



HAL
open science

The Archaeology of Games. Playing with Knucklebones in the Early Chalcolithic of the Balkans

Isabelle Sidéra, Andreea Vornicu

► **To cite this version:**

Isabelle Sidéra, Andreea Vornicu. The Archaeology of Games. Playing with Knucklebones in the Early Chalcolithic of the Balkans. Bacvarov; Krum and Gleser; Ralf. Southeast Europe and Anatolia in Prehistory Essays in Honor of Vassil Nikolov on His 65th Anniversary, Verlag Dr. Rudolf Habelt GmbH, pp.379-388, 2016, 978-3-7749-4066-6. hal-01548553

HAL Id: hal-01548553

<https://hal.parisnanterre.fr/hal-01548553>

Submitted on 7 Oct 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

UNIVERSITÄTSFORSCHUNGEN ZUR PRÄHISTORISCHEN ARCHÄOLOGIE

Aus der Abteilung für Ur- und Frühgeschichtliche Archäologie
der Universität Münster

Band 293

Southeast Europe and Anatolia in prehistory

Essays in honor of Vassil Nikolov
on his 65th anniversary



edited by
Krum Bacvarov and Ralf Gleser

2016

VERLAG DR. RUDOLF HABELT GMBH, BONN

Bacvarov/Gleser (eds.) · Southeast Europe and Anatolia in prehistory.
Essays in honor of Vassil Nikolov on his 65th anniversary

Universitätsforschungen zur prähistorischen Archäologie

Band 293

Aus der Abteilung für Ur- und Frühgeschichtliche Archäologie
der Universität Münster



2016

Verlag Dr. Rudolf Habelt GmbH, Bonn

Southeast Europe and Anatolia in prehistory

Essays in honor of Vassil Nikolov
on his 65th anniversary

edited by

Krum Bacvarov and Ralf Gleser



2016

Verlag Dr. Rudolf Habelt GmbH, Bonn

Gedruckt mit Unterstützung
der Alexander von Humboldt Stiftung Bonn und der Westfälischen Wilhelms-Universität Münster

Front cover: White painted anthropomorphic pot from the Neolithic site of Mursalevo,
Southwest Bulgaria (early 6th mill. BC). © Mursalevo Salvage Excavation Project.

Redaktion: Rashida Hussein-Oglü (Münster), Krum Bacvarov (Sofia)
Satz: Renate Roling (Münster)

ISBN 978-3-7749-4066-6

Bibliografische Information der Deutschen Nationalbibliothek
Die Deutsche Nationalbibliothek verzeichnet diese Publikation in der Deutschen Nationalbibliografie;
detailliertere bibliografische Daten sind im Internet über <http://dnb.dnb.de> abrufbar.

Copyright 2016 by Dr. Rudolf Habelt GmbH, Bonn

VORWORT DER HERAUSGEBER

Die Reihe „Universitätsforschungen zur prähistorischen Archäologie“ trägt dem Bedürfnis Rechnung, Examensarbeiten und andere Forschungsleistungen in die Öffentlichkeit zu tragen. Thematisch findet darin die ganze Breite des Faches vom Paläolithikum bis zur Archäologie der Neuzeit ihren Platz.

Ursprünglich hatten sich fünf Universitätsinstitute in Deutschland zur Herausgabe der Reihe zusammengefunden, der Kreis ist inzwischen deutlich größer geworden. Alle interessierten Professoren und Dozenten sind einge-

laden, als Mitherausgeber tätig zu werden und Arbeiten aus ihrem Bereich der Reihe zukommen zu lassen. Für die einzelnen Bände zeichnen jeweils die Autoren und Institute ihrer Herkunft, die im Titel deutlich gekennzeichnet sind, verantwortlich. Sie erstellen eine druckfertig gestaltete Datei (PDF). Bei gleicher Anordnung des Umschlages haben die verschiedenen beteiligten Universitäten jeweils eine spezifische Farbe. Finanzierung und Druck erfolgen entweder durch sie selbst oder durch den Verlag Dr. Rudolf Habelt GmbH, der in jedem Fall den Vertrieb der Bände sichert.

Herausgeber sind derzeit:

Kurt Alt (Mainz)	Joseph Maran (Heidelberg)
François Bertemes (Halle)	Carola Metzner-Nebelsick (München)
Nikolaus Boroffka (Berlin)	Johannes Müller (Kiel)
Peter Breunig (Frankfurt am Main)	Ulrich Müller (Kiel)
Philippe Della Casa (Zürich)	Michael Müller-Wille (Kiel)
Manfred K.H. Eggert (Tübingen)	Mária Novotná (Trnava)
Clemens Eibner (Heidelberg)	Bernd Paffgen (München)
Frank Falkenstein (Würzburg)	Diamantis Panagiotopoulos (Heidelberg)
Ralf Gleser (Münster)	Christopher Pare (Mainz)
Bernhard Hänsel (Berlin)	Hermann Parzinger (Berlin)
Alfred Haffner (Kiel)	Heidi Peter-Röcher (Würzburg)
Albert Hafner (Bern)	Britta Ramming (Hamburg)
Svend Hansen (Berlin)	Jürgen Richter (Köln)
Ole Harck (Kiel)	Sabine Rieckhoff (Leipzig)
Joachim Henning (Frankfurt am Main)	Thomas Saile (Regensburg)
Christian Jeunesse (Strasbourg)	Wolfram Schier (Berlin)
Albrecht Jockenhövel (Münster)	Thomas Stöllner (Bochum)
Tobias L. Kienlin (Köln)	Wolf-Rüdiger Teegen (München)
Rüdiger Krause (Frankfurt am Main)	Biba Teržan (Berlin)
Klára Kuzmová (Trnava)	Gerhard Tomedi (Innsbruck)
Amei Lang (München)	Ulrich Veit (Leipzig)
Andreas Lippert (Wien)	Karl-Heinz Willroth (Göttingen)
Jens Lüning (Frankfurt am Main)	Andreas Zimmermann (Köln)



A handwritten signature in black ink, consisting of several overlapping loops and strokes, positioned below the photograph of the man.

EDITORIAL

This collection of essays honors Professor Vassil Nikolov on the occasion of his sixty-fifth birthday. A distinguished scholar of southeast European prehistoric archaeology, Vassil has been with the National Institute of Archaeology and Museum of the Bulgarian Academy of Sciences since 1984, after successfully completing his PhD thesis on *The Early Neolithic Pottery Decoration in Bulgaria*, but not before he spent some unemployed time due to his politically incorrect family background. Throughout the years, Vassil went up the steps of the academic career, defended a second doctorate (DSc), *Studies on the Neolithic Pottery in Thrace. The Karanovo II–III, III and III–IV Ceramic Assemblages in Their Northwest Anatolian and Southeast European Context*, in 1998, held the positions of the Director of Museums and Art Galleries Directorate of the Bulgarian Ministry of Culture (1991), Head of the Prehistory Department (1989–1999), Deputy Director (1999–2003) and Director (2003–2007) of the National Institute of Archaeology and Museum, Chairman of the Academic Board of the Institute (2003–2015), Corresponding Member and Member of the Executive Board of the Bulgarian Academy of Sciences (since 2013), all the time teaching prehistoric archaeology at all major Bulgarian universities and widely lecturing abroad, directing national and international excavation and research projects, editing journals and collected volumes, organizing conferences and exhibitions, and even hosting a weekly TV show about Bulgarian archaeological heritage. He has been awarded numerous fellowships and honors, notably Alexander von Humboldt Research Fellowships (first in 1991–1993) and the Order of Merit of the Federal Republic of Germany (2009).

The papers in the volume are contributed by Vassil's friends and colleagues, former and present students, and reflect his wide range of research interests, from the Paleolithic to the Iron Age, from Central Europe to the Near East and beyond. His fascinating way of describing the past to undergraduate students or academia, common public or visiting heads of state, has won him many admirers and friends. His latest excavation projects, at the Early Neolithic site of Slatina-Sofia (where in 2016 he revealed an extraordinarily large house of the early sixth millennium BC) and the Salt-Producing Center of Provadia-Solnitsata (where the last decade has witnessed the uncovering of an amazingly well preserved stone fort and salt-production facilities of the fifth millennium BC), continue to excite the archaeological establishment and the public alike with a wealth of spectacular discoveries that immensely influence current archaeological knowledge and interpretation.

It is with great pleasure that we offer this Festschrift to Vassil Nikolov as a mark of our appreciation to his many contributions to the prehistoric archaeology of Southeast Europe, congratulating him most warmly for his sixty-fifth birthday, and wishing him many more years of good health and productive scholarship!

Ad multos annos, Magister carissime!

*Krum Bacvarov and Ralf Gleser
Sofia and Münster, October 2016*

PUBLICATIONS OF VASSIL NIKOLOV

MONOGRAPHS

България. Историческа памет и национална идентичност (София: Институт за исторически изследвания при БАН 2010). (*with* Г. Марков / Р. Попов / Р. Богданова / М. Каймакамова / В. Божинев / К. Бъчваров / Е. Троева-Григорова / С. Недев)

Провадия-Солницата: археологически разкопки и изследвания през 2008 г. Предварителен отчет (София 2009). (*with* В. Петрова / К. Бъчваров / П. Лещанков / Н. Христов / Е. Анастасова / М. Люнчева / Д. Такорова / К. Бояджиев / С. Трифонов / Е. Маринова / П. Пенкова / Б. Рангелов)

Неолитни култови масички (София 2007).

Култура и изкуство на праисторическа Тракия / Kultur und Kunst des vorgeschichtlichen Thrakien (Plovdiv 2006).

Раннонеолитна рисувана орнаментация / Frühneolithische bemalte Ornamentik (Sofia 2002).

Проучвания върху неолитната керамика в Тракия. Керамичните комплекси Караново II–III, III и III–IV в контекста на Северозападна Анатолия и Югоизточна Европа (София 1998).

Раннонеолитно жилище от Слатина (София). Разкопки и проучвания 25 (София 1992).

Древни селища край Елешница / Ancient settlements near Eleshnitsa (Sofia 1987). (*with* К. Maslarov)

Горна Оряховица (София 1985). (*with* И. Константинов)

EDITED BOOKS

Salt and gold: The role of salt in prehistoric Europe. Proceedings of the International Symposium (Humboldt-Kolleg) in Provadia, Bulgaria, 30 September – 4 October 2010 (Provadia – Veliko Tarnovo 2012). (*with* К. Bacvarov)

Българска национална история, т. I: Българските земи през древността (Велико Търново 2011). (*with* Д. Попов / П. Делев)

Festschrift for Marion Lichardus-Itten. Studia Praehistorica 14 (Sofia 2011). (*with* К. Bacvarov / М. Gurova)

Interdisziplinäre Forschungen zum Kulturerbe auf der Balkanhalbinsel (Sofia 2011). (*with* К. Bacvarov / Н. Попов)

Солта е злато. Праисторически солодобивен център Провадия-Солницата (София 2010).

Сборник в памет на професор Велизар Велков (София 2009). (*with* Д. Аладжова / А. Божкова / П. Делев / Х. Прешленов)

Праисторически солодобивен център Провадия-Солницата. Разкопки 2005–2007 г. (София 2008).

Стара Загора - 8000 години. Раждането на Европа (Стара Загора 2008).

Спасителни археологически разкопки по трасето на железопътната линия Пловдив-Свиленград през 2005 г. (Велико Търново 2008). (*with* Г. Нехризов / Ю. Цветкова)

Древните цивилизации в българските земи (София 2007). (*with* К. Николов)

Спасителни археологически разкопки по трасето на железопътната линия Пловдив-Свиленград през 2004 г. (Велико Търново 2006). (*with* Г. Нехризов / Ю. Цветкова)

Национален археологически музей. 100 години от откриването на първата експозиция 18.05.1905 – 18.05.2005 г. / National Museum of Archaeology. 100 years from the opening of the first exhibition 18.05.1905 – 18.05.2005 (Sofia 2005).

Karanovo, IV. Die Ausgrabungen im Nordsüd-Schnitt, 1993–1999 (Wien 2005). (*with* S. Hiller)

Die Thraker. Das goldene Reich des Orpheus. Ausstellungskatalog Bonn (Mainz 2004) (*with* A. Fol / J. Lichardus)

Prehistoric Thrace. Proceedings of the International Symposium in Stara Zagora, 30.09 – 04.10.2003 (Sofia – Stara Zagora 2004). (*with* К. Bacvarov / П. Kalchev)

Von Domicia bis Drama. Gedenkschrift für Jan Lichardus (Sofia 2004). (*with* К. Bacvarov)

Karanovo, II. Die Ausgrabungen in O19 (Wien 2002). (*with* S. Hiller)

Beiträge zu jungsteinzeitlichen Forschungen in Bulgarien. Saarbrücker Beiträge zur Altertumskunde 74 (Bonn: Habelt 2002). (*with* M. Lichardus-Itten / J. Lichardus)

Тракия и съседните райони през неолита и халколита. Карановски конференции за праисторията на Балканите 1 (София 2000).

Karanovo, III. Beiträge zum Neolithikum in Südosteuropa (Wien 2000). (*with* S. Hiller)

Селищна могила Капитан Димитриево. Разкопки 1998–1999 (София-Пещера 1999).

Karanovo. Die Ausgrabungen im Südsektor 1984–1992. Volumes I & II. (Salzburg-Sofia 1997). (*with* S. Hiller)

Археологически разкопки на праисторически обекти през 1992 г. (София 1994).

Праисторически находки и изследвания. Сборник в памет на проф. Г. И. Георгиев (София 1993).

