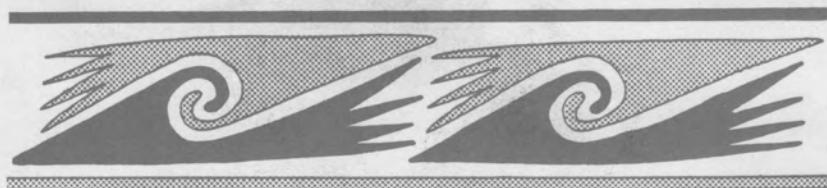


K. Deagan

# Society for American Archaeology



53rd ANNUAL MEETING  
April 27–May 1, 1988  
SHERATON PHOENIX HOTEL  
(formerly Adams Phoenix/Hilton)

PROGRAM AND ABSTRACTS

**The James A. Ford  
Library of Anthropology**



**Florida Museum of Natural History,  
Anthropology Division**



FLORIDA  
MUSEUM

OF NATURAL HISTORY

**Gift of: Dr. Kathleen A. Deagan**

**PROGRAM AND ABSTRACTS  
of the Fifty-third Annual Meeting  
Phoenix, Arizona  
April 27-May 1, 1988**

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*Cover Illustration*

Painted border pattern on pottery from Casas Grandes, the Southwest. 12th-13th centuries.

The annual meeting of the Society for American Archaeology provides a forum for the dissemination of knowledge and discussion. The views expressed at the sessions are solely those of the speakers and the Society does not endorse, approve, or censor them. Descriptions of events and titles are those of the organizers, not the Society.

Published by the  
Society for American Archaeology  
808-17th Street, N.W.  
Washington, D.C. 20006

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**SOCIETY FOR  
AMERICAN ARCHAEOLOGY**  
**Fifty-third Annual Meeting**

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J Jefferson Reid  
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## GENERAL INFORMATION

**Abstracts** Abstracts of papers presented at this meeting are included in the Program. Additional copies are available for \$5 per copy and may be ordered prepaid from the Society, 808-17th Street N.W., Washington, D.C. 20006.

**Business Meeting** The Society's annual business meeting will begin at 5:30 PM on Friday in the Ballroom.

**Convention Office** Any problems or special requests during the meeting should be reported to the Convention Office in the Papago Room.

**Exhibits** Exhibits will be displayed in the Pueblo Room from 9 AM to 6 PM on Thursday and Friday, and 9 AM to 2 PM on Saturday.

**Membership Services and Publications** SAA publications will be displayed and membership information will be available in the Pueblo Room during the exhibit hours.

**Message and Information Center** A self-service message center will be open in the second floor lobby from 5 PM to 8 PM Wednesday, and from 8 AM to 5 PM Thursday through Saturday.

**New Member Reception** Officers of the Society will host a reception for students, new members and members attending their first annual meeting on Wednesday at 8 PM in Hopi A.

**Placement Service** A placement service will be conducted in Mohave B from 5 PM to 8 PM on Wednesday, from 8 AM to 5 PM Thursday and Friday, and from 8 AM to noon on Saturday. Positions open or wanted may be listed with the service throughout the meeting. Message forms will be provided and box numbers will be assigned for use in the placement service message center.

**Registration** Registration, which includes a copy of the Program and Abstracts, is required for attendance at all sessions. Registration desks will be open from 5 PM to 8 PM on Wednesday, from 7:30 AM to 3 PM on Thursday, 8 AM to 3 PM on Friday and from 8 AM to noon on Saturday. Members who preregistered by April 6 should claim their badges and programs at the advance registration desk. Wearing of the badge is required for admission to all sessions and the exhibits.

**Symposia and Sessions Chairs** Please maintain the established schedule scrupulously in fairness to persons planning to attend sessions at specific times to hear particular speakers; please pause for the period allotted in the program if a scheduled speaker fails to appear.

**Session Smoking Ban** Smoking during sessions will not be permitted.

**Slide Screening Room** A 35mm slide projector and screen will be available in Mohave A from Wednesday at 6 PM and thereafter throughout the meeting for presenters who wish to check their slides before presentation.

## ANNUAL MEETINGS OF THE SOCIETY FOR AMERICAN ARCHAEOLOGY

Meeting	Place	Date
1st	Andover, Massachusetts	December, 1935
2nd	Washington, DC	December, 1936
3rd	Milwaukee, Wisconsin	May, 1938
4th	Ann Arbor, Michigan	May, 1939
5th	Indianapolis, Indiana	April, 1940
6th	Minneapolis, Minnesota	May, 1941
7th	Cincinnati, Ohio	May, 1942
8th	Because of travel difficulties and other wartime restrictions, the business of the annual meeting in 1943 was conducted by mail by the Executive Committee, whose actions were approved at the next annual meeting.	
9th	Washington, DC	May, 1944
10th	Washington, DC	May, 1945
11th	Indianapolis, Indiana	May, 1946
12th	Ann Arbor, Michigan	May, 1947
13th	Milwaukee, Wisconsin	May, 1948
14th	Bloomington, Indiana	May, 1949
15th	Norman, Oklahoma	May, 1950
16th	Evanston, Illinois	May, 1951
17th	Columbus, Ohio	May, 1952
18th	Urbana, Illinois	May, 1953
19th	Albany, New York	May, 1954
20th	Bloomington, Indiana	May, 1955
21st	Lincoln, Nebraska	May, 1956
22nd	Madison, Wisconsin	May, 1957
23rd	Norman, Oklahoma	May, 1958
24th	Salt Lake City, Utah	May, 1959
25th	New Haven, Connecticut	May, 1960
26th	Columbus, Ohio	May, 1961
27th	Tucson, Arizona	May, 1962
28th	Boulder, Colorado	May, 1963
29th	Chapel Hill, North Carolina	May, 1964
30th	Urbana, Illinois	May, 1965
31st	Reno, Nevada	May, 1966
32nd	Ann Arbor, Michigan	May, 1967

33rd	Santa Fe, New Mexico	May, 1968
34th	Milwaukee, Wisconsin	May, 1969
35th	Mexico City, Mexico	May, 1970
36th	Norman, Oklahoma	May, 1971
37th	Bal Harbour, Florida	May, 1972
38th	San Francisco, California	May, 1973
39th	Washington, DC	May, 1974
40th	Dallas, Texas	May, 1975
41st	St. Louis, Missouri	May, 1976
42nd	New Orleans, Louisiana	April, 1977
43rd	Tucson, Arizona	May, 1978
44th	Vancouver, Canada	April, 1979
45th	Philadelphia, Pennsylvania	May, 1980
46th	San Diego, California	April–May, 1981
47th	Minneapolis, Minnesota	April, 1982
48th	Pittsburgh, Pennsylvania	April, 1983
49th	Portland, Oregon	April, 1984
50th	Denver, Colorado	May, 1985
51st	New Orleans, Louisiana	April, 1986
52nd	Toronto, Ont.	May 1987

