BEADMAKING: TECHNICAL ASPECTS

This section of the bibliography deals with beadmaking technology, ancient and modern, around the world. To facilitate searches, the entries have been assigned to the following categories: Glass; Faience; Metal; Stone; Shell; Eggshell; Bone, Ivory, Antler, and Horn; Seeds and Nuts; and Mixed Materials.

GLASS

Agyei, I.K., J. Adu-Agyem, and R. Steiner

Discusses the techniques and materials used to produce glass beads in present-day Ghana.

Ajithprasad, P. and Marco Madella

Anderson, Nicole

The Conterie was the principal producer of glass seed beads on Murano in the Venetian lagoon from 1898 to 1992. Among other things, this book discusses glass chemistry and the machinery and technology involved in producing drawn beads. There is also a section on the art of lampworked beads.

Babalola, Abidemi Babatunde
Describes the deposits (12th-15th centuries) and the recovered materials in significant detail. Using chemical and physical analyses of the glass beads and glass production debris, the competing hypotheses of local primary glass production or re-melting of imported glass to create beads are explored in detail.

**Babalola, Abidemi Babatunde, Susan Keech McIntosh, Laure Dussubieux, and Thilo Rehren**


The recovery of glass beads and associated production materials from a site in Nigeria has shed light on early glass manufacturing techniques in West Africa between the 11th and 15th centuries AD.

**Babalola, Abidemi and Thilo Rehren**


Presents the results of the classification, macro/microstructural, and compositional analyses carried out on glass-working and possibly glassmaking crucibles excavated at Igbo Olokun, Ile-Ife. Drawn-bead production waste was also recovered.

**Babalola, Abidemi Babatunde, Thilo Rehren, Akinlolu Ige, and Susan McIntosh**


Provides an in-depth examination of numerous crucible fragments recovered from deposits dating to the 11th-15th centuries in order to understand the quality of the crucibles, their typology, and their functions in glassworking/making. Compositional analysis of a sample of the thousands of glass beads from the excavations indicates that the crucibles were used to melt the glass used for their production.

**Basa, Kishor**


Examination of silicone rubber impressions of the perforations of two Iron Age glass beads from Ban Don Ta Phet, Thailand, shows evidence that they were drilled by lapidary methods more associated with stone beads.

**Bayley, J.**


Mentions the use of ceramics as melting plates in the production of glass beads.
Bellintani, Paolo, Mauro Cesaretto, and Giovanna Residori
Reports on experimental production replication of Bronze Age glass and faience beads found in northern Italy.

Bertini, Martina, Rajmund Mokso, and Eva M. Krupp
The innovative application of X-ray micro-computed-tomography (µCT) with synchrotron light permitted the identification of characteristic features and markings typical of specific low temperature glass-working techniques, and also added to the evidence for local manufacture.

Brendle, Tobias
Experimental observations on the techniques used to manufacture glass beads during the early Middle Ages.

Burchell, Alan David
Based on archaeological finds in Denmark and Sweden, presents research into small Viking-period furnaces used to produce glass beads.

Callmer, Johan and Julian Henderson
Examines the beadmaking technology and chemical composition of the recovered glass beads.

Carroll, B. Harvey, Jr. with Jamey D. Allen
This article reproduces a rare eyewitness account of beadmaking at Murano/Venice, Italy, towards the end of the First World War and documents the technology of the time as well as what impact the war had on the industry. Carroll’s report takes us through the various steps in the production of drawn or tube beads and also provides a historical perspective of the industry.
Although the report presents much useful information, we now know much more about most aspects of glass beadmaking and endnotes provide much additional information and clarification.

Eluyemi, Omotoso

Provides a partial inventory of the Olokun beads and discusses their composition and dating. The contemporary fabrication of drawn and rolled beads in Ile-Ife, Nigeria, which uses crushed glass, is also discussed.

Francis, Peter, Jr.
Illustrated account of the manufacture and history of various kinds of beads made from pulverized glass.

Gam Aschenbrenner, Tine
Experiments in glass beadmaking at Ribe, Denmark, during the 8th century.

This valuable article reconstructs the methods for making various kinds of beads: reticella, millefiori, eye beads, etc.

On glass bead manufacture in the Late Roman Iron Age and Viking period.

Amsterdam.
On the author’s archaeo-experiments in glass beadmaking.


Experimentation has shown how wound beads from an 8th-century workshop at Ribe, Denmark, could have been made, though the furnace construction is still debatable.


Experimental archaeology: glass bead manufacture in southern Scandinavia.

Gott, Suzanne
Discusses the various beadmaking traditions in modern Ghana.

Government of India, Geographical Indications Registry
www.ipindia.nic.in/writereaddata/Portal/IPOJournal/1_67_1/gi-journal-61.pdf
This Application for the Registration of a Geographical Indication contains information regarding the modern-day glass-bead industry in Varanasi, Uttar Pradesh, northern India, and the materials and techniques utilized.

Greiff, S. and E. Nallbani
An in-depth examination of foil beads from the Bukël site in Albania using chemical analysis and optical microscopy. The beads date to the 7th-9th centuries.

Grimbe, Jannika
2010 Making Glass Beads from the Past. euroREA: Journal for (Re)construction and Experiment in Archaeology 7:19-22.
Reports on experiments to replicate the technology used to produce glass beads during the Scandinavian Iron Age.

Henderson, Julian

Henderson, Julian, Torben Sode, and Yvette Sablerolles  
Considers the possibility of the use of tesserae for glass bead production in Scandinavia and the Netherlands during the 8th-9th centuries, from both archaeological and compositional points of view.

Hird, F.  

Hložeka, M. and T. Trojek  
2015  Millefiori Glasswork Technique in the Migration Period: Investigation of Beads with the Use of Nondestructive X-Ray Fluorescence Micro-Analysis. Radiation Physics and Chemistry 116:332-334, DOI:10.1016/j.radphyschem.2015.01.020. Analysis centered on determining the composition and the production technology of a unique millefiori bead that was found in a burial ground in Kyjov (Hodonin district, Czech Republic) dating back to the Migration Period.

Hodgkinson, Anna and Miriam Bertram  
2019  Experimental Bead-Making at Amarna, 2017, 2018. British Mission to Tell el-Amarna. Investigation of the courtyard of houses M50.14-16 in the Main City South uncovered some small fireplaces which appeared to have been used for the manufacture of wound glass beads. Experiments were conducted to confirm this.

Holland, S. and T. Holland  
2006  Folded Glass Beads: An Islamic Innovation. Ornament 29(4):34-37. Replicates the production of folded beads which appear at the end of the Roman period in the eastern Mediterranean. A few previous articles had tried to describe how they were made but some basic steps were lacking.

Höpken, Constanze  

**Kankam-Dwumfour, Eunice**  
Detailed study of modern powder-glass bead production in southern Ghana.

**Kanungo, Alok Kumar**  

Glass beads are presently a major product of India in at least three different locations, using altogether different techniques. Each production process leaves behind debitage unique to its individual manufacturing process. Archaeologically, it is imperative to identify and record the production techniques of glass bead manufacture and to identify the various specific waste products rather than merely speaking of beads and production centers on the basis of statistics.

This paper records the process of making millefiori beads as practiced in Purdilnagar as a model for interpreting associated archaeological findings.

**Karklins, Karlis**  

Describes the method generally used for rounding large glass beads in European glasshouses from the early 17th century to the latter part of the 18th century.

German translation of Karklins (1993) with different (and color) images.
2012 Guide to the Description and Classification of Glass Beads found in the Americas. 
Provides concise descriptions of the manufacture of drawn, wound, blown, mold-pressed, 
wound-on-drawn, and Prosser-molded beads.

**Karklins, Karlis with Carol F. Adams**
1990 Dominique Bussolin on the Glass-Bead Industry of Murano and Venice (1847). _Beads: 
Journal of the Society of Bead Researchers_ 2:69-84.
Translation from a French book of 1847 by the noted glassmaker Dominique (Domenico) 
Bussolin on Venetian bead manufacture and trade. Italy.

**Karklins, Karlis and Derek Jordan**
2009 An Early 19th-Century Account of Beadmaking in Murano and Venice. _Beads: Journal 
In 1816, two German botanists recorded one of the first accounts of drawn beadmaking in 
Venice, Italy. This version corrects several errors that appear in an earlier translation.

**Kock, Jan and Torben Sode**
1995 _Glass, Glass Beads and Glassmakers in Northern India_. THOT, Vanlose, Denmark.
Copiously illustrated study, covering traditional beadmaking in Firozabad, Jalesar, and 
Purdalpur, all near Agra, India. Tools and furnaces used in making raw glass, beads, and bangles 
are covered.

**Krzyżanowska, Marta and Mateusz Frankiewicz**
2015 An Archaeological Experiment with Early Medieval Glass Bead Production in an Open 
The aim of this research was to verify the hypothesis of glass bead production in an open hearth, 
based on archeological evidence from Viking Age Ribe, Denmark, where the remains of “glass” 
hearths were discovered.

**Küçükerman, Önder**
1987 _Glass Beads: Anatolian Glass Bead Making: The Final Traces of Three Millennia of 
Glass Making in the Mediterranean Region_. Turkish Touring and Automobile 
Association, Istanbul.
Furnace-wound beadmaking in western Turkey.

**Lierke, Rosemarie, F. Birkhill, and P. Molnar**
1995 Experimental Reproduction of Spiral Beads. In _Glass Beads: Cultural History, 
Technology, Experiment and Analogy_, edited by M. Rasmussen, U.L. Hansen, and U. 
Näsmann, pp. 117-121. Historical-Archaeological Experimental Center, Studies in 
Technology and Culture 2.
Liu, Robert K.
On Roman, Venetian, and modern Indian methods of manufacture.

Matthes, C., M. Heck, C. Theune, P. Hoffmann, and J. Callmer
Discusses the production mechanisms of early medieval glass beads.

Moretti, Cesare
Part II of Moretti and Moretti (1999). This part presents a full list of the primary and secondary raw materials and intermediate products, culled from recipe books of the 14th-20th centuries, found mainly in private collections. The nature, chemical formula, and function of the recipes are indicated with additional historical information and sources, where known.

Moretti, C. and S. Moretti
Lists all the raw materials found in ca. 70 Venetian manuscripts of the 14th-19th centuries along with the name of the original manuscript and its date. Also provides chemical formulae and the source or origin of the materials when possible.

Moretti, Cesare and Tullio Toninato
Provides a transcription of an anonymous Venetian manuscript from the mid-16th century along with an English translation with notes by David C. Watts and Cesare Moretti. Many recipes are specifically for beads.

Morris, Carole
A complete “kit” for making powder glass beads collected in the 1930s is in the Beck Collection, Cambridge.

Neri, Antonio
Published in three instalments, this is a new translation of the original, which was first published in 1612, and is generally recognized as a seminal work. An inset facsimile page of the original in
17th-century Italian accompanies each page of the translation. At the end of each volume is a glossary, full notes, a select bibliography, and appendices.

**Neuwirth, Waltraud**

1993 *Farbenglas I/Color in Glass I.* Self published, Vienna, Austria.
While not dealing directly with beads, this well-illustrated English/German volume will be of interest to anyone concerned with color in glass. There are hundreds of 18th-20th-centuries formulae for the researcher or glass artist. The present volume covers white, black, yellow and green.

This major work presents a detailed and well illustrated account of the Bohemian beads industry including history, technology, and numerous color plates that illustrate the various products. Text is in German and English. Czech Republic.

Like Neuwirth (1993) but the colors covered are blue and red.

This volume reprints the revised English text of Dr. Neuwirth’s (1994) treatise on the Bohemian bead industry complete with all 50 color plates. Czech Republic.

**Oppen, Marie-José and Howard Oppen**

Describes the different ways of making “false pearls” and illustrates some of the various styles, with a focus on the 20th century and Rousselet, a Parisian beadmaking firm.