PAPERS

- Социални измерения на солта през късната праистория на Източните Балкани. Наука 2015, 4, 44–47.
- Newly-unearthed types of plastic figurines from the Late Neolithic pit sanctuary at Kapitan Andreevo in Southeast Bulgaria. In: R. Gleser / F. Stein (Hrsg.), Äusserer Anstoss und innerer Wandel. Festschrift für Rudolf Echt zum 65. Geburtstag (Rahden/Westf. 2015) 21–26.
- Провадия-Солницата: «город» V тыс. до н. э. в Западном Причерноморье. В: Древние культуры юго-восточной Европы и западной Азии. Сборник к 90-летию со дня рождения и памяти Н. Я. Мерперта (Москва 2014) 267–277.
- Раннеолитна обредна яма край Съединение, Сунгурларско. В: В. Петрова / С. Танева / К. Бояджиев (съст.), In memoriam Lilyana Pernicheva-Perets. Годишник на Националния археологически музей 12 (София 2014) 49–66.
- Халколитни обредни ямни комплекси. В: К. Рабаджиев / Х. Попов / М. Дамянов / В. Кацарова (ред.), Сборник в памет на академик Д. П. Димитров (София 2013) 17–22.
- Праисторически градски център през V хил. пр. Хр. в контекста на Западното Причерноморие: Провадия-Солницата. Археология 54/1, 2013, 7–21.
- Проучвания на тел Караново в контекста на проблема за продължителността на хиатуса между късния халколит и ранната бронзова епоха. Археология 54/2, 2013, 7–24. (with В. Петрова)
- Salt, early complex society, urbanization: Provardia-Solnitsata (5500–4200 BC). In: V. Nikolov / K. Bacvarov (Hrsg.), Salz und Gold: die Rolle des Salzes im prähistorischen Europa / Salt and Gold: The Role of Salt in Prehistoric Europe (Provardia-Veliko Tarnovo 2012) 11–65.
- Сол, ранно комплексно общество, урбанизация: Провадия-Солницата (5500–4200 г. пр. Хр.). Археология 53/1, 2012, 7–27.
- Природни катаклизми през V хил. пр. Хр. и загиване на първата европейска цивилизация. История 2012, 4, 346–351.
- Die Kategorie *Zeit* in der Spätvorgeschichte des Ostbalkans. In: D. Goltschnigg (Hrsg.), Phänomen Zeit. Dimensionen und Strukturen in Kultur und Wissenschaft (Tübingen 2011) 47–50.
- Неолитни ямни светилища. Археология 52/1, 2011, 7–24.
- Праистория на българските земи. В: В. Николов / Д. Попов / П. Делев (ред.), Българска национална история, т. I: Българските земи през древността (Велико Търново 2011) 11–307.
- Tell Karanovo, Südbulgarien: das grosse Apsidenhaus. In: M. Dizdar (ed.), Panonski prapovijesni osviti. Zbornik radova posvećenih Korneliji Minichreiter uz 65. Obljetnicu života (Zagreb 2011) 283–287.
- Das vorgeschichtliche Salzgewinnungszentrum Provardia-Solnitsata und seine Rolle für die circumpontischen Kontakte. In: E. Sava / B. Govedarica / B. Hänsel (Hrsg.), Der Schwarzmeerraum vom Äneolithikum bis in die Früheisenzeit (5000 - 500 v. Chr.), Bd. 2: Globale Entwicklung versus Lokalgeschehen: internationale Fachtagung von Humboldtianern für Humboldtianer im Humboldt-Kolleg in Chişinău, Moldavien (4. – 8. Oktober 2010) (Rahden/Westf. 2011) 30–40.
- Provardia-Solnitsata (NE Bulgaria): A salt-producing center of the 6th and 5th millennia BC. In: M. Alexianu / O. Weller / R.-G. Curcă (eds), Archaeology and anthropology of salt: a diachronic approach. BAR International Series 2198 (Oxford 2011) 59–64.
- Die interdisziplinäre Erforschung der Spätvorgeschichte auf bulgarischen Boden. In: V. Nikolov / K. Bacvarov / H. Popov (Hrsg.), Interdisziplinäre Forschungen zum Kulturerbe auf der Balkanhalbinsel (Sofia 2011) 9–18.
- A reinterpretation of Neolithic complexes with dug-out features: pit sanctuaries. In: V. Nikolov / K. Bacvarov / M. Gurova (eds.), Festschrift for Marion Lichardus-Itten. Studia Praehistorica 14 (Sofia 2011) 91–119.
- Salt and gold: Provardia-Solnitsata and the Varna Chalcolithic cemetery. Archäologisches Korrespondenzblatt 40/4, 2010, 487–501.
- Сол и злато: Провадия-Солницата и Варненският халколитен некропол. Археология 51/1–2, 2010, 7–17.
- Без злато може, но без сол не. В: В. Николов (ред.), Солта е злато. Праисторически солодобивен център Провадия-Солницата (София 2010) 7–18.
- Праисторическо производство на сол в Провадия-Солницата: богатство зад каменни стени. В: В. Николов (ред.), Солта е злато. Праисторически солодобивен център Провадия-Солницата (София 2010) 69–86.
- Tell Provardia-Solnitsata. In: I. Cholakov / K. Chukalev, Archaeology in Bulgaria, 2007–2009. American Journal of Archaeology 114, 2010, 731–733.
- Salt and gold: Provardia-Solnitsata and the Varna Chalcolithic cemetery. In: F. J. Abarquero Moras / E. Guerra Doce (coord.), Los yacimientos de Villafafila (Zamora) en el marco de las explotaciones salineras de la prehistoria europea (Valladolid 2010) 37–48.
- Periodisierung und Kulturdifferenzierung der postfrühneolithischen Schichtungen in neolithischen Siedlungen in Thrakien. Studia Praehistorica 13, 2010, 97–133.
- Early Bronze Age sanctuary at Tell Kazanlak. Studia Praehistorica 13, 2010, 319–337.
- Използване на солта от древността до наши дни. Наука 2009, 1, 30–33.
- On the semantics of the Neolithic altars. In: J. Marler / M. R. Dexter (eds.), Signs of civilization. Neolithic symbol system of Southeast Europe (Novi Sad – Sebastopol 2009) 141–144.

- Среднохалколитна отбранителна система на тел Провадия-Солницата. В: Б. Петрунова / А. Аладжов / Е. Василева (ред.), *Laurea. In honorem Margaritae Vakiņova, I* (София 2009) 7–14.
- Ретроспекция на солта. В: Проблеми и предизвикателства на археологическите и културно-историческите проучвания, I. Археология и култура. (Пловдив 2009) 54–62.
- Технология на праисторическото производство на сол в Провадия Солницата. В: В. Григоров / М. Даскалов / Е. Коматарова-Балинова (ред.), *Eurika. In honorem Ludmilae Donchevae-Petkovae* (Sofia 2009) 1–7.
- Сакрални комплекси през ранната бронзова епоха в Казанлъшкото поле. В: И. Гацов (ред.), *Saxa Locuantur. Сборник в чест на 65-годишнината на Николай Сираков* (София 2009) 293–300.
- Колективна находка от къснонеолитни сърпове в тел Провадия-Солницата. В: Д. Аладжова / А. Божкова / П. Делев / В. Николов / Х. Прешленов (ред.), *Сборник в памет на професор Велизар Велков* (София 2009) 15–22.
- Neue Forschungsthemen in der späten Vorgeschichte: Ljubimec und Provadija (Ostbulgarien). In: V. Becker / M. Thomas / A. Wolf-Schuler (Hrsg.), *Zeiten – Kulturen – Systeme. Gedenkschrift für Jan Lichardus. Schriften des Zentrums für Archäologie und Kulturgeschichte des Schwarzmeerraumes 17* (Langenweißbach 2009) 141–149.
- “Стратиграфска последователност” или “стратиграфска непрекъснатост”. В: М. Гюрова (ред.), *Праисторически проучвания в България: новите предизвикателства* (София 2008) 258–260.
- Най-ранният солодобивен център в Европа / The earliest salt extraction center in Europe. In: *Новости / News 2007* (София 2008) 80–83.
- Dana Bunar 2. In: I. Cholakov / K. Chukalev, *Archaeology in Bulgaria, 2006 Season. American Journal of Archaeology* 112, 2008, 159–161.
- Tell Provadia-Solnitsata. In: I. Cholakov / K. Chukalev, *Archaeology in Bulgaria, 2006 Season. American Journal of Archaeology* 112, 2008, 165–166.
- Въведение. В: В. Николов (ред.), *Праисторически солодобивен център Провадия-Солницата. Разкопки 2005–2007 г.* (София 2008).
- Тел Провадия-Солницата: археологически проучвания, стратиграфия и периодизация. В: В. Николов (ред.), *Праисторически солодобивен център Провадия-Солницата. Разкопки 2005–2007 г.* (София 2008) 35–50. (*with V. Петрова*)
- Постройка 5: архитектура и съоръжения. В: В. Николов (ред.), *Праисторически солодобивен център Провадия-Солницата. Разкопки 2005–2007 г.* (София 2008) 87–115.
- В. Николов. Укрепителна система: аналитично описание, датировка и контекст. В: В. Николов (ред.), *Праисторически солодобивен център Провадия-Солницата. Разкопки 2005–2007 г.* (София 2008) 277–296.
- Ограден ров. Дребни находки. В: В. Николов (ред.), *Праисторически солодобивен център Провадия-Солницата. Разкопки 2005–2007 г.* (София 2008) 309–317. (*with П. Лещиков*)
- Обредни структури през неолита в българските земи. In: D. Gergova (ed), *Phosphorion. Studia in honorem Mariae Čičikova* (Sofia 2008) 28–34.
- Herausforderungen für die Forschung in Bulgarien: Notwendigkeit von Reformen der Organisation und der Finanzierung. In: *Forschung in Bulgarien und Rumänien: Probleme und Perspektiven nach dem EU-Beitritt* (Sofia 2008) 73–80.
- Светилище от ранната бронзова епоха на тел Казанлък. *Археология* 49/1–4, 2008, 23–33.
- Am Anfang der europäischen Zivilisation. In: E. van der Meijden (Hrsg.), *Die alten Zivilisationen Bulgariens. Das Gold der Thraker* (Basel 2007) 11–23.
- Формиране на тракийската култура в края на ранната бронзова епоха. *Проблеми и изследвания на тракийската култура* 2, 2007, 33–40.
- Bulgarian-Austrian Excavations at Tell Karanovo. Contributions to the Prehistory of Thrace. In: F. Lang / C. Reinholdt / J. Weilhartner (Hrsg.), *Στέφανος Αρσιτέιος. Archäologische Forschungen zwischen Nil und Istros. Festschrift für Stefan Hiller zum 65. Geburtstag* (Wien 2007) 191–197.
- В зората на европейската цивилизация. В: В. Николов / К. Ников (ред.), *Древните цивилизации в българските земи* (София 2007) 5–17, 107–112.
- Bulgarien, Karten 9–14 (Neolithikum, Äneolithikum). In: M. Buchvaldek / A. Lippert / L. Košnar (Hrsg.), *Archeologický atlas pravěké Evropy. Acta Instituti Praehistorici Universitatis Carolinae Pragensis. Praehistorica 27* (Praha 2007) 60–64.
- Problems of the early stages of the Neolithization in the southeast Balkans. In: M. Spataro / P. Biagi (eds.), *A short walk through the Balkans: the first farmers of the Carpathian Basin and adjacent regions. Proceedings of the Conference held at the Institute of Archaeology UCL on June 20th – 22nd, 2005. Società per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia 12* (Trieste 2007) 183–188.
- Cultura e arte dei primi agricoltori nelle terre Bulgare. In: *Tesori della Bulgaria. Dal neolitico al Medioevo* (Roma 2006) 15–18.
- Oggetti di culto del tardo Calcolitico (seconda metà del V millennio a.C.). In: *Tesori della Bulgaria. Dal neolitico al Medioevo* (Roma 2006) 21–22.

