period.

To the climate factor we should add the anthropic one — during the Chalcolithic, the soil resources were significantly richer than during the medieval period, when they were affected by a more intense and prolonged agricultural exploitation.

As for Vladimir Kruc, he uses as starting point the values advanced by Serghey Bibikov that we consider quite close to reality. We consider that the surface—cultivated with cereals (wheat and barley)—necessary for one member of the Precucuteni-Cucuteni-Tripolye communities could be of *ca.* 0.25 ha; we probably should add another 0.25 ha for the other plant species (fibrous plants, vegetables, aromatic plants, fruit trees, vine), that leads us to a total of 0.5 ha of cultivated surfaces. There were of course other areas as big as these ones covered with pastures that provided the animals food. We don't have to overlook the fallow ground which is supposed to have the same dimensions as the one utilized for the agricultural activities; the fallow ground was to be cultivated in the future (in order to produce the necessary food resources both for the human community and for the domestic animals owned). With respect to the cereal harvest obtained we believe that the medium quantity was around 500 kg per 1 ha. Our option for the mentioned values in the case of the cultivated areas, the areas of pastures and fallow grounds takes into account, on one hand, the relation between the working time and the effort that the members of the community assigned for their activity and on the other hand the quantity of food resources obtained.

By taking into consideration the numbers previously mentioned, we made an approximate estimation of the surfaces exploited from an agricultural (including cultivated lands and pastures) and economic (constituted from cultivated surfaces, pastures and fallow grounds) point of view, by the communities from the settlements of the Precucuteni-Cucuteni-Tripolye cultural complex.

This evaluation was made for the settlements that already have demographic estimations of their population, but also considering their typology (typology that we proposed based on their surface, the number of constructions, and the number of individuals accommodated).

GIS-BASED SPATIAL ANALYSIS IN CHALCOLITHIC. CASE STUDY IN MOLDOVA

Robin BRIGAND[1], Andrei ASĂNDULESEI[1], Olivier WELLER[2], Vasile COTIUGĂ[1]

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Keywords: Neolithic, Chalcolithic, Moldova, landscape archaeology, GIS, natural resources.

Despite a long tradition of studies on the Moldavian Neolithic and Chalcolithic cultures, the analysis of human communities' territorial behaviour remains underexploited. This work

combines concepts used in landscape archaeology with the potentiality of a Geographic Information System (GIS) in order to mobilise archaeological artefacts in a large-scale setting and multiple thematic scopes. This presentation compares spatial and temporal distributions of archaeological evidences in the west part of the Iaşi County, but also in the Neamţ County. Field survey, statistical analysis, spatial analysis and remote sensing were carried out in order to describe natural and anthropogenic factors that could organize and affect settlements patterns. An exhaustive archaeological database was built, using both earlier and most recent published repertories. The main goal is to obtain, for every prehistoric settlement, different qualitative indicators regarding the spatial precision of the topographic mapping, the nature of settlement and its chronological framework, the quality and period of the archaeological information. Another goal is to focus on natural indicators and on their relative attractiveness in order to define their relation with socio-economic development. The general scope is to evaluate how Prehistoric territories are constituted and how natural resources (water, soils, salt springs, etc.) were driving factors for these farming groups of eastern Romania. Visual analysis and spatial patterning allow us to describe territorial models which explain the original organisation of these territories.

Acknowledgments. This study was supported by the Romanian research program CNCS – UEFISCDI PN-II-ID-PCE-2011-3-0825, no. 219/05.10.2011.

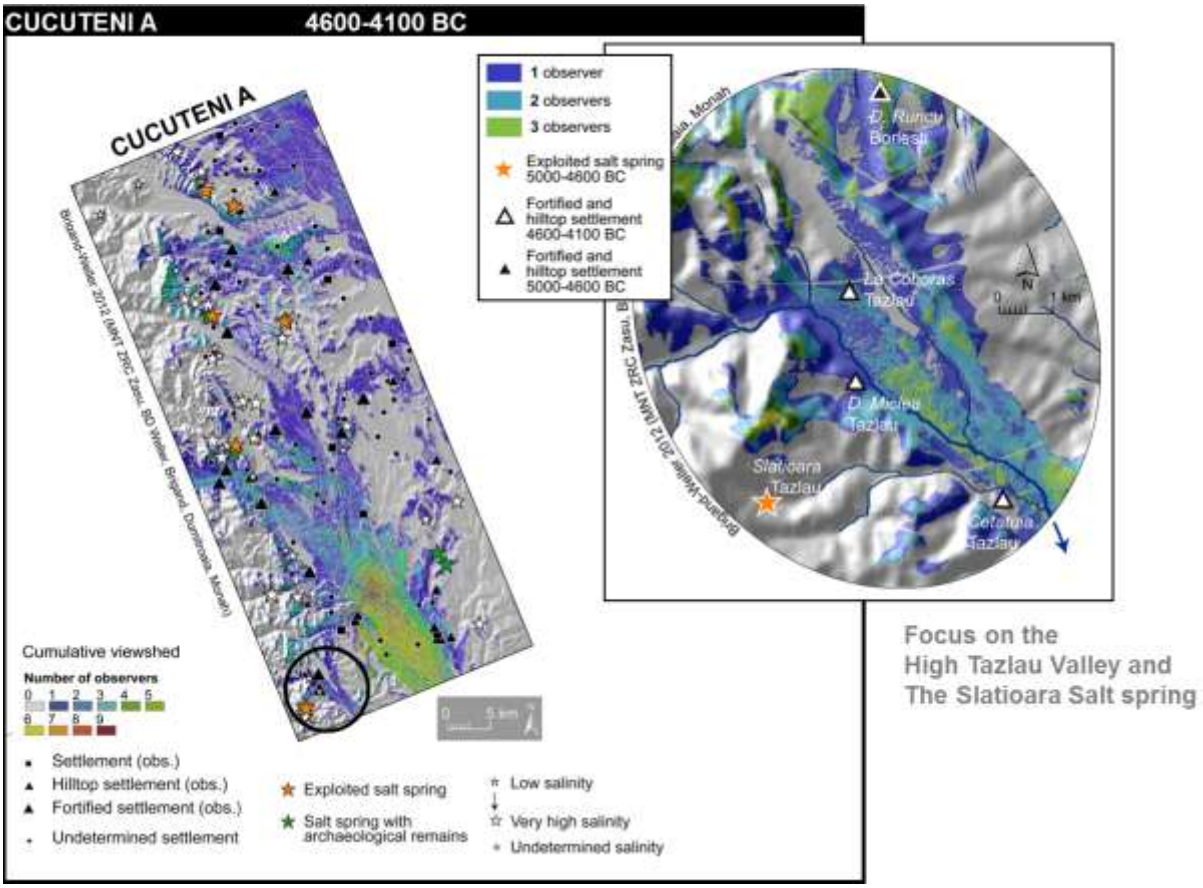

Figure 1. Cumulative viewshed in Cucuteni A Phase (Neamț and Iași counties).

INTERDISCIPLINARY GEOGRAPHICAL AND ARCHAEOLOGICAL APPROACHES IN CUCUTENIAN SETTLEMENTS FROM THE VALEA OII RIVER WATERSHED

Ionuț-Cristi NICU, Gheorghe ROMANESCU, Andrei ASĂNDULESEI, Vasile COTIUGĂ, Silviu GANIA, Radu-Ștefan BALAUR

[1] *"Alexandru Ioan Cuza" University of Iași, ARHEOINVEST Platform*

Keywords: Chalcolithic, Cucuteni culture, settlements, interdisciplinary research, GPS, GIS.

The interdisciplinary researches that were made in the Valea Oii River watershed area (tributary stream of Bahlui River) by teams consisting of archaeologists and geographers lead to charting the Chalcolithic settlements found in archaeological registries, but also discovering new ones (Figure 1). In the mapping of settlements, we used a Leica System 1200, comprising a reference station and a rover, in this way being possible a more accurate location. Some of the settlements were chosen to realize more detailed topographical surveys (*Dealul Mănăstirii*/*La Dobrin*/*Dealul Gosanu*, *Dealul Boghiului*/*Dealul Mare*) and geophysical research (*Dealul Boghiului*/*Dealul Mare*).

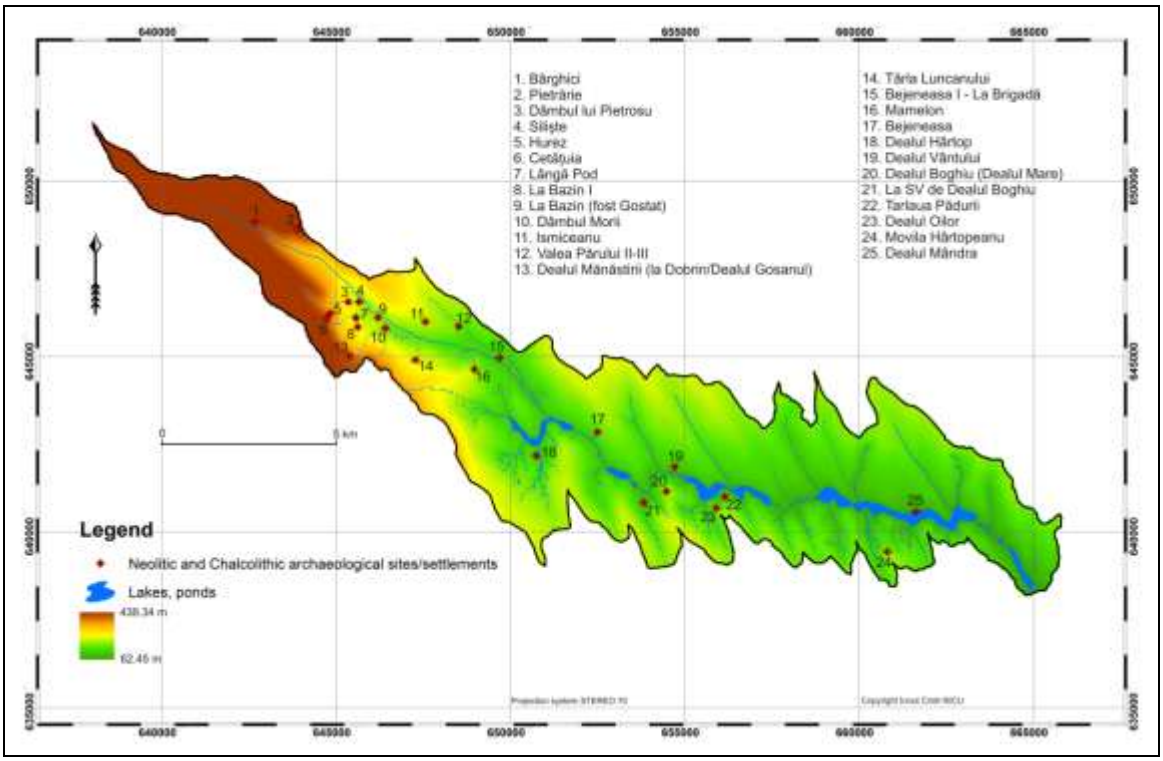

Figure 1. Neolithic and Chalcolithic settlements from the Valea Oii River watershed.

The Valea Oii River watershed with a surface of 96 km² is located in the North-Eastern part of Romania and it is mainly within the area of the Moldavian Plain, except for a small part from the upper basin which is located in the Suceava Plateau.

Further on in the future, we intend to take more field surveys to identify archaeological sites from other periods (Bronze Age, Iron Age, etc.), and to make a more detailed analysis regarding their location and evolution over the historical periods.

Over the time, humans or human communities moved and established their settlements depending on the natural factors and their evolution, like climate change fluctuations (colder periods with warmer ones), the presence of new hydrological resources (e.g., springs) as a consequence of landslides or in the proximity of a water course, the disappearance of forests as a consequence to overexploitation, etc. Because with or without their will, they had to take into account some of these features.

This interdisciplinary approach allowed us to apply geographical methods and techniques (GIS) for archaeological research, and to create a more detailed and common database regarding the location of settlements and the geographical background, especially the geological evolution and the landforms (plateaus, cuestas, gullies, landslides) of this area.

SOCIO-ECONOMIC CHANGES IN CENTRAL NORTH-WESTERN TRANSYLVANIA. AN INTERDISCIPLINARY APPROACH

József Gábor NAGY, Kovács Zsolt MOLNÁR, Zoltán IMECS

"Babeş-Bolyai" University of Cluj-Napoca

Keywords: Late Bronze Age, Early Iron Age, settlement pattern, peer polity, cost distance, GIS, landscape archaeology.

The current paper studies settlement systems along with metal finds, isolated graves and graveyards belonging to the Late Bronze Age and Early Iron Age cultures from central and north-western Romania. It is the capitalisation of basic and interdisciplinary research undertaken in recent years by the authors of the presentation. Despite the fact that for objective reasons information is lacking, we managed to assemble a set of knowledge and information from field research and systematic excavations.

The current state of knowledge has an impact on interpretations and dating of various settlements and archaeological features. Most sites can be dated only broadly within the Bronze Age and Early Iron Age.

Our aim was to investigate the social transformations and the dynamics of the settlements through data from field walks, excavations and building on the information's regarding the landscape and paleo-environment of the studied geographical area. Thus we mainly used macro-regional paleo-environment from central and north-western Romania. The research also had an interdisciplinary character, in our approach we used satellite images, aerial photographs and geophysical measurements stored in a geographic information system. From methodological point of view, we defined and delimited the territory of the fortifications and possible routes of communication within the Someşul Mic Basin through theoretical archaeological models and GIS. Modelling the territories of the communities from central Transylvania provided information on prehistoric space division. Analyses based on cost surface and visibility provided data on the perception of prehistoric space and helped reconstruct the possible role of fortifications as regional centres of power and control.

The analysis of the organization and social structure of the communities from central Transylvania is based on interdisciplinary archaeological and ethno archaeological research of the settlements and settlement system. An open question in the research of chiefdoms is the

degree of institutionalization of power and socio-economic control. Main indicators of social hierarchy are objects considered prestige goods. Besides bronze weapons fortifications created through a collective effort are another indicator of social organization and hierarchy.

Changes were seen especially in spreading of the cultural groups. Cultural groups belonging to the Late Bronze Age, characterized by specific cultural material, economic strategies and different types of settlements that could be differentiated geographically in Transylvania, will be replaced by a relatively homogeneous cultural unit, channelled ceramic horizon, which at the beginning of the Early Iron Age spreads in Transylvania and peripheral regions.

Changes in the shape and size of houses did not provide conclusive data because the current state of research. Late Bronze Age dwellings are well researched and appear to be more massive buildings than those known from the Early Iron Age. The latter are smaller, with one compartment.

The settlements of the analyzed historical periods present a number of similarities. Out of the 246 mapped sites, 222 are open settlements with an economy based on agriculture and animal husbandry. Peasant way of production is associated with smaller short lived settlements (0.2 to 3 hectares) with a simple internal spatial organization. The traces of social division are difficult to detect. The emergence of large fortifications at the beginning of Early Iron Age reflects a change in settlements system compared to the smaller fortifications from the Bronze Age. In the first Iron Age fewer small or medium open settlements can be seen. The Bronze Age socio-economic system changes during the Early Iron Age.

As a result of the analysis undertaken we can state that the social system of the Late Bronze Age and Early Iron Age was based on the interaction of equal social and political formations. These chiefdoms controlled relatively small territories along valleys. Our approach gives an outlined view on the actual stage of research, being convinced that our investigations will provide more concluding evidence in this matter.

THE DEFENSIVE SYSTEM FROM SAHARNA MARE IN THE LIGHT OF THE SPATIAL, ARCHAEOMAGNETIC, AND ARCHAEOLOGICAL EXCAVATION DATA

Ion NICULIŢĂ[1], Vasile COTIUGĂ[2], Aurel ZANOCI[1], Mihail BĂŢ[1], Andrei ASĂNDULESEI[2]

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Keywords: Early Hallstatt, Cozia-Saharna culture, Saharna Mare fortress, geomagnetic survey, archaeological excavations.

The Saharna Mare archaeological site is located at 1 km south-west of the modern-day village of Saharna, in Rezina district, Republic of Moldova. The site lies on a trapezoid interfluve that is part of the Dniester's right-bank high terrace, at a height of *ca.* 140 m from the river bed. Its northern, eastern, and south-eastern sides are constituted by the lofty and steep banks of two defiles that merge at the western edge of the Saharna village.

The remains of the defensive system, visible to this day at the surface of the soil, were subjected to systematic archaeological excavations, the results of which have been published in several studies.

The geomagnetic surveying conducted in the summer of 2010, but also a minute inspection of the orthophotoplans, revealed a number of hitherto unknown defensive structures, which likewise could not be traced at ground level.

Following the corroboration of the orthophotoplans and the results of the geomagnetic scan with the data obtained from the field investigation conducted in the south-eastern sector of the Saharna Mare interfluve, the vestiges of a semi-oval "citadel" measuring 60×64 m (approx. 0.32 ha) were identified. The structure was delimited to the East, North, and West by a man-made defensive system, and to the South-East by the steep bank of the interfluve. The archaeological investigation of the "citadel" documented a "wall" with an adjacent ditch. The "wall", measuring *ca.* 185 m in length, ran along a semi-circular path, the extremities of which touched the interfluve's steep bank. The bank was likewise fortified with two wooden palisades placed at a distance of *ca*. 0.6–0.8 m from each other, and with the space between them filled with a mixture of earth and stones. The ditch was dug in front of the "wall", following its semi-circular path. On the western and northern sides, the ditch was at approximately 10 m from the "wall", and was dug at the bottom of a natural doline, and on the eastern sector it was dug directly into the ancient occupation level, at a distance of 2.7 m from the "wall". The material discovered in-between and at the base of the wall ruins and in the ditch allowed us to conclude that the defensive elements were constructed during the Early Hallstatt period, and that the "citadel" is part, from a cultural-chronological point-of-view, of the framework of monuments attributable to the Cozia-Saharna culture.

The north-western side of the "citadel" abutted another "enclosure", likewise of semi-oval shape, measuring de 55×78 m; its contour was identified following the geomagnetic survey. An archaeological excavation was conducted in order to elucidate the character of the anomaly from the area where the structure curved. The dig revealed a dig with a trapezoidal profile, with a width of 2 m on the top and *ca.* 1 m at the bottom, and a depth of *ca.* 1.1 m. The ceramic fragments unearthed from the inferior portion of the ditch are specific to the Cozia-Saharna culture; this allows us to date the construction of this defensive work during the Early Hallstatt period, just like the "citadel".

The geomagnetic survey and the analysis of the most recent orthophotoplans revealed yet another defensive line on the interfluve's the northern, north-eastern, and south-eastern sides. It could be traced for a distance of *ca.* 600 m, and appears as a small earth wall, today barely visible with the naked eye on the surface of the soil; its width at the base was 1.8 m, and its height *ca.* 0.3–0.4 m. The archaeological investigation established that the earth wall is actually what is left of a more complex defensive structure that consisted of two parallel stakewalls positioned at a distance of 1.2–1.3 m from each other. The six stakewall postholes that were preserved had a diameter which varied from 0.2 m to 0.45 m, and a depth of 0.35 m. The space between the two stakewalls was filled with stone (a quantity of 1.3 m^3 of limestone was collected from a 2-meters-long section of the investigated area) and earth. Fragments of Thracian-Getae ceramic ware and Greek amphorae were discovered inside and at the base of the "wall", making this defensive line contemporaneous with the large enclosing wall, the ditch, and the bastions from the south-western side of the interfluve, which functioned during the 4th–3rd centuries BC.

1

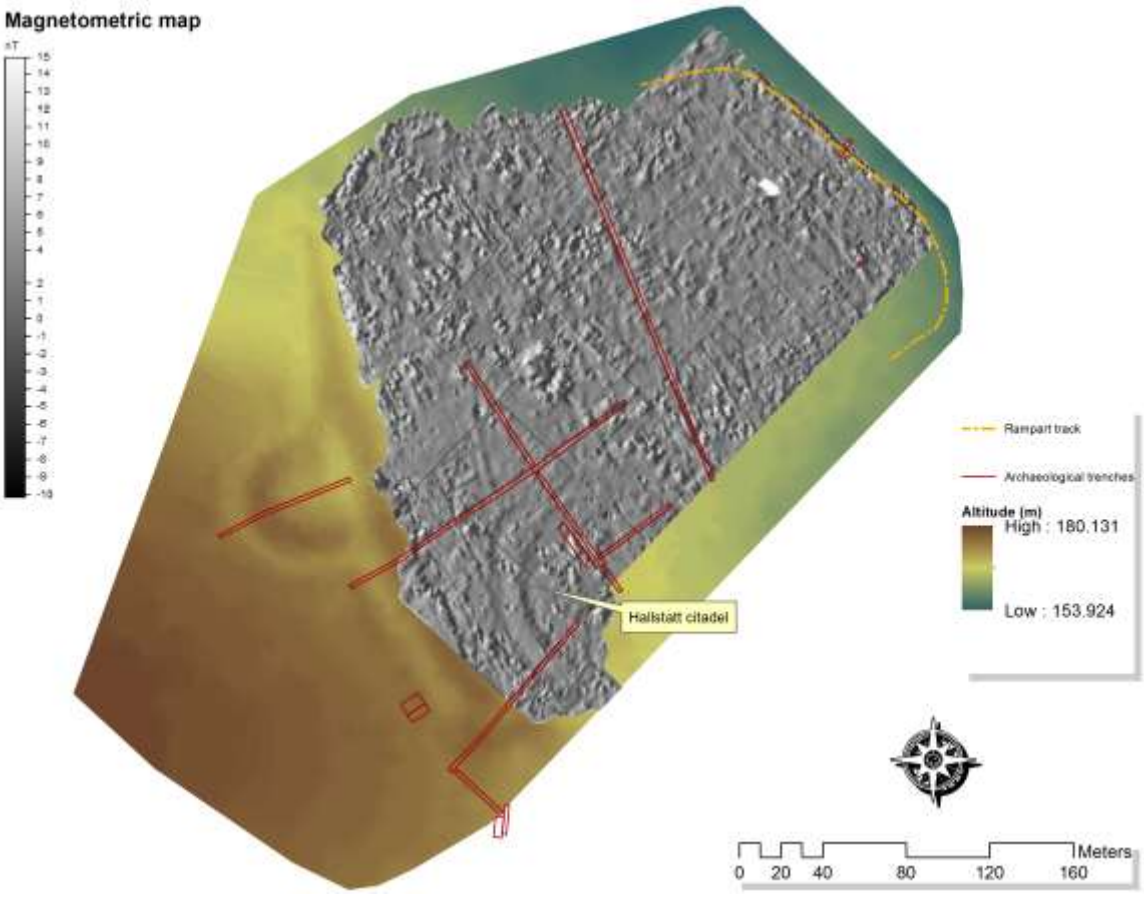

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Figure 1. Saharna Mare. 1: the orthophotomap of the site; 2: the magnetometric map.

