# SHELL IDENTIFICATION AND ANALYSIS

## PURPOSE

The purpose of this class is to give members of the Arizona Archaeological Society a working knowledge and ability to recognize and analyze archaeological shell assemblages. The course is intended to focus on a specific site, a series of related sites, or a region of the state. Depending on the project objectives, analysis forms will be developed from the research design. Members may take this class several times to become proficient with shell materials found in Arizona.

Emphasis is placed on identification of specific shell genus and species, their sources and their anatomy. Additionally, a strong focus will be on recognition of worked and un-worked shell and analysis of human modification techniques. Laboratory methods of labeling and storing of shell artifacts will also be presented.

Because some archaeologists believe that most of the shell objects found in other parts of the state were manufactured by the Hohokam, and because the Hohokam seem to have used the greatest variety of species in a greater variety of forms than most other pre-historic Arizona societies, the theme of this syllabus is centered around shell artifacts from Hohokam sites.

## PREREQUISITES

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

## COURSE FORMAT

The course is designed to be presented in 60 hours, with 20 hours of lecture (as indicated under the Classroom Instruction Section) and 40 hours of laboratory experience (as indicated under the Laboratory Instruction Section). Laboratory experience could include a research paper, and possible field trips to sites that demonstrate shell processing/and or manufacturing.

## LABORATORY STRUCTURE

Depending on available resources, participants may wash, sort and analyze bags of shell materials provided by the host chapter; or, identify, analyze, measure and illustrate shell material and artifacts previously processed in the other laboratory collections.

## FIELD TRIPS

Visits to local sites may be arranged at the discretion of the instructor according to the needs and interests of the students and as permitted by landowners and managers.

**LABORATORY MATERIALS**

A. 10x hand lens
B. Digital or hand drawn caliper 15cm+
C. Scale with accuracy of +/- 1 gram or +/- 0.1 grams
D. Microscope 33.5x stereo zoom
E. Protractor
F. Standard compass
G. 35 mm camera with appropriate lenses, or digital camera
H. Calculator
I. Analysis forms
J. Labeling materials
K. Drawing materials

**COURSE OBJECTIVES**

At the conclusion of the course, students will

A. Be able to recognize basic shell genera/species that characterize the Hohokam assemblage
B. Be able to separate modified and unmodified shell material
C. Be able to sort shell material based on specific use
D. Be able to identify steps of manufacturing and processing of shell material
E. Be able to carry out necessary laboratory functions: cleaning, labeling, analysis, measurement, drawing, documentation and proper storage techniques

**RECOMMENDED TEXTS**

A. *Hohokam Marine Shell Exchange and Artifacts* by Nelson, Richard S. (1991)

B. It is highly recommended that a selection of articles from the bibliography be chosen by the course instructor. This will provide a good representative background of the broad concepts of shell identification and analysis, the Hohokam trade systems, and the significance of Hohokam shell artifact production. A suggested required reading list is marked with asterisks (*) in the bibliography.

C. Shell identification guides chosen from the following list (Vokes 2002):

**Marine Guides**

Abbott, Robert Tucker
1974 *American Seashells: The Marine Mollusca of the Atlantic and Pacific Coasts of North America*. 2nd ed. Van Nostrand Reinhold, New York.

Keen, A. Myra
1971 *Sea Shells of Tropical West America: Marine Mollusks from Baja California to Peru*. 2nd. ed. Stanford University Press, Palo Alto.

Morris, Percy A.
1966 *A Field Guide to Pacific Coast Shells, 2nd Edition*. Houghton Mifflin Company, Boston.

Rehder, Harald A.
1981 *The Audubon Society Field Guide to North American Seashells*. New York: Alfred A. Knopf, Inc.

**Freshwater and Terrestrial Mollusca Guides**

Abbott, Robert Tucker
1989 *Compendium of Landshells: A Color Guide to More than 2,000 of the World's Terrestrial Shells*. American Malacologists, Inc., Melbourne, Florida.