- Beobachtungen über den Übergang zwischen dem Früh- und dem Spätneolithikum in Thrakien und im Strumatal. In: B. Brukner (ed.), From Starčevo to Vinča Culture (Zrenjanin 2006) 43–51.
- Negative features in Neolithic houses. In: M.-C. Frere Sautot (dir.), Des trous... Structures en creux pré- et protohistoriques (Actes du Coll. de Dijon et Baumeles-Messieurs, 24–26 mars 2006) (Montagnac 2006) v–x.
- Музеят като изследователски център. В: В. Николов (ред.), Национален археологически музей. 100 години от откриването на първата експозиция 18.05.1905 – 18.05.2005 г. (София 2005) 15–19.
- Die anthropomorphe Gestalt in der Mythologie des Neolithikums. In: F. Daim / W. Neubauer (Hrsg.), Zeitreise Heldenberg. Geheimnisvolle Kreisgräben. Katalog zur Niederösterreichischen Landesausstellung 2005 (Horn-Wien 2005) 217–219.
- Тел Караново и тел Капитан Димитриево – репери на неолитна Тракия. В: Културните текстове на миналото. Носители, символи и идеи. Материали от Юбилейната международна научна конференция в чест на 60-годишнината на професор д. н. н. Казимир Попконстантинов, Велико Търново, 29 – 31 октомври 2003. Книга I (София 2005) 59–62.
- Кулатовите масички от тел Казанлък. В: К. Рабаджиев (ред.), Stephanos Archaeologicos in honorem Professoris Ludmili Getov. Studia Archaeologica Universitatis Sercicensis Supl. IV (София 2005) 510–518.
- Престиж и белези на престиж в неолитното общество. Археология 46/1–4, 2005, 7–17.
- Първи свидетелства за най-ранното солодобиване в Европа. Археология 46/1–4, 2005, 109–117.
- Раннонеолитно селище Слатина: втори строителен хоризонт (предварително съобщение, част I). Археология 45/1–2, 2004, 5–14.
- Die Kultur der ersten Ackerbauern im heutigen Bulgarien. In: A. Fol / J. Lichardus / V. Nikolov (Hrsg.), Die Thraker. Das goldene Reich des Orpheus. Ausstellungskatalog Bonn (Mainz 2004) 15–29.
- Neolithische zweigeschossige Häuser in Thrakien. Praehistorische Zeitschrift 79/2, 2004, 231–243.
- Über dem Denotat der Kulttischchen. In: V. Nikolov / K. Bacvarov (Hrsg.), Von Domicia bis Drama. Gedenkschrift für Jan Lichardus (Sofia 2004) 33–41.
- Динамика на културните процеси в неолитна Тракия / Dynamics of the cultural processes in Neolithic Thrace. In: V. Nikolov / K. Bacvarov / P. Kalchev (eds.), Prehistoric Thrace. Proceedings of the International Symposium in Stara Zagora, 30.09 – 04.10.2003 (Sofia – Stara Zagora 2004) 13–25.
- Сондажни проучвания на Юрганджийската селищна могила до Коньово, Новозагорско. Археология 45/3–4, 2004, 37–46.
- Постижения на академичната археология. Светлини и сенки върху археологическото наследство. Археология 45/3–4, 2004, 102–105.
- Dynamics of the cultural processes in Neolithic Thrace. In: S. Perić (ed.), The Neolithic in the Middle Morava Valley, N1. The Central Pomoravlje in Neolithization of South East Europe (Belgrade 2004) 69–74.
- The Neolithic and the Chalcolithic periods in Northern Thrace. TÜBA-AR 6, 2003, 21–83.
- Periodization of the Neolithic along the Struma Valley. In: In Honorem Annorum LXX Alexandri Fol. Thracia 15 (Sofia 2003) 99–106.
- Рисуваната орнаментация като система за комуникация между поколенията (по материали от ранно- и среднонеолитния пласт на тел Казанлък). Археология 44/2, 2003, 5–14. (with A. Karastoyanova)
- Тракийски ярни светилища в района на Сунгурларе. В: Д. Димитрова (ред.), Пътят. Сборник научни статии, посветен на живота и творчеството на д-р Георги Китов (София 2003) 145–155.
- Painted pottery ornamentation as a communication system between generations (based on evidence from the Early and Middle Neolithic layers at Tell Kazanlak). In: L. Nikolova (ed.), Early symbolic systems for communication in Southeast Europe. BAR International Series 1139 (Oxford 2003) 173–179. (with D. Karastoyanova)
- Hacılar und das Mestatal: das Problem der Überseekontakte. In: In Honorem Mihaili Lazarov. Thracia Pontica VI.2 (Sofia 2003) 135–140.
- Anthropomorphe Plastik aus der spätneolithischen Siedlung Ljubimec, Südost-Bulgarien. In: M. Özdoğan / H. Hauptman / N. Basgelen (eds.), Köyden Kente. Yakındoğru'da İlk Yerleşimler. Ufuk Esin'e Armağan / From village to cities. Early villages in the Near East. Studies presented to Ufuk Esin (Istanbul 2003) 481–490.
- Селищна могила Капитан Димитриево, Пещерско: проучване на раннохалколитния пласт. Археология 43/1, 2002, 5–19. (with A. Karastoyanova / M. Гурова)
- Изобразителна дейност през халколита в Тракия. В: Р. Гичева / К. Рабаджиев (ред.), Пътят: Изследвания в чест на проф. Иван Маразов. Studia in honorem Prof. Ivani Marazov (София 2002) 315–325.
- Антропоморфна пластика от къснонеолитното селище Любимец. Археология 43/2, 2002, 25–32.
- Einführung zur Erforschung der Jungsteinzeit in Bulgarien. In: M. Lichardus-Itten / J. Lichardus / V. Nikolov (Hrsg.), Beiträge zu jungsteinzeitlichen Forschungen in Bulgarien. Saarbrücker Beiträge zur Altertumskunde 74 (Bonn 2002) 11–21. (with M. Lichardus-Itten / J. Lichardus)
- Die wichtigsten Siedlungen der Perioden Karanovo I–V. In: M. Lichardus-Itten / J. Lichardus / V. Nikolov (Hrsg.), Beiträge zu jungsteinzeitlichen Forschungen in Bulgarien. Saarbrücker Beiträge zur Altertumskunde 74 (Bonn 2002) 85–94.

- Problems of cultural development and chronology of the Early Neolithic in West Bulgaria. In: M. Lichardus-Itten / J. Lichardus / V. Nikolov (Hrsg.), Beiträge zu jungsteinzeitlichen Forschungen in Bulgarien. Saarbrücker Beiträge zur Altertumskunde 74 (Bonn 2002) 159–163.
- Zwei frühneolithische Wohnhäuser aus Slatina-Sofia. In: M. Lichardus-Itten / J. Lichardus / V. Nikolov (Hrsg.), Beiträge zu jungsteinzeitlichen Forschungen in Bulgarien. Saarbrücker Beiträge zur Altertumskunde 74 (Bonn 2002) 165–189. (*with E. Sirakova*)
- Nochmals über die Kontakte zwischen Anatolien und dem Balkan im 6. Jt. v. Ch. In: R. Aslan / S. Blum / G. Kastl / F. Schweizer / D. Thumm (Hrsg.), Mauerschau: Festschrift für Manfred Korffmann 2 (Remshalden-Grumbach 2002) 673–678.
- Culture matérielle et systèmes religieux, mythologiques et cultuels de la préhistoire tardive sur les terres bulgares. In: L'or des Thraces. Trésors de Bulgarie. Exposition Palais des Beaux-Arts, Bruxelles, du 5 octobre 2002 au 5 janvier 2003. (Gent 2002) 47–51.
- Materiële cultur en religieuze, mythologische en cultische systemen in de Bulgaarse gebieden in de late prehistorie. In: A. Fol / V. Fol / K. Iordanov / H. Devisscher / D. Vanhede (eds.), Goud van de Thraciërs. Schatten uit Bulgarije (Gent 2002) 47–51.
- Die bulgarische Archäologie im letzten Jahrzehnt des 20. Jahrhunderts. In: P. Biehl / A. Gramsch / A. Marciniak (Hrsg.), Archäologien Europas / Archaeologies of Europe. Geschichte, Methoden und Theorien / History, methods and theories. Tübinger Archäologische Taschenbücher 3 (Münster & New York 2002) 303–307.
- Stratigraphie, Baureste und Periodisierung der Kulturschichten. In: S. Hiller / V. Nikolov (Hrsg.), Karanovo, II. Die Ausgrabungen in O19 (Wien 2002) 7–13.
- Der Keramikkomplex aus Horizont VII (Schichtenfolge Karanovo II–III). In: S. Hiller / V. Nikolov (Hrsg.), Karanovo, II. Die Ausgrabungen in O19 (Wien 2002) 15–28.
- Keramikkomplex aus den Horizonten VI–IV (Schichtenfolge Karanovo III). In: S. Hiller / V. Nikolov (Hrsg.), Karanovo, II. Die Ausgrabungen in O19 (Wien 2002) 29–56.
- Keramikkomplex aus Horizont III (Schichtenfolge Karanovo III–IV). In: S. Hiller / V. Nikolov (Hrsg.), Karanovo, II. Die Ausgrabungen in O19 (Wien 2002) 57–82.
- Некоторые аспекты новейших исследований неолита во Фракий. В: Проблемы археологии Евразии. К 80-летию Н. Я. Мерперта (Москва 2002) 239–245.
- За някои елементи на неолитната материална култура в Тракия. Годишник на Археологическия музей-Пловдив 9/1, 2002, 22–32.
- Аспекти от късната праистория на българските земи. In: E. Grammatikoroğlu (ed.), The Balkans in prehistory (Athens 2001) 31–43.
- Неолитни двуетажни къщи в Тракия. Археология 42/1–2, 2001, 1–12.
- Българската археология през последното десетилетие на XX век. Праистория. Археология 42/3–4, 2001, 84–88.
- Neolithic cult assemblages from the Early Neolithic settlement at Slatina, Sofia. In: P. Biehl / F. Bertemes (eds.), The archaeology of cult and religion (Budapest 2001) 133–137.
- Slatina-Sofia: Data on the early farming cult. In: F. Drășovean (Hrsg.), Festschrift für Gheorghe Lazarovici. Zum 60. Geburtstag. Bibliotheca historica et archaeologica Banatica 30 (Timișoara 2001) 19–31.
- “Маските” от Варненския некропол. В: Палеобалканистика и старобългаристика. Втори есенни международни четения “Проф. Иван Гълъбов” (Велико Търново 2001) 453–455.
- Още за контактите между Анатолия и Балканите през VI хил. пр. Хр. В: В. Николов (ред.), Тракия и съседните райони през неолита и халколита. Карановски конференции за праисторията на Балканите 1 (София 2000) 7–13.
- Karanovo 1947–1957: Das Neolithikum. Forschungsgeschichte und Daten zur Stratigraphie. In: S. Hiller / V. Nikolov (Hrsg.), Karanovo, III. Beiträge zum Neolithikum in Südosteuropa (Wien 2000) 7–10. (*with S. Hiller*)
- Neolithische Keramikkomplexe in Thrakien. In: S. Hiller / V. Nikolov (Hrsg.), Karanovo, III. Beiträge zum Neolithikum in Südosteuropa (Wien 2000) 11–19.
- Kapitan Dimitriev tell sequence and cultural characteristics (Brief report in the light of the sounding excavations in 1998–1999). In: L. Nikolova (ed.), Technology, style and society: contributions to the innovations between the Alps and the Black Sea in prehistory. BAR International Series 854 (Oxford 2000) 51–63.
- Tell Karanovo: cultural and chronological differentiation of the Neolithic layers. In: Studia in memoriam Velizari Velkov. Thracia 13 (Sofia 2000) 319–324.
- Началото. В: А. Попов / Е. Тончева / Е. Дроснева (ред.), София - 120 години столица. Юбилейна книга (София 2000) 118–123.
- Българската археология през последното десетилетие на XX век. Старини 2000, 1, 95–97.
- Варианти на преход от ранния към късния неолит в Тракия и долината на Струма. Старини 1999, 1, 7–18.
- Стратиграфска позиция на неолитните пластове Караново II–III, III и III–IV в праисторически селища от Новозагорско. В: Археологически и исторически проучвания в Новозагорско (Нова Загора 1999) 21–29.
- Селищна могила Казанлък: характеристика и културно диференциране на керамичния комплекс. Казанлък в миналото и днес 5, 1999, 9–15.

- Наблюдения върху плана на една раннеолитна къща от Слатина. Годишник на Археологическия музей-Пловдив 9, 1999, 101–107.
- Разкопки 1998–1999. Стратиграфия, архитектурни останки, периодизация и хронология. В: В. Николов (ред.), Селищна могила Капитан Димитриево. Разкопки 1998–1999 (София-Пещера 1999) 9–24.
- Къснонеолитна керамика. В: В. Николов (ред.), Селищна могила Капитан Димитриево. Разкопки 1998–1999 (София-Пещера 1999) 39–53.
- Проучвания на неолитната култура в българските земи (II). Археология 40/1–2, 1999, 1–12.
- Културно-хронологически проблеми на ранния неолит в дн. Западна България. Старини 1999, 2, 59–65.
- Die Kultszene aus Ovcarovo: ein Versuch für Kalenderinterpretierung. In: P. Anreiter / L. Bartosiewicz / E. Jerem / W. Meid (eds.), Man and the animal world. Studies in archaeozoology, archaeology, anthropology and palaeolinguistics in memoriam Sandor Bökönyi (Budapest 1998) 285–305.
- The Circumpontic cultural zone during the Neolithic period. Archaeologia Bulgarica 2/2, 1998, 1–9.
- Методически принципи за изследване на неолитни керамични комплекси. Археология 39/3–4, 1998, 1–10.
- The Circumpontic cultural zone during the 6th millennium BC. Documenta Praehistorica 25, 1998, 81–89.
- Das megalithische Yard-Baumaß in den Hausbauten der bulgarischen Tellsiedlungen. In: D. Ahrens / R. Rottländer (Hrsg.), Internationaler interdisziplinärer Kongreß für Historische Metrologie (St. Katharinen 1998) 115–124.
- Сондажни проучвания на праисторическото селище в м. Изгорялата нива край с. Помощица, Поповско през 1995 г. Попово в миналото 2, 1997, 33–37.
- Two dwellings and their pottery assemblages from the Karanovo III layer in Tell Karanovo. Archaeology in Bulgaria 1, 1997, 15–22.
- Le terre dei traci dal Neolitico alla tarda eta del Bronzo. In: R. Berti / E. La Porta (eds.), Glorie di Tracia: L'oro più Antico, i tesori, i miti / The glories of Thrace: the most ancient gold, the treasures, the myths (Firenze 1997) 63–66.
- Periodisierung und Chronologie. In: S. Hiller / V. Nikolov (Hrsg.), Karanovo. Die Ausgrabungen im Südsektor 1984–1992, I.1 (Text) (Salzburg-Sofia 1997) 49–53.
- Die neolithische Keramik. In: S. Hiller / V. Nikolov (Hrsg.), Karanovo. Die Ausgrabungen im Südsektor 1984–1992, I.1 (Text) (Salzburg-Sofia 1997) 105–146; I.2 (Tafeln), Taf. 1–67.
- Periodisierung und Chronologie der südwestlichen Variante der Kultur Karanovo I. In: M. Lazić (ed.), ANTIΔΩΡON Dragoslavo Srejšović completis LXV annis ab amicis collegis discipulis oblatum (Beograd 1997) 139–145.
- Неолитната култура в българските земи в контекста на Анатолия и Балканите. Годишник на Департамент Археология - НБУ 2–3, 1996, 133–144.
- Югозападен вариант на култура Караново I. Археология 37/2–3, 1996, 1–8.
- Проучвания на неолитната култура в българските земи (I). Археология 37/4, 1996, 1–6.
- Notes on the periodization and chronology of the Neolithic in Thrace. In: Studia in honorem Alexandri Fol. Thracia 11 (Sofia 1995) 63–70.
- Бележки за рисуваната орнаментация на керамичните съдове от Чавдар (група Кремиковци). Минало 1995, 2, 11–17.
- Bemerkungen zur gemalten Ornamentierung auf den Tongefäßen aus Cavdar (Gruppe Kremikovci). Acta Musei Napocensis 32/1, 1995, 53–65.
- Две жилища и керамичните им комплекси от пласта Караново III в селищната могила Караново. Археология 36/4, 1995, 19–26.
- Социален и религиозно-митологичен контекст на златото във Варненския некропол. Проблеми на изкуството 1994, 3, 11–13.
- Der soziale und religiös-mythologische Kontext des Goldes in der Nekropole bei Varna. Годишник на Департамент Археология - НБУ 1, 1994, 4–7.
- Рисуваната орнаментация върху раннеолитни керамични съдове от Чавдар. Годишник на Департамент Археология - НБУ 1, 1994, 185–208.
- Бележки за периодизацията и хронологията на неолита в Тракия. Годишник на Департамент Археология - НБУ 1, 1994, 255–262.
- Характеристика на неолитната култура по средното течение на р. Янтра. В: Сборник Ряховец. Страници от историята на Горна Оряховица (Велико Търново 1994) 10–25.
- Bemerkungen zur Periodisation des Neolithikums in Thracien. A nyíregyházi Jóna András Múzeum évkönyve 36, 1994, 151–158.
- Die neolithischen Kulturen Karanovo I, II und III im Kontext ihrer Beziehungen zu Anatolien. Anatolica 19, 1993, 167–171.
- Spätneolithische Siedlungen in Thracien: das Problem Karanovo IV. Saarbrücker Studien und Materialien zur Altrtumskunde 2, 1993, 157–190.
- Полихромно рисувана орнаментация върху раннеолитни керамични съдове от България. В: В. Николов (ред.), Праисторически находки и изследвания. Сборник в памет на проф. Г. И. Георгиев (София 1993) 59–68.
- Сондажни проучвания на раннеолитното селище в Добринище, Разложко. Археология 33/1, 1992, 1–14. (with M. Радева)
- Die Untersuchungen der frühneolithischen Siedlung Slatina (Sofia) in den Jahren 1985–1987. Studia praehistorica 11–12, 1992, 68–73.