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Figure 2. Saharna Mare. 1: ruins of the "wall" of the Hallstatt citadel; 2: the ditch of the Hallstatt citadel; 3: the ditch of the adjacent area of the Hallstatt citadel; 4: the remains of the "wall" at the eastern extremity of the interfluve.

AN ARCHAEOASTRONOMIC CASE STUDY: THE SITE FROM VALEA ALIOŞU, MAŞLOC VILLAGE, TIMIŞ COUNTY, ROMANIA

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Arheovest NGO

Keywords: Bronze Age fortification, geoastronomy, archaeoastronomy, solar cult, midsummer sunrise alignment.

In the context of an archaeoastronomic study of a series of "fortresses", namely Corneşti–*Iarcuri* (probably the largest of the European Bronze Age; CIMEC RAN code 158,047.01; Lat. 45 ° 56 'N, Long. 21 ° 14'15 "E; about 1700 ha), Firiteaz–*Ţârvenca* (undated; Lat. 45 ° 59'58 "N, Long. 21 ° 21'42" E; about 13 ha; in close vicinity of an important Bronze Age fortified settlement), Firiteaz–*Golumbului Hill* (Lat. 46 ° 0'15 .50 "N, Long. 21 ° 21'28 .40" E; approximately 4ha), and Alioş–*Valea Alioşu* (Bronze Age fortification and settlement; CIMEC RAN code 157,709.02; Lat. 46 ° 3'52 "N, Long. 21 ° 30'18" E; about 7 ha), we noticed an alignment of several of their important structural elements both with Highiş Peak (Lat. 46 ° 12'23 .30 "N, Long. 21 ° 48'33 .25" E) from the western part of the Zarand Mountains, and with position of the sunrise at the summer solstice (Figure 1).

The circular fortification from Valea Alioşu is of the type with a trench and earth wall (currently with a depth of 1 m and, respectively, a height of 1 m). The diameter of the earth rampart is 105 m; this results in a surface area of about 0.8 ha for the entire enclosure (Figure 2).

The apparent alignment is observable using the Google Earth software suite. At the summer solstice of 2011, a series of videos and photographs of the sun as it rises from behind Highiș Peak (799 m; the highest landform of the horizon) confirmed the previous computer simulations.

For the necessary corrections related to the phenomenon of precession of earth axis we used the Solstice Azimuth 1.5 software tool created by Jürgen Giesen (www.jgiesen.de/ SolsticeAzimuth), and the Sky Map (Cartes du Ciel) 3.2 software program.

Assuming on the basis of the ceramic analysis that the fortification from Alioşu Valley was built during the Middle Bronze Age, the azimuth values for the sunrise for the years 2000–1700 BC are 54.21°–54.26°. Currently, the azimuth value for the midsummer sunrise is 55°. Taking into account the height of Highiș Peak, and the angle of the sun of 32', we computed that for a viewer located on the site of the fortress at midsummer's sunrise, the sun's disk would have appeared as topping Highiș Peak.

We hold the opinion that the location of this fortification was selected by its founders based on this geoastronomical feature, related to the importance of the sun for the Bronze Age communities of the region.

Furthermore, there are a number of elements that could argue against selecting this location on tactical grounds: it does not provide visibility into the corridor of the Mureș River, an important communication route (while countless locations from the area do); the site does not benefit from a terrain that can facilitate its defence, unlike other locations; the inclination towards the North of the fortification, which has no military justification and was not due to topographical constraints (Figure 3). Instead, if the fortification was fortified on this northern slope with palisades (most likely), this inclination would have permitted the unhindered observation of the sunrise.

We do not exclude the possibility that the fortified enclosure was used for religious rituals; an extensive archaeological investigation could certainly confirm or refute this hypothesis and clarify at least some of the issues presented above.

Figure 1. The Bronze Age sites aligned with Highiș Peak, and the sunrise during the summer solstice.

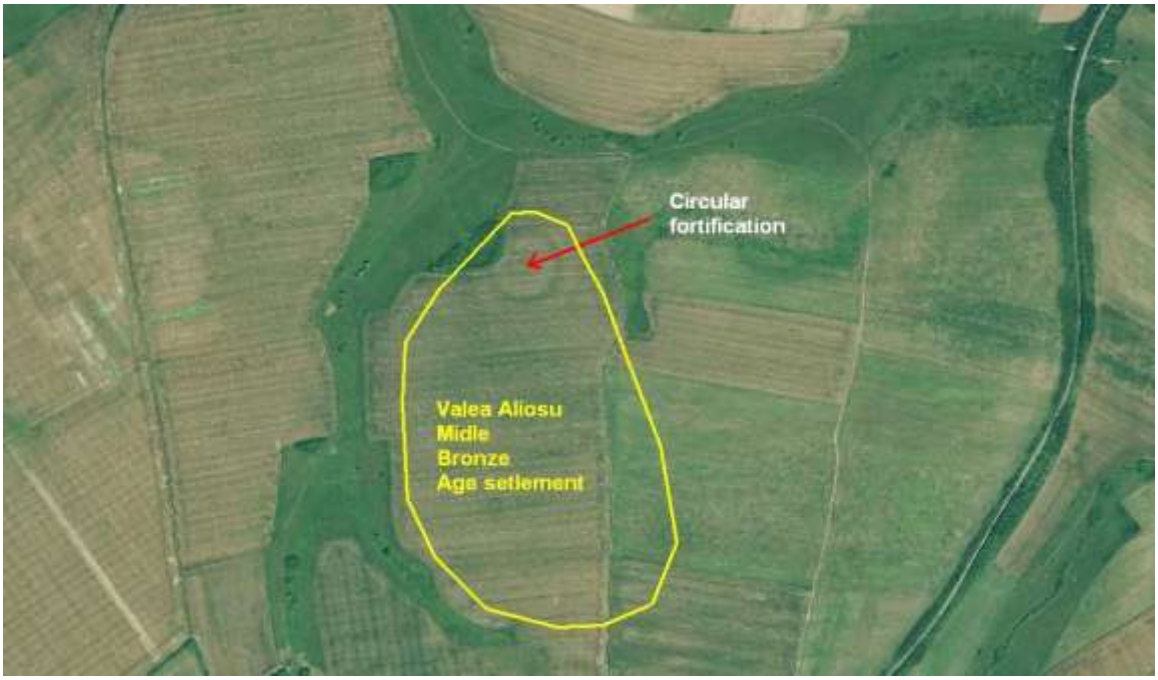

Figure 2. Valea Alioşu (orthophotogram).

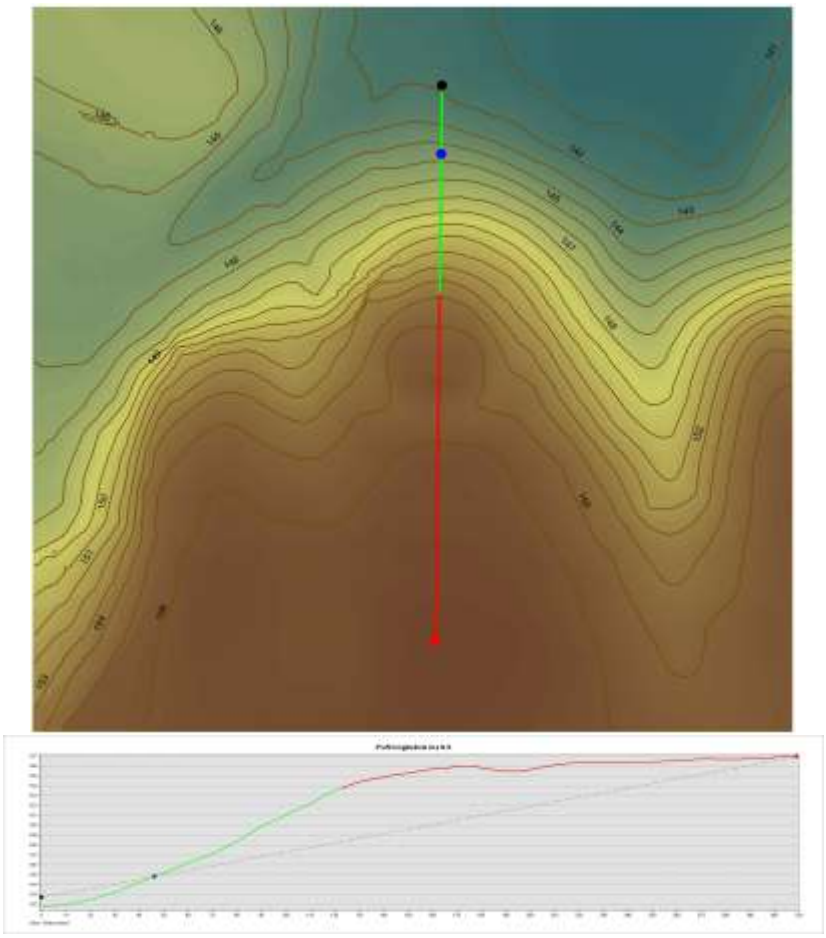

Figure 3. The topographic map and the N–S longitudinal profile of the fortification from Valea Alioşu (D. Micle and A. Cântar).

SEASONS OF DEATH. TOWARDS AN ARCHAEOLOGICAL-ASTRONOMICAL METHOD FOR STUDYING ANCIENT BURIAL RITES

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Keywords: Gepid necropolises, archaeoastronomy, funerary archaeology, landscape archaeology.

The paper focuses on the many problems occurring while analysing mortuary discoveries, emphasizing and reviewing the main aspects that should be taken into consideration while dealing with such material. Right from the start we would like to stress the fact that such an approach is strictly conditioned by a thorough excavation technique and way of elaborating its documentation in order to obtain the right amount of data that may offer the possibility of

drawing some conclusions about the way ancient communities related themselves to the concept of death.

The orientation of the tomb can offer us a great deal of information following the idea that no such action was in fact random. We can then suppose that the orientation of the tombs was performed according to inner cosmologies and rules of each structured community being thus the result of a conscious and self-assumed way of thinking. Following this idea and based on the hypothesis that some religious cardinal points should exist in every community whether they refer to geographical, religious or cultural aspects we tried to establish the seasons of death in two Gepidic necropolises—Vlaha (Cluj County) and Fântânele (Bistriţa-Năsăud County)—based on the slight deviations of the axis of the tombs. Insofar as we know, there are no such attempts for the Great Migration Period.

We considered a robust and objective method for grave orientation making use of image processing techniques. The basic idea is to fit an ellipse for the grave frontier (limits) and to determine the angle of the ellipse major axis. The vectored images must be pre-processed (threshold and contour detection) prior to the ellipse fitting and the angle measurement procedures. For every point of an object of interest (the irregular contour of the grave) identified by manual selection, the second order moments relative to the object's canter of mass were computed. For our practical purposes we are interested especially in the angle value between the major axis of the ellipse fitted and the geographical North. Using transforming relations between equatorial and horizontal coordinate systems, unique relations were obtained for each site involved. Based on these datasets, and taking into consideration the natural horizon for each site, we were able to determine the actual period of the year in which the deceased were buried.

The potential of such an approach to the study of ancient cemeteries is quite considerable as far as we are concerned, having great implications in establishing the structure of the necropolises (on each phase of their existence), the chronology, the funerary practices, or the structure of the population. In this manner we are opening a new way into determining more precisely the relative chronology of such sites and afterwards analysing different patterns inside this new and more precise chronological phases. Last but not least, such an approach can shed new light upon funerary practices which otherwise would of remained unknown, such as the moment of establishing the orientation of the graves, which in this case seems to be at dusk, when the sun sets in.

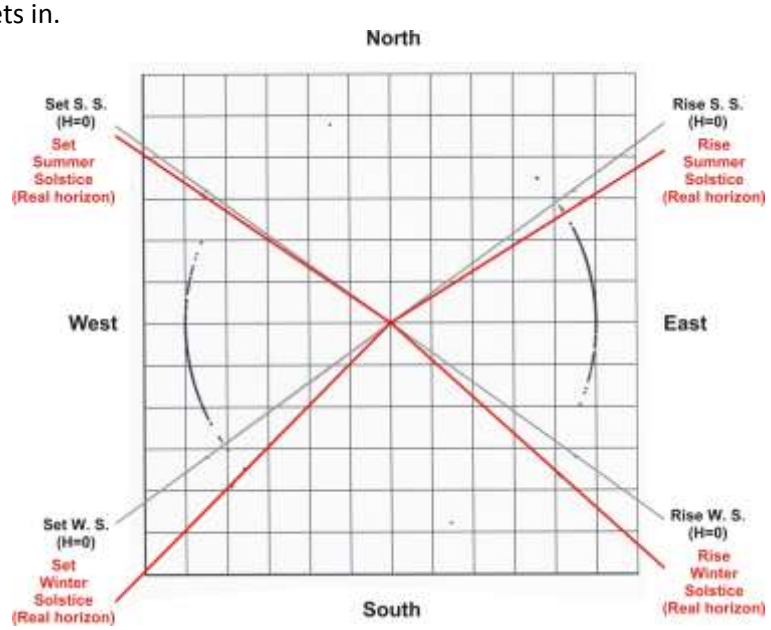

Figure. 1. Diagram showing the orientation of the tombs and the correlation with the real horizon of the site.

POWER AND CONTROL IN THE DACIAN KINGDOM'S PERIOD (1ST CENTURY BC–1ST CENTURY AD). A CASE STUDY: USING GIS SOFTWARE IN ANALYSING THE RELATIONSHIP BETWEEN FORTIFICATIONS AND SETTLEMENTS LOCATED AT THE ENTRY OF THE MUREȘ RIVER IN THE ARAD PLAIN

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Keywords: Late Iron Age, Dacian Kingdom, fortifications, GIS, viewshed analyses.

For the intra-Carpathian area, the Dacian Kingdom's period (1st century BC–1st century AD) marks the appearance on a large scale of fortified settlements and fortifications. This phenomenon is clearly connected with the emergence of new elites, who, from an ideological as well as a spatial point of view, tended to separate themselves from the common folks.

The case study we are presenting is dedicated to a small, conventionally delimitated geographical area, located at the entry of the Mureș River in the Arad Plain. As a result of archaeological research carried out in this area over time, 19 archaeological objectives where identified, that can be roughly dated to period of the Dacian Kingdom, to which a series of monetary finds may also be added.

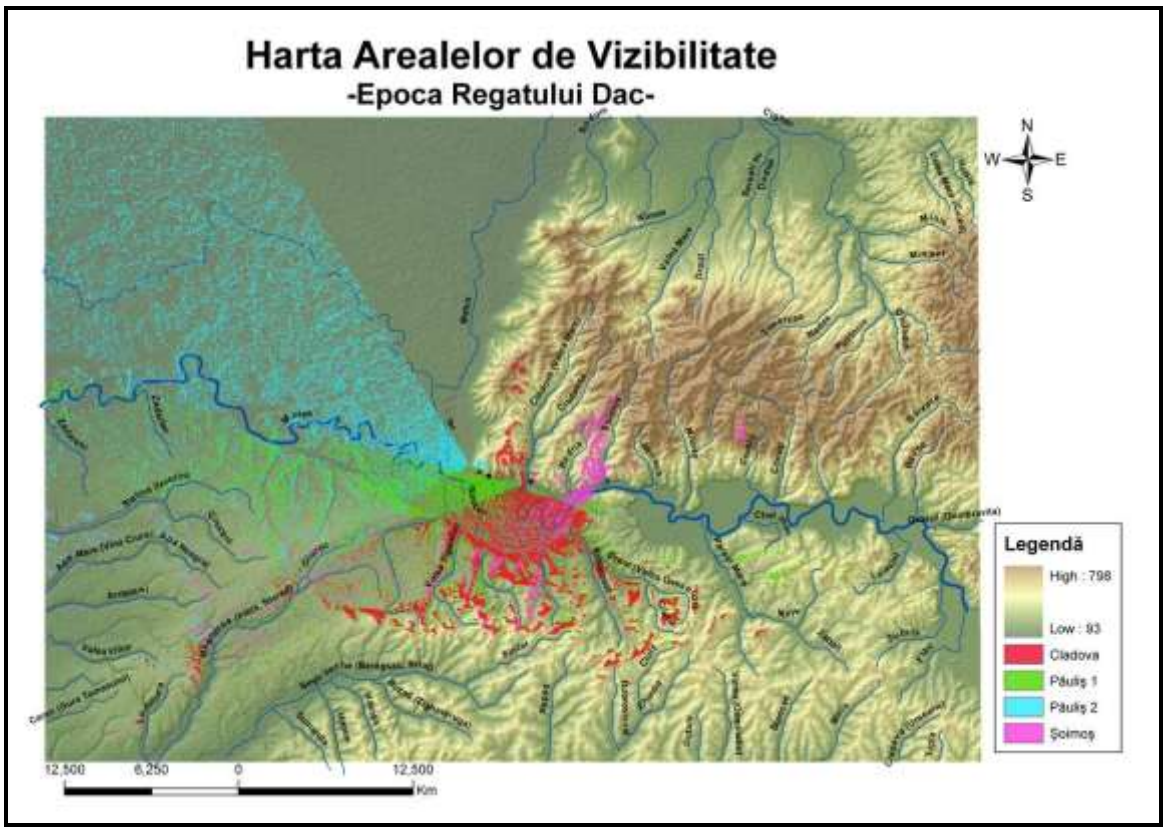

Figure 1. Viewshed map of sites from during the period of the Dacian Kingdom (generated in ArcGis 9.1).

The identified objectives were georeferenced, charted, and processed using dedicated GIS software. An entire series of geomorphographical elements that illustrate the relationships existing between the analyzed objectives and the geographical environment were taken into account, and also the possible relationships developed with other objectives, situated nearby. In order to do this, we brought into discussion a key element, the problem of visibility, respectively the problem of inter-visibility relationships that exists between different known objectives (Figure 1).

We had encountered a series of limitations during our study, which are related, mostly, to the insufficient publication of the results obtained during the systematic or non-systematic archaeological diggings at sites such as Cladova–*Dealul Cetăţii*, or Şoimoş–*Dealul Cetate*, which represent, unfortunately, real impediments for our study, in the sense that it forces us to operate with rough chronologies and datings.

Despite these shortcomings, we believe that such regional analyses can offer a wealth of information, by presenting the opportunity for extensive discussions related to many issues, such as the relations between settlements and the environment, the problem of ancient communication routes, the existence or inexistence of "fortification systems", and the problem of relations between centres of powers and their nearby hinterland.

FIELD RESEARCH ON TRACKING AND OBTAINING THE GPS COORDINATES OF THE MONASTERIES DESTROYED IN THE 18TH CENTURY IN *ŢARA FĂGĂRAŞULUI*

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Keywords: 18th century, *Ţara Făgărașului*, monasteries, GPS, map.

In the summer of 1761, Austrian troops under the command of general Adolf von Buccow burned down and destroyed all the Orthodox churches and monasteries from the historical region of Ţara Făgăraşului (southern Transylvania) that refused to be placed under the jurisdiction of the Uniate (Eastern Catholic) Church. The unfortunate result was the disappearance of archival documents, manuscripts, icons, and other cult items; only few of these have been saved by the locals. The monks were martyred, some of them, however, fled over the mountains to the monasteries in Argeș (southern Romania). Only some traces of walls from these survived in time.

The "Ştefan Mailat" Cultural Association from Făgăraş, together with the Moldova State University of Chișinău decided to organize in the summer of 2011 a project to track and obtain the GPS coordinates of the monasteries destroyed in the 18th century in Ţara Făgăraşului.

The first stage of the project was focused on studying the Josephine map. It was the first single topographical project for the Habsburg Empire initiated under the reign of Maria Theresa and completed during that of Joseph II (1741-1790). The set of maps designed for military purposes only existed in two copies, both kept secret. The monasteries from Ţara Făgăraşului

were also drawn in these maps shortly before their downfall. As a result of this research, 37 locations have been identified where monasteries existed.

The second stage consisted of validating the positions from the Josephine map with locations on site. Those where existence of monasteries was confirmed have been positioned with GPS. Old locations of the Dejani, Berivoi, Şinca Nouă, Sebeş, and Drăguş monasteries were successfully recovered. Out of these 5, on two locations new monasteries have been built over the last 20 years without any archaeological supervision (Dejani, Berivoi). In Şinca Nouă, the old monastery was discovered during archaeological excavations in recent years which were unfortunately never published. As for the other two monasteries in Sebeş and Drăguş, they were only identified in field, but not studied from an archaeological perspective.

Tracking the monasteries' locations represents only the beginning of this project with regards to their registration as archaeological sites, to be followed, per individual basis, by non-invasive research or archaeological excavations and their incorporation in the Ţara Făgăraşului tourist routes.

CITY IN RUINS AND RUINS IN THE CITY. AN ARCHITECT'S LOOK AT THE ARCHAEOLOGICAL MONUMENT

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Keywords: archaeological monuments, urban architecture,

The paper was born in a time of urban dissolution, a time marked by the schism between cultural values and practices generally accepted in building urban space. This situation is exacerbated by differences between different groups of professionals involved in developing the city. In recent years, due to increasing pressure on the housing market, a significant amount of archeology (more or less valuable) is brought to surface. Thus, it is required to analyse the coexistence of archeology and the contemporary city. This analysis should be placed in the context of city being claimed by multiple individual interests that overlap far less over the public interest.

The historic ruin is a founding act, an act of urban legitimacy and thus it should be exposed to the community. The object can represent nothing in a neutral context, but in conjunction with the tools of contemporary architectural language can become a figure of speech. Certainly there are lots of signs from our becoming, in the basements of the city, which we see randomly or sometimes remain completely hidden. Therefore, any occasion of revelation of such evidence is required to put it right.

We can distinguish three cases of coexistence of archeology with the city: (a) *ruin in ruins* — abandonment, disinterest, even suppression; is by far the most common; (b) *monument – urban enclave* — an exaggerated protection that leads to a quarrel with the city; the adhesion of the consumer public is virtually impossible; (c) *archeology monument in contemporary living* — perfectly integrated into the urban fabric of the city, a body recently brought out of cryogenic sleep that is living in the present.

A well-worked urban planning, broken into all disciplines, landscape, architecture, anthropology, sociology, and last but not least, a much stronger social dialogue, will be able to successfully integrate contemporary archeology into the tissue of the city. The paper uses some personal contributions, especially at Iasi, conducted at various stages in the last 30 years, but examples from the West to try to extract the final few sustainable solutions.

In conclusion, genuine interdisciplinary dialogue may seal the coexistence in the mental, theoretical, and physical space of arts and sciences dealing with the city and may reveal novel approaches to the problems concerned.

