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A MESSAGE FROM THE EDITOR

Happy New Year to All of You!!

With the start of a New Year, we often reflect on the events of the past year and look to the future and potential of the New Year. Change often is a major part of how we reflect on the good and the bad of the past, present and future. A change from something comfortable and familiar to something new and unknown (e.g., the transition from President Obama to President-Elect Trump) can be very unsettling and may even cause concern among some. The Society for Archaeological Sciences (SAS) also has gone through some recent changes and more are likely for the future. The torch of leadership has been smoothly passed from former President Marc Walton to current President Rachel Popelka-Filcoff. Likewise a few other positions within the SAS Executive Board and the SAS Bulletin also have changed, including the SAS Bulletin Editor.

As the new SAS Bulletin Editor, I want to start by thanking Vanessa Muros for her wonderful work as SAS Bulletin Editor since Summer 2013. Kudos to you and thank you so much for your time and efforts, Vanessa! I assumed the role of Editor starting this past May, and almost immediately my life changed in many ways. I packed all my belongings, which were shipped off and placed in storage in southern California for 3 months, while my wife, my 9-month old daughter and I travelled all over the world and lived out of suitcases in remote locations for 3 months. Upon the traveling ending, I immediately had to find a place to live across the country, locate and unpack all of our belongings and start a new job within 2 weeks. The work load was unexpectedly

high and finding that balance in life took me a few months. Needless to say 2016 for me and my family was filled with many change and shifts from the comfortable and familiar to the new and unknown. So, this in part is my apology and excuse for the delay in getting out Issues 3 and 4 of the 2016 SAS Bulletin. As a result, I am sending out the final issue of 2016 as an enlarged and combined issue Nos. 3/4 of Volume 39. In 2017 the normal 4 issues will be back on track with only minor delays in Issue 1 of the New Year. Again, I apologize and thank you for your patience in allowing me these transitions.

Changes can be fast and furious or slow and tortuous, but they do not always need to be bad or sad (e.g., the loss of David Bowie). In fact, some changes can be very good things, and help to provide new and exciting opportunities and paths to the future. This is absolutely the case with the SAS Bulletin. We have followed a tried and true formula for the Bulletin for many years, and long before my days of contributing, the Bulletin had always been something I looked forward to receiving in the mail. Eventually, changes were made and new issues of the Bulletin were available as both printed issues and PDF files for download by members, while some of the old issues also were prepared as PDF files for download. This routine again changed where members could opt to receive either printed or electronic issues of the Bulletin, and many chose the PDF only option as many of us already are overwhelmed by receiving printed materials, and the electronic editions made our lives simpler, transportable and more manageable.

Well, we are again at the crux of potential change with the SAS Bulletin and you, the members, will help us to shape these changes and the future vision of the Bulletin. These changes could include shifting to a four-times-per-year online format for the Bulletin (which could be downloadable as a PDF), and print-on-demand options for those who still want the traditional printed version. Access to these issues will still be restricted on an annual basis to allow members to have the first access to view and/or download, before the general public has access. Likewise, some aspects of contributions to the Bulletin are time sensitive, and it makes more sense to shift these

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components to online formats where the membership can have quicker more timely access. The shift to online formats and access also will allow for increased color figures and graphics, which are not economically viable in the current price structure for the Bulletin.

There are other potential future changes in the works for the SAS Bulletin, both in its presentation and format, as well as in its content, and I hope you all will be excited about the changes in vision and direction expected in the coming months and years. So, while the future may be uncertain, it does not have to be frightening and I hope you will all see some new and wonderful changes in the SAS Bulletin in 2017 and beyond. Have a happy, healthy and productive 2017!!

Thomas R. Fenn
SAS Bulletin Editor

MARITIME ARCHAEOLOGY
Nicolás Ciarlo, Associate Editor

This section contains two notes about ongoing investigations in maritime archaeology. The first deals with the determination of manufacturing methods for copper bolts from early Modern British warships, by means of crystallographic analysis (P. Northover), while the second is focused on the application of geophysics for modeling a 3D image of a First World War' wreck (J. Russo & A. Alves Salgado). Besides, an account on recent papers, books, thesis, previous conferences, and future courses, is presented.

Current Research

Ships' sheathing and fastenings

Building on the characterization of copper and brass bolts and sheathing from three shipwrecks (HMS *Impregnable* lost in 1799), HMS *Pomone* (1811) and *Flower of Ugie* (1852) a multi-faceted program of research has been developed. The first part continues the metallurgical study of copper and copper alloy components from wooden ships. A database has been assembled of all available compositions from around the world which is helping construct a robust chronology, and to assist in reassessing ships already studied, confirming the identity of wrecks or in helping identify unknown wrecks. Problems still remain with the analysis of brass because with alloys like Muntz metal part of the structure always corrodes very quickly and a method of determining the original alloy content is still being developed.

For the crucial period for British ships between, say, 1775 and 1825 the copper is rather uniform in composition and

microstructure but the use of a range of diffraction techniques to determine the crystallographic texture of copper bolts can identify the methods by which they were produced and to connect them with a particular manufacturer even when (as is usual) there are no works stamps on the bolts. For example, the process patented by William Collins in 1783 for drawing rather than rolling bolts produces a very recognizable texture and these results have now been published.

Parallel documentary research is focused on Admiralty records and the business archive of William Forbes. This last is very detailed and covers aspects from the operation of his rolling mill to the organization of the naval supply chain. It is possible to link Admiralty orders with the ledgers itemizing material leaving the works and for what ships. For a wreck like *Impregnable* excavated bolts can be matched with a very complete paper trail.

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Creating an analogical 3D model of a Great War loss from a multibeam record

On March 31, 1917, the German submarine U-35 left the base of Kattaro (Montenegro), heading to the south of Portugal. On April 24, she sunk one Danish and two Norwegian steamers, and an Italian sailing vessel, off Sagres and Lagos, Portugal. Since 2014, CINAV – Portuguese Research Centre, has been studying this Great War episode, both from the historical and archaeological perspectives.

One of the sunken Norwegian steamers was the 3.715 tons SS *Vilhelm Krag*, where different methods of wreck recording were tested, including the classical multibeam geophysics. Based on the data acquired, the feasibility of an analogical 3D model of the wreck and its value as an archaeological resource were tested.

The archaeological recording by geophysics —multibeam in this case— provides researchers with a very useful tool to interpret a wreck. To brief, debrief and allocate diverse tasks, a tridimensional analogical tool is sometimes preferred over a digital one. This is of critical importance when it comes to efficiency and safety. Bearing this in mind, the team searched for methods to produce an analogical 3D model of the SS *Vilhelm Krag*, in the most automatic, quick and reliable way possible.

To achieve this goal, data acquired both from archaeographic and geophysical records was crucial. A considerable amount of reliable x, y and z data was

obtained by geophysics (Figure 1.a). From this point onwards, a quest for ways to transform digital tridimensional information in analogical data began. The idea was suggested by a mechanical engineer, Ricardo Rodrigues, while the printable file (see below) was elaborated by the project boat skipper, Tiago Dores.

The process consists in using software. This is indeed very simple, but works well nonetheless. For instance, with the open source *MeshLab*, used for processing and editing unconstructed 3D triangular meshes (<http://meshlab.sourceforge.net/>), the multibeam x, y and z data was transformed in a .stl file, which can be loaded to any 3D printing software. The .stl file was printed, thus completing the first step toward an analogical 3D model. Afterwards, details missed during the impression, such as rocks, were added. The result was then undercoated and hand painted, simulating rust and concretion, as well as marine animal and plant colonization (Figure 1.b).

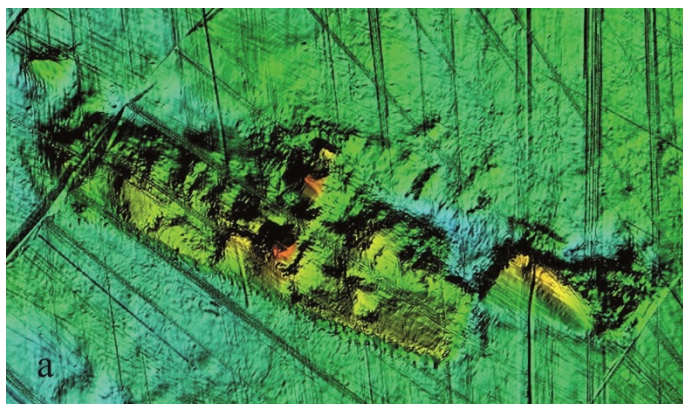


Figure 1. (a) A multibeam image of the site SS Vilhelm Krag; (b) A 3D image, after digital processing and editing.

By making the best of an existing pack of data recorded by multibeam, which optimized and maximized the technical means applied, it was possible to produce a very useful analogical 3D model of the wreck of the SS *Vilhelm Krag* from a digital 2D record. Thanks to the resulting model, the research staff was able to plan in advance the dives and tasks to perform, as well as analyze

their efficiency. This made possible a better and safer archaeological practice, providing a method and resource which is very valuable for research.

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Recent Publications

International Journal of Nautical Archaeology. From *IJNA* 2016, Vol. 45, No. 1: “Discovery of Iron Grapnel Anchors in Early Modern Ryukyu and Management of Underwater Cultural Heritage in Okinawa, Japan” (R. Ono et al.); and “Archaeological Assessment of Second World War Anti-Torpedo Close Protection pontoons in Scapa Flow, Orkney” (A. Christie et al.).

Journal of Archaeological Sciences. From *JAS* 2016 (up to June), Vol. 65: “Fishing with lure hooks at the Late Neolithic site of Vinča – Belo Brdo, Serbia” (E. Cristiani et al.); Vol. 66: “Detection of shipwrecks in ocean colour satellite imagery” (M. Baeye et al.); Vol. 67: “Tin ingots from a probable Bronze Age shipwreck off the coast of Salcombe, Devon: Composition and microstructure” (Q. Wang et al.); and Vol. 70: “Distinguishing offshore bird hunting from beach scavenging in archaeological contexts: The value of modern beach surveys” (K. M. Bovy et al.); and “Testing the endurance of prehistoric adornments: Raw materials from the aquatic environment” (M. Mărgărit).

Journal of Archaeological Sciences: Reports. From *JAS: Reports* 2016 (up to June), Vol. 5: “The nutritional value of Pacific herring: An ancient cultural keystone species on the Northwest Coast of North America” (M. L. Moss); “Extended residence times for foraminifera in a marine-influenced terrestrial archaeological deposit and implications for palaeoenvironmental reconstruction” (T. Nagel et al.); “The archeology, sedimentology and paleontology of Gray’s Reef National Marine Sanctuary and nearby hard bottom reefs along the mid continental shelf of the Georgia Bight” (E. G. Garrison et al.); “Craft production of large quantities of metal artifacts at the beginnings of industrialization: Application of SEM–EDS and multivariate analysis on sheathing tacks from a British transport sunk in 1813” (N. C. Ciarlo et al.); “Evolution of Taman Peninsula’s ancient Bosphorus channels, south-west Russia: Deltaic progradation and Greek colonization” (M. Giaime et al.); “Wind and wave modelling for the evaluation of the maritime accessibility and protection afforded by ancient harbours” (C. Safadi); and “A study on provenance of marine porcelains from Huaguangjiao No. 1 after sample desalination” (Y. Chen et al.); Vol. 6: “Prey selection, size, and breakage

differences in *Turbo undulatus* opercula found within Pacific Gull (*Larus pacificus*) middens compared to Aboriginal middens and natural beach deposits, southeast Australia” (J. Sherwood et al.); “Windward vs. leeward: Inter-site variation in marine resource exploitation on Ebon Atoll, Republic of the Marshall Islands” (M. Harris et al.); “Refining the chronology for west polynesian colonization: New data from the Samoan archipelago” (J. T. Clark et al.); “Scanning the *H. L. Hunley*: Employing a structured-light scanning system in the archaeological documentation of a unique maritime artifact” (M. P. Scafuri & B. Rennison); and “Identifying prehistoric trade networks in the Massim region, Papua New Guinea: Evidence from petrographic and chemical compositional pottery analyses from Rossel and Nimowa Islands in the Louisiade Archipelago” (B. Shaw et al.). Furthermore, this volume contains a special section entitled *Aquatic resource exploitation by prehistoric humans*, that includes a series of articles focused on human management of different resources associated to aquatic environments (e.g. fish, shellfish, and birds), as well as on the relevance of isotopic evidence and other sources of data to evaluate the consumption of marine and freshwater animals in island and coastal scenarios. Finally, from Vol. 7: “Geoarchaeological evolution of Tel Akko’s ancient harbour (Israel)” (C. Morhange et al.); “Dendrochronological dating of kauri timbers from Browne’s spar station (1832–1836), Mahurangi, Auckland, New Zealand” (G. Boswijk et al.); “A ‘North Atlantic island signature’ of timber exploitation: Evidence from wooden artefact assemblages from Viking Age and Medieval Iceland” (D. E. Mooney); “The environmental context of the Neolithic monuments on the Brodgar Isthmus, Mainland, Orkney” (C. R. Bates et al.); and “Indicator groups and effective seasons on the coast: Zooarchaeology of fish in the lower Suwannee region of Florida” (A. Palmiotto).

Quaternary International. From Vol. 391: “Maritime fishing during the Middle Holocene in the hyperarid coast of the Atacama Desert” (S. Rebolledo et al.); Vol. 401: “Upper Holocene sea level changes in the West Saronic Gulf, Greece” (E. Kolaiti & N. D. Mourtzas); “Vertical land movements and sea level changes along the coast of Crete (Greece) since Late Holocene” (N. Mourtzas et al.); and “New insights on the subsidence of Lipari island (Aeolian islands, southern Italy) from the submerged Roman age pier at Marina Lunga” (M. Anzidei et al.); Vol. 405 (Part B): “Variation in regional diet and mandibular morphology in prehistoric Japanese hunter-gatherer-fishers” (K. C. Hoover & F. L’Engle Williams); and Vol. 407 (Part A): “Sedimentological evidence of an assumed ancient anchorage in the

hinterland of a Phoenician settlement (Guadiana estuary/SW-Spain)” (T. Klein et al.).

Several articles published in the first half of 2016 comprehend archaeometric results that could be useful for maritime archaeologists: *Applied Physics A*, Vol. 122, No. 4: “Texture analysis of Napoleonic War Era copper bolts” (F. Malamud et al.); *Archaeological and Anthropological Sciences* (available online): “Scattered shipwreck site prospection: the combined use of numerical modeling and documentary research (*Fougueux*, 1805)” (T. Fernández-Montblanc et al.); *Archaeological Research in Asia*, Vol. 6: “Glass bead trade in the Early Roman and Mamluk Quseir ports – A view from the Oriental Institute Museum assemblage” (J. Then-Obluskaa & L. Dussubieux); *Archaeometry*, Vol. 58, No. 3: “A Box Containing Carpenter’s Accessories from The Akko 1 Shipwreck, Israel: Archaeometallurgical Analysis of Surviving Ironwork” (D. Cvikel et al.); *Comptes Rendus Palevol*, Vol. 15, No. 5: “Perforation techniques and traces of use on the Mesolithic adornments of the Trench Area at Cabeço da Amoreira Shellmidden (Muge, central Portugal)” (L. André & N. Bicho); *Corrosion Science* (available online): “Brass–iron couple and brass–iron–wood ternary system of metal objects from the Akko 1 shipwreck (Israel)” (D. Ashkenazi et al.); *Digital Applications in Archaeology and Cultural Heritage*, Vol. 3, No. 1: “3D reconstruction of marble shipwreck cargoes based on underwater multi-image photogrammetry” (C. Balletti et al.); *Geoarchaeology*, Vol. 31, No. 3: “Emergence of Civilization, Changes in Fluvio-Deltaic Style, and Nutrient Redistribution Forced by Holocene Sea-Level Rise” (B. T. Pennington et al.); and “A Geoarchaeological Survey of the Marine Extension of the Roman Archaeological Site Villa del Pezzolo, Vico Equense, on the Sorrento Peninsula, Italy” (P. Aucelli et al.); *International Biodeterioration & Biodegradation*, Vol. 107: “The effects of wood anisotropy on the mode of attack by the woodborer *Teredo navalis* and the implications for underwater cultural heritage” (A. M. Eriksen et al.); and Vol. 108: “Impact and colonization dynamics of the bivalve *Rocellaria dubia* on limestone experimental panels in the submerged Roman city of Baiae (Naples, Italy)” (E. Casoli et al.); *ISPRS Journal of Photogrammetry and Remote Sensing*, Vol. 114: “A structured light method for underwater surface reconstruction” (A. Sarafraza & B. K. Haus); *Journal of Cultural Heritage*, Vol. 17: “A thermophysical study on the freeze drying of wooden archaeological artifacts” (Z. Shaozhi et al.); and Vol. 18: “Strontium carbonate nanoparticles for the surface treatment of problematic sulfur and iron in waterlogged archaeological wood” (E. J. Schofield et al.); *Journal of Human Evolution*, Vol.

