

## **LITHIC IDENTIFICATION AND ANALYSIS**

### **PURPOSE**

The purpose of this class is to give members of the Arizona Archaeological Society a working knowledge of, and the ability to, identify and sort lithic materials found in Arizona. The course is intended to focus on a specific site, a series of related sites, or a region of the state. Members may take this class several times to become proficient with the lithics of various prehistoric culture areas.

Emphasis is placed on identifying specific rock types, recognizing minerals, crystals, rock forming processes and analyzing human modification techniques.

### **PREREQUISITES**

The only requirement is the completion of Prehistory of the Southwest. However, it is strongly recommended that the participant have completed Laboratory Techniques.

### **FORMAT**

The course is designed to be presented in 60 hours, with 20 hours of lecture and 40 hours of laboratory processing, identification and analysis experience. Optional field trips would be included within the laboratory hours.

### **COURSE STRUCTURE**

The content will be presented through lecture, demonstration, hands-on experience, and practical quizzes. Students will work as a class, in groups, and as individuals depending on the skill to be mastered. They will wash, sort, and analyze lithic materials provided by the host chapter. Each student will choose and complete a lithic research project by the end of the course.

### **RECOMMENDATION**

It is highly recommended that serious students in lithic analysis who intend to continue as a member of a project team should create a rock collection gathered from the site project area.

### **FIELD TRIPS**

Field trips will be arranged depending on the needs of the students and the availability of permission from landowners to enter site area.

## **REQUIRED TEXTS**

Adams, Jenny L.

2002 *Ground Stone Analysis: A Technological Approach*. The University of Utah Press. Salt Lake City.

Sliva, R. Jane

1997 *Introduction to the Study and Analysis of Flaked Stone Artifacts and Lithic Technology*. Center for Desert Archaeology. Tucson, Arizona.

## **RECOMMENDED ELECTIVE TEXTS**

Adrefsky, William Jr.

2003 *Lithic Debitage: Context, Form, Meaning*. The University of Utah Press  
Salt Lake City.

Kardulias, P. Nick, and Richard W. Yerkes

2003 *Written in Stone: The Multiple Dimensions of Lithic Analysis*. Lexington Books. Altamira Press. California.

Mottana, Annibale, Rodolfo Crespi and Giuseppe Liborio (latest version)

1978 *Simon and Schuster's Guide to Rocks and Minerals*. Simon and Schuster. New York

## **MATERIALS NEEDED**

A. Each student should provide:

1. 10x hand lens
2. Contact goniometer
3. Calipers 15cm+
4. Calculator
5. Analysis forms

B. Laboratory should be equipped with:

1. Ohaus triple beam balance 2, 6, 10g
2. Munsell ROCK color chart (2)
3. Marking materials - (BIC Brand Quick Dry White Out; PIGMA Brand Micron 02 #1 Archival Black Ink .30mm; CLEAR fingernail polish)
4. Various versions of rock and mineral identification guides
5. Basic rock and mineral collection for reference (optional)

## **COURSE OBJECTIVES**

At the conclusion of the course, students will be able to

1. Recognize basic lithic types that characterize the area of study
2. Understand the significance of flaked and groundstone artifacts to archaeologists
3. Understand the laboratory tools necessary for lithic analysis
4. Recognize informal and formal lithic tools in the field as well as in the laboratory
5. Sort lithic materials based on rock type, fracture and possible use
6. Separate and categorize flaked stone tools
7. Identify the basic fractures associated with specific tool types
8. Explain the role of debitage in the analysis of lithic assemblages
9. Describe the variations seen in pecked and ground stone use
10. Relate the project research design to the format of the analysis sheet
11. Identify the minimal lithic attributes to be recorded for any chosen level of analysis
12. Become familiar with the appropriate Arizona Bureau of Mines Geologic Map for the county where the project site is located
13. Establish a reference collection of local rock types that may be of use in the manufacture of lithic materials

## **COURSE OUTLINE**

### **A. Introduction to Basic Rocks and Minerals**

1. Igneous Rock - Consolidation of a magma
  - a. Mode of formation: extrusive (volcanic), hypobysal, intrusive (plutonic)
  - b. Major examples: alkaline feldspar granite, granite, diorite, ophiolitic gabbro, alkaline feldspar, rhyolite, dacite, andesite, basalt, obsidian, diabase
2. Sedimentary Rock - Transformed preexisting rocks
  - a. Mode of formation: alteration, transportation, erosion, deposition
  - b. Major examples: conglomerate, arkose, argillite, jasper, compact limestone, dolomite, flints, sandstone
3. Metamorphic Rock
  - a. Mode of formation: re-crystallization due to temperature and/or pressure
  - b. Major examples: quartzite, phyllite, mica schist, chlorite schist, gneiss, serpentine, slate

