

## **RAPORT STIINTIFIC**

### **pentru anul I si II (2012 si 2013) de desfasurare a proiectului PN-II-ID-PCE-2011-3-0881 “O perspectiva geostiintifica asupra tehnologiei ceramicii: evolutia din Neolitic pana in timpurile Bizantine pe teritoriul Romaniei”**

Materialul colectat si prelucrat pana in prezent acopera toate epocile majore preistorice si respectiv istorice prevazute in propunerea de proiect: Neolithic, Bronz, Fier (de la celti la daci), Roman si Bizantin. Epoca Bronzului, Epoca Fierului, Romanul si Bizantinul sunt acoperite de suficiente date (situri) incat sa permita concluzii majore privind tehnologia de obtinere a ceramicii. In continuare activitatea proiectului se va concentra pe Neolitic (toate cele trei faze, Timpuriu, Mediu si Tarziu) pentru a completa imaginea evolutiei tehnologiei de obtinere a materialelor ceramice. Primii doi ani ai proiectului s-au axat pe:

- Documentare de teren si bibliografica
- Colectare si prelucrare de probe de ceramica
- Colectare si prelucrare probe de materii prime (argile) din zona siturilor
- Prelucrare (spalare) probe de argile din zona siturilor
- Executare de sectiuni subtiri pentru investigatii mineralogice si petrografice
- Executare de sectiuni subtiri pentru analize de microsonda electronica
- Executare de fotografii la microscopul polarizant
- Analize de difractie de raze X pe pulberi
- Mojarare de probe pentru analize geochimice
- Executare de analize geochimice prin ICP-ES si ICP-MS
- Executare de analize SEM-EDS
- Experimente de ardere pe argile din zona siturilor
- Investigatii de EPR pentru calibrare termica a arheoceramicii
- Analize de FT-IR pe ceramica si argile din zona sitului
- Participare la manifestari stiintifice internationale si nationale si comunicarea rezultatelor (oral, poster)
- Organizare de sesiuni stiintifice specifice (ceramica arheologica, arheometrie) la manifestari stiintifice internationale
- Publicare de rezultate finale (articole ISI, BDI, capitole in carti, editare volum)

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#### **A. Documentare de teren si bibliografica**

A cuprins vizitarea siturilor inclusiv cartare de teren pentru identificarea si probarea potentialelor materii prime (argile, marne, nisipuri) si colectare de material bibliografic pentru siturile cercetate, inclusiv material de referinta publicat international. A fost completata colectia de articole in domeniul arheometriei cu peste 400 de titluri.

## **B. Colectare si prelucrarea de probe de ceramica si materii prime**

Au fost prelucrate (sectiuni subtiri si lustruite, mojarare) si partial investigate siturile:

- Neolitic: Targu Frumos-Baza Patule (25 probe), Cucuteni-Ruginoasa (50 probe), Poienesti (Cucuteni) (33 probe), Magura (10 probe), Poroschia (15 probe), Beciu (7 probe), Vitanesti (10 probe)
- Epoca Bronzului: Lapus (115 probe); Dersida (10 probe), Palatca (7 probe), Silistea-Neamt (13 probe), Copaceni (7 probe)
- Epoca Fierului (Celtic; jud. Mures): Fantanele (35 probe), Arandul Nou (5 probe), Moresti (5 probe)
- Epoca Fierului (Dacic): Sarmizegetusa Regia Dacica (30 probe)
- Roman: Micasasa (Roman; 25 probe), Sarmizegetusa Regia Dacica (30 probe), Sarmizegetusa Regia Romana (30 probe), Carnic/Alburnus Major (25 probe), Histria (20 probe)
- Roman/Bizantin: Ibida (41 probe), Novodinum (37 probe), Argamum (47 probe)

## **C. Efectuarea de analize mineralogice/petrografice, XRD, SEM, EMPA, EPR si analize chimice (ICPMS)**

Investigatiile au inclus pentru toate probele documentare fotografica a aspectelor macroscopice, analize mineralogice si petrografice pe sectiuni subtiri inclusiv efectuarea de fotografii la microscopul cu lumina polarizata si difractie de raze X pe pulberi. Pentru probele reprezentative s-au efectuat masuratori la microsonda electronica (pe sectiuni lustruite) si la microscopul electronic de scanning (in spartura). Probele care au cantarit mai mult de 25 g au fost analizate chimic pentru 60 de elemente majore, minore, urma, inclusiv terre rare (prin ICP-MS). Pe materiile prime (argile) s-au efectuat experimente termice, documentate prin difractie de raze X si prin rezonanta electronica de spin.