## SOCIETY FOR AMERICAN ARCHAEOLOGY

### Past Presidents

(\*Deceased)

A C Parker *	1935–36	Jesse D Jennings	1959–60
Diamond Jenness *	1936–37	Erik K Reed	1960–61
A V Kidder *	1937–38	Junius Bird *	1961–62
Edgar B Howard *	1938–39	David A Baerreis	1962–63
Neil Judd *	1939–40	James A Ford *	1963–64
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Glenn Black *	1941–42	Paul S Martin *	1965–66
Nels C Nelson *	1942–43	Joe B Wheat	1966–67
Emil W Haury	1943–44	Gordon B Willey	1967–68
J Alden Mason *	1944–45	H Marie Wormington	1968–69
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Frederick Johnson	1946–47	Robert Lister	1970–71
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Waldo R Wedel	1948–49	Charles C DiPeso *	1972–73
J O Brew	1949–50	Douglas W Schwartz	1973–74
Frank H H Roberts Jr *	1950–51	Charles R McGimsey III	1974–75
James B Griffin	1951–52	Stuart Struever	1975–76
Irving Rouse	1952–53	Raymond H Thompson	1976–77
Gordon Ekholm *	1953–54	Cynthia Irwin-Williams	1977–79
Robert Wauchope *	1954–55	Fred Wendorf	1979–80
W Duncan Strong *	1955–56	Richard E W Adams	1981–83
William A. Ritchie	1956–57	George C Frison	1983–85
George I Quimby Jr	1957–58	Don D Fowler	1985–87
Richard B Woodbury	1958–59	Dena F Dincauze	1987–

## AWARDS TO ARCHAEOLOGISTS, 1946-85

### Compiled by N Woodbury

The *Viking Fund Annual Awards in Anthropology* (provided by the WennerGren Foundation) consisted of three Viking Fund Medals, with accompanying Viking Fund Prizes of \$1,000 each. These were awarded annually 1946-60 for distinguished research, publication and contribution to science. Scholars were selected by committees of their respective societies—in archaeology by the Society for American Archaeology, in general anthropology by the American Anthropological Association and in physical anthropology by the American Association of Physical Anthropologists.

The awardees in archaeology are:

- 1946 Alfred Vincent Kidder
- 1947 John Otis Brew
- 1948 Alex Dony Krieger
- 1949 Hallam Leonard Movius, Jr.
- 1950 Emil Walter Haury
- 1951 Frank Harold Hanna Roberts, Jr.
- 1952 Alfonso Caso
- 1953 Gordon Randolph Willey
- 1954 William Duncan Strong
- 1955 John Eric Sidney Thompson
- 1956 Junius Bouton Bird
- 1957 James Bennett Griffin
- 1958 Jesse David Jennings
- 1959 Irving Rouse
- 1960 Samuel Kirkland Lothrop

The *Alfred Vincent Kidder Award*, a bronze medallion bearing the likeness of Kidder, was established in 1950 as a tribute to the leadership of A V Kidder by the American Anthropological Association. It has been awarded every three years for eminence in American archaeology, particularly in those fields in which Kidder contributed so much, the Southwestern United States and Middle America.

The awardees have been:

- 1950 Alfred Marston Tozzer
- 1953 Earl Halstead Morris
- 1956 Samuel Kirkland Lothrop
- 1959 Charles Corradino Di Peso
- 1962 Tatiana Proskouriakoff
- 1965 Neil Merton Judd
- 1968 Paul Sidney Martin
- 1971 Richard Stockton MacNeish
- 1974 Gordon Randolph Willey
- 1977 Emil Walter Haury

- 1980 William Timothy Sanders
- 1983 Samuel Watson Smith
- 1986 Ignacio Bernal

The *Distinguished Service Award* of the Society for American Archaeology was established in 1975. In 1980 it was decided to make the award annually. It consists of a framed inscribed citation.

The awardees have been:

- 1975 Carl Haley Chapman  
Charles Robert McGimsey III
- 1980 Gordon Randolph Willey
- 1981 Albert Clanton Spaulding
- 1982 Jesse David Jennings
- 1983 Hannah Marie Wormington
- 1984 James Bennett Griffin
- 1985 Emil Walter Haury
- 1986 Waldo R Wedel
- 1987 William A Ritchie

The *Fryxell Award for Interdisciplinary Research* was set up by the Society for American Archaeology in 1977 in memory of Roald Fryxell whose career exemplified so well the crucial role of interdisciplinary cooperation in archaeology. The award, consisting of a citation and a medallion, was to be presented annually; however, no award was made in 1984.

The awardees have been:

- 1978 C Vance Haynes
- 1979 Peter J Mehringer
- 1980 James B Griffin
- 1981 Karl W Butzer
- 1982 David A Barreis
- 1983 John E Guilday (posthumously)
- 1984 (No Award)
- 1985 Roger T Saucier
- 1986 Donald K Grayson
- 1987 Richard I Ford

The *Crabtree Award* was established by the Society for American Archaeology in 1985 to recognize major contributions to American archaeology by individuals who have had little if any formal training in archaeology and little if any wage or salary as an archaeologist. The award is named after Don Crabtree of Twin Falls, Idaho, who made significant contributions to the study of lithic technology and whose dedication to archaeology was a lifelong personal and financial commitment.

The awards have been:

- 1985 Clarence H. Webb, MD
- 1987 Leonard W Blake

## BUSINESS AND SOCIAL EVENTS

### MONDAY, APRIL 25

8:00 AM	US Forest Service	Gila Room
9:00 AM	Soil Conservation Service	Mohave A
3:00 PM	Society of Africanist Archaeologists in America—Biennial Meeting	Pima Room

### TUESDAY, APRIL 26

8:00 AM	US Forest Service	Gila Room
8:00 AM	Society of Africanist Archaeologists in America—Biennial Meeting Continued	Pima Room
9:00 AM	Soil Conservation Service	Mohave A
12 Noon	Army Corps of Engineers	Maricopa Room
7:30 PM	Society for American Archaeology—Executive Committee Meeting	Apache A

### WEDNESDAY, APRIL 27

8:00 AM	Society for American Archaeology—Executive Committee Meeting	Navajo D Room
8:00 AM	US Forest Service	Gila Room
8:00 AM	Society of Africanist Archaeologists in America—Biennial Meeting Continued	Pima Room
8:00 AM	Army Corps of Engineers	Maricopa Room
8:00 AM	Association of Transportation Archaeologists	Apache A
9:00 AM	Soil Conservation Service	Mohave A
9:00 AM	Society for American Archaeology—Government Affairs Committee Meeting	Mohave B
9:00 AM	National Association of State Archaeologists—Business Meeting and Workshop	Apache B
9:00 AM	American Society for Conservation Archaeology—Executive Committee meeting	Hopi A
2:00 PM	American Society for Conservation Archaeology—Workshop	Hopi A
7:00 PM	Department of Defense—GRASS and Archaeological Data Bases	Maricopa Room
8:00 PM	Student and New Member Reception	Hopi A & B