Burch, J. B.
1972 *Freshwater Spaeriacean Clams (Mollusca:Pelecypoda) of North America*. Biota of Freshwater Ecosystems Identification Manual No. 3. Environmental Protection Agency Publication, Washington, D. C.

1973 *Freshwater Unioacean Clams (Mollusca:Pelecypoda) of North America*. Biota of Freshwater Ecosystems, Identification Manual No. 11. Environmental Protection Agency, Washington, D.C.

Burch, John B., and John L. Tottenham
1980 North American Freshwater Snails: Part IV. Species List, Ranges and Illustration. *Walkeranna* 1(3):81-214.

Clarke, Arthur H.
1981 *The Freshwater Mollusks of Canada*. National Museums of Canada. Ottawa, Canada.

**COURSE OUTLINE – CLASSROOM INSTRUCTION**

A. General Theory Overview
   1. The Hohokam as shell artifact manufacturers

2. The "sphere of influence" (Nelson 1991)
3. Hohokam trade systems
   a. Northern Sonora (Brand 1937,1938)
   b. Papagueria and southern edge of the Gila River Valley (Hayden 1972)
   c. Middle and Upper Santa Cruz (Craig 1982)

B. The importance of recognizing unmodified and modified shell found in a site assemblage

C. Examples of source materials from the Gulf of California, Pacific coast, and local freshwater/terrestrial sources

D. Purpose of Decorative Items
1. Decoration
2. Wealth
3. Religious/ceremonial
4. Status indicators
5. Family affiliation

E. Terms Involved in Shell Analysis
1. Axially ribbed
2. Anterior canal
3. Horny operculum
4. Spine
5. Aperture
6. Concentric ribbing
7. Heat-shaped lunale
8. Lenticular shape
9. Hinge
10. Radial structure
11. Arched hinge plate
12. Chevron shaped teeth
13. Height
14. Crenulated ribbing
15. Fossa
16. Operculum
17. Nacreous

F. Shell Anatomy (Vokes 2002)
1. Component parts of a univalve (Gastropod/snails)
   a. Spire
      - Apex
      - Penultimate whorl
      - Columella
   b. Body whorl
      - Outer lip aperture
      - Callus/parietal wall
      - Siphonal canal

2. Component parts of a bivalve (Pelecypod/clams)
   a. Outer shell
      - Umbo

- Beak
- Dorsal/ventral
- Sides
- Cardial rib
- Concentric structure (ribbing)

b. Inner shell
- Cardinal teeth
- Lateral teeth
- Taxadontic teeth
- Muscle scars
- Pallial line

3. Hohokam Shell Genera and Species (mainly Agua Fria River Valley)

a. Marine
- Glycymeris gigantea
- Glycymeris maculata
- Pecten vogdesi
- Spondylus sp.
- Dosinia ponderosa
- Turritella leucostoma
- Cerithium adustum
- Cerithium maculosum
- Cerithidea albonodosa
- Cerithidea mazatlanica
- Columbella sp.
- Oliva melampus
- Oliva spicata
- Olivella alba
- Olivella dama
- Olivella gracilis
- Conus sp.
- Conus brunneus
- Nassarius pogodus
- Nassarius versicolor
- Neritina sp. (Theodorus)
- Theodoxus luleotasciatus
- Haliotis sp.
- Oyster sp.
- Vermicularia sp.
- Strombus sp.

b. Freshwater
- Anodonta californiensis
- Freshwater snails

G. Evidence for Local Manufacturing
   1. Raw materials
   2. Broken in processing
   3. Wastage – debitage
      a. Large unused pieces
   4. Finished products – local style
   5. Limited use of local resources
      a. Gulf of California – Rocky Point
      b. Pacific Ocean
   6. Specific stone technology
   7. Bracelet production techniques