## **D. Publicarea si comunicarea rezultatelor:**

### **D.1. Lucrari ISI** (numele membrilor echipei, in bold)

1. **Hoeck V., Ionescu C., Metzner-Nebelsick C., Nebelsick D.L.** (2012): Mineralogy of the ceramic slags from the Bronze Age funerary site in Lapus, NW Romania. *Geological Quarterly*, **56** (4), 649-664 (Publicat) **ISI Journal, I.F. = 0.844; Scor de infl. = 0,53.**
2. **Ionescu C., Hoeck V., Crandell O.N., Šaric K.** (2013) Burnishing versus smoothing in ceramic surface: A SEM study. *Archaeometry* (in evaluare). Manuscript ID: ARC H-08-0157-2013. **ISI Journal, I.F. = 1.287; Scor de infl. = 1,620.**
3. **Benea M., Ienciu R., Rusu-Bolindet V.**, (2013), Mineralogical and physical characteristics of Roman ceramics from Histria, Basilica *extra muros* sector, west-east section (Romania). *Studia Universitatis Babeş-Bolyai Chemia*, 2013, No. **4**, 13 pp. **ISI Journal, I.F. 0.129, Scor de infl. = 0,089** (Publicat).
4. **Ionescu C., Hoeck V., Gruian C., Simon V.** (2013) Insights into the EPR characteristics of heated illitic clay. *Applied Clay Science*, Manuscript ID: CLAY5710; 26 pp., **ISI Journal, I.F. = 2,342; Scor de infl. = 1,551** (In evaluare).
5. **Crandell O., Vornicu D.-M.** (2013): Aspects of long distance trade by the Precucuteni Culture. *Transylvanian Review*, vol. 22 (4) (in print) **ISI Journal, I.F. = 0,11;**

## **D.2. Lucrari in reviste din BDI** (numele membrilor echipei, in bold)

1. **Lazarovici C.-M.** (2013) Gropile de cult din asezarea Poienesti-Magura/Dealul Teilor. *Arheologia Moldovei*, vol. XXXVII, pp. 199-209;  
ISSN: 0066-7358. <http://arheo.ro/2013-06-28-04-21-49/arheologia-moldovei>; IC Master Journal List (<http://jml2012.indexcopernicus.com/>; <http://journals.indexcopernicus.com/passport.php?id=5140>),  
World Cat (<http://www.worldcat.org/title/arheologia-moldovei/oclc/2444967>),  
Genamics Journal Seek (<http://journalseek.net/index.htm>)
2. **Crandell O.** (2013) The provenance of Neolithic and Chalcolithic stone tools from sites in Teleorman county, Romania. *Buletinul Muzeului Judetean Teleorman - Sectia Arheologie*, vol. 5, pp. 125-142;  
*Central and Eastern European Online Library*  
<http://www.ceeol.com/aspx/publicationdetails.aspx?publicationid=05af4a94-5942-4b26-81ab-c1d5ac81177a>

## **D.3. Carti**: numele membrilor echipei, in bold)

1. **Crandell O.**, Cotiuga V. (2013) Stories written in stone. International Symposium on Chert and Other Knappable Materials. *Editura Universității „Alexandru Ioan Cuza” din Iași*, 104 p., ISBN 978-973-703-758-9
2. Hein I., Biro K., Buxeda i Garrigos J., Day P., **Ionescu C.**, Kilikoglu V., Maggetti M., Waksman Y. (2013) Ancient ceramics: Analysis and components. *Applied Clay Science* (ISI, IF 2,342) vol. 82 (1-2), 1-134 Elsevier.  
<http://www.sciencedirect.com/science/journal/01691317/82>