### THURSDAY, APRIL 28

8:00	Society for American Archaeology—Committee on Public Archaeology	Pima Room
9:00 AM	Society for American Archaeology—Finance Committee	Board Room
11:30 AM	Council of Presidents Luncheon (By invitation only)	Hopi A
12 Noon	Society for Archaeological Sciences—Executive Board	Pima Room
1:00 PM	Society of Professional Archaeologists—Executive Board	Board Room
3:00 PM	State, Provincial and Local Archaeological Societies: a meeting of society representatives and other interested persons to discuss their role	Maricopa Room
4:00 PM	SAA History of Archaeology Committee: an open meeting for persons interested in this archives project	Hopi A
4:00 PM	Special Presentation: <i>Perspectives of Native American Holy People, Elders, and Tribal Officials on the Reburial Issue.</i> Organizers: Larry Zimmerman (South Dakota), Randall McGuire (SUNY-Binghamton), Peter Ucko (Southampton). Native American concerns about the reburial issue are usually presented to archaeologists by Indian spokespeople who are often judged to be vocal and militant. Archaeologists rarely get the opportunity to exchange views directly with more traditionally oriented Indians. In this special event Native American holy people, elders and tribal representatives from many different tribes and regions will present brief views of their people on scientific treatment of human skeletons. Their presentations will be followed by open discussion with archaeologists present.	Navajo D
5:00 PM	Society for Archaeological Sciences—Annual Meeting	Pima Room

### FRIDAY, APRIL 29

8:00 AM	Archaeology Unit of the American Anthropological Association—Executive Committee Meeting	Havasupai
12 Noon	Society of Professional Archeologists—Annual Business Meeting	Havasupai
12 Noon	American Society for Conservation Archaeology—Annual Business Meeting	Hopi A
1:30 PM	Society of Professional Archeologists—Executive Committee Meeting	Havasupai
5:30 PM	Society for American Archaeology—Annual Business Meeting	Ballroom
8:00 PM	Public Lecture by Stuart Streever entitled "Crow Canyon: Building a Center for Public Archaeology"	Ballroom

SATURDAY, APRIL 30

9:00 AM	Society for American Archaeology—Executive Committee Meeting	Gila Room
9:00 AM	American Society for Conservation Archaeology—Executive Committee Meeting	Hopi A
10:00 AM	Arizona Archaeological Council Meeting	Havasupai

## Special Events

THURSDAY, APRIL 28

**Heard Museum Open House** The Heard Museum is internationally recognized for collections, exhibitions, and programming focused on Southwest Indian cultures, Native American fine arts, and native peoples worldwide. Demonstrations by Native American artists and performances are planned. The event is sponsored by the Heard Museum. 5:30–7:30 PM.

THURSDAY, APRIL 28 & FRIDAY, APRIL 29

**Field Tours** The Arizona Department of Transportation will sponsor tours to the archaeological site, La Lomita, currently under investigation in the Phoenix metropolitan area. The Hohokam site is being excavated by Soil Systems, Inc. Two tours are planned—two hours each—Thursday afternoon and/or Friday morning. Transportation from the hotel is free. Minimum: 20 persons per tour.

FRIDAY, APRIL 29 & SATURDAY, APRIL 30

**Field Tours** Arizona State University will sponsor half-day field trips to two archaeological sites currently being excavated located northeast of Phoenix. Both the Spur Cross Ranch and Pinnacle Peak Archaeological Sites will be visited. Two tours are planned each day. Tours by Drs. Charles Redman, Paul Minnis, Pat Gilman and Glen Rice. Transportation from the hotel provided free. Departure times: Friday 12:30 & 2:30 PM; Saturday 8:30 & 10:30 AM. Minimum of 20 persons per tour.

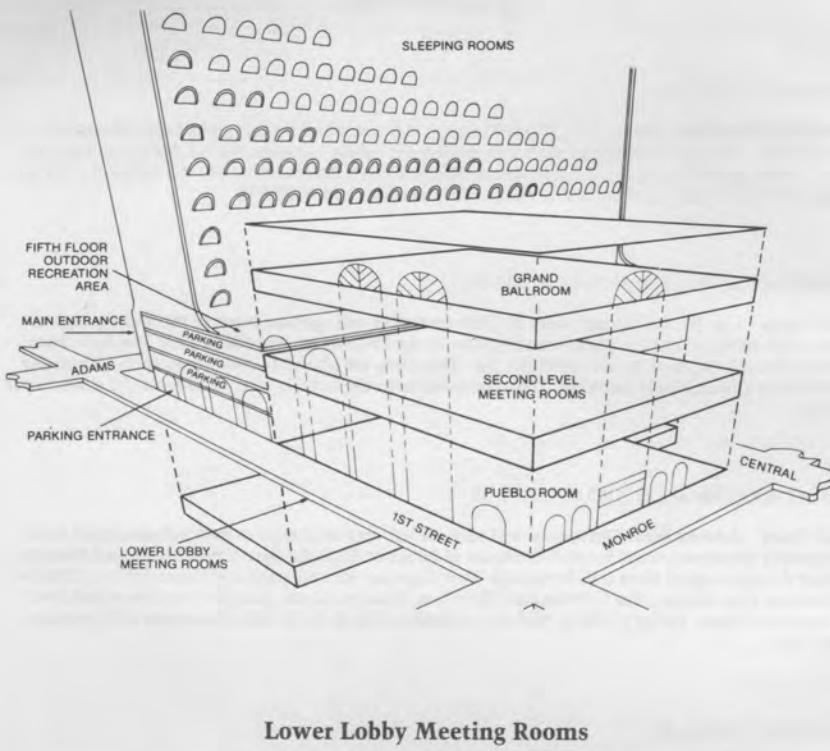
SATURDAY, APRIL 30

**Arizona State University Reception** Arizona State University will host a reception with food, drink and music. The museum, lab facilities and special collections will be open for visitation by SAA participants. 4:00–7:00 PM. Transportation provided free from the hotel with departures every 30 minutes beginning at 3:30 PM.

THURSDAY, APRIL 28, FRIDAY, APRIL 29 & SATURDAY, APRIL 30

**Pueblo Grande Museum Open House** Pueblo Grande Museum will be setting up special tours (times to be announced) for SAA participants. The Museum is a City of Phoenix park which contains a museum, the ruins of prehistoric Hohokam platform mound and prehistoric canals. The tours will be sponsored by the Pueblo Grande Museum Auxiliary. Free admission to the museum will be offered to all SAA members.

**Heard Museum** The Heard Museum will provide free admission to the museum to all SAA members for the duration of the meeting.