- Mittelneolithische Keramik aus Karanovo: typologische Charakteristik. *Balkanica* 23, 1992, 121–131.
- Die Ausgrabungen in der frühneolithischen Siedlung von Sofia-Slatina, Bulgarien, in den Jahren 1985–1988. *Acta praehistorica et archaeologica* 24, 1992, 221–233. (*with K. Grigorova / E. Sirakova*)
- Zur Interpretation der späteneolithischen Nekropole von Varna. In: J. Lichardus (Hrg.), *Die Kupferzeit als historische Epoche. Saarbrücker Beiträge zur Altertumskunde* 55 (Bonn 1991) 157–166.
- Längenbaumass im Frühneolithikum. *Archäologisches Korrespondenzblatt* 21, 1991, 1, 45–48.
- Сонячно-космічна орнаментація у давньому поховальному обряді. - В: М. Бондар (ред.), *Поховальний обряд давнього населення України* (Київ 1991) 18–40. (*with M. O. Чмихов*)
- Раннеолитно селище Слатина в София: първи строителен хоризонт (предварително съобщение). *Археология* 32/3, 1991, 13–26. (*with K. Григорова / Е. Сиравова*)
- Gemalte Ornamentierung auf Keramikgefäßen der frühneolithischen Siedlung Cavdar in Bulgarien. In: M. Mori / H. Ogawa / M. Yoshikawa (eds.), *Near Eastern studies. Dedicated to H.I.H. Prince Takahito Mikasa on the Occasion of His Seventy-Fifth Birthday. Bulletin of the Middle Eastern Culture Center in Japan* 5 (Wiesbaden 1991) 247–266.
- Календарна интерпретация на култовата сцена от Овчарово. *Интердисциплинарни изследвания* 18, 1991, 97–103.
- Das Flusstal der Struma an der frühneolithischen Strasse von Anatolien nach Mitteleuropa. In: M. Höneisen (Hrsg.), *Die ersten Bauern: Pfahlbaufunde Europas. Forschungsberichte zur Ausstellung im Schweizerischen Landesmuseum und zum Erlebnispark/ Ausstellung Pfahlbauland in Zürich*, 28. April – 30. September 1990. Band 2: Einführung, *Balkan und angrenzende Regionen der Schweiz* (Zürich 1990) 63–69.
- Към интерпретацията на керамичната „плочка“ със знаци от Градешница. *Изкуство* 1990, 2, 47–49.
- Проблемът за централнобалканските миграционни пътища през ранния неолит: интердисциплинарен подход. *Интердисциплинарни изследвания* 17, 1990, 9–24.
- La Tracia prima dei Traci. *Archeo* 67, 1990, 52–55.
- Die neolithische Siedlung Slatina in Sofia (Ausgrabungen im Jahre 1985). *Studia Praehistorica* 10, 1990, 77–85.
- Моделът на пещ от Слатино: опит за интерпретация. *Археология* 31/2, 1990, 32–37.
- Надписи от 1845 г. в църквата на Туден. *Векове* 1989, 3, 67–74. (*with Ж. Аладжов*)
- L'art et la mythologie des agriculteurs du chalcolithique final sur les terres bulgares. In: C. Élùère (éd.), *Le Premier or de l'humanité en Bulgarie : 5e millénaire : [exposition]*, 17 janvier – 30 avril 1989, Musée des antiquités nationales (Saint-Germain-en-Laye 1989) 45–48.
- Das frühneolithische Haus von Sofia-Slatina. Eine Untersuchung zur vorgeschichtlichen Bautechnik. *Germania* 67, 1989, 1–49.
- La scène de culte d'Ovcharovo. *Dossiers histoire et archéologie* 137, 1989, 68–71.
- Zu einigen Aspekten der Kultur Karanovo I. In: S. Hiller (Hrsg.), *Tell Karanovo und das Balkan-Neolithikum. Gesammelte Beiträge zum Internationalen Kolloquium in Salzburg*, 20. – 22. Oktober 1988. *Schriftenreihe des Instituts für Alte Geschichte und Altertumskunde und des Instituts für Klassische Archäologie der Universität Salzburg* 7 (Salzburg Archä 1989) 27–41.
- Das Flusstal der Struma als Teil der Strasse von Anatolien nach Mitteleuropa. In: S. Bökönyi (ed.), *Neolithic of Southeastern Europe and its Near Eastern connections. International Conference 1987, Szolnok-Szeged, Hungary. Varia archaeologica Hungarica* 2 (Budapest 1989) 191–199.
- Karanovo VI-Periode in Bulgarien. Belege zu Religion, Gesellschaft und Wirtschaft. In: A. Fol (Hrsg.), *Macht, Herrschaft und Gold: das Gräberfeld von Varna (Bulgarien) und die Anfänge einer neuen europäischen Zivilisation. Ausstellung organ. vom Minister für Kultur, Bildung und Wissenschaft der Volksrepublik Bulgarien etc., Moderne Galerie des Saarland-Museums (Saarbrücken 1988) 209–240.*
- Liste der erforschten Siedlungen und Gräberfelder der Karanovo VI-Periode in Bulgarien. In: A. Fol (Hrsg.), *Macht, Herrschaft und Gold: das Gräberfeld von Varna (Bulgarien) und die Anfänge einer neuen europäischen Zivilisation. Ausstellung organ. vom Minister für Kultur, Bildung und Wissenschaft der Volksrepublik Bulgarien etc., Moderne Galerie des Saarland-Museums (Saarbrücken 1988) 267–271.*
- Архитектура и вътрешна уредба на една раннеолитна къща от Слатина (София). *Българска етнография* 1988, 2, 3–14.
- Beiträge zu den Beziehungen zwischen Vorderasien und Südosteuropa aufgrund der frühneolithischen bemalten Keramik aus dem Zentralbalkan. *Acta praehistorica et archaeologica* 19, 1987, 7–18.
- Струмският път през ранния неолит. *Векове* 1987, 2, 39–47.
- Неолитни керамични съдове за приготвяне на храна (По материали от Югозападна България). *Българска етнография* 1987, 2, 29–35.
- Орнаментацията на раннеолитната рисувана керамика от Мулдава. *Родопски сборник* 6, 1987, 142–152.
- Картината на света в раннеолитната орнаментация от Ракитово. *Известия на Българското историческо дружество* 39, 1987, 5–29.

- Die neolithische Siedlung Kremenik bei Sapareva Banja, Bezirk Kjustendil. *Studia Praehistorica* 8, 1986, 108–151. (*with G. I. Georgiev / V. Nikolova / S. Cobadzjev*)
- Най-голямото раннеолитно жилище. Музеи и паметници на културата 1986, 2, 2.
- Връзки на долината на р. Места с Анатолия през ранния неолит. *Археология* 27/2, 1986, 5–10.
- Über den Ursprung einiger frühneolithischen ornamentalen Motiven aus dem Zentralbalkangebiet. *Thracia pontica* 2, 1982 (1985), 187–195.
- Раннеолитен свастиковиден мотив от Кременик край Сапарева баня. *Векове* 1985, 5, 49–53.
- Die Kunst der späten Kupferzeit in Bulgarien. In: *Das erste Gold der Menschheit*. In: G. Biegel (Hrsg.), *Die älteste Zivilisation in Europa* (Freiburg 1985) 22–28.
- Katalog. In: *Das erste Gold der Menschheit*. In: G. Biegel (Hrsg.), *Die älteste Zivilisation in Europa* (Freiburg 1985) 51–136. (*with I. Ivanov*)
- Праисторически мраморни амулети от Югозападна България. *Векове* 1984, 1, 60–64.
- Раннеолитическите култури в западната България. *Советская археология* 1984, 2, 5–21.
- Die ornamentale Verzierung der bemalten frühneolithischen Keramik aus der Ebene von Sofia. *Studia Praehistorica* 7, 1984, 17–32.
- Тракийско светилище под Мека цръв. Музеи и паметници на културата 1983, 1, 22–24.
- Тракия и Тесалия през ранната бронзова епоха. *Векове* 1983, 1, 12–18.
- Кръстовидни изображения върху раннеолитната керамика. *Атеистична трибуна* 1983, 3, 57–60.
- Орнаментация на раннеолитната рисувана керамика: систематизация и характеристика. *Археология* 24/1–2, 1983, 29–43.
- Колективна находка на керамични съдове от късната бронзова епоха в с. Есеница, Варненски окръг. *Известия на Народния музей – Варна* 18 (33), 1982, 87–92. (*with B. Жекова*)
- Строителство с абсиден план в българските земи. *Българска етнография* 1982, 1, 29–37.
- Приложение на математико-статистически метод за териториално групиране на рисуваната раннеолитна керамика. *Интердисциплинарни изследвания* 9, 1982, 33–50.
- Строителството с абсиден план в българските земи: ретроспективен анализ. *Интердисциплинарни изследвания* 7–8, 1981, 99–110.
- Раннеолитна керамична статуетка на богинята Майка-Земя. *Изкуство* 1981, 9–10, 64–66.
- Аспекти на религиозно-митологичната система през ранния неолит (според рисуваната керамична орнаментация). *Изкуство* 1981, 9–10, 67–70.
- Die Tradition in den Absidenbauten in Bulgarien. *Thracia* 5, 1980, 155–166.
- Селищна могила до с. Дядово: сондажен изкоп (археологически разкопки 1977–1978 г.). *Expedicio thracica* 1, 1980, 9–94. (*with P. Каминчаров / Я. Бест / В. Николова*)
- Проучвания в Голямата пещера над с. Илия, Кюстендилски окръг. *Векове* 1980, 3, 71–76. (*with B. Василев*)
- Проучване на остеологичния материал от Голямата пещера край с. Илия, Кюстендилски окръг. *Интердисциплинарни изследвания* 5–6, 1980, 57–64. (*with B. Василев*)
- За скалния надпис на „Брат Томе“ при с. Царевец, Врачанско. *Векове* 1980, 1, 69–70.
- За акултурацията в праисторическата епоха. *Интердисциплинарни изследвания* 5–6, 1980, 45–50.
- Богинята Майка-Земя и племенният вожд-жрец. *Атеистична трибуна* 1980, 6, 45–50.
- Уникално скулптурно изображение. *Изкуство* 1979, 4, 46–47.
- Проблемът за продължителността на неолитната революция в Предна Азия. *Thracia antiqua* 4, 1978, 11–28.
- Тракийско светилище на връх Петровски кръст в Чепън. *Векове* 1978, 2, 40–53.
- Проблемът за акултурацията в праисторическата епоха. *Бюлетин на Клуба за НТМ - ИФ 2*, 1977, 38–43.
- Проблемът за акултурацията на мезолитната общност по западното Черноморско крайбрежие (Тезиси). *Бюлетин на Клуба за НТМ - ИФ 2*, 1977, 1–7.
- Неолитната революция в Предна Азия и нейните резултати. *Археология* 17/4, 1977, 1–11.
- Нови мезолитни материали от Побитите камъни. *Музеи и паметници на културата* 1977, 4, 36–39.
- Проблемът за безкерамичния неолит в Тракия и на Балканите. *Thracia antiqua* 2, 1977 (1978), 1–18.
- Традиции в строителството с абсиден план. *Студентски проучвания* 4, 1976 (1978), 3–22.
- Елементи на тракийското архитектурно наследство. *Студентски проучвания* 3, 1975, 3–20.
- Неолитно селище в Горна Оряховица. *Студентски проучвания* 3, 1975, 21–40.
- Проблеми на мезолита в България и неолитната революция. *Студентски проучвания* 2, 1974, 3–31.