**Peake, James R.N. and Ian C. Freestone**

SEM-EDS analysis of glass beads from the early Anglo-Saxon cemetery complex at Eriswell, southeast England, has provided insights into the production and technology of opaque red glass.

**Peterson, N., S. Backa, J. Ross, and R. Schweitzer**

On the glass-working temperatures achieved in different types of reconstructed furnaces.

*The Pottery Gazette*


This article on the production of drawn glass beads on the Island of Murano, Venice, Italy, is most notable for the drawings of the various steps in the production process. A discussion of the manufacture of false pearls is also presented.

Purowski, Tomasz


Dated to late Hallstatt C and Hallstatt D, ca. 850 glass beads from Wicina 1 site in Poland were examined and 22% were found to be made by the winding technique.


The examination of petrographic thin sections of five glass beads from the Wicina stronghold have demonstrated beyond doubt the usefulness of the method in determining beadmaking techniques attributed to the Halstatt period. English summary.

2012  *Wyroby szklane w kulturze łużyckiej w międzyrzeczcu Noteci i środkowej Odry* [Glass Products of Lusatian Culture in the Noteć and Middle Oder River Interfluve]. Instytut Archeologii i Etnologii Polskiej Akademii Nauk, Warsaw.

A thorough study of the objects, including a wide range of beads. Includes information regarding bead production techniques. Poland.

Råhlander, Moa

2017  *How Beads Come Together: Late Iron Age Glass Beads as Past Possessions and Present Sources*. Masteruppsats i Arkeologi, Stockholms Universitet.

Investigates processes of glass bead production in Scandinavia and Anglo-Saxon England during the 6th-9th centuries.

Rolland, Joëlle


Approaches La Tène glassmaking through a socio-economic perspective. Includes the chaîne opératoire for glass beads.
Ross, Lester A.
An examination of hundreds of U.S. patents reveals that the mechanized production of drawn beads could have occurred as early as the late 19th century, but more likely, they were not mass produced until the end of World War I, after the invention of the Danner process for mechanically drawing glass tubing. These beads sometimes have multiple sides and/or distinctive polyhedral perforations.

Ross, Lester A. with Barbara Pflanz
Provides technical information on Bohemian glass beadmaking during the late 19th and early 20th centuries. The article concentrates on the manufacture of mold-pressed beads, secondarily describing methods for producing wound, blown, and drawn beads.

Sablerolles, Yvette, J. Henderson, and W. Dijksman
Glassworking, together with other high-temperature industries, was practiced in Merovingian Maastricht. A pit of the late 6th to early 7th centuries in the Jodenstraat yielded comprehensive evidence for glass beadmaking and some interesting technological information.

Schultz, Sarah and Heather Walder
Drawing on ethnohistoric sources and the material properties of refired glass pendants recovered from 17th-18th-centuries sites across the Plains and Midwest regions of North America, investigates the production process.

Sode, Torben
Photographs and sketches show how contemporary Anatolian glass beadmakers get their effects with the simplest technology. This has relevance for archaeological bead studies. Turkey.

The important 8th-century trading center of Ribe, Denmark, has produced many bead finds and much evidence regarding local beadmaking.

**Sode, Torben, Claus Feveile, and Ulrich Schnell**

A substantial number of the glass beads excavated at Ribe are imported beads, especially prevalent in the late 8th and beginning of the 9th century. Manufacturing techniques are discussed.

**Spaer, Maud**

Describes the types and methods of manufacture of these beads from the 3rd century BC using gold foil. Rhodes is at present the sole known production site. In parts of eastern Europe, these beads lasted into the early 13th century AD.

**Sprague, Roderick and An Jiayao**

The authors visited several factories and describe the manufacture of various bead types in an industry now changing under pressure from the plastic bead industry.

**Staššiková-Štukovská, Danica and Alfonz Plško**

Three unusual beadmaking technologies employed in the region of Slovakia during the 7th-10th centuries are discussed: 1) utilizing glass impurities for ornamentation, 2) decorating with minute balls using binder, and 3) the use of “glass-crystalline” or “glass-quartz” techniques.

**Stern, E. Marianne and Birgit Schlick-Nolte**

Contains a long section on glass and faience manufacture (pp. 19-94) with superb color photos. Many provenances are given as “Art market, Zurich.”

**Stolyarova, Ekaterina**
2010  К вопросу о технологии изготовления стеклянных золоченых бус домонгольского периода [Concerning Technology of Production of Gold-Glass Beads in the Pre-Mongol...
The author posits two production periods for metal-in-glass beads which are associated with different technological patterns and production centers. Beads of the 9th-10th centuries were made from drawn glass tubes in workshops of the Near East, while beads of the 11th-13th centuries were made in Byzantium and Rus’ by twisting a glass rod. Russia. In Russian.


Describes the four main technological types.

Teruzzi, Giorgio and Anna Alessandrello (eds.)

This exhibition catalog provides a brief overview of the Venetian bead industry including well-illustrated descriptions of the two major glass beadmaking processes (drawn and wound) and the various styles/types of beads (some on sample cards) that were produced for trade in Africa as well as elsewhere.

Theune, C., J. Callmer, M. Heck, and P. Hoffmann

On glass bead production in the early Middle Ages.

Wiesenberg, Frank

Experimenting with a bead furnace to replicate Roman-period beads and vials. In German and English.

Willoughby, J.

This DVD shows detailed stages in making fused and powder-glass beads at Krobo and Asiofia, Ghana, and furnace-worked beads at Kurudere, Turkey.
FAIENCE

Bellintani, Paolo, Mauro Cesaretto, and Giovanna Residori

Reports on experimental production replication of Bronze Age glass and faience beads found in northern Italy.

Hatton, G.D., A.J. Shortland, and M.S. Tite

Reports on the microstructure and chemical composition of some 55 Egyptian blue and green frit samples (including bead fragments) from New Kingdom Egypt and 15th-century BC Mesopotamia. The findings suggest that frit cakes were the primary product, and that these were ground to produce powder which was then molded to shape and refired to produce vessels and beads.

Kenoyer, J. Mark

Discusses a workshop where various objects of steatite and faience were made, including beads. The findings suggest that the beads may have been quite important as symbols of value since they were being made in relatively controlled contexts.

Shortland, A.

Explains clearly how faience was made. Scottish and English prehistoric faience beads were made somewhat differently. In Scotland seaweed was used, and jabbing a sharp tool into the side of a paste cylinder formed segmented beads. In England, other kinds of plant ash were used and the beads were formed by rolling a cylinder against a shaper. Faience know-how was probably transmitted through the tin-trade connection.

Shortland, A.J., N. Shishlina, and A. Egorkov
An essential ingredient of the lovely blues in ancient Egyptian materials (faience, glazes, frits) is copper. How did the knowledge of that copper use arise? There is a telling congruence with Egyptian techniques in drilling stone artifacts, and the characteristics of the powder drilled out as waste.

Tajeddin, Zahed
Discusses the structure and composition of Egyptian faience objects, and also provides a description of how faience beads and other objects are currently made in Qom, Iran.

Tite, M.S. and M. Bimson
Towards discovering which of the three principal manufacturing methods (efflorescence, cementation, application) used in antiquity for glazing faience beads, etc., was used on a particular object.

Tite, M.S., P. Manti, and A.J. Shortland
The chemical composition and microstructure of 35 faience objects spanning the period from the Middle Kingdom through to the 22nd dynasty were determined using analytical scanning electron microscopy in order to determine with certainty whether ancient faience was glazed by efflorescence, cementation, or application.

Tite, M.S. and A.J. Shortland
Provides an overview of faience production in Europe, the Near East, and the Indus Valley. Beads enter into the discussion, including their chemical composition.

Zhang Zhiguo and Ma Qinglin
Discusses the chemical composition and manufacturing technology.
Zhou Gu, Jian Zhu, Yaoting Xie, Tiqiao Xiao, Changsui Wang, and Yimin Yang

METAL

Bonomo, Mariano, Edgardo D. Cabanillas, and Ricardo Montero
Concludes that the metal pendants and beads recovered from 12th-15th-century sites in the Paraná Delta were manufactured from copper by casting in open molds and hammering.

Childs, S. Terry
Among other things, this article examines the cultural and non-cultural factors that influenced the effects of native copper production and use on different Native American societies over time. Beads are discussed.

Ehrhardt, Kathy, Samuel K. Nash, and Charles P. Swann
A sample of 64 copper-based metal artifacts (including beads and pendants) excavated at the Haas/Hagerman Site, Clark County, Missouri, were examined metallographically to identify manufacturing techniques and technical processes employed by the Illinois to produce these new forms.

Francis, Peter, Jr.
An account of old methods still in use, with a photograph of an unusual, very large, intricate elbow bead of brass “netting.”

Gates, Marie-Henriette
Early Neolithic copper beads are found to have been heat-treated (p. 212).

Hansen, Svend

Discusses metal beads in southern Europe with emphasis on narrow elongated specimens. Includes a section on beadmaking technology.

Konstantinidi-Syvridi, Eleni, Nikolas Papadimitriou, Anna Philippa-Touchais, and Akis Goumas

The techniques discussed include granulation, the anticlastic technique, and “gold embroidery.” Beads are included in the discussion.

Lazarovici, Gheorghe and Cornelia-Magda Lazarovici

Located in Peştera Ungurească, Cheile Turzii, Romania, the workshop operated between 4150 and 3800 cal BC. Its products included beads, gold plaques, and pieces applied to clothing or armor. Information about the production process is provided.

Leusch, Verena, Ernst Pernicka, and Barbara Armbruster

Discusses some aspects of early goldworking and use on the basis of new analyses of gold objects (including beads) from the Late Chalcolithic cemetery, Varna I, in Bulgaria.

McCoy, T.J., A.E. Marquardt, John T. Wasson, Richard D. Ash, and Edward P. Vicenzi

Delves into the composition and manufacture of the beads, as well as the source of the material.
**Miller, Duncan E. and Nikolaas J. van der Merwe**
Describes Early Iron Age metal working at the sites of Divuyu and Nqoma including the fabrication of forged square wire and flat sheets of inhomogeneous iron and steel which were subsequently cut into strips for beads and other ornaments.

**Natuniewicz-Sekula, Magdalena**
Discusses the chemical composition and production techniques of gold, silver, and copper-alloy beads and pendants from sites in northern Poland.

A condensed version of the previous article omitting the compositional information.

**Ottenwelter, Estelle Jiří Děd, and Ludmila Barčaková**
Reports on the composition, construction, and decorative techniques displayed by ornate hollow, spherical, metal pendants (gombiky) and beads. Czechia.

**Pozza, Jacqueline M.**
Provides a detailed catalog of the recovered beads, pendants, and tinkling cones with information concerning production techniques.

Within the range of manufacturing styles for beads in the site assemblages, there appear to be two clearly variant traditions.

2019  Approaching a Vast and Varied Copper Collection: An Analysis of Oneota Copper Artifacts of the Lake Koshkonong Region in Southeastern Wisconsin. *Journal of*
Manufacturing marks on beads provide arguments for multiple manufacturing traditions.

**Prévalet, Romain**

2009  Preliminary Observation on Three Late Bronze Age Gold Items from Ras Shamra-Ugarit (Syria). *ArchéoSciences* 33:129-133.

Describes the technical characteristics of the filigree and granulation of two gold beads, as well as the joining processes that were employed by the craftsmen of a famous Levantine kingdom at the end of the 2nd millennium BC.


A detailed study of the technology and production of gold ornaments, including beads and pendants, in the Eastern Mediterranean during the Bronze Age and the transmission of the techniques.


Presents an overview of the manufacture of gold jewelry in Syria during the Bronze Age, beads included.


Reconstructs the technical processes employed in the 3rd millennium BC to produce a gold bead decorated with filigree and granulation at Tell Banat, Syria.

