Lithic Technology
ASM 573 - 84941
Fall 2013 - Michael Barton

Course Resources

Texts:
Andrefsky, W. (2005). *Lithics: Macroscopic Approaches to Analysis*. Cambridge University Press.

Whittaker, J. C. (1994). *Flintknapping: making and understanding stone tools*. Austin: University of Texas Press.

Other useful books:
Amick, D. S. (1989). *Experiments in lithic technology* (Vol. 528). British Archaeological Reports.

Andrefsky, W. (2001). *Lithic debitage: context, form, meaning*. Salt Lake City: University of Utah Press.

Andrefsky, W. (2008). *Lithic Technology: Measures of Production, Use and Curation* (1st ed.). Cambridge: Cambridge University Press.

Carr, P. J., Bradbury, A. P., & Price, S. E. (2012). *Contemporary Lithic Analysis in the Southeast: Problems, Solutions, and Interpretations*. University of Alabama Press.

Odell, G. H. (1996). *Stone tools: theoretical insights into human prehistory*. New York: Plenum Press.

Course Objectives, Organization, and Grading

The fundamental goal of this course is for students to gain an in depth understanding an extinct technological system that was critical for human cultural and biological evolution, but which is very different from the technologies that permeate our lives today. Students should be learn to build on this understanding of lithic technology to design scientifically sound research that can use the analysis of chipped stone artifacts to provide insights into past human behaviors and societies.

The emphasis in the course will be on lithic technologies in the context of small-scale societies—because that has been the focus of the great majority of relevant research. While we will touch on ground stone, the course is primarily about chipped stone because both technological practice and social context of ground stone and chipped stone technologies differ to a considerable extent, ground stone is only present in some Holocene societies (while chipped stone has been a ubiquitous human technology for at least a couple million years), and chipped stone is by far more common in archaeological assemblages world-wide.

The course will combine critical discussion of recent published research, treating both theory and practice, with hands-on experience in lithic analysis. This will enable students to develop a critical and nuanced understand prehistoric lithic technology and to better apply this knowledge to archaeological questions. Hence, class time usually will be divided between seminar-like discussions and hands-on practica.

Grades will be based on several projects over the course of the semester, and a final project consisting in the analysis of a lithic collection and the presentation of the results; the final paper can be based on experimental or archaeological material but it will need to demonstrate the integration of theory, practice, and explanation. In-class participation and presentation of readings will also contribute to the final grade. Projects will build on activities carried out in the practica, and build on concepts discussed in the seminar time. So active and regular participation is critical.

Readings for each class session include:

- General methodology and application from the Andrefsky and/or Whittiker texts. These are references for methods and their applications.
- Articles that exemplify aspects of lithic technology and lithic analysis in anthropological/archaeological research which we will discuss in class. These will be the basis for the seminar-like discussion. You will need to read the assigned articles so as to not feel embarrassed in front of your peers who DID read them.
- Optional papers that you might find useful if you wish to pursue a topic further.

Course grades will be based on the following:

1. three short projects that will focus on the application of GIS and image analysis techniques to small, test data sets (45%);
2. the completion and oral presentation of paper presenting the results of an original analysis of a lithic assemblage (40%);
3. active participation in class discussion and lab practica (15%).

Student Academic Integrity Standards

Student Standards: Students are required to read and act in accordance with university and Arizona Board of Regents policies, including:

- The Academic Integrity Policy: https://provost.asu.edu/index.php?q=academicintegrity
- The Student Code of Conduct: Arizona Board of Regents Policies 5-301 through 5-308: https://students.asu.edu/srr/code
- The Computer, Internet and Electronic Communications Policy: http://www.asu.edu/aad/manuals/acd/acd125.html

Cheating and Plagiarism are unethical and represent serious violations that will be dealt with as harshly as University procedures permit. Cheating means presenting others work as your own. Plagiarism is using information and or original wording in your writing without giving proper credit to the source. If you follow an argument closely or quote a source directly, you *must* provide a citation to the publication, including the author, date and page number. If you directly quote a source, even in an assignment, you must use quotation marks and a page number citation for each quoted sentence or phrase.

You may work with other students on assignments, however, all work that you do and writing that you turn in must be done independently. If you have any doubt about whether the form of cooperation you contemplate is acceptable, ask the instructor ***in advance of turning in an assignment.***

Syllabus and Reading List

8/28 Introduction to lithic technology and to class

Andrefsky, chapt. 1

Barton, C. M. (1991). Retouched tools: fact or fiction? Paradigms for interpreting chipped stone. In G. A. Clark (Ed.), Perspectives in prehistory paradigmatic biases in circum-Mediterranean hunter-gatherer research (pp. 143–163). Philadelphia: University of Pennsylvania Press.