### Lower Lobby Meeting Rooms

Board Room  
Papago  
Mohave A & B  
Gila  
Havasupai  
Maricopa  
Pima

### Second Floor Meeting Rooms

Hopi A & B  
Apache A & B  
Navajo A, B, C, & D

### Ballroom Level

North and South Ballroom

## PROGRAM

### THURSDAY MORNING APRIL 28, 1988

#### Poster Session: ARCHAEOLOGY ON DISPLAY PUEBLO

##### Participants

- William W. Bloomer; An Architectural Analysis of Moon House, Cedar Mesa, Southeastern Utah
- Angela Schwab; Archaeology and Public Education
- James N. Gunderson and Bruce D. Smith; The Lithology of the Birger "Bauxite" Figurine
- Diana Frances Elder, Carl J. Phagan, Jeffery A. Anderson and Pat S. Chavez; Examination of Projectile Points Utilizing Digital Image Processing for Topographic Enhancements
- Mary S. Carroll; A Dynamic Archaeological Database for the Microcomputer: The Shoofly Village Example
- Gregory H. Henton and Stephen R. Durand; Raster Based Projectile Point Measurement
- Cindy L. Myers, Diane Fenicle, Deborah Hull and A. E. Rogge; Reconstructing Social History: A Case for the Role of Historical Archaeology
- Judy A. Roman and Helen L. O'Brien; Using Personal Computers for Cartography
- Matthew L. Murray, Katherine M. Moore and Margaret J. Schoeninger; Prehistoric Diet from Bone Chemistry: Problems and Suggestions

#### [1] Symposium: COLUMBIAN QUINCENTENARY SYMPOSIUM, PART I: CONTACT PERIOD STRATEGIES IN THE SOUTHWESTERN HEARTLAND

##### NORTH BALLROOM

Organizer: David H. Thomas Organizer and Chairperson: Linda S. Cordell

##### Participants

- 8:00 David H. Thomas; Introduction to the Columbian Quincentenary Symposia
- 8:20 Charles F. Merbs; Effects of European Contact on Patterns of Health and Disease in Southwestern Indians
- 8:40 David E. Doyel; The Transition to History in Northern Pimeria Alta
- 9:00 E. Charles Adams; Passive Resistance: Hopi Responses to Spanish Contact and Conquest
- 9:20 Randall H. McGuire; The Archaeology of Protohistoric Sonora
- 9:40 Charles W. Polzer; The Spanish Colonial Southwest: New Technologies for Old Documents
- 10:00 Hartman H. Lomawaima; Hopification, A Strategy for Cultural Preservation
- 10:20 Katherine A. Spielmann; Colonists, Hunters, and Farmers: Plains/Pueblo Interaction in the Seventeenth Century
- 10:40 Mark T. Lyett; Spanish Contact in the Rio Grande Valley, New Mexico: The Archaeology of Demographic Collapse
- 11:00 Steadman Upham; Southwestern Regional Systems: Demography, Economy, and Sociopolitics Preceding Contact
- 11:20 John L. Kessell; Spaniards and the Pueblos: From Crusading Intolerance to Pragmatic Accommodation

#### [2] Symposium: RECENT RESEARCH IN POST PROCESSUAL ARCHAEOLOGY

##### SOUTH BALLROOM

Organizer and Chairperson: Russell G. Handsman

##### Participants

- 8:00 Andrew T. Black; Dealing with Cultural Change: An Analysis of the Diaz Household, Monterey, California

## Thursday Morning, April 28

- 8:20 Charlotte Damm; Exploring Historical and Interactional Factors of Change Through Structural Variation  
 8:40 Terrence W. Epperson; Archaeologies of Racism and Resistance in British Colonial America  
 9:00 Russell G. Handsman; Re-Writing the Archaeological Atlas on Colonialism  
 9:20 Christine Hoepfner; "Popular Interest" and Private Intent: Conflicts in the Construction of the American Past, 1880-1920  
 9:40 Matthew H. Johnson; The Transformation of the Medieval House: A Study of Structure and Agency  
 10:00 Dean J. Saitta; Tribal Political Economy and Southwestern Social Change  
 10:20 Paul A. Shackel and Barbara J. Little; The Structuring of Meaning in Annapolis, Maryland  
 10:40 Anthony G.M. Sinclair; Foraging for Meaning: Seeking Structure in Palaeolithic Society  
 11:00 Discussants: Mark P. Leone, Ian Hodder and Merrilee H. Salmon

**[3] Symposium: REFITTING MORE THAN CORES: INTERPRETATION AND INFERENCE OF CONJOINABILITY**

## APACHE A-B

Organizer and Chairperson: James G. Enloe

## Participants

- 8:00 Michael D. Petraglia; Artifact Refitting at the Abri Dufaure: Interpretation of Prehistoric Behavior and Natural Formation Processes  
 8:20 Margaret A. Jodry; Fitting Together Folsom: Refitted Lithics and Site Formation Processes at Stewart's Cattle Guard Site  
 8:40 Mary Lou Larson and Eric E. Ingbar; The Nature of Refitted Assemblages  
 9:00 Ricky R. Lightfoot; Refitting Studies at the Duckfoot Site, An Early Anasazi Pueblo  
 9:20 Alan P. Sullivan; Sherd Refitting and the Reconstruction of Household Ceramic Technology  
 9:40 Owen Lindauer; Ceramic Conjoinability: A Southwestern Example  
 10:00 Barbara J. Mills, Eileen L. Camilli and LuAnn Wandsnider; Spatial Patterning in Ceramic Vessel Distributions  
 10:20 Michele Julien; Refitting Hearth Stones in the Study of a Prehistoric Habitation: Pincevent  
 10:40 James G. Enloe and Francine David; Food Sharing in the Paleolithic: Refitting Carcasses at Pincevent  
 11:00 David J. Rapson and Lawrence C. Todd; Conjoins, Contemporaneity, and Site Structure: Distributional Analysis of the Bugas-Holding Site  
 11:20 Paola Villa, Jean Courtin and Daniel Helmer; Refitted Bones from Fontbregoua Cave: The Case for Cannibalism  
 11:40 Discussant: Lewis R. Binford

**[4] General Session: STUDIES IN OLD WORLD ARCHAEOLOGY**

## HOPI B

Chairperson: G. A. Clark

## Participants

- 8:00 Zeidan Kafafi, Rolfe D. Mandel and Alan H. Simmons; The 'Ain Ghazal Survey: Human Occupation of the Wadi Zarqa, Central Jordan  
 8:20 Steven E. Falconer; Early Urbanism, Ruralism and Social Complexity in Southwestern Asia  
 8:40 Haskel J. Greenfield; Late Neolithic Subsistence Economy of the Central Balkans (Yugoslavia)  
 9:00 Michael Dietler; Driven by Drink: the Social Uses of Imported Wine and Implications for Economic and Political Change in French Iron Age Societies  
 9:20 John A. Cavallo and Robert J. Blumenschein; Larders in the Limbs: Expanding the Early Hominid Scavenging Niche  
 9:40 David William Zeanah and Karen D. Lupo; Sexual Segregation of Activity Areas: Three Ethnoarchaeological Examples