**Schorsch, D.**


Ball beads of gold and of silver were investigated by X-ray, EDS/SEM, and other analytical methods, revealing how joins were made with the help of flanges. Ancient Egypt.

**Tate, Jim, Katherine Eremin, Lore G. Troalen, Maria Filomena Guerra, Elizabeth Goring, and Bill Manley**


Describes the necklace and also provides information concerning its production techniques and the composition of the metal.

Troalen, Lore G., Maria Filomena Guerra, Jim Tate, and Bill Manley
2009 Technological Study of Gold Jewellery Pieces Dating from the Middle Kingdom to the New Kingdom in Egypt. *ArchéoSciences* 33:111-119; https://www.academia.edu/35998229/. This preliminary study illustrates the Ancient Egyptian goldsmiths’ skills in working with wires, granulation, and joining techniques, and provides information about the evolution of alloy composition and the use of alluvial gold.

STONE

Alarashi, Hala

Altinbilek, Ç., G. Coşkunsu, Y. Dede, M.R.Iovino, C. Lemorini, and C. Özdogan

Amblard, Sylvie

Andrieu, Chloé, Edna Rodas, and Luis Luin
Presents a technological reanalysis of material (beads included) recovered from a large jade preform production area in Guatemala and shows that the quality and color of the raw material corresponds to very different production processes, values, and distribution within the site.

Aurisicchio, C.
SEM and electronic microsound analyses reveal the tools used for perforating and polishing a Late Neolithic steatite bead found in Rome, Italy. The stone probably came from some distance away: the Ligurian Alps or Tuscan-Emilian Appennines.

Bains, Roseleen
Examines technological practices and choices, reconstructs the manufacturing process, and analyzes production contexts in order to determine the organization of stone-bead production at a large Neolithic settlement.

Bains, Roseleen, Milena Vasić, Daniella E. Bar-Yosef Mayer, Nerissa Russell, Katherine I. Wright, and Chris Doherty
Focuses on the technology and methods of manufacture of the recovered Neolithic beads, pendants, and preforms of stone, bone, shell, and clay. Turkey.

Baird, Douglas, Andrew Garrard, Louise Martin, and Katherine Wright
Discusses the form and method of manufacture of the stone, shell, and bone beads recovered from PPNB and Late Neolithic contexts at sites Azraq 31 and Wadi el-Jilat 32 in Jordan.

Barthélemy de Saizieu, B., and M. Casanova
On the production of stone beads at a 5th-2nd-century site in Kandahar, Afghanistan.

Baysal, Emma L.
Discusses the production technology of the beads recovered from this site in Turkey.
Beck, Curt W. and S. Shennan  
Definitive and indispensable study with a catalog of the beads (with many drawings and sections), spectrographic analysis results, and a discussion of manufacturing techniques, social significance, and chronology.

Belcher, Ellen H.  
Studies in Early Near Eastern Production, Subsistence, and Environment 13  
Examines some of the technological aspects of stone beads, pendants, and seals from a large 6th-millennium BC site in southeast Turkey in terms of both the utilization of raw materials and the evidence for the methods of manufacture of final products.

Bellintani, Paolo, Luciano Salzani, Gianni de Zuccato, Marilena Leis, Carmela Vaccaro, Ivana Angelini, Chiara Soffritti, Marco Bertolini, and Ursula Thun Hohenstein  
Studi di Preistoria e Protostoria 2  
Discusses the late Bronze Age amber-working site of Campestrin di Grignano Polesine in northeastern Italy and provides a reconstruction of the *chaîne opéraire* of “Tiryns type” beads.

Behera, Pradeep K. and Sakir Hussain  
2017  *Early Historic Gemstone Bead Manufacturing Centre at Bhutiapali, the Middle Mahanadi Valley, Odisha*.  
Located in east-central India, the site yielded evidence of the production of beads from precious and semi precious stones.

Bernabò Brea, M., M. Miari, P. Bianchi, A. Ghiretti, R. Micheli, and J. Tirabassi  
Discusses the typology, technology, and distribution of stone ornaments (including beads and pendants) excavated in Emelia, northern Italy, made between the Neolithic and the Bronze Age.

Bhan, Kuldeep K.  
Bhan, Kuldeep K., Jonathan Mark Kenoyer, and Massimo Vidale

Bril, Blandine, Valentine Roux, and Gilles Dietrich

Bruhns, Karen O.

Brunet, Olivier


Calegari, Giulio

Calley, Sylvie
Discusses a workshop in a Neolithic settlement in Turkey with debris and unfinished carnelian disc beads at various stages of manufacture. These illustrate the techniques of production.

Calley, Sylvie and Roger Grace
Dated to the 6th millennium, a Neolithic bead workshop at Kumartepe provides evidence for the production sequence of both flint micro-borers and carnelian beads.

Ciarlo, Nicolás C., Patricía Solá, and Cristina Bellelli
Microscopic and analytical examination reveal that two stone beads found in central Argentina are made of a fine-grained metamorphic rock, possibly phyllite or slate. Comments regarding production techniques are provided.

Clark, J.D.
Proposes links between micro-blade and beadmaking techniques.

Coşkunsu, Güner
Typo-technological analysis, use-wear analysis, and experimentation are used to illustrate two major technological and cultural shifts at Mezraa Teleilat, Turkey, towards the end of the Pre-Pottery Neolithic B (PPNB) and the beginning of the Pottery Neolithic (PN): 1) the use of micro-borers and cylindrical polished drills, which are the two most distinctive hole-making tools among the site’s flint assemblage, and 2) bead manufacturing.

Cristiani, Emanuela and Cristina Lemorini
Proposes the production process for beads of hard and soft stone and ostrich eggshell from Wadi Tanezzuft funerary contexts, Libya.

Critchley, P.
Archaeological, ethnographic, and experimental evidence is used to investigate the technology of stone bead production at the site. The approach used is the *chaine opératoire* – how the production process is embedded in socio-economic and socio-cultural organization. Exchange networks, aspects of economic and craft specialization, and symbolic and aesthetic aspects of bead production are briefly described.

Curcija, Zachary S.

Curcija, Z. and D. Wescott

de Mille, C.N. and T.L. Varney

de Mille, C.N., T.L. Varney, and M. Turney
The investigation focuses on the examination of manufacturing traces on the bore walls of stone beads from Antigua in addition to other attributes such as bore hole shape and size.

d'Errico, F., V. Roux, and Y. Dumond
Uses microscopic analysis and measurements of roughness to identify the techniques used to polish chalcedony beads at Cambay, India.
Dimopoulou, N.
1997  Workshops and Craftsmen in the Harbour-Town at Poros-Katsambas. In TEMNH:
Craftsmen, Craftswomen and Craftsmanship in the Aegean Bronze Age. Proceedings of
the 6th International Aegean Conference, Philadelphia, 1996, edited by R. Laffineur and
Preliminary account of an important excavation of workshops at the harbor linked with the
Minoan palace at Knossos, Crete. Finds include raw materials and finished beads, tools, and
items such as abrasives and molds.

Domanski, Marian and John Webb
Discusses the heat treatment of stone beads to alter their color, appearance, and hardness.

Du Gardin, Colette
2015  Du nodule à la parure: l’artisanat de l’ambre à l’âge du Bronze en Europe occidentale
[From Raw Material to Ornament: Amber Working in Western Europe During the
Bronze Age]. In Artisanats et productions à l’âge du bronze. Actes de la journée de la
Société Préhistorique Française, Nantes, 8 Octobre 2011, edited by Sylvie Boulud-Gazo
A comparative observation of the beads produced by the most important Bronze Age cultural
groups confirms the existence of workshops with different degrees of specialization which
produced the beads from amber imported from Northern Europe.

Duhard, J.-P.
2002  Quelques aspects techniques dans la confection des “perles” néolithiques en pierre du
Discusses various aspects of the shaping, drilling, and polishing of Neolithic stone beads based
on specimens found in situ in Algeria, Mali, Nigeria, and Mauritania.

2003  Quelques “ateliers” de perles du Mali nord-oriental découverts avec Jean Gaussen.
Examines several ancient stone-bead workshops discovered in northeastern Mali.

Ekmen, H., C. Diker, F.G. Ekmen, and C. Tunoğlu
2020  New Evidence of Chalcolithic Age Steatite Beads from İnönü Cave: Typology and
Technology Aspects with Archaeometric Techniques. Mediterranean Archaeology and
SEM-EDS analysis of seven beads was performed to understand steatite bead production
techniques during the Chalcolithic Age in western Turkey.
Endo, Hitoshi, Izumi Takamiya, and Renée Friedman
Stone beadmaking; Ancient Egypt.

Fabiano, M., F. Berna, and E. Borzatti von Lowenstern
Thousands of borers and awls were found together with hundreds of worked and unworked amazonite fragments. A few finished beads of amazonite and sandstone were also found. Experiments demonstrate that the awls were mounted in drills and the majority of the borers were actually drill bits.

Falci, Catarina Guzzo, Maria Magdalena Antczak, Andrzej T. Antczak, and Annelou Van Gijn
The collection contains beads and pendants of shell, stone, and ceramic that relate to the Valencoid culture. The pendants include zoo- and anthropomorphic forms. Information is provided regarding manufacturing techniques and use-wear.

Falci, Catarina Guzzo, Alice C. S. Knaf, Annelou van Gijn, Gareth R. Davies, and Corinne L. Hofman
Preseats a study of a private collection of semiprecious lithic ornaments which combines raw material identification, typo-technological analysis, and microwear analysis.

Falci, Catarina Guzzo, Dominique Ngan-Tillard, Corinne L. Hofman, and Annelou Van Gijn
Reports on the production sequence and use life of beads and pendants recovered from five sites. Materials include stone, shell, bone, teeth, coral, and ceramic.
Falci, Catarina Guzzo and Maria Jacqueline Rodet
Site MMA-02 in the Serra dos Carajás region of Brazil, associated with the Amazonian variant of the Tupiguarani tradition, was a specialized place for the production of body adornments from a raw stone material known as silicified kaolinite. Disc beads were the main product.

Fedorchenko, A. Yu.
Reports on the series of stone beads, pendants, and plaques recovered from the Ushki sites complex in Central Kamchatka, Russia, with emphasis on production technology. In Russian with short English summary.

Located in Kyrgyzstan, Obishir-5 is one of the most important Final Pleistocene to Early Holocene sites in western Central Asia. The Early Holocene component (10,700-8,200 cal BP) yielded one of the oldest and largest assemblages of soft stone ornaments known from the region. It was possible to reconstruct the chaîne opératoire of these artifacts which include three pendants, one “labret”-like ornament, and one ornament blank.

Francis, Peter, Jr.
Pecking (spot percussion) for dimpling, perforating, and shaping beads.

Frazier, S., A. Frazier, and G. Lehrer
Discusses the famous stone beadmaking emporium of Idar-Oberstein in west-central Germany. It describes the water-driven cutting mills, the technology, the sources of agate and other gemstone materials, and the harsh working conditions of former times.

Gallaga Murrieta, Emiliano and Emiliano Melgar Tizoc
Discusses the production techniques used to shape and perforate turquoise beads and pendants in the Onavas Valley of Senora, Mexico.

**Garrido Escobar, Francisco Javier**

2015 Mining and the Inca Road in the Prehistoric Atacama Desert, Chile. Ph.D. dissertation. Dietrich School of Arts and Sciences, University of Pittsburgh.

Investigates the social organization and *chaîne opératoire* of turquoise and malachite beads production at camps on the Cachiyuyo de Llampos Mountain and the nature of settlement and associated artifact assemblages along a nearby section of the Inca Road.

**Gaussen, J.**


Deals with Neolithic beadmaking techniques observed at workshops found at Tilemsi, Mali, and the Ioullemedene region.