92: “Return rates from intertidal foraging from Blombos Cave to Pinnacle Point: Understanding early human economies” (J. C. De Vynck et al.); and Vol. 93: “Earliest evidence of personal ornaments associated with burial: The *Conus* shells from Border Cave” (F. d’Errico & L. Backwell); *L’Anthropologie*, Vol. 120, No. 2: “Les environnements du Vanuatu de l’Holocène à nos jours: un état des lieux des connaissances” (C. Combettes); *Marine Geology*, Vol. 371: “Quantification of bottom trawl fishing damage to ancient shipwreck sites” (M. L. Brennan et al.); *Metallography, Microstructure, and Analysis*, Vol.5, No. 1: “The Dor 2002/2 Shipwreck, Israel: Characterization of Surviving Ironwork” (D. Cvikel & D. Ashkenazi); *Microchemical Journal*, Vol. 126: “Analytical study of waterlogged ivory from the Bajo de la campana site (Murcia, Spain)” (M. T. Doménech-Carbó et al.); *Ocean Engineering*, Vol. 114: “Stabilizing control and human scale simulation of a submarine ROV navigation” (A. Khadhraoui et al.); *Periodico di Mineralogia*, Vol. 85, No. 1: “Archaeometric characterization of Roman volcanic millstones from Messina territory (Sicily, Italy)” (M. Di Bella et al.); *Photogrammetric Engineering & Remote Sensing*, Vol. 82, No. 3: “Characterizing a Debris Field Using Digital Mosaicking and CAD Model Superimposition from Underwater Video” (J. M. Vincelli et al.); *Quaternary Science Reviews*, Vol. 136: “Realising consilience: How better communication between archaeologists, historians and natural scientists can transform the study of past climate change in the Mediterranean” (A. Izdebski et al.); and *The Bulletin of the Australasian Institute of Maritime Archaeology*, Vol. 39 (for 2015): “Understanding the interactive nature of in-situ processes for management of submerged cultural heritage material” (T. Winton).

British Archaeological Reports (BAR). The following book published early on 2016 by Archaeopress is of particular interest: *Water as a morphogen in landscapes/L'eau comme morphogène dans les paysages* (S. Robert & B. Sittler, eds.), BAR No. 232, viii + 104 pages; illustrated throughout in black and white, ISBN 9781784912871. This book includes eight communications of the *XVII UISPP World Congress*, which was held on 1st to 7th September 2014 in Burgos, Spain. These presentations shed light on the relationship between inhabitants of different periods and places from Prehistory to recent times, and their surrounding environment. The common denominator of these papers is a focus on the role played by water bodies —mostly rivers— in people’s settlement, circulation across the territory, management of resources, and landscape construction, among the main themes.

Thesis

Early on 2016, the Ph.D. Dissertation “Innovación tecnológica y conflicto naval en Europa Occidental, 1751-1815: aportes arqueológicos e históricos al conocimiento de la metalurgia y sus aplicaciones en los barcos de guerra”, was presented by Nicolás C. Ciarlo at the School of Philosophy and Letters, University of Buenos Aires, Argentina. This thesis deals with the analysis of technological innovations and conflict of naval powers from mid-18th to early 19th century, with focus on the applications of metallurgy to warships. An array of metal artifacts from British, French and Spanish shipwrecks from this period was characterized. Ships of different rates (and unrated) were considered, and special attention was paid to objects related to structural fastenings, sheathing, nautical equipment, and ordnance for specific analysis. The application of different instrumental techniques such as Light Microscopy, Scanning Electron Microscopy, Energy Dispersive X-ray Spectroscopy, Optical Emission Spectroscopy, and Atomic Absorption Spectrometry, allowed identifying the materials and methods of manufacture employed. Based on this technical data and the information recovered from historical sources and other well studied archaeological sites, changes in metallurgy and warships of the main European navies were analyzed. A discussion concerning technological transfer, the place of empirical techniques and scientific knowledge, as well as the implications that war between the mentioned states had on developments, allow shedding light on the dynamic of the innovation process during early Modern period.

Previous Meetings and Conferences

49th Annual Conference on Historical and Underwater Archaeology. A Call to Action: The Past and Future of Historical Archaeology. This meeting was held from 6th to 9th January 2016, at the Omni Shoreham Hotel in Washington, D.C. The following presentations dealt with the application of geophysical methods for archaeological survey, the use of digital techniques for recording wrecks and artifacts, as well as the analysis of samples from ships and prehistoric sites: “Using Mobile Sonar and 3D Animated Web Modeling for Public Outreach and Management of Historic Shipwrecks in Lake Michigan” (K. Kaufmann); “Initial Deepwater Archaeological Survey and Assessment of the Atomic Target Vessel US Independence (CVL22)” (J. P. Delgado et al.); “Recent Analyses of the Faunal Assemblage from the Submerged Cave Site of Hoyo Negro: Implications for Late Pleistocene Human Ecology Research on the Yucatan Peninsula” (D. Rissolo et al.); “Multiscale Image Acquisition for Structure-from-Motion (SfM) Modeling of the Submerged Late Pleistocene Site of Hoyo Negro, Quintana, Mexico” (A. E. Nava Blank et al.); “The Case

of Patrão Lopes Military Ship: The Bio-Sedimentation as Monitor Element of Underwater Archaeological Sites of Cascais Sea, Portugal” (J. Freire et al.); “Bed Load: An Archaeological Investigation of the Sediment Matrix at the H.L. Hunley Site” (H. Brown); “Can A Picture Save A Thousand Ships?: Using 3D Photogrammetry to Streamline Maritime Archaeological Recordation and Modeling” (C. P. Morris); “The Egadi 10 Warship: From Excavation to Exhibition” (M. Polakowski); “3D Digitization of Archaeological Artifacts in Conservation” (C. Dostal); “Reconstruction of the Pillar Dollar Wreck, Biscayne National Park, Florida” (W. L. Fleming); “ROV-Based 3D Modeling Efforts on a Submerged WWII Aircraft for Museum Display” (M. Lickliter-Mundon & B. Buxton); “Legacies of an Old Design: Reconstructing Rapid’s Lines Using 3D Modeling Software” (I. Mollema & J. F. McKinnon); “Shelburne Shipyard Steamboat Graveyard: Results of the 2015 Field Season Using Traditional and New Recording Techniques” (C. Kennedy); “Photogrammetric Recording of 19th Century Lake Champlain Steamboats: Shelburne Shipyard Steamboat Graveyard 2015” (K. Yamafune & D. Bishop); “Analyzing Nineteenth-Century Steamboat Rudders on Lake Champlain: Using Photogrammetric Modeling to Aid the Archaeological Process” (D. Bishop & K. Yamafune); “Mechanical Scanning Sonar: 21st Century Documentation of 19th Century Shipwrecks” (C. Sabick); “Efficient and Effective in situ Heritage Management: Using 3D Photomodels to Document and Assess a Site’s condition” (K. Yamafune et al.); “Hidden in Plain Sight: Monitoring Shipwrecks in the Atlantic Waters of St. Augustine, Florida” (P. B. Burke); “High-Resolution 2D and 3D Imaging of the USS Macon Wreck Site” (M. L. Brennan et al.); “Forensic Archaeological Investigation and Recovery of Underwater U.S. Naval Aircraft Wreck Sites: Two Case Studies from Palau and Papua New Guinea” (R. K. Wills & A. T. Piertruszka); “Deconcreting the Hunley: Revealing the Surface of the Submarine for the First Time” (P. Mardikian); “The Hunley Revealed: 3D Documentation, Deconcretion, and Recent Developments in the Investigation of the *H.L. Hunley* Submarine” (M. P. Scafuri); “Corrosion Monitoring and Preservation in Situ of Large Iron Artifacts at the *Queen Anne’s Revenge* Shipwreck site” (S. Watkins-Kenney); “USCS Paddle Steamer Robert J. Walker, 1847-1860: Historical and Archaeological Research, Diver and Fisher Knowledge, and the Remote Sensing Search” (J. H. Steinmetz); “Modeling Change: Quantifying Great Lakes Metal Shipwreck Degradation Using Structure from Motion 3D Imaging” (C. N. Zant); “Life Among the Wind and Waves: Examining Living Conditions on Sailing Vessels Through the Use of Microscopic Remains” (J. D. Shidner); “Recognizing Geomagnetic Storms in Marine Magnetometer Data:

Toward Improved Archaeological Resource Identification Practices” (B. M. Carrier et al.); and “Directions in Deepwater Marine Archaeology: Using Technology to Grow and Synthesize Knowledge on the Deep Frontier” (E. Swanson et al.).

44th Computer Applications and Quantitative Methods in Archaeology Conference (CAA 2016). *Exploring Oceans of Data.* This meeting was held from March 29th to April 2nd 2016, at the Museum of Cultural History, University of Oslo, Norway. The conference was attended by scholars, specialists and experts in the field of computing technologies applied to archaeology, and addressed a multitude of topics. The presentations were focused on the exploration the oceans of digital information available from a plethora of archaeological sites. Regarding maritime heritage, the following case studies from all over the world are worth mentioning: from Session No. 3, “Modeling prehistoric maritime interactions in East Polynesia” (M. Allen et al.); “Reconstructing and modelling the Stone Age landscape in Southeastern Norway” (G. Steinskog); “Uncovering routes to Grenada: Exploring possible routes between mainland South America and the Southern Lesser Antilles” (E. Slayton et al.); “Looking for the lost harbor. Role of non-invasive archaeological methods in the reconstruction of the seascape of an ancient city Paphos” (P. Ćwiąkała et al.); “Simulating Pre-Hispanic canoe navigation in Lake Cocibolca, Nicaragua” (A. K. Benfer); “Evocative virtual exploration of underwater sites: Issues and approaches” (M. Ritondale et al.); “A space and time analysis of the Early Bronze Age Levantine Littoral” (C. Safadi); “Exploitation of prevailing winds and currents by the earliest known seafarers, reaching and colonizing Australasia c 50 000 years ago” (E. K. Kuijjer et al.); “Using GIS modeling to reconstruct the urban landscape of the Roman city of Ossonoba” (C. S. Machado Teixeira et al.); and “The first web based viewer for archaeological underwater sites in Europe: The Splashcos—Viewer” (M. Mennenga & H. Jöns); from Session No. 6, “3D Reconstruction of Koch, Russian rowing/sailing boat of the 17th century” (M. V. Vavulin et al.); from Session No. 7, “Creation of an Early 19th century Siberian ship 3D model” (A. A. Pushkarev et al.); and “Underwater archaeological remains open to the public diving – close range photogrammetry as a digital preservation and complex documentations of despairing relicts” (A. M. Kubicka); from Session No. 11, “Best practices to re-use remote sensing data coming from marine geophysical surveys for the 3D reconstruction of underwater archaeological deep-sites” (M. Ritondale et al.); from Session No. 13, “Liquid footprints: Water, urbanism, and sustainability in Roman Ostia” (M. A. Locicero); and from Session No. 15, “From the largest to the smallest:

The use of the latest technology in digitalization of the objects from the collection of the National Maritime Museum in Gdańsk” (P. Dziewanowski & J. Różycki).

Society for American Archaeology 81st Annual Meeting. This event was held from 6th to 10th April 2016, at Orlando, Florida. Among the numerous presentations on the archaeology of maritime cultures, the following can be highlighted: “Deepwater Shipwrecks and Oil Spill Impacts: A Multidisciplinary Investigation of Shipwreck Impacts from the Deepwater Horizon Oil Spill” (D. Warren et al.); “Gulf of Mexico Shipwreck Corrosion, Hydrocarbon Exposure, Microbiology, and Archaeology (GOM-SCHEMA) Project: Did the 2010 Deepwater Horizon Oil Spill Impact Historic Shipwrecks?” (M. Damour et al.); and “From Excavation to the Laboratory: A Multi-faceted Analysis of the Emanuel Point Shipwrecks” (J. Bratten). See the final program at: www.saa.org/Portals/0/SAA/MEETINGS/2016%20Program/Program_final.pdf

Courses and Seminars

Advanced Practicum in Maritime Archaeology. Flinders University will host a field school practicum between 21st and 26th November 2016. It will focus on marine geophysics and 3D modeling in Archaeology, providing students with opportunities to participate in a professional work environment. This course will be taught in intensive mode during one week (6 days) and will focus on the principles, theory and method of marine geophysics for archaeology. It will also include a 2-day workshop on the application of 3D modeling to maritime archaeology. One day will be spent in the field, to acquire data, while another will be devoted to the interpretation and reporting. Theory and taught coursework will cover an introduction to sidescan, marine magnetometer, sub-bottom and multi-beam. Field data will be gathered and interpreted using sidescan data only. If you need further information about the course please contact Dr Jonathan Benjamin to jonathan.benjamin@flinders.edu.au

3D Workshop in underwater archaeology. A workshop on 3D Multi-image Photogrammetry will be taught by specialists Mr Kevin Edwards (Tempus Archaeology & Western Australian Museum, Perth & Flinders University, Adelaide) and Dr Kotaro Yamafune (Texas A&M University, Texas) during 26th & 27th November 2016. This two day course will precede the opening of the *Sixth International Congress on Underwater Archaeology (IKUWA6)*, which will be hosted by the Western Australian Maritime Museum in Fremantle, Western Australia, between 28th November and 2nd December.

For more information about the IKUWA6 and the course, see: www.aima-underwater.org.au/about-ikuwa6/



Figure 2. The INA new research vessel: Virazon II.

Miscellanea

INA new research vessel: Virazon II. On May 4, The Institute of Nautical Archaeology (INA) christened a brand-new custom-built archaeological research vessel in Istanbul, Turkey (Figure 2). The 25 m-long *Virazon II* was designed by NAVTEK naval architecture firm and built in the MengiYay shipyard in Tuzla, Turkey. She is powered by twin 405-hp engines, three 108-kw generators, and a 54-kw bow thruster. She can accommodate 19 researchers and crew, including two guests in a VIP cabin with en-suite bathroom. *Virazon II* is designed to support underwater surveys and shipwreck excavations around the world, being equipped with a 5-ton A-frame for lifting INA’s two-person submersible *Carolyn*, a 500-kg deck crane, two hull-mounted sonar units, a two-person recompression chamber, and 8 high- and low-pressure air compressors for airlifting and tank-filling with Nitrox capability. *Virazon II* is the first ship in Turkey to be built and classed by RINA as an archaeological research vessel; her construction was made possible by a donation honoring the lifelong contributions of INA Director and underwater pioneer Claude Duthuit (1931-2011). She is named after INA’s first research vessel, the 1953 U.S. Army T-Boat *Virazon*. INA has been affiliated with the graduate Nautical Archaeology Program at Texas A&M University for four decades. INA owns and operates a research center in Bodrum, Turkey and works closely with the Bodrum Museum of Underwater Archaeology, where thousands of artifacts from five decades of INA shipwreck excavations are on public display. Following sea trials this summer, *Virazon II* will relocate to her permanent berth in Yalıkavak Marina outside of Bodrum before serving in her first Turkish shipwreck survey this fall.

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ARCHAEOLOGICAL CERAMICS

Charles C. Kolb, Associate Editor

This issue contains three topics: 1) Book Reviews on Ceramics; 2) Previous Professional Meetings; and Ceramics in the *Journal of Archaeological Science: Reports*.