PRELIMINARY EXCAVATION REPORTS

- Археологически проучвания на раннеолитното селище Слатина-София. *Археологически открития и разкопки през 2014 г., 2015*, 39–41. (*with Д. Такова / Е. Сиравова / К. Митов / В. Стоицова / С. Жечева*)
- Спасително археологическо проучване на неолитното селище в м. Деве боаз при с. Мурсалево, община Кочериново. *Археологически открития и разкопки през 2014 г., 2015*, 45–47. (*with К. Бъчваров / Д. Такова / В. Петрова / Г. Самичкова / Г. Кацаров*)

- Спасително археологическо проучване на площта на строителните дейности за канализационна система на Мурсалево в обхвата на източната част на неолитното селище в м. Деве боаз при с. Мурсалево, община Кочериново. Археологически открития и разкопки през 2014 г., 2015, 48–50. (*with* К. Бъчваров / Д. Такорова / В. Петрова / Г. Самичкова / Г. Кацаров)
- Археологически проучвания на праисторическия солодобивен и градски център Провадия-Солницата. Археологически открития и разкопки през 2014 г., 2015, 88–90. (*with* К. Бъчваров / П. Лещиков / Г. Самичкова / Н. Христов / М. Люнчева / В. Стоицова / Е. Пурнарова / С. Жечева / С. Трифонов / Д. Енверова / П. Илиева / К. Макуини / М. Славкова)
- Археологически проучвания на раннонеолитното селище Слатина-София. Археологически открития и разкопки през 2013 г., 2014, 41–44. (*with* Д. Такорова / Е. Сиракова / Т. Дяков)
- Пра- и протоисторически обреден комплекс в м. Хауза край Капитан Андреево, Свиленградско. Трасе на Via Diagonalis. Археологически открития и разкопки през 2013 г., 2014, 68–70. (*with* В. Петрова / Т. Христова / П. Лещиков)
- Археологически проучвания на праисторическия солодобивен и градски център Провадия-Солницата през 2013 г. Археологически открития и разкопки през 2013 г., 2014, 89–91. (*with* К. Бъчваров / П. Лещиков / Г. Самичкова / Н. Христов / К. Макуини / С. Трифонов / Е. Пурнарова / В. Стоицова / М. Славкова / П. Илиева / С. Жечева / Р. Спасов / Ш. Мартино)
- Археологически проучвания на Провадия-Солницата през 2012 г. Археологически открития и разкопки през 2012 г., 2013, 78–80. (*with* П. Лещиков / М. Люнчева / К. Бъчваров / Н. Христов / С. Трифонов / П. Паринова / Е. Пурнарова / В. Стоицова / М. Славкова / Т. Малтер / П. Илиева / Е. Анастасова)
- Спасителни археологически разкопки в м. Хауза до Капитан Андреево, Свиленградско през 2012 г. Археологически открития и разкопки през 2012 г., 2013, 60–62. (*with* В. Петрова / Т. Христова / П. Лещиков / М. Люнчева / Г. Самичкова / С. Терзийска-Игнатова / К. Бояджиев / Н. Христов)
- Археологически проучвания на праисторическия солодобивен център Провадия-Солницата през 2011 г. Археологически открития и разкопки през 2011 г., 2012, 66–68. (*with* К. Бъчваров / П. Лещиков / М. Люнчева / Н. Христов / Г. Самичкова / Д. Такорова / К. Бояджиев / Е. Анастасова / С. Трифонов / С. Игнатова / П. Паринова / Е. Пурнарова / В. Стоицова / Т. Малтер / М. Славкова / В. Данов)
- Археологически разкопки на тел Караново през 2011 г. Археологически открития и разкопки през 2011 г., 2012, 68–70. (*with* В. Петрова)
- Аварийно археологическо проучване на къснонеолитното ямно светилище Дана бунар 2 край Любимец. Археологически открития и разкопки през 2010 г., 2011, 62–64. (*with* В. Петрова / М. Люнчева / Е. Сиракова / Т. Тодоров / М. Славкова / В. Стоицова / Е. Пурнарова)
- Археологически проучвания на праисторическия солодобивен комплекс Провадия-Солницата. Археологически открития и разкопки през 2010 г., 2011, 71–73. (*with* В. Петрова / К. Бъчваров / Н. Христов / М. Люнчева / Е. Анастасова / С. Игнатова / П. Лещиков / С. Трифонов)
- Археологически проучвания на тел Провадия-Солницата. Археологически открития и разкопки през 2009 г., 2010, 65–68. (*with* В. Петрова / К. Бъчваров / П. Лещиков / Н. Христов / Е. Анастасова / М. Люнчева / С. Трифонов / Д. Такорова / К. Бояджиев / М. Доткова)
- Археологически проучвания на тел Караново, Новоазгорско. Археологически открития и разкопки през 2009 г., 2010, 97–99. (*with* В. Петрова / Е. Анастасова / М. Люнчева)
- Археологически проучвания на тел Крън, Казанлъшко. Археологически открития и разкопки през 2009 г., 2010, 99–101. (*with* Д. Андреева / М. Люнчева)
- Праисторически солодобивен център Провадия-Солницата: разкопки през 2008 г. Археологически открития и разкопки през 2008 г., 2009, 67–70. (*with* В. Петрова / К. Бъчваров / Н. Христов / П. Лещиков / Е. Анастасова / Д. Такорова / К. Бояджиев / С. Трифонов / М. Люнчева)
- Археологически проучвания на праисторическото селище Ковачево, община Сандански. Археологически открития и разкопки през 2007 г., 2008, 35–38. (*with* А. Перничева / М. Лихардус-Итен / Ж.-П. Демул / М. Гребска-Кулова / П. Кулов)
- Археологическо проучване на къснонеолитно ямно светилище Любимец-Дана бунар 2. Археологически открития и разкопки през 2007 г., 2008, 57–60. (*with* В. Петрова / П. Лещиков / Е. Анастасова / Н. Еленски / С. Игнатова / К. Бояджиев / Д. Такорова / М. Люнчева / М. Доткова)
- Сондажни археологически проучвания на неолитна селищна могила Борунката до Желязово, Бургаска област. Археологически открития и разкопки през 2007 г., 2008, 60–62. (*with* М. Класнаков)
- Археологически проучвания на праисторическия солодобивен център “Провадия-Солницата” при гр. Провадия. Археологически открития и разкопки през 2007 г., 2008, 63–65. (*with* В. Петрова / Н. Христов / П. Лещиков / Е. Анастасова / П. Стоянова / М. Люнчева)
- Археологическо проучване на къснонеолитното ямно светилище Любимец-Дана бунар 2. Археологически открития и разкопки през 2006 г., 2007, 44–47.

- (with B. Петрова / E. Анастасова / H. Еленски / Д. Андреева / С. Пелнатова / П. Лецаков / М. Доткова / Е. Найденова / М. Класнаков)*
- Археологически проучвания на солодобивен център Провадия-Солницата. Археологически открития и разкопки през 2006 г., 2007, 47–51. *(with B. Петрова / H. Христов / E. Анастасова / П. Лецаков)*
- Спасителни археологически проучвания на Обект 28, м. Хауза, Капитан Андреево, общ. Свиленград. Археологически открития и разкопки през 2006 г., 2007, 51–53. *(with K. Ников / Т. Христова)*
- Tell Karanovo 2002–2004. Vorbericht (Salzburg 2005). *(with S. Hiller / F. Lang)*
- Tell Karanovo 2000–2001. Vorläufiger Bericht (Salzburg 2002). *(with S. Hiller)*
- Tell Karanovo 1998–1999. Vorläufiger Bericht (Salzburg 1999). *(with S. Hiller)*
- Tell Karanovo 1996–1997. Vorläufiger Bericht (Salzburg 1997). *(with S. Hiller)*
- Tell Karanovo 1995. Vorläufiger Bericht (Salzburg 1995). *(with S. Hiller)*
- Tell Karanovo 1993–1994. Vorläufiger Bericht (Salzburg 1994). *(with S. Hiller)*
- Tell Karanovo 1992. Vorläufiger Bericht (Salzburg 1992). *(with S. Hiller / S. Bökönyi / P. Höglinger / J. Görsdorf / B. Weninger)*
- Tell Karanovo 1991. Vorläufiger Ausgrabungsbericht (Salzburg 1991). *(with S. Hiller)*
- Tell Karanovo 1990. Vorläufiger Ausgrabungsbericht (Salzburg 1990). *(with S. Hiller)*
- Tell Karanovo 1989. Vorläufiger Ausgrabungsbericht (Salzburg 1989). *(with S. Hiller)*
- Tell Karanovo 1988. Vorläufiger Ausgrabungsbericht (Salzburg 1988). *(with S. Hiller)*

THE ARCHAEOLOGY OF GAMES. PLAYING WITH KNUCKLEBONES IN THE EARLY CHALCOLITHIC OF THE BALKANS

ISABELLE SIDÉRA AND ANDREEA VORNICU

Abstract

We will address here the subject of prehistoric games by looking with fresh eyes at knucklebone collections from Chalcolithic sites located in modern-day Bulgaria and Romania, with special attention to Drama-Merdžumekia – Karanovo V/Maritsa¹ – Târgu Frumos-Baza Pătule and Isăiia-Balta Popii – Precucuteni culture². Gaming activities did not always leave identifiable traces in the archaeological record. Children's toys appear occasionally among very old remains, as it is the case of the bone anthropomorphic figurines of the late Linear Pottery culture (5100 BC), for which a function as dolls for girls can be firmly supported³. But these are only isolated cases. The great importance of the Drama Merdžumekia assemblage and of other assemblages from neighboring contemporary cultures, resides in the fact that they contain hundreds of game pieces, which provide the means to understand the issue of games in their social aspects, since it is observable. On these sites, games appear with frequency and intensity, as a common practice. Thereby, we push back the prehistory of games to the moment it becomes systematic, at the beginning of the 5th millennium BC, with Karanovo V/Maritsa⁴, and Precucuteni in the Eastern part of Romania⁵.

In honor of Vassil Nikolov, we choose to debate a topic that integrates a part of the significant collection of almost 2000 animal hard tissue objects from the site of Drama, which was partly published in previous studies⁶. The reason for this choice lies in the almost legendary nature of the site, which brought together researchers from all of Europe and beyond, for a period of over thirty years during the archaeological investigations in the micro-region of Drama. It is during the campaigns of excavations carried out between 1994 and 2001 that we have often rubbed shoulders with Vassil Nikolov. In remembrance of those campaigns, we dedicate this text to him.

BRIEF SNAPSHOT OF KNUCKLEBONES IN ANTIQUITY

The knucklebones are components of the tarsal bones. They form a compact bone roughly rectangular, with morphologically differentiated sides (fig. 1). In Greco-Roman Antiquity, knucklebones were used mainly as game pieces, bringing together various players without age or gender limit. “The popularity of the game of knucklebones in ancient Greece and the importance of the role it played in the everyday life of Greeks are attested by texts, paintings, and plastic art of all types and standards”⁷.

During play, these game pieces were thrown and different names and values were attributed to each side of the bone. The combination of sides facing up when they fell formed different figures to which names were given. Most of the game pieces are natural knucklebones from

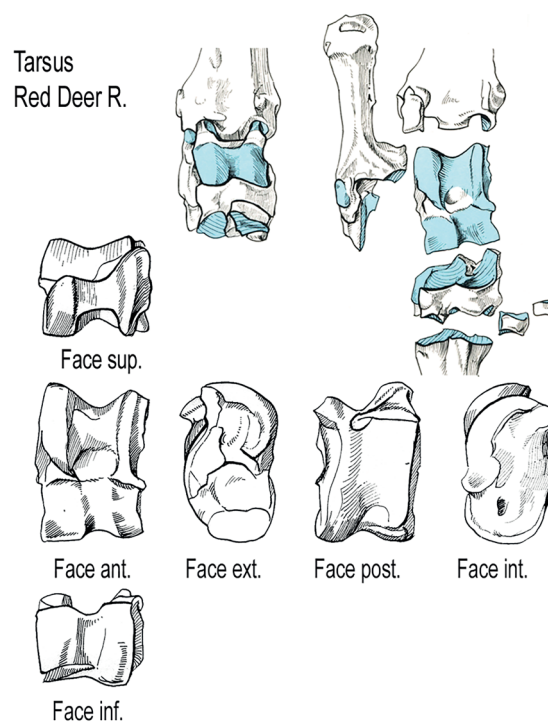


Fig. 1: Anatomical aspects of knucklebones.

various sized species and are more or less modified. They display diverse volumes, forms and materials. If we accept the assemblage of 10,000 pieces identified by F. Poplin within the 24,000 knucklebones found in the Corycian Cave (Greece), most of them came from sheep and goat and to a smaller extent from cattle, pig, red deer, fallow deer, and roe deer⁸. Some of them are drilled, or are flattened on their sides. Others are inscribed, covered or filled with gilding metal or lead, as showed by the overabundant collection of Coycian Cave, remarkably studied by Pierre

1 Sidéra 1998.
2 Vornicu 2013.
3 De Maret / Sidéra 2015.
4 Sidéra 1998.
5 Vornicu 2013.
6 Sidéra 1998; 2012.
7 Armandry 1984, 376.

8 Poplin 1984, 383.

Amandry⁹. There are also imitations of knucklebones, of which some are faithful replicas made of marble, limestone or even bronze¹⁰. The use of knucklebones as game pieces or dices goes beyond the Greco-Roman world. Thus, the Tutankhamun sepulcher from Egypt contains eight imitations of knucklebones, many of which are made of resin¹¹.

It should be added that in Antiquity knucklebones are present in all environments: private houses, public buildings, sanctuaries and graves¹².

In Southeast Europe and Asia, the game of Knucklebone has survived until today. It is called *aşık* in Turkey¹³ and *Mōzōn Şagaj* in Mongolia¹⁴.

In Roman and Greek Antiquity, but also in Mongolia, knucklebones were also used in divination¹⁵, showing the shift from gaming towards magic, which commonly occurs in traditional societies. The same object thus serves several simultaneous or successive functions¹⁶. In his work, *Lives of the Twelve Caesars*, Suetonius reports that Emperor Tiberius, wanting to know the future, threw several golden knucklebones into a spring and interpreted the combination of knucklebones in the water to his advantage¹⁷.

The divinatory function of knucklebones is well attested by the *astragaloi* oracle tradition, which was fashionable during the 2nd and 3rd centuries¹⁸. People turned to oracles in order to consult the gods in the pertinence of their future actions. The answers came from the numerical combination obtained by throwing five or seven knucklebones (the sides of the bone were numbered 1, 3, 4, 6) to which corresponded oracular answers¹⁹.

