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TRADYCJE I INNOWACJE W TECHNOLOGII WŁÓKIENNICZEJ
W EPOCE BRĄZU W EUROPIE I BASENIE MORZA ŚRÓDZIEMNEGO

REDAKCJA NAUKOWA

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TRADITION AND INNOVATION IN TEXTILE TECHNOLOGY
IN BRONZE AGE EUROPE AND THE MEDITERRANEAN

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INTRODUCTION TO THE VOLUME LVI OF THE 'ŚWIATOWIT' JOURNAL

Dear Readers,

In the incoming year 2019 we are going to celebrate the centenary of the opening and foundation of the Institute of Archaeology at the University of Warsaw. This occasion makes all of us in the academic community very proud, since it was when the Institute became one of the most important and dynamically-developing institutions, where many generations of students could find an intellectual quiet harbour, hone their knowledge, and indulge in their fascination about the past and past cultures. One of the emblematic symbols strongly associated with this intellectual atmosphere has ever since been, and I hope it shall remain so, 'Światowit'. This archaeological journal has been considered the most important platform for presentation of research results and exchange of ideas with other scholars. If we take a careful look at the first volumes of 'Światowit', edited by one of the most prominent scholars in the history of Polish archaeology, Erazm Majewski, it will be clear that since the establishment of the journal it has been an academic and scholarly medium focusing not only on the local Polish archaeological research, but has included also contributions analysing findings, artefacts, and social and cultural processes from a much broader perspective. In this context, it is worth mentioning, especially for those Readers who have so far had little interest in the history of archaeology in Poland and the dynamics of development of this scholarly discipline, that the first volume of 'Światowit' was published as early as 1899. It makes the journal predate the history of archaeology in the Institute itself.

If we had another close look into the past, the process of the development of the journal can be clearly observed with its many editorial changes, which reflect a natural scientific, scholarly, and technological progress. It means that the 'Światowit' journal has never been a conservative medium and has instead ever been open to new ideas and research perspectives, even if sometimes they promoted controversial results or, much more often, heralded breakthroughs in our understanding of the past and past cultures with the dynamical processes of their expansion, decline, and transformation.

The technological aspects of the editorial process also required some adjustments over the years. The main goal of every change in the layout, reviewing process, or other

such features was undertaken so as to help 'Światowit' become and remain a top-tier and valued archaeological periodical with readership in Poland and beyond.

This very intention was behind one of the most important recent decisions – to change the language of the journal and focus our attention on publishing articles in foreign languages, especially in English. This choice determined a thorough shift in the editorial approach and involved the latest modification of the layout of the periodical. The person who should be credited with reviving and pushing the idea of 'Światowit' forward was the late Tomasz Mikocki. He was a very dynamic personality and openly shared his ideas with other scholars and colleagues employed in the Institute of Archaeology at the University of Warsaw. As Chief Editor of the journal, he was in a position to rewrite, redefine, and renew its mission statement. One of his decisions was to split the two main channels of archaeological research and publish two volumes a year. One was dedicated to the prehistoric research and some aspect of archaeology of Poland. The other, in turn, focused on the so-called Mediterranean or non-European archaeological studies. Such state of matters continued for a relatively long time. The next two Chief Editors were simultaneously Directors of the Institute. It needs to be admitted that since Tomasz Mikocki reformed and renewed 'Światowit', it became a rule that the director of the Institute was automatically elected as Chief Editor of the journal. In consequence, with the personal involvement of Kazimierz Lewartowski and Wojciech Nowakowski, and their verve for the editorial work, it was possible to maintain the high scientific quality of 'Światowit'. The current situation, especially the internationalisation of the archaeological research, prompted another change in the editorial concept of the journal. Nowadays, the artificial border between the so-called Mediterranean research and pre- or protohistorical as well as medieval archaeology seems to be absolutely pointless. Even more so if one considers the diverse and interdisciplinary scholarly pursuits of the academic staff of the Institute of Archaeology at the University of Warsaw. Moreover, a very dynamic and active new generation of archaeologists took over as editors of the journal, which testifies that the legacy of the past generations and numerous scholars who

regularly published their contributions in 'Światowit' is still vivid among younger researchers, and thus makes keeping 'Światowit' up and running a worthwhile effort.