Book Reviews on Ceramics

Ceramics, Cuisine and Culture: The Archaeology and Science of Kitchen Pottery in the Ancient Mediterranean World, edited by Michela Spataro and Alexandra Villing, Oxford and Philadelphia: Oxbow Books, 2015. Vii + 278 pp., illustrations, index. ISBN: 9781782979470, \$75.00 / £50.00 (hardbound); ISBN: 9781782979487 \$2.99 (Kindle digital). Print copies are available from a variety of sources starting at US \$45.00. Michela Spataro is the scientist for ceramics and stone in the British Museum's Department of Conservation and Scientific Research and is a member of the faculty at University College London in Italian Pre- and Protohistory. Before joining the Museum in 2007, she was a Leverhulme Trust Research Fellow at University College London Institute of Archaeology, studying the early Neolithic Starčevo-Criș Culture in Romania, Serbia and Croatia, which produced the earliest pottery in continental Europe. This project was linked to her Ph.D. research, also at UCL Institute of Archaeology, on early and middle Neolithic pottery production and circulation in the Adriatic region (Italy and Croatia). She has been conducting natural science research on ceramics at the British Museum since 2007. Her research interests are directed to the Neolithic in Southern and Southeastern Europe with a focus on the technology of ceramic production and origin of raw materials. She participates in a project team of the National Institute of Archaeology with Museum. Spataro is responsible for scientific analyses of clay and stone artefacts in the Museum collection. She uses optical microscopy and Scanning Electron Microscopy to identify raw material sources and the technological processes used to produce these artifacts. She is particularly interested in the provenance of ceramic raw materials (clays and mineral inclusions) which can indicate where a pot was manufactured, and therefore shed light on patterns of pottery production and trade in the past. She has also worked on porcelain, clay tablets, mosaic tesserae, stoneware, marble and sandstone, and collaborates with conservators to assess

changes in the condition of marble or limestone statues. Classical archaeologist Alexandra Villing is concerned mainly with ancient Greece and its culture. She is the Curator of Greek pottery and terracotta figurines at the British Museum's Department of Greece and Rome, and joined the British Museum in 2001 after having studied at Oxford and worked in Germany and Greece. She was the academic advisor for the British Museum's Ancient Greece website, co-curated a cross-cultural, cross-period exhibition on Fantastic Creatures (shown in Korea and Hong Kong), and has long been involved in excavations in Turkey, at ancient Miletos and Knidos. Her most recent work includes research with Michela Spataro on the social and technological aspects of Greek 'coarse ware' pottery. Villing is currently preparing publications on Archaic pottery from Miletos and on Greek-Egyptian relations at Naukratis, a Greek-Egyptian trading city in the Nile Delta.

The 23 papers presented in this monograph derive from a conference which had the same title as this volume that was held at the British Museum in London in December 2010. These contributions are the products of the interdisciplinary exchange of ideas and approaches to the study of kitchen pottery between archaeologists, material scientists, historians and ethnoarchaeologists. They aim to set a vital but long-neglected category of evidence in its wider social, political and economic contexts. Structured around main themes concerning technical aspects of pottery production; cooking as socio-economic practice; and changing tastes, culinary identities and cross-cultural encounters, a range of social economic and technological models are discussed on the basis of insights gained from the study of kitchen pottery production, use and evolution. Much discussion and work in the last decade has focused on technical and social aspects of coarse ware and in particular kitchen ware. The chapters in this volume contribute to this debate, moving kitchen pottery beyond the Binfordian 'technomic' category and embracing a wider view, linking processualism, ceramic ecology, behavioral schools, and ethnoarchaeology to research on historical developments and cultural transformations covering a broad geographical area of the Mediterranean region and spanning a long chronological sequence. This volume includes contributions spanning eras from the Bronze Age to the Modern period, although many of the essays focus on Hellenistic and Roman subjects. As the table of contents indicates, several essays consider kitchen wares in Peloponnesian and Greek contexts near to the Corinthia, including the nearby Berbati Valley, Laconia, Aegina, and Athens. A majority of publications on Hellenistic, Roman, and Late Antique pottery have focused on amphorae (storage and transport vessels), or fine tableware's (for dining), material classes

that were produced and regularly exchanged across the Mediterranean. The gritty, scorched, utilitarian kitchen wares, however, have been relatively neglected, even though they comprise one of the most common kinds of pottery found in Hellenistic and Roman contexts and were the basis for one of the most fundamental human activities in the ancient world: cooking and food preparation. As they tend to be regionally produced, and regionally produced in similar forms over long periods of time, they mark significant indicators of regional tastes and traditions.

The volume is divided into three parts; each chapter has its own bibliography. The double-column “Index: (pp. 269-278) emphasizes topical entries and proper nouns and also includes figures, tables, and notes. The front matter consists of a “Preface” (pp. v-vii) and a “List of contributors” (pp. vii-viii) with academic or other affiliations and email addresses. Chapter 1 “Investigating ceramics, cuisine and culture – past, present and future” by Alexandra Villing and Michela Spataro (pp. 1-25, 11 figures, 26 endnotes, 132 references). The editors provide an overview on the topics of foodways, the development of cooking pots (including shapes and functions), relationships between ceramics and cuisines, and importance of use wear and residue analyses. Contributions from archaeobotany, zooarchaeology, and osteological analyses, and materials science studies are noted, and social approaches to cuisine such as gender, social stratification, and ethnicity are reviewed. The authors comment that “ancient foodways and cuisine are an integral part of the technical, social, and cultural history of humanity: and “food and culture shape our lives and our history” (p. 19).

Part I. How to make a perfect cooking pot: technical choices between tradition and innovation (8 chapters). Chapter 2 “Materials choices in utilitarian pottery: kitchen wares in the Berbati valley, Greece” by Ian Whitbread (pp. 28-36, 3 figures, 42 references). The properties of cooking wares and centers of cooking ware production in the Aegean region are detailed and the Berbati Valley characterized. A total of 243 samples of pottery from all chronological periods was studied by optical petrographic thin-section analysis and assigned to six fabric groups. Felsic fabrics were found in all cookware for four periods, Archaic through Late Antique. Chapter 3 “Home-made recipes: tradition and innovation in Bronze Age cooking pots from Akrotiri, Thera” by Noémi S. Müller, Vassilis Kilikoglou and Peter M. Day (pp. 37-48, 6 figures, 1 table, 4 endnotes, 46 references). The geological setting of Bronze Age Akrotiri is reviewed and an analysis of 159 ceramic specimens by optical petrographic thin-section analysis.

Diachronic changes are noted in mechanical and thermal properties, and phyllite temper was characteristic. Experimental work was conducted on fired clay briquettes. SEX, XRD, and FTIR analyses are reported and assessments made on fracture strength and toughness, thermal shock resistance. The implications of this research are also discussed. Chapter 4 “Heating efficiency of archaeological cooking vessels: computer models and simulations of heat transfer” by Anno Hein, Noémi S. Müller and Vassilis Kilikoglou (pp. 49-54, 5 figures, 11 references). Archaeological cooking vessels were produced in a great variety of shapes using different methods of clay paste preparations. Heating efficiency is differentiated from heating effectiveness and the authors discuss vessel performance in relation to material parameters and vessel shapes. The use of digital computer models and simulations of cooking practices are documented. Chapter 5 “A contextual ethnography of cooking vessel production at Pòrtol, Mallorca (Balearic Islands)” by Peter M. Day, Miguel A. Cau Ontiveros, Catalina Mas-Florit and Noémi S. Müller (pp. 9 figures, 1 endnote). The municipality of Pòrtol was and is a production center famous for its cooking ware. The potters and potting traditions in ten workshops are documented using interviews and videotaping. Raw materials (most potters use the same clay source), vessel types, genders of potters, and changing traditions are reported and the authors note that “using the right clay is important to the potters” (p. 62). The decrease in numbers of production workshops is notable, and the authors report that there is ongoing research on the clays and ceramics produced.

Chapter 6 “Aegina: an important centre of production of cooking pottery from the prehistoric to the historic era” by Walter Gauss, Gudrun Klebinder-Gauss, Evangelia Kiriati, Areti Pentedeka and Myrto Georgakopoulou (pp. 65-74, 10 figures, 44 endnotes, 43 references). The Island of Aegina has been a major potter-making center since prehistoric times (Early, Middle, and Late Bronze Age) as well as historic eras (Archaic and Late Classical times); the potter’s wheel has been used since the 6th century BC. Fabric groups are identified macroscopically and related to the chronological periods and pottery consumption and vessel types are detailed. Local volcanic rock temper (andesitic) and the presence of gold-mica are characteristic of the pastes. Chapter 7 “True grit: production and exchange of cooking wares in the 9th-century BC Aegean” by James Whitley and Marie-Claude Boileau (pp. 75-90, 8 figures, 5 tables, 30 endnotes, 60 references). Studies of coarse ware have been neglected in the study of ancient Aegean ceramics. The kitchen pottery from Knossos is discussed in terms of contexts and uses and the authors provide a detailed and valuable

summary of 94 previous studies (1992 through 2010) of cooking wares from Knossos spanning Subminoan through Classical times. Optical petrographic thin-section analysis was performed on 210 sherds from six deposits (Early Iron Age ff.) and seven fabric groups related to four production and consumption phases (before 850 BC, 850-800, 800-600, and 525 BC onwards). Issues in the identification of local production versus imports remain. Chapter 8 “Cooking wares between the Hellenistic and Roman world: artifact variability, technological choice and practice” by Kristina Winther-Jacobsen (pp. 91-101. 7 figures, 1 table, 1 endnote, 43 references). The author discusses her theoretical framework on technological choices (citations to the work of Schiffer, Dobres, and Bourdieu) in the production of specialized fabrics. Alexandria, Egypt as a Greek city and ancient Cypriot sites are noted and the production of Hellenistic cooking wares documented for cities and the hinterlands. Optical petrographic thin-section analysis was employed to characterize fabric descriptions; wall thicknesses changes suggest specializations. Some previous PIXE studies are noted but SEM EDS research on quartz particles is anticipated.

Part 2. Lifting the lid on ancient cuisine: understanding cooking as socio-economic practice (7 chapters). Chapter 9 “From cooking pots to cuisine. Limitations and perspectives of a ceramic-based approach” by Bartłomiej Lis (pp. 104-114, 7 figures, 11 endnotes 37 references). The research documents materials from the Early Mycenaean through Late Helladic periods but the author notes a major limitation is the nature of the archaeological contexts from which the pottery was recovered. Vessel morphology and stability, burning marks, and the identification of cooking methods and definition of cuisine are discussed. Cooking assemblages are characterized and diachronic changes reported, and contexts and the importance of scientific analyses including archaeobotanical and archaeozoological data from residue analysis are stressed. Chapter 10 “Cooking up new perspectives for Late Minoan IB domestic activities: an experimental approach to understanding the possibilities and the probabilities of using ancient cooking pots” by Jerolyn E. Morrison, Chrysa Sofianou, Thomas M. Brogan, Jad Alyounis and Dimitra Mylona (pp. 115-124, 8 figures, 38 references). Background on and the nature of the research design is reported for studies undertaken at the site of Papadiokampos, East Crete. The cooking pot assemblage from House A.1 is reviewed and experimental procedure discussed, notably the production of cooking pots, preparation of the pots for use, food preparation and cooking, and vessel morphology. Replica vessels were fabricated and use in food preparation, lessons learned reported, and comments made on post-

cooking and eating habits. Chapter 11 “Reading the Residues: The Use of Chromatographic and Mass Spectromic Techniques for Reconstructing the Role of Kitchen and other Domestic Vessels in Roman Antiquity” by Lucy J. E. Cramp and Richard P. Evershed (pp. 25-140, 6 figures, 117 references). The authors point out that macroscopic residues are rare finds in the archaeological record but that absorbed residues are common. The scientific analyses using GC/MS, LC/MS, HPLC, EI, CI and APCI are discussed. Commodities important in the Roman Empire included animal products, marine products (including *garum*), plant oils and waxes, beeswax, resins and gums, and wine and beer – all characterized by scientific analysis. The chapter also includes a discussion of residues from Classical antiquity, the interpretation of culinary practices, and vessel functions: culinary, non-culinary, cooking, serving, cosmetic, symbolic, and decorative.

Chapter 12 “Cooking pots in ancient and Late Antique cookbooks” by Andrew James Donnelly (pp. 141-147, 3 tables, 6 endnotes, 20 references). Donnelly reports fascinating research on cooking techniques defined from cooking texts and their uses in defining the functions of cooking vessels. Three examples from early cookbooks are provided. Apicius (1st century AD, reported by Pliny the Elder) a ten chapter cookbook with 450+ recipes. A frequency analysis of eight words for different vessel types (*caccaba*, *patina*, *patella*, *olla*, *clibanus*, *pultarius*, *sartago*, and *zerna*) leads to definitions of form and functional uses. Studies of cookbooks by Vinidarius (5th-6th century AD) with four vessel words and Anthimus (6th century AD) with two are also reported. Different methods of cooking by cultural groups are noted. Chapter 13 “Unchanging tastes: first steps towards the correlation of the evidence for food preparation and consumption in ancient Laconia” by Elizabeth Langridge-Noti (pp. 148-156, 5 figures, 3 endnotes, 32 references). The author discusses three major topics: 1) literary sources on foodstuffs (notably wine and figs), 2) archaeological floral and faunal analysis from the site of Gerake, Lakonia, and 3) food preparation and equipment including the pottery assemblage and vessel shapes. Chapter 14 “Fuel, cuisine and food preparation in Etruria and Latium: cooking stands as evidence for change” by Laura M. Banducci (pp. 157-169, 8 figures, 1 table, 34 endnotes, 74 references). A typology of cooking stands is reported from 1st millennium BC sites in Central Italy. Cooking vessel, fabrics, vessel morphology, cooking fuels (a shift from firewood to charcoal), and cooking stand and their relation to foodways are related; food preparation time is also considered. Chapter 15 *Vivaria in doliis*: a cultural and social marker of Romanised society?” by Laure G. Meulemans (pp. 170-178, 5

figures, 25 endnotes, 25 references). The author documents a rare kind of container from sites in the Elsa Valley (northwest of Siena, Italy) which has thick walls with perforated apertures, “hard texture, and rich inclusions,” and seen in sherds rather than complete vessels. This chronological marker dates from the late 2nd century BC to the end of the 2nd century AD. A case is made that these were containers for the husbandry of two species dormice, small rodents reared for human consumption and a luxury food for affluent classes (based on literary references).

Part 3. New pots, new recipes? Changing tastes, culinary identities and cross-cultural encounters (7 chapters). Chapter 16 “The Athenian kitchen from the Early Iron Age to the Hellenistic period: by Susan I. Rotroff (pp. 180-189, 8 figures, 37 endnotes, 33 references). Rotroff provides an overview based upon her analysis of 450 inventoried vessels from the excavations in the Athenian Agora dating c 1150 BC to the end of the 1st millennium BC. The specimens have a chronological distribution from Early Iron Age (1050-800 BC), and Archaic (800-600 BC), Classical (600-400) through Hellenistic (400-200 and 200-1 BC). Local and imported vessels are differentiated and these robust forms include cooking jugs, *chytra*, *lopas*, pans and parchers. Chapter 17 “Mediterranean-type cooking ware in indigenous contexts during the Iron Age in southern Gaul (6th-3rd centuries BC)” by Anne-Marie Curé (pp. 190-202, 7 figures, 42 references). Mortars (shallow open bowls with thick walls, sometimes with spouts and handles) were produced and widely distributed from the 6th to 3rd centuries BC in Mediterranean Gaul. Twelve main types are defined and relationships to amphorae, wine making, and local cooking wares from eight sites are detailed. The author concludes that these were exogenous items imported initially and then produced on a regional scale. Chapter 18 “Forms of adoption, adaptation and resistance in the cooking ware repertoire of Lucania, South Italy (8th-3rd centuries BC)” by Alessandro Quercia (pp. 203-212, 8 figures, 10 endnotes, 41 references). The author discusses the distribution and chronologies of cooking wares and manufacturing sites of “impasto” pottery, a handmade coarse fabric pottery, made during the Bronze and Iron Ages in Lucania. Vessel types include *chytra*, *kakkabe*, *tagema*, and *lopas*. Southern Italy was influenced by ceramic production in the Metaponto region of Italy, particularly by the Roman Republic after the 4th century BC but the Lucanians were selective in adapting the Greek and Roman cooking ware repertoire. Chapter 19 “Pots and bones: cuisine in Roman Tuscany – the example of Il Monte” by Günther Schörner (pp. 213-221, 6 figures, 3 tables, 24 endnotes, 70 references). Foodways in Roman Etruria are detailed from the

archaeological record rather than literary sources; the Il Monte site is located in northern Tuscany. Coarse common ware for cooks but also for storage and serving food are considered. Jars, cooking ollas, bowls, lids, cups, bottles, and plates are in the ceramic assemblage. Cooking meat, primarily pig rather than cattle, is discerned from the animal bones and the ceramic assemblage from Etruscan sites differed from Roman practices. The evolution of cuisine in terms of food items is also documented.