NON-DESTRUCTIVE ARCHAEOLOGY: FROM THE LEGAL TO THE PRACTICAL ISSUES

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Keywords: Valletta Convention, non-destructive archaeology, archaeological heritage, legal framework.

The debates on archaeological heritage research, preservation and management have increased in recent years as effect of International/European standards such as Council of Europe Conventions and the EU integration process. The ICOMOS Charter for the Protection and Management of the Archaeological Heritage (1990), the Valletta Convention (The revised *European Convention on the Protection of the Archaeological Heritage,* 1992), are playing an important role in this process, including the Consolidated version of the Lisbon Treaty, which makes cultural heritage an issue for the EU members states too "…It shall respect its rich cultural and linguistic diversity, and shall ensure that Europe's cultural heritage is safeguarded and enhanced".

According to the UNESCO, Council of Europe, ICOMOS and professional organization, such as the World Archaeological Congress (WAC), Europae Archaelogiae Consilium (EAC), or European Association of Archaeologist (EAA) all archaeologists have to prevent the deterioration of the archaeological sites and goods and to use as much as possible the non-destructive methods.

Since 1956 UNESCO required each member state to use most appropriate methods for research and preservation so that "all archaeological remains be studied and, where possible, preserved and taken into safe keeping" and that "... Prior approval should be obtained from the competent authority for the removal of any monuments which ought to be preserved in situ".

The first document which directly recommends applying the non-destructive techniques during the archaeological project is the ICOMOS Charter for the Protection and Management of the Archaeological Heritage (1990):

"… It must be overriding principle that the gathering of information about the archaeological heritage should not destroy any more archaeological evidence than is necessary for the protectional or scientific objectives of the investigation. Non-destructive techniques, aerial and ground survey, and sampling should therefore be encouraged wherever possible, in preference to total excavation …".

and…

"… In exceptional cases, unthreatened sites may be excavated to elucidate research problems or to interpret them more effectively for the purpose of presenting them to the public. In such cases excavation must be precede by thorough scientific evaluation of the significance of the site. Excavation should be partial, leaving a portion undisturbed for future research…".

The *in situ* preservation is recommended for underwater cultural heritage too: "… Non-destructive techniques, non-intrusive survey and sampling should be encouraged in preference to excavation…". Similar attitude is required for treating already discovered cultural goods made from specific materials and parts of historic structures, such as timber or wall paintings.

The Valletta Convention invites countries to take care about preservation archaeological heritage and using non-destructive methods too:

"… to ensure that excavations and other potentially destructive techniques are carried out only by qualified, specially authorised persons;

… to implement measures for the physical protection of the archaeological heritage: ii. for the conservation and maintenance of the archaeological heritage, preferably *in situ;*

… to make provision, when elements of the archaeological heritage have been found during development work, for their conservation *in situ* when feasible".

Recent Council of Europe Guidelines for protection of the archaeological heritage (2011) from its introduction part are recommending the member states to develop own legislation and administration systems in the preservation field according international standards: "This part deals with the legislation necessary to protect the archaeological heritage *in situ* and to regulate archaeological investigations and excavations".

Romania and the Republic of Moldova are among of 42 ratifications/accessions countries of the Valletta Convention. Romania signed the this Convention in 1996, ratified in 1997 and since May 21, 1998 entry into force, but the first official document on archaeology according Valletta Convention was approved by Romanian authorities just in 2000 and then modified in 2001, 2003, 2006. The Republic of Moldova signed Valletta Convention in 1998, ratified in 2001 and just since November 2002 entry into force and the law on archaeological preservation was voted by Parliament just in September 2010. So, we can see how different was the process of signing, ratification and entry into force of this European Convention. But, in both cases is important to see the impact of International and European Conventions on archaeological research and preservation practices and how these treaties influenced the legal and management changes in our countries. We consider that archaeologists are the key persons of using new technologies in the field work and developing the non-destructive archaeology. Because, nowadays the archaeology does not mean just the excavation, it is a very large field with many research methods and tools. So, by using non-destructive methods archaeologists will preserve archaeological heritage as part of European collective memory for next generations:

"The archaeological heritage is a finite, non-renewable resource and should be managed carefully so that it continues to exist as a scientific source in the future. The most desirable option is therefore to leave remains preserved in situ. Excavations should accordingly only be permitted when they are absolutely necessary in order to resolve a scientific, archaeological issue or when remains are threatened by unavoidable decay, erosion or development."

BIOARCHAEOLOGY

ARCHAEOBOTANICAL RESEARCH ON A BATCH OF ARCHAEOLOGICAL MATERIALS FROM THE CUCUTENIAN SETTLEMENT OF FETEŞTI–*LA SCHIT*, ADÂNCATA COMMUNE, SUCEAVA COUNTY

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Keywords: Chalcolithic, Cucuteni culture, archaeobotany, leafs, seeds, caryopses, inflorescences.

The archaeological site of Feteşti–*La Schit* (Adâncata commune, Suceava County, Romania), partially investigated during the 2000–2006 campaigns, was inhabited during several historical periods: the Chalcolithic (the Cucuteni culture, phases A and B: B_{1b} and B_{2a}), the beginning of the Bronze Age (the Horodiştea-Erbiceni-Gordineşti culture), the second Iron Age (the Getic Latène, 5th–3rd centuries), the Early Modern period (18th–19th centuries), and the contemporary era. Of these, the most representative in terms of the number and value of the artefacts discovered is the Cucuteni B_{1b} phase.

Among the discoveries from this level is a series of materials whose archaeobotanical analysis lead to the interesting information regarding the spontaneous and cultivated flora from the vicinity of the site, corresponding to the respective timeframe.

A first category of materials is represented by batches, not significant from a quantitative point of view, which contain seeds predominantly from cereals: wheat (*Triticum monococcum* and *Triticum aestivum*), rye (*Secale cereal*e), millet (*Panicum milliaceum*); herbaceous cultivated plants: buckwheat (*Fagopyrum sagittatum*); legumes: peas (*Pisum sativum*), vetch (*Vicia spp.*), or trees: hazel (*Corylus avellana*), that were carbonised in the fires that destroyed the buildings from the settlement. The largest batch was found in a frustoconical bowl (pan) discovered in dwelling L. 1/2000. To the above, we also add a number of fragments of ceramic ware and of anthropomorphic and zoomorphic statuettes onto which cereal caryopses (*Triticum monococcum*) and plant inflorescences (*Plantago officinalis*) were impressed, probably deliberately.

Another category of findings consists of clay pieces from dwellings and, to a lesser extent, of pottery fragments, on which was accidentally preserved impressions of leaves of trees: hornbeam (*Carpinus betulus*), hazel (*Corylus avellana*), oak (*Quercus robur*), beech (*Fagus sylvatica*), elm (*Ulmus minor*) and herbaceous plants: burdock (*Arctium lappa*).

The identification of the plant species discovered as carbonised remains or as impressions, by comparing them with modern species, produces a suggestive image, albeit a partial one, of the plant species that were harvested and cultivated for their seeds, but also of the relative composition of the forests and the sod existing around the settlement. The thickness and size of the veins suggests that the dwellings were built during late summer, probably from July onwards. The conclusion can be supported by the presence of an important quantity of chaff in the daub. On the other hand, the analysis revealed that certain plants might have served cultic, magical, and/or symbolic purposes for the members of the community, having the ability to alter the spiritual potency of some objects.

NEW PALEOENVIRONMENTAL DATA FROM THE CHALCOLITHIC TELL BORDUŞANI–*POPINĂ* FROM THE BALTA IALOMIŢEI FLOODPLAIN

Valentin RADU, Constantin HAITĂ, Adrian BĂLĂŞESCU

National Museum of Romanian History, Bucharest

Keywords: Chalcolithic, Gumelnița culture, archaeozoology, molluscs, sedimentology.

The Chalcolithic *tell* settlement Borduşani–*Popină* is situated in the floodplain area of the Balta Ialomiţei, a river island with important sedimentary evolution during the Holocene, between the Borcea and the Ostrov branches of the Danube.

The geomorphologic transformations of this area have firstly natural causes, to which are added the different anthropic changes from the recent period (draining, damming, and changes of hydrologic regime of some channels, changes of land use and soil evolution).

The characterization of the environment in the period of the Chalcolithic occupation represents an important stage in the landscape reconstruction and the deciphering of human-environment relationships that can be assumed for that period.

The molluscs can bring important evidences concerning the activities of prehistoric communities, but also for the definition of different areas in the landscape. The exploitation of the information related to specific ecologic requirements of shells and their biologic specificities, as well as the archaeozoological data, can bring details referring to the capture season, the frequency and the place of the harvesting, the human diet, etc.

The study of the faunal remains provides information on the activities of livestock management and hunting. Surprisingly for the geographic location of the site, in an environment rich in natural resources, is the fact that the remains of domestic animals are the majority (approx. 78%). Of these, swine are predominant, being followed by bovines and ovicaprids. Apparently, the "intensive" exploitation of the pig is as well a consequence of the environment in the Chalcolithic period, favourable to this animal growth in very good conditions, probably in semi-freedom state.

Game is less important in terms of percentage, but it is extremely diverse (15 taxa). The ecological preferences of the identified taxa show a mosaic-like environment, rich in forests (indicated by the roe deer, wild boar, marten, lynx, and wild cat), open areas (hare, wild horse), marshy areas and aquatic resources (beaver, otter).

The sedimentological analysis performed at the base of the *tell*, but also in its immediate vicinity, indicate the fact that this settlement is located on a former erosion remnant from the lower terrace of the Danube and also the fact that the period of Chalcolithic occupation is characterized by important episodes of inundations, suggesting the presence of a least one important alluvial channel, very probably connected other channels, lakes and ponds separated by alluvial deposits.

All these data converge to a model of resources management characterized by their exploitation both in the alluvial plain and on the lower terrace, suggesting an important mobility of the inhabitants, both by water and by land, corresponding to the specific paleoenvironment.

DATA ON TWO MANDIBLES OF *CANIS FAMILIARIS* DISCOVERED IN THE SULTANA–*MALU ROŞU* SETTLEMENT, CĂLĂRAŞI COUNTY

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Keywords: Chalcolithic, Gumelniţa culture, ornaments, mandibles, *Canis familiaris*.

The aim of the paper is to present an unpublished discovery, specifically two perforated mandibles of *Canis familiaris,* discovered in house no. 14 from Sultana–*Malu Roșu* tell settlement (Călăraşi County, Romania). The site from Sultana–*Malu Roșu* is found in South-eastern Romania, at approximately 7 km from the Danube, very close to the Bulgarian border. It is well-known in the dedicated literature from Romania also because it was the first Gumelnița site in which systematic research was carried out, in 1924 by Ioan Andrieșescu.

From the chrono-cultural point of view, this settlement belongs to the Gumelniţa culture (A2 phase), from during the second half of the 5th millennium B.C. The two mandibles, which constitute the focus of the present paper, were found in dwelling no. 14, a rectangular (6×8 m) burnt structure located in the settlement's eastern–south-eastern side, having a North-South orientation. With respect to its features, the dwelling had foundation ditches on its northern and western sides. The destruction level consists of burnt, crumbled adobe remains, seldom as massive wall pieces.

The two mandibles belong to the *Canis familiaris* species (the domestic dog), with the biometrical data framing within the known values for the Gumelniţa culture. Because it preserved its teeth, one of the mandibles was able to be estimated as belonging to an animal with intermediary age, an adult, while for the second one an age of over six months was suggested. Both mandibles are perforated at the coronoid process, using the alternative rotation, from both sides. The very good preservation of one of the mandibles illustrates, in the superior side of the perforation, a strip of macroscopic polish that indicates the passage area of the thread used for suspension. At this area, the perforation's walls are *lisse*, with a receding of the specific rotation scratches. The lingual face presents, on its entire surface, a macroscopic polish, a fact that might signify that it acted as the contact surface with a material. The friction with the latter translates, at a microscopic level, as a unitary field of scratches that are longitudinal to the axis, evidencing a prolonged contact during which the material's structure imprinted itself onto the bone.

Beyond the strict meaning of this principal discovery that has yet to be totally deciphered, we can conclude that it associated with the universal human tradition in which the dog plays an intermediary role, oscillating between a domestic and an utilitarian purpose, used in hunting, guarding, transport, exploited for raw materials, even as food, to which we can add its virtues of symbolic being with special attributes of protecting its master in the afterworld, or mediating the contacts with the world of spirits.

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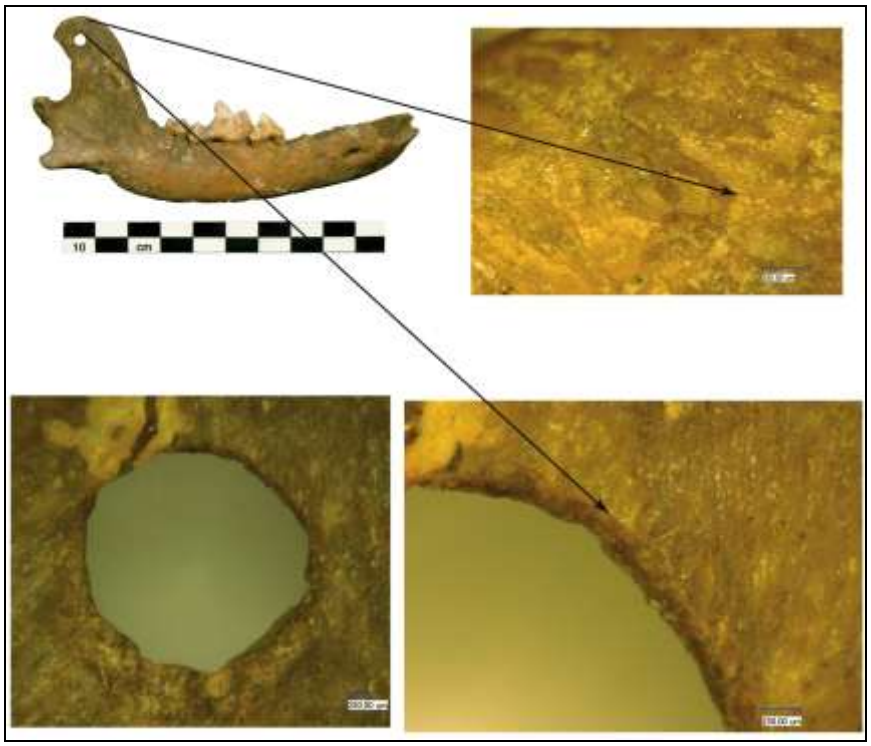

Figure 1. Mandible no. 1—lateral view and microscopic details.

THE EXPLOITATION OF ANIMAL RESOURCES BY THE CHALCOLITHIC COMMUNITIES FROM EASTERN ROMANIA

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Keywords: Chalcolithic, Precucuteni-Cucuteni cultural complex, archaeozoology, meat consumption, animal husbandry, hunting.

The present study relies on the evaluation of animal resources from the perspective of meat input, the primary food resource offered. Meat consumption is analysed not only from the point of view of taxonomic composition of the archaeozoological spectra, but also from the perspective of predominant skeletal parts.

To this purpose, the faunal remains of mammals from three Chalcolithic settlements have been analysed: Hoiseşti (Iași County), Poduri (Bacău County), and Isaiia (Iași County). These settlements have been taken into consideration due to the large, representative archaeozoological inventory, each sample containing over 1.000 bone fragments attributed to mammals.

The animal husbandry seems to have played an important role in the economy of these three settlements. Within two of the sites, the remains from domesticated mammals present high percentages—Poduri: 86.20 % and Isaiia: 76.68 %—while for Hoiseşti the value is situated at only 59.15 %.

Following the analysis of bone remains as skeletal elements, within all three samples the predominance of the appendicular skeleton against the axial skeleton has been documented. The analysis of the axial skeleton has concentrated especially on remains originating from ribs and vertebrae, bones belonging to anatomical regions which could bring a significant meat ration within the elements of the axial skeleton. For the appendicular skeleton, our attention has focused on the elements of the limbs skeleton above the knee, due to their high contribution in superior quality meat.

Hunting as means for meat procurement was mainly focused on three large species of artiodactyls: *Cervus elaphus, Capreolus capreolus*, and *Sus scrofa ferus*.

The analysis on the provenance of bone fragments from the skeletal segments reveals a similar situation—the predominance of appendicular skeletal remains.

Starting from these data, we will try to reconstruct possible behavioural patterns with regard to the exploitation of animal resources.

Acknowledgements. This study was carried out through the project TE 172/2010, financed by the CNCS-UEFISCDI.

NEW DATA REGARDING THE USE OF SHELLS AS ADORNMENTS IN THE NEOLITHIC AND AENEOLITHIC OF TRANSYLVANIA

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Keywords: Neolithic, Aeneolithic, Transylvania, adornments, shells.

The symbolic manifestations in Prehistory of Transylvania are very well represented at the level of osseous materials industry. In this respect, shell adornments had a special place during the Neolithic and Aeneolithic.

This paper will focus on presenting an assemblage comprising 309 shell ornaments discovered in archaeological excavations from intra-Carpathian sites. These were studied according to the Beldiman methodology: the typological list was elaborated, the manufacture traces and the use-wear ones were observed using macroscopic and microscopic techniques, a catalogue was done and the data were statistically analysed.

From a typological point of view, the artefacts are included in the 3rd (Adornments) and the 5th (Varia – Raw materials) typological categories. Twelve types were introduced in the database, eleven of them belonging to the 3rd category (307 adornments), and one to the 5th one (two raw materials). The analysis allowed us to introduce some new types in the Beldiman Typological List.

The raw materials used in order to create these adornments are both local and Mediterranean shells. From this perspective, the *Unio* river shell is dominating the statistics. *Spondylus* and *Glycimeris* were also used in order to obtain adornments. While the river shells were gathered from local environment, the marine ones were probably obtained by trade.

The technological procedures applied in the *débitage* and *façonnage* (shaping) stages are the standard ones used in order to obtain shell adornments: indirect percussion, abrasion, transversal cutting, and perforation using indirect percussion and rotation procedures.

In order to establish the functionality of the artefacts, a traceological study was done. In this respect, the analysis of use-wear traces corroborated by the funerary discoveries offered us essential clues regarding the role that these artefacts played in the Neolithic and Aeneolithic communities. Here we mention the necklace made from 256 *Unio* shell discs discovered at Ariuşd in a ritual pit. In the necropolis from Decea Mureşului these beads were in a large number (about 1817, according to our estimations) and they were used in composite ornaments as: bracelets, belts, necklaces. This type of ornament appears exclusively in the graves, so we may consider them funerary ornaments. Provided that the shell is the symbol of the rebirth, regeneration, we could state that the use of shells in burial contexts could be related to this idea. The discovery at Tărtăria of an anthropomorphic idol made from an entire *Spondylus* shell is a unique one at the level of Neolithic and Aeneolithic from Transylvania. Similar discoveries are attested in the Hungarian Carpathian Basin where in burials these types of artefacts are attested. These advanced the hypothesis according to which this type of artefacts could have been used as pendants in composite necklaces.

Figure 1. Necklace made of *Unio* shell discs from Ariuşd, Covasna County, Cucuteni-Ariuşd culture.

MICROSCOPY OF ANCIENT TECHNOLOGY. RED-DEER ANTLER ARTEFACTS AND METALWORKING AT HISTRIA

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Keywords: Histria, ancient anvil, ancient sickle, iron technology, red-deer antler industry.

The paper presents the results of recent in-depth analyses regarding a special artefact discovered in 2002 in the Ancient Greek city of Histria—the Basilica with Crypt ("Florescu") sector, under the supervision of Irina Adriana Achim—and made of red-deer antler. The item dates from the 2nd century A.D., and was used as an anvil for finishing the cutting blades of iron

sickles. This controversial category of objects includes finds discovered in the last century in Western and Central Europe (France, Spain, Portugal, recently in Italy and Hungary), as well as the Black Sea Basin—the territories of Romania, Republic of Moldova, and Ukraine. Those from the latter-mentioned area seem to have the oldest ages, hence suggesting that their origin is to be found in the regions near the Black Sea.

The aim of the artefacts' analysis is to record all contextual, morphological, typological and technological data and to highlight the "manufacturing chain" and use wear. In this way, we may reconstruct "the technological biography" of the artefact. We currently use low-power optical and digital microscopy (4x–200x) with the aim of recording exhaustive data of the artefacts' traces of manufacture and use. The piece is discussed in the perspective of raw material, technology of manufacturing, use wear and function using the data of use wear analysis and digital microscopy.

The category of osseous materials artefacts that are generally called "anvils" were made of long bones (especially cattle and equid metapodials), but there are also cases when there have been used flat bones (like mandible), and, rarely, red-deer antler fragments. These pieces have one or more active parts shaped by chopping. They present specific triangular impressions in parallel or curved rows resulting from the operation of shaping active part of serrated sickles blades.

In this context, we analyse the unique artefact HST/2002-BFL 6, the biggest anvil (or a yoke? – reused as an anvil) discovered so far in this part of Europe, which, up to this moment, does not have close analogies in the archaeological literature consulted. Red-deer antler artefacts manufactured and used as anvils are rarely published in the specialized literature from East-Central Europe. In this respect, there is a piece made of a segment of an antler's beam coming from Romania (Ostrov, Constanţa County) and another from the Republic of Moldova (Saharna Nouă—made of a segment of antler tine).

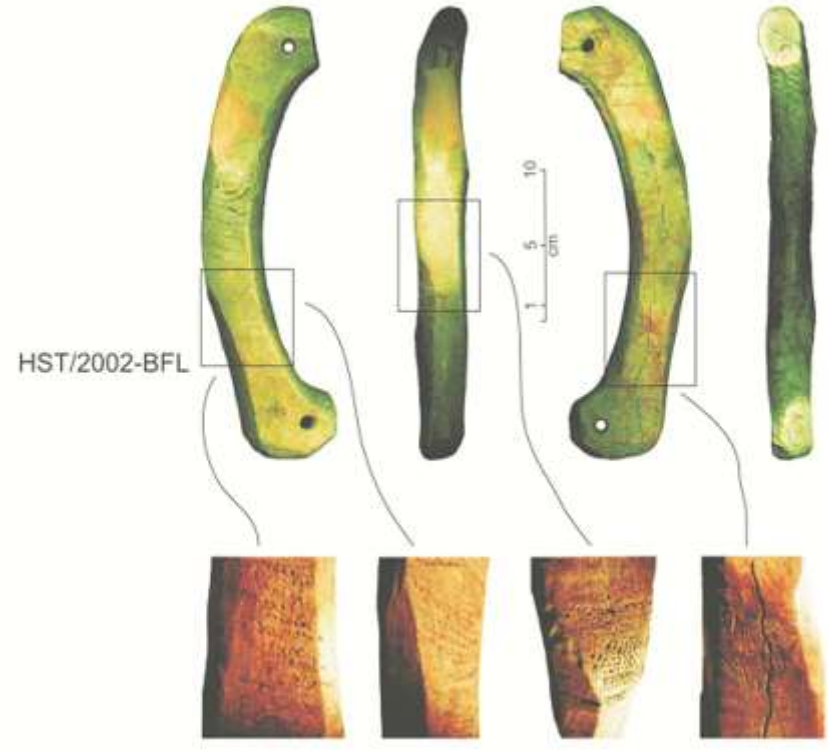

Figure 1. Histria—Basilica with Crypt ("Florescu") sector. Red-deer antler anvil (HST/2002-BFL 6).