## **D.4. Capitoale in carti** (numele membrilor echipei, in bold)

1. **Ionescu C.**, **Hoeck V.** (2012) Mineralogia si chimismul ceramicii fine de tip Cucuteni de la Ruginoasa. In: Ruginoasa-Dealul Draghici. Monografie arheologica. Lazarovici M. & Lazarovici Gh. (eds.), *Bibliotheca Archaeologica Moldaviae XX*, pp. 181-196. Edit. Karl A. Romstorfer, ISBN 978-606-93329-0-0.
2. **Crandell O.** (2012) Petrographic evidence of intercultural trade during the Chalcolithic; Examples from Neamț County, Romania. In: Depresiunea Neamț. Contribuții arheologice. *Editura Constantin Matasă*, ISBN 978-973-7777-21-8, 10 p.
3. **Ionescu C.**, **Hoeck V.**, **Simon V.**, **Crandell N.C.** (2014) Ceramic sherds from *Sarmizegetusa Regia* (1<sup>st</sup> century C.E.): An archaeometric study. In: *Sarmizegetusa Regia. Cercetari arheologice recente* (Gelu Florea, ed.), 43 p., *Editura Mega Cluj-Napoca* (sub tipar). ISBN: 978-606-543-395-3.
4. **Ionescu C.**, **Hoeck V.** (2014) Electron microprobe analysis (EMPA). In: *The Oxford Handbook for Archeological Ceramic Analysis*. (Alice Hunt, ed.), 20 pages, *Oxford University Press*, ISBN: 978-019-968-153-2.
5. **Crandell O.**, Marcuti F. (2013) Provenance of Neolithic stone artefacts from the Banat Region, Romania. In: *Interdisciplinary Research in Archaeology. Proceedings of the Second Arheoinvest Congress, Iași, Romania*, *Archaeopress Oxford*, 18 pp.
6. **Crandell O.**, Popa C.I. (2013) The chert quarrying and processing industry at the Piatra Tomii site, Romania. In: *Interdisciplinary Research in Archaeology. Proceedings of the Second Arheoinvest Congress, Iași, Romania*, *Archaeopress Oxford*, 21 pp.
7. **Crandell O.** (2013) Balkan flint in Southeast European Prehistory. In: *Revisiting the question of Balkan flint in Southern Romania: some observations on artefacts and geological sources*. *Archaeopress Oxford*, 8 pp.

## **E. Comunicarea rezultatelor la manifestari stiintifice internationale si nationale** (numele membrilor echipei, in bold)

### **E.1. 5<sup>th</sup> MINERAL SCIENCES IN THE CARPATHIANS CONFERENCE & 3<sup>rd</sup> CENTRAL-EUROPEAN MINERALOGICAL CONFERENCE, Miskolc, Hungary, 19-21 Aprilie 2012;**

1. **Hoeck V., Ionescu C.**, Metzner-Nebelsick C., Nebelsick L.D. & Kacsó C. (2012) Bronze age ceramics and slag from the Lăpuș necropolis (NW Romania). *Acta Mineralogica-Petrographica, Abstr. series, 7*, pp. 56. ORAL
2. **Ionescu C., Hoeck V. & Simon V.** (2012) The “black ceramics of Marginea” (Romania): a modern analogue of ancient ceramics? *Acta Mineralogica-Petrographica, Abstr. series, 7*, pp. 65. ORAL
3. **Crandell O.N.** (2012) Petrographic analysis of lithic artefacts from Limba (Romania) to confirm Neolithic trade patterns. *Acta Mineralogica-Petrographica, Abstract series, 7*, pp. 31. POSTER
4. **Filipescu R.**, Zaharia L., Cristescu C. & **Simon V.** (2012) Dacian ceramics from Sarmizegetusa Regia archaeological site (Romania): an optical and XRPD study: *Acta Mineralogica-Petrographica, Abstr. series, 7*, pp. 44. POSTER

### **E.2. 39<sup>TH</sup> INTERNATIONAL SYMPOSIUM ON ARCHAOMETRY, LEUVEN, BELGIUM, 28 MAI -1 Iunie 2012; <https://ees.kuleuven.be/isa2012/>**