## Thursday Morning, April 28

- 10:00 Anne P. Underhill; The Organization of Ceramic Production During the Late Prehistoric Period of North China  
 10:20 Margaret F. Glass; Settlement Pattern Change from the Early to Late Neolithic in Central Europe  
 10:40 Monica L. Smith; Roman Imperial Expansion and the Price of Colonialism: An Example from Roman Britain  
 11:00 Bonnie Magness-Gardiner; Interpreting Patterns of Ceramic Distribution: Historical Sources in Second Millennium B.C. Syria  
 11:20 Nancy L. Benco; Organization and Technology of Traditional Pottery Production in Morocco

**[5] General Session: GEOARCHAEOLOGY AND PALEOENVIRONMENT**

## NAVAJO A

Chairperson: Frank E. Bayham

## Participants

- 9:00 Michael R. Waters; Geoarchaeological Interpretations of Landscape Change on the Santa Cruz River Floodplain, Arizona  
 9:20 R. Michael Stewart; Stratigraphic Sequences and Archaeological Sites in the Delaware Valley: Implications for Paleoenvironmental Change in the Middle Atlantic Region, Eastern U.S.  
 9:40 Frank E. Bayham; The Effect of Thermal Maxima on Middle Archaic Habitat Selection in the Arid Southwest  
 10:00 Owen K. Mason; Geoarchaeological Correlations of Northwest Alaska Beach Ridges  
 10:20 Mark J. Brooks and Kenneth E. Sassaman; Point Bar Geoarchaeology in the Upper Coastal Plain of the Savannah River Valley  
 10:40 John F. Hoffecker and W. Roger Powers; Late Glacial Prehistory and Loess Stratigraphy in the Nenana Valley, Central Alaska  
 11:00 Cynthia A. Thayer and Nathan D. Hamilton; Prehistoric Settlement Patterns and the Paleohydrology of the Moosehead Lake Basin  
 11:20 Michael McFaul and William R. Latady, Jr.; Colluvial/Alluvial Processes and Artifact Preservation, Uinta County, Wyoming

**[6] Symposium: VILLAGES AND TOWNS: SOUTHWEST/MISSISSIPPIAN PARALLELS**

## NAVAJO B

Organizer and Chairperson: Glen Eugene Rice

## Participants

- 9:00 T. Kathleen Henderson; Organizational Change at La Ciudad: Implications for the Hohokam Region  
 9:20 Suzanne K. Fish, Paul R. Fish and John Madsen; Evolution and Integration of a Multi-Site Community in the Hohokam Classic Period  
 9:40 Keith W. Kintigh; The Organization of Prehistoric Villages in the Cibola Area of the Southwest  
 10:00 Glen Eugene Rice and Jodi Kisselburg; Hohokam Tribal Influence in the Southwest  
 10:20 Bruce D. Smith; The Corporate and Domestic Spheres of Hopewellian Farming Societies  
 10:40 John E. Kelly; Changes in the Late Woodland-Emergent Mississippian Community Plans of the American Bottom  
 11:00 James M. Collins, George R. Holley, Neal H. Lopinot and William I. Woods; Mississippian Settlement Dynamics at Cahokia AD 1000-1250: Big Brother, Little Brother, No Brother  
 11:20 Thomas E. Emerson and George R. Milner; Internal Structure, Distribution, and Relationships Among Low-level Mississippian Period Communities in Illinois

**[7] Symposium: CHICHEN ITZA: RECENT ADVANCES IN ARCHAEOLOGY, EPIGRAPHY, AND ART HISTORY**

## NAVAJO C

Organizer and Chairperson: Virginia E. Miller

## Participants

- 8:00 Virginia E. Miller; Processional Banquettes at Chichen Itza

- 8:20 Charles E. Lincoln; Dual Kingship at Chichen Itza, Yucatan  
 8:40 Ruth J. Krochock; Epigraphic Evidence for Political Change at Chichen Itza  
 9:00 Clemency C. Coggins; On the Significance of Offeritory Ritual at the Sacred Cenote  
 9:20 Karl A. Taube; The Iconography of Lightning at Chichen Itza  
 9:40 Susan Milbrath; Seasonal Patterns of Sunlight in the Ball Court Complex of Chichen Itza  
 10:00  
 10:20 Cynthia B. Kristan-Graham; Identification of Lineage Members in the Art of Chichen Itza  
 10:40 Marvin Cohodas; Mexican vs. Maya at Chichen Itza  
 11:00 Discussant: Mary Ellen Miller

**[8] Symposium: ADOPTION OF AGRICULTURE IN THE SOUTHERN SOUTHWEST**

NAVAJO D

Organizers and Chairpersons: Stephen H. Lekson and Bruce B. Huckell

Participants

- 7:50 Stephen H. Lekson; Subsistence Geography in the Ethnohistoric Southern Southwest  
 8:10 Richard S. MacNeish; The Beginnings of Agriculture in the American Southwest as Seen from the Archaic Chihuahuan Tradition  
 8:30 Robert J. Hard; Measuring and Postdicting the Emergence of Farming  
 8:50 Patricia A. Gilman; Architectural Measures of Agricultural Reliance  
 9:10 Bruce B. Huckell and Lisa W. Huckell; Crops Come to the Desert: Late Preceramic Agriculture in Southeastern Arizona  
 9:30 John S. Cable; The Processes Leading to the Adoption of Agriculture in the Phoenix Basin, Arizona  
 9:50 R. G. Matson; The Adoption of Agriculture in the Southwest: The View from Cedar Mesa, Utah  
 10:10 Discussants: Michael E. Whalen and Paul R. Fish

**[9] General Session: CERAMIC STUDIES**

NAVAJO D

Chairperson: Arleyn W. Simon

Participants

- 10:40 Timothy Kaiser; Vinca Subsistence at Opovo: Functional Inferences from Household Ceramics  
 11:00 Pamela Vandiver, Olga Soffer and Bohuslav Klima; Venuses and Wolverines—The Origins of Ceramic Technology ca. 26,000 B.P.  
 11:20 Christopher Carr; The Potentials of Radiography in Archaeological Ceramic Analysis  
 11:40 Ingrid Herbich; Differentiating Between the Social Contexts of Ceramic Manufacture and Use in an African Society and the Question of Stylistic Signalling of Ethnic Boundaries  
 12:00 Ronald L. Bishop, Velella Canouts and Patricia L. Crown; Analytical Precision and Sensitivity in Ceramic Analysis

**THURSDAY AFTERNOON APRIL 28, 1988**

**[10] Symposium: THE FRYXELL SYMPOSIUM: SOILS, LANDSCAPE EVOLUTION, AND HUMAN OCCUPATION**

NORTH BALLROOM

Organizer and Chairperson: Vance T. Holliday

Participants

- 1:00 C. Reid Ferring; Alluvial Soils and Geoarchaeological Research  
 1:25 Vance T. Holliday; Soil Formation, Time and Archaeology