The artefact is partially broken, but it displays all the phases of the "manufacturing chain", and all types of specific wear traces. The anvil was made from a disaffected piece—probably a yoke. We can point out also the fact that invariably the context of discovery of such artefacts (most of them made of bone) is related to the area of iron working.

Taking into consideration the analysis of different traces of manufacture and use, we propose the reconstitution of phases of the manufacturing chain of the red-deer yoke and secondary the anvil, namely *débitage* by sawing and chopping, and the *façonnage* in two stages: intensive chopping and scrapping of natural surfaces using a metallic blade—probably an axe and a knife—in order to obtain three flat and smooth surfaces.

The artefacts reflect a unique and complex interface of the crafts, the ancient technology and economy in the regions around the Black Sea.

ANIMAL RESOURCES EXPLOITED AT THE BEGINNING OF THE SECOND MILLENNIUM AD IN SETTLEMENTS FROM THE AREA BETWEEN THE DANUBE AND THE BLACK SEA

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Keywords: second millennium AD, Dobrudja, archaeozoology, quantification, fishing, hunting, animal husbandry.

The paper presents a zooarchaeological synthesis for the settlements dating from the beginning of the second millennium AD found in the historical region of Dobrudja for which archaeozoological analyses had been made, *viz.* Dumbrăveni, Oltina (*Altinum*), Capidava, Isaccea (*Noviodunum*), Hârşova (*Carsium*), Piatra Frecăţei (*Beroe*), and Nufăru (*Prislava*).

The faunal remains from these samples are molluscs, fish, reptiles, birds, and mammals; the greatest number is represented by mammalian remains. The presence of fish, bird (wild and domestic), and mammalian (wild and domestic) remains is an indicator of activities such as fishing, hunting and animal husbandry undertaken by the people inhabiting these settlements. For six of the settlements, the most important activity is that of animal husbandry. In terms of domestic animals raised, for six settlements the highest frequency (in terms of number of remains) is represented by cattle (*Bos taurus*), while for the settlement from Dumbrăveni is ovicaprids (*Ovis aries/Capra hircus*), followed by cattle.

Among wild mammals, the red deer (*Cervus elaphus*), the wild boar (*Sus scrofa ferus*), and the roe deer (*Capreolus capreolus*) appear in all samples, the first two having the largest share. At the beginning of the second millennium AD, the auroch (*Bos primigenius*) and the beaver (*Castor fiber*) still existed in Dobrudja, unlike today. The red deer strongly reduced its range throughout time because of deforestation, and is today found only in the Carpathian area.

Among wild bird species, the Black Vulture (*Aegypius monachus*) had disappeared from the fauna of Romania, while others, such as the White-tailed Eagle (*Haliaeetus albicilla*), the Whooper and the Mute swans (*Cygnus Cygnus* and *Cygnus olor*), the Great White Pelican (*Pelecanus onocrotalus*), the Great Cormorant (*Phalacrocorax carbo*), and the Lesser Spotted Eagle (*Aquila pomarina*) are currently endangered species strictly protected by law.

There have been identified 12 species of fish belonging to the Acipenseridae, Esocidae, Cyprinidae, Siluridae, and Percidae families; all species of Teleostei live in freshwater habitats, being fished in the Danube, the lakes and the rivers from the neighbourhood area; the Cyprinidae are the most representative in number.

Acknowledgments. This study was supported by the Romanian research program CNCS – UEFISCDI PN-II-RU-TE-2011-3-0146.

ARCHAEOZOOLOGICAL DATA CONCERNING THE ANIMAL RESOURCES AND THEIR EXPLOITATION STRATEGIES BY THE INHABITANTS OF THE MEDIEVAL SETTLEMENT AT BEROE

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Keywords: 11th–12th centuries, Dobrudja, Beroe, animal resources, hunting, animal husbandry.

The site of Piatra Frecăţei (the former settlement of Beroe) lies on the right bank of the Danube, 3 km from the village of Ostrov (Tulcea County). During the excavations carried out here between 1999 and 2002, materials dated to the 11th–12th centuries were discovered.

The main information that can be provided by an archaeozoological analysis of the material from Beroe are: the identity and description of the animal species with which the human community from Beroe came into contact; the assessment of the relations (hunting, fishing, animal husbandry) between this population and the animal species identified; the assessment of the animal exploitation strategies; the estimation of the ranges of certain mammals, and of their changes occurring as a consequence of human activities.

The archaeozoological sample consisted of 3923 remains, of which three belonged to humans (*Homo sapiens*), 86 to birds, 316 to fish, and the rest (3518) to mammals. The list of identified species is diverse and indicates the exploitation of the forest, steppe, and aquatic biotopes. The presence of mammals' remains illustrates two important activities of the Beroe population: hunting and animal husbandry.

Most of the mammalian remains belong to domestic species (56.75 %); from this group, the species with the highest representation (32.72 % of the total mammalian remains) are cattle (*Bos taurus*), followed by ovicaprids (*Ovis aries*/*Capra hircus*), and domestic pig (*Sus scrofa domesticus*), the latter two with similar percentages. Other species of domestic mammals identified were: horse (*Equus caballus*), donkey (*Equus asinus*), and cat (*Felis domesticus*), each with shares less than 1 % of the total.

Wild mammals also have a significant share (43.25 %), which is an indication that hunting was an important occupation for the inhabitants of this settlement. The identified species comprise red deer (*Cervus elaphus*), wild boar (*Sus scrofa ferus*), roe deer (*Capreolus capreolus*), hare (*Lepus europaeus*), fox (*Vulpes vulpes*), wolf (*Canis lupus*), beaver (*Castor fiber*), and auroch (*Bos primigenius*); red deer and wild boar have the highest proportion in the group of wild mammals. Red deer is a species whose range diminished during the recent centuries to the point that is now restricted to the Carpathian region, but it was very common in the early second

millennium AD in Dobrudja. Two other noteworthy species identified are the beaver and the auroch; both were present in this area in the early part of the second millennium AD.

The bird species identified are the large cormorant, mute swan, rook, white-tailed eagle, domestic hen, and coot; for some remains (e.g., duck and goose), only the *genus* was identified, and this prevented a clear distinguishing between domestic and wild species.

Acknowledgements. This study was supported by the Romanian research program CNCS – UEFISCDI PN-II-RU-TE-2011-3-0146.

REGRESSION EQUATIONS FOR STATURE ESTIMATION OF ARCHAEOLOGICAL HUMAN REMAINS — A METHODOLOGICAL REVIEW

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Keywords: stature, long bones, regression equations, human archaeological remains.

Stature estimation of past people is, beside sex and age at death determinations, one of the three main descriptors of human archaeological remains. Per se, this measure is not very informative in what the life of the individual is concerned, but can contribute to sex, age, and robusticity determination, and in some cases gives insights in potential pathologies, occupation, etc. Stature measurements characterizing populations are one of the markers used in paleodemography.

Stature of human archaeological remains was historically recorded as early as the 19th century and determined by various means: from the tables of Manouvrier till the most recent regression equations calculated for different historical or modern populations. A multitude of published works deal with stature estimation for various sets of archaeological remains; what is missing, is a consensus equations set or a clear methodology to indicate the best regression equation sets for populations from different historical periods and geographic locations.

Due to the fact that for historical populations from the current Romanian territory the methodology for stature measurement appears only sporadically in scientific publications, our study comes to review the use of the most commonly used regression equations in establishing living stature starting with measurements of the long bones. In addition, the utility of other bones (the metacarpal and metatarsal bones, etc.) and of fragments from long bones will be discussed. Correlations between determined stature and sex, age and potential pathologies are also presented.

At the end of the study presented here we will test how relevant are the most common regression equations used for determining the stature for different populations, already studied, modern or historical, when applied in order to estimate the height during the life for a historical population from the territory of Romania (4th-5th century AD). Consequently, we will be able to select the most adequate mathematical apparatus for estimating the stature for the population we are interested in. Moreover, we will compare the medium height of this population to that of similar groups from other geographical regions.

The results must be taken as an example; on the other hand, the strong point of our project is the standardization both of the working methodology and of the selection of the mathematical apparatus which is consistent with the calculation of stature for human archaeological remains unstudied so far from this point of view. Taking into consideration the fact that some regression equations used for determining stature for historical population are elaborated by studying modern populations, and that the average height fluctuates in the same population at different chronological moments, this approach finds itself useful both to archaeologists and anthropologists.

BIOARCHAEOLOGICAL DATA ABOUT HUMAN SKELETONS FROM THE SULTANA–*MALU ROŞU* ENEOLITHIC NECROPOLIS

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Keywords: Eneolithic, Gumelnița culture, necropolis, graves, anthropology, paleopathology, taphonomy.

The aim of the paper is to present preliminary bioarchaeological data from the Sultana–*Malu Roşu* Eneolithic necropolis, Călăraşi County, Romania. Until now, 50 inhumation graves were excavated at this site. They had relatively uniform elements of burial treatment. From a chrono-cultural point of view, most of the graves belong to the Boian and the Gumelniţa cultures, with only one dating from during the Bronze Age.

The osteological analysis focused on eight skeletons without skulls (graves no. 7, 14, 25, 31, 32, 33, 34, and 35). This type of discovery is quite rare in the Balkans. The analysed skeletons show no signs of cutting at the cervical vertebrae, which leads us to the conclusion that we are not dealing with an *ante-mortem* decapitation, but with a *post-mortem* manipulation of the skulls, probably shortly after the body was buried.

From a taphonomical point of view, the analysed bone material is fragmented and incomplete (because of their preservation degree), being coated with limestone (because of the lying in the loess layer).

Most of skeletons were found in individual pits, deposited in a crouched position on their left side, East–West oriented. The only exception is an individual from grave no. 35, which was aligned on a Northeast–Southwest direction, and positioned in dorsal decubitus. Based on morphometric characteristics (relative robusticity, size and weight of long bones, and mandible and pelvic sexual characteristics) we identified four female individuals (graves no. 14, 31, 32, 33) and four male individuals (graves no. 7, 25, 34, 35). By taking into account the degree of molar tooth wear and epiphyseal fusion or age-related changes of the sternal ends of ribs, the osteological remains were interpreted as belonging exclusively to adult individuals, aged between 18 and 45. The stature was calculated in three cases, according to the formulas proposed by Trotter and Gleser. In terms of health, we underline the presence in two cases of bone changes caused by osteoarthritis (graves no. 25 and 31), or the congenital absence of the III lower molars, bilaterally (grave no. 35). We also identified a number of epigenetic traits (grave

no. 33), and bone asymmetry due to strong mechanical stress, expressed unilaterally (grave no. 34).

Acknowledgements. This work was supported by two grants of the CNCS–UEFISCDI, project numbers PN II-RU code16/2010 and PN-II-ID-PCE-2011-3-1015.

Figure 1. Grave no. 35 from the Sultana–*Malu Roşu* Eneolithic necropolis, Călăraşi County, Romania.

DEFLESHING THE DEAD: UNCOMMON BURIAL PRACTICE IN THE NEOLITHIC SITE OF ALBA IULIA–*LUMEA NOUĂ*?

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Keywords: Neolithic, Eneolithic, Alba Iulia–*Lumea Nouă*, funerary practices, defleshing.

The Alba Iulia–*Lumea Nouă* prehistorical site is well known in the scientific literature. The archaeological excavations form the past 10 years evidenced one of the most important Neolithic and Eneolithic habitations in Transylvania.

We attribute the remarkable discoveries from 2003 and 2005 to Foeni bearers, the funerary complex containing bone remains of approximately 100 individuals, mostly human skulls. The skeletal remains have not been identified in anatomical connection, and some human skulls present circular shaped clogging fractures. The anthropological analyses confirmed the presence of skeletal remains of both children and male and female adults. The AMS data provide a chronological timeframe of 4600–4500 calBC, which makes this discovery part of the advanced Foeni group evolution, which is also the beginning of Neolithic in Transylvania.

The most important archaeological discovery of the 2011 campaign is represented by the complex researched in Sp. I/2011, square D, of particular funerary practices. The complex was found at ▼0.15–0.20 m from the current soil. On a surface of approximately 2×2 m there were

identified multiple human skulls, mandibulae and maxillaries, long bones, and vertebrae. The skeletal remains were not in anatomical connexion. We mention the fact that the general deposition of the remains was not disturbed by later anthropic activities. The external limits of the funerary complex are marked by ceramic fragments from large vessels. No long bones in slanting position have been discovered, all were found lying on the ground. Associated with the human bones, there were also discovered faunal remains.

Figure 1. A skeleton unearthed at Alba Iulia–*Lumea Nouă*.

It is remarkable that long bones were identified in rectangular shapes, and that inside those structures skulls were found. The working hypothesis is that the skeletal remains discovered were intentionally positioned in the shape described above. The archaeological context leads to the idea that we are dealing with an agglomeration of defleshed bones. The last human remains were extracted from ▼0.35–0.40 m. The ceramics discovered in association with the skeletal remains belongs to the Foeni group. This funerary complex is part of the Foeni layer, which overlaps the pit of a big Vinča B hut.

We are directly correlating this exceptional funerary discovery with the previous ones, made in the same perimeter. The main focus of our presentation is to present the archaeological context and the physical anthropology data.

Acknowledgements. This work was possible with the financial support of the Sectoral Operational Programme for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project number POSDRU/89/1.5/S/61104 with the title „*Social sciences and humanities in the context of global development - development and implementation of postdoctoral research*".

THE STUDY OF DEVELOPMENTAL ANOMALIES OF THE URBAN POPULATION OF MEDIEVAL IAŞI — A 17TH CENTURY NECROPOLIS FOUND IN THE EASTERN SIDE OF *CURTEA DOMNEASCĂ*)

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Keywords: 17th century, Iași, necropolis, skeletal series, development anomalies.

The paper presents the developmental anomalies present on a series of skeletons that was exhumed from the necropolis situated in the eastern side of the former *Curtea Domnească* from Iaşi, Romania. The necropolis was discovered in 2008 and it is dated to the 17th century. The archaeological excavations brought to light relics that have a great historical importance, among which a series of 111 human skeletons (teenagers, adults, mature and senile) that came from 60 graves (individual and collective).

The average age of death of the population for the 0–x Y.O. segment is 35.92 years; for the 20–x Y.O. segment it is 39.86 years for males and 35.96 years for females. The distribution according to the sex and age category shows a significantly higher rate of males in comparison with females, indicating a very high masculinity index (80/31).

The presence of anomalies, pathologies, or rare conditions was calculated for each separate sex (80 men and 31 women), as well as for the entire osteological series (111 individuals). From the numerous pathologies/anomalies identified at the level of the cranial segment for the 111 individuals, the highest incidence is registered by wormian bones, followed by dental decay, head injuries, and cribra cranii externa. Other anomalies, like hypodontia and partial edentation, are very common.

An accentuated sexual dimorphism was registered among dental cavities, with pathologies being identified only for males. With respect to the post-cranial segment, the highest incidence is registered by sacralization, followed by osteoarthritis, lumbarisation, and supratrochlear humerus perforation. Reduced but significant presences were registered for spina bifida occulta and for the formation of the block vertebrae. Other pathologies/anomalies, like xiphosternal junction, sternal perforation, the fusion of the axis with C1, and the posterior spina bifida atlantis, make sporadic appearances. An important aspect that needs to be mentioned is the fact that the females are less pathologically burdened in comparison with males, no matter the skeletal segment (cranial or postcranial) considered. This last statement should nonetheless be considered with caution, because of the smaller number of female specimens available for the study.

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POSTERS

THE PIG (*SUS SCROFA DOMESTICUS*) IN NEOLITHIC AND CHALCOLITHIC SETTLEMENTS FROM EASTERN ROMANIA: A MORPHOMETRIC APPROACH

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Keywords: Neolithic, Chalcolithic, Starčevo-Criş culture, Precucuteni and Cucuteni cultures, pig, morphometric data.

The abundance of pig remains in Neolithic and Chalcolithic assemblages from Romania is a marker of the sedentary life of the human communities. The relative importance of pigs in the economy of the studied communities has been estimated on the basis of the NISP, and reveals an increase in the importance of pigs in the economy of the Early Neolithic (Starčevo-Criş culture: 6000–4500 CAL. BC) compared to that of the Chalcolithic (Precucuteni culture: 4800–4500 BC; Cucuteni culture: 4600–3500 CAL. BC).

The study is a morphometric analysis of Neolithic and Chalcolithic pigs conducted on samples collected from archaeological sites from eastern Romania. The study relies predominantly on those samples whose properties allow an assessment of the size (height at the withers) and the characteristics of the local pig populations. It is known that pigs of the prehistoric communities were slaughtered at early ages (less than 2 years), biological development stage during which some anatomical elements did not witnessed complete epiphysis. Considering the fact that the complete, un-fragmented metapodials, which can provide the most critical clues regarding the height at withers of an animal, are seldom encountered in faunistic assemblages, means that an animal's height at the withers is most often estimated using the astragalus and the calcaneus bones.

The cephalic bones analysed display primitive features, typical of Neolithic pigs, such as elongated snouts, and curved foreheads.

A large variation was observed in the height at the withers, which could be explained by the breeding between wild and domestic pigs. This increases the difficulty of clearly ascertaining the variability limits of the two species. The conclusion is that the pig populations from during Chalcolithic were characterised by larger, more robust specimens (average height at withers is 76.1 cm for the Precucuteni culture, and 98.36 cm for the Cucuteni culture) than those of the Early Neolithic (for the Starčevo-Criş culture, the height at the withers is 68.85 cm).

Acknowledgements. This study was supported by the Romanian research programs CNCS – UEFISCDI PN-II-RU-TE-2011-3-0146 and POSDRU/89/1.5/S/49944.

BIOMETRIC SEPARATION OF DOMESTIC PIG (*SUS SCROFA DOMESTICUS*) AND WILD BOAR (*SUS SCROFA FERUS*) REMAINS IDENTIFIED IN SITES OF THE FIRST AND SECOND MILLENNIA AD FROM EASTERN AND SOUTH-EASTERN ROMANIA

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Keywords: archaeozoology, morphometric data, pig, wild boar.

The separation of pig (*Sus scrofa domesticus*) remains from those of wild boar (*Sus scrofa ferus*) is particularly important in archaeozoology, taking account that in almost all faunistic samples there are remains belonging to both forms, but also quite difficult because of there are not clear morphological criteria for this discrimination. Another fact which makes difficult distinction between them is that material is quite fragmented, being part of waste category. For this reasons, the two forms separation is based on dimensional criteria and very little on morphological differences.

Most numerous measurable cranial remains are mandible fragments. For this anatomical element, length of the third molar is the most common used. Our results reveal that variation limits for the length of the third molar are 27 mm–36 mm for pig, and 41 mm–51 mm for wild boar.

In our samples, postcranial skeleton is better represented than the cranial remains. The largest metric data series are given by humerus, radius, tibia, coxal, talus, calcaneus, and medapodials.

The variability limits for calcaneus length are between 66.5 mm and 82 mm for pig, respectively 97 mm–119 mm for wild boar. A clear distinction between the two species is obvious for metacarpus IV, the length of which varies between 67 mm and 74 mm for domestic pig, and 95 mm and 114 mm for wild boar.

A crossbreeding between the two species is suggested by some variables that could not clearly reveal the separation limits between the two.

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MORPHOLOGICAL PATTERNS IN THE DENTITION OF PIGS FROM STĂNCEŞTI, BOTOŞANI COUNTY (6TH–3RD CENTURIES BC)

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Keywords: pig, dentition, morphology, variability, Stănceşti.

A sample comprising 131 molars (the second and the third molar from the mandible and maxillary) were subjected to a traditional morphometric statistical analysis in order to identify morphological patterns in the dentition of the swine from the settlement of Stănceşti (Botoşani County, Romania) dating from the 6th–3rd centuries BC).

The maximum lengths and breadths of the molars were used as variables for the univariate (indexes of central tendency and variability) and bivariate (Pearson's correlation and linear regression) analyses. In our results, according to the coefficient of variation (CV %), the largest variability was found for the length of the upper third molar (CV % = 11; M±SD = 4.09±0.4; M – mean, SD – standard deviation), and the smallest variability for the breadth of the lower third molar (CV % = 5; M±SD = 1.89±0.1). The bivariate analysis revealed a statistically insignificant correlation between the two variables of the lower second molar: r = 0.25; p = 0.18. Strong positive correlations, statistically significant, were observed for the lower third molar, and the upper second and third molars (r > 0.8; p < 0.05) (table 1). The degree of sexual dimorphism was conspicuously pronounced in the case of the upper second molar.

	Pearson Correlation Coefficient (r)	Linear Regression Equation	Coefficient of Determination (R^2)	*p*-value
Lower second molar	0.25	y = 0.1628x + 1.3075	0.065	0.18
Upper second molar	0.81	y = 0.6034x + 0.5072	0.5859	0.0001
Lower third molar	0.8	y = 0.2111x + 0.9587	0.6492	0.001
Upper third molar	0.89	y = 0.4185x + 0.6355	0.7975	0.0001

Table 1. The result of the bivariate analysis of pig dentition.

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ANIMAL RESOURCES EXPLOITATION IN THE ROMAN SETTLEMENT FROM NICULIŢEL: ARCHAEOZOOLOGICAL DATA

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Keywords: archaeozoology, 2nd–3rd centuries AD, Niculiţel, animal husbandry, hunting, fishing.

The site of the archaeological excavations in located to in the central-northern part of the Niculiţel village, about 200 m south of the earth wall (which is no longer visible in this section), and about 10 m east of a creek that during the 1950–1960s was moved about 100 m to the west. South of the earth wall is a *vicus*, and north of it a *villa* dated to the 2nd–3rd centuries AD. The *villa* was investigated in 1970 by a team coordinated by V. Baumann.