KNUCKLEBONES IN PREHISTORY

Knucklebones and knucklebone imitations are present in the material culture of Neolithic and Chalcolithic sites from the Near East to Central Europe. In the current state of research, it appears that they were not used within the Neolithic cultures of Central and West Europe. The earliest knucklebones date to the middle of the 7th millennium and were found in the site of Çatal Höyük, in Anatolia²⁰. In the 6th millennium BC, in the Starčevo Criş, Dudeşti and Vinča cultures from the western part

of Balkans and Romania, this type of objects appears rarely and in isolation. Their presence seems to increase from the 5th millennium in Precucuteni and Gumelniţa contexts in Romania, and Karanovo V-Maritza, Karanovo VI-Gumelniţa in Bulgaria.

Recent studies have shown that the functions of knucklebones in prehistory were not equivalent. But, in order to reveal this variability, they must become the subject of detailed studies carried out with analytical tools specific to the functional analysis: the study of wear and its distribution on objects and experimentation²¹.

Three hypotheses regarding the use of knucklebones in prehistory have previously been proposed. The first, based exclusively on ethnographic or historical analogy, supports the use of knucklebones in divination or as game pieces²². The other two, based on use-wear analysis and experimentation, propose a material function for Caprid knucklebones, as tools associated with activities such as pottery shaping²³ or hide working²⁴.

We believe that only a holistic perspective, encompassing the cultural and archaeological context, the morphological and technological variations, as well as the wear traces for each individual object can shed light on the use of knucklebones. More precisely, the study of technological transformations combined with use-wear analysis enables the gathering of objective and reliable data on the physical manner in which the knucklebones performed their function. As for the analysis of the archaeological context, it offers an understanding of the environment in which knucklebones functioned: domestic, funeral, technical, etc. The ethnographic and historical data provide interpretative models able to reveal the meaning and symbolic content associated with this type of object. Finally, we insist on the importance of studying each individual object, since it is possible that objects of the same type perform different functions.

RAW MATERIAL AND MORPHOLOGY

Objects made of osseous materials are often obtained by the transformation of raw material through a technical process that comprises blank production (*débitage*) and shaping (*façonnage*).

Sometimes, the raw material is little or not at all transformed. In this case, the product is the result of a direct transfer from the anatomy to the object, as François Poplin has beautifully described: “[...] starting from the animal, in front of the preoccupations of those who have in mind Civilization”²⁵. These “natural items” occur in all Neo-

9 Armandry 1984.

10 Armandry 1984.

11 Tait 1982, 38; Bellessort 2016.

12 Armandry 1984; Carè 2009; De Grossi Mazzorin / Minniti 2009; De Grossi Mazzorin 2014.

13 Mellaart 1964, 103.

14 Tatár 1972.

15 Armandry 1984.

16 Lusardy 2006; De Maret / Sidéra 2015.

17 Nikulina / Schmolcke 2008.

18 Cuvigny 2010, 267.

19 Cuvigny 2010, 267.

20 Russell / Griffiths 2013, 295–296.

21 Legrand / Sidéra 2007.

22 Gilmour 1997; Bejenaru et al. 2010; McCarty 2013; Kogălniceanu et al. 2014.

23 Choyke / Bartosiewicz 2009; Meier 2013; Mărgărit 2015.

24 Cavaleriu / Bejenaru, 2009.

25 Poplin 1984, 381.

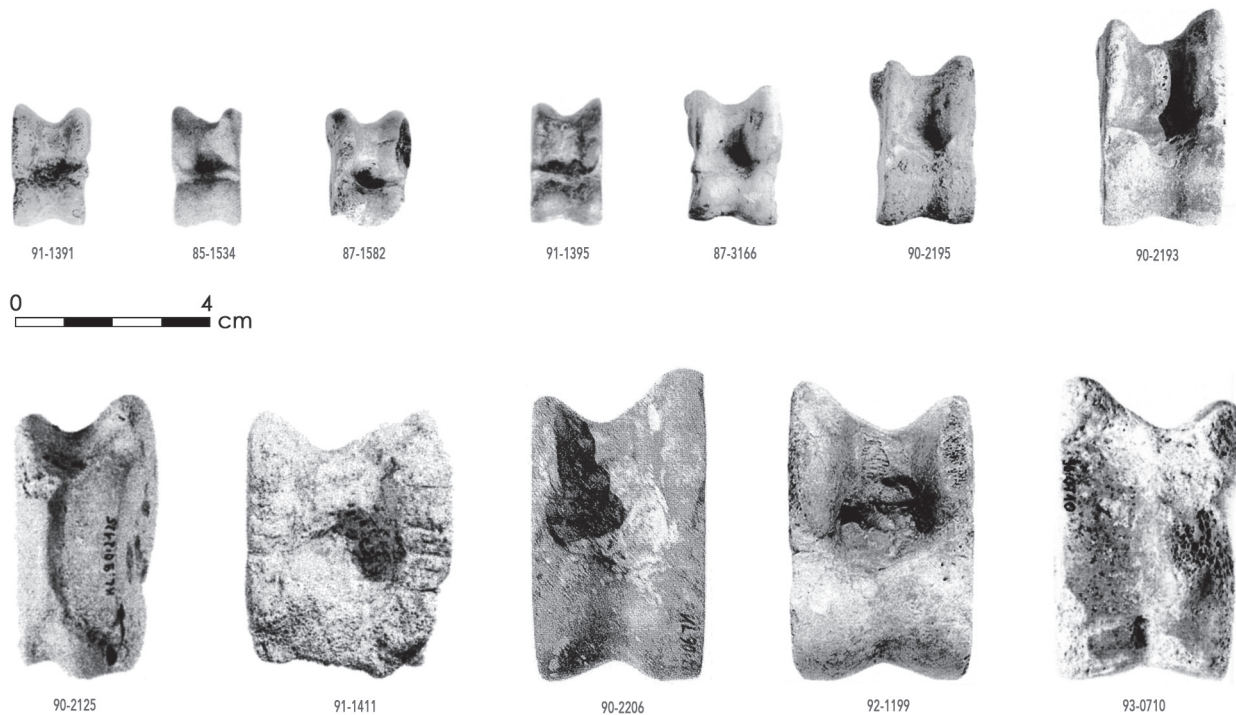


Fig. 2: View of the anterior face of Drama's knucklebones. Num. 91-1391, 85-1534, 87-1582, 91-1395, 87-3166 sheep or goat. Num. 90-2195 roe deer. Num. 90-2193 red deer. Num. 91-1411, 90-2206, 92-1199, 93-0710 cattle. Num. 90-2125 boar.

lithic and Chalcolithic industries, but they are represented in small proportions.

However, the assemblages we are discussing here are of great importance within the cultural context to which they belong. Their number is extraordinary: 291 of 1897 objects made of osseous materials at Drama-*Merdzumeikia* (Bulgaria), 45 of 318 at Târgu Frumos and six of 34 at Isaiia (Romania).

As regards the raw material, three categories were identified within the knucklebone collections. The heavy and massive specimens, weighting between 42 to 121 grams, come from large ruminants like the domestic cattle and aurochs (fig. 2 num. 91-1411, 90-2206, 92-1199, 93-0710). Smaller specimens, of average size and lower weight, come from red deer (fig. 2 num. 90-2193), fallow deer (fig. 3 num. 87-3156), boar, and domestic pig (fig. 2 num. 90-2125). These species are rare. The swine bones weigh between nine to eleven grams, while those of fallow deer weigh 26 grams (the specimens from red deer were much deteriorated, thus they were not weighed). Finally, there are the small, very lightweight knucklebones, weighing between three to nine grams – which come from small ruminants i.e., sheep, goat, and rarely roe deer (fig. 2 num. 91-1391, 85-1534, 87-1582, 91-1395, 87-3166).

The sites of Drama, Târgu Frumos and Isaiia share a common preference in terms of raw material exploitation. The heavy, massive knucklebones from large ruminants are favored over the small specimens of sheep and goat (tab. 1). Finally, at the two sites from Romania, the presence of small ruminant knucklebones is insignificant. This pat-

tern seems to be specific for the early Chalcolithic of the East Carpathian region – Precucuteni and is quite unusual considering the high use of small ruminant knucklebones in the previous and later periods.

Excluding the unworked knucklebones, there are three main categories of modifications on knucklebones that occur generally in Neolithic and Chalcolithic sites:

- 1) Flattening is the most common modification found on knucklebones. It may be located on the anterior side (1A), the flanks of the bone – medial and/or lateral side (1B), the flanks and the front side (1C) or on all four sides (1D). The flanks are not always flattened symmetrically, one of them being flatter than the other. Sometimes even a single side is flattened. Similarly, the extent of the flattened area varies. It may affect the entire face or it may be located in a defined area (fig. 3–4).
- 2) Drilling – which may be either simple or multiple. Several situations are possible, such as drilling of the proximal part (2A), opposite drillings, one on the proximal and the other on the distal part (2B), and drilling on the proximal or distal part (2C). This technique is always associated with flattening. Drilled knucklebones are quite common and were found from Middle Neolithic to Chalcolithic sites from Serbia and Romania²⁶.

26 Vitezović 2011; 2013; Mărgărit et al. 2014; Kogălniceanu et al. 2014.

- 3) Incising is very rare and always associated with flattening. Incisions appear like short lines made with a flint blade, arranged in parallel and following the bone's contour. The incisions are located on the lateral or medial face of the knucklebones. They occur in several knucklebone assemblages from Romania²⁷.

At Drama, the transformations of knucklebones are mainly of type 1B: flattening on the flanks, regardless of the species (231 from 291 objects) (fig. 3–4). Unworked knucklebones are rare (21 pieces). The drilled Type 1C (13 objects) and 2A are marginal (four objects). The flattening of the anterior side is rare. Among the curiosities, the swine knucklebones, and sometimes also goat and bovine, are strongly abraded obliquely (fig. 2 num. 90-2125).

The large knucklebones from Precucuteni collections are always flattened on the anterior side (type 1A). Other types of transformation, such as perforation or incision, are lacking. This seems to be a pattern specific to Precucuteni collections, which will be maintained until the beginning of the Cucuteni culture, when the patterns of transformation will diversify, and a shift to caprid knucklebone as the main raw material type will occur.

Finally, we note that a surface treatment in order to color or perhaps dry the material²⁸ was applied on most of the Drama objects (239 of 291). The colors range from dark brown to a set of mixed hues of yellowish and brown. All have a shiny appearance. Some of the knucklebones from the site of Isaiia display colors varying from dark brown to grey or black, as a result of burning along with the dwelling in which they were deposited.

MODUS OPERANDI

The type 1 modification, namely flattening, is the most problematic, since its formation may be the result of three possible actions: 1) shaping, by which was intended to obtain various types of objects; 2) use processes or 3) a combination of shaping and use.

Studies that rely on naked eye observations consider the flattened aspect of the bone surface as an indicator of shaping by abrasion²⁹. We do not contest this interpretation, as in Drama, the lateral sides of many knucklebones display very clear traces of fashioning by abrasion (fig. 4 num. 89-1628). However, naked eye observations are not enough to understand the function of these surfaces. It takes a detailed examination using optical instruments to uncover the otherwise invisible traces. This ultimately leads to a better understanding of the manner in which knucklebones were used.

Observations made by means of stereomicroscopy have previously related the flattening of sides to use: knuck-

Species	Qty. Drama	Qty. Târgu Frumos	Qty. Isaiia
Cattle	144	43	6
Red deer	7	1	-
Fallow deer	18	-	-
Caprids	80	1	-
Roe deer	14	-	-
Swine	21	-	-
Undetermined ruminants	3	-	-
Undetermined large ruminants	2	-	-
Undetermined small ruminants	2	-	-
Undetermined	1	-	-
Total	292	45	6

Tab. 1: Distribution by species of the knucklebones from Drama, Târgu Frumos and Isaiia.

lebones are tools for ceramic smoothing³⁰. Yet, before use, the objects may have undergone shaping,³¹ the flattening being in several cases the result of surface preparation by abrasion, which aimed to erase the naturally irregular aspect of the bone³².

As regards the modifications on the anterior surfaces of knucklebones, the study of Drama, Târgu Frumos and Isaiia assemblages showed that the flattened aspect formed as a result of use³³. The wear appears as bright polished areas, that vary in extend and degree restricted to four areas on the knucklebone's anterior side (fig. 3; 5). These correspond to the contact points of a knucklebone standing on a flat surface with the anterior side downwards. Despite the flattened aspect of the surface, no striations similar to those caused by shaping were observed. The collections contain knucklebones in different stages of use, providing enough data for the reconstruction of the wear sequences (*chaîne d'usure*). Thus, we observed that the wear evolves differently on the four mentioned areas. Firstly, the high points of the anterior face (1–2 in fig. 6) develop a polished aspect on a small area, which will gradually enlarge and begin to flatten. At this point, a rarely visible polished aspect will appear on the lower areas of the anterior surface (3–4 in fig. 6).