Chapter 20 “Culinary clash in northwestern Iberia at the height of the Roman Empire: the Castro do Vieito case study” by António José Marques da Silva (pp. 222-232, 8 figures, 34 references). The site of Castro do Vieito is located in northwest Iberia and the author provides historical context and data from the ceramic assemblage from salvage archaeological studies. There is no evidence of ceramic production at the site, but vessel types and indigenous potters’ marks are documented. Roman influence is noted but few foreign ceramics were recovered but hybrid ceramic types are reported. Chapter 21 “Coarse kitchen and household pottery as an indicator for Egyptian presence in the southern Levant: a diachronic perspective” by Alexander Fantalkin (pp. 233-241, 1 figure, 12 endnotes, 79 references). There was strong Egyptian involvement in Canaan from the Late Bronze Age through beginning of the Iron Age; at least one Egyptian “retreat” of 500 years is noted in the 12th century BC. The presence of East Greek pottery and an Early Islamic incursion are reported. Colonization, cultural preferences, and trade are factors affecting the kitchen and household ceramic assemblages. Chapter 22 “Kitchen pottery from Iron Age Cyprus: diachronic and social perspectives” by Sabine Fourrier (pp. 242-250, 1 figure, 29 endnotes, 38 references). Fourrier differentiated Aegeanizing versus Orientalizing for Cyprus from the 12th century BC onwards. The use of the fast wheel and production of jugs, amphorae, and cooking pots is documented, and a unique 6th century BC terracotta grill from the site of Amathous described.

Postscript: Looking beyond antiquity (1 chapter). Chapter 23 “Aegean cooking pots in the modern era (1700–1950)” by Yorgos Kyriakopoulos (pp. 252-268, 9 figures, 90 endnotes, 49 references, including “Further Reading”). There was little cultural change in the Aegean region from Late Antiquity to the last quarter of the 18th century. Only minor differences in the everyday food repertoire are noted between religious groups, but marked differences occurred during religious holidays. Kyriakopoulos points out that the “bread culture” dictated the sizes of cooking pots and that there were urban and rural variations. Fireplace ovens and stoves also dictated

the shapes of cooking pot bases. Eight main forms of cooking pots and some minor variants are described and illustrated in color, and vessel nomenclature and pedigree reviewed. A case study from the Island of Siphnos differentiates pottery workshops production and export through three periods: pre-1840, 1840-1930, and 1930-1948. He ends his excellent analysis with a salient comment: “Sadly, after 65 centuries, the [pottery] craft can be pronounced dead” (p. 265).

An incredible amount of information is presented in this well-edited volume, and the excellent color illustrations, maps, and line drawings add immeasurably to the narratives. It is definitely a valuable landmark study that will be useful for years to come and would also be valuable to scholars concerned with foodways in other parts of the world. The monograph uses an pleasing and easy to read font, but, alas, the printing ink was smeared on three pages (p. 35, 36, and 108) in the copy I purchased.

Journal of Roman Pottery Studies 16, edited by Steven Willis, Oxford and Philadelphia: Oxbow Books for The Study Group for Roman Pottery, 2015. xii + 190 pp., illustrations (black-and-white and color), tables, appendices. ISBN-10: 178570074X, ISBN-13: 978-1785700743. \$100.00 (paperback) and \$50.00 (e-Book); less costly at some retailers. This journal appears at irregular intervals and was published initially by Oxbow Books for The Study Group for Romano-British Pottery (volumes 1-12) and more recently for The Study Group for Roman Pottery. These volumes focus on a variety of topics from Britain and the Continent, ranging from papers dealing with production sites to the distribution of ceramic types, and include relevant book reviews. Four previous issues of the *Journal of Roman Pottery Studies* have been reviewed in this column in the *SAS Bulletin*: *Volume 11*, edited by Pamela V. Irving; Oxford, 2004; *SAS Bulletin* 28(4):14 (Winter 2005). *Volume 13*: *A Mortarium Bibliography for Roman Britain*, edited by Katharine F. Hartley and Roberta Tomber, with Peter V. Webster; Oxford: Oxbow Books, 2007; *SAS Bulletin* 30(3):21 (Fall 2007). *Volume 14*, edited by Pamela V. Irving and Steven Willis; Oxford: Oxbow, 2009); *SAS Bulletin* 33(3):13 (Fall 2010). *Volume 15*, edited by Steven Willis; Oxford and Oakville, CT: Oxbow Books, 2012; *SAS Bulletin* SAS 36(2):16-18 (Summer 2013). The current volume maintains the excellence of previous issues and adds immeasurably to our understanding of Roman ceramics. This issue begins with the obituaries of three members of the Study Group, followed by nine significant contributions, and ends with four book reviews (one volume each published in French and German and two in English; pp. 180-196). The

scholarship and editing are superb and this volume, like its predecessors, is recommended to researchers specializing on Roman ceramics but also to the wider community of ceramic specialists in both the Old and New Worlds who deal with issues of pottery provenance, production, and distribution in state-level societies and empires.

“Verulamium Region White Ware production at the Roman kiln site of Brockley Hill, Middlesex: A compositional and technological reassessment” by Silvia Amicone and Patrick Sean Quinn (pp. 1-22, 8 figures, 5 tables, 45 references). The authors are both at University College London. The recent discovery of a Roman kiln site dated c. 50-170 AD at Northgate House in the present day City of London (Seeley and Drummond-Murray 2005) has begun to alter the view of pottery production and distribution in and around Roman London. The kiln site at Northgate House produced a range of material, including sandy, light-colored, functional pottery that closely matches Verulamium Region White Ware (VRW). Production of this common Roman coarse ware was previously thought to have been restricted to workshops of the Verulamium region pottery industry, which was located between Stanmore and St. Albans, northwest of London. Previous studies are reviewed and the selection of 50 VRW specimens (sherds from mortaria and flagons) from six contents is documented. Thin section analysis and ED-XRF studies were undertaken (splendid color microphotographs, Figs. 5-6). Sources of variability are also considered and a PCA classification presented.

“‘Hoo ware’ – an investigation and comparative analysis of evidence recovered from a first century AD Romano-British site in North Kent” by David Applegate (pp. 23-53, 23 figures [five in color], 77 print and 7 Web references). The discovery in August 1955 of an assemblage of Romano-British pottery flagons of mid-first century AD date located in the saltmarshes and mudflats of the Medway estuary at Hoo resulted in a published typology of the pottery (Blumstein 1956). Although no evidence of a pottery kiln was discovered, the assemblage was tentatively interpreted as the working debris from a possible kiln due to a small number of wasters that were identified amongst the material. In 1996 members of the Upchurch Archaeological Research Group discovered another large assemblage of typologically identical pottery from the same location (Site 056) (UARG 1999, 12). Pat Quinn undertook a thin section petrographic analysis (color microphotographs, Figs. 11-13). Applegate discusses flagon types and other forms, the lack of mortaria, and presence of a few Samian ware sherds. Ten flagon types are documented along

with 20 Monaghan beakers, jars, cups, dishes, and platters. “Roman pottery production at the site of Vervoz, Belgium, between the mid-first century AD and the end of the second century AD” by Barbara Borgers (pp. 54-72, 11 figures [five in color], 2 tables, 54 references). Borgers explores the potential of ceramics as a source for understanding social and technological traditions focusing on the pottery production site of Vervoz. Excavations at the site (1962-1972), which lies in the Meuse region of Belgium, revealed important evidence for pottery manufacture during the Roman period, consisting of seven workshops (with clay storage, preparation areas, and kilns), production debris, and pottery, dated to between the mid-1st century and the end of the 2nd century AD. By using a compositional approach combining typomorphological study with thin section analysis, aspects of the raw materials and production technology of this pottery were investigated (the research is a part of her Ph.D. thesis). The results of the site excavation, the selection of 126 sherd specimens, and fabric classification through thin section analysis are documented (color microphotograph, Fig. 11); 12 fabrics were characterized among the specimens which chronologically span the Early and Middle Roman periods.

“Unusual kiln vessels from Danbury, near Chelmsford, Essex” by Joyce Compton (pp. 73-76, 3 figures, 10 references). During monitoring work for Aggregate Industries (UK) Ltd at Danbury Quarry in 2006 a Roman pottery kiln (NGR TL 762 058) was uncovered by Phoenix Consulting Archaeology Ltd. Upwards of 14 kg of pottery, and a similar quantity of ceramic building material, was initially recorded. The pottery was further recorded, by context, by the Essex County Council Field Archaeology Unit, noting the relevant sherd counts and weights by fabric. The author documents kiln and non-kiln pottery, and provides an appraisal of a number of unusual vessels deemed to be kiln products, since full publication of the site is unlikely to take place. Use as saggars or as vessels in frit production are considered. “Getting Samian ware to Britain: Routes and transport possibilities” by Geoffrey Dannell and Allard Mees (pp. 77-92, 73 figures, 23 references and three ancient sources). The authors note that much of what is written here reflects what they stated at the recent Reading conference ‘Seeing Red’ and which was published in the conference proceedings volume (Dannell and Mees “New approaches to Samian distribution,” in M. Fulford and E. Durham (eds.), *Seeing Red: New Economic and Social Perspectives on Gallo-Roman terra sigillata*, London, pp. 165-187, 2013). It is a brief survey, consistent with the time limits of the conference at which they presented this summary, namely the Study Group’s Amsterdam conference organized by Julie van Kerckhove and Mark

Driessen. The data used comes from *Names on Terra Sigillata* volumes 1–6 (Hartley and Dickinson 2008-2010). Britain was an attractive market for Samian products and the authors document general riverine and overland routes in Gaul and note possible portages. Eight major kiln sites that produced stamp decorated pottery are reviewed, seven in France: La Graufesenque (the Rhône-Moselle-Rhine corridor); Montans (mid-1st and 2nd centuries AD); Les Martres-de-Veyre; Lezoux; Rheinzabern; Trier; and Chémery-lès-Faulquemat; and Colchester in Britain.

“Pottery production in Roman Cologne: A summary of old and new finds” by Constanze Höpken (pp. 93-104, 8 figures, 1 table, 16 references). The first settlement of Cologne -- the oppidum Ubiorum -- was founded by the Romans on the river Rhine in what is now northwest Germany, in the last centuries BC. In AD 50 it became the colony Colonia Claudia Ara Agrippinensium and around AD 80 the colony became the capital of the newly created province of Germania Inferior. In the second century the new capital was a focal point of a flourishing economy, integrated in the international business of the Roman Empire. Between AD 259/260 and 274 the city became the capital of the Gallic Empire and in 355 it was plundered by the Franks. About 50 Roman pottery production sites are situated within Cologne city and chronologically span the period from the early 1st century to the 4th century AD. Selected pottery types are illustrated for four periods (first half 1st century, 2nd half 1st century, 2nd century, and 3rd and 4th centuries). Wasters are documented from Severinstrasse 222-228 and Georgstrasse 7, and the chronological decline in production is reviewed. A catalog of the workshops completes the analysis. “The Ancient Tripolitanian amphora: The evidence from France and the recent excavation at Toulouse ‘caserne Niel’” by Matthew E. Loughton and Laurence Alberghi (pp. 105-130, 15 figures, 6 tables, 131 references). The past several decades has seen a vast improvement in our understanding of amphora production in Tunisia during the Roman period. Most notable is the recent typological synthesis by Michael Bonifay (2004), while great advances have been made in assigning amphorae to different production centres (for example Bonifay *et al* 2010; Gallia *et al* 2005; Mrabet and Ben Moussa 2007) and identifying the commodities they contained (Ben Lazreg *et al* 1995; Bonifay 2007; Slim *et al* 2007). In contrast, less work has been devoted to Tripolitanian amphorae (Panella 1973; 1977; Zevi and Tchernia 1969, 193-195). Tripolitanian amphorae characteristically have an ovoid shape, a short triangular or vertical rim, a short neck, two rounded handles, and a simple button-like base. The recent rescue excavation in Toulouse (published in

2012) produced 880,000 sherds, ca. 80 metric tons. The authors discuss the selection of 1,434 sherds from 13 excavation zones and review the typology, spatial distribution, frequency, and illustrate diagnostic sherds' Four fabrics were discerned using visual analysis and the use of a hand lens. Stamps, resin linings, reuse, and modifications are noted and comparanda reported. The chronological span begins in ca. 150 BC and the distribution in France is detailed. Dated find spots in France, Greece, Portugal, Spain, and North Africa suggested terminal dates of production.

“A gazetteer of the incidence of less common Samian ware fabrics and products in northern and western Britain. Part 1: Introduction and South Gaulish fabrics” by Margaret Ward (pp. 131-155, 3 figures, 2 appendices, 192 references). Brian Hartley’s seminal work of 1972, “The Roman occupation of Scotland: the evidence of Samian ware” published in *Britannia*, was both revelation and inspiration, highlighting the significance of Samian ware found on the northernmost frontier of the Roman Empire. Patterns of presence, but also of absence, were evident in the supply to Britain. Hartley’s findings were expanded upon and analysed by Steven Willis (2005 and 2011). Their research draws to our attention not only trends, but deviations from what may be considered the normal patterns of Samian distribution in Roman Britain. Ward focuses on five ceramic production areas: South Gaul (Montans, Banassac, and La Graufesenque); Central Gaulish (Lezoux); “Black Samian” (Lezoux); East Gaulish; and Central Gaulish. Ward discusses the development of the database and Gazetteer, biases (northern and military), inclusions, absences, and exclusions, provenance, dating, and problems. “Late Montans decorated Samian ware from Scotland and North-West England” by Felicity C. Wild (pp. 156-179, 14 figures, 9 references). During the preparation of his article, “The Roman occupations of Scotland: the evidence of Samian ware” (Hartley 1972), that the late Brian Hartley realized that an appreciable quantity of late South Gaulish ware came from sites in Scotland with no evidence for 1st century occupation, including those on the Antonine Wall, and that this must, consequently, be assigned to the Antonine period. Most, if not all, of this material is likely to have originated from Montans. He had hoped to include full publication of both the stamps and decorated ware in his original article, but this never materialized. Wild documents the characteristics of the ceramics, provides a map of Scottish sites, and has identified three Montans potters. The ware was distributed AD 140-160 and a catalogue of sites and specimens from Scotland and North-West England is provided.

Roman Pottery in the Near East: Local Production and Regional Trade: Proceedings of the Round Table Held in Berlin, 19-20 February 2010, Bettina Fischer-Genz, Yvonne Gerber and Hanna Hamel (eds.), Roman and Late Antique Mediterranean Pottery 3, BAR International Series 88, Oxford: Archaeopress, 2014. ii + 215 pp., illustrated throughout. ISBN 9781905739677, £35.00/\$63.00 (paperback); ISBN 9781784910686, £29.75 (e-publication). The Archaeopress series, Roman and Late Antique Mediterranean Pottery (RLAMP), is devoted to research of the Roman and late Antique pottery in the Mediterranean. It is designed to serve as a reference point for all potential authors devoted to pottery studies on a pan-Mediterranean basis. The series seeks to gather innovative individual or collective research on the many dimensions of pottery studies ranging from pure typological and chronological essays, to diachronic approaches to particular classes, the complete publication of ceramic deposits, pottery deposit sequences, archaeometry of ancient ceramics, methodological proposals, studies of the economy based on pottery evidence or, among others, ethnoarchaeological ceramic research that may help to understand the production, distribution and consumption of pottery in the Mediterranean basin. An international workshop with 20 participants dedicated solely to the study of Roman common ware pottery in the Near East was held in Berlin in February 2010. The goal of this workshop was to provide researchers actively engaged in the study of Roman common wares the possibility to meet and discuss the current state of research as well as questions and problems they are facing with their material. Some of the participants were able to bring pottery samples, which provided the possibility to compare and discuss specific fabrics on a regional and supra-regional scale. The volume under review includes 17 papers from this event. Several presentations, as noted below, make use of optical microscopy thin-section analyses and WD-XRF is employed in one contribution. Each article has its own bibliography.