The excavation for the foundations of a sport arena, performed mechanically on a surface of 200 m^2, led to the destruction of a number of Roman vestiges. Before that, they were affected by the foundations of a C.A.P. farm. The archaeological material recovered from this excavation and other mechanical interventions dates from between the middle of 2nd century and the beginning of the 4th century AD; the material consists of table amphorae, local North Pontic domestic pottery, drinking vessels, hand-made jugs, smokers, lamps, glass vessels, bone needles, a tool (hoe) and several iron spikes, tiles, bricks and draintiles, aqueduct spouts, ceramic statuettes, coins, and a large number of animal bones.

The analysis of the 246 faunal remains from Niculiţel collected during the excavation conducted in the 1970s was published in 1996 by S. Haimovici. From the remains, two originate from fish, one from birds, and the rest from mammals. Most of the mammalian remains belong to domestic species (94.7 %), among which cattle (*Bos taurus*) has the largest share (70.9 %). The mammalian species identified are: *Bos taurus, Ovis aries/Capra hircus, Sus scrofa domesticus, Equus caballus, Cervus elaphus, Capreolus capreolus, Bos primigenius, Ursus arctos, Canis lupus*.

The archaeozoological sample collected in the years 2009, 2010, and 2011 also includes household waste, the vast majority from domestic mammals; cattle (*Bos taurus*) predominates. Besides the remains of mammals (which are predominant), remains of fish and birds were also identified.

The mammalian species identified in this last sample are: *Bos taurus, Ovis aries, Capra hircus, Sus scrofa domesticus, Equus caballus, Cervus elaphus, Capreolus capreolus, Sus scrofa ferus, Bos primigenius, Vulpes vulpes*. The red deer and the bear are nowadays species restricted to the Carpathians, but in the early part of the first millennium AD, they were also found in Dobrudja. The aurochs, now an extinct species in the fauna of Romania, was also present in this area during the first millennium AD.

Animal husbandry was a very important activity for the community from Niculiţel, while hunting and fishing had a small importance in the food economy of the settlement.

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FRESHWATER SHELLS AS SUPPORTS FOR CUCUTENIAN BODY ORNAMENTS

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Keywords: Chalcolithic, Cucuteni culture, ornaments, *Unio* shells, paleo-technology, nacre.

The paper aims to open the discussion on a category of Cucutenian body ornamenting items that have been neglected so far in the synthetic scientific approaches, only seldom presented in conjunction with other archaeological materials – the body ornamenting items made of fresh water shells, belonging especially to the *Unionide* family.

A first direction of analysis aims at providing necessary typological clarifications. Two differentiation criteria were taken into account for the classification of the shells: that the degree of support fragmentation and the perforation techniques used for the transformation thereof in an ornamenting item. The Cucutenian communities used both natural shapes, adapted by perforation to the intended usages, and an elaborate technical treatment that resulted into the drastic modification of the original shell shape.

In the first case, we refer to the shells whose natural valve shape was preserved, the degree of transformation by perforation being very low. According to the perforation techniques, one can notice the existence of at least three types of such items. The simplest modality of transformation of the shells into body ornamenting items involves the rubbing of the

shell valve on a tough abrasive surface, thus creating a hole in the centre of the cavity, situation which allowed its usage as simple ornament as such or as element of a composite structure.

A second method of transforming shells into body ornamenting items consists in creating a perforation by percussion. According to the aspect and size of the perforation as identified using the microscope one can distinguish between the rotary percussion, a technique used at the level of the back end of the shell (known as *apex* or *umbo*) and the linear one, technique used for obtaining larger perforations generally at the level of the central cavity of the shell valve. Such items were discovered both in settlements of the phase A of the culture such as Hăbăşeşti, Scânteia, Ruginoasa (Iași County) and Frumușica (Neamț County) and of phase A-B, such as Vorniceni (Botoșani County).

The process of creating extremely elaborated body ornamenting items starting from shells, circular pearls, pendants, and appliqués obtained from *Unionide*, involved the application of a complex technical treatment. Such items were discovered in Ariuşd (Covasna County), Frumușica (Neamț County), Scânteia and Ruginoasa (Iași County).

The existence of the technical items abandoned in various phases of elaboration allow the recreation of the operating chain (*chaîne opératoire*) for the circular pearls, items that compose the quasi-totality of the body ornamenting items obtained using the procedure of shell fragmentation. Thus, on the basis of the examination of the discoveries of Scânteia and Ruginoasa we can document all phases of achievement of the items already described in the literature presenting the experimental studies of such items: the processing by percussion and the shaping which contained the selection of the obtained fragments, the smoothing of the contour, the abrasion of the two surfaces, the perforation and calibration of the item sizes.

The usage of macrophotography-based examination techniques allowed for the identification of functional hypotheses.

ANTHROPOLOGICAL RESEARCH CONCERNING THE URBAN POPULATION OF MEDIEVAL IAŞI — A 17TH CENTURY NECROPOLIS FOUND IN THE EASTERN SIDE OF *CURTEA DOMNEASCĂ*

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Keywords: 17th century, Iași, necropolis, anthropological analysis, biometric characteristics.

This study presents an anthropological analysis performed on a series of 111 human skeletons found in 60 tombs (individual and collective) that were dug in 2008 (by archaeologist Stela Cheptea and collaborators from the Centre of History and European Civilization from Iași) in the medieval necropolis (17th century) situated on the eastern side of **"**Curtea Domnească'' from Iași.

From a total of 60 tombs, a number of 37 were individual tombs, 7 double tombs, 6 with 3 skeletons, 8 with 4 skeletons, and 2 tombs with 5 skeletons. The division according to gender and age show that are significantly more men than women (72.92 % vs. 27.08 %), which indicates a very high coefficient of masculinity (80/31).

We stress the predominance of deaths for the mature segment (65.77 %), followed by the adult (18.92 %), the young, and the senile ones. We mention the fact that the anthropologic study was conducted only on human skeletons that passed the adult stage, of which 70 were male and 26 were female, skeletons that gave us the possibility to conduct a relatively complete study. By analysing each skeleton, according to the methodology established in anthropological research, a series of biometric and morphologic characteristics were ascertained, which eventually revealed the anthropological particularities of the population buried in this medieval necropolis.

The anthropological analysis shows a population, on average, of high and above average height, with a tendency for orthocranous and, respectively, hypsicranous brachycraniality, as showed by indexes for the height of the skull, with a metrimetopic and oval forehead, with the occipital predominantly middle and in the shape of a "house". The cranial terrain is most often attenuated or at most moderately developed. The face is mesenic, with mesoconcic orbits and a mesorine nose.

On account of the analysis of the main biometric and morphologic indicators was established that the main stock of this population group may be defined as Dinaro–Mediterranido–East-Europid, with subsidiary Alpinoid and Nordoid influences.

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STUDY OF BACTERIAL COMMUNITIES FROM THE WOOD CHURCH, NICULA MONASTIC COMPLEX, CLUJ COUNTY — METAGENOMIC APPROACH

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Keywords: metagenomics, 16S RNA gene, bacterial identification.

Bacteria are microorganisms that may survive almost any environmental conditions. Identifying these microorganisms is difficult due to the fact that only 1–2 % of the environmental bacteria can be cultured in laboratory conditions and characterized by classic microbiology methods. A metagenomic approach, involving the use of molecular biology techniques, allows a more ample characterization of bacterial communities. The most frequently used method is the amplification by PCR (Polymerase Chain Reaction) of some 16S RNA ribosomal (16S rARN) gene fragments (ribonucleic acid molecule from the small ribosomal subunit). Due to the presence of some conservative regions in almost all bacterial species, a single PCR reaction using only one pair of primers amplifies homologue fragments of the 16S rRNA gene of all bacteria from one sample.

The objective of this study was the identification and characterization of bacterial communities from a location of historic and cultural interest, by means of molecular techniques. Research of these communities brings supplementary information on the state and the potential

damage of the historical objective and the potential health risk for visitors. The historical and cultural objective from which biological samples were collected is the Eastern-Orthodox 'Dormition of the Virgin Mary' wood church from Nicula, Cluj County, Romania.

For the PCR amplification of the 16S rDNA fragments the universal primers 27F (AGA GTT TGA TCM TGG CTC AG) and 1407R (GAC GGG CGG TGW GTR CA) were used. DNA fragments obtained by PCR were isolated and purified from 1 % agarose gels. For the analysis of every fragment, the DNA molecules were cloned in a cloning vector. Recombined molecules (coning vector with DNA insert) were sequenced. The obtained sequences were compared to sequences available in the NCBI database using the BLAST (http://blast.ncbi.nlm.nih.gov/) option. Analysis data revealed the predominance of some bacterial strains from the Bacillus, Solibacillus, Paenibacillus and Sporosarcina genera, but also, of some newer species, that show less than 98 % similarity to sequences already present in the databases.

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CHRONOARCHAEOLOGY

RADIOCARBON DATING AND HISTORICAL CHRONOLOGY OF "PROTOHISTORIC" TIMES

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Keywords: Bronze Age, Early Iron Age, radiocarbon dating (^{14}C), relative and absolute chronology.

The first resonant outcome of the use of radiocarbon dating in archaeological research was the radical re-evaluation of absolute chronology and of the relationship system of the European Neolithic and Eneolithic civilizations with the Aegean and the Near Eastern world. Then, the increase of ^{14}C data as concerns the "transitory period" and the Bronze Age allowed the setting of a considerably higher chronology of the Early and Middle Bronze ages, including in Romania.

Nevertheless, there are relatively few ^{14}C data as for the Late Bronze Age and the Early Iron Age chronology in Central-Eastern Europe. The specificity of these "protohistoric" periods consists of the fact that the available radiocarbon dates may be compared with the cross-dating results based on the historical chronology of the 2nd and 1st millenniums B.C., which were established for the Eastern Mediterranean region, especially for the Aegean basin (Late Helladic, Protogeometric, Geometric periods). According to the available data, which are analyzed in our paper, the calibrated radiocarbon dates obtained for the LBA and EIA sites in Central and Eastern Europe (including Romania) revealed dates that were 100–200 years "higher" than the expected age based on historical (contact) chronology. A similar phenomenon—i.e., a systematic deviation between calibrated radiocarbon dates and historical chronological data—was noticed also in the Egyptian and Aegean chronology. Considering this deviation, which has not yet been sufficiently accounted for, and for the avoidance of any doubt, it is recommendable, when referring to "protohistoric" periods, to specify (and mark accordingly) the chronological system that is used: either calibrated radiocarbon dates (expressed in Cal BC years), or historical (contact) chronological dates (expressed in BC/a.Chr. years).

Our paper also focuses on the fact that, beyond its absolute chronological value, radiocarbon dating (and especially series of dates) is an instrument that is still employed too little to establish relative chronology (synchronisms, anteriority and posteriority relations). This instrument is at least just as useful and trustworthy as the typological comparative method.

The definition of a solid chronology of the pre- and protohistoric periods in Romania will only be possible by implementing a radiocarbon dating project (if necessary, also checked by other modern dating methods), able to cover all the cultural phenomena and all the country regions. Such a project requires the performance of a great number of measurements, performed on high quality samples and preferably in the same laboratory. The current projects, which are also being implemented in Romania, to set up and to bring into operation dating laboratories, give us hope.

CONSIDERATIONS REGARDING THE PSEUDO-CALENDARS ATTRIBUTED TO THE DACIANS

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Keywords: archaeoastronomy, Dacians, calendar, sanctuary, Sarmizegetusa-Regia.

Most of the attempts aimed at "deciphering"—from an astronomical point of view—the components of the sacred terrace from the premises of the former Dacian capital relied, predominantly, on arithmetical methods, time markings (day–night, synodic month, tropical year) on stone slabs, pillars, etc., in order to develop more-or-less accurate solar, lunar, or lunar-solar calendars.

The beginnings of this archaeoastronomic research conducted by Romanian and foreign researchers was marked by a series of errors and shortcomings, the results of which are felt to this day. Basically, the majority ultimately employ—explicitly or not—diophantine equations (Ax + By = C) with the tropical year (in some cases the current one!) or the synodic month, as well as the number of elements of various building structures (round, rectangular, or apsidal sanctuaries) in most cases conveniently and hence arbitrarily selected, sometimes from unrelated locations, as the working coefficients. Such an equation can have an infinity of solutions, and as such they can generate an infinity of calendars.

Other mistakes encountered in these researches are at the same time some of the most basic, yet the most dangerous ones: equating two cardinal numbers that have different measuring units. Thus, if the ruin of a sanctuary has a side measuring 29.53 m, the consequential inference is that the physical dimension translates the 29.53-days timespan of the synodic month. In other words, an unwarranted equating of 'metres' with 'days' took place. Furthermore, the fact that the ancients did not measure lengths in metres (the 29.53 m become, for example, 66.57 Roman and 69.90 Babylonian cubits), the question of the presence of the synodic month is the sanctuary is inexorably mooted. Other methods employ a whimsical succession of arithmetical operations with randomly chosen values, until the desired result is obtained.

Furthermore, it is groundlessly assumed that the Dacians made use of computations with decimal or fractional numbers, operations present in the 'correction apparatus' of the tropical years resulting from these computations. Even more, for a long period of time now, these calculations have been using incorrect entry data, since the archaeological investigation were never completed (e.g., counting 68 pillars in the 'C' circle of the Great Round Sanctuary instead of 84, the real number; even with 68 pillars, the resulting calendars were claimed as great discoveries, only to be abandoned later, as expected).

All these issues worked to increase the susceptibility of the specialists from the archaeological and historical domains of study, and to consolidate the notion according to which mathematics can be used to demonstrate anything.

Obviously, we do not exclude the possibility that in the past some populations also marked the lapse of time with stones arranged in circles. We also don't exclude the possibility that the Dacians once proceeded in this way too, and that one of the calendars advanced so far is indeed an/the accurate one. However, an encompassed view of the entire Dacian-Getae civilisation during the 1st millennium AD—one of the most advanced of its age—strongly undermines the theory according to which on the sacred terrace of Sarmizegetusa-Regia only

some giant stone circular calendars are to be found, and hence that the ancient writers were wholly wrong when they ascribed to the Dacians superior astronomical knowledge.

The consequence would be serious: by denying on this basis any other astronomical knowledge of the Dacians, we run the risk of condemning to oblivion certain real knowledge that the Dacians, we are certain of it, had. Mathematically speaking,

Mathematically speaking, the necessary condition for such a calendar would be, of course, the coincidence of the temporal cycles with groups of pillars, drums, etc., but considering the complexity of the calendar, this coincidence does not represent a sufficient condition. Other information about the Dacian spirituality—which we, unfortunately, do not possess—could allow us to select from the myriad of possible variants, the real Dacian calendar cycle.

ETHNOARCHAEOLOGY AND EXPERIMENTAL ARCHAEOLOGY

METHODS TO RECONSTRUCT THE SPIRITUAL LIFE OF THE PREHISTORICAL COMMUNITIES BY MEANS OF EXPERIMENTAL AND SENSORIAL ARCHAEOLOGY

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Keywords: prehistory, spiritual life, reconstructing, sensorial experiment.

The paper starts from the observation, borne out by archaeological evidence, that the same religious theme, although unitary in its essence, takes different material forms of symbolic manifestation, both for contemporaneous communities, as well as for, in some cases, habitation units from within the same settlement. The author believes that the explanation for this peculiarity should be sought in an individual's own idiosyncratic behaviour, namely the desire of each believer to profess his devotion towards the venerated divinity through personalised means. Considering the fact that the essence of the prehistoric religions was the veneration of the forces that set the nature in proper motion (in other words, those that ultimately ensured the perpetual subsistence means of a community and an individual), accomplishing the devotional act was best achieved by profound immersing the individual into the natural environment, through the direct communication with nature using the sensory system (particularly vision and hearing), and which could lead to a state of trance. This state of ecstatic spirituality could have stimulated creativity, suggesting to the prehistoric man novel personalised methods for manifesting his devotion towards the divinities.

The author considers that this theory can be validated both by calling on the results of the research from the fields of psycho-analysis and history of religions, as well as through experimental means. Up to this moment, experimental archaeology concerned itself only mostly with examining certain aspects of the material culture of prehistoric communities, and expressed only as theoretical assumption the possibility for employing this archaeological sub-discipline in investigating the spiritual domain.

Relying on methods provided by sensorial and experimental archaeology, the paper presents the considerations of the author about the circumstances by which the above-mentioned state of trance could have been achieved, which lead to the stimulation of the religious creativity, the generation of ideas, materialised in various artefacts with ritualistic and magical character. The inference is therefore that with respect to spirituality, the methods of experimental archaeology do not aim to reconstruct the processes by which artefacts or activities were made, used and, respectively, performed, but instead to reconstruct the conditions that lead to the appearance of the ideas which generated their analogous material processes.

EXPERIMENTS WITH CHALCOLITHIC CLAY INSTRUMENTS USING AIR-DRAUGHT

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Keywords: Chalcolithic, Cucuteni culture, Gumelniţa culture, air-draught, experimental archaeology.

Although apparently diverse, the Chalcolithic material culture from the 5th millennium B.C. South Eastern Europe displays similarities, an example being the pyro-technologies using air-draught by means of the perforated surfaces of the objects, identified in various traditions. To understand ancient technologies and consequently the function and utilizations of objects in relationship with them, one shall first approach these technologies by means of experimental archaeology.

The present paper tries to demonstrate, with the help of experimental archaeology, the existence in the Cucuteni and Gumelniţa traditions of a common feature between clay objects apparently different in terms of form and function (as household objects or sunken up-draught kilns), and (some of them) apparently not in direct contact with fire. Three case studies describing three different types of clay objects, from functional to ritual, demonstrate the use of air-draught in three different pyro-technologies. The paper presents the experiments carried with each of these types of objects, offering technical details and explanations about the ergonomic manipulation and efficiency of the shape of the objects with perforated shapes. A conclusion of the experiments could be the identification of an isomorphic character of the pyro-technologies, the same principle of air control being used from macro to micro scale in the Chalcolithic household. Experiments put into evidence a unitary strategy of air control similar in the household space and in the chamber of the sunken up-draught kiln.

All experiments discussed support the idea of a high degree of efficiency and, at the same time, of minimalism of the Chalcolithic pyro-technologies and objects' design, and intend to plead for the utilization of experimental archaeology as a useful instrument to create new creative perspectives to approach the material culture of the past.

POTTERS AND POTTER'S CRAFT IN MOLDAVIA. SOME ETHNOARCHAEOLOGICAL INQUIRIES

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Keywords: potter's craft, Moldavia, ethnoarchaeological survey.

The paper is intended to present some theoretical and methodological guidelines on the relevance of ethnoarchaeological research on the field archaeology and on the suitability of certain communities to be the subject of ceramic ethnoarchaeological investigations; there are also presented some preliminary ethnoarchaeological data obtained through questioning the few remaining traditional pottery manufacturers in Moldavia region, North-East Romania.

Once a very important occupation, with dozens production centres until the last decades of the 20th century, today the potter's craft is almost extinct in this region, primarily due to the precarious social and economic background. Unfortunately, until now, there is no systematic study of present ceramics from an archaeological point of view, though, worldwide, this approach has become very popular among archaeologists. Our work, started this year, aims, as far as possible, at filling this gap until it's too late. The research methodology consists of observing and interviewing the potters; an ethnoarchaeological enquiry form with 89 questions is used. The questions are grouped into several categories such as: identification data; pottery technology; learning and transmitting the knowledge; context of pottery production and distribution; rituals, beliefs and interdictions related to pottery manufacture. Of these, based on field research undertaken in Vaslui, Bacău and Botoşani counties, the focus will be on the skill duration and source of the interviewed potters, the degree of specialization and mechanisms of goods distribution; there are also presented several data concerning the technological chain of pottery making, from purchasing raw materials, in terms of clays choosing and distance to the clay deposits, through initial processing, shaping, drying and firing the clay objects (types of installations, duration of firing and fuels).

Acknowledgements. This paper was prepared with the financial support of OIPOSDRU, through the project *Dezvoltarea capacităţii de inovare şi creşterea impactului cercetării prin programe post-doctorale*, POSDRU/89/1.5/S/49944.

Figure 1. Vasile Luca "Şchiopuşoru", potter from Frumoasa-Balcani, Bacău County, Romania.

OBSERVATIONS ABOUT THE ARCHITECTURE OF THE GUMELNIŢA CULTURE BASED ON A STUDY OF EXPERIMENTAL ARCHEOLOGY: 2011 RESULTS

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Keywords: experimental archeology, architecture, house, Eneolithic, Gumelniţa culture.

In 2011, the archaeological site Sultana–*Malu Roşu*, Călăraşi County (Romania) witnessed the implementation of the second stage of the *Experimental Archaeology & Architecture Project: Reconstruction of Prehistoric Dwellings* research project. The main purpose of the experiment was to evaluate the degradation level of the construction erected in 2010, and also to make the necessary repairs and finish the decoration of the building, in order to achieve the final goal of the experiment (Figure 1).

Figure 1. The reconstruction of a Gumelniţa dwelling (Sultana–*Malu Roşu*, Călăraşi County, Romania).

One year after the building of the house, in 2011, we made a first evaluation of how it behaved. Our analysis was directed especially towards the evaluation of the status of the structural strength of the building, by following different construction elements. Also, we analyzed the behaviour of the external walls of the house. The interior of the house was not insisted upon, and it will be evaluated on a next phase, planned for 2012. Thus, in terms of infrastructure it has been observed that the foundation system performed favourably, with the exception of a slight subsidence on the southern side. In the case of the vertical supporting structure it has been observed that the posts supporting the walls were not significantly distorted from their original state. The roof resisted well to its own weight load, to snow and wind. There were observed inclinations of the trusses of the roof perpendicularly on their plan,

with deviations of up to 25 cm on a horizontal plan. Also, two secondary beams are curved due to their small section and because of the pressure by the short props located at the intersection of the rafters. As regards the cover of the roof, the reed compacted as result of its drying and the loss of initial weight. It was observed in some areas, especially on the southern side, the sliding down the slope of the reed layer, due to foundation's subsidence of the building.

The decoration process took place after the repairs. For this operation, we added on the external walls a final smooth layer of clay with much sand, as a preparatory layer for dying. After drying we proceeded to the painting of the north-western, north-eastern and south-eastern walls. The south-western side was left unpainted as it is object of a separate study. To paint the walls, we used red clay and white clay diluted with water, but also graphite for drawing outlines. The painted motifs are inspired by decorations on pottery found at the site of Sultana–*Malu Roşu*.

Acknowledgements. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-II-ID-PCE-2011-3-1015.

EXPERIMENTAL INVESTIGATION OF THE "PIT-KILNS" FROM THE AREA OF THE COZIA-SAHARNA CULTURE

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Keywords: experimental archaeology, pit-kiln, Early Iron Age, Cozia-Saharna culture.