30 Meier 2013; Mărgărit 2015.

31 Mărgărit 2015.

32 Sidéra 2012; Vornicu 2015, 201–203.

33 Vornicu 2013, 56–57.

27 Berciu 1956; Cucuș 1999; Beldiman et al. 2012.

28 Sidéra 2000.

29 Vitezović 2011.

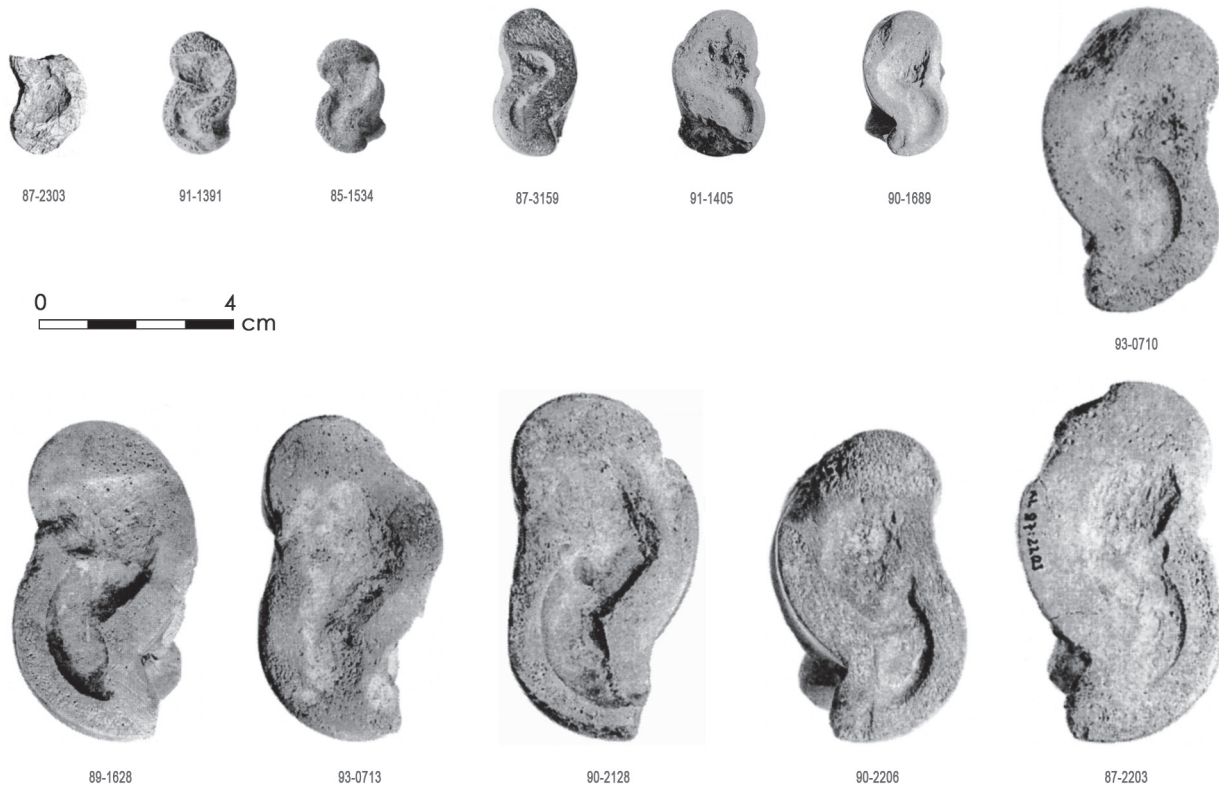


Fig. 3: Modifications of the internal side of Drama's knucklebones. 91-1391, 91-1395, 88-1031 sheep or goat, 87-3156 fallow deer, 90-2193 red deer, 91-1396, 89-1628, 90-2206, 90-2128 cattle.

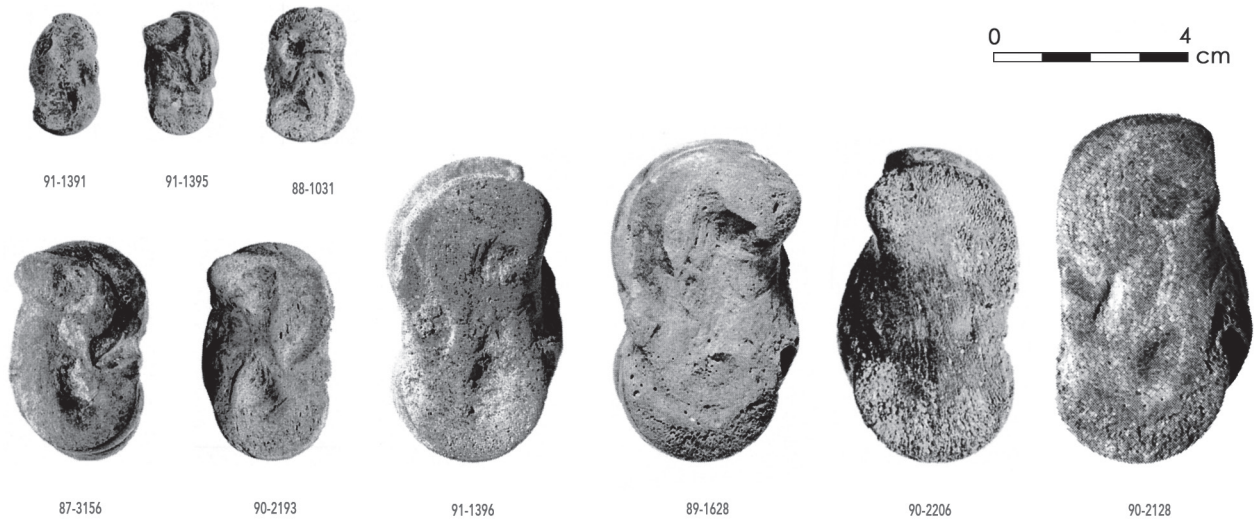


Fig. 4: Modifications of the external side of Drama's knucklebones 87-2303 sheep, goat, roe deer, 91-1391, 85-1534, 91-1405 sheep or goat, 87-3159, 90-1689 roe deer, 93-0710, 90-2206, 87-2203, 89-1628, 93-0713, 90-2128 cattle.

As the wear on areas 1 and 2 increases in size and become more flattened, the other two regions will also begin to develop a flattened aspect. This type of wear development is encountered only when the knucklebone is used as a passive object. This was shown by an experiment that we carried out, in which a small knucklebone was launched on the surface of a dry clay floor, always with the anterior side facing down. The bone's movement was controlled only at the launching point. It took ten minutes for the areas 1 and

2 to gain a flatten appearance, while the areas 3 and 4 had developed only a shiny appearance (fig. 7). This contrasts the pattern resulting when a knucklebone was used as an active object. In this case, when continuous and organized gestures replicated a controlled friction against the same floor, the wear developed uniformly on the four areas from the very first movements. Moreover, after five minutes, not only these four areas were flattened, but the wear extended in other adjacent points (fig. 7).

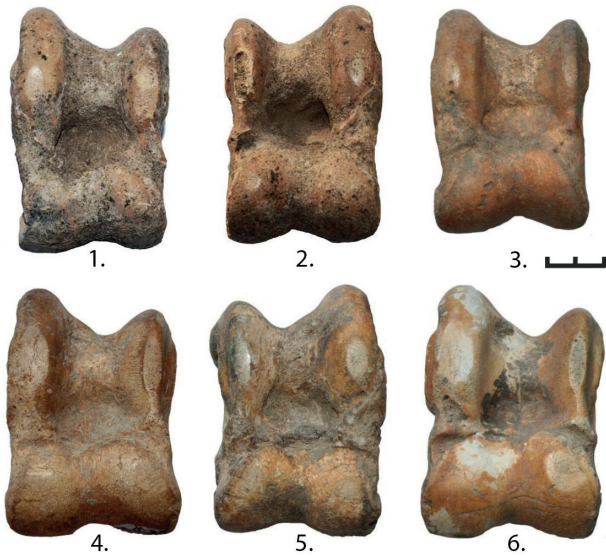


Fig. 5: Knucklebones from the Precucuteni sites of Isaiia-Balta Popii (1-2) and Târgu Frumos-Baza Pătule (3-6) showing different degrees of wear- incipient (2, 3), intermediary (1, 4), and advanced (5, 6).



Fig. 6: The use-wear's distribution and order of appearance (with numbers from 1 to 4) on the anterior side of the knucklebones from Precucuteni culture.

Besides this type of wear, the archaeological specimens display on their posterior, lateral and medial sides patchy bright areas of a varnished aspect and which color differs, with no visible striations (fig. 8). These are obvious traces from handling. Also, there are no clear traces of impact or accidental friction on the edges or surface of knucklebones.

One can infer that in the case of the knucklebones, their use did not involve a gesture of throwing/tossing, but rather by launching or pushing the bone with the anterior side facing down. The great majority of knucklebones from the three sites show an incipient or intermediary wear,

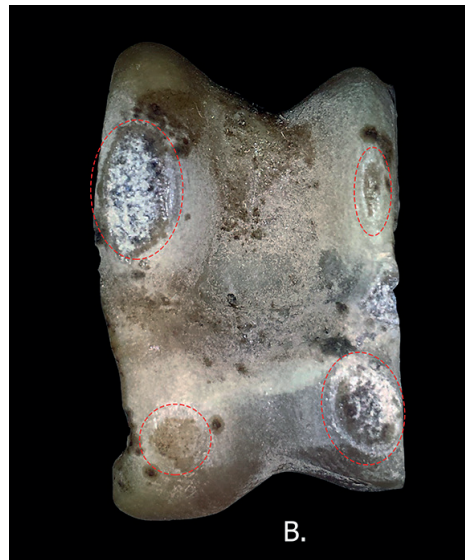
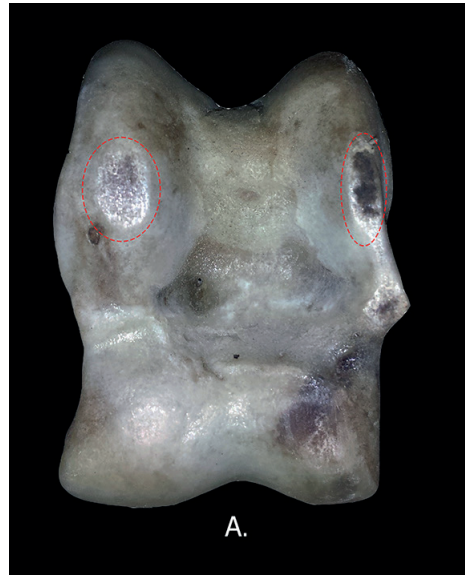


Fig. 7: The use-wear's distribution on two experimental knucklebones- A. used as a passive object on a dry clay floor for ten minutes, B. used as an active object on a dry clay floor for five minutes.

indicating that the objects were abandoned after a short or occasional use. From what we can judge from the 37 out 291 Drama's objects with a well-defined wear, other types of wear traces identified on the knucklebones also reflect a passive use. These are traces of impact and accidental friction (e.g., material removal and pitting, sinking and compression, wide and deep striations isolated or organized in small groups) on the edges and on the prominences of the anterior and posterior sides' joints (fig. 2). There are no wear traces that could suggest an active use of the surfaces. Thus, the large majority of knucklebones were not tools. This applies both to objects dated from Karanovo V, VI

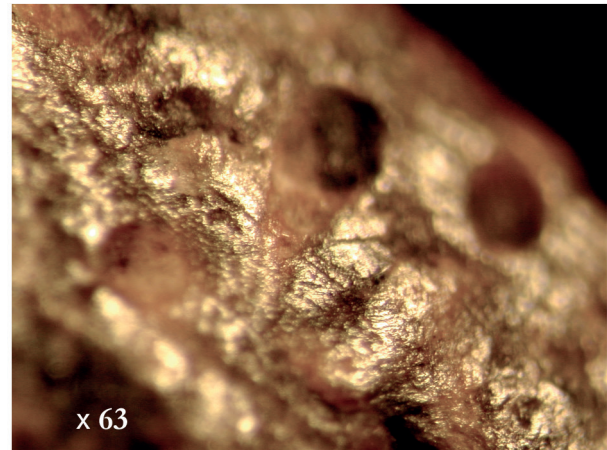
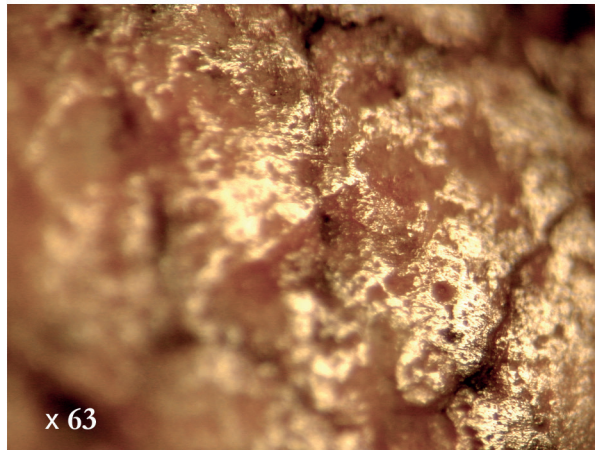


Fig. 8: Microscopic view of the flat sides showing traces of fabrication and wear, with the typical handling polish.

and Precututeni, as well to objects of the Cernavoda III culture³⁴. Some objects, but rare, with more organized and systematic striations could, however, may have functioned as occasional tools.

Overall, the low frequency of well-developed wear is striking – the wear traces consist mostly in surface and edge rounding. This means that many knucklebones were disposed when they were slightly deformed. Some of them are burnt (42 pieces in Drama). Also, it is worth noting that the most visible wear is present on the heavy and massive objects. As in the case of the Precututeni assemblage, the traces of use on the small caprid knucklebones are almost imperceptible, at least at the mesoscopic scale.

The detailed observation of the flattened lateral areas shows abrasion at different degrees of intensity in most of the cases. It can be combined occasionally with scraping. These are technical actions which purpose is to flatten the faces. Sometimes, the technical traces are superposed by traces of use. The most common use wear consists of dull surface and volume blunting, which leads to the erasure of shaping traces and the rounding and polishing of the edges. The areas with wear display an irregular, superficial, and very bright polish interspersed with multiple multidirectional, short, superficial, and unorganized striations, which are specific to handling³⁵.

Given that 1) knucklebones at the three sites were not active tools, 2) most of them do not show highly developed wear traces, but rather rounding with traits associated with handling, and 3) the traces of material removal indicate accidental impact and friction; we deduce that we are dealing with game pieces hand-held and thrown on more or less hard surfaces of various types, upon which they were rolled and pushed. The variability of the soil types could explain the very irregular traces of wear.

An experiment was conducted with large knucklebones that consisted in recreating the playing conditions, by sitting on the floor and throwing the pieces against a well graded soil so that they roll. The experimental pieces show very similar wear to those on archaeological specimens, but with a much more developed wear, this being due to the well graded type of soil. One should imagine at Drama game areas on more or less fine-grained soils, with or without grass, or even hard soil or, possibly, a floor.

Perhaps different units of knucklebones served as various types of games, as it happened in Antiquity. Thus, the game of tossing up the knucklebones and catching them on the back of the hand, called *pentelitha*, was played with five pieces. The Greek and Roman authors mention that it was played rather by women and girls³⁶. The *astragaloi* was a game of chance in which were counted the values of the sides on which the knucklebone fell. In this game, four bones were thrown simultaneously, or one after another. They rolled just until they stabilized on one side³⁷.