- 1:45 E. Arthur Bettis III; Soil Morphologic Properties and Weathering Zone Characteristics as Age Indicators in Holocene Alluvium in the Upper Midwest  
 2:05 Rolfe D. Mandel; Holocene Landscape Evolution in Central and Southwestern Kansas: Implications for Archaeological Studies  
 2:25 Bruce G. Gladfelter; Soils and Landscapes in Southern Sinai During the Late Pleistocene  
 2:45 Paul Goldberg; Micromorphology, Soils and Archaeological Sites  
 3:05 Joseph Schuldenrein; Implications of Sub-Soil Lamellae for Reconstructing Prehistoric Occupation Surfaces  
 3:25 Julie K. Stein; Organic Matter: A Clue for Interpreting Landscape Evolution  
 3:45 Jonathan A. Sandor; Soils at Prehistoric Agricultural Terracing Sites in New Mexico and Peru

**[11] Symposium: PRACTICAL APPROACHES TO THE TREATMENT OF HUMAN REMAINS: AN EXAMINATION OF STATE LAWS AND FEDERAL POLICIES**

SOUTH BALLROOM

Organizer and Chairperson: Franco Ruffini

Participants

- 1:00 Francis P. McManamon; The Department of the Interior Guidelines for the Treatment of Human Remains from Archaeological Sites  
 1:20 Kent A. Schneider, Russell Kaldenberg and Gordon Peters; USDA-FS Regional Policy on the Treatment of Human Remains  
 1:40 Brona G. Simon; An Evaluation of the Results and Archaeological Benefits of the Implementation of the Unmarked Burial Law in Massachusetts  
 2:00 Thomas J. Green; The Unmarked Grave Act in Idaho  
 2:20 Steve Claggett; Pragmatic Aspects of Skeletal Reinterment: The North Carolina Experience  
 2:40 Robert L. Brooks; Management and Treatment of Burial Remains: An Oklahoma Perspective  
 3:00 Rick Dexter; Wisconsin's Burial Site Preservation Program

**[12] General Session: SOUTHWEST STUDIES I**

SOUTH BALLROOM

Chairperson: Richard W. Effland, Jr.

Participants

- 3:45 Kristin Langenfeld and Larry L. Baker; Site Variability in Tanques Canyon, NM and its Implication for Largo-Gallina Community Structure  
 4:05 James B. Walker; Protection Tools for Archeological Sites  
 4:25 Neal W. Ackerly; Hohokam Irrigation Systems in the Eastern Phoenix Basin  
 4:45 Frederick W. Lange; Archaeology in the Yellow Jacket Area, SW Colorado

**[13] Symposium: GEOGRAPHIC INFORMATION SYSTEMS APPLICATIONS IN ARCHAEOLOGY**

APACHE A-B

Organizer: David L. Carmichael Organizer and Chairperson: Diana Christensen

Participants

- 1:00 Kenneth L. Kvamme; GIS Algorithms, Analysis Procedures, and Regional Archaeological Spatial Analysis  
 1:20 James A. Farley and W. Fredrick Limp; The Theoreticians Workbench: Integrating GIS, Remote Sensing, EDA and Database Management  
 1:40 Bryan A. Marozas and James A. Zack; The Use of a Geographic Information System to Measure Independent Variables for Archaeological Site Location Studies  
 2:00 William C. Smith; Sagebrush and Grass: GIS Predictive Modeling  
 2:20 David L. Carmichael and Diana Christensen; GIS Predictive Modeling of Prehistoric Site Distributions in Central Montana  
 2:40 Robert E. Warren; Predictive Modeling of Archaeological Site Location: Two Case Studies from the Midwest

- 3:00 Ezra Zubrow; The Evolution of Demographic Aspects of Settlement Pattern Using GIS Systems  
 3:20 Kathleen M. Allen; Modeling the Development of Trade Patterns Using GIS Systems  
 3:40 Roy A. Mead, Kent A. Schneider and Sandi Forney; Applications of a Geographic Information System for Cultural Resources on the Ocala National Forest  
 4:00 Jeffrey H. Altschul; Red Flag Models: The Use of the Modeling Process in Management Contexts  
 4:20 Frederick L. Briuer; Geographic Information Systems and Automated Archaeological Information: Investments and Dividends for Archaeological Resource Management  
 4:40 Discussant: Timothy A. Kohler

**[14] General Session: RESEARCH IN THE AMERICAN SOUTHWEST—I**

HOPI B

Chairperson: Shereen Lerner

**Participants**

- 1:00 Vernon L. Scarborough; A Transitional Period Pithouse Village  
 1:20 John R. Welch; Rapid Subsistence Change: The Shift from Horticulture to Agriculture in the Grasshopper Region  
 1:40 Marybeth S.F. Tomka; Societal Implications of the Great Kiva at the WS Ranch Site  
 2:00 Margaret M. Lycoris; Ceramic Production and Exchange Among the Virgin Anasazi  
 2:20 Daniel O. Larson; Impacts of Climatic Variability on the Virgin Branch Anasazi  
 2:40 Bradley J. Vierra; A Sixteenth Century Spanish Campsite in the Tiguex Province  
 3:00 Catherine M. Cameron; Processes of Structural Abandonment at Village Sites in Arid Areas  
 3:20 Harry J. Shafer; Material Evidence of Mimbres Social Organization: Architectural and Mortuary Patterning at the NAN Ranch Ruin, Grant County, New Mexico  
 3:40 Julie C. Lowell; The Development of Moiety Systems in the Pueblo Southwest: An Ethnographic and Archaeological Analysis  
 4:00 Karen M. Dohm; Tract Housing in the Prehistoric Southwest: The Spatial Structure of Basketmaker II and III sites on Cedar Mesa, Southeastern Utah

**[15] General Session: ZOOARCHAEOLOGY**

NAVAJO A

Chairperson: Katherine A. Spielmann

**Participants**

- 1:00 Steve A. Tomka; Site Function and Bone Assemblage Variability  
 1:20 Brian Hesse; The Outer Limits: Estimating the Parameters of a Bag of Bones  
 1:40 Karen D. Lupo; Anatomical Part Selection and Bone Modification Among Modern Hadza Hunter-Gatherers  
 2:00 William C. Noble and Jacqueline Crerar; Neutral Iroquois Deer Management  
 2:20 David W. Anthony; Identification of Early Horse Riding Through Microscopic Bit Wear Analysis  
 2:40 Jack M. Broughton; Ichthyofaunal Quantification Issues Involving the Determination of Relative Abundance  
 3:00 Stephanie D. Livingston; A Taphonomic Analysis of Two Great Basin Avifaunal Assemblages