**Glover, Lauren and J.M. Kenoyer**


Analyses of a sample of 68 carnelian and agate beads from Korea’s late Proto-Three Kingdoms and Three Kingdoms period (CE 100-668) provide evidence for long-distance exchange with South Asia. Much information on drilling techniques.

**González-Urquijo, Jesús, Frederic Abbès, Hala Alarashi, Juan José Ibáñez, and Talía Lazuén**


Drills found in the Khiamian levels at Tell Mureybet, Wadi Tumbaq 1, and Nachcharini were used mainly to perforate stone beads. This is evident from use-wear marks on the active areas and the residue preserved on them. All the evidence points to at least some of them being hafted.

**Gorelick, L. and A.J. Gwinnett**


Modern experiments and the detailed study of drill holes place the change in the 3rd millennium BC.


Suggests that the use of diamond drills traveled to the Mediterranean in Roman times from India.
1990  Innovative Lapidary Craft Technique in Neolithic Jarmo. *Archaeomaterials* 4:25-32. Hard stone beads found in northern Iraq were probably worked with a bow drill and loose abrasive.


A total of 14 mostly tiny turquoise beads excavated from the royal tomb at Sipan, Peru, were studied to determine the method of manufacture using functional analysis and scanning electron microscopy. Two manufacturing hypotheses and experimental duplication are discussed.

1996  Innovative Methods in the Manufacture of Sasanian Seals. *Iran* 34:79-84. Further study of ancient drilling techniques based on 124 Sasanian seals in the Metropolitan Museum of Art. Most were perforated using iron drills but the remainder seem to have been drilled using twin diamond-tipped iron drills. Also discusses the technical problems of faceting and speculates on the import of garnet bead blanks drilled at workshops within the Sasanian Empire.

**Groman-Yaroslavski, Iris and Daniella E. Bar-Yosef Mayer**


Use-wear analysis applied to two carnelian beads from the Middle Pre-Pottery Neolithic B period in southern Israel revealed a manufacturing procedure that corresponds to genuine lapidary technologies of contemporary traditional societies.

**Gurova, Maria, Clive Bonsall, Bruce Bradley, and Elka Anastassova**


Experimentation on drilling stone of various hardness, as well as shell and bone, using replicated micro-borers and employing manual and mechanical drilling (with a pump drill).

**Gurova, Maria, Clive Bonsall, Bruce Bradley, Elka Anastassova, and Pedro Cura**


Presents experiments in drilling different materials including minerals and rocks, as well as shell and bone, to help understand bead production during the Early Neolithic in the Balkans.
SEM examination and experimental archeology are used to understand how Teotihuacan-style stone objects (beads and pendants included) found among the offerings at the Templo Mayor, Tenochtitlan, central Mexico, were made.

Gwinnett, A.J. and L. Gorelick
The highly-magnified comparison of quartz beads made using a diamond splinter turned by a bow drill in present-day Cambay, India, to those from archaeological contexts in Sri-Lanka suggests that the latter were similarly manufactured.

A worked rock crystal, not dating after AD 300, may be the earliest evidence of diamond drilling technology.

Experiments reveal that tumbling was practiced at the important beadmaking center at Mantai in Ceylon, ca. AD 700-1000.

Investigation of 64 stone beads (12th century BC to 1st century AD) reveals drilling techniques (Indian connections?) and the earliest evidence for polishing by tumbling (9th-8th centuries BC).

Illustrates the development of drill technology from predynastic times to late antiquity.

Silicone impressions of the perforations of beads, amulets, and seals are interpreted to define the types of drill used; scanning electron micrographs can identify drill holes from the Paleolithic to the present day, and the drills used.
Healey, Elizabeth and Stuart Campbell
Attempts to determine whether beads and other obsidian ornaments were produced at two sites (Domuztepe and Tell Arpachiyah) in Turkey and Iraq, or were acquired as finished objects (or both).

Heimpel, W., L. Gorelick, and A. Gwinnett
On the prized abrasive from Egypt, India, and the Greek island of Naxos used from ca. 2000 BC for, inter alia, the manufacture of stone beads.

Horn, M.
2015 Preliminary Investigations Into the Production of Glazed Steatite Beads: Discussing the Use of Turquoise During the Badarian Period in Egypt. *Archéo-Nil* 25:91-121.
Several beads and pendants found in Badarian graves in the Qau-Matmar region of Middle Egypt formerly identified as turquoise are actually glazed steatite.

Inizan, Marie-Louise
Discusses the importation of carnelian and agate bead from the Indus Valley to Mesopotamia based on material recovered from two sites in Iraq and Iran, with notes on manufacturing technology.

Johnson, Jay K.
Description and discussion of the stone beads and the tools used in their manufacture at this Middle Archaic mound site in northern Louisiana.

Kanungo, Alok Kumar
Karanth, R.V.


Karklins, Karlis, Alicia Hawkins, Heather Walder, and Scott Fairgrieve
2018 Florida Cut-Crystal Beads in Ontario. *Beads: Journal of the Society of Bead Researchers* 30:44-51. Discusses three faceted rock-crystal beads generally termed Florida Cut-Crystal which were found in the legacy collections of two 17th-century Huron-Wendat sites in southern Ontario. Includes details about their manufacture and chemical composition.

Kelly, Gwendolyn O.

2016 Heterodoxy, Orthodoxy and Communities of Practice: Stone Bead and Ornament Production in Early Historic South India (c. 400 BCE - 400 CE). *Archaeological Research in Asia* 6:30-50. Argues that the South Indian producers of stone beads and ornaments should be considered as a single community of practice, not as distinct ethnic groups, as suggested by some. Also deals with beadmaking techniques.

Kenoyer, J. Mark


The analysis of beads from different periods and areas of Harappa, Pakistan, have made it possible to define specific trade networks and the organization of production as well as changing patterns of interaction over the history of the site.

2005 Steatite and Faience Manufacturing at Harappa: New Evidence from Mound E Excavations 2000-2001. *Museum Journal* (National Museum of Pakistan) III-IV:43-56. Discusses a workshop where various objects of steatite and faience were made, including beads. The findings suggest that the beads may have been quite important as symbols of value since they were being made in relatively controlled contexts.


**Kenoyer, J. Mark and Dennys Frenez**

2018 Stone Beads in Oman during the 3rd to 2nd Millennia BCE: New Approaches to the Study of Trade and Technology. *Beads: Journal of the Society of Bead Researchers* 30:63-76. Archaeological collections in Oman were documented to determine the range of variation in the finished objects and if there is evidence for local production of carnelian and other hard-stone beads. Also provides a chronological discussion of the different techniques used to drill stone beads and pendants.

**Kenoyer, J. Mark and Massimo Vidale**

research on the relationship between drilling and other contemporaneous technologies are discussed. India, Pakistan.

Kenoyer, J. Mark, M. Vidale, and K.K. Bhan


Presents preliminary results of ethno-archaeological and experimental studies of the stone-bead industry of Kambhat.


Among other things, this report deals with the production of amber beads.

Konasukawa, Ayumu, Hitoshi Endo, and Akinori Uesugi


The site yielded a wide variety of beads but especially those of terra cotta and various types of stone. They are attributed to the Harappan and Historical periods. Includes information regarding the drilling technology used based on silicone casts of the perforations.

Kovacevich, Brigitte


Combines ethnographic, ethnohistorical, and archaeological data to identify, describe, and interpret the material correlates and social processes surrounding the production of jade beads and other ornaments at a Late Classic Maya site in Guatemala.

Krzyżanowska, Marta and Mateusz Frankiewicz


Experiments were conducted to determine if Early Medieval Scandinavian beadmakers were capable of crafting complex mosaic glass beads. In Polish with English abstract.
New observations of steatite microbeads from Zhekhada in northern Gujarat, India, strongly suggests that Harappan craftspeople made the beads by cutting, drilling, and grinding solid steatite rock rather than by forming them from a ground steatite paste as was previously thought.

Ludvik, Geoffrey
This study addresses antique stone beads made of agate, carnelian, turquoise, jasper, and lapis lazuli, and focuses on stylistic and morphological features as well as manufacturing techniques, specifically the nature of drilling used to perforate the beads.

Ludvik, Geoffrey, J. Mark Kenoyer, Magda Pieniążek, and William Aylward
Eighteen carnelian and two rock-crystal beads from the site of Troy, Turkey, were studied to better understand lapidary technology and trade during the 3rd-2nd millennium BC in this part of Anatolia.

Ludvik, Geoffrey, Magda Pieniążek, and J.M. Kenoyer
The beads uncovered at Hattuša, the capital of the Hittite Empire during the late Bronze Age in what is now Turkey, were manufactured from soft stones, like serpentine or limestone, as well as hard stones such as lapis lazuli, rock crystal, and variations of chalcedony such as agate, carnelian, and onyx.

Lume Pereira, Federica, Giuseppe Guida, Ulrike Müller, and Massimo Vidale
Addresses technological transmission in the context of newly established exchange mechanisms of the Early Bronze Age in the Near East and South Asia by focusing on a number of beads recovered from Gonur Depe (Turkmenistan) – the best known urban center of the so-called Oxus civilization (BMAC).
Maury, J.
Discusses stone drill bits for perforating necklace beads at Camprouch, a Chalcolithic site in southern France.

Mazzieri, Paola and Roberto Micheli
Reports on the existence of a steatite disk bead workshop at a Middle Neolithic settlement in northern Italy during the Square Mouthed Pottery phase. The recovered material allows the complete reconstruction of the disk bead manufacturing sequence.

Melgar Tísoc, Emiliano R. and Iris del Rocío Hernández Bautista
Discusses the typology and technology of lapidary objects (including beads) recovered at Nevado de Toluca, Mexico.

Melgar Tísoc, Emiliano Ricardo and Frances Joan Mathien
Presents a new approach that characterizes and compares production marks on bead blanks, beads, and pendants made using experimental archaeological techniques with those seen on artifacts.

Melgar, Emiliano, Reyna Solís, and José Luis Ruvalcaba
The aim of this work is to measure the composition of the recovered stone beads and other artifacts for provenance study and to establish the manufacturing technique and tools used to produce them.

Melgar Tísoc, Emiliano R. and Reyna Beatriz Solís Ciriaoco
Reports on the chemical analysis and manufacturing techniques of stone ornaments recovered from a neighborhood of Teotihuacan, central Mexico.

Menon, Jaya
This article looks at different drilling technologies in the Bronze Age from Egypt to the Indian subcontinent. The adoption or rejection of different types of drilling mechanisms in different regions reminds us that technologies have to be socially acceptable in the first place before they could be adopted.

Miller, Heather M.-L.
The classification of talc-faience complex materials is difficult as they are almost identical in appearance even under low magnification. This article provides comparative, descriptive terminology for these various materials which should facilitate more uniform descriptions in the future. Also provided is an overview of the probable processes of the manufacture of these materials and the objects created from them.

Mohanty, R.K. and Tilok Thakuria
Provides a detailed account of non-glass bead manufacture and trade in India from the upper paleolithic to early history. Includes information about manufacturing techniques, raw materials, and manufacturing centers in ancient India, as well as traditional bead manufacturing at Khambat, Gujarat.

Moorey, P.R.S.
The chapter on “The Stoneworking Crafts: Ornamental Stones” contains a section on beads and the types of stones used to produce them.

Needham, Andy, Aimée Little, Chantal Conneller, Diederik Poomstra, Shannon Croft, and Nicky Milner
Chapter 33 discusses the small group of ornaments recovered from the important Mesolithic site of Star Carr in North Yorkshire, England, United Kingdom. They include shale disc beads, a possible bird-bone bead, a perforated amber fragment, perforated red deer teeth, and a unique,
engraved shale pendant which represents the earliest form of Mesolithic art in Britain. Insight is provided regarding the manufacture of the ornaments.