1. **Crandell O., Ionescu C., Hoeck V.** (2012) Macroscopic and microscopic aspects of polishing ceramic pots using water worn pebbles. Abstract V26; pp. 344; POSTER  
[https://ees.kuleuven.be/isa2012/scientific-programme/ISA2012\\_Programme\\_Abstracts.pdf](https://ees.kuleuven.be/isa2012/scientific-programme/ISA2012_Programme_Abstracts.pdf)
2. **Crandell O., Diaconu V.** (2012) Petrographic evidence of intercultural trade during the Chalcolithic. Examples from Neamț County, Romania. Abstract S10. pp. 140; POSTER;  
[https://ees.kuleuven.be/isa2012/scientific-programme/ISA2012\\_Programme\\_Abstracts.pdf](https://ees.kuleuven.be/isa2012/scientific-programme/ISA2012_Programme_Abstracts.pdf)

### **E.3. FIRST EMC – EUROPEAN MINERALOGICAL CONFERENCE, 2-7 SEPT. 2012, FRANKFURT, GERMANY; <http://emc2012.uni-frankfurt.de/index.php?id=4>**

1. **Ionescu C., Hoeck V.**, Metzner-Nebelsick C., Nebelsick L.D., Kacsó C. (2012) Overview of the ceramic finds in the Lapus Bronze Age barrow necropolis (NW Romania). Proceedings of First European Mineralogical Conference, 2-7 Sept. 2012, Frankfurt, Vol. 1, pp. EMC2012-740. ORAL

### **E.4. SECOND ARHEOINVEST CONGRESS; INTERDISCIPLINARY RESEARCH IN ARCHEOLOGY, IASI. 7-9 June 2012**

1. **Crandell O., Popa C.** (2012) The chert mining and processing. Second Arheoinvest Congress; Interdisciplinary Research in Archeology. Iași. 7-9 June 2012. Programme and Abstracts, pp. 87-88. ISSN 2285-2018, Editura Universitatii Al. I. Cuza Iasi

### **E.5. PANGEO 2012, 15-20 SEPT. 2012, SALZBURG, AUSTRIA;**

<http://pangeo.sbg.ac.at/index.php#sessions>

1. **Ionescu C., Hoeck V.**, Rusu-Bolindet V. (2012) Micasasa pottery workshop in Roman Dacia (II-III c. A.D.): Moulds for *terra sigillata*. *Program and Abstracts*, pp.75. ORAL
2. **Hoeck V., Ionescu C., Simon V.** (2012) Analytical and experimental data on black ceramics: origin of colour. *Program and Abstracts*, pp.66, POSTER

### **E.6. CONFERINTA NATIONALA A SOCIETATII ROMANE DE GEOLOGIE, BUCURESTI 2 NOV. 2012**

1. **Ionescu C., Hoeck V.** (2012) Aplicații ale geoștiințelor în studiul arheoceramicii. *Program and Abstracts Conferinta Nationala SGR, Bucuresti, 2 Nov. 2012*, pp. 37-38. ORAL  
<http://www.geosociety.ro/wp-content/uploads2/2012/11/Volum-abstracte-CN-SGR-2012.pdf>

**E.7. SYMPOSIUM 90 YEARS OF ALBANIAN GEOLOGY, 26-28 OCTOBER, 2012, TIRANA ALBANIA**

1. **Hoeck V., Ionescu C., Simon V.** (2012) Mineralogy and chemistry of black ceramics. *Bulet. I Shkencave Gjeologjike*, **31** (48), Sp. Is., pp. 94, ORAL
2. **Ionescu C., Hoeck V.** (2012) Application of geosciences in the study of archaeoceramics. *Bulet. I Shkencave Gjeologjike*, **31** (48), Sp. Is., pp. 29, ORAL

**E.8. INTERNATIONAL SYMPOSIUM STORIES WRITTEN IN STONE, 20-24 AUGUST 2013, IASI, ROMANIA; <http://arheoinvestsymposium.uaic.ro/stone>**

1. **Crandell N.O.** (2013) Lithic trade patterns in Neolithic Romania. Abstract volume, pp. 30; *Edit. Universității „Alexandru Ioan Cuza” Iasi*; ISBN: 978-973-703-758-9; <http://arheoinvestsymposium.uaic.ro/5th/Stories-Written-in-Stone-Programme-and-Abstracts.pdf>; ORAL.
2. **Crandell N.O.** (2013) An online database for lithic resources. Abstract volume, pp. 74; *Edit. Universității „Alexandru Ioan Cuza” Iasi*; ISBN: 978-973-703-758-9; <http://arheoinvestsymposium.uaic.ro/5th/Stories-Written-in-Stone-Programme-and-Abstracts.pdf> ORAL
3. **Crandell N.O.** (2013) Knappable lithic resources in the Eastern Carpathians. Abstract volume, pp. 75; *Edit. Universității „Alexandru Ioan Cuza” Iasi*; ISBN: 978-973-703-758-9; <http://arheoinvestsymposium.uaic.ro/5th/Stories-Written-in-Stone-Programme-and-Abstracts.pdf> POSTER