“Roman pottery in the Near East: Local production and regional trade” (pp. 1-2). The editors outline the goals of this monograph and problems related to chronology. “Pottery of the ‘Land of Carchemish’ project and the Northern Euphrates” by Paul Newson (pp. 3-19, 11 figures, 49 references). The survey methodology, sampling strategy, ceramic types (fine ware, table ware, cooking pots, and amphorae), and distributions among the sites are documented for two major periods: Hellenistic and Early Roman and Byzantine and Early Islamic. There is a discussion of production and trade for Hellenistic fine wares and Eastern Sigillata A in this preliminary report. “The local pottery from Ras el

Bassit” by Phil Mills (pp. 21-35, 24 figures, 13 references). Sites are characterized, ceramic periods described, and methodologies reviewed. A total of 41,086 sherds were obtained from stratified contexts and the author discusses Class A amphorae, Class M mortaria and basins, Class N *dolia*, Class O oxidized utilitarian vessels, and Tile. He concludes that the site produced specialized pottery and coarse ceramic wares during the period spanning the 1st century BC through 7th century AD. “A 3rd to 4th century AD pottery assemblage from Apamea and some further considerations on pottery production and distribution in Roman Syria” by Agnès Vokaer (pp. 37-51, 8 figures, 54 references). The author discusses pottery production in Roman Syria and in Palmyra; the latter had five kilns. Three workshops were also discerned and differentiated in the manufacture of Brittle Ware, tableware, amphorae, and plain ware ceramics. “The Homs Survey (Syria): Contrasting Levantine trends in the regional supply of fine wares, amphorae and kitchen wares (Hellenistic to early Arab periods)” by Paul Reynolds (pp. 53-65, 10 figures, 30 references). Reynolds discusses the chronologies for the Hellenistic period 3rd to 1st century BC, differentiates the Early Roman (1st to 3rd century AD, and Byzantine and early Arab occupation 4th to 8th century AD. Locally-produced and imported wares are noted and Brittle Ware and Syrian calcareous amphorae documented. The author has also published *Trade in the Western Mediterranean, AD 400-700: The Ceramic Evidence*, British Archaeological Reports International Series S-604, Oxford: Tempus Reparatum, 1995 -- reviewed by Charles C. Kolb in the *SAS Bulletin* 33(2):9-10 (Summer 2010); and *Hispania and the Roman Mediterranean, AD 100-700: Ceramics and Trade*, London: Duckworth, 2010 -- reviewed in the *SAS Bulletin* 33(2):10-11 (Summer 2010).

“Roman pottery in Baalbek/Heliopolis” by Hanna Hamel (pp. 67- 78. 5 figures, 31 references). Local production is documented for five periods: Hellenistic, 1st to 4th century AD, late 1st to early 2nd century AD, late 2nd and 3rd centuries AD, and early 4th century AD. A wide range of forms were produced from local fabrics: cups, bowls, basins, mortars, kraters, storage jars, cooking pots, casseroles, jugs, and table amphorae. The author discusses these for each of the latter four periods. “Local pottery traditions in the rural settlements around Baalbek/Heliopolis, Lebanon” by Bettina Fischer-Genz (pp. 79-87, 7 figures, 18 references). The survey of ten major sites and methodological considerations are reviewed. Basins and the large variety of storage jars are featured but there was a notable lack of tableware. The settlements are characterized as having a mixed horticultural and animal husbandry economy. “Economy and cultural transfers: evidence of Hellenization and early

Romanization in Beirut by” Dina Frangié-Joly (pp. 89-101, 14 figures, 28 references). Site Bey-144 is detailed and a new type of amphora identified (Beirut Amphorae) for the 1st century BC. Other ceramics discussed include cooking vessels, bifido plates, and thin-walled vessels (especially beakers). “Pottery production in the Late Hellenistic and Early Roman Periods at Jiyeh – ancient Phoenicia (Lebanon)” by Urszula Wicenciak (pp. 103-124, 30 figures, 51 references). Two common ware deposits were discerned, the first dating to the late 3rd to mid or later 2nd century BC and the second to mid-1st to early 2nd century AD. For the first she noted a great diversity of vessel forms and wasters, with Coarse Ware production and five amphorae types recognized. Kitchen ware included cooking pots, casseroles, bowls, *lekanai*, kraters, and jars. For the second period Early Roman period amphorae table amphorae casseroles, cooking pots, jugs, and juglets are notable. “Pithos-type vessels from the excavations in Chhîm, Lebanon” by Zofia Kowarska and Szymon Lenarczyk (pp. 125-134, 6 figures, 22 references). The site chronology spans the Middle Bronze Age to the Late Antique period. The authors discuss terminology, collection strategy (1,500+ vessel fragments were recovered), and characterize *pithoi* types and forms, and types of decoration. There is a notable lack of securely dated deposits at the site.

“The current state of the WD-XRF database of Hellenistic and Roman Fine Wares in the Levant” by Gerwulf Schneider and Malgorzata Daszkiewicz (pp.135-138, 2 tables, 17 references). The authors point out that their WD-XRF analysis employs a minimum of 15-20 chemical elements rather than just a few elements. Scattergram plots of four wares (imported Hellenistic and Roman Black and Red gloss among them) are reported and 21 Eastern Mediterranean sites with WD-XRF data are tabulated in this brief report. “‘Kefar Hananya Ware’ made in Yodefath Pottery production at Yodefath in the first century AD” by Mordechai Aviam (pp. 139-146. 6 figures, 8 references). The pottery dates to the Second Temple period (1st century BC to 1st century AD) at Yodefath, a Galilean Jewish town. Excavations located four pottery kilns and one larger kiln could be reconstructed (a line drawing illustration is provided), while another had been destroyed in antiquity due to the construction of a defensive wall. Kefar Hananya Ware, defined in 1993 by David Adan-Baywitz as part of his dissertation research, was being produced in quantity at Yodefath. “Provenance study of Hellenistic, Roman and Byzantine kitchen wares from the Theatre-Temple Area by” Malgorzata Daszkiewicz, Bernd Liesen, and Gerwulf Schneider (pp. 147-158, 13 figures, 23 references). The authors provide a preliminary report on this Jordanian site. Kitchen ware was produced locally and distributed

from Galilee and Golan, while long-distance exchange involved Italy (Pompeian Red is noted) and Turkey (Phoecian kitchen ware as also present). Optical petrography was performed on nine thin sections (black-and-white microphotographs are among the illustrations) and WD-XRF chemical analysis undertaken on 26 specimens; cluster analysis was performed. “Two-part ceramic incense burners in Late Roman and Byzantine Palestine: technological, regional and ethno-religious aspects” by Itamar Taxel and Mark Iserlis (pp.159-169, 3 figures, 57 references). Three small bowls with matching lids and fenestrated walls are featured. Petrographic analysis was undertaken and the geographic distribution of specimens, provenance, and dating (late 2nd to 3rd century AD through 6th or 7th century AD) are discussed, and comparisons made with 14 known incense burners.

“Late Hellenistic and Early Roman ceramic trends at Tall Mādabā, Jordan” by Jonathan Ferguson (pp. 171-188, 7 figures, a catalogue, 63 references). The author presents preliminary results from his dissertation research. The analysis involved 25,205 diagnostic sherds dating 1st century BC to the turn of the 2nd century AD. The site location is detailed, chronology discussed, and three ceramic groups characterized: 1) storage vessels (*pithoi*, jugs, jars, juglets, and unguent aria); 2) cooling wares (nine form of cooking pots); and 3) service ware (in the main, bowls, plates, and kraters). The introduction of Nabataean Fine Ware suggested a shift from Hasmonaean to Nabataean political control. “Comparing pottery traditions from South Transjordan and from Middle and North Transjordan during the Nabataean/Roman periods (1st to 5th centuries AD)” by Yvonne Gerber (pp. 189-203, 8 figures, 45 references). Common ware samples from Petra are compared to corresponding forms from Tell Hisban. Chronological terms and sites are discussed and the importance of James Sauer’s ceramic studies noted. Two separate ceramic *koines*, Nabataean and Palestinian, are postulated for the region. “Coarse ware pottery from Roman Aila (Aqaba, Jordan)” by S. Thomas Parker (pp. 205-215, 16 figures, 30 references). Background is provided on the geography, the site, excavation area, and coarse ware typology. Alia amphorae, a new type dated to the 5th to 7th century AD, are defined, and the distribution of Aqaba Ware ceramics perceived to have major economic implications.

This highly specialized monograph provides new data on the distribution of imported and locally-produced Roman ceramics in the Near East, joining other volumes in the series. Other titles in the series: *LRCW I: Late Roman Coarse Wares, Cooking wares and amphorae in the Mediterranean: Archaeology and archaeometry* edited by J. M^a. Gurt i Esparraguera, J. Buxeda i Garrigós, M. A.

Cau Ontiveros, *British Archaeological Reports International Series S-1340*, 2005 – reviewed by Charles C. Kolb in the *SAS Bulletin* 29(2):13-17 (Summer 2006). *LRFW 1. Late Roman Fine Wares. Solving problems of typology and chronology. A review of the evidence, debate and new contexts* edited by Miguel Ángel Cau, Paul Reynolds and Michel Bonifay. ISBN 9781905739462. *Roman and Late Antique Mediterranean Pottery* 1 (2012), £30.00; *The Ancient Mediterranean Trade in Ceramic Building Materials: A Case Study in Carthage and Beirut* by Philip Mills. ISBN 9781905739608. £30.00. *Roman and Late Antique Mediterranean Pottery* 2 (2013), £30.00.

Previous Professional Meetings

The 41st International Symposium on Archaeometry was held 15-21 May 2016 in Kalamata, Greece. Additionally, the ISA hosted two special sessions: 1) Environmental Remote Monitoring for Archaeology and Cultural Heritage, and 2) The Beginning of the Bronze Age in Eastern Mediterranean. Ceramic studies were represented among the presentations: Monday, May 16, two sessions: “Ceramics, Glazes, Glass and Vitreous Materials” I and II. Tuesday, May 17, three sessions: “Ceramics, Glazes, Glass and Vitreous Materials” III, a Poster Session, and “Metals and Metallurgical Ceramics” I. Wednesday, May 18: one session: “Metals and Metallurgical Ceramics” II. Friday, May 20, two sessions: “Metals and Metallurgical Ceramics” III, “Ceramics, Glazes, Glass and Vitreous Materials” IV, and a keynote address by Maria-Filomena Guerra “Beyond Gold: Open-Ended Questions and Analytical Challenge.” Among the contributions, the following were notable: Hannah Page, Patrick Quinn, and Andrew Reid “Complexity in African Ceramics?”; Jelena Zivkovic, Jose Cristobal Carvajal Lopez, Myrto Georgakopoulou, and Timothy Power “Defining Ceramic Production of the Late Islamic Arabia: A View on Bahla/Khunj Ware from al-Ain”; Jonathan R. Wood, Ian Freestone, and Roberta Tomber “Recycled Vessel Glass as a Raw Material in the Production of Mesopotamian Alkali Ceramic Glazes”; Matt Phelps, Ian Freestone, Yael Gorin-Rosen, and Bernard Gratuze “Developments in Natron Glass Production and Supply in Early Islamic Palestine”; Carlotta Gardner, Ian Freestone, and Michael Marshall “Metalworking Crucibles in Roman London”; Carmen Ting and Jane Humphries “A Thousand Years of Iron Production: A Study of the Technology and Craft Organisation of Technical Ceramics from Meroe and Hamadab, Sudan”; David Larreina-García, Marcos Martín-Torres, and Yanxiang Li “Beaten Tracks in Technological Traditions: Bloomery Smelting after 2500 Years of Cast Iron Production in Central China”; and Xiuzhen Li, Marcos Martín-Torres, and Thilo Rehren “Aesthetics and Technology: Gold and Silver Ornaments

in the Qin First Emperor's Bronze Chariots." The *ISA 2016 Proceedings* will be published in a special issue of the open access journal *Science and Technology of Archaeological Research* (STAR). Additional information about the conference may be requested at isa2016@uop.gr.

Conference: "Voices, Images, and Artefacts of Ancient Craftsmen/Women: Encountering the Producers of Middle Bronze Age Egypt," was held 22-24 June 2016 at the Institut National d'Histoire de l'Art (INHA), Paris. One of the 17 papers was on ceramics: Toby C. Wilkinson (University of Cambridge, McDonald Institute for Archaeological Research), "Material metaphors: rethinking pottery decoration of the Near East and Egypt, 4th to 2nd millennia BC."

Journal of Archaeological Science: Reports

The *JAS:R*, an affiliate of the *Journal of Archaeological Science*, began publication in 2015 and as of July 2016, seven issues have been published and two others are in progress.

<http://www.sciencedirect.com/science/journal/2352409X>

It would appear that this journal is, and will continue to be, a remarkable source for ceramic studies. At least every issue thus far as at least one contribution on ceramics: 2015 (n = 11): Volume **1** (n = 1), **2** (n = 4), **3** (n = 4), and **4** (n = 2). 2016 (n = 33): Volume **5** (n = 3), **6** (n = 4), and **7** (n = 26). The latter issue, *JAS:R* 7, has two main sections on ceramics; the contents of these are noted below. At least five other ceramic articles are forthcoming.

Special section on "Interdisciplinary Studies of Ancient Materials from the Mediterranean - Proceedings of the International Conference organized by the NARNIA Project"; Guest Edited by Maria Dikomitou Eliadou and Vasiliki Kassianidou. *Journal of Archaeological Science: Reports* **7**: 15 articles. Maria Dikomitou-Eliadou, Artemis Georgiou, and Athanasios K. Vionis (2016). Cooking fabric recipes: an interdisciplinary study of Cypriot cooking pots of the Late Bronze Age. Christina Makarona, Nadine Mattielli, Priya Laha, Herman Terryn, Karin Nys, and Philippe Claeys (2016). Leave no mudstone unturned: Geochemical proxies for provenancing mudstone temper sources in South-Western Cyprus. Elisavet Charalambous, Maria Dikomitou-Eliadou, Georgios M. Milis, Georgios Mitsis, and Demetrios G. Eliades (2016). An experimental design for the classification of archaeological ceramic data from Cyprus, and the tracing of inter-class relationships. Shlomo Shoval and Ayelet Gilboa (2016). PXRF analysis of pigments in decorations on ceramics in the East Mediterranean: A test-case on Cypro-Geometric and

Cypro-Achaic Bichrome ceramics at Tel Dor, Israel. Sergios Menelaou, Ourania Kouka, and Peter M. Day (2016). Pottery production and exchange at the Heraion, Samos during the late third millennium BC: First steps in the study of technology and provenance. R. Montesana, P. M. Day, V. Kilikoglou, S. Todaro (2016). United in our differences: The production and consumption of pottery at EM IB Phaistos, Crete. William D. Gilstrap, Peter M. Day, Vassilis Kilikoglou (2016). Pottery production at two neighbouring centres in the Late Bronze Age Saronic Gulf: Historical contingency and craft organisation. Artemi Chaviara and Eleni Aloupi-Siotis (2016). The story of a soil that became a glaze: Chemical and microscopic fingerprints on the Attic vases. Noémi S. Müller, George Vekinis, and Vassilis Kilikoglou (2016). Impact resistance of archaeological ceramics: The influence of firing and temper. G. Kordatzaki, E. Kiriati, N. S. Müller, M. Voyatzis, D. Romano, S. Petrakis, J. Forsén, G. Nordquist, E. Rodriguez-Alvarez, and S. Linn (2016). A diachronic investigation of 'local' pottery production and supply at the sanctuary of Zeus, Mount Lykaion, Arcadia, Peloponnese. X. Charalambidou, E. Kiriati, N. S. Müller, M. Georgakopoulou, S. Müller Celka, T. Krapf (2016). Eretrian ceramic products through time: Investigating the early history of a Greek metropolis. Andrew J. Koh, Philip P. Betancourt, Marie Nicole Pareja, Thomas M. Brogan, and Vili Apostolou (2016). Organic residue analysis of pottery from the dye workshop at Alatsomouri-Pefka, Crete. Lente Van Bremept and Vasiliki Kassianidou (2016). Facing the complexity of copper-sulphide ore smelting and assessing the role of copper in south-central Cyprus: A comparative study of the slag assemblage from Late Bronze Age Kalavassos-Ayios Dhimitrios. Demetrios Ioannides, Vasiliki Kassianidou, Olivier Bonnerot, and Andreas Charalambous (2016). A preliminary study of the metallurgical ceramics from Kition, Cyprus with the application of pXRF. Adi Eliyahu Behar, Shira Albaz, Itzhaq Shai, Aren M. Maeir, and Haskel J. Greenfield (2016). Faience beads from Early Bronze Age contexts at Tell es-Safi/Gath, Israel.