**Nguyen Kim Dung**

The microwear observations on tools, finished nephrite ornaments (including beads), and waste material from the Bronze Age site of Trang Kenh, Vietnam, supported by experiments, indicate a rather high level of development using quite complex tools for jewelry manufacture during the late 2nd millennium BC in northern Vietnam.

**Noain Naura, María José**

Reconstructs the manufacturing sequence for Neolithic variscite necklace beads in the province of Barcelona, Spain.


Describes the process for making variscite necklace beads.

**Pelegrin, J.**

Expounds on the stone-bead knapping methods and techniques practiced at Cambay, India.

**Lume Pereira, Federica, Giuseppe Guida, Ulrike Müller, and Massimo Vidale**

Presents the results of microscopic surface imaging of silicone casts taken from the drill holes of stone beads from the site of Gunar Tepe in Turkmenistan.

**Popkiewicz, Eryk**
Replicative experimentation revealed that the tools used to process amber beads excavated in northeastern Poland were made of metal, most likely copper alloys. In Polish with substantial English abstract.

Prabhakar, V.N.

Prabhakar, V.N., R.S. Bisht, R.W. Law and J.M. Kenoyer
A detailed study of the large collection of Harappan drill bits excavated at Dholavira, Gujarat, India, which were used in the production of stone beads. Mostly made of “Ernestite,” the drills played a major role in the advancement of technology in the perforation of beads made of siliceous materials.

Queffelec, Alain, Pierrick Fouéré, Céline Paris, Christian Stouvenot, and Ludovic Bellot-Gurlet
Present an integrated study of the mineralogy and typo-technology of the ornaments which date to 250-400 cal. AD. The materials used include serpentine, amethyst, turquoise, sudoite, rock crystal, calcite, feldspar, diorite, jasper, aventurine, chlorite, paragonite, and nephrite. Production waste represents several stages of the chaîne opératoire.

Quinn, Colin Patrick
Discusses stone bead production techniques during the Early Neolithic in the Southern Levant at the site of Dhra’, Jordan, with emphasis on hole drilling.

Raad, Danielle
Patterns of typology, color, and material are systematically explored, and manufacturing methods are reconstructed based on the close examination of perforations, polishing, and tool marks on ten PPNA beads carefully selected as case studies.
Raad, Danielle and Cheryl A. Makarewicz
Investigates raw material selection and bead manufacture at the PPN settlement of el-Hemmeh, Jordan.

Ricou, Christian, Thimus Esnard, and Luc Laporte
Reports on the experimental replication of stone and shell beads found on Artenacian sites in west-central France.

Rigaud, Solange and Veerle Rots
A microscopic examination of four talc beads from a tomb in Syria dated to the early Bronze Age (ca. 2800-2000 / 2700-1900 BC) reveals the chaîne opératoire.

Rochette, Erick T.
Archaeological surveys and excavations were conducted in the Middle Motagua Valley of southern Guatemala, centering on the region around the Lower Lato River Valley, to understand the distribution, organization, and technological process of jadeite artifact production (primarily beads). English abstract.

2009 The Late Classic Organization of Jade Artifact Production in the Middle Motagua Valley, Zacapa, Guatemala. Ph.D. dissertation. Department of Anthropology, Pennsylvania State University, State College, PA.
The archaeological evidence demonstrates widespread production of jade artifacts in the only positively identified jade source for prehispanic Mesoamerica. Discusses the technology involved.

2010 Jade in Full: Prehispanic Domestic Production of Wealth Goods in the Middle Motagua Valley, Guatemala. In *Housework Craft Production and Domestic Economy in Ancient*

Presents evidence for non-elite, household production of jadeite items (particularly beads) in the study area.

**Rodet, M.J., D. Duarte-Talim, and C.G. Falcão**


The production of stone beads in the Amazon at Serra dos Carajás, Pará, Brazil, from the theoretical and methodological perspective of the classical French School.


**Rollefson, Gary**


By analogy with other settlements in the Levant, the presence of large numbers of drills at al-Basit argues for a bead industry despite the glaringly small number of ornaments that have been recovered.

**Rollefson, Gary and M. Parker**


Analysis of material recovered from the large LPPNB settlement at al-Basit, near Petra in southern Jordan, demonstrates a focus on drill production, ostensibly for the manufacture of beads.

**Roux, Valentine**


Presents a historical and ethnographical introduction to the Cambay stone-bead industry including a synopsis of manufacturing techniques; India. English abstract.

**Roux, Valentine (ed.)**

Contains nine articles on various aspects of beadmaking technology in the Indus Valley of India and Pakistan, as well as related topics. The nine articles are listed individually in the respective sections of this bibliography.

**Roux, V., B. Bril, and G. Dietrich**
New methods of recording manufacturing processes throw light on the makers of long carnelian beads and their high value in the Harappan civilization.

**Roux, V. and P. Matarasso**
Harappan stone-bead technology; Pakistan and India.

On the technology of Harappan carnelian beads; Pakistan, India.

**Roux, V. and J. Pelegrin**
An ethno-archaeological investigation of stone-bead production in Gujarat, India.

**Salvatori, S., M. Vidale, G. Guida, and E. Masioli**
Surface finds include a number of copper beads as well as a silver example. Their production and composition are discussed.

**Sax, Margaret and Nigel Meeks**
Close examination of the techniques used in the production of a small perforated quartz skull reveal that the object is not pre-Columbian but was made between the late 16th century and the mid-19th century when it was acquired.

**Seeberger, F.**
Neolithic working debris and flint drills from a site on Lake Constance, Germany, inspired experiments in reconstructing stone-bead manufacture using flint bits and a bow drill. Calculations about the time required suggest that only the upper levels of society could afford beads.

**Sela, A. and V. Roux**


A technical approach to perforating Harappan chalcedony beads; India.

**Shinohara, Yûichi**


The ritual items include beads in comma-shaped, cylindrical, round, disc, and mortar-shaped forms. Thorough report which includes information about manufacturing techniques and chronology.

**Siebrecht, Matilda**


Considers how variability in raw material properties may have influenced the selection of techniques and tool-kits employed for the production of beads made from different materials (e.g., whether bone and stone disc beads were created using a similar production process). Turkey.

**Solís Ciriaeco, Reyna Beatriz and Emiliano Melgar**


A detailed technological analysis of greenstone beads, pendants, and other ornaments excavated in central Mexico permitted the highly accurate identification of the tools and techniques employed in their production. Three technological patterns were identified.

**Stocks, Denys A.**

Among the craftworkers depicted in Egyptian tomb-painting are drillers of beads going about their work. An experimental study of bead-drilling leads to an assessment of the industrial nature of the enterprise.

A very illuminating book with a whole chapter devoted to early beadmaking techniques. Detailed discussion of the mass-production techniques depicted in Egyptian tombs and then of the author’s attempts to replicate them (pp. 203-224). The most highly skilled workers could produce up to five beads at a time. Other parts of the book deal with drills, abrasives, etc.

Microscopic examination of a group of Bronze-Age amber beads from two different sites in northern Italy revealed the use of a red-hot punch for creating the perforations.

Takács, József
A thousand or so Burmese gemstone objects at the Department of Mineralogy of the Eötvös Loránd University and at the Hungarian Southeast Asian Research Institute were examined to identify the materials used, establish the techniques used in their production, and determine whether they are authentic, ancient pieces.

Thakuria, T. and R.K. Mohanty
Discusses the bead forms encountered and the production process. The material likely dates to the Early Iron Age Megalithic period.

Tosi, M. and M. Vidale
Describes the lapis lazuli industry at Mehrgarh based on material surface collected at site MR2 which dates to the 4th millennium B.C. This find represents one of the earliest lapis lazuli beadmaking assemblages in South Asia and shows the involvement of the Kachi Plain region in the production of luxury ornaments since comparatively ancient periods.
Tsoraki, Christina
Burial fill in the North Area of a large Neolithic and Chalcolithic settlement in southern Turkey contained anklets and bracelets composed of various stones, but primarily carnelian. Some comments on manufacturing techniques.

Uesugi, Akinori, Manmohan Kumar, and Vivek Dangi
Prepresents a thorough analysis of the stone beads recovered from two Urban Indus sites in northern India, including a reconstruction of the bead production process.

Uesugi, Akinori and Wannaporn Kay Rienjang
Silicone casts made of the perforations of stone beads recovered from an early 1st millennium site in northern Pakistan provide information concerning the various drilling techniques used.

Van Gijn, Annelou
Discusses the beads and their production techniques.

Discusses the amber and jet beads recovered from a Middle Neolithic site in the western Netherlands with an account of production techniques.

Provides descriptions of the recovered beads and pendants, as well as details concerning their production.

2014  Beads and Pendants of Amber and Jet. In A Mosaic of Habitation at Zeewijk (the Netherlands): Late Neolithic Behavioural Variability in a Dynamic Landscape, edited by
Utilizes a biographical approach to the study of ornaments, including a characterization of the raw material, a reconstruction of the production processes, and examination of its use life, and a study of the context of deposition. The material dates to the Late Neolithic. See García-Díaz (2014) for stone beads from the site.

Vidale, Masimo
Reconstructs the techniques used by ancient artisans to make steatite disc beads, Pakistan. Excellent illustrations and SEM photos.

Reports on the stone beads and their production techniques.

Vidale, Massimo, Maurizio Mariottini, Giancarlo Sidoti, and Muhammad Zahir
Deals with the archaeological material recovered from a Chalcolithic craft center. The emphasis is on lapis lazuli and chert drill heads.

Viola, Stefano
On the social meaning of stone jewelry (including beads and pendants) from sites in northern Italy dating from the Copper to Early Bronze ages. Includes a detailed account of the manufacturing processes.

Viola, Stefano, Maria Adelaide Bernabo’ Brea, Dino Delcaro, Federica Gonzato, Cristina Longhi, Giorgio Gaj, Roberto Macellari, Luciano Salzani, Alessandra Serges, James Tirabassi, and Marie Besse
Compares jewelry artifacts (mainly stone beads) from sites in northern Italy dating from the Copper Age to the Early Bronze Age to determine the technology and tools used to produce them, as well as how to differentiate wear marks from technological traces.

Viola, Stefano, Giorgio Gaj, Dino Del Caro, and Marie Besse
2019 Techno-Functional Study of the “Lignite” Ornament Elements of the Boira Fusca Cave (Cuorgnè, loc. Salto-Torino). Poster presentation at the 11th Experimental Archaeology Conference, 2-4 May, Trento, Italy.
Proposes a chaîne opératoire for the production of lignite beads found in northern Italy.

Wartke, R.-B.
Succinct account of the techniques for making stone beads (shaping, boring, etching) in the ancient Orient, and some remarks pertinent to beadmaking in metal and various vitreous materials.

Williams, L.
Stone bead technology.

Wright, Katherine I. (Karen)
Discusses the massive evidence for the production of beads made of green, red, and black “Dabba marble” at the Late Neolithic sites of Jilat 13 and 25 in eastern Jordan.

Wright, K.I., P. Critchley, A.N. Garrard, R. Bains, D. Baird, and S. Groom
Stone bead production and exchange in Wadi Jilat and the Azraq Basin, Jordan.

Wright, Katherine I. and Andrew Garrard
Discusses evidence for stone bead production and use at six seasonally occupied aceramic neolithic campsites in the Wadi Jilat region of eastern Jordan. Most of the beads were made from a local colored stone, so-called “Dabba Marble,” but varieties of flint, silicified sandstone, white limestone/chalk, white quartz/calcite were also used. Long-distance imports were limited to two
beads of malachite and turquoise, and a small number of Red Sea shells and mother-of-pearl beads.

Yamahana, Kyoko and Yasunobu Akiyama  
Reports on the replication of a necklace composed of several forms of sulfur beads made during the Ptolemaic to early Roman periods. In Japanese with English abstract.

Yang, Y., M. Yang, Y. Xie, and C. Wang  
The specimen examined is a black stone beads from a tomb of the “Peng” Nation, Western Zhou Dynasty (1046-771 BC).