Frison, G. C. (1968). A Functional Analysis of Certain Chipped Stone Tools. American Antiquity, 33(2), 149–155. doi:10.2307/278516

McPherron, S. P., Alemseged, Z., Marean, C. W., Wynn, J. G., Reed, D., Geraads, D., … Bearat, H. A. (2010). Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. Nature, 466(7308), 857–860. doi:10.1038/nature09248

9/4 Ethnoarchaeology of the last lithic users

Bamforth, D. B. (1986). Technological efficiency and tool curation. American Antiquity, 51(1), 38–50.

Hiscock, P. (2004). Slippery and Billy: Intention, Selection and Equifinality in Lithic Artefacts. Cambridge Archaeological Journal, 14(1), 71–77. doi:10.1017/S0959774304230050

Holdaway, S., & Douglass, M. (2011). A Twenty-First Century Archaeology of Stone Artifacts. Journal of Archaeological Method and Theory. doi:10.1007/s10816-011-9103-6

For further reading:

Gould, R. A. K., Koster, D. A., & Sontz, A. H. L. (1971). The lithic assemblage of the Western Desert Aborigines of Australia. American Antiquity, 36(2), 149–168.

McCall, G. S. (2012). Ethnoarchaeology and the Organization of Lithic Technology. Journal of Archaeological Research, 20(2), 157–203. doi:10.1007/s10814-011-9056-z

White, J. P., & Thomas, D. H. (1972). What mean these stones? Ethno-taxonomic models and archaeological interpretations in the New Guinea Highlands. In D. L. Clarke (Ed.), Models in Archaeology. London: Methuen.

Practicum: preparing for flint-knapping

9/11 The mechanics of conchoidal fracture and the physics of knapping

Andrefsky, chapt. 2

Whittaker, chapts. 2, 4-6

Dibble, H. L., & Rezek, Z. (2009). Introducing a new experimental design for controlled studies of flake formation: results for exterior platform angle, platform depth, angle of blow, velocity, and force. Journal of Archaeological Science, 36(9), 1945–1954. doi:10.1016/j.jas.2009.05.004

For further reading:

Cotterell, B., & Kamminga, J. (1987). The formation of flakes. American Antiquity, 52(4), 675–708.

Speth, J. D. (1972). Mechanical basis of percussion flaking. American Antiquity, 37(1), 34–60.

Practicum: making flakes (KEEP YOUR DEBITAGE)

9/18 Cores and bifaces

Whittaker, chapts. 7-8

Flenniken, J. J., & Wilke, P. J. (1989). Typology, technology, and chronology of Great Basin dart points. *American Anthropologist*, *91*(1), 149–158.

Kelly, R. L. (1988). The Three Sides of a Biface. American Antiquity, 53(4), 717–734. doi:10.2307/281115

McPherron, S. P. (2000). Handaxes as a Measure of the Mental Capabilities of Early Hominids. Journal of Archaeological Science, 27(8), 655–663. doi:10.1006/jasc.1999.0467

For further reading:

Kessler, R. A., Beck, C., & Jones, G. (2009). Trash: the structure of Great Basin Paleoarchaic debitage assemblages in western North America. In B. Adams & B. S. B. A. P. Investigator (Eds.), Lithic Materials and Paleolithic Societies (pp. 144–159). Wiley-Blackwell. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/9781444311976.ch3/summary

Practicum: making bifaces (KEEP YOUR DEBITAGE)

9/25 Technological practice: stages, chains, or trees

Andrefsky, chapt. 6

Bleed, P. (2001). Trees or chains, links or branches: Conceptual alternative for consideration of stone tool production and other sequential activities. Journal of Archaeological Method and Theory, 8(1), 101–127.

Bradbury, A. P., & Carr, P. J. (1999). Examining stage and continuum models of flake debris analysis: An experimental approach. Journal of Archaeological Science, 26(1), 105–116.

Neeley, M. P., & Barton, C. M. (1994). A new approach to interpreting late Pleistocene microlith industries in southwest Asia. Antiquity, 68(259), 275–288.

For further reading:

Hiscock, P. (2002). Quantifying the Size of Artefact Assemblages. Journal of Archaeological Science, 29(3), 251–258. doi:10.1006/jasc.2001.0705

Shott, M. J. (2003). Chaıne opératoire and reduction sequence. Lithic Technology, 28, 95–105.