ARCHAEOLOGICAL CONTEXT

By studying the archaeological context of knucklebone discoveries from the end of the Neolithic and the Chalcolithic of Balkans and even of the Near East, one could easily recognize very similar patterns in their distribution within the sites.

As a distinguishable element, very often, knucklebones are found grouped together in hoards. Sometimes, used knucklebones are found alongside unused specimens. In the sites of Drama, Isaiia and Târgu Frumos such hoards comprise from five to 20 pieces. Only in one pit at Târgu Frumos, four used knucklebones were found in association with 16 unmodified specimens³⁸, while at Isaiia, six used and eight unused knucklebones were recovered from

34 Sidéra 2012, 269–270; Vornicu 2015.

35 Sidéra 2012, fig. 8.

36 Nikulina / Schmölcke 2008.

37 Nikulina / Schmölcke 2008.

38 Ursulescu / Boghian 1996.

dwelling no. 7³⁹. At Drama, groups of five, seven, nine till 16 knucklebones were identified inside several houses. This behavior is not restricted to the Neolithic and the Chalcolithic, but extends into the Bronze Age and Iron Age⁴⁰. Among the most impressive assemblages by the sheer number of knucklebones found together, are the 497 pieces that form the hoard discovered at the Chalcolithic site of Ghelăiești – Cucuteni culture⁴¹ – or the 684 specimens from the Iron Age site of Meggido⁴², both of them deposited in ceramic pots.

Most of the times, knucklebones are found inside houses – e.g., the Neolithic and Chalcolithic sites of Çatalhöyük⁴³, Kazane Höyük⁴⁴, Pietrele⁴⁵, Iepurești⁴⁶, Costești⁴⁷, – or placed in clay layers within house foundations – at Poduri – *Dealul Ghindaru*⁴⁸, Bordușani⁴⁹ – fireplaces or rebuilt ovens – in the Chalcolithic sites of Hârșova⁵⁰ and Bucșani-*La Pod*⁵¹.

At Târgu Frumos, there are three houses that contain in their inventories a small number of knucklebones (one and two per house), while at Isaiia and Drama the hoards are larger, as mentioned above. Hoards of knucklebones occur in refuse pits or in pits for which a cultic destination was assumed, such at Târgu Frumos⁵².

Certainly, knucklebones are also found in the archaeological strata, but in this case, they are no mentions of them being found grouped or scattered.

Therefore, it seems that the value of knucklebones resides in their use together, destined to a large public.

CONCLUSION

The study of traces associated to volume modifications on abraded or unworked and used knucklebones from the sites of Drama (Bulgaria), Târgu Frumos and Isaiia (Romania) provide sufficient data to formulate a solid hypothesis for the use of knucklebones as game pieces, at least for a significant part of them.

A ludic activity occurred on these sites, indicated by hundreds of objects. For the first time in the history of the Balkans this activity is now very visible. Let us add that the large number of clay tokens discovered at these sites could also refer to another sphere of game play and increase the visibility of gaming activity.

So, games were being played with knucklebones at Drama, Târgu Frumos, and Isaiia with certain intensity. Probably, on these sites, the practice of playing was a part of everyday life of the groups. The presence of knucklebones of different sizes, as well as the variations in the wear traces could speak for the existence of various types of games. Thus, the large knucklebones may have been launched on the ground, while the lightweight pieces were perhaps used differently, like in the Antique games of *astragaloi* and *pentelitha*. A larger experimentation should be carried out in this aspect in order to document all types of use wear.

In any case, such games are collective actions, which involved various actors and various locations – knucklebones and clay tokens are found both inside houses and outdoors, in the spaces between buildings, among domestic wastes.

For a long time, the domain of game was considered anodyne. But theoreticians see it as an integral part of culture and, much more, a source of dynamism within societies⁵³, since its presence is active and fruitful in the major forms of community life: cult, poetry, music and war⁵⁴. Indeed, the sphere of game does not refer so much to the child's universe and bagatelle, but rather to the social relationships between adults⁵⁵. Thus, the game is a “serious task”⁵⁶. Considering the degree of systematization in the practice of games on these sites, new in the history, we ask here whether the strong manifestation of game play in the chronological horizon of the late Neolithic and early Chalcolithic constitutes a new indicator of the changing social relationships that accompanied the emergence of metallurgy.

39 Vornicu 2013.

40 Affanni 2008; Gilmour 1997.

41 Cucos 1999.

42 Minniti / Peyronel 2005, 16.

43 Russell / Griffiths 2013.

44 McCarty 2013.

45 Berciu 1956.

46 Kogălniceanu et al. 2014.

47 Vornicu 2015.

48 Bejenaru et al. 2010.

49 Voinea 1997.

50 Popovici et al. 1998-2000.

51 Bem 2001.

52 Urulescu et al. 2005.

53 Caillois 1958.

54 Huizinga 1951.

55 Hamayon 2012.

56 Huizinga 1951.

REFERENCES

- Armandry 1984: P. Armandry, Chapitre IX: Os et coquilles. *Bulletin de correspondance hellénique, Supplément 9*, 1984, 347–380.
- Bejenaru et al. 2010: L. Bejenaru / D. Monah / G. Bodi, A Deposit of Astragali at the Cooper Age Tell of Poduri-Dealul Ghindaru, Romania. *Antiquity 84* (323). URL: <http://www.antiquity.ac.uk/projgall/bejenaru323/> [Stand: Mai 2016].
- Beldiman et al. 2012: C. Beldiman / D.-M. Sztancs / D. L. Buzea, Animale tehnologice și artefacte preistorice din materii dure animale descoperite la Păuleni-Ciuc, jud. Harghita. *Catalog, Editura Angustia (Sfântu Gheorghe 2012)*.
- Bellessort 2016: M.-N. Bellessort, Osselets. Objets de la vie quotidienne. URL: <http://www.louvre.fr/oeuvre-notices/osselets> [Stand: Juni 2016].
- Bem 2001: C. Bem, A special Type of Aeneolithic Dwelling. Unicum or Deficiency of Conservation? *Studii de Preistorie 1*, 2001, 153–192.
- Berciu 1956: D. Berciu, Cercetări și descoperiri în regiunea București. *Materiale și Cercetări Arheologice 2*, 1956, 493–562.
- Caillois 1958: R. Caillois, *Les Jeux et les Hommes* (Paris 1958).
- Carè 2009: B. Carè, Knucklebones from the Greek necropolis of Locri Epizefiri, Southern Italy (Vith-IIIth century BC): Typological and Functional Analysis. In: F. Lang (ed.), *The Sound of Bones. Proceedings of the 8th Meeting of the ICAZ Worked Bone Research Group in Salzburg 2011. Schriften zur Archäologie und Archäometrie der Paris Lodron-Universität Salzburg 5* (Salzburg 2013) 87–100.
- Cucoș 1999: Ș. Cucuș, Faza Cucuteni B în zona subcarpatică a Moldovei (Piatra-Neamț 1999).
- De Grossi Mazzorin 2014: J. De Grossi Mazzorin, Gli astragali della tomba 101 della necropoli di Varranone (Poggio Picenze – AQ): elementi apotropici per i vivi o per i morti? In: S. Bourdin / V. D’Ercole (eds.), *I Vestini e il loro territorio dalla Preistoria al Medioevo. Collection de l’École française de Rome 494* (Rome 2014) 81–89.
- De Maret / Sidéra 2015: P. De Maret / I. Sidéra, Les poupées sur métapode de ruminant. Quand des exemples africains contribuent à l’interprétation de vestiges d’autres continents, Afrique, *Archéologie et Arts 11*, 2015, 9–20.
- Hamayon 2012: R. Hamayon, *Jouer. Etude anthropologique à partir d’exemples sibériens* (Paris 2012).
- Huizinga 1951: J. Huizinga, *Homo ludens. Essai sur la fonction sociale du jeu* (Paris 1951).
- Kogălniceanu et al. 2014: R. Kogălniceanu / A. Ilie / M. Mărgărit / A. Simalcsik / V. Dumitrașcu, A hoard of astragals discovered in the Copper Age settlement at Iepurești, Giurgiu County, Romania. *Documenta Praehistorica 41*, 2014, 283–304.
- Legrand / Sidéra 2007: A. Legrand / I. Sidéra, Methods, Means, and Results When Studying European Bone Industry. Chapitre 5. In: C. Gate / R. Walker (éd.), *Bones as tools: current methods and interpretations in worked bone studies, British Archaeological Reports. International Series 1622*, 2007, 291–304.
- Lusardy 2006: M. Lusardy, Ces poupées qui ne veulent pas être que des jouets. *Cahiers jungiens de psychanalyse 117*, 2006, 9–16.
- Mărgărit et al. 2014: M. Mărgărit / C. E. Ștefan / V. Dumitrașcu, Management of Osseous Materials for Processing Artifacts in the Eneolithic Boian Settlement of Radovanu – La Muscalu (Romania). *Archaeologia Bulgaria 18/3*, 2014, 1–34.
- McCarty 2013: S. A. McCarty, Telling the Future or Hoarding the past? A Halaf Cattle Astragalus Cache from Kazane Höyük, Southeastern Turkey. In: O. Nieuwenhuys / P. Akkermans / R. Bernbeck / J. Rogasch (eds.), *Interpreting the Late Neolithic of Upper Mesopotamia. Palma Egyptology. Papers on Archaeology from the Leiden Museum of Antiquities*, 2013, 225–232.
- Mellaart 1964: J. Mellaart, Excavations at Çatal Hüyük. 1963. Third Preliminary Report, *Anatolian Studies 14*, 1964, 39–119.
- Minniti / Peyronel 2005: C. Minniti / L. Peyronel, Symbolic or Functional Astragali from Tell Mardikh-Ebla (Syria). *Italian Archaeological Mission at Tell Mardikh-Ebla, Archaeofauna 14*, 2005, 7–26.
- Nikulina / Schmölcke 2008: E. A. Nikulina / U. Schmölcke, Les Osselets, ancêtres du jeu de dès. *Pour la science 365(3)*, 2008, 40–43.
- Poplin 1984: F. Poplin, Contribution ostéo-archéologique à la connaissance des astragales de l’Antre corycien, *Bulletin de correspondance hellénique, Supplément 9*, 1984, 381–393.
- Popovici et al. 1998–2000: D. Popovici / B. Randoiu / Y. Railland / V. Voinea / F. Vlad / C. Bem / C. Haită, Les recherches archéologiques du tell de Hârsova (départ. de Constantza) 1997–1998. *Cercetări Arheologice 11/1*, 1998–2000, 13–124.
- Russell / Griffiths 2013: N. Russell / J. L. Griffiths, Çatalhöyük Worked Bone: South and 4040 Areas. In: I. Hodder (ed.), *Substantive Technologies at Çatalhöyük: Reports from the 2000–2008 Seasons. (Los Angeles 2013) 227–306*.
- Sidéra 1998: I. Sidéra, Rapport d’étude de l’assemblage osseux de Drama (Bulgarie). *Bericht der Römisch-Germanischen Kommission 77*, 1998, 120–129.

- Sidéra 2000: I. Sidéra, Feu et industrie osseuse. Un marqueur d'identité culturelle. *Paléorient* 26/2, 51–59, fig. pl. 6–7.
- Sidéra 2012: I. Sidéra, Bone, antler and tooth artifacts. In: R. Gleser / M. Thomas, “Merdžumekja”-Südothang. Späte Kupferzeit und früheste Bronzezeit: Ergebnisse siedlungsarchäologischer Forschungen. Drama - Forschungen in einer Mikroregion 1 (Bonn 2012) 269–275.
- Tait 1982: W. J. Tait, Game-Boxes and Accessories from the Tomb of Tut'ankhamun (Oxford 1982).
- Tatár 1972: M. Tatár, Le mósön šagaj charvach, jeu d'osselets mongol. *Acta Orientalia Academiae Scientiarum Hungaricae* 25, 221–226.
- Ursulescu / Boghian 1996: N. Ursulescu / D. Boghian, Principalele rezultate ale cercetărilor arheologice din aşezarea precucuteniană de la Tg.Frumos (jud. Iași) I, în *Codrii Cosminului s.n. – Analele* (Suceava 1996).
- Ursulescu et al. 2005: N. Ursulescu / D. Boghian / V. Cotiugă, Problèmes de la culture Précucuteni a la lumière des recherches de Târgu Frumos (départ. Iași). *Scripta Praehistorica*. Institutul de Arheologie Iași, Academia Română, Miscellanea in honorem nonagenarii magistri Mircea Petrescu Dîmbovița oblat 1 (Iași 2005) 217–260.
- Vitezović 2013: S. Vitezović, The Neolithic Bone Industry from Drenovac, Serbia. In J. Baron / B. Kufel-Diakowska (eds.), *Written in Bones. Studies on Technological and Social Contexts of Past Faunal Skeletal Remains* (Wrocław 2013) 117–136.
- Vitezović 2013a: S. Vitezović, The Vinča Culture Bone Industry from Divostin. *Zbornik Narodnog Muzeja* 21/1, 2013, 109–127.
- Vitezović 2013b: S. Vitezović, The Prehistoric Bone Tool Assemblage from Grivac (Central Serbia). *Journal of Serbian Archaeological Society* 29, 2013, 209–232.
- Voinea 1997: V. Voinea, Artifacts made from hard raw material of animal origin, in *Archaeological researches at Bordusani-Popină (Ialomița County)*. Preliminary report 1993–1994. *Cercetări arheologice* 10, 1997, 96–105.
- Vornicu 2013: A. Vornicu, *Industria materiilor dure animale în cultura Precucuteni. Studiu de caz: artefactele din aşezările de la Isăia și Târgu Frumos* (PhD thesis, Universitatea Alexandru Ioan Cuza, Iași 2013).
- Vornicu 2015: A. Vornicu, Technological behaviour in the manufacturing of bone pointed tools: case study on the chalcolithic settlement from Târgu Frumos, Iași county, Romania. In: M. Mărgărit / G. Le Dosseur / A. Averbough, *An overview of the exploitation of hard animal materials during the Neolithic and Chalcolithic* (București 2015) 137–154.