SHELL  
André, Lino  
Provides information regarding perforation techniques and use wear on Mesolithic adornments (primarily beads) from the Cabeço da Amoreira shell midden at Muge, central Portugal. The same content as the next entry.

André, Lino António and Nuno F. Bicho  
Discuss a set of personal adornments made of gastropod shells (beads included), a cervid tooth, and a clay ring fragment. Includes a description of the objects, their distribution in the archaeological context, the techno-typological analysis of the perforations, and the evidence for their use as adornments.

Arnold, Jeanne E. and Diana Rachal  
Illustrated study of experiments in drilling and other technological aspects of aboriginal production of shell beads along the Pacific coast of California.
Avezuela Aristu, B.  
2010  The Personal Ornaments Made from Molluscs at the Middle-Late Magdalenian Site of La Peña de Estebanvela (Segovia, Spain). In Not only Food: Marine, Terrestrial and Freshwater Molluscs in Archaeological Sites, edited by E. Álvarez-Fernández and D. Carvajal-Contreras, pp. 48-56. Munibe Suplemento 31.  
The ornament collection from the site contains six species of marine molluscs, one freshwater mollusc, and three red deer atrophied canines, all of them perforated. A technological study of the perforations was undertaken on the molluscs and an experimental comparative collection created.

Avezuela Aristu, B., I. Martín Lerma, J.A. Marín de Espinosa, and F.J. Muñoz Ibáñez  
Investigates how a certain species of shell was perforated to form ornaments during the Upper Paleolithic period.

Baird, Douglas, Andrew Garrard, Louise Martin, and Katherine Wright  
Discusses the form and method of manufacture of the stone, shell, and bone beads recovered from PPNB and Late Neolithic contexts at sites Azraq 31 and Wadi el-Jilat 32 in Jordan.

Bar-Yosef Mayer, Daniella E.  

Barton, R. Nicholas E. and Alison J. Roberts  
The shell beads are represented by three species. In addition to reporting aspects of beadmaking technology, the article reviews the dating evidence at each of the three sites and makes broader comparisons with other finds in Britain and adjacent areas of Ireland and France.

Basilia, Pauline A.  
SEM examination of shell beads from a Philippine Metal Age site revealed that a number of them exhibited appliques of black, yellow, red, and high-fiber substances.

Basilia, Pauline A., Angel Bautista and Katherine Szabó

Beldiman, Corneliu and Diana-Maria Sztancs

Benghiat, Samuel, Darko Komšo, and Preston T. Miracle

Blake, Michelle
2010 Drill Baby, Drill! An Analysis of Late Period Chumash Microdrills from CA-SLO-214. M.A. thesis. Sonoma State University, Rohnert Park, CA. Presents a study of Chumash shell beads and the microdrills used to produce them in southern California.

Burley, David V. and Travis Freeland
2019 A Shell Disc Bead Maker’s Workshop from Kavewa Island, Northern Fiji. Archaeology in Oceania (in press). Test excavation of an early Lapita colonizing site encountered an abundant assemblage of Anadara shell disc beads and preforms, as well as lithic micro-drills for bead perforation. Radiocarbon dates place this assemblage in the interval 2490-2280 calBP.
Campbell, Greg

Uses replication experimentation to demonstrate how very short (1-3 mm) tusk-shell beads were made during the Epipaleolithic of the Levant.

**Camps-Fabrê, Henriette (ed.)**

A typology for prehistoric bone, shell, and ivory ornaments, including beads, spacers, and pendants. Information concerning production techniques, use/wear, and spacial and temporal distribution is also provided.

**Cargill, Sydney, Isha Chavva, Shannon Duffy, Julia Flores, Jennifer Mao, Gabrielle Shvartsman, Cindy Weng, and Sharmitha Yerneni**

Investigates and compares the methods used to produce Spondylus-shell beads in two Ecuadorian cultures.

**Carlson, Lisabeth Anne**

Excavations carried out at the Governor’s Beach site (GT-2) on the island of Grand Turk, Turks and Caicos Islands, B.W.I. provide the first evidence of specialized shell beadmaking in the Caribbean. Dating between AD 1100 and 1200, the site produced a large sample of complete beads, partially worked pieces, and scrap that have allowed the reconstruction of prehistoric Taino beadmaking techniques.


See above.

**Carter, Benjamin**
Presents a thorough study of Manteño shell bead production based on a large collection of material recovered from six sites in two geographically and temporally different groups: the southern portion of modern-day Manabí province and from the Santa Elena Peninsula; and Late Guangala/Early Manteño (ca. AD 700-1300) and Late Manteño (ca. AD 1200-post 1532).

**Carter, Benjamin and Matthew Helmer**

Contains information regarding the techniques utilized in the production of the perforated shell and stone ornaments recovered from a Chimú-Inka period (ca. 1470-1532) elite tomb at Samanco, Peru.

**Carter, Robert, Harriet Crawford, Simeon Mellalieu, and Dan Barrett**

Flint microdrills found with finished and unfinished shell disc beads confirm a bead manufacturing function for this small, coastal 5th-millennium site in Iraq.

**Charpentier, V. and S. Méry**

The site yielded several types of characteristic beads. In particular the occupants of Akab produced discoid beads in *Spondylus* sp., to the extent that this site may be termed one of specialized production. The chaîne opératoire for them is provided.

**Ciarla, R., F. Rispoli, and P. Yukongdi**

Presents the manufacturing cycle for the three main shell-bead types recovered from a Bronze Age site (ca. 1100-500 BCE).

**Cooke, Richard. G and Luis A. Sánchez H.**

Discusses shell bead and pendant manufacture at a prehispanic site in Panama.

**d’Errico, F., P. Jardón-Giner, and B. Soler-Mayor**
Criteria for experiments to determine if holes in shells are natural or intentional.

**Dyrdahl, Eric**

Material recovered from refuse deposits filled with waste from crafting both local and non-local materials provides an unparalleled opportunity to better characterize interregional interaction in the Ecuadorian Late Formative. Ornaments include beads and pendants made of mother-of-pearl, *Spondylus* and other shell, bone, animal teeth, and gold. Production sequences are postulated for the shell items.

**Falci, Catarina Guzzo, Maria Magdalena Antczak, Andrzej T. Antczak, and Annelou Van Gijn**

The collection contains beads and pendants of shell, stone, and ceramic that relate to the Valencioid culture. The pendants include zoo- and anthropomorphic forms. Information is provided regarding manufacturing techniques and use-wear.

**Falci, Catarina Guzzo, Dominique Ngan-Tillard, Corinne L. Hofman, and Annelou Van Gijn**

Reports on the production sequence and use life of beads and pendants recovered from five sites. Materials include stone, shell, bone, teeth, coral, and ceramic.

**Falci, Catarina Guzzo, Annelou Van Gijn, M. Magdalena Antczak, Andrzej T. Antczak, and Corinne L. Hofman**

Microwear analysis is used to assess technologies of production and use-wear of figurative shell beads and pendants from north-central Venezuela.

**Feinman, Gary M. and Linda M. Nicholas**

Reports on the production of shell beads and other adornments from Pacific Coast species during the Terminal Formative/Early Classic periods at a site in Oaxaca, Mexico.
Household Craft Specialization and Shell Ornament Manufacture in Ejutla, Mexico.

Fernández, Mabel M. and Mariano Ramos

Folb, L.

Francis, Peter, Jr.

Graesch, Anthony P.

Groman-Yaroslavski, Iris, Danny Rosenberg, and Dani Nadel

Reports on the analysis of the large collection of flint perforators, shell beads, and bead production waste found at a site in Lower Jordan Valley Israel.
Gruet, Yves, Luc Laporte, and Yves Bodeur
Provides a detailed account of the beads fashioned from fresh and fossil shell and stone excavated at Ponthezières, France, along with a discussion of how they were produced.

Guinea, Mercedes
Discusses several hypotheses concerning the production of shell beads at Japotó, an archaeological habitation site of the Integration Period (AD 800-1535) in Ecuador.

The prehispanic J4 mound at Japoto, Ecuador, yielded evidence of the manufacture of shell beads. The article examines the technology, places of manufacture, and bead use.

Hartzell, Leslie L.
The detailed study of shell bead production refuse enhances the ability of archaeologists to determine when and where particular bead types were manufactured.

Harzhauser, Mathias, Eva Lenneis, and Christine Neugebauer-Maresch
Documents the methodology of perforating the shells of the fluvial gastropod Lithoglyphus naticoides based on experimental comparison. The study focuses on one “population” of piercings found in an early Neolithic (Linear Pottery Culture) grave in Kleinhadersdorf, Austria, to determine whether these artificial openings are a random product of grinding or whether the Neolithic craftsmen already tried to meet distinct parameters.

Heit, Ilia
The archaeological remains indicate production of a distinct type of disc bead from one shell species of the genus *Didacna*. Moreover, they allow a closer look at manufacturing techniques and raise questions about craft specialization as well as the presence of a long tradition of shell jewelry in the Circumcaspian region.

**Henrickson, Celeste N.**

2013  *The Archaeology of Cueva Santa Rita: A Late Holocene Rockshelter in the Sierra de la Giganta of Baja California Sur, Mexico.* Ph.D. dissertation. Department of Anthropology, University of California, Berkeley.

Chapter 4 deals with the production of *Olivella* shell beads.

**Hoareau, Leïla, Chiara Zen, Federica Fontana, and Sylvie Beyries**


Eight perforation methods were tested to identify their traces and variability depending on the species tested and the origin of the shell.

**Hohmann, Bobbi M.**


**Holley, George R.**


Includes a discussion of the production of shell beads.

**Howard, Jennifer M.**

2008  *No Drills, No Problem? The Possible Use of Sea Urchin Spines as Drills on San Nicolas Island: An Experimental Archaeology Project.* M.A. thesis. Department of Anthropology, Northern Illinois University, Dekalb.

Disproves the theory that worked sea urchin spines found in association with shell-bead detritus at a site in California’s Channel Islands were used to drill *Olivella* shell beads. They may, however, have been used to smooth out the drill perforations after manufacture.

**Koppel, Brent and Katherine Szabó**


One section reports on *Nassarius pullus* bead production using indirect percussion.

**Kozuch, Laura**

Presents evidence for heat-treatment of marine shell in bead manufacture at this Mississippian culture site. Includes a columella bead-working reduction sequence.

2007  Replication of *Busycon* Columella Shell Beads. Illinois Archaeology 14/15:142-157. Concentrates on the technology used to produce shell beads found on Mississippian sites in the eastern United States.


**Laporte, Luc**

Presents a technological study of Late Neolithic shell-bead production along the west coast of France.


Discusses Late Neolithic production of disc shell beads in western France.


A condensed version of Laporte (1994).

**Leonardt, Sabrina**

On the production and distribution of shell beads in the late Holocene of continental Patagonia, Argentina.

**Lindner, Christopher and Lisa Folb**

Replicative experiments focusing on chert microdrills from a Schoharie Creek site argue against a proposed function of drilling holes in shell beads.
Littman, S.L. and W.F. Keegan

Luca, Sabin Adrian and Ana-Maria Păpureanu
Thorough investigation of the recovered items including the manufacturing techniques involved in their production. They are of the Vinča culture and dated between the Early and Late Neolithic.

Mărgărit, Monica
The settlement of Hârșova-tell, Romania, has produced material representing all the stages in the manufacture of disk beads from Unio shells. It is attributed to the Gumelnita culture.

Mărgărit, Monica and Mădălina Dimache
The funeral inventory includes small cylindrical, tubular, or biconvex beads, made of various raw materials: Spondylus shell, bone, malachite, copper, and green slate. At the technical level, attention is drawn towards the technological transformation scheme of the raw material.