**[16] General Session: RESEARCH REPORTS—EASTERN WOODLANDS**

NAVAJO A

Chairperson: Ann F. Ramenofsky

**Participants**

- 3:30 J. Dunbar, Michael Faught and D. Webb; Page-Ladson: An Underwater Paleo-Indian Site of NW Florida  
 3:40 William R. Belcher; Archaeological Investigations at the Knox Site (30-21), East Penobscot Bay, Maine  
 3:50 Kevin P. McGowan; Late Woodland Relationships: A Shelbyville Locality Perspective

- 4:00 William S. Dancey; The Water Plant Site: An Early Late Woodland Village in Central Ohio  
 4:10 Charles R. Moffat; Investigations at the Little Muddy Shelter, Jackson County, Illinois  
 4:20 Wakefield Dort, Jr., Larry D. Martin, Edward J. Zeller and Gisela M. Dreschhoff; Human Bones, Including Cranial Parts, Associated with Bones of Extinct Fauna in Northeastern Kansas

**[17] Symposium: PUTTING FLESH ON THE BONES: ETHNOGRAPHIC ANALOGY AND CULTURAL DISCONTINUITY IN MAYAN MESOAMERICA**

NAVAJO B

Organizer and Chairperson: K. Anne Pyburn

**Participants**

- 1:00 Don Rice; Historical Analogy in the Study of the Maya Classic to Post-Classic Transition  
 1:15 Robin Robertson; Is the End the Beginning? Termination Rituals in the Late Preclassic  
 1:30 Richard R. Wilk; A Non-traditional View of Tradition, Applied to Modern Kekchi Maya  
 1:45 Elizabeth A. Graham and Grant Jones; Ethnohistorical Models for the Archaeology of the Conquest Period Maya  
 2:00 Dirk Van Tuerenhout; From Continuity in Form to Continuity in Meaning: the Role of Ethnographic Analogy in Maya Archaeology  
 2:15 Maynard B. Cliff; Indigenous Lowland Maya Nucleation—an Ethnohistorical Perspective  
 2:30 K. Anne Pyburn; Warring Tribes, Trader Chiefdoms, Feudal States: Analogies and Realities in the Evolution of Nohmul  
 2:45 Discussant: Brian D. Hayden

**[18] General Session: PLAINS ARCHAEOLOGY**

NAVAJO B

Chairperson: Charles A. Reher

**Participants**

- 3:10 Michael D. Metcalf and Kevin D. Black; Early Archaic Pit House Architecture in the Colorado Rockies: Implications for Seasonal Sedentism and Year-Round Habitation of High Altitudes  
 3:30 Donald J. Blakeslee; Tools, Trails and Territories  
 3:50 Richard R. Drass and Peggy Flynn; Temporal and Geographic Variations in Subsistence Practices for Plains Villagers in the Southern Plains  
 4:10 Charles A. Reher; Culture Change and Continuity on the Prehistoric High Plains  
 4:30 Craig S. Smith; Intrisite Spatial Relationships and Prehistoric Hunters and Gatherers of Southwest Wyoming

**[19] Symposium: AGRICULTURAL ADAPTATIONS TO MARGINAL AREAS OF THE UPPER MIDWEST**

NAVAJO C

Organizers and Chairpersons: Robert J. Jeske and John P. Hart

**Participants**

- 1:00 Thomas J. Riley; From Horticulture to Agriculture in the Prairie Peninsula and its Northern Periphery  
 1:20 John M. O'Shea; Marginal Agriculture or Agriculture at the Margins: Maize Agriculture in the Upper Great Lakes  
 1:40 James J. Krakker; Late Prehistoric Corn Horticulture and Sociocultural Systems in Southeast Michigan  
 2:00 Gail E. Wagner; The Implications of the Adoption of Northern Flint Corn  
 2:20 John P. Hart; Variation in Mississippian Maize Production Across Environmental Gradients: Site Catchment Analysis  
 2:40 Charles W. Markman; The Mississippian Period in Northern Illinois: Hedging Bets and Maintaining Tradition  
 3:00 Robert J. Jeske; Agricultural Technology and Social Interaction at the Edge of the Prairie Peninsula

- 3:20 Robert F. Sasso; Aspects of Oneota Agriculture and Settlement in Western Wisconsin  
 3:40 Discussants: Gary W. Crawford and Guy Gibbon

[20] Symposium: ARCHITECTURE AND INTEGRATIVE RITUALS: ANASAZI ANALYSES

NAVAJO D

Organizers and Chairpersons: William D. Lipe and Michelle Hegmon

Participants

- 1:00 Michael A. Adler; Ritual Facilities and Social Integration in Nonstratified Societies: A Cross Cultural Perspective  
 1:20 William D. Lipe; Social Scale of Anasazi Integrative Facilities  
 1:40 Stephen Plog; Ritual, Exchange and the Development of Regional Systems  
 2:00 Richard H. Wilshusen; Unstuffing the Estufa: Ritual Floor Features in Anasazi and Pueblo Pit Structures, A.D. 600-1900  
 2:20 Michelle Hegmon; Ceramics and Style in Early Public Architecture in the North American Southwest  
 2:40 Mark D. Varien and Ricky R. Lightfoot; Ritual and Nonritual Activities in Mesa Verde Area Protokivas  
 3:00 Bruce A. Bradley; Kiva Use in the Thirteenth Century Mesa Verde Area: A New Assessment  
 3:20 E. Charles Adams; Western Anasazi Kivas: Contrasting Patterns in Form and Function from A.D. 1000 to A.D. 1500  
 3:40 Discussants: Stephen H. Lekson and Alfonso Ortiz

**FRIDAY MORNING APRIL 29, 1988**

[21] Symposium: COLUMBIAN QUINCENTENARY SYMPOSIUM, PART II: CONTACT PERIOD STRATEGIES IN THE CALIFORNIAS

NORTH BALLROOM

Organizer: David H. Thomas Organizer and Chairperson: Julia G. Costello

Participants

- 8:40 G. James West; Early Historic Vegetation Change in California: The Sub-Fossil Evidence  
 9:00 Julia G. Costello; California Missions: Internal Responses to External Change  
 9:20 David Hornbeck; Economic Growth of the California Missions  
 9:40 Ed D. Castillo; The Native Response to the Colonization of Alta California  
 10:00 Robert L. Hoover; Spanish-Native Interaction at a California Mission within a World Systems Framework  
 10:20 John R. Johnson; The Chumash and the Missions  
 10:40 Norman Neuerberg and Georgia Lee; The California Indians as Artists Before and After Contact  
 11:00 Phillip L. Walker, Patricia M. Lambert and Michael J. DeNiro; The Effects of European Contact and Missionization on the Diet and Health of Southern California Indians  
 11:20 R. Michael Mathes; Baja California: A Special Area of Contact and Colonization—1535-1697  
 11:40 Glenn J. Farris; The Russian Imprint on the Colonization of California