Practicum: production stages and debitage analysis

10/2 Classification and typology

Bisson, M. S. (2000). Nineteenth Century Tools for Twenty-First Century Archaeology? Why the Middle Paleolithic Typology of François Bordes Must Be Replaced. Journal of Archaeological Method and Theory, 7(1), 1–48. doi:10.1023/A:1009578011590

Hiscock, P. (2007). Looking the other way: a materialist/technological approach to classifying tools and implements, cores and retouched flakes. In S. P. McPherron (Ed.), Tools versus Cores. Alternative Approaches to Stone Tool Analysis (pp. 198–222). Newcastle, UK: Cambridge Scholars Publishing.

O'Brien, M. J., & Lyman, R. L. (2002). The epistemological nature of archaeological units. Anthropological Theory, 2(1), 37–56.

Sullivan, A. P., & Rozen, K. C. (1985). Debitage analysis and archaeological interpretation. American Antiquity, 50(4), 755–779.

Practicum: examining typologies

PROJECT 1 DUE

10/9 Artifact life histories and formation processes

Andrefsky, W. (1994). Raw-material availability and the organization of technology. American Antiquity, 59(1), 21–35.

Clarkson, C. J. (2008). Changing reduction intensity, settlement, and subsistence in Wardaman Country, northern Australia. In W. Andrefski (Ed.), Cambridge (pp. 286–316). Cambridge: Cambridge University Press.

Dibble, H. L. (1995). Middle Paleolithic scraper reduction: background, clarification, and review of the evidence to date. Journal of archaeological method and theory, 2(4), 299–368.

For further reading:

Barton, C. M. (1990). Stone Tools and Paleolithic Settlement in the Iberian Peninsula. Proceedings of the Prehistoric Society, 56, 15–32.

Brumm, A., & McLaren, A. (2011). Scraper reduction and "imposed form" at the Lower Palaeolithic site of High Lodge, England. Journal of Human Evolution, 60(2), 185–204. doi:10.1016/j.jhevol.2010.09.005

Eren, M. I., Dominguez-Rodrigo, M., Kuhn, S. L., Adler, D. S., Le, I., & Bar-Yosef, O. (2005). Defining and measuring reduction in unifacial stone tools. Journal of Archaeological Science, 32(8), 1190–1201. doi:10.1016/j.jas.2005.03.003

Holdaway, S., McPherron, S., & Roth, B. (1996). Notched Tool Reuse and Raw Material Availability in French Middle Paleolithic Sites. American Antiquity, 61(2), 377–387. doi:10.2307/282432

Kuhn, S. L. (1990). A geometric index of reduction for unifacial stone tools. Journal of Archaeological Science, 17(5), 583–593. doi:10.1016/0305-4403(90)90038-7

Newman, J. R. (1994). The Effects of distance on lithic material reduction technology. Journal of field archaeology, 21(4), 491.

Practicum: modeling formation processes

10/16 Lithics as components of technological systems

Andrefsky, chapt 5

Nelson, M. C. (1991). The study of technological organization. Archaeological Method and Theory, 3, 57–100.

Shott, M. J. (1997). Stones and Shafts Redux: The Metric Discrimination of Chipped-Stone Dart and Arrow Points. American Antiquity, 62(1), 86–101. doi:10.2307/282380

Torrence, R. (1989). Retooling: towards a behavioral theory of stone tools. In R. Torrence (Ed.), Time energy and stone tools (pp. 57–66). Cambridge: Cambridge University Press.

For further reading:

Bleed, P. (1986). The optimal design of hunting weapons: maintainability or reliability. American Antiquity, 51(4), 737–747.

Myers, A. (1989). Reliable and maintainable technological strategies in the Mesolithic of mainland Britain. In R. Torrence (Ed.), Time energy and stone tools (pp. 78–91). Cambridge: Cambridge University Press.

Practicum: lithic attributes

10/23 Land-use, mobility, and settlement

Barton, C. M., Riel-Salvatore, J., Anderies, J. M., & Popescu, G. (2011). Modeling Human Ecodynamics and Biocultural Interactions in the Late Pleistocene of Western Eurasia. Human Ecology, 39(6), 705–725. doi:10.1007/s10745-011-9433-8

Dibble, H. L., Schurmans, U. A., Iovita, R. P., & McLaughlin, M. V. (2005). The Measurement and Interpretation of Cortex in Lithic Assemblages. American Antiquity, 70(3), 545–560.