Mărgărit, Monica, Cristian Virag, and Alexandra Georgiana Diaconu
Investigates how the small cylindrical beads made of Spondylus shell that dominate the assemblage were produced and if the beads were worn before being interred.

Mas, Elodie
Detailed study of the marine-shell ornaments found at sites dating between AD 450 and 1000 in the Sayula Basin of western Mexico. Much data on production techniques.
Mayo Torné, Julia del Carmen
Discusses the prehispanic manufacture of beads and other ornaments from marine shells in Panama.

Melgar Tísoc, Emiliano Ricardo
In depth study of the specialized manufacture of the shell objects, including beads and pendants, found at a site in central Mexico. Includes experimental technology replication.

Identifies the different tools and techniques employed in the production of Oliva shell pendants, also known as tinklers, at the Epiclassic (AD 650-900) site of Xochicalco, in the Western Valley of Morelos, México. These pendants once formed necklaces and were part of offerings inside the main structures of the settlement.

Presents evidence for the manufacture of shell beads and pendants at Xochicalco, a walled site in Mexico inhabited ca. AD 650-900.

Melgar Tísoc, Emiliano Ricardo and María del Rosario Domínguez Carrasco
Describes shell beadmaking technology based on specimens excavated at Calakmul, Campeche, Mexico.

Micheli, Roberto
2015 Conchiglie affascinanti per ornamenti di prestigio: produzione, distribuzione e impiego dello Spondylus gaederopus nella preistoria europea. In Appunti di archeomalacologia, edited by A. Girod, pp. 198-212. All’Insegna del Giglio, Sesto Fiorentino.
Investigates the production, distribution, and use of ornaments, including beads, made from the shells of Spondylus gaederopus in European prehistory.

Miller, Michelle A.
Examines the manufacture of one distinct type of disc bead made from marine mollusc shell. The results of this study establish criteria which may be applied to the production of diverse ornaments of various materials and from sites of many regions and dates.

**Moore, Jerry D. and Carolina Vilchez**

Presents new archaeological data for the Inka state’s organization of Spondylus craft production at Taller Conchales which illuminate the different châines opératoires involved in producing Spondylus objects such as beads and pendants – production that reflects political decisions, ritual practice, and the techné of artisans.

**Murphy, Kirsty**

Analyzes the relative effectiveness of different manufacturing techniques for whole shell bead perforation, using simple technologies that would have been available at the time.

**Nigra, Benjamin T. and Jeanne E. Arnold**

Tests the proposition that Channel Island, California, chert outperforms other lithic materials in drilling efficiency and drill use life.

**Pascual Benito, Josep Lluís**

Discusses the process for producing circular beads from Cardium shells at two Early Neolithic sites in Spain.

**Pauc, Paulette**

Replicates the technology used to produce circular beads from cockle shells during the Neolithic period.
Fifty sites in the department of Aude in southern France have revealed evidence of marine-shell ornament production, mainly circular beads made from the shells of *Cerastoderma edule*.


Jewellery components made in imitation of prehistoric examples were strung on a linen cord and worn for a month. The results are compared with prehistoric jewellery showing different types of wear.

**Pauc, P. and A. Pauc**


The authors have been experimenting with the perforation and threading of beach shells in an attempt to reproduce prehistoric shell necklaces such as found in Early Bronze Age contexts in Switzerland.

**Pauc, P. and J. Reinhard**


**Pauc, P. with D. Bohic and P. Faure**


Presents a brief description of the stone tools used in the manufacture of Neolithic shell beads and investigates the source of the raw material. France.

**Paz Bautista, Clara**

2014 Estudio de los ornamentos de concha del Templo de Quetzalcoatl de Teotihuacan. La producción de las indumentarias ceremoniales teotihuacanas. M.A. thesis. Escuela Nacional de Antropología e Historia, Mexico, DF. [https://www.academia.edu/11644514/](https://www.academia.edu/11644514/).

Presents a taxonomic, typological, and technological study of the shell ornaments that constitute the ceremonial garments of the individuals sacrificed at the consecration of the Temple of the Feathered Serpent.

**Pearson, Charles E. and Fred C. Cook**

Excavation revealed abundant information regarding shell-working technology, including the full range of tools and raw materials used and the sequences involved in the production of shell beads. Replication experiments were conducted to validate the archaeological findings.

**Perlès, Catherine**


The majority of ornaments recovered from Franchthi Cave in Greece were formed from shell and constitute one of the largest collections in Europe for the temporal periods involved. Analysis of the ornaments has revealed the complete production process.

**Perlès, Catherine and Patrick Pion**


The lack of consistency in the chaîne opératoire and the high frequency of broken pieces at this Early Neolithic workshop has led to the inference that this indicates small-scale domestic production by unskilled artisans. The authors contend that the evidence points to the beads being made by both skilled artisans and their apprentices.

**Perlès, Catherine and Marian Vanhaeren**


A reassessment of the ornaments from the site led to the hypothesis that a variable fraction of at least one type of personal ornament (marine-shell beads belonging to the species *Cyclope neritea*) may have been intentionally heated to change their natural whitish color to black.

**Perrette, Claire**


This study of 324 shell ornaments (including beads and pendants) associated with the Lapita culture focuses on four major facets of shell artifact production and consumption: (1) raw material choice, (2) shellworking techniques, (3) curation, and (4) implications for value.

**Rick, Torben C.**


California’s Channel Islands were ancient centers of shell bead production and exchange. Research at two historic Chumash villages on the Santa Rosa and San Miguel islands produced large assemblages of red abalone epidermis beads, beads-in-production, and bead blanks. A dearth of finished beads compared to beads-in-production suggests that most of the beads were being manufactured for trade or use outside of the household in which they were produced.
Ricou, Christian and Thimus Esnard
Sites devoted to the manufacture of shell beads from cockle shells on the island of Oléron, France, have yielded evidence for all the production steps.

Ricou, Christian, Thimus Esnard, and Luc Laporte
Reports on the experimental replication of stone and shell beads found on Artenacian sites in west-central France.

Rigaud, Solange and I. Gutiérrez-Zugastic
*L. obtusata* and *Trivia* sp. shells were systematically used for personal ornamentation by groups who occupied northern Iberia during the Mesolithic. The shells from two sites in Asturias, Spain, offer a unique opportunity for investigating raw material procurement, selection strategies, and manufacturing processes developed by Asturian Mesolithic societies for bead production.

Salas Rossenbach, Kai
Describes the techniques used to produce the shell bead that comprise the long necklaces worn by the Patagonian Canoe Indians of Chile.

Serrand, Nathalie
Concentrates on beads and pendants specifically made from *Strombus gigas* shells and presents the complete manufacturing sequence. The material dates to ca. AD 1000-1500.

Shaw, Ben and Michelle C. Langley
Shell beads and other objects from five prehistoric sites on two islands (Rossel and Nimowa) in the Louisiade Archipelago are analyzed to determine how they were manufactured and used.

**Solís del Vecchio, Felipe and Anayensy Herrera Villalobos**
Analysis of the shell beads and pendants recovered from a site occupied during the 10th-15th centuries in northwestern Costa Rica has permitted the reconstruction of the *chaîne opératoire* for the different forms.

**Stiner, Mary C., Steven L. Kuhn, and Erksin Güleç**
Ten early Upper Paleolithic layers in Üçağızlı Cave I (41-29 uncalibrated ky BP) on the Hatay coast of southern Turkey preserve a rich and varied record of early upper Paleolithic life, including the production and use of large numbers of shell ornaments. This study examines shell bead production, use, and discard in relation to site function and the diversity of on-site human activities.

**Szabó, Katherine**
Presents a detailed account of shell artifact production at various sites attributed primarily to the Lapita culture. The findings suggest widespread relationships in shell-working practices across the study area that have a considerable time depth. Beads appear to have been made principally from *Conus* shells.

**Sztancs, Diana-Maria and Corneliu Beldiman**
Examination of two fossil dentalium-shell beads from the Bronze Age level reveals information about their manufacture and use.

**Taborin, Yvette**
Discusses the technology for making shell beads and tooth pendants found in the late Solutrean/early Magdelenian levels at Jamblancs, France.
Tátá, Frederico, João Cascalheira, João Marreiros, Telmo Pereira, and Nuno Bicho
Focuses on shell bead production during the Upper Paleolithic at the site of Vale Boi in southwestern Portugal as a means of understanding social visual transmission. Experimental replication techniques include scratching, sawing, and hammering using lithic and bone implements on both internal and external sides of the shells.

Tóth, Zsuzsanna
The assemblage contains real and imitation red-deer canines, usually strung together with limestone and shell beads, as well as *Spondylus* and other shell beads. Includes information concerning their chaîne opératoire.

Trubitt, Mary Beth D.
Approaches the subject from a worldwide perspective. Shell beads and their manufacture enter into the discussion.

Tsuneki, Akira
Beads are among the objects discussed.

Velázquez Castro, Adrián
2007  *La producción especializada de los objetos de concha del Templo mayor de Tenochtitlan.* Instituto Nacional de Antropología e Historia, México.
 Discusses the specialized production of shell beads and other objects at the Great Temple of Tenochtitlan, Mexico City.

The techniques employed to manufacture mollusc shell objects in pre-Hispanic Mexico have been little studied to date. Researchers have, therefore, turned to experimental archaeology and the characterization and comparison of manufacturing traces. This article presents the principal results obtained concerning shell pieces found in offerings in the sacred precinct of Tenochtitlan, Mexico City.
Velázquez-Castro, Adrián, Patricia Ochoa-Castillo, Norma Valentín-Maldonado, and Belem Zúñiga-Arellano

Presents the analysis of a shell pendant depicting two lizards excavated in southern Mexico that dates to the Early Formative period. Includes information regarding manufacturing techniques.

Velázquez-Castro, Adrián, Norma Valentín-Maldonado, and Belem Zúñiga-Arellano

Reports on the production technology used to produce shell beads, pendants, and other ornaments recovered from the Teopancazco area of Teotihuacan, Mexico.

Vitezović, Selena

Examines 20 objects of bone and shell (including beads and pendants) from the Starčevo culture in Serbia from a technological point of view: raw materials, production techniques, form, use, and discard.

Yerkes, Richard W.

The processes that prehistoric Mississippian artisans developed to manufacture shell beads have been reconstructed through experimental replication studies, microwear analysis, and ethnographic observations. A survey of ethnographic data on shell-working in southeastern North America is presented, and the results of the replication experiments and microwear analyses are summarized.

EGGSHELL

Barich, Barbara E. and Giulio Lucarini
Discusses ostrich eggshell bead production at a mid-Holocene site in Egypt.

**Bednarik, Robert G.**
Discusses the subject from the perspective of cognitive human evolution. Posits the presence of beads from the Acheulian period onwards, and presents the results of replicating the manufacture of ostrich-eggshell beads.

On early disc beads and the replication of their manufacturing techniques.

This paper attempts to explore beyond the predictable and banal archaeological explanations relating to early beads and pendants. It recounts replication experiments to establish aspects of technology so as to better understand what can be learned from the quantifiable properties of these artifacts.

**Beyin, Amanuel**
The sites produced large quantities of lithic artifacts in association with mollusc shells and ostrich eggshell beads, but it is unclear if all the stone tools were required for bead and mollusk shell processing. The study involved recording of microfracture damage traces in order to infer the use-material and the manner in which the artifacts were used.

**Cristiani, Emanuela**
Analysis permitted the reconstruction of the chaîne opératoire of the ostrich eggshell beads from a mid-Holocene site thanks to the large number of unfinished fragments.

**Dayet, Laure, Rudolph Erasmus, Aurore Val, Léa Feyfant, Guillaume Porraz**
The ostrich-eggshell, giant land-snail, and marine-shell beads recovered from the site were subjected to a technological and use-wear study with chemical analyses (SEM-EDS and Raman analyses) of the colored residues they bear. Information concerning production techniques is also provided.
Discarded potsherds or stone cobbles with long grooves abraded into their surfaces are some of the most common artifacts on late 1st-millennium AD coastal sites and are believed to have been utilized to form shell beads. Examination of a large assemblage of grinders from Tumbe suggests that production was unstandardized and decentralized, carried on in individual households.