Special section on "Trade and Interaction in the Uruk Expansion: Recent Insights from Archaeometric Analyses"; Guest Edited by Leah Minc and Geoff Emberling. *Journal of Archaeological Science: Reports* **7**: nine articles on ceramics. Leah Minc, Geoff Emberling (2016). Trade and interaction during the era of the Uruk expansion: Recent insights from archaeometric analyses. Leah D. Minc (2016). Trace-element analyses of Uruk ceramics: Establishing a database to track interregional exchange. Jorge Sanjurjo-Sánchez, Juan-Luis Montero Fenollós, Maria Isabel

Prudêncio, Víctor Barrientos, Rosa Marques, and Maria Isabel Dias (2016). Geochemical study of beveled rim bowls from the Middle Syrian Euphrates sites. Geoff Emberling and Leah Minc (2016). Ceramics and long-distance trade in early Mesopotamian states. Hilary Gopnik, Clemens Reichel, Leah Minc, and Rasha Elendari (2016). A view from the east: The Godin VI Oval and the Uruk Sphere. Benjamin Mutin, C. C. Lamberg-Karlovsky, and Leah Minc (2016). Investigating ceramic production during the Proto-Elamite period at Tepe Yahya, southeastern Iran: Results of instrumental neutron activation analysis of periods IVC and IVB ceramics. John R. Alden and Leah Minc (2016). Itinerant potters and the transmission of ceramic technologies and styles during the Proto-Elamite period in Iran. Holly Pittman and M. James Blackman (2016). Mobile or stationary? Chemical analysis of clay administrative devices from Tell Brak in the Late Uruk period. Henry T. Wright (2016). The Uruk Expansion and Beyond: Archaeometric and Social Perspectives on Exchange in the IVth Millennium BCE.

ARCHAEOMETALLURGY
Thomas R. Fenn, Associate Editor

The column in this issue includes the following categories of information on archaeometallurgy: 1) New Books; 2) New Book Chapters/Articles; 3) Doctoral and Master Theses; 4) Forthcoming Meetings; 5) Previous Meetings; 6) Research, Education & Employment Opportunities; and 7) Web-based Resources.

New Books

Old Kingdom Copper Tools and Model Tools, by Martin Odler, 2016, Archaeopress Publishing Ltd, Oxford, UK, xvi+292 pages; illustrated throughout in color and black & white. *Archaeopress Egyptology 14*. ISBN 978-1-78491-442-4, 978-1-78491-443-1 (e-PDF), £45.00.

The Old Kingdom of Egypt (Dynasties 4–6, c. 2600–2180 BC) is famous as a period of the builders of the largest Egyptian pyramids. It is generally accepted that the evidence on the use of copper alloy tools from this era is meagre. Martin Odler gathers the textual, iconographic and palaeographic evidence and examines Old Kingdom artefacts in order to revise this view on the use of copper alloy tools and model tools. Furthermore, he provides updated definitions of tool classes and tool kits, together with the context of their use. Besides rare specimens of full-size tools, the largest corpora of the material have been preserved in the form of model tools in the burial equipment of the Old Kingdom elite and were most

probably symbols of their power to commission and fund craftwork. Moreover, the size and elaboration of the model tools were probably connected to the social status of the buried persons. The long-standing division in the Egyptological literature between full-size tools and model tools is questioned. The ancient sources also enable to show that the preservation of material culture from the Old Kingdom was largely dependent on a conscious selection made within the past culture, with completely different settlement and funerary contexts and a conspicuous absence of weapons. The volume is completed by co-authored case studies on archaeometallurgy of selected Old Kingdom artefacts in the collection of the Egyptian Museum of Leipzig University, on morphometry of Old Kingdom adze blades and on the finds of stone and ceramic vessels associated with the findings of so-called Old Kingdom model tools.

The main sections of the volume consist of: Introduction (p. 1), Chapter 1. Limits of subject, chronology and chorology (p. 4); Chapter 2. Tools and model tools in archaeological theory (p. 7); Chapter 3. Tools and toilet implements in Ancient Egypt – history of research (p. 10); Chapter 4. Definitions of artefacts (p. 13); Chapter 5. Research tools (p. 23); Chapter 6. Copper tools in Old Kingdom textual and iconographic sources (p. 29); Chapter 7. Archaeological sources – material culture (p. 54); Chapter 8. Tools and toilet implements (p. 98); Chapter 9. Towards a semiosis of tools in the Old Kingdom culture (p. 212); Chapter 10. Conclusion (p. 236); Chapter 11. Case studies (p. 238), which includes “Archaeometallurgical study of copper alloy tools and model tools from the Old Kingdom necropolis at Giza” (Jiří Kmošek – Martin Odler – Tereza Jamborová – Šárka Msallamová – Tereza Šálková – Martina Kmoníčková; p. 238), “Morphometrical and statistical case study of Old Kingdom adze blades” (Martin Odler – Ján Dupej; p. 248), “Dating of archaeological contexts from the Memphite necropolis with copper tools and model tools based on assemblages of model stone vessels (Lucie Jirásková; p. 261), “Dating of select Old Kingdom archaeological contexts in the Memphite region based on ceramic finds” (Katarína Arias Kytnarová; p. 264); Bibliography (p. 271); and Catalogue (p. 291). More information and how to purchase the publication can be found at the publisher’s website: <http://www.archaeopress.com/ArchaeopressShop/Public/displayProductDetail.asp?id={DED38ACF-A714-4454-8448-4C8C91A92F43}>.

Metals in Mandara Mountains: Society and Culture, edited by Nicholas David, 2012, Africa World Press, Trenton, NJ, 360 pages, 54 illustrations, 18 tables, ISBN: 978-1-59221-890-5, cost: \$34.95. [SAS Bulletin Editor’s

note: this book actually was published by the Africa World Press and ready to ship in May 2012, but issues in the quality of the illustrations lead the editor to complain to the publishers, and after two more years of delay, the book's copyrights were transferred back to the editor and authors, and it is now released as a PDF of the original book proofs.]

Metals, and especially iron, are critical factors of production and destruction and deeply embedded in social relations and cultural life. In the Mandara Mountains of Cameroon and Nigeria, anthropological research over a period of six decades has generated a rich body of data that stimulates exploration of the multi-faceted and complex relationship between technology, society and culture. *Metals in Mandara Mountains Society and Culture* is the collaborative product of researchers from six nations, all with long and ongoing experience of the mountains and their multi-ethnic montagnard inhabitants. It is unique in that it explores the implications of metallurgy for society and culture from points of view that together add up to a regional and multidisciplinary mosaic in which the results of their various approaches—ethnographic, archaeological, ethnoarchaeological and social anthropological—throw light upon each other.

In PART I, the editor introduces the physical and human geography and its metallurgy, Scott MacEachern synthesizes regional archaeology, and Bernhard Gardi describes ground-breaking early ethno-metallurgical research. PART II deals with the reciprocal influences of iron on society and culture. Nic David and Judy Sterner describe the varying forms of integration of ironworkers into montagnard societies. David's quantitative study emphasizes the rationalization of the iron industry at various scales. David and Ian Robertson investigate the recent competition between montagnard and lowland smiths, and Robertson explores the factors that generate typological variety in hoes and knives. PART III examines the indigenous caste phenomenon found in many montagnard communities in terms of the political and culture history of the area (Olivier Langlois), socio-cultural anthropology (James Wade) and in contrasting case studies of Kapsiki iron and brass by Walter van Beek. PART IV, an afterword by Jean-Pierre Warnier, reflects upon and in part resolves tensions between authors' conclusions while emphasizing that technologies are embedded in systems of agency that transform the persons involved.

The sections of the volume consist of: **Part I Setting the Stage**, Chapter 1. Introduction (Nicholas David, p. 3), Chapter 2. The prehistory and early history of the northern Mandara Mountains and surrounding plains

(Scott MacEachern, p. 27), Chapter 3. My father René Gardi & Co.: Truadak and Rabash, Hans Eichenberger and Paul Hinderling (Bernhard Gardi, p. 69), **Part II Society and Economy**, Chapter 4. Smith and society: patterns of articulation in the northern Mandara Mountains (Nicholas David and Judy Sterner, p. 87), Chapter 5. Ricardo in the Mandara Mountains: iron, comparative advantage, and specialization (Nicholas David, p. 115), Chapter 6. Competition and change in two traditional African iron industries (Nicholas David and Ian G. Robertson, p. 171), Chapter 7. Form, style, and ethnicity: iron hoes and knives in the Mandara region, Northern Cameroon (Ian G. Robertson, p. 185), **Part III History and Ideology**, Chapter 8. The development of endogamy among smiths of the Mandara mountains eastern piedmont: myths, history and material evidence (Olivier Langlois, p. 225), Chapter 9. The wife of the village: understanding caste in the Mandara Mountains (James H. Wade, p. 257), Chapter 10. The iron bride: blacksmith, iron, and femininity among the Kapsiki/Higi (Walter van Beek, p. 285), Chapter 11. A touch of wildness: brass and brass casting in Kapsiki (Walter van Beek, p. 303), **Part IV Afterword**, Chapter 12. Afterword (Jean-Pierre Warnier, p. 327), List of contributors (p. 343), Index (p. 347). The PDF version of the book can be found about halfway down the page at the link: <http://www.sukur.info/Lib/libindex.htm>.

New Book Chapters/Articles

From the book *Proceedings of the 6th Symposium of the Hellenic Society for Archaeometry*, 2016, edited by E. Photos-Jones, in collaboration with: Y. Bassiakos, E. Filippaki, A. Hein, I. Karatasios, V. Kilikoglou and E. Kouloumpi, *BAR S2780*, British Archaeological Reports Ltd, Oxford, UK, comes "Did copper usually arrive in the Aeolian Islands in the fourth millennium BC? The evidence from a small but iconic fragment of vitreous material thought to be copper slag" (Maria Clara Martinelli, Effie Photos-Jones, Sara Tiziana Levi; p. 73), "Selective use of arsenical copper during the Mycenaean period: the evidence from Pylia (Messenia, Greece)" (Charilaos E. Tselios, Eleni Filippaki, Georgios S. Korres; p. 81), "Copper production during the early Bronze Age at Aghios Antonios, Potos on Thasos" (Nerantzis Nerantzis, Stratis Papadopoulos; p. 89), "A comparative study of Cypriot bronzes dated to the Late Bronze and Early Iron Age" (Andreas Charalambous, Vasiliki Kassianidou, George Papasavvas; p. 95), "Conservation of a silver coin hoard from the geometric period Necropolis in Samos" (Ioannis P. Staikopoulos; p. 101), "Gold inlay decoration on the blade of an iron sword from the Tomb A at Katerini" (Vasiliki Michalopoulou, Barbara Smit-Douna, Ioannis Karapanagiotis; p. 107), "The so-called 'helicoidal' ore

washeries of Laurion: their actual function as circular mills in the process of beneficiation of silver and lead contained in old litharge stocks” (George D. Papadimitriou; p. 113), “Technical and chemical examination of a small silver treasure dated from the 6th-7th century AD” (D. Kotzamani, J.F. Merkel; pp. 119), and “Study of gold and silver finds from ancient akanthos, Chalkidiki, N Greece” (S. Vivdenko. E. Trakosopoulou-Salakidou, P. Manoudis; p. 127).

From the book *Networks of Trade in Raw Materials and Technological Innovations in Prehistory and Protohistory: An Archaeometry Approach*. Proceedings of the XVII UISPP World Congress (1–7 September 2014, Burgos, Spain), Volume 12/Session B34, edited by Davide Delfino, Paolo Piccardo, and João Carlos Baptista, 2016, Archaeopress Publishers, Oxford, UK, comes “Middle Bronze Age metalworking in the cave of Monte Meana (South-western Sardinia, Italy)” (Marco Serra, Stefano Naitza, Carla Cannas, Giacomo Paglietti; p. 1), “Bronze Age silver artifacts from Romania – an archaeo-metallurgical study” (Bogdan Constantinescu, Daniela Cristea-Stan, Anca-Diana Popescu; p.13), “Prehistoric gold metallurgy in Transylvania – an archaeometrical study” (Daniela Cristea-Stan, Bogdan Constantinescu; p. 27), and “Passage of technologies – an archaeometric case study of iron artifacts of a Scythian Age grave from the Carpathian Basin” (B. Török, A. Gyucha, Á. Kovács, P. Barkóczy, Gy. Gulyás; p. 39).

From the book *Late Prehistory and Protohistory: Bronze Age and Iron Age*. Proceedings of the XVII UISPP World Congress (1–7 September 2014, Burgos, Spain), Volume 9 / Sessions A3c and A16a, 1. The Emergence of warrior societies and its economic, social and environmental consequences, edited by Fernando Coimbra and Davide Delfino, 2016, Archaeopress Publishers, Oxford, UK, comes “Model of metalwork and scrap’s bronze circulation during Late Bronze Age in the Middle Tagus” (Davide Delfino; p. 91).

From the book *Cultural Dynamics and Production Activities in Ancient Western Mexico: Papers from a symposium held in the Center for Archaeological Research, El Colegio de Michoacán 18-19 September 2014*, 2016, edited by Eduardo Williams Blanca Maldonado, Archaeopress Publishers, Oxford, UK, comes “Copper as a Strategic Resource in Pre-Hispanic Western Mexico” (Blanca Maldonado; pp. 179-186).

From the *Journal of Archaeological Science* (2016, Vol 76) comes “Iron isotopes as a potential tool for ancient iron metals tracing” (Jean Milot, Franck Poitrasson, Sandrine Baron, Marie-Pierre Coustures; pp. 9-20),

“Remote sensing landscapes of water management on the Victorian goldfields, Australia” (Peter Davies, Jodi Turnbull, Susan Lawrence; pp. 48-55), “Tracing edges: A consideration of the applications of 3D modelling for metalwork wear analysis on Bronze Age bladed artefacts” (Barry Molloy, Mariusz Wiśniewski, Frank Lynam, Brendan O’Neill, Aidan O’Sullivan, Alan Peatfield; pp. 79-87), and from (2016, Vol. 25) comes “Copper mining and smelting technology in the northern Lowveld, South Africa, ca. 1000 CE to ca. 1880 CE” (David Killick, Duncan Miller, Thomas Panganayi Thondhlana, Marcos Martín-Torres pp. 10-26), “A lead-isotope database of copper ores from the Southeastern Alps: A tool for the investigation of prehistoric copper metallurgy” (G. Artioli, I. Angelini, P. Nimis, I.M. Villa; pp. 27-39), and from (2016, Vol. 74) comes “A Re-evaluation of inverse segregation in prehistoric As-Cu objects” (Marianne Mödlinger, Benjamin Sabatini; pp. 60-74), and from (2016, Vol. 72) comes “Early Bronze Age copper production systems in the northern Arabah Valley: New insights from archaeomagnetic study of slag deposits in Jordan and Israel” (E. Ben-Yosef, A. Gidding, L. Tauxe, U. Davidovich, M. Najjar, T.E. Levy; pp. 71-84).