H. Shell Working Technology
   1. Cutting and breaking
      a. Indicated better in shell debitage
         - Seen easier in thin shell
         - Cut lines and overlaps
         - Breaks along cut lines (ragged edges)
         - Narrow pointed tool (.5 – 1 mm)
   2. Chipping/Grinding/Abrasion
      a. Direct blow by small hammer
      b. Hitting object against an anvil
      c. Highly abrasive fine grain stone
         - Negative – positive grinding
         - Repairing tools for bracelets
         - Umbo treatment
           a) Plain
           b) Round
           c) Square
           d) Perforated
           e) Heart-shaped
   3. Engraving/Incising
      a. Same as cutting – decorative treatment
      b. Edge nicking
   4. Drilling
      a. Use to delimit cut boundaries
      b. Production of suspension/string holes
         - Biconical and conical
   5. Acid retard etching
      a. Rare
      b. Use of weak acid
      c. Modern experiments
      d. Known examples
   6. Painting

**COURSE OUTLINE – LABORATORY INSTRUCTION**

A. Laboratory Analysis
   1. Separation in the field
   2. Assignment of specimen number
   3. Proper field storage techniques
      a. Container
      b. Packing material
   4. Specimen cleaning process
      a. Dry brushing with soft bristle brush
      b. Immersion (if needed) in distilled water
      c. Soft brushing to remove dirt
      d. Allow to air dry
      e. Chemical cleaning
         - only if necessary (rare)
   5. Analysis form
      a. Relationship to research proposal
      b. General data
         - Specimen number
         - Species
         - Artifact cross section
         - Umbo modification
         - Length
         - Width
         - Thickness
         - Inside diameter
         - Artifact identification
         - Comments
         - Drawings
         - Additional data as needed

B. Shell Species Identification
   1. Type collection location
      a. Care in handling
         - Modern field specimens (Baja California)
            a) Similarity to those excavated
            b) Effects of sun on coloring
      b. Size considerations
   2. Illustrations in site reports
      a. Care in regards to species named
         - Changes
         - Incorrect identification
   3. Malocological reports
   4. Experts in the field when possible
   5. Most common marine species (Keen 1958, 1971)
      a. Cerithidea albonodosa (Gould and Carpenter 1857)
      b. Columbella sp.
      c. Conus sp.
      d. Dosina ponderosa (Gray 1838)

e. Glycymeris gigantean (Reeve, 1843)
f. Glycymeris maculate (Broderlip 1832)
g. Laevicardium elatum (Sowerby 1833)
h. Nassarius pogodus (Reeve 1844)
i. Nassarius versicolor (Adams 1852)
j. Neritina luteofasciata (Miller 1879)
k. Olivella alba (Marrat in Sowerby 1871)
l. Olivella dama (Wood 1828)
m. Pecten vogdesi (Arnold 1906)
n. Spondylus sp.

6. Most common fresh water species
    1. Anodonta califoriensis (Lea)
    2. Succinea avarca

C. Artifact Description
1. Measurements needed
2. Utilitarian shell
   a. Ground working edges
3. Decorative shell
   a. Beads
      - Location of stringing holes
      - Perforation of the umbo
      - Spine/aperture removal
      - Disc beads
        a) Perforation size
        b) Bead diameter
        c) Profile
   b. Cylindrical beads – time sensitive
        a) Barrel Beads (Olivella sp.)
        b) True cut cylindrical beads
4. Pendants
   a. Whole shell
   b. Cut and carved
   c. Ground
5. Rings
   a. Finger/toe
      - Whole shell
      - Ground
   b. Earrings
6. Tinklers
7. Mosaic pieces
8. Bracelets, armlets, anklets, pendants
   a. Cut and ground
      - Plain
        a) Haury classification system
        b) Umbonal treatment
      - Decorated
        a) Carved
        b) Incised

9. Acid-retard etching
10. Prestige items
   a. Carved-incised bracelets
   b. Pecten vogdesi beads and pendants
   c. Strombus sp. Trumpets
   d. Acid-retard etched shells

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