In parallel to the changes in the editorial team, as well as the recent activity of the journal's scientific board, the general concept of the periodical was also updated during meetings of the steering committee.

As a fruit of the said labour and choices, we are delighted to present the latest volume of 'Światowit'. It can be noticed on the first glance that in comparison to the previous editions this publication looks slightly different. The decision concerning the graphic layout of the journal, and a more open policy regarding the possible publications of the texts sent by authors not employed in our Institute, was broadly discussed, as already mentioned above. Right now, the final effect of these editorial works is becoming more visible. The whole editorial team and I personally believe that the new layout will be well-received and the scope of the problems and research published in contributions submitted to this volume, and those which shall be published in the future, will be welcomed warmly by the community of scholars and researchers.

This volume embodies the new way of thinking about our journal. The current issue contains numerous articles focused mainly on research on the ancient textile industry, fabric manufacturing, and weaving. These studies show almost the whole spectrum of this scholarly discipline and simultaneously put our new idea and

concept of 'Światowit' to practice. Here, the Readers will find multi-faceted studies dealing with problems concerning textile production in the prehistory and proto-history of Northern Europe as well as the Mediterranean, Greece, Middle East, and other regions outside Europe. All of these eleven contributions were originally presented as lectures during the session '*Tradition and Innovation in Textile Technology in Bronze Age Europe and the Mediterranean*' organised by Agata Ulanowska and Małgorzata Siennicka during the 22nd Annual Meeting of the European Association of Archaeologists in Vilnius. It bears emphasising that the contributions presented in the current volume are not only of a high scholarly level, but also witness emergence of a small yet dynamic team of researchers from our Institute who are following the latest international studies on textiles and fabric manufacturing industries. Such activities represent new perspectives in archaeological research and as attempts at reconstruction of culturally- and socially-patterned behaviour in past societies will always be warmly welcomed and supported by the Institute. I hope deeply that this publication is opening a new chapter in the history of the 'Światowit' journal, which will confirm its position as one of the most important archaeological periodicals in Poland providing information on the latest state-of-the-art research endeavours. On behalf of the editors and my humble self, I can confidently say that we are ready to work hard to keep the journal on a good level and ensure its recognition among other archaeological periodicals published in the European Union.

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TRADITION AND INNOVATION IN TEXTILE TECHNOLOGY
IN BRONZE AGE EUROPE AND THE MEDITERRANEAN

ABSTRACT

The papers collected in the present volume of the 'Światowit' journal examine developments in textile production in Bronze and Iron Age Europe and the Mediterranean by tracing both traditional and innovative elements in textile technology. The issue comprises 11 original contributions that resulted from the session '*Tradition and Innovation in Textile Technology in Bronze Age Europe and the Mediterranean*' organised in 2016 by Agata Ulanowska and Małgorzata Siennicka during the 22nd Annual Meeting of the European

Association of Archaeologists in Vilnius. The papers discuss available archaeological evidence of textiles, textile imprints, textile tools and textile iconography, as well as botanical and faunal remains related to textile manufacture and dyeing. The papers examine the types of social relations and cultural and economic processes which may have enhanced developments in textile technology and impacted on cross-cultural transmission of textile knowledge and skills in the Bronze and Iron Ages.