From *Journal of Archaeological Science: Reports* (2016, Vol. 9) comes “A new Ghassulian metallurgical assemblage from Bet Shemesh (Israel) and the earliest leaded copper in the Levant” (Ben-Yosef Erez, Vassal Yitzhak, van den Brink Edwin C.M., Beeri Ron; pp. 493-504), “Provenance determination of silver artefacts from the 1629 VOC wreck *Batavia* using LA-ICP-MS” (Liesel Gentelli; pp. 536-542), “Authentication and conservation of corroded archaeological Qatabanian and Himyarite silver coins” (Omar Abdel-Kareem, Awad Al-Zahrani, Mounir Arbach; pp. 565-576), “Study of eight Albanian-Dalmatian axes (XIII-XII B.C.) and six celts (XI-X B.C.) found in northern Albania, by μ -XRF, OM, SEM-EDS” (Olta Çakaj, Teuta Dilo, Nikolla Civici, Gert Schmidt, Frederik Stamatii; pp. 219-225), and from (2016, Vol. 8) comes “Tripod cauldrons produced at Olympia give evidence for trade with copper from Faynan (Jordan) to South West Greece, c. 950–750 BCE” (Moritz Kiderlen, Michael Bode, Andreas Hauptmann, Yannis Bassiakos; pp. 303-313), and from (2016, Vol. 7) comes “Facing the complexity of copper-sulphide ore smelting and assessing the role of copper in south-central Cyprus: A comparative study of the slag assemblage from Late Bronze Age Kalavassos-Ayios Dhimitrios” (Lente Van Brempt, Vasiliki Kassianidou; pp. 539-553), “A preliminary study of the metallurgical ceramics from Kition, Cyprus with the application of pXRF” (Demetrios Ioannides, Vasiliki Kassianidou, Olivier Bonnerot, Andreas Charalambous, pp. 554-565), “A diachronic study of Cypriot copper alloy artefacts” (Andreas Charalambous; pp. 566-573),

“Copper metallurgy of the Early Bronze Age in Thassos, north Aegean” (Nerantzis Nerantzis, Yannis Bassiakos, Stratis Papadopoulos; pp. 574-580), “Weight and context: A new approach to the role of metals in LBA societies on Crete” (Lena Hakulin; pp. 581-587), “Seeing the forest for the trees: Assessing technological variability in ancient metallurgical crucible assemblages” (Frederik W. Rademakers, Thilo Rehren; pp. 588-596), “Copper-alloy use in a Tyrrhenian medieval town: The case of Leopoli-Cencelle (Italy)” (Mainardo Gaudenzi Asinelli, Marcos Martín-Torres; pp. 597-608), “New insights on Late Bronze Age Cu-metallurgy from Coles de Samuel hoard (Central Portugal): A combined multi-analytical approach” (Carlo Bottaini, Raquel Vilaça, Nick Schiavon, José Mirão, António Candeias, Rui Bordalo, Giovanni Paternoster, Ignacio Montero-Ruiz; pp. 344-357), and from (2016, Vol. 6) comes “Complicating the frontier: Armaments, fortifications, and identities beyond the Great Wall” (Jang-Sik Park, William Honeychurch, Amartuvshin Chunag; pp. 475-487).

From *Archaeometry* (2016, Vol. 58, No. 6) comes “The Ore-Dressing Grindstone Called a ‘Quimbaete’: a Mechanics-Based Approach (N. Florsch, F. Téreygeol, P. J. Cruz; pp. 881-898), “The Science of Cupules (R. G. Bednarik; pp. 899-911), “Never Judge A Gold Object by Its Surface Analysis: A Study of Surface Phenomena in a Selection of Gold Objects From the Staffordshire Hoard (E. S. Blakelock; pp. 912-929), “Technical Studies on the Bronze Age Metal Artefacts from the Graveyard of Deh Dumen, South-Western Iran (Third Millennium BC) (O. Oudbashi, R. Naseri, M. Malekzadeh; pp. 947-965), “Middle Bronze Age Arsenical Copper Alloys in Southern Portugal (P. Valério, A. M. M. Soares, M. F. Araújo, R. J. C. Silva, L. Baptista; pp. 1003-1023), and from (2016, Vol. 58, No. 5) comes “The Silversmith’s Workshop of Tira Del Lienzo (Totana, Murcia) In The Context of Iberian Bronze Age Metallurgy (S. Delgado-Raack, V. Lull, K. Martin, R. Micó, C. Rihuete Herrada, R. Risch; pp. 779-795), and from (2016, Vol. 58, Supplement S1) comes “Lead Isotope Analysis of Pewter Mounts from the Viking Ship Burial at Gokstad: on the Origin and Use of Raw Materials (U. Pedersen, T. Andersen, S. Simonsen, M. Erambert; pp. 148-163), “The Production, Distribution and Consumption of Metals and Alloys at Great Zimbabwe (F. Bandama, A. J. Moffett, T. P. Thondhlana, S. Chirikure; pp. 164-181), and from (2016, Vol. 58, No. 4) comes “A Compositional and Microstructural Study of Eighth Century BC Bronzes from Moita Da Ladra (Tagus Estuary): How Did the Spread of the Phoenician Metallurgy Take Place in Western Iberia? (P. Valério, A. M. M. Soares, M. Monteiro, A. Pereira, M. F. Araújo, R. J. C. Silva; pp. 593-609), “Characterization of a Historical Cannonball

from the Fortress of San Juan De Ulúa Exposed to a Marine Environment (M. Hernandez, M. Hernandez-Escampa, C. Abreu, J. Uruchurtu, M. Bethencourt, A. Covelo; pp. 610-623), “Pre-Industrial Iron Smelting and Silver Extraction in North-Eastern Greece: an Archaeometallurgical Approach (N. Nerantzis; pp. 624-641), “Revisiting Key Sedimentary Archives Yields Evidence Of A Rapid Onset Of Mining In The Mid-13th Century At The Great Copper Mountain, Falun, Sweden (R. Bindler, J. Rydberg; pp. 642-658), and from (2016, Vol. 58, No. 3) comes “A Box Containing Carpenter’s Accessories from The Akko 1 Shipwreck, Israel: Archaeometallurgical Analysis of Surviving Ironwork (D. Cvikel, T. Ben-Artzi, D. Ashkenazi, N. Iddan, A. Stern, Y. Kahanov; pp. 427-440), “Metallurgical Characterization of A Coated Roman Iron Coin By Analytical Investigations (R. Haubner, S. Strobl, J. Zbiral, C. Gusenbauer, U. Pintz; pp. 441-452).

From *Archaeological and Anthropological Sciences* (2016, Vol. 8, No. 4) comes “On the making of copper oxhide ingots: evidence from metallography and casting experiments” (Andreas Hauptmann, Ralf Laschimke, Maria Burger; pp. 751-761). From *Azania: Archaeological Research in Africa* (2016, Vol. 51, No. 3) comes “The archaeometallurgical reconstruction of early second-millennium AD metal production activities at Shankare Hill, northern Lowveld, South Africa” (Thomas Panganayi Thondhlana, Marcos Martín-Torre, Shadreck Chirikure; pp. 327-361), and “Archaeological evidence for modes of air supply into iron smelting furnaces in the African Great Lakes region” (Edwinus C. Lyaya; pp. 362-379). From *Proceedings of the Seminar for Arabian Studies* (2016, Vol 46) comes “Iron Age metallurgy at Salūt (Sultanate of Oman): a preliminary note (poster)” (Michele Degli Esposti, Martina Renzi, Thilo Rehren; pp. 81-88), and “Early Iron Age metal circulation in the Arabian Peninsula: the oasis of Taymā as part of a dynamic network (poster)” (Martina Renzi, Andrea Intilia, Arnulf Hausleiter, Thilo Rehren; pp. 237-246). From *Southeastern Archaeology* (2016, Vol. 35, No. 1), comes “Reflectance transformation imaging (RTI) of a little known southeastern copper plate” (Amanda D. Roberts Thompson, Mark Williams; pp. 70-80), while from the *Indian Journal of History of Science* (2016, Vol. 51, No. 1) comes “Metallurgy of Zinc, High-tin Bronze and Gold in Indian Antiquity: Methodological Aspects” (Sharada Srinivasan; pp. 22-32). From *Levant* (2016, Vol. 48, No. 1) comes “Late Bronze Age copper production in Timna: new evidence from Site 3” (Omri A. Yagel, Erez Ben-Yosef, Paul T. Craddock; pp. 33-51), while from *Meteoritics & Planetary Science* (Online Version: May 20, 2016, DOI: 10.1111/maps.12664) comes “The meteoritic origin of Tutankhamun’s iron

dagger blade” (D. Comelli, M. D’Orazio, L. Folco, M. El-Halwagy, T. Frizzi, R. Alberti, V. Capogrosso, A. Elnaggar, H. Hassan, A. Nevin, F. Porcelli, M. Rashed, G. Valentini; 9p.).

Doctoral & Master Theses

Marpole Metal: Contextualizing the Evidence of Pre-Contact Copper Technology in the Salish Sea Basin, by Garrett David Hunt (Master of Science in Anthropology, Department of Anthropology, Purdue University, West Lafayette, Indiana), August 2015, xii+192 pages, 33 figures, 20 tables, 2 appendices, and bibliographical references.

The purpose of this thesis is to investigate the relationship between the appearance of native copper technologies and the emergent social complexity of the Marpole Phase (2000-1100 BP). By examining collections at the American Museum of Natural History, the Canadian Museum of History, the Royal British Columbian Museum, BC Archaeology Branch records and grey literature, this thesis provides a consolidated report of the earliest evidence for native copper working on the Central Northwest Coast. The prevalence of native copper artifacts that can be confidently associated with the Marpole Phase are extremely limited in number. The evidence suggests that native copper artifacts are not exclusive to the Marpole Phase and are too limited to be used as a diagnostic trait of Marpole cultural complexity. Rather, the uneven adoption of native copper technologies reflects a regional network of competing material narratives. The motivation for communities to adopt native copper technologies is argued to be dependent on the success of the material in communicating a socio-expressive goal. Traditional suggestions of an Alaska-Yukon origin for the technology are rejected through contextual and morphological comparison. However, the archaeological evidence presents a very narrow view into the life history of native copper artifacts within the Central Northwest Coast. This seems counter to the expectations of a local innovation. [Abstract from thesis]

The Influence of Iron on Arctic Thule Migration Patterns, by Alina Truzal Aquino (Master of Arts in Anthropology, Department of Anthropology, University of Nevada, Las Vegas), November, 2015, viii+110 pages, 37 figures, 1 table, and bibliographical references.

Arctic scholars have yet to fully understand the reasons behind the migration of Thule culture from the western to the eastern Arctic. This rapid movement across such a vast area into environmentally diverse regions marks a critical period of cultural change that is usually

summarized by two theoretical positions. Ecological theories postulated environmental changes placed selective pressures on traditional food sources that required Thule hunters to follow migrating prey. Theories that focused on material acquisition alternately proposed the Thule followed the trail of meteoric iron eastward into northwestern Greenland.

This research sought to examine the eastward Thule migration from another possible perspective. Instead of taking an environmental view, it focused on the search for valuable materials such as meteoric iron. Information on iron artifacts from archaeological site reports was examined to discuss the use of iron tools and possible metalworking methods. I also conducted experimental research into how meteorite iron ore may have been cold forged into endblades. This provided a deeper understanding of how these materials were processed in an environment with such limited resources. [Abstract from thesis]

Forthcoming Meetings

Iron in Archaeology: Bloomery Smelters and Blacksmiths in Europe and Beyond is an international conference in honor of Radomír Pleiner in the 50th year of the CPSA, to be held from May 30 – June 1, 2017, at the National Technical Museum in Prague, Czech Republic. The aim of the conference is to bring together scholars involved in research on early ironworking and to share the newest results and experiences achieved in this field. Very welcome contributions are those informing about recently excavated bloomeries and smithies, about results of analyses of slags and iron artefacts, about new analytical methods developed, new trends and achieved results in experimental archaeometallurgy of iron, etc.

The event will be held at Prague in the spring of 2017, thus 30 years after R. Pleiner himself organized a similar CPSA conference at Liblice near Prague. Conferences organized under the auspice of the CPSA have already a long tradition, which will be, by the forthcoming event, revived and continued. The first meeting was held at Schaffhausen in 1970, the others at Eisenstadt in 1975, Schaffhausen in 1979, Sankelmark in 1980, Vordernberg in 1981, Populonia in 1983, Belfast in 1984, Norberg in 1985, Mainz in 1986, Liblice in 1987 (the 20th anniversary of CPSA), Val Camonica in 1988, Kielce-Ameliówka in 1989, Sévenans-Belfort in 1990, Budal in 1991, Ripoll in 1993, Besançon in 1993, Plas Tan y Bwlch in 1997 (the 30th anniversary of CPSA), Bienno in 1998, Sopron-Somogyfajs in 1999, Sandbjerg in 1999 and Uppsala in 2001. All these conferences were the most enjoyable and friendly of occasions, which helped to bond together a family of scholars of European early

ironworking. The organizers believe that the forthcoming conference in Prague will also be such an event.

Both oral presentation and posters are welcome. Proposals should be submitted with a short abstract via the preliminary registration form. Oral presentations (max. 20 min) as well as posters (A0, A1) must be prepared in English. Poster sessions will take place in a public area of the museum, i.e. will be accessible to all its visitors. Definitive Abstracts (not exceeding 400 words) for all accepted contributions will be published in a Booklet of Abstract, which participants will receive at the Conference. These abstracts must be prepared in compliance with the Instructions for Writing Definitive Abstracts can be submitted by email to J. Hošek (ia2017@arup.cas.cz).

Deadlines and key dates:

Proposal submission (Title & Short Abstract):	Jan. 15, 2017
Acceptance of proposed submission:	Feb. 28, 2017
Definitive abstracts for Booklet of Abstracts:	Apr. 15, 2017

[Additional information can be found at the following link: http://www.arup.cas.cz/ia2017/index.html.](http://www.arup.cas.cz/ia2017/index.html)

The *Ninth International Conference on the Beginnings of the Use of Metals and Alloys (BUMA IX)* will be held from October 16-19, 2017, at the International Center, Bumin Campus, Dong—A University, Busan, Korea.

About the Conference

The international conference on “the Beginnings of the Use of Metals and Alloys” (BUMA) is the interdisciplinary gathering of scientists, engineers, archaeologists and historians with a focus on production and use of metals, and an emphasis on cultural interactions and evolutions over time and space especially between the West and the Asian region.

BUMA was founded in 1981 by two eminent archaeometallurgists Prof. Robert Maddin in Philadelphia USA and Prof Tsun Ko in Beijing, China, with the strong support of late Professors Cyril Stanley Smith (MIT) and Yunoshin Imai (Tohoku University) from the second Conference on. From Beijing in 1981 BUMA has traveled to Zhengzhou, China (1986), Sanmenxia, China (1992), Matsue, Japan (1998), Gyeongju, Korea (2002), Beijing, China (2006), Bangalore, India (2009). Nara, Japan (2013).

BUMA IX will be held in Busan, Korea in 2017. As the largest harbor of Korea, there are many historical and cultural attractions in Busan.

Scope of the Conference

The main theme at the Busan Conference is “Cultural Interaction and the Use of Metals”. The Conference will provide a forum for discussion on the effects of metals on the culture and history with a special focus on Asian materials. Comparative studies and case studies on ancient and traditional metallurgy from other regions can illuminate the interactions between the Far East and the West through South Asia as well as Eurasia.

The Conference covers the following theme:

- (1) Iron and Steel Technology
- (2) Copper and Bronze Technology
- (3) Precious Metals and Coinage
- (4) Casting Technology of Bronze and Iron
- (5) Swords and Iron Artifacts
- (6) History of Alloys (Brass, Paktong and Shiromé)
- (7) Ores and Metal Production
- (8) Illustrated Technology of Mining and Metallurgy
- (9) Experimental Metallurgy, Survey Methods and Conservation

Important Dates/Deadlines

Abstract (1 page) submission Deadline:	Feb. 1, 2017
Abstract Acceptance:	Mar. 31, 2017
Advance registration Deadline:	May 31, 2017
Final Program:	July 31, 2017
Conference:	Oct. 16-19, 2017
Full paper (within 8 pages) submission Deadline:	Oct. 18, 2017

Additional information can be found in the 1st conference circular PDF file at: <http://kim.or.kr/UploadData/Editor/EmBody/201604/96EBA3E68BA446B2B935206E0DF47D24.pdf>, and at the conference website: <http://buma9.org/>.

Previous Meetings

The *22nd Annual Meeting of the European Association of Archaeologist (EAA)* was held in Vilnius, Lithuania, from August 31 – September 4, 2016. Three main sessions were dedicated to metals and archaeometallurgy. The session “Iron making techniques and social change in the medieval and early modern Europe” (Abstract nr. TH1-32), included “Basque Iron metallurgy, habitat and social complexity during the Middle Ages (7th-14th A.D.)” (Jose Luis Solaun), “The Iron and the Smartphone: ‘expensive’ technologies at the verge of the

millennium” David Larreina-Garcia), “Iron and Society in the Baltic 900 - 1350 AD” (Gert Magnusson), “Bergslagen - a medieval innovation Centre” (Catarina Karlsson), “Iron in the everyday life in the medieval rural sites of Western Nyland (Fi. Uusimaa) in Finland” (Elina Terävä), and “Forges, Furnaces and Cannon Foundries - Deserted 17th century Iron Industries in Sweden” (Georg Haggren).