Jacquet, Agathe

Replicates the likely method used to produce Neolithic ostrich-eggshell beads in the Gobaad Basin, Republic of Djibouti, Africa.

Kabiru, Angela W.

An overview of the subject from the prehistoric period to the present day. Includes information regarding production techniques.

Kandel, Andrew W. and Nicholas J. Conard

Focuses on the production, use, and discard of ostrich eggshell beads recovered from Later Stone Age open-air sites in the Geelbek Dunes of the Western Cape, and presents a comprehensive production chain for analyzing the manufacture of beads and introduces the concept of a heuristic production value for evaluating the degree of completion reflected by an assemblage.

Orton, Jayson

The data from five beadmaking sites of the Later Stone Age in Namaqualand show that most breakage occurs during the drilling stage and that the production process has not changed through the last 4,000 years. The lack of production debris reflecting large beads suggests these were brought into Namaqualand from elsewhere.
Pleurdeau, David, Emma Imalwa, Florent Détroit, Joséphine Lesur, Anzel Veldman, Jean-Jacques Bahain, and Eugène Marais
The recovered ostrich eggshell beads and pendants were produced using three different manufacturing techniques.

Sůvová, Zdeňka, Lenka Suková, Ladislav Varadzin, Martin Odler, Václav Cílek, and Petr Pokorný
Poster presentation on material from a site in Sudan.

Varuku, Mandu

Provides a production sequence for OES beads based on specimens recovered from two sites in Kenya.

Wang, ChunXue, Yue Zhang, Xing Gao, XiaoLing Zhang, and HuiMin Wang
Discusses the production techniques for the eggshell beads found at the Shuidonggou (SDG) site, Ningxia Province, China, and dated to the Early Holocene (< 10 ka BP).

Wingfield, Chris
An in-depth study of the making of ostrich eggshell beads and what can be learned from applying present-day technology to interpreting the past.

Explores the patterns of connection that emerge around the production of ostrich-eggshell beads in the Kalahari region of Southern Africa. Includes a section on modern-day beadmaking techniques at two locations in Botswana.
BONE, IVORY, ANTLER, AND HORN

Baird, Douglas, Andrew Garrard, Louise Martin, and Katherine Wright
Discusses the form and method of manufacture of the stone, shell, and bone beads recovered
from PPNB and Late Neolithic contexts at sites Azraq 31 and Wadi el-Jilat 32 in Jordan.

Beldiman, Corneliu and Diana-Maria Sztancs
2010  Elemente ale simbolismului social-identitar în preistorie: pandantive paleolitice și
epipaleolitice descoperite pe teritoriul României. *Analele Universității Creștine
Reports on the eight oldest stone and bone pendants attributed to the Eastern Gravettian and the
Epigravettian/Tardigraevtian in Romania. Includes information concerning manufacturing
techniques and use wear. French abstract.

Brumm, Adam, Michelle C. Langley, Mark W. Moore, Budianto Hakim, Muhammad
Ramli, Iwan Sumantri, Basran Burhan, Andi Muhammad Saiful, Linda Siagian,
Suryatman, Ratno Sardi, Andi Jusdi, Abdullah, Andi Pampang Mubarak, Hasliana,
Hasrianti, Adhi Agus Oktaviana, Shinatra Adhityatama, Gerrit D. van den Bergh,
Maxime Aubert, Jian-xin Zhao, Jillian Huntley, Bo Li, Richard G. Roberts, E. Wahyu
Saptomo, Yinika Perston, and Rainer Grün
2017  Early Human Symbolic Behavior in the Late Pleistocene of Wallacea. *PNAS*; DOI:
Late Pleistocene finds at the Leang Bulu Bettue rock-shelter on Sulawesi, Indonesia, include two
bead blanks fashioned from the same lower incisor of a pig-deer and a pendant consisting of a
bear cuscus phalange with a perforation at its proximal end. Includes information regarding
production techniques.

Camps-Fabrer, Henriette (ed.)
Publications de l’Université de Provence, Aix-en-Provence.
A typology for prehistoric bone, shell, and ivory ornaments, including beads, spacers, and
pendants. Information concerning production techniques, use/wear, and spacial and temporal
distribution is also provided.

Grayger, Jeanne-Marie and Frarçois Lévêque
1997  Parure castelperronienne et aurignacienne: étude de trois séries inédites de dents percées
et comparaisons. In *Comptes Rendus de l’Academie des Sciences, Sciences de la Terre et
des Planetes* 325:537-543; https://www.academia.edu/1577346/.
Compares the drilling techniques used to perforate tooth pendants from Castelperronian and
Aurignacian components at sites in France.
Larsson, Lars

Lázničková-Galetová, Martina
2014  The Phenomenon of Gravettian Necklaces – Mammoth Ivory Necklaces from Dolní Věstonice I (Moravia, Czech Republic). Quaternary International 359-360:229-239. Seven beads/pendants were examined to determine the state of conservation, manufacturing technology, decorating style, and supposed function. It was possible to partially reconstruction of the chaîne opératoire.

Le Dosseur, Gaëlle

Lubinski, Patrick M.

MacGregor, Arthur
1985  Bone, Antler, Ivory, and Horn: The Technology of Skeletal Materials Since the Roman Period. Barnes and Noble, Totowa, NJ. Beads, mostly medieval (pp. 99-102, fig. 58).

Mărgărit, Monica, Valentin Radu, and Dragomir Nicolae Popovici
2015  From Operculum to Bead: Production of Pearls from Opercular Bones of Cyprinus carpio in the Romanian Eneolithic. Environmental Archaeology, DOI: http://dx.doi.org/10.1179/1749631414Y.0000000019. Sites of the Gumelnița culture in Romania have produced a significant number of carp opercular bones in the process of being turned into circular beads.
Moreno-García, Marta, Carlos M. Pimenta, Ana Pajuelo Pando, and Pedro M. López Aldana
On the manufacture of lathe-turned bone rosary beads.

Picod, C.E.A.
An examination of lathe-turned bone beads of the 16th and 17th centuries with replication experimentation.

San Juan-Foucher, Cristina, Pascal Foucher, and Carole Vercoutère
Presents a detailed typo-technological and comparative study of two previously unrecorded items of personal adornment from the Aurignacian deposits at Gargas, France. One is a finished antler bead and the other an ivory bead blank.

Siebrecht, Matilda
Considers how variability in raw material properties may have influenced the selection of techniques and tool-kits employed for the production of beads made from different materials (e.g., whether bone and stone disc beads were created using a similar production process). Turkey.

Smith, Marc B. and John W. Fisher, Jr.

Spitzers, Thomas A.
Presents an analysis of bone beadmaking technology and economics during the late medieval period in Constance, Germany.

As above.

**Vitezović, Selena**


Examines 20 objects of bone and shell (including beads and pendants) from the Starčevo culture in Serbia from a technological point of view: raw materials, production techniques, form, use, and discard.

**Walter, Rudolf**


Reports on attempts to replicate small double-perforated ivory beads which are an important category of finds in southwestern Germany during the Aurignacian.

**White, Randall**


Reconstructs ivory bead production during the Aurignacian period in southwestern France.


Reports on several years of research on Aurignacian personal ornaments, a large proportion of which were manufactured of mammoth ivory. The technology of ivory bead production is shown to have been extraordinarily labor consumptive and to have varied from one European region to the next. France, Germany, Belgium, European Russia.


Discusses the technology of Aurignacian beads and pendants of ivory and animal canines, respectively. Also a perforated gastropod shell. France.
Observation, analysis, and experimentation reveal the techniques used by Aurignacian artisans to produce “basket” beads of mammoth ivory.

**Wolf, Sibylle, Claus-Joachim Kind, and Nicholas J. Conard**


Excavations in six caves of the Swabian Jura (Baden-Württemberg, Germany) have recovered beads and pendants from Aurignacian deposits made by early anatomically modern humans. Illustrates the production process for double-perforated beads of mammoth ivory.

**SEEDS AND NUTS**

**Pauc, P., P. Moinat, and J. Reinard**

2005 Description de la fabrication expérimentale du grain d’enfilage en akène de Lithospermum de type 2 et de la pendeloque à ailettes globulaires. *euroREA* 2:40-54.

Replicates the production of two types of prehistoric beads made from seeds in Europe.

**MIXED MATERIALS**

**Acosta, Alejandro A., Natalcha Buc, and M. Natalia Davrieux**


The beads and pendants of shell, stone, ceramic, and perforated carnivore canines recovered from several sites are described, focusing on the raw materials used, their acquisition, and other aspects linked to the manufacturing processes. Their possible use as vectors of information transmission is also discussed.

**Bains, Roseleen, Milena Vasić, Daniella E. Bar-Yosef Mayer, Nerissa Russell, Katherine I. Wright, and Chris Doherty**

Delves in detail into the technologies and methods used to manufacture beads of stone, clay, shell, and bone and teeth at a large Neolithic settlement in southern Anatolia, Turkey.

Breukel, T.W. and C.G. Falci  
Reports on the experimental replication of techniques used for splitting, abrading, carving, and perforating a variety of shell species and rock types using tools made of flint, bone, coral, coarse and fine-grained sandstone, and shell.

Evely, D.  
Describes a stone mold for making gold and vitreous relief-beads (pp. 29-31).

Falci, Catarina Guzzo  
Assesses how beads were produced and used by the indigenous peoples of the Caribbean based primarily on finds from the site of El Flaco which dates to the 13th-15th centuries. Included are beads made of igneous rocks, calcite, coral, and shell.

Formigli, Edilberto  
A detailed and amply illustrated study of Etruscan manufacturing methods including gold, ivory, bone, and stone. Much on granulation.

Gurova, Maria and Clive Bonsall  

Hutchinson, M.E.  
Examines the holes, surfaces, etc., of 557 amber, jet/shale, silver, and quartz beads. A diskette accompanying the report contains two databases describing each bead.

Kenoyer, J. Mark

Mathien, Frances J.
Inventories the beads and pendants recovered from over 20 sites in Chaco Canyon, New Mexico, which span the period from the Archaic to Pueblo III, as well as Navaho. They are discussed by period with much comparative material. Also notes on beadmaking technology. Materials include various stones and minerals, shell, bone, wood, and seeds.

Miller, Heather M.-L.
Discusses the technological aspects of the production of beads of stone, shell, faience, and glass, as well as the archaeological determination of the relative value of objects for prehistoric societies, and the relationship between valued objects and status.

Pau, Claudia
Reports on the beads and pendants of bone, shell, and animal teeth from a Bell Beaker site in southeastern Spain, including insight into usage and production technology.

Pauc, Paulette, Patrick Moinat, and Jacques Reinhard
2004 Le collier de la dame de Chamblandes. euroREA 1:103-118.
Discusses the replication of a necklace found with a female burial in Switzerland and attributed to the 4th millennium BC. Materials included marble, brown coal, shell, and seeds.

Reese, David S.
Describes a neolithic stone disc, 105 mm in diameter, 7 mm thick, with a beveled 4.75-mm central perforation. Various uses have been suggested for such discs but the author suggests they were platforms for stone and shell beadmaking, the central hole serving to hold the piece being worked.
White, Randall and Christian Normand
Focuses on the techniques used for perforating teeth; the chronological variation in the selection of animal teeth (and one human tooth); the raw materials used for the beads and pendants (amber, ivory, talc, bone); data concerning local personal ornament production (or not); the exploitation of amber and its provenance; and the existence of abundant personal ornaments (pendant-anthropomorphic sculpture and shells) in the Archaic Aurignacian levels.

Wright, Katherine I. (Karen)