STRESZCZENIE

TRADYCJE I INNOWACJE W TECHNOLOGII WŁÓKIENNICZEJ W EPOCE BRĄZU W EUROPIE
I BASENIE MORZA ŚRÓDZIEMNEGO

Artykuły zebrane w tym tomie „Światowita” traktują o zmianach w produkcji włókienniczej w Europie i w basenie Morza Śródziemnego w epoce brązu i żelaza. W skład tomu wchodzi 11 oryginalnych tekstów, będących rezultatem sesji pt. „*Tradition and Innovation in Textile Technology in Bronze Age Europe and the Mediterranean*” zorganizowanej przez Agatę Ulanowską i Małgorzatę Siennicką podczas 22-go *Annual Meeting of the European Association of Archaeologists* w Wilnie. Przedmiotem

rozważań są tekstylia archeologiczne i ich odciski, narzędzia włókiennicze, ikonografia tekstyliów oraz inne pozostałości odnoszące się do wyrobu tekstyliów i ich barwienia. Analizowane są także relacje społeczne oraz procesy ekonomiczne, które sprzyjać mogły rozwojowi technologii włókiennictwa i wpływały na międzykulturowy przepływ wiedzy technicznej i umiejętności rzemieślniczych oraz dystrybucję wyrobów.

Keywords: textile technology, innovation, tradition, Bronze Age, Iron Age, Europe, Mediterranean

Textile archaeology has developed significantly in recent years, prompting growing academic interest in archaeological textiles, textile technology, and textile production. These developments have arisen from multi- and interdisciplinary approaches to studies of prehistoric textiles that comprise all the available evidence and comparative data, such as material-contextual, iconographic, and textual sources, as well as experimental archaeology and scientific analyses (*cf.* Rahmstorf 2015; Siennicka *et al.* 2018). As a result, textile production, with its complex technology and high socio-cultural significance, has been acknowledged as a key craft in the economies of Bronze Age Europe and the Mediterranean. In addition to this, the great diversity and complexity of knowledge and skills, as well as the large workloads required by textile-making, have been properly recognised as economically and socially important (*cf.* Andersson Strand, Nosch 2015).

Despite its complexity and importance, textile technology has often been considered rather traditional and unchanging throughout the centuries of the Bronze Age (for a discussion on traditional and innovative elements in textile production, *cf.* Nosch 2015). It is only in the last few years that innovations in textile technology, such as a spread of woolly sheep and the growing significance of 'wool economy' (*cf.* Breniquet Michel 2014; Nosch 2015; Becker *et al.* 2016; Bender Jørgensen, Rast-Eicher 2016; Sabatini in this volume), various methods of procurement of fibres and yarns (*cf.* Rast Eicher 2005; Grömer *et al.* 2013; Bender Jørgensen, Rast-Eicher 2016; Ruiz de Haro in this volume), various weaving and decoration techniques such as twill weaves, tapestry, embroidery (*cf.* Grömer *et al.* 2013; Nosch 2015; Bender Jørgensen, Rast-Eicher 2016; Banck-Burgess in this volume), as well as invention of advanced dyeing techniques such as purple dyeing (*cf.* Burke 2010; Nosch 2015; Hofmann-de Keijzer 2016; Landenius Enegren, Meo 2017) have been recognised as major developments in the Bronze Age.

In order to examine in more detail the processes that may have influenced innovations in textile technology, as well as possible factors which may have prevented textile techniques from changing through time, Agata Ulanowska and Małgorzata Siennicka organised a session 'Tradition and Innovation in Textile Technology in Bronze Age Europe and the Mediterranean' during the 22nd Annual Meeting of the European Association of Archaeologists in Vilnius, in 2016. The session was intended to explore the ways in which traditional and innovative elements in textile technology may be traced and defined in the *longue durée* of the Bronze Age. To this end, the archaeo-

logical evidence for textiles, textile imprints, textile tools and textile iconography, as well as evidence for the botanical and faunal environment of Bronze and Iron Age Europe and the Mediterranean were analysed (see various contributions in this volume). It was also an objective of the conference to scrutinise what kinds of social relations, as well as cultural and economic processes, might have stood behind the developments in textile technology, and what their impact might have been on the transmission of textile knowledge and skills (*cf.* Ulanowska, Siennicka 2017a; 2017b).