The archaeological investigations conducted at the Saharna–*Țiglău* site, dated in 2008 to the Early Iron Age, resulted in the discovery of two pits (Complex 22, pit 19 and Complex 24, pit 21) attributed to the Cozia-Saharna culture. The pits were united at their foundation by means of a "tunnel" built in sterile soil (Figure 1). Inside the pits there were found traces of secondary burning, with the "tunnel" that unites the pit indicating a possible technological use of this construction feature.

An archaeological experiment (Figures 2) was set up at the Saharna–*Țiglău* site in order to verify this hypothesis. In identically reconstructed pits with a linking "tunnel" at their foundations, ceramic vessels characteristic to the Cozia-Saharna culture discovered at Saharna-Țiglău were baked. The results of the experiment and the field observations lead to the conclusion that these installations can be successfully used as pit-kilns for burning pottery.

The discovery of such archaeological complexes at the settlement of Saharna–*Țiglău* in the area of the Cozia-Saharna culture, testify for the technological use of these complexes-installations as "pit-kilns" for burning ceramic ware during the beginning of the Early Iron Age.

The diversity and richness of the "incised and imprinted" pottery at Saharna–*Țiglău* makes it different from other pottery centres of the Cozia-Saharna culture from the middle course of the Dniester River.

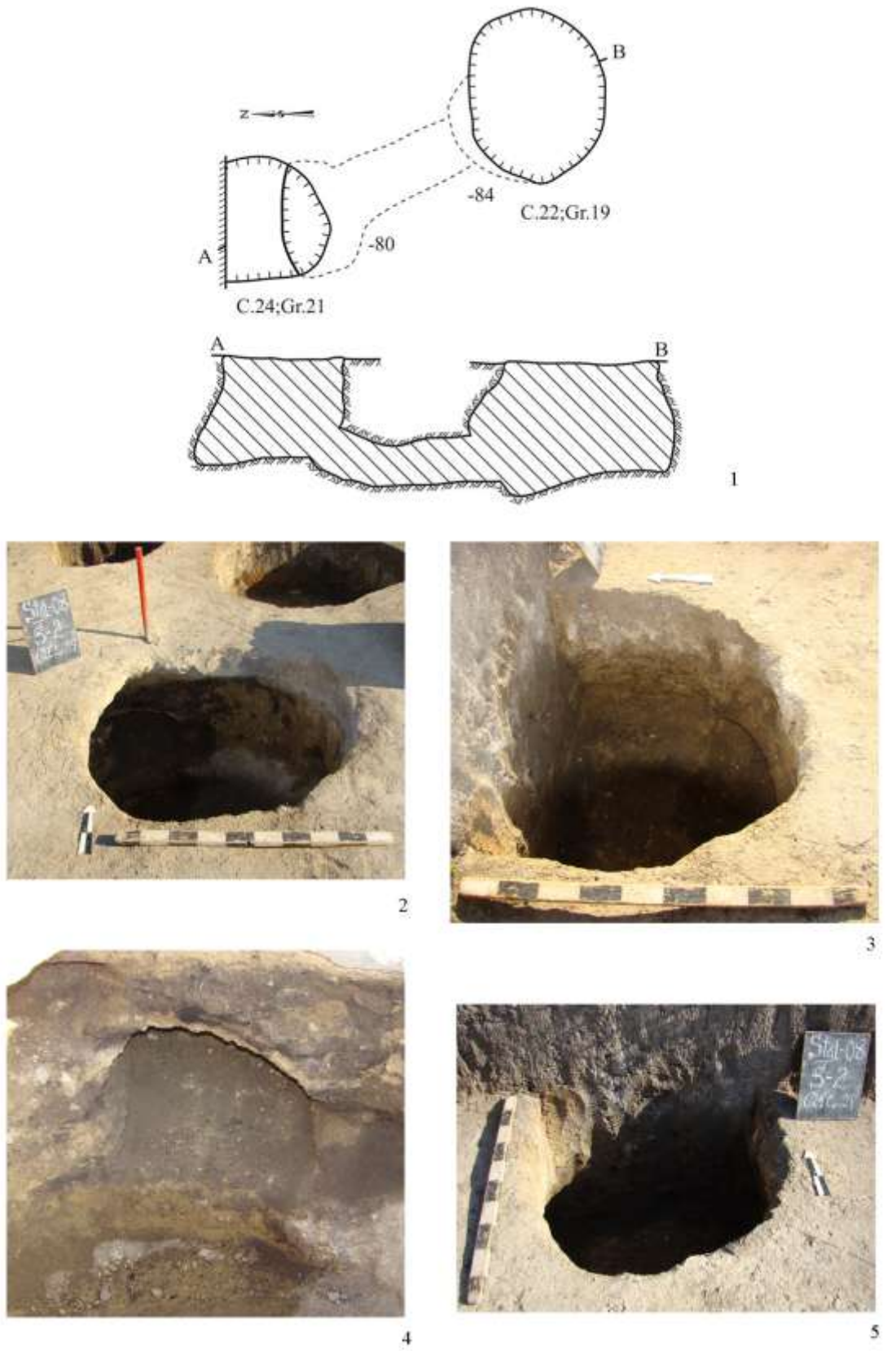

Figure 1. Saharna–*Ţiglău*. 1: The plan and profile of pits nos. 19 and 21; 2: pit no. 19 (photo); 3, 5: pit no. 21 (photo); 4: the "tunnel" between pits no. 19 and 21 (photo).

1

2

3

4

5

Figure 2. The Saharna–*Ţiglău* archaeological park. 1: reconstructed pits with a linking "tunnel"; 2: preparing the pottery's burning; 3: burning of the vessels; 4: the kiln after burning; 5: burnt pots.

BUILDING A DACIAN POTTERY KILN — EXPERIMENTAL ARCHAEOLOGY AT MEDIEŞU AURIT, SATU MARE COUNTY

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Keywords: experimental archaeology, Roman Age period, Free Dacians, pottery kiln, jars.

The archaeological site of Medieşu Aurit (Satu Mare County, Romania) is known from the early '60s when, when archaeological research unearthed a large settlement (1st–4th century AD), a ceramic production centre, and a cemetery belonging to Dacians (mixed with some Germanic elements). After a topographic and aerial mapping of the relief and site, the Satu Mare County Museum carried out between 2009 and 2011 a geophysical program on an area of 18 hectares (out of 25–30 ha). The preliminary results have led to the discovery of over 200 pottery kilns, thereby determining the location of the most important craft centre for the production and burning of pottery (jars type) from the *Barbaricum* of the 3rd–4th centuries AD.

In 2011, through a project funded by the Administration of the National Cultural Fund, the Satu Mare County Museum initiated a project of experimental archeology entitled *Dacian ovens from Medieşu Aurit*. The *Industria dacică* project (coordinated by Robert Gindele) is set to take place in two stages: the first focuses on the construction of the oven and his protective structure, and the second aims to build a pottery workshop in which to produce and burn different type of vessels, especially jars, after the models produced here in Roman Period.

Figure 1. Dacian pottery kiln reconstructed.

The *Terra Dacica Aeterna Association* from Cluj-Napoca was designated for building the oven and its protection system. All the material for both constructions consisted of wood, clay, reed, and willow twigs that were collected from the surroundings of the Medieşu Aurit village (within 500 m from the pottery kiln). Around furnaces but also in the service pit were discovered, during archaeological digging, pits and traces of burning poles. Therefore, it was assumed that they were covered by a lightweight structure meant to protect them from weather. Wooden poles were placed at a distance of 2 m, with a total length of the construction reaching 10 m. The roof, consisting of a structure of wood and reed, have three pillars of support on axis, height of 3.5 m, and slope inclination of 45°. The oven with all of its components was built under this structure: the service pit, the combustion chamber, and the vessel chamber. The oven's service pit has a total length of 6 m, and a width of 1 m at its eastern end, and 2.5 m at its western end. It has descending steps with an average width of 20 cm. The side walls are supported by wooden beams. The oven has an interior diameter 2.4 m, the thickness 10 cm, height 90 cm (from ground level), and the combustion chamber has a height of 1.6 m. Between the service pit and the combustion chamber, there are two supply channels with a length of 1m, 50×50 cm wide, and a 40 cm distance between them.

EXPERIMENTAL ARCHAEOLOGY: BONE AND HORN PROCESSING DURING THE ROMAN PERIOD

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Keywords: experimental archaeology, Roman period, bone, horn.

Since the dawn of man, bone and horn constituted the primary materials for making weapons and tools. In Roman Age, processing animal hard materials was a major activity of craftsmen. The presence of bone or antler artefacts in most Roman sites, albethey urban or rural settlements, or military camps, forced us to conclude that the processing of such materials was a very well represented activity in almost all the Roman settlements.

In this study I attempted to produce replicas of some tools, ornaments, or pieces of Roman military equipment made from bone and horn, using ancient methods, by following the steps also taken by the Roman artisans.

The starting base of this study was provided by the archaeological evidence for this kind of craft available for Roman Dacia; the main case study was a workshop processing hard animal raw materials unearthed at the site of Ulpia Traiana Sarmizegetusa. Following the archaeological campaigns of 2008 and 2009, this workshop, located west of the Forum Vetus, was archaeologically investigated and dated to the first years of the second century AD. Our investigation focused on analysing the raw materials used, the stages of manufacturing, the unfinished items, the botched items, and the refuse.

An important part of the study was the investigation of the processing of domestic ruminants horn. Although in Roman workshops there were found many traces of cutting and scrapping bovine and ovicaprid horn, no artefacts produced from this material could be identified. This is due to the fact that the horns of these animals have two distinct layers: the

core is made from a spongy tissue that is not suitable for use but whose osseous nature means that it preserves buried for long periods of time; the external keratinous sheath has properties that makes it ideal for use in producing a wide range of items, but since its entirely organic it easily decomposes over time.

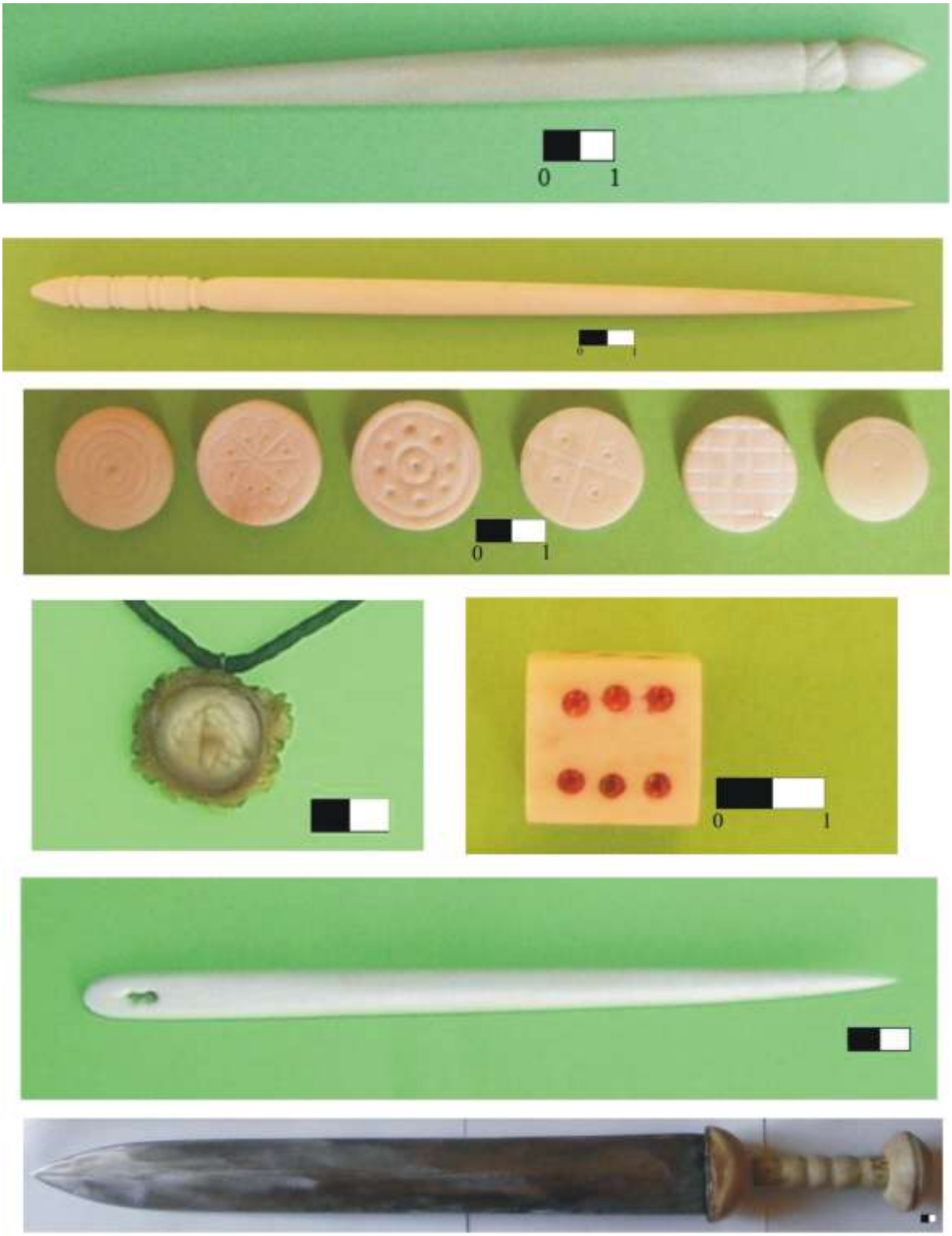

Figure 1. Antler and bone replicas.

Tool handles, sewing and ornamental needles, medical instruments, dices, chips, cordial springs, sword handles, etc. were created during the experiment, thus demonstrating that this craft can be pursued even without the availability of complex installations such as lathe, for example by a single Roman soldier stationed in a camp. The items created from bovine and goat horns displayed a surprising elasticity and aesthetic value (translucency), which during Antiquity would have produced highly sought implements and adornments.

Acknowledgements. This work was made possible with the financial support of the Sectoral Operational Programme for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project number POSDRU/107/1.5/S/77946 with the title "Doctorate: an Attractive Research Career".

HYPOTHESES CONCERNING THE MANNER BY WHICH TEXTILE FABRIC IMPRESSIONS WERE CREATED ON CUCUTENIAN CERAMIC WARE. EXPERIMENTAL RESEARCH

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Keywords: ethnoarchaeology, Cucuteni culture, textiles, ceramic, impressions.

During the archaeological research carried out in the settlements of the Cucuteni civilization, there were discovered ceramic fragments coming from what once were the sustaining bases of vessels, and which preserved impressions of textile materials. Previous research of these impressions allowed the recreation of the structure of the impressed textile materials: woven or knitted textiles obtained by different techniques. The paper describes the experimental research undertaken in order to recreate the manner by which such impressions were formed, pointing out aspects pertaining to the use of textile materials in the process of achievement of the clay vessels.

Establishing the methodology of vessel elaboration requires both the identification of analogies to ethnographic elements and the relation to the technical possibilities of the period when the artefacts were created. The experiments, undertaken in collaboration with a ceramist/potter plastic artist, using the same types of materials, instruments, and work methods, aimed at obtaining result similar to the prehistoric ones. In this regard, in the recreation of the process of elaboration of ceramic vessels, there were used for the coverage of shaping/drying stand, textile materials specific to the Cucuteni culture, with different structures and width, recreated on the basis of prior information. In the process of drying/shaping of the clay, structural elements from the surface of textile materials, being in direct contact to the soft humid clay, left their impression on the base of the vessel. Researches correlated the depth of the created impressions to the vessel dimensions and to the characteristics of the textile materials used to cover the drying/shaping stand for the ceramic vessels.

In the experimental remaking of the successive manufacturing stages of the Cucutenian vessels, two possible scenarios were taken into consideration:

1. The creation of impressions by the drying the already-modelled vessels on a stand covered with a textile material;

2. The creation of impressions by shaping the vessel on a stand covered with textile material. In this case, the textile material can also be used as a rudimentary system for rotating the vessels during the modelling process, moved by potter himself or by another person assisting him. In the Cucuteni culture, potters knew of the advantages of the rotational movement, as indicated by uniform parallel and horizontal grooves found on the interior walls of some vessels, or by the alignment of mica grains in the composition of the clay, present both in the centre of the vessel walls and along its sides.

During the experimental research carried out by implementing the second scenario, certain aspects were revealed, which led to new hypotheses about the creation of the textile impressions and, implicitly, about the use of textiles in the process of ceramic ware manufacturing. For instance, for shaping large vessels there were used textile materials obtained from thicker threads. Their impressions were made deep in the clay mass and for this reason the extraction of the textile material once the vessel dried caused the deterioration of the vessel base. In this case, there emerges the hypothesis of firing the vessel together with the impressed textile stand, the aspect of the impressions created this way being similar to the one preserved on the base of the vessels belonging to the Cucuteni culture (Figure 1/a). In the same case, the removal of the textile material impressed in the soft clay, before getting dry, results in the disturbance of the clay, and the exaggerated raising of the contours of the impression motifs (Figure 1/b). To elucidate these aspects, the research is still in progress.

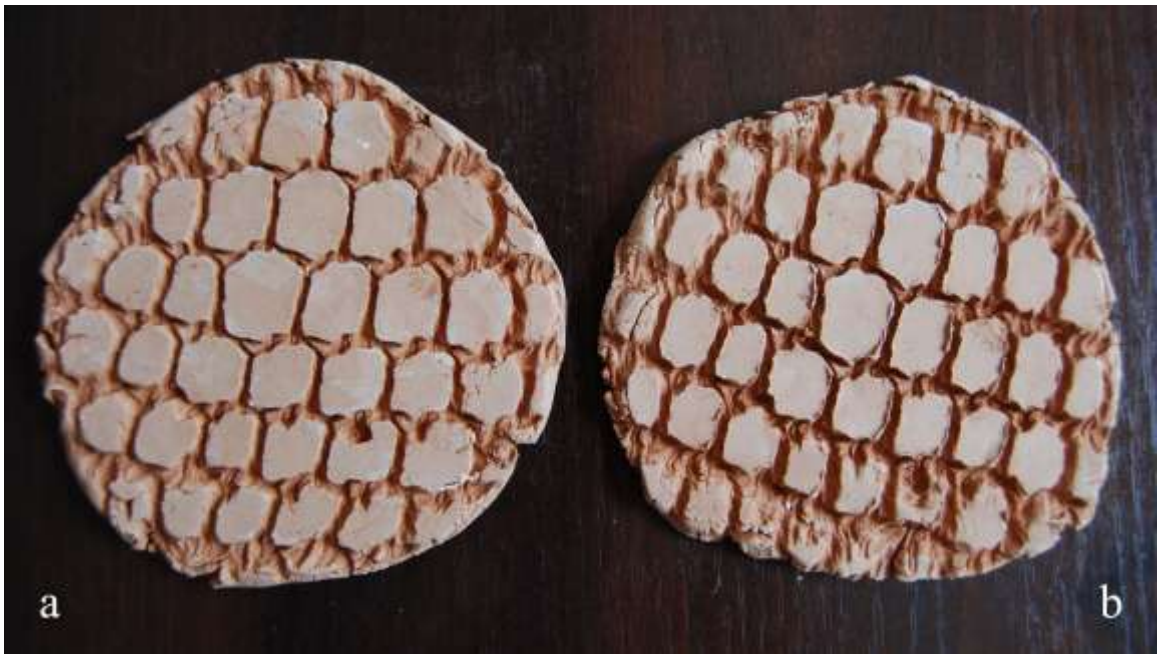

Figure 1. The impressions of a textile material created as a result of two different work methods.

PAGAN WATER RITUALS IN THE ROMANIAN LOCAL TRADITION

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Keywords: ethnoarchaeology, ethnology, pagan rituals, water rituals.

During antiquity, people performed a series of rituals that involved water. Ancient documents mention the collective hand washing and the symbolic spatter of the beast designated for the sacrifice both purifying rituals performed before every votive offering. Also well-documented are healing rituals consisting in the apparently simple gesture of drinking the water of a sacred spring, or taking a bath in it. The habit of soothing the death through periodical offerings of wine and water is not just mentioned in the literature but also proven through archaeology. Holes for a water supply system have been identified in the covers of some roman sarcophagi found also in Romania.

However the rituals related to water often do not leave visible marks. If they are not mentioned in the literature or epigraphic inscriptions, nor represented on figurative monuments, the meaning of a simple finding like a pot in a grave or a spring might not be interpreted correctly.

The above mentioned rituals have prehistoric roots; many of them are related to magic acts, performed with the purpose of ensuring the rain will fall, the seasons will follow each other and the land will be fertile. That is why they are widespread and not characteristic just for one region. But the fact that they were widely spread and transmitted orally from one generation to another, led to the development of a series of local features. Analysing these peculiarities for the period before Christianity on the territory of modern Romania is even harder, as there are no written documents regarding this specific area.

By the time Christianity became the official religion these rituals were massively performed. The church adapted some of them while others were preserved by local traditions. These traditions, sometimes preserved until modern days, can substitute the limits of archaeology. Local traditions, traditional holydays or gestures transmitted from one generation to another, which became habits, might hide pagan rituals.

For example, the habit of spattering the plough and cows with holly water before beginning the spring ploughing, or the habit of young women of washing their face in the spring with waters from melted snow, could originate from ancient agricultural rituals performed in order to ensure the fertility of the land and women.

The traditional believe in the healing powers of water can be seen for example in a village of Drăguș, near Făgăraș, were on special occasions women take their ill relatives to drink from the waters of a holly spring or to wash their faces, leaving next to the spring an object that belonged to the person that needs to be healed. Another ritual performed in the same village is the expression of the purifying power of water. Immediately after childbirth women should avoid contact with anything that might be contaminated until they are symbolically purified through holly water brought from the church. Ancient Greek and Roman women had to perform similar rituals from the exact same reason.

A ROMANIAN CNCS PROJECT (2011–2014): *THE ETHNOARCHAEOLOGY OF THE SALT SPRINGS AND SALT MOUNTAINS FROM THE EXTRA-CARPATHIAN AREAS OF ROMANIA*

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Keywords: ethnoarchaeology, salt springs, salt mountains, salt cliffs, Romania.