The session “The selective deposition of metalwork in the Bronze Age: a pan-European phenomenon?” (Abstract nr. TH1-07), included “Introduction. The selective deposition of metalwork” (David Fontijn), “Object deposition in Central Norway c. 2350-500” (Merete Henriksen), “Taming the Might of Bronze – Localisation of Bronze-Related Ritual Practises in Bronze Age Finland” (Jarkko Saipio), “Early Bronze Age metalwork depositions in Denmark” (Marieke Visser), “Horse harness in Late Bronze Age hoards in southern Scandinavia and the southern Baltic area” (Torben Sarauw), “The metal hoards practice in Central and Western Europe: a statistical and geographical approach” (Hélène Blitte), “Oscillating Metal - comparing selective depositions and graves in the Bronze Age of Central Europe” (Daniel Neumann), “The selective deposition of tools – an indication of personalized hoards?” (Bianka Nessel), “Fragmentation as a common feature in European Bronze Age hoarding” (Regine Maraszek), “Places of deposition of metalwork assemblages in West Bohemia” (Luboš Jiráň), “The Copper Highway - An Overview of Early Bronze Age Hoards in South Bohemia” (Jan John), “Urnfield Period hoards in South Bohemia” (Ondrej Chvojka), “O’ mighty Danube. The deposition of swords in rivers in the area of middle Danube” (Martin Bača), “Between formalism and substantivism: Selective deposition of metal in the BA Carpathian Basin” (Vajk Szeverényi, Tamás Polányi), “Late Bronze Age Metal Deposition Practices on the Southern Outskirts of the Carpathian Basin” (Kalafatić Hrvoje), “Hoards, burials, ornaments – selective depositions in Middle Bronze Age Hungary” (Viktória Kiss), “Patterns of metalwork deposition during the LBA in the Lower Danube region” (Florica Matau), “Bronze Age hoards deposition in the Upper Tisa Basin: time, space and cultural context” (Josip Kobal), “Going with the flow? Atlantic Bronze Age metalwork deposition practices” (Catriona Gibson), “Structures and function of Bronze Age deposition in Ireland” (Katharina Becker), “Creative Destruction - Early Bronze Age depositions in the broader Middle Rhine Valley” (Sabrina Autenrieth), “Selective Deposition of Metalworking Remains in Bronze Age Britain” (Sophia Adams), “Deposition of Middle Bronze Age Metalwork on the Isle of Wight: GIS Based Approach” (Robert Kaleta), “The selective deposition of

Bronze Age metalwork in the River Trent, English East Midlands” (Mark Pearce), “Late Bronze Age metal deposits in the West fringe of NW Portugal: contingencies” (Hugo Sampaio), “Between two worlds – Hording practices in the Caucasus between European and Near Eastern traditions” (Sabine Reinhold), and “Non-burial metalwork depositions in Bronze Age China: a case study of the Shang” (Cao Qin).

The session “Tradition, innovation and networks - metal working around the Baltic Sea: From the Bronze Age to the Middle Ages” (Abstract nr. TH4-10), included “Traces on Material Culture: Craftspeople and Contact Networks in the Nordic Bronze Age” (Heide Nørgaard), “Technology exchange and iron trade around the Baltic Sea” (Arne Jouttijärvi), “Vendel period seaxes from Grobin” (Artis Aboltins), “Bronze Age fine metal working in Nordic Europe - gold discs and vessels” (Barbara Armbruster), “Some aspects of the local weapon production in Western Latvia from 9th to 13th Century” (Artūrs Tomsons), “New archaeometallurgical investigations on Bronze Age metal objects from the Eastern Baltic region” (Elka Duberow), “A multidisciplinary approach to the study of Polish silver denarii minted by the early Piasts” (Julio M. Del Hoyo), “Smithies and forges in the Northeastern Baltic from the 11th to 16th century AD” (Ragnar Saage), “Tracing Multimetal Craftsmanship through Metallurgical debris – Open air workshops and multimetallicity” (Andreas Svensson), “On some aspects of specialized production in Roman Iron Age. A case study of S-shaped clasps” (Krzysztof Patalan), “The path of knowledge - Transfer of knowledge of bronze crafting in the Late Bronze Age Scandinavia” (Andreas Nilsson), “Markers of ethnicity and female power? Some reflections on Scandinavian brooches in Viking Age Rus” (Michael Neiß), “Technological aspects of the Swedish gold collars” (Barbara Armbruster), and “Iron smelting process in the Žarde-Bandužiai archaeological complex (Lithuania)” (Ieva Masiuliene).

Additional papers of archaeometallurgical interest found in other sessions include “Tin presence in Geto-Dacian silver coins as revealed by XRF and micro-PIXE – a possible explanation” (Bogdan Constantinescu), ““Yes! We’re all individuals!” “I’m not”: Clusters and the singular in the chemistry of copper-alloys” (Peter Bray), “Trafficking copper: Source of metal artefacts from an Iron Age cemetery in Finland by Pb isotopes” (Elisabeth Holmqvist), “Iron isotopes as a new tool for ancient metal tracing: comparison with classical tracing methods” (Jean Milot), “Iron slag and the quest for provenance” (Ema Bauzyte), “Interpretation of Heavy Elements Traces in pXRF Analyses on Prehistoric Copper Alloys” (Stefano

Spagni), “Reconsidering early hillforts in the east Baltic: conflicts and metallurgy” (Vytenis Podėnas), “Anthracology of iron craft in the Canigou mountain (Antiquity-Early Middle Ages)” (Christophe Vaschalde), “The use of charcoal in metallurgy (Iberian Peninsula, 14th and 15th centuries)” (Javier López Rider), “Fuel Selection and Forest Management by Middle Age Belgian Brass Blacksmiths along the Meuse River” (Alexandre Chevalier), “The use of coal in “la chaîne opératoire du fer” to late Middle Ages in the north of France” (Benjamin Jagou, Danielle Arribet-Deroin), “The introduction of metals and metalworking in Sicily” (Andrea Vianello), “What’s new? The first bronzesmiths in southern Scandinavia” (Deborah Olausson), “Value-added gold: The physical, social, and cultural repurposing of Scandinavian bracteates” (Nancy Wicker), “Striking Objects: Comparing the metal used for Roman copper-alloy coinage and domestic artefacts” (Peter Bray), “Moulding meanings. Late Bronze Age valuables through the organisation of metalworking” (Anna Sörman), “Geophysical and Archaeological research on Late Roman Ironsmelting site at Virje (Croatia)” (Igor Medarić), “Use of space in metalworking - Spatial analysis of working areas by systematic soil sampling” (Arne Jouttijärvi), and “Copper ore: the path from the Tien Shan to the South Urals in the Late Bronze Age” (Nikolai Shcherbakov). More information about the conference and abstracts for the sessions is at: <http://eaavilnius2016.lt/>.

Internationales Symposium “Anatolian Metal VIII”: Eliten-Handwerk-Prestigegüter will be held November 17-19, 2016, at the Deutsches Bergbau-Museum, Bochum, Germany. Since 1998 the Deutsches Bergbau-Museum Bochum has regularly organized the symposium series “Anatolian Metal”. In this series, findings from the museum’s research in Anatolia and neighboring countries are presented to other scholars in the field. This series has now become a firm fixture and will be continued in the years to come. The previous conferences have been funded by the Gerda Henkel Foundation and the Fritz Thyssen Foundation, and it is anticipated that this will continue. The 2016 conference will be the eighth such symposium in the series and will be held in memory of Halet Çambel (1916-2014), an important figure in Anatolian Archaeology.

The conference will include a range of papers including “Gold in anatólischen Hochkulturen” (Hans-Gert Bachmann), “The Agency and Value of Metal in depositional Contexts” (Christoph Bachhuber), “Neue Erkenntnisse zu den Goldfunden aus dem Königsgrab von Ur” (Moritz Jansen, Sabine Klein, Andreas Hauptmann), “Zu den chalkolitischen Goldfunden von Varna” (Ernst

Pernicka, Verena Leusch), and “Edelmetallverarbeitung in der Kupfer- und Bronzezeit” (Barbara Armbruster). More details on the conference, including the full preliminary program can be found at: <http://www.bergbaumuseum.de/de/forschung/tagungen/anatolian-metal-viii>.

Research, Education & Employment Opportunities

MIT Visiting Faculty Fellowship in Archaeological Materials. The Department of Materials Science and Engineering (DMSE) at MIT invites applications for its new, ongoing program of Visiting Faculty Fellowships in Archaeological Materials. The Fellowship is intended to support a visiting scholar at DMSE for up to one academic year who will work at the intersection of materials science and engineering and archaeology, which includes investigations that bridge archaeological materials and paleoecologies. Fellows can draw upon DMSE facilities and laboratories as well as those at the Center for Materials Research in Archaeology and Ethnology (CMRAE). The Fellowship includes a salary, and additional support is available for teaching. Applicants should submit a letter of interest, a CV with the names of three references, up to three publications, and a two- to three-page description of the applicant’s research plan and, optionally, for teaching during the term of the Fellowship. Applicants from academic institutions must have appointments at the level of Associate Professor or Professor.

Please submit application materials no later than by 31 January 2017 to dmse-fellowship@mit.edu. Questions about the Fellowships may be addressed directly to Professor Heather Lechtman (lechtman@mit.edu).

With MIT’s strong commitment to diversity in engineering education, research and practice they especially encourage minorities and women to apply. MIT is an Equal Opportunity/Affirmative Action employer

Web-based Resources

An online article discussing the use of children as miners at the Bronze Age mine of Great Orme, Wales, UK, can be found at this link: <http://www.bbc.com/earth/story/20160420-the-ancient-copper-mines-dug-by-bronze-age-children?ocid=fbtra>.

OBITUARY

Ursula Martius Franklin (1921-2016)

Dr Ursula Martius Franklin, one of the true pioneers in the field of archaeometry, died on July 22, 2016, at the age of 94. Dr Franklin was born in Munich in 1921, where her father was an archaeologist and her mother an art historian. She spent the last several years of the war interned in a forced labour camp, where she suffered frostbite that led to constant pain in her legs for the rest of her life. After the war, she attended the Technical University Berlin receiving in 1948 a doctorate in experimental physics. She came to Canada as a post-doctoral student at the University of Toronto in 1949, and Toronto was her home base for the rest of her life.

Following her postdoctoral studies she was employed for 15 years at the Ontario Research Foundation, and then joined the Department of Metallurgy and Materials Science of the University of Toronto as an Associate, then Full Professor. At U of T, she became known as an inspirational teacher and a mentor to countless students and colleagues. She carried out research in such “conventional” areas as materials characterization by X-ray diffraction and X-ray microradiography. However, it was in the application of materials characterization techniques to ancient and historic materials, both metallic and non-metallic, that her work has had the greatest scientific impact. One of her more important accomplishments was as creator and director of the Collegium Archaeometricum, a group of colleagues in a wide range of disciplines from the University of Toronto and other universities in Southern Ontario as well as the Royal Ontario Museum. The Collegium, which included metallurgists, physicists, chemists, mineralogists, anthropologists, statisticians and museum conservators, acted as a stimulus for collaborative research as well as for the teaching of Archaeometry, with courses at both the graduate and undergraduate levels. She considered interdisciplinary studies to being equivalent to going fishing with friends in that someone brings the boat, someone knows where the fish are, someone knows what equipment to recommend, someone knows how to cook the fish, and all are friends. One of her favourite metaphors was to liken scientific collaboration to a potluck supper where everybody contributes what he or she can do best.

In 1984, she was awarded the title of University Professor (as distinct from Professor in a specific department), the highest honour given by the University to a faculty member, and was the first woman at U of T



to be accorded this honour. She was active in the international archaeometric community, including the International Symposia on Archaeometry. She was known (and perhaps feared) for her penetrating and incisive questions and comments in discussions following seminars and conference presentations. For the last part of her academic life, she was a Senior Fellow at Massey College, the University of Toronto’s interdisciplinary graduate college, and a Fellow of the Ontario Institute for Studies in Education. She also served for a time as director of the U of T’s Museum Studies programme.

In addition to her scholarly life, Ursula Franklin, a lifelong practicing Quaker, participated in an incredible number of public activities related to peace, international understanding and the role of women in society. She worked tirelessly to bring a humanitarian and feminist voice to the world of science, and the world in general. In the 1960s, she used her analytical expertise to help investigate the levels of strontium-90 - present in radioactive fallout from nuclear weapons testing - in children’s teeth. This work was instrumental in discussions about stopping nuclear weapons testing in the atmosphere, and was a factor in her deep scepticism towards nuclear energy production in Canada.

She was active in encouraging young women to seek careers in science, working for peace and justice, and considerations of the social impacts of science and technology. She felt that women’s perspectives are often different from those of their male counterparts - that

they are more likely to create a spirit of cooperation, and allow them to connect knowledge gained with its impact on communities rather than its economic impact.

She gave much consideration to how science and technology shape our society and how they are, in turn, shaped by the demands that society makes of them. She encouraged people to become “citizen scientists”, to gain a general knowledge of science and technology in order to understand issues and become activists if necessary to influence and even reverse the directions of change. She drew a distinction between holistic technology as illustrated by the creative work of artisans, and prescriptive technology of corporations and bureaucracies which require a division of labour, with operations carried out in a series of steps, thereby requiring a need for bosses or managers and creating a culture of compliance and, if necessary, enforcement. She once said that she liked the monarchy because it represented “defanged power.”

She wrote and co-produced numerous radio programs on science, technology and public policy. These included a number for Ideas, the prestigious CBC radio series, with titles such as “Technology, Democracy and Freedom”, “Nuclear Peace”, “Complexity and Management”, and “Size and Scale in Technology”. Books she authored included *Every Tool Shapes the Task: Communities and the Information Highway* (Lazara 1996), *The Real World of Technology* (Anansi, rev. ed. 1999), *The Ursula Franklin Reader: Pacifism as a Map* (Between the Lines, 2006, and *Ursula Franklin Speaks: Thoughts and Afterthoughts* (McGill-Queens, 2014).

She received many honours throughout her life including being named a Companion of the Order of Canada, a Fellow of the Royal Society of Canada and a Member of the Order of Ontario. She was awarded numerous other honours notably the Pearson Medal of Peace for her work in advancing human rights, a Governor General’s Award for promoting the equality of girls and women in Canada and honorary degrees from many Canadian universities. With her keen interest in education at all levels, she was deeply pleased when the school authorities in Toronto named a new high school “The Ursula Franklin Academy.” She took a deep interest in the school, played a major role in its academic planning and curriculum, and made frequent visits. She believed that the appropriate metaphor for education was a garden, not a production line, and this philosophy infuses the Academy. This was very much along the lines of what she called her “earthworm hypothesis”: many tiny moves and achievements of individuals prepare the soil in which progress grows.

As one of her admirers and friends succinctly put it, “A giant tree has fallen”. However from this tree many new shoots have sprung, pushing science and humane thinking ahead. In these troubling times, Ursula’s voice calling for peace and justice and the absence of fear, and her clear determination to fight for dignity and humanity are sorely missing. Let us hope that somebody as forceful and determined as Ursula Martius Franklin will take up the torch that she had to drop.

Ursula is survived by her husband of more than 60 years, a son, a daughter and four grandchildren. In addition, in many communities throughout the world there are people who admired her and were strongly influenced by her. For many she was a mentor, a colleague, a role model, a friend. She lived her convictions in a very passionate way, and always defended with incredible determination and admirable strength what she felt was important and just. She will be deeply missed but not forgotten.

- R. Heimann, V. Vitali and M.L. Wayman

UPCOMING CONFERENCES

2017

5-8 January. Joint Annual Meeting of the Archaeological Institute of America (AIA) and the Society for Classical Studies (SCS). Toronto, Canada. <https://www.archaeological.org/annualmeeting> Call for papers now open. Submissions deadline August 7, 2016 and August 21, 2016 (\$25 fee). <https://www.archaeological.org/meeting/CFP>

29 March-2 April. Society for American Archaeology. 82nd Annual Meeting, Vancouver, BC, Canada. General information: TBA

18-22 April. American Association of Physical Anthropologists Annual Meeting. New Orleans, LA. General information: TBA

2-6 April. 253rd American Chemical Society National Meeting and Exposition. San Francisco, CA, USA. General information: TBA

20-24 August. 254th American Chemical Society National Meeting and Exposition. Washington, DC, USA. General information: TBA

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