Parry, W. J., & Kelly, R. L. (1987). Expedient core technology and sedentism. In J. K. Johnson & C. A. Marrow (Eds.), The Organization of Core Technology (pp. 284–304). Boulder and London.: Westview Press.

For further reading:

Barton, C. M., Villaverde, V., Zilhão, J., Aura, J. E., Garcia, O., & Badal, E. (2013). In glacial environments beyond glacial terrains: Human eco-dynamics in late Pleistocene Mediterranean Iberia. Quaternary International. doi:10.1016/j.quaint.2013.05.007

Douglas, M. J., Holdaway, S. J., Fanning, P. C., & Shiner, J. I. (2008). An assessment and archaeological application of cortex measurement in lithic assemblages. American antiquity, 73(3), 513.

Kuhn, S. L. (1992). On planning and curated technologies in the Middle Paleolithic. Journal of Anthropological Research, 48, 185–214.

Riel-Salvatore, J., & Barton, C. M. (2004). Late Pleistocene technology, economic behavior, and land-use dynamics in southern Italy. American Antiquity, 69(2), 273–290.

Practicum: analysis of survey data

PROJECT 2 DUE

10/30 Intra-site activities

Andrefsky, chapt. 8

Dibble, H. L., Chase, P. G., McPherron, S. P., & Tuffreau, A. (1997). Testing the reality of a "living floor" with archaeological data. American Antiquity, 62(4), 629– 651.

Morrow, T. M. (1996). Lithic refitting and archaeological site formation processes: a case study from the Twin Dutch site, Greene County, Illinois. In G. H. Odell (Ed.), Stone tools theoretical insights into human prehistory (pp. 345–373). New York: Plenum Press.

Ullah, I. I. T. (2012). Particles from the past: microarchaeologial spatial analysis of ancient house floors. In B. J. Parker & C. P. Foster (Eds.), New Perspectives in Household Archaeology (pp. 123–138). Winowna Lake: Eisenbrauns.

For further reading:

Cahen, D., & Keeley, L. H. (1980). Not less than two, not more than three. World Archaeology, 12(2), 166–180.

Sherwood, S. (2001). Microartifacts. In P. Goldberg, V. T. Holliday, & C. R. Ferring (Eds.), Earth Sciences and Archaeology (pp. 327–351). New York: Kluwer Academic/Plenum.

Practicum: refitting

11/6 Style and social identity (guest, Josh Watts)

Barton, C. M. (1997). Stone tools, style, and social identity: an evolutionary perspective on the archaeological record. In C. M. Barton & G. A. Clark (Eds.), Rediscovering Darwin: Evolutionary Theory in Archaeological Explanation (Vol. 7, pp. 141–156). Washington, D.C.: American Anthropological Association.

Davidson, I. (2010). Stone tools and the evolution of hominin and human cognition. In A. Nowell & I. Davidson (Eds.), Stone tools and the evolution of human cognition (pp. 185–205). Boulder, CO: University Press of Colorado.

Watts, J. (2013). Traces of the Individual in Prehistory: Flintknappers and the Distribution of Projectile Points in the Eastern Tonto Basin, Arizona. Advances in Archaeological Practice, 1(1), 25–36. doi:10.7183/2326-3768.1.1.25

For further reading:

Sackett, J. R. (1982). Approaches to style in lithic archaeology. Journal of Anthropological Archaeology, 1, 59–112.

Practicum: morphology and style

11/13 Traces of use and damage

Anderson, P. C., Chabot, J., & van Gijn, A. (2007). The Functional Riddle of "Glossy" Canaanean Blades and the Near Eastern Threshing Sledge. Journal of Mediterranean Archaeology, 17(1), 87–130. doi:10.1558/jmea.v17i1.87

Newcomer, M., Grace, R., & Unger-Hamilton, R. (1986). Investigating microwear polishes with blind tests. Journal of Archaeological Science, 13(3), 203–217. doi:10.1016/0305-4403(86)90059-2

Pevny, C. D. (2012). Distinguishing taphonomic processes from stone tool use at the Gault Site, Texas. In P. J. Carr, A. P. Bradbury, & S. E. Price (Eds.), Contemporary lithic analysis in the Southeast: Problems, Solutions, and Interpretations (pp. 55–78). Tuscaloosa: University of Alabama Press.

Young, D., & Bamforth, D. B. (1990). On the macroscopic identification of used flakes. American Antiquity, 55(2), 403–409.

For further reading:

Bamforth, D. B. (1988). Investigating microwear polishes with blind tests: the Institute results in context. Journal of Archaeological Science, 15, 11–23.