The multidisciplinary studies related to salt (either in a solid or liquid state of aggregation) have underlined its overwhelming role for alimentation, human and animal health state, food conservation during unproductive seasons (before the era of refrigeration), the stability and development of human habitat. This function subsequently determined the tendency to control (inclusively in a military way) this natural resource, irreplaceable to human life The sub-Carpathian area of the Eastern Romania, characterized by a high density of the salt springs (over 200 that we know so far), holds the record for the most ancient traces of salt exploitation all around the European area, beginning with the Starčevo-Criş culture. To this essential aspect for the whole European prehistory we should also add that the most distinctive aspect which clearly set apart and distinguished the sub-Carpathian Moldavian area from similar European ones (or maybe worldwide), where diachronic methods of salt spring exploitation were attested, is the continuity of these methods to an intensity difficult to imagine up to the present, regardless of any sort of mechanization, economic organization or legal regulation, hence in similar conditions to those of pre-industrial societies. This unique situation in Europe represents the ideal framework for the development of complex ethnoarchaeological researches even within the European Union. Nowadays, researchers resort to the ethnographic analogies regarding remote areas unrelated to salt springs, in order to understand the archaeological phenomena related to salt springs, which drastically reduces the adequacy degree and the credibility of the ethnographic analogy.

The approach of the Romanian-French team so far, which completely observed the exigencies specific to the ethnoarchaeology, underlined the huge cognitive potential of this area on a global level. The idea to compare a Neolithic (and of other historical eras) situation, despite the succession of different archaeological cultures around salt springs, to the present day situation gains a solid ground in the fact that traditional brine supply methods and their intensity, the distribution and use networks of salt springs are practically identical. This is proven by the mediaeval and modern documents that cover a period of half of a millennium. Thus, the methodological novelty consists in the substantiation of applying current models to prehistoric archaeological contexts, beginning with the ascertained fact of the continuity—during the second half of the millennium—of the economic patterns and social contexts generated by the existence of salt springs. This occurred despite the major changes in the social, political, and administrative organization of the communities within the sub-Carpathian Moldavian area, inclusively the fact that Romania joined the European Union. An essential impediment in the setting of ethnoarchaeological researches was the lack of ethnographic studies related to the phenomenon of exploiting brine from salt springs. As we already know, ethnographers do not deal with the same issues as archaeologists; as consequence, most of the situations that could be interesting for the archaeology are never recorded. Due to this fact, an original ethnographic

questionnaire related to the subject of salt springs exploitation from an archaeological perspective was elaborated. By successfully testing this useful instrument on the whole Eastern sub-Carpathian Romanian space, we elaborated a complex database that has already enabled the first modelling processes. The results of spatial analyses provide solid arguments to accept/reject several working hypotheses related to the role of salt springs in prehistory, especially in the Cucuteni-Tripolye cultural complex. Given the fact that the salt spring exploitation in Mexico, America, etc., even though it presents very interesting aspects, it does not have enough amplitude for complex modelling. Our 1992 study caught the attention of O. Weller (CNRS France) who obtained several successive series of financing since 2003 in order to carry on ethnoarchaeological investigations in the salt springs area, whose importance we have apprehended. Since 2007-2010 the researches have intensified within the CNCSIS Idei no. 167/2007 project, entitled *The salt springs of Moldavia: the ethnoarchaeology of a polyvalent natural resource* (Alexianu, M., Weller, O. 'The Ethnosal project. Ethnoarchaeological investigation at the Moldavian salt springs', *Antiquity*, vol. 83, Issue 321, September 2009, antiquity.ac.uk/projgall/weller321).

Because each campaign provided new and often unexpected aspects concerning the exploitation, uses, distribution networks, social contexts related to salt springs, we need to extend the ethnoarchaeological research framework to the entire Romanian extra-Carpathian area in order to build a saturated model (cf. G. E. Sacks, *Saturated model theory*[2], World Scientific Publishing Co., Singapore, 2010). We need to continue this type of research, taking into account also the imminent disappearance of the older generations, who have first-hand information regarding the non-industrial salt exploitation during the last century. We underline the fact that, for the first time in the field of ethnoarchaeology, the correlations between the exploitation of salt springs and that of salt mountains/cliffs will be systematically analyzed. We thus create the premises to fully substantiate interpretative models impossible to achieve anywhere else in Europe. It is obvious that the modeling based on such a consistent database maximizes the credibility of using the ethnographical analogy to understand the various contexts on the archaeological time. Therefore, the different sub-models provided by this project will undoubtedly be used as reference for the areas—anywhere in the world—with evidences of salt exploitation in the archaeological, but not in the ethnographic time. We also mention that the tendency to build potentially universal models will not exclude the emphasis on the idiographic aspects illustrating the intelligence of human behaviours in particular situations. On the other side, the complexity and diversity of ethnographic data of such a large area is the ideal information support to theoretically substantiate the concept of anthropology of salt, that we have recently put into circulation (*Archaeology and Anthropology of Salt: a diachronic approach*, (eds. M. Alexianu, O. Weller, R.-G. Curcă), BAR 2198, Archaeopress, 2011, Oxford).

The project proposed aims to apply the spatial method in the field of ethnoarchaeological researches on salt springs. This top, innovating orientation in the field of ethnoarchaeological researches will be extended to the whole extra-Carpathian region, and, in the future, to the intra-Carpathian area. It is obvious that the Romanian-French ethnoarchaeological researches on salt springs will impose a pattern of scientific behaviour for all future European and international researches on the ethnoarchaeology of salt springs and salt mountains/cliffs and on ethnoarchaeology in general.

The saturated model of non-industrial salt exploitation, developed as a result of the project's implementation, will undoubtedly represent an inevitable referential for the ethnoarchaeological researches on salt worldwide. The theoretical substantiation behind the concept of anthropology of salt will definitely inspire and potentiate the interest of specialists from other fields of knowledge (especially, medicine, biochemistry, linguistics, philology, hermeneutics). It is our firm believe that the original features of this Romanian project will entice

the interest of both students and young researchers, specialized in exploring the past of Romania, Europe and other continents. The proceeding stages of the project will also feature a highly important cultural significance through the safeguarding intangible heritage regarding the universe of salt. A few important involvements must be underlined concerning the public health care within the investigated areas (detecting the toxic elements of brine from salt springs), the sustainability of rural economy, through supporting this parallel non-quantifiable economy, medicine (traditional halotherapy). The future results of this project developed in the extra-Carpathian area of Romania can be used successfully used within the archaeological and ethnographical tourism programs.

PHYSICAL AND CHEMICAL INVESTIGATIONS

SEARCHING FOR CHEMICAL FINGERPRINT: CLAYS FROM DOBRUDJA

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Keywords: Dobrudja, clay, XRF, statistics, chemical fingerprint.

The paper presents some of the feasibility tests made for a new partnership research project (CERAMALL) oriented on ceramics, with four main directions: origin, fabrication, dating and use. Our presentation will develop some of the first direction, about origin expertise.

We have acknowledged the huge amount of data in international literature in the field. In the same time, we have to admit that in Romanian archaeology have been done very few steps forward. Few as they are studies were concern almost exclusively on petrography, interesting nonetheless, able to asses is an object was made around the place of discovery, giving some technological clues, but not very much more.

Considering the nature of preliminary tests, we used the most accessible, simpler and not expensive available technique – fluorescence spectroscopy, using a portable XRF. Our tool is clearly outdated, losing the lighter elements like silicon and aluminium, prevalent in any clay as oxides making up from 56 to 86 % of clays' composition. There are left anyway 5 major and 7 minor chemical elements to search for the fingerprint of the raw materials.

Out tests had as targets to make a difference between burned and crude clays and to provide an experimental base about analytical means to discriminate raw materials and building materials (of Roman age) from 10 sites from all over Dobrudja (antique *Scythia Minor*).

XRF data proved that burned clays do not alter dramatically their balance of chemical elements, as expected. Therefore, a good knowledge about natural clays can be a good departure point for investigating ceramic materials' origin. The alteration vector was studied with experimental means, samples being burned in a lab oven, in analogue conditions with real ones.

Out tests showed, based on 11 clay samples and environ 40 archaeological samples, that is possible to discriminate at least three major areas in Dobrudja, conventionally named North, Centre and South. On this ground some of the antique routes and directions of trade for building materials have been suggested, but this will not make our subject for now.

Our results have been opposed with literature data from Sardinia, Sicily, northern Hungary and south-western Turkey, to test the overall feasibility of discriminating different distant ceramics. The test succeeded, as we are going to show.

Local variability of clays (as a radius of 10 km) couldn't be a target for a preliminary test, but we will deal with it on three case studies, in our future project, in the benefit of a better statistic processing data.

DECORATION ON CUCUTENI CERAMIC: AN ARCHAEOMETRICAL RESEARCH

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Keywords: Chalcolithic, Cucuteni culture, ceramic, pigment, raw materials, SEM-EDX, XRF.

The Cucuteni culture was discovered at the end of the 19th century and during the approximately 120 years that have elapsed since then the research was mainly focused on field archaeological investigations. The Chalcolithic ceramics of Cucuteni is renowned especially for its extraordinary painted decoration, which sparked the intense interest of historians and researches.

The paper's aim is to characterise the materials used for ceramic ornamentation using instrumental techniques such as SEM-EDX and XRF; a comparison between the methods used is also intended. The SEM-EDX analyses were performed on Cucutenian ceramic fragments dated to the Cucuteni A, Cucuteni A-B, and Cucuteni B phases, and coming from the Cucuteni–*Cetăţuia*, Cucuteni–*Dâmbul Morii*, Ruginoasa–*Dealul Drăghici*, and Scânteia–*Dealul Bodeşti* sites. The XRF analyses, concerning the decoration pigments, were carried out on Cucutenian ceramics from Ruginoasa, Scânteia, Vorniceni, Ripiceni, and Cucuteni.

The OM and SEM analysis highlighted the morphology of the painted layer applied on the surface of the ceramics. Figure 1 presents the aspect of the black-coloured decoration—a discontinuous layer of variable thickness (2.5–22 μm).

The SEM-EDX was used in determining elements like Na, Mg, Al, Si, K, Ca, Ti, Mn, Fe, O, while the XRF analysis for the determination of Ca, Mn, Fe, K .

While the SEM-EDX presents the advantage of analysing a thin surface layer, which is convenient for investigating painted decoration, the XRF spectrometry allows a non-invasive investigation of the ceramic decoration.

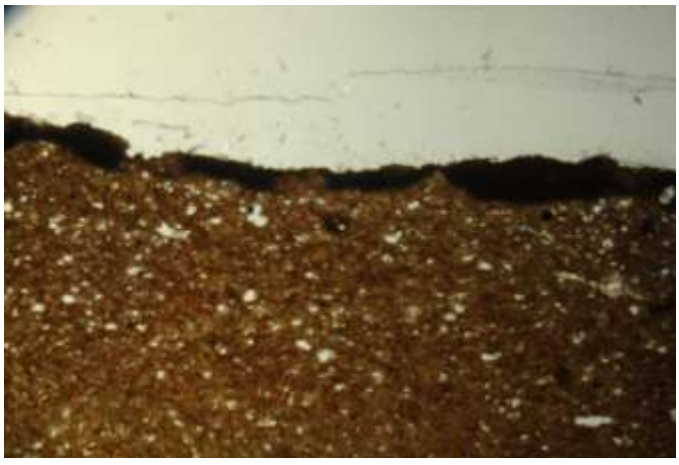

Figure 1. SEM image of the cross section — a black layer.

The pigments identified in the three colours characteristic for Cucutenian ceramics are natural raw materials: iron oxide for red, clay with higher or lower calcium content for white and ferromanganese oxides for the brown/black pigment. The engobe contained illitic white clay, probably mixed with calcite.

Both analytical methods gave similar results regarding the pigments used for decorating the Chalcolithic Cucuteni ceramics.

The results of the archaeometrical research, alongside with stylistic analyses and historical studies, will be included into a database of the Cucuteni Chalcolithic ceramics in the context of the Old European civilisations.

ARCHAEOMETRIC INVESTIGATIONS OF COPPER AGE CERAMICS PIGMENTS

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Keywords: Copper Age, Cucuteni culture, Gumelniţa culture, ceramics, pigments, archaeometry.

The south-eastern region of Europe was the cradle of numerous ancient civilizations. Thus, during the Copper Age, several cultures that produced remarkable painted ceramic wares, such as Petreşti, Gumelniţa, Sălcuţa, Cucuteni, developed and flourished on the nowadays Romanian territory.

For a modern observer, it seems reasonably to presume the existence of a certain reciprocal influence between the Cucuteni and Gumelniţa cultures: they were spread on geographically different, but contiguous areas, and they overlapped—to a certain extent—from a chronological point of view. One can also expect that this inferred link to be somehow reflected by the way the pottery from these two cultures were produced and decorated. These archaeometric investigations were triggered by a possible comparison between the pigments and decorating techniques employed for ceramics decoration by the craftsmen from these two partially contemporary cultures.

To answer such questions, pigments decorating some painted—red, white, and brown/black—ceramic shards belonging to the Cucuteni and Gumelniţa Copper Age cultures were investigated using Particle-Induced X-ray Emission (PIXE), micro-X-ray Diffraction (XRD), micro-Raman spectrometry and Scanning Electron Microscopy (SEM-EDX) techniques.

The analyzed shards were selected from the collections of the National Museum of Romanian History, Bucharest. They were excavated from the following archaeological sites: Ţolici, Scânteia, Calu, Vlădeni, Gîrcina for the Cucuteni culture, and Borduşani–*Popina* for the Gumelniţa culture. The PIXE measurements were performed using an AGLAE accelerator at C2RMF (Paris), while the micro-XRD, micro-RAMAN and SEM experiments were carried out at CEMES (Toulouse).

From the obtained experimental data, it was concluded that the brown/black decoration of the Cucutenian shards contained variable amounts of jacobsite (Fe_2MnO_4), hematite (Fe_2O_3), and magnetite (Fe_3O_4)—the last one in minute proportions, indicating the lack of a strict oxidising atmosphere in the kiln. The red colour pigment was due to hematite (Fe_2O_3), while the white pigments were identified as a combination of iron pyroxenes, gehlenite ($Ca_2Al_2SiO_7$), and anorthite ($CaAl_2Si_2O_8$).

On the other hand, the white colour decorating the Gumelniţa shards was produced through the application—after firing the ceramic vessel—of a compound containing calcite ($CaCO_3$); the black colour pigment in this case feature high amounts of carbon/graphite (C) and quartz (SiO_2).

The compositional studies on Copper Age pigments led to the conclusion that different techniques and raw materials were employed by the potters who manufactured the shards from these two Copper Age cultures.

Acknowledgements: External PIXE measurements at the AGLAE accelerator of C2RMF took place in the frame and with the financial support of EU FP7 CHARISMA project.

NEW ARCHAEOMETRICAL ANALYSIS ON A BATCH OF CERAMIC FRAGMENTS AND PIGMENT SAMPLES DISCOVERED AT THE SITE OF FETEȘTI–*LA SCHIT*, ADÂNCATA COMMUNE, SUCEVA COUNTY

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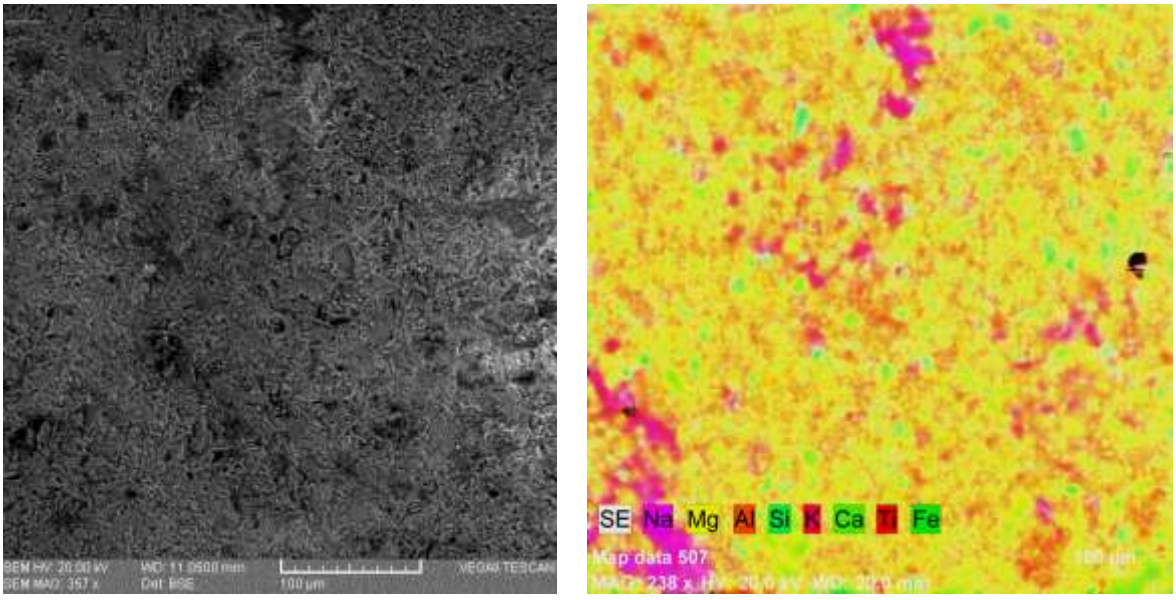
Keywords: Cucuteni culture, electronic microscopy, spectral analysis, microdurity, stereo-microscopy, manganese.

In the paper, the authors analyse, as a follow-up to previous archaeometric investigations, using electronic microscopy, a batch of ceramic fragments coming from the archaeological site of Fetești–*La Schit*, Adâncata commune, Suceava County, Romania. The items, which are currently part of the collection of the Archaeology Laboratory from the "Ştefan cel Mare" University of Suceava, were assigned to the main categories of the A and B phases (painted, decorated with impressed and Cucuteni "C" motifs), in order to obtain comparative ceramographic dates as complete as possible. Also presented are the results of the microscopic (electronic microscopy, stereomicroscopy), spectral, and micro-hardness analyses carried out on a batch of micro-granules of mineral pigment (one of the raw materials used for painting the ceramic ware) discovered *in situ* in the Cucuteni B level of the same site. These investigation were conducted in the Laboratory of Instrumental Analysis (Faculty of Food Engineering) and the Laboratory of Material Science and Technology (Faculty of Mechanical Engineering, Mechatronics, and Management) from the "Ştefan cel Mare" University of Suceava.

The electronic micrographs of the pre-treated ceramic samples reveal the microstructural layout and the distribution of the chemical elements on the scanned surfaces (Figure 1). The corroboration of the data on the chemical compositions (chemical elements and oxide compounds) and on the microstructural features supplement the results previously obtained, highlighting both the similarities and the differences between the ceramic categories analysed, denoting technological specificities according to the phase, traditions, and production centre. The spectral analysis of the pigment micro-granules (corpuscles) revealed the presence of various manganese (hausmannite, pyrochroite, manganite, pyrolusite, jacobsite) and iron

compounds originating from mountainous sources from Suceava County, which were swept by running waters and re-embedded into the banks of some rivers (mainly the Bistriţa river) from where they were subsequently collected. The results expand the databases on the natural colorants used during prehistory. The corroboration of these data with the analyses of some ceramic samples painted with black pigments, likewise from the site of Fetești–*La Schit*, fully confirm these conclusions.



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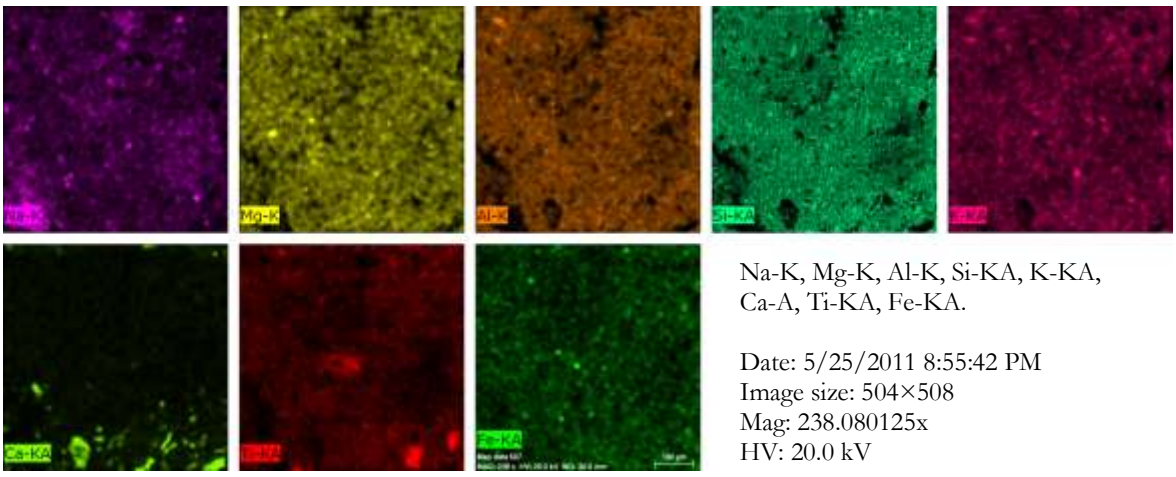

Figure 1. The electronic micrographs of sample SV127,
and the distribution of chemical elements on the scanned surfaces.

CHEMICAL-PHYSICAL ANALYSES ON SAMPLES OF MINERAL PIGMENTS FROM THE CUCUTENIAN SETTLEMENT OF BUZNEA, ION NECULCE COMMUNE, IAȘI COUNTY

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Keywords: Chalcolithic, Cucuteni culture, mineral pigment, X-ray spectroscopy, micro-FTIR spectroscopy,

The paper presents the data on the chemical composition of two pigment lentils discovered in the cultic dwelling from Buznea–*Silişte/După Grădini* (Cucuteni B_1 phase), one of which appears as a large flatted lump with traces of calcination. A fragment of painted pottery from the same site was found near the smaller lens. The study employed optical and electronic scan microscopy techniques, the latter coupled by X-ray and micro-FTIR spectroscopy, in order to reveal the nature, provenance, and use of these materials.

The analyses established that the mineral has a *limonite* ($FeO(OH)\cdot nH_2O$) base consisting of a hydrated mix of iron oxide–hydroxide (III) (regularly ochre *goethite* -α-FeO(OH), and red *lepidocrocite* -γ-FeO(OH), sometimes un-purified with *jarosite*—red-brown coloured Fe and K double sulphate). The ratio between the three components gives the final colour of the pigment. The pigment was initially finely pulverised, but it gradually monolithised into the shape of the vessel that contained it (a brimmed bowl), and developed a grey salt crust that covered it.

The analyses were performed for the large lens on samples collected from four spots (the area with a dark-red colouration, another with a light-red colouration, on the burnt area, and on the surface), and on two spots on the small lens (on the surface and on the red area). The dark area of the red pigment contains a smaller amount of Fe, but despite that it has a higher concentration of Ti, the presence of S as sulphurs makes it darker. The calcinated area has a lower concentration of Fe at its exterior than in its interior, because it underwent processes of dissolution in the phreatic layer, and has traces of contamination (P, S, C). Compared with the larger lens, the small lens displays the same Si/Al caustic module between 2.2 and 2.3; conversely, the Fe content is twice as large, while the contamination from the site is weaker. At the centre of the two lenses, the composition varies at the same degree as at the surface structure, with the difference that through segregation the contamination with compounds that contain P is greater for the small lens.