## **A. Introduction to Basic Rocks and Minerals (continued)**

4. Minerals
  - a. Solid crystalline substances
  - b. Crystal morphology and its importance
  - c. Major examples: copper, galena, hematite, malachite, turquoise, epidote, muscovite, biotite, quartz, chalcedony
5. Distribution of rock types
  - a. Identify rock sources for local tools using the Arizona Bureau of Mines Geologic Map for their county
  - b. Locate closest sources, outcrops, and roadbeds near project site

## **B Rock Tool Types and Tasks**

1. Flaked stone
  - a. Description
    - Raw material
    - Processing
  - b. Usage
    - Cutting
    - Scraping
    - Projecting
1. Ground and pecked stone
  - a. Description
  - b. Usage
    - Food processing
    - Storage
    - Agriculture
    - War(?)

## **C. Mechanics of Tool Manufacture**

1. Breaking of cobbles and nodules
2. Biface shaping and thinning
3. Direct percussion
  - a. Hard hammer
  - b. Soft hammer
  - c. Use of anvil - bipolar
4. Indirect percussion
5. Pressure flaking
6. Retouching

## D Flaked Stone Analysis

1. Flake technology
  - a. Terms associated with flakes
    - Soft hammer - dorsal, ventral, platform, lip, eralure, diffuse bulb of force, preparation flake scars, fissures or hackles, contact area, previous blade scar, dorsal ridge areas
    - Hard hammer - pronounced bulb of force, slightly crushed contact area, absence of lip
  - b. Basic types of flakes
    - amputated, backed, lade, prismatic
  - c. Stages of manufacture
    - primary, secondary, tertiary
2. Flaked tools
  - a. Definitions: knife, scraper, graver, chopper
  - b. Types of Edges
    - Unifacial - less formal
    - Bifacial - more formal, less common, ex. projectile points
3. Cores - Raw material
  - a. Amorphous
  - b. Unidirectional
  - c. Bidirectional
  - d. Discoid
  - e. Exhausted
  - f. Multidirectional
  - g. Polyhedral
  - h. Residual
  - i. Tabular
4. Hammerstones - Core reduction
  - a. Angular
  - b. Cobble
    - Round
    - Elongated
  - c. Core
  - d. Discoid
  - e. Spheroid
  - f. File
  - g. Flaked
5. Debitage - Waste flakes
  - a. Recognition of waste flakes
  - b. Use ofdebitage
    - determine techniques of manufacture
    - study technological traits
  - c. Intentional and unintentional breaking of artifacts.

## **E. Ground and Pecked Tool Analysis**

1. Design and Manufacture
  - a. As relates to specific project and research design
2. Determining Function
  - a. Form does not always reflect function
  - b. Use of historic photographs
  - c. Use of ethnology
  - d. Use of experimental archaeology
3. Debitage
4. Types of tools
  - a. Abrading, smoothing and polishing
  - b. Grinding and pulverizing
    - mano, metate (basin, slab, trough), mortar, pestle, palette
  - c. Percussion
    - pottery anvil, pecking stones, choppers, chisels, crushers(?)
  - d. Hafted percussion
    - axe, adze, hoe
  - e. Perforating, cutting and scraping
    - reamers, awls, saws and files, planes
  - f. Spinning
    - spindle whorl
  - g. Paraphernalia
    - balls, stone rings, plummet, pigments, ornaments
  - h. Containers
    - bowls, censers

## **F. Laboratory Processing of Lithic Materials**

1. Definitions
2. Stone modification
  - a. Natural
  - b. Human
3. Cleaning
4. Preservation
5. Markings
6. Measurements needed
7. Low or high level magnification

## **G. Role of the Research Design**

1. Site research design
2. Lithic research questions

3. Development of analysis forms for date recording
  - a. Arizona State University
  - b. Glendale Community College
    - Coldwater Ruin
    - Quass Pueblo
  - c. Phoenix Chapter - Arizona Archaeological Society
    - Casa de Piedras
  - d. Center for Desert Archaeology
  - e. University of Denver
  
4. Specific (special) data forms

#### **H. Summary**

1. Emphasis on the importance of:
  - a. physical geology
  - b. flake technology
  - c. the ability to recognize and separate rock types
  - d. the ability to recognize and separate cultural artifacts
  - e. non-cultural lithic material
  - f. being able to interpret lithic materials in site and non-site contexts

REFERENCES FOLLOW ON PAGES 8 AND 9

**REFERENCES (\*) indicates substitution with local site reports**

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1997 *Manual for a Technological Approach to Ground Stone Analysis*. Center for Desert Archaeology. Tucson, Arizona. OP and republished as:

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Craig, Douglas B. (editor)

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1987 Expedient Core Technology and Sedentism. In *The Organization of Core Technology*. Edited by K. J. Johnson and C. A. Morrow. pp. 285-304. Westview Press. Boulder

Rodgers, James

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Shoger, Maurice Dean

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