The peer-reviewed contributions collected in the present volume of the 'Światowit' journal are the outcomes of the abovementioned EAA session in Vilnius.¹ The contributions are arranged geo-chronologically, starting with the discussion on the oldest traditions and innovations in textile-making in Europe.

In her paper "Nothing Like Textiles": *Manufacturing Traditions in Textile Archaeology*, **Johanna Banck-Burgess** examines prehistoric techniques for making patterned textiles. She discusses several combinations of weaving and wrapping techniques observed in archaeological textiles from Europe dated to between the Neolithic and the Early Iron Age, and argues that manufacturing traditions were of significant importance for the value and visual appearance of prehistoric fabrics.

A study of 'textile ceramics' – impressions of textiles on Early Bronze Age ceramic vessels from Bruszczewo in Poland – is presented in the paper „Textilkeramik“: *Textileindrücke auf bronzzeitlicher Keramik vom Fundplatz Bruszczewo* by **Stefanie Schaefer-Di Maida**. On the basis of silicone impressions taken from the original imprints on clay, she analyses technical features of the impressed textiles and suggests that second-hand textiles were used in production of pottery, as well as proposes possible aesthetic and symbolic meanings of the fabrics impressed on clay.

Serena Sabatini, in the paper 'Wool Economy During the European Bronze Age', examines whether the conceptual frame of 'wool economy', which has been successfully applied to studies of textile production in the Near East and the Aegean Bronze Age, may also be applicable to the evidence from Bronze Age Europe. This contribution also considers the complex socio-economical mechanisms that must have stood behind the production and trade of wool in prehistory.

In the paper *Innovative or Traditional: Diachronic Approach to Weaving Technology in Bronze Age Greece*, **Agata Ulanowska** identifies potential innovations in weaving technology in Bronze Age Greece, as well as

¹ Unfortunately, not all of the originally presented papers could be published in this volume. For the complete list of the partici-

pants of the EAA session in Vilnius and short summaries of their presentations, *cf.* Ulanowska, Siennicka 2017a; 2017b.

discusses whether these innovations can be examined diachronically and in the context of specific socio-cultural relations. As potential innovations she suggests improvements in the construction of the warp-weighted loom, possible use of other types of big looms, and the introduction of new forms of loom weights.

Various uses of fibre-spun products, e.g. strings and ropes, as well as the research potential of imprints of threads on clay and plaster, are studied in the contribution *'Beyond Textiles: Alternative Uses of Twisted Fibres. Evidence from Akrotiri, Thera'* by **Sophia Vakirtzi**, **Fragoula Georma**, and **Artemis Karnava**. Technical parameters of thread and string impressions from Late Bronze Age Akrotiri on Thera are also examined in relation to finds of actual strings and ropes from Akrotiri, as well as the functional parameters of textile tools discovered at the site, in order to recognise whether locally and non-locally produced threads may be distinguished.

Dominika Kofel discusses textile production and dyeing at Late Bronze Age Hala Sultan Tekke in the paper *'To Dye or Not to Dye: Bioarchaeological Studies of Hala Sultan Tekke Site, Cyprus'*. With the intention to scrutinise what kind of raw materials were used and what textile activities could have been undertaken at Dromolaxia Vizatzia, she analyses the compound evidence of bioarchaeological remains (plant macrofossils and molluscs) together with textile tools and built-in installations from the site.

The use of a spinning bowl and production of linen yarns in the Castreña culture of the Late Bronze and Iron Age are discussed by **María Irene Ruiz de Haro** in her paper *'Technical Innovation in Processing of Flax Yarn Production in the Northwest of the Iberian Peninsula: The Spinning Bowl'*. She analyses the limited and late distribution of the so-called 'spinning bowls' in relation to flax, a fibre that was presumably processed with these tools, contextualised by the raw materials and spinning techniques that were traditionally used in this region and time-period.