The analysis of the ceramic from the same site showed that these pigments were used for the slip; only kaolinite with a high Ti content and pyrolusite (MnO_2), both impurified by barium oxides, were found in the pigment.

Considering the association of these samples with other artefacts from outside the cultic dwelling from Buznea, we do not rule out the possibility that these pigments were also used for body painting during ritual processions. The origin of the mineral pigments identified seems to be the north-eastern Carpathian area, where geologists determined their associated presence.

FIRING ATMOSPHERE INVESTIGATION OF ANCIENT CERAMICS THROUGH THE STUDY OF FE VALENCE STATE DISTRIBUTION

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Keywords: Greek and Roman periods, ceramics, firing conditions, archaeometry.

The ceramic production in the Greek and Roman periods reached new heights, through the development of high-gloss surface finishes through vitrification, and redox chemistry of an iron oxide-rich clay material. Depending on the firing protocol used, the surface finishes could be more-or-less vitrified with a black (reducing condition), red (oxidizing condition), or black and red colour (thermal multi steps process). The mastering of the multi steps process was at the origin of the famous Attic potteries, while *terra sigillata* ware comes from the improvement of red gloss coatings through the creation of specific kilns during the Roman time. The mastering of the firing protocol played a significant role in the production of this type of coatings, and was a key feature to assess the production quality of these antic potteries. The practitioners of this complex and evolving technology must have paid a lot of attention to the nature of the starting clay, and the master potters must have understood the intricacies of firing Fe-rich clay sufficiently well to develop the kilns through the different stages as the pottery evolved. Unfortunately, however, very few kilns from this period have been discovered during the excavations of pottery workshops, and even when a few were discovered not much of it was found besides the base.

The communication presents the results of the synchrotron μXRF, elemental and valence state mapping, and μXANES spectroscopy measurements obtained on cross-sections of pottery specimens previously prepared for electron microscopy scanning. The Fe chemical mapping at the micrometre scale revealed an in depth Fe valence distribution in the slip/body set, which is a key factor for inversely getting (reverse engineering) the atmosphere variations during the firing process, and thus allowed us to trace an important part of the firing protocol. Another advantage was the use of the same sample for all type of characterization, which allowed coordinated studies.

Acknowledgements: This work was supported by the *Conseil Régional de Midi-Pyrénées* under contract No. 08005556-2 and a France–Stanford Center grant for the 2006–2007 academic years.

THE CHERT MINING AND PROCESSING INDUSTRY AT PIATRA TOMII, ALBA COUNTY

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Keywords: Chalcolithic, Coţofeni culture, Romania, chert, quarrying, lithics.

Fieldwalking surveys in 2007 and 2008 revealed a moderate sized Coţofeni settlement on Piatra Tomii hill (Alba County, Romania). This site was considered of interest because of its

location on top of a natural source of chert, and the large amount of chert artefacts found on the surface. As well, this is as yet the only chert quarrying or mining settlement found in the Transylvanian basin. Given its affluence, especially considering the relative isolation of the settlement, it is likely that the chert industry here was important to communities in the vicinity. Indeed artefacts found at contemporary sites in the Mureş valley appear to have been made from the same or a similar chert.

In 2009 excavation at the site began. Although the vast majority of finds on the hill are from the Coțofeni period, artefacts from the Vinča and Petrești cultures were also discovered. One of the objectives of the excavation was to learn more about the chert mining and processing at the site. The ratio of artefact types and lack of use-wear suggests that not only was raw material being extracted at the site, but tools were also being produced locally before being exported. The 2009 excavations also revealed what appear to be the remains of pit mining and fire cracked limestone along with stone hammers and axes. These finds give us technical insight into late Chalcolithic and Early Bronze Age chert mining techniques.

This presentation will look at the chert artefacts and the suggestions about the processing and export industry, as well as the possible methods of extracting the raw material used at this settlement.

PETROGRAPHIC ANALYSES ON THE POLISHED STONE INDUSTRY FROM THE CUCUTENIAN SETTLEMENT OF RUGINOASA–*DEALUL DRĂGHICI*

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Keywords: Cucuteni A, polished stone industry, raw materials, Raman analyses.

This paper presents the results of the investigations carried out on a set of 75 polished stone items from the Cucutenian A_3 site of Ruginoasa–*Dealul Drăghici*. The petrographic type was established by means of macroscopic observation with a binocular magnifying glass, and by means of non-destructive Raman analyses which allowed the identification of the main minerals.

The results indicate the fact that the Cucutenian communities exploited a large variety of raw materials, including 6 types of rocks (limestone, marl, sandstone, silicolite, conglomerates, and andesite). Their usage is connected to the typology and functionality of the implements. The explanation for such a variety of raw materials is the presence in the settlement's immediate vicinity of the Siret River; the river's main bed and terraces represented an inexhaustible source of raw materials for the human communities, starting with the Palaeolithic until modern times.

One can also notice that certain perforated items, such as those established as being fashioned from pyroxenic andesite, have a source of their raw materials different from the local one, more precisely the area of the Harghita–Călimani–Gurghiu mountains in the Eastern Carpathians. We believe that such raw materials were obtained either through expeditions of procurement of raw materials, or, most probably, following intercommunity exchanges, possibly even of the items in their finished form.

CHEMICAL-PHYSICAL ANALYSES OF TWO BRONZE ARTEFACTS DISCOVERED AT BOLDEȘTI, TODIREȘTI COMMUNE, IAȘI COUNTY

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Keywords: Boldești, Early Hallstatt, Gáva–Holihrady culture, bronze, SEM-EDX, micro-FTIR.

The archaeological collection of the "Mihai Constantin" School Museum of the "Ion Neculce" Secondary School from Târgu Frumos, Iași County, Romania, comprises numerous important archaeological materials, among which bronze artefacts (a spear head and a knife blade) coming from a haphazard discovery made at Boldești–*Vatra Satului*, Todirești commune, Iași County, Romania, from what was possibly a deposit. According to the typological features, these items can be dated to the Early Hallstat period, and attributed to the Gáva–Holihrady culture.

The artefacts were analysed using non-invasive optical microscopy, and scanning electronic microscopy (SEM) coupled by EDX and micro-FTIR detection, in order to establish the degree of preservation, a series of archaeometrical features, and the manufacturing technology. Thus, the microscopic analysis revealed a green corrosion crust spread unevenly and with embedded microstructures from the archaeological site.

Figure 1. Microscopic view (100x) of the (a) spear head and (b) the knife blade.

The SEM-EDX measurements identified both the chemical elements of the base alloy—Cu, Sn, Pb, and Ni—as well as the contaminant elements from the site or those from the moulds—Si, Al, Fe, Na, K, Ca, Mg, Cl, S, C, and O. The contents, in terms of mass percentages, for the base alloys are 81–83 % Cu, 6–7.5 % Sn, 2–3.1 % Pb, and 0.65–0.75 % Ni, values which assign the items to the category of fine (high quality) medium-alloyed bronzes. These elements can be

found both in the core, as well as in the corrosion crust of the pieces; in the latter case, the percentages differ from those of the base structures of each item. The presence of nickel in the alloy suggests that the raw material might have come from ores in the Eastern Carpathians. The micro-FTIR analysis, on the basis of the characteristic group vibrations, confirmed the nature of the corrosion products from the surface structures.

At the moment of speaking, it is difficult to determine whether these pieces were "local" products, from a production centre in the Eastern or North-Eastern Carpathian area, or the result of medium- and long-distance trade between different communities.

A FIRST ATTEMPT TO STATISTICALLY ANALYSE GETO-DACIAN GOLD AND SILVER COINS

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Keywords: Koson coins, X-ray fluorescence, elemental composition, cluster analysis.

A statistical analysis was performed for the elemental composition (Au, Ag, Cu concentrations) of a hoard of 143 Koson coins (37 with monogram and 106 without monogram) recuperated by the Romanian authorities in the autumn of 2009. The elemental composition was obtained by using an energy dispersive X-ray portable spectrometer (X-Met 3000 TX+, Oxford instruments).

Several studies showed that the coins differ in elemental composition and probably in composition and minting as well: the conclusion reached was that most of the monogrammed coins are made from refined gold (3–5 % Ag, less than 0.5 % Cu), while the coins without monograms are made from native Transylvanian gold (9–20 % Ag, 0.5–2 % Cu), of alluvial origin, proved by the presence of Sn, Sb, and Te embedded in the gold. Therefore, the data were grouped and evaluated separately, according to the specific inquiries, in order to obtain meaningful statistical correlations. Two methods were used: Cluster Analysis and Principal Component Analysis (PCA).

The Koson coins with monograms were grouped using Cluster Analysis and then compared with some other contemporary emissions—a hoard of Lysimach staters recovered in May 2011, and with a group of Lysimach staters struck in the Greek cities from the Black Sea (at Tomis and Kallatis)—well grouped by numismatics features. Kosons with monograms from the old collections of three Romanian museums (from Cluj, Alba and Hunedoara counties) were also included in the analysis.

Based on the cluster analysis results, the Kosons with monogram were divided into three groups corresponding to three different minting phases. The results also showed differences and analogies between the emissions based on their alloy composition.

The Kosons without monogram were grouped into four clusters. The Principal Component Analysis was performed for the elemental composition of the coins of each

cluster. Based on the Ag–Cu correlation coefficient, we formulated a hypothesis regarding the proximity from the primary source of the alluvial gold used: a strong positive correlation suggests proximity to the primary source, while a weak correlation suggests distance from the primary source, as the copper, which is more electronegative, oxidizes faster. A Cu–Fe correlation in some of the clusters suggests the presence of the chalcopyrite as a mineral inclusion in gold grains.

Multivariate statistics analysis (cluster analysis and principal components analysis) combined with X-ray fluorescence was shown to be a powerful analytical tool for drawing conclusions regarding the workshops, periods, and gold sources of these numismatic items.

INTERACTIVE 3D MODEL VIEWING USING THE WORD AND POWERPOINT SOFTWARE PROGRAMS

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Keywords: visualization, interactivity, 3D virtual artefacts, Microsoft Word, PowerPoint.

Archaeological artefacts are often fragile, damaged or incomplete. To overcome this problem, computer aided technologies are being used. Objects can be scanned on site and transferred or stored for later processing. The possibility to create 3D virtual replicas of the artefacts constitutes a great advantage for archaeologists.

With common computer applications like Microsoft Word and PowerPoint, users can view all external and internal surfaces of 3D virtual objects, experience object editing functions like rotations, zooming and panning, watch animations, and practice slicing tasks in real time. Interactivity of these applications may help improve observation skills of different details from the outer and inner surfaces of the 3D digital artefacts.

The paper describes all steps from 3D model reconstruction to 3D model viewing using Word and PowerPoint. Interactivity was created in this study using the Deep Exploration software for creating and delivering visual graphic products. Deep Exploration (CAD Edition) enables users to create and deliver visual products and to collaborate more effectively. The main characteristic of this software is the ability to convert a lot of 3D CAD formats into accurate 2D or 3D product graphics. The software transform, author and publish 2D and 3D product graphics and documents on the desktop using existing engineering CAD design data and other digital content.

Another capability in this approach are the visualization, slicing and measurement tools furnished by the free player Deep View (associated with Deep Exploration) that allows visualization, slicing and measuring the distance between two objects of a scene or in the case of a single object, the distance between an object's faces, arcs, and vertices. These measurements can replace the need for 2D drawings sometimes.

The presented solutions are interesting tools for 3D model interactivity that can be used for presentations, training material, online catalogues, and technical documentation.

POSTERS

COMPARATIVE STUDY OF SPECTROSCOPIC TECHNIQUES APPLIED IN THE ANALYSIS OF MINERAL PIGMENTS

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Keywords: mineral pigments, painted ceramics, spectroscopic investigation, cultural heritage.

This paper presents a comparative archaeometric study on the performances of various spectroscopic techniques, i.e. two modes of Fourier transform infrared spectroscopy (attenuated total reflectance-Fourier transform spectroscopy ATR-FTIR and transmittance-Fourier transform infrared spectroscopy T-FTIR), in conjunction with X-ray diffraction (XRD) and X-ray fluorescence (XRF), applied for the characterisation and identification of painted ceramic materials designated as cultural heritage.

The mineral pigments identified on the decorations of ancient painted ceramics are calcite ($CaCO_3$), gypsum ($CaSO_4 \cdot 2H_2O$), hematite (α-Fe_2O_3), magnetite (Fe_3O_4), and pyrolusite (MnO_2). The analytical techniques are compared from the point of view of their reproducibility, non-destructiveness, specificity, sensitivity, the depth of colour of mineral pigment and interferences from adjacent compounds of unknown pigments mixtures (mainly red ochre, earths and silicates).

We are also presenting the advantages and the limitations of each spectroscopic technique. Our results show that T-FTIR (in the far-infrared range) gives better results for the identification of iron-based pigments than ATR-FTIR. Nevertheless, ATR-FTIR is very useful for the analysis of small samples, since these spectroscopic measurements are fast, can be performed in a relatively easy way and no sample preparation is needed. The only requirement is to achieve a good contact between the sample and the diamond crystal.

The general conclusion is that the best approach for the in-depth characterisation and identification of painted materials is to combine these techniques. Their individual results may lead to truncated interpretations. Therefore the multi-technique investigation of the pigments found on ancient painted ceramic belonging to different cultures may contribute to a better conservation and restoration of the cultural heritage.

PETROLOGICAL ANALYSIS OF THE STONE TOOLS FROM THE CHALCOLITHIC SITE OF CODRENI, VASLUI COUNTY

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Keywords: Chalcolithic, Cucuteni culture, petrography, axes, flint blades, jasper, Idrici.

The archaeological site of Codreni is located about 4 km north of the village of Roșiești, in Vaslui County, in the valley of the Idrici River. The site of Codreni is an important archaeological site, with remains of the Cucuteni culture and the Stoicani–Aldeni cultural aspect.

The Cucuteni culture is attested by trichromatic painted pottery, fragments of anthropomorphic figurines, etc. The last five years of field research led to a significant collection of trichromatic painted pottery and of other unpainted pottery attributed to the Cucuteni, A and B phases, Noua, and Dridu cultures. Fragments of zoomorphic and anthropomorphic figurines were also collected. From the surface of the archaeological site, 150 stone tools and fragments of tools such as pestles, axes, flint blades, waste flakes, flint blades or blade fragments, flint cores, altar pieces, and flakes from perforated flint axes and hatchets, were collected. A notable piece collected at the site is a completely-preserved flint arrowhead.

The macroscopic determination of the raw material from a petrological point of view was performed for all artefacts. The determination schema comprised the following criteria: type of raw material, colour, structure, texture, varieties, mineral composition (examined macroscopically), and origin.

The paper aims to characterize the rocks and determine the provenance of the lithic raw materials of polished (axes, adzes, chisels, hammer-axes) and ground (grinding stones, abraders, pestles, etc.) stone tools, which could reveal, together with those used for manufacturing the chipped-stone implements, the network of cultural connections that included the site of Codreni during the development of the Cucuteni culture, A and B phases, and the trade and exchange systems active at that time.

Several types of rocks can be defined in the case of the Codreni archaeological site. They constitute the bulk of raw materials for the ground and abrasive stone tools: a group of metamorphic rocks types such as quartzite, a group of volcanic rocks types such as basalt, a group of sedimentary rock types such as sandstones (in which the two subgroups differ—fine-grained and coarse-grained sandstones), and a group of residues of different origin. Each artefact is made from a stone (rock or mineral) that has certain petrographic and technological attributes.

The geological setting of the region is as follow: Upper Miocene—sandstones, sands, clays, intercalations and lenses of gravel and pebble (jasper, sandstone).

The petrographic analysis of the raw materials used for making ground and abrasive tools at Codreni was performed macroscopically and microscopically (10 samples). In order to reconstruct the technology of the tools, the analysis of the ground stones included the platform on which the tool was fashioned, the degree of preservation/fragmentation of the artefact, the morphometric characteristics, the manufacturing stage (semi-finished/final product), the processing technique, the morphology of the dorsal side, the chemical/thermal damage (e.g.

burning) and any other changes in the material, the presence of a cortex, and traces of use on the basis of microscopic analysis.

Acknowledgements. This work was supported by the European Social Fund in Romania, under the responsibility of the Managing Authority for the Sectoral Operational Programme for Human Resources Development 2007-2013 [grant POSDRU/107/1.5/S/78342].

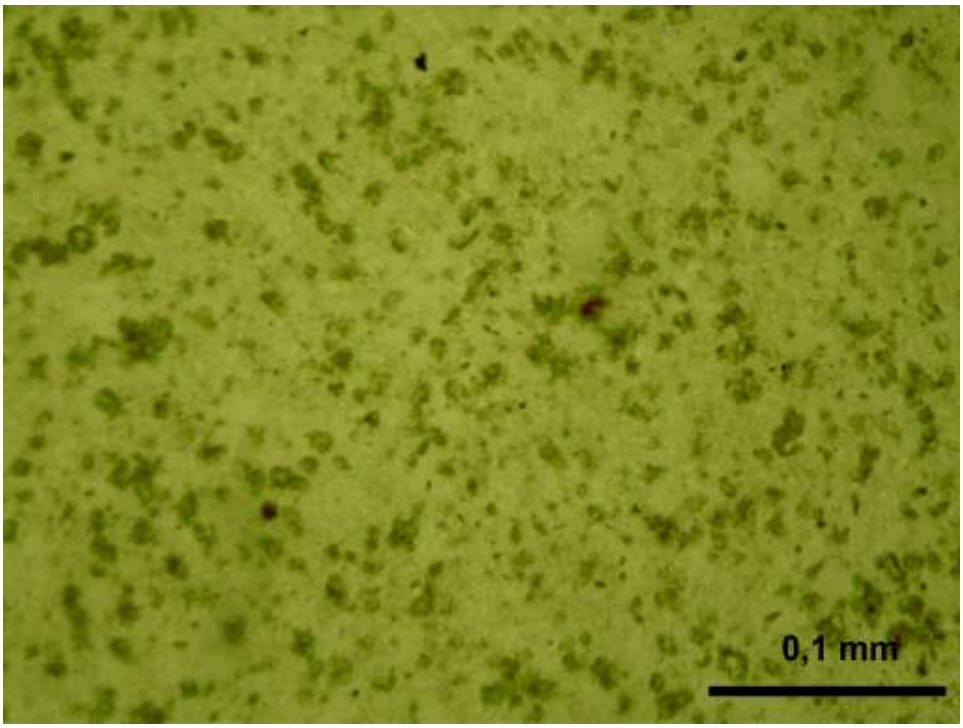

Figure 1. Thin section of jasper (plane polarized light).

ARCHAEOLOGICAL OBJECTS EXAMINATION WITH AN X-RAY TOMOGRAPH

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Keywords: X-ray Computed Tomography, ceramics, Neolithic Age, Iron Age.

Using X-Ray Computed Tomography (CT) one can obtain images that map the variations of the X-ray attenuation within objects, variations that can in turn be closely related to differences in density. Pertinent interpretation of CT images can provide powerful insights regarding the internal structure of a large class of objects.

This paper presents the prototype of an X-ray tomograph that was recently developed at the "Horia Hulubei" National Institute for Nuclear Physics and Engineering for investigating small archaeological objects made of low-Z materials such as ceramics, clay, bone, wood, etc.

This tomographic device can be used to reveal any empty voids within structure of the investigated objects, to determine the constituting parts of complex artefacts, and to visualise the internal objects that were incorporated during the manufacturing process or introduced on purpose into the artefacts, as is the case of the so-called "rattles". Cracks and/or fissures in the structure of artefacts can be also exposed, providing information potentially useful for conservation/restoration initiatives.

The makeshift CT device contains a compact X-ray source, a positioning system capable of rotation and translation movements, and a Varian PaxScan flat panel detector with large dimensions (40×30 cm^2). To perform the image reconstruction, a software based on a modified Filtered Back Projection algorithm was developed as well. The spatial resolution that can be acquired using this CT machine is around 300 μm.

The tomographic investigation of three ceramics objects dating from the Neolithic and Iron Age is also presented in the paper. The artefacts scrutinised were an anthropomorphic figurine and two rattles, one of them shaped as a bird and the other one as a sceptre head.

The X-ray tomographic scans revealed the internal structure, configuration, and dimensions of the investigated objects. For the rattles, the tomography revealed the presence and precise number of inner clay balls. The existence of these clay spheres inside the objects is a finding contradicts the belief held by archaeologists according to which these rattles contain enclosed pebbles.

ARGUMENTS CONCERNING THE USE OF BITUMEN AS ADHESIVE FOR HAFTING LITHIC TOOLS DURING THE EARLY BRONZE AGE IN THE REGION OF THE CURVATURE SUBCARPATHIANS

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Keywords: Early Bronze Age, Glina culture, hafting, bitumen, FTIR.

This paper brings forward the hypothesis that bitumen was used to bind to their handles some stone tools dating from the Early Bronze Age. The bitumen samples were recovered mechanically from the surface of two bifacially worked plaquettes discovered at the sites of Adânca and Gorgota (Dâmboviţa County, Romania), in the Subcarpathian region, in a cultural context attributed to the Glina culture, during the Early Bronze Age.

The samples were obtained first by scrapping off the surfaces of the tools, and then by extracting the compounds using chloroform or tetrahydrofuran by ultrasonic treatment for 45 minutes at 45°C. The samples were analyzed as pellets in KBr, with the help of a FTIR Perkin Elmer spectrometer. The analysis revealed that the black solid samples are made of bitumen. The field research allowed us to also identify the source of the raw material used in obtaining the tools in question by the Glina communities, which is local and represented by thin menilite plaquettes belonging to menilithic and disodilic schists of the Pucioasa–Fusaru Facies geological formation, a local variety of Oligocene deposits from the Subcarpathians.

Moreover, our study defines the type of support used, especially since the disodile plaquettes were used only by Glina communities, and they constitute, alongside different types

of ceramic and decorations, a defining feature of this cultural tradition. We also intend to describe the stone material discovered together with the adjusted plaquette at Adânca, and to compare it with other groups of stone tools attributed to Glina sites throughout Romania.

The presence of bitumen on two stone tools originating from different geographic areas, Adânca and Gorgota, but also from cultural contexts attributed to the Early Bronze Age, is a novel situation in Romanian prehistorical archeology. This is the first such discovery, and its implications are far from being clarified by this paper. Was bitumen used to bind those tools to their handles? We consider this hypothesis acceptable at this stage, and the argument is supported by the frequent presence of bitumen in the parts where the tools were attached to handles.

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