**E.9. EMAC 2013 (EUROPEAN MEETING ON ANCIENT CERAMICS), 19-21 SEPTEMBER 2013, PADOVA, ITALY; <http://emac2013.geoscienze.unipd.it/>**

1. **Ionescu C., Hoeck V., Simon V.** (2013) Sourcing the raw materials for ancient ceramics based on geochemistry: a case study from Romania. *Conference program and abstracts*, pp. 57. ORAL  
[http://emac2013.geoscienze.unipd.it/EMAC2013\\_book\\_of\\_abstracts.pdf](http://emac2013.geoscienze.unipd.it/EMAC2013_book_of_abstracts.pdf)
2. **Ionescu C., Simon V., Hoeck V.** (2013) A FTIR and EPR study on thermally-treated Ca-rich illitic clay. In: *Conference program and abstracts*, pp. 172. POSTER  
[http://emac2013.geoscienze.unipd.it/EMAC2013\\_book\\_of\\_abstracts.pdf](http://emac2013.geoscienze.unipd.it/EMAC2013_book_of_abstracts.pdf)

**F. EDITARE DE MANUSCRISĂ PENTRU PUBLICARE:**

1. **Hoeck V., Ionescu C., Simon V.**, Sourcing the raw materials for ancient ceramics based on geochemistry. *Journal of Archaeological Science*.
2. **Ionescu C., Hoeck V.**, Gruian C., **Simon V.**, An FTIR study on thermally treated Ca-rich illitic clay. *Applied Clay Science*.
3. **Ionescu C., Hoeck V.**, Rusu-Bolindet V. The Micasasa workshop for *terra sigillata* imitations: a mineralogical and chemical study. *Journal of Archaeological Science*.
4. **Ionescu C., Hoeck V.**, Ca-Al-Si-Fe phases formed in the Copper Age ceramics from Cucuteni-Ruginoasa (Romania). *European Journal of Mineralogy*.

## **G. ALTE REALIZARI:**

**G.1. Organizarea conferintei 5<sup>th</sup> MINERAL SCIENCES IN THE CARPATHIANS CONFERENCE & 3<sup>rd</sup> CENTRAL-EUROPEAN MINERALOGICAL CONFERENCE, Miskolc, Hungary, 19-21 Aprilie 2012; <http://www.msc-cemc.com/>**

**G.2. Organizarea Sesiunii stiintifice “Archaeometry–care and preservation” (conveneri, chair: Susanne Greiff (Germania), Corina Ionescu (Romania), Sabina Quartieri (Italia), la **FIRST EUROPEAN MINERALOGICAL CONF.**, 2-7 SEPT. 2012, **FRANKFURT, GERMANY**, <http://meetingorganizer.copernicus.org/EMC2012/sessionprogramme/Theme+13>**

**G.3. Achizitionarea unui microscop polarizant extrem de performant, Zeiss, dotat cu sistem automat de captare si de prelucrare electronica a imaginii.**



**G.4. Organizarea sesiunii stiintifice de Arheometrie la PANGEO 2012, 15-20 SEPT. 2012, SALZBURG, AUSTRIA**

**G.5. Organizarea (scientific committee, reviuer, convener, chairperson) conferintei European Meeting on Ancient Ceramics EMAC 2013, Padova (Italy): <http://emac2013.geoscienze.unipd.it/commettees.html>**

**G.6. Curs “Introduction into the mineralogy and petrography of ancient ceramics”, Paris Lodron University, Salzburg (Austria), Curs no. 101.104, Noiembrie 2012**

**G.7. Curs “Introduction into the mineralogy and petrography of ancient ceramics”, Paris Lodron University, Salzburg (Austria), Curs no. 101.104, Noiembrie 2013**

20.10.2013

**DIRECTOR PROIECT  
PROF.DR. CORINA IONESCU**