McBrearty, S., Bishop, L., Plummer, T., Dewar, R., & Conard, N. J. (1998). Tools underfoot: Human trampling as an agent of lithic artifact edge modification. American Antiquity, 63(1), 108–129.

Newcomer, M. H., Grace, R., & Unger-Hamilton, R. (1987). Microwear methodology: a reply to Moss, Hurcombe, and Bamforth. Journal of Archaeological Science, 15, 25–33.

Practicum: use and damage

PROJECT 3 DUE

11/20 Lithic raw materials and sourcing (guest, Steven Schmich)

Andrefsky, chapt. 3

Brantingham, P. J. (2003). A Neutral Model of Stone Raw Material Procurement. American Antiquity, 68(3), 487–509.

MacDonald, D.H., 1999. Modeling Folsom mobility, mating strategies, and technological organization in the northern plains. Plains Anthropologist 44, 141–161.

Shackley, M. S. (1998). Gamma Rays, X-Rays, and Stone Tools: Some Recent Advances in Archaeological Geochemistry. Journal of Archaeological Science, 25(3), 259–270.

For further reading:

Shackley, M. S. (1995). Sources of Archaeological Obsidian in the Greater American Southwest: An Update and Quantitative Analysis. American Antiquity, 60(3), 531–551.

Practicum: trace element analysis

11/27 A different stone technology: ground stone (guest, Craig Fertemels)

Adams, J. L. (1999). Refocusing the Role of Food-Grinding Tools as Correlates for Subsistence Strategies in the U.S. Southwest. American Antiquity, 64(3), 475–498. doi:10.2307/2694147

Burton, J. (1987). Exchange pathways at a stone ax factory in Papua New Guinea. In G. de G. Sieveking & M. H. Newcomer (Eds.), The human uses of flint and chert (pp. 183–191). Cambridge: Cambridge University Press.

Mauldin, R. (1993). The Relationship between Ground Stone and Agricultural Intensification in Western New Mexico. Kiva, 58(3), 317–330. doi:10.2307/30247402

For further reading:

Adams, J. L. (1993). Toward Understanding the Technological Development of Manos and Metates. Kiva, 58(3), 331–344. doi:10.2307/30247403

Practicum: looking at ground stone

12/4 Lithic technology in complex societies and industrial contexts

Andrews, B. (2003). Measuring prehistoric craftsman skill: contemplating its application to Mesoamerican core-blade research. In P. Kelterborn, J. Pelegrin, & B. Andrews (Eds.), Mesoamerican lithic technology: Experimentation and interpretation (pp. 208–219). Salt Lake City: University of Utah Press.

Biagi, P., & Starnini, E. (2008). The Bronze Age Indus quarries of the Rohri hills and Ongar in Sindh (Pakistan). Geoarchaeology and Archaeomineralogy, 77–82.

Hartenberger, B., Rosen, S., & Matney, T. (2000). The early Bronze-Age blade workshop at Titris Hoyuk: Lithic specialization in an urban context (The importance of production systems in the development of the early Canaanite state and civilization). Near Eastern Archaeology, 63(1), 51–58.

Rosen, S. A. (1996). The decline and fall of flint. In G. H. Odell (Ed.), Stone tools theoretical insights into human prehistory (pp. 129–158). New York: Plenum Press.

For further reading:

Aoyama, K. (2001). Classic Maya State, Urbanism, and Exchange: Chipped Stone Evidence of the Copán Valley and Its Hinterland. American Anthropologist, 103(2), 346–360. doi:10.1525/aa.2001.103.2.346

Biagi, P., & Cremaschi, M. (1991). The Harappan flint quarries of the Rohri Hills. Antiquity, 65(246), 97–101.

Clark, J. E. (2003). Craftsmanship and craft specialization. In K. G. Hirth (Ed.), Mesoamerican lithic technology: experimentation and interpretation: [papers presented at the Conference on Ancient Mesoamerican Obsidian Blade Production, held May 22-28, 2000, at the Department of Anthropology, Pennsylvania State University] (pp. 220–233). Salt Lake City: Univ. of Utah Press.

Parry, W. J. (2001). Production and exchange of obsidian tools in Late Aztec city-states. Ancient Mesoamerica, 12(01), 101–111.

Quintero, L. A., & Wilke, P. J. (1995). Evolution and economic significance of naviform core-and-blade technology in the Southern Levant. Paléorient, 21(1), 17–33. doi:10.2307/41492608

PRESENTATIONS DURING FINALS TIME