In the paper *'Textile-impressed Pottery Revisited: Its Usefulness for Studying Bronze Age Textile Craft in Estonia'*, **Riina Rammo** examines and systematises textile impressions on pottery as indirect evidence of textile manufacturing in the Estonian Bronze Age. While discussing the limitations of the data that can be gained from the imprints, as well as the application of other items that may have been impressed on clay, she suggests that textiles were primarily impressed on clay for functional reasons, without excluding potential symbolic meanings of this practise.

Magdalena Przymorska-Sztuczka, in the paper *'A Comb or a Loom? An Attempt at Interpretation of the Szemud Urn Image'*, discusses an engraving on a face-urn from the Late Bronze or Early Iron Age Szemud in Poland as a possible representation of a vertical warp-

weighted loom. By presenting a comparative analysis of the Iron Age iconography of the warp-weighted loom, she suggests a new interpretation for a motif that is traditionally recognised as a depiction of a comb.

In the paper *'The Hallstatt Textiles from the Bi-ritual Cemetery in Świbie'*, **Joanna Słomska** and **Łukasz Antosik** present the largest collection of archaeological textiles from the Hallstatt period in Poland. After discussing technical parameters of fabrics, braids, and threads, they argue that, unlike the other finds of archaeological textiles from the Hallstatt period in Poland, the textiles from Świbie represent several features that associate them with textile production of the Lusatian culture.

In the contribution *'Wool Textiles from the Roman Period at the Site of Grudna, Poland'*, **Małgorzata Grupa** introduces unique remains of wool textiles, made using the sprang technique, that were discovered in a kurgan dated to the Roman period. She discusses the status of the person buried in the kurgan and the possible provenance, e.g. local or non-local, of the grave goods, including the textiles.

The editors of the present 'Światowit' volume wish to express their special thanks to Marie-Louise Nosch (Centre for Textile Research, Copenhagen) whose excellent paper *'The Wool Age: Traditions and Innovations in Textile Production, Consumption and Administration in the Late Bronze Age Aegean'* (2015) inspired them to choose tradition and innovation as the main framework for investigating developments in textile technology during the EAA session in Vilnius. We would also like to thank the colleagues from the EAA and the University of Vilnius for all the received support and help in organising the session. However, the organisation of the session would not be possible without the funding received by Agata Ulanowska from the National Science Centre in Poland for her research project 'Textile production in Bronze Age Greece – comparative studies of the Aegean weaving techniques' (FUGA post-doctoral internship at the Centre for Research on Ancient Technologies, Polish Academy of Sciences, awarded by the National Science Centre in Poland, DEC-2015/16/S/HS3/00085) and the funding received by Małgorzata Siennicka from the Research Executive Agency of the European Commission and the Marie Skłodowska-Curie Actions for her research on textile tools from Early Bronze Age Greece carried out at the University of Copenhagen (PIEF-GA-2012-329910).

The editors wish to express their gratitude to the director of the Institute of Archaeology at the University of Warsaw, Krzysztof Jakubiak, who kindly agreed to publish the proceedings of the Vilnius session in this issue of the 'Światowit' journal, as well as provided all the necessary funding for this publication. For the language proof

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Finally, the editors wish to sincerely and warmly thank all the peer-reviewers and experts who kindly advised on the submitted papers contributing their time and knowledge to improve the entire publication. These are, in alphabetical order: **Carmen Alfaro Giner** (University of Valencia, Spain), **Eva Andersson Strand** (Centre for Textile Research, Copenhagen, Denmark), **Marta Bazzanella** (Museo degli Usi e Costumi della Gente Trentina, Trento,

Italy), **Lise Bender Jørgensen** (Norwegian University of Science and Technology, Trondheim, Norway), **Karina Grömer** (Natural History Museum in Vienna, Austria), **Anna Grossman** (Archaeological Museum in Biskupin, Poland), **Susan Möller-Wiering** (Archäologie und Textil, Germany), **Elena Soriga** (“L’Orientale” University of Naples, Italy), **Stella Spantidaki** (ARTEX Hellenic Centre for Research and Conservation of Archaeological Textiles, Athens, Greece), and **John Peter Wild** (University of Manchester, England).

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