[22] Symposium: THEORY IN POST-PROCESSUAL ARCHAEOLOGY

SOUTH BALLROOM

Organizer and Chairperson: James A. Chiarelli

Participants

- 8:00 Thomas C. Patterson; History and the Post-Processual Archaeologies  
 8:20 Antonio Gilman; Marxism in Anglo-American Archaeology  
 8:40 James A. Chiarelli; On History, Positivism, and the Political Uses of Archaeology  
 9:00 Timothy Yates; Reading the Past: From Reconstruction to Deconstruction in Archaeology

- 9:20 Robert W. Paynter; Post-Structural Archaeology and the Politics of Everyday Life  
 9:40 Margaret W. Conkey and Joan M. Gero; Building a Feminist Archaeology  
 10:00 Christine Ward Gailey; Gender, Kinship, and Resistance in Class and State Formation  
 10:20 Allen Zagarell; History, Agency, Structure and Production  
 10:40 Parker B. Potter, Jr.; Jacques Lacan, Psychoanalysis, Radical Epistemology and Archaeology  
 11:00 Barbara Bender; Questions of Change and Stasis  
 11:20 Philip L. Kohl; Limits to a Post-Processual Archaeology (or The Dangers of a New Scholasticism)  
 11:40 Discussants: Ian Hodder, Merrilee H. Salmon and Mark P. Leone

[23] Symposium: ARCHAEOLOGICAL APPROACHES TO MEGAFAUNA

APACHE A-B

Organizers and Chairpersons: James M. Savelle and Allen P. McCartney

Participants

- 8:00 James M. Savelle; Approaches to Human-Megafauna Relationships in Prehistory  
 8:20 James F. O'Connell, K. Hawkes and N. Blurton Jones; Hadza Hunting and Scavenging and Their Archaeological Implications  
 8:40 Henry T. Bunn, Laurence E. Bartram and Ellen M. Kroll; Comparative Analysis of Butchery Practices by Hadza and Kua San Hunter-Gatherers  
 9:00 John W. Fisher, Jr.; Present-Day Elephant Butchery  
 9:20 Marvin Kay and George C. Frison; The Technology of Big Game Kills: Experimental Approaches to Tool Function  
 9:40 Gary Haynes; Elephant Bonesites: Graveyards or Slaughterhouses?  
 10:00 Jeffrey J. Saunders; Mammoth Procurement by Clovis Paleoindians  
 10:20 Igor I. Krupnik; Prehistoric Eskimo Whalers in the Arctic: Baby Slaughterers or Innate Ecologists?  
 10:40 David R. Huelsbeck; The Economic and Ecological Context of Northwest Coast Whaling  
 11:00 Allen P. McCartney and Edward D. Mitchell; Bones and Zones: Human Ecology and Thule Eskimo Whaling  
 11:20 Discussant: David R. Yesner

[24] General Session: MAYAN RESEARCH

HOPI B

Chairperson: Michael Blake

Participants

- 7:40 Thomas Fletcher; 'Closed' and 'Open' Village Economies and Wealth Status Expression Among Households  
 8:00 Elliot M. Abrams and AnnCorinne Freter; Intra-Polity Economics at Copan, Honduras  
 8:20 Norman Hammond; Nohmul: Evolution of a Maya City  
 8:40 Peter S. Dunham; Social Process and the Maya Collapse: The Classic Balkanization of the Southern Lowlands  
 9:00 Stephen L. Whittington; Spatial and Temporal Variation in the Classic Maya Population of Copan, Honduras  
 9:20 Heather J. McKillop and Lawrence Jackson; Development of Maya Sea Trade: Evidence From Wild Cane Cay, Belize  
 9:40 Michael Blake; Households at Canajaste: Integrating Symbols and Process in the Study of an Evolving Postclassic Maya State  
 10:00 Richardson B. Gill; The Great Maya Droughts

[25] General Session: DATING METHODS

HOPI B

Chairperson: Jeffrey S. Dean

Participants

- 10:30 J. M. Adovasio and R. C. Carlisle; The Meadowcroft Rockshelter Radiocarbon Chronology: Some Facts and Fictions

- 10:50 Andrew L. Christenson; The Cultural Sequences of Black Mesa and Tsegi Canyon, Arizona: A Comparison Using Mean Ceramic Dating  
 11:10 William L. Deaver and Lynn S. Teague; Archaeomagnetism as a Relative Dating Tool  
 11:30 Jeffrey L. Eighmy; Dating Hohokam Canals by the Archaeomagnetic Method  
 11:50 Jeffery F. Burton; Volcanism, Obsidian Hydration, and Archaeological Reality in the Western Great Basin

**[26] Symposium: BREAKING THE GORDIAN KNOT: NEW APPROACHES TO UNDECORATED CERAMICS**

**NAVAJO A**

Organizer: Arley W. Simon Organizer and Chairperson: Charles L. Redman

**Participants**

- 8:45 Warren R. DeBoer; The Decorative Burden: Media Shifts Among Pots, Baskets, Clothing, Houses, Human Skin, and Other Containers  
 9:20 Rita P. Wright; The Identification of Production Units in the Analytical Study of Ceramics  
 9:40 Gary M. Feinman and Sherman Banker; A Technological Perspective on Changes in the Ancient Oaxacan Greyware Ceramic Tradition  
 10:00 James M. Skibo, David J. Hally and Michael B. Schiffer; The Manufacture and Use of Fiber-Tempered Pottery from the Southeastern United States  
 10:20 Arley W. Simon; An Integrated Ceramic Analysis of Intersite Relationships Using Central Arizona Plainwares  
 10:40 Vincas P. Steponaitis, M. James Blackman and Russell Weisman; Chemical and Mineralogical Characterizations of Mississippian Pottery  
 11:00 James H. Burton; Plainware Provenience and Typology: A Trace Mineralogic Study  
 11:20 Discussants: Prudence M. Rice and Sander E. van der Leeuw

**[27] Symposium: FROM THE MISSISSIPPI TO THE RIO GRANDE: ARCHEOLOGICAL AND BIOARCHEOLOGICAL SYNTHESIS ON A CONTINENTAL SCALE**

**NAVAJO B**

Organizer and Chairperson: W. Fredrick Limp

**Participants**

- 8:20 W. Fredrick Limp; An Overview of the Overview: Managing Synthesis on a Continental Scale  
 8:40 Barbara A. Burnett; The Biological Correlates of Subsistence Among the Caddo of the Arkansas and Red Rivers and Northeast Texas  
 9:00 Anna M. Harmon; Bioarchaeology of the Lower Mississippi Valley in Historical Perspective  
 9:20 D. Gentry Steele and Ben W. Olive; Trends in Bioarcheological Research in Central and Southern Texas: Changes in the Data Base and Theoretical Orientation  
 9:40 Douglas W. Owsley; Bioarcheology in the Southern Plains: Past Trends and New Perspectives  
 10:00 Ann L.W. Stodder; The Status of Bioarcheological Research in the American Southwest  
 10:20 Jack L. Hofman and Robert L. Brooks; Black Holes and Bright Lights: Archeological Data Inventory and Interpretation of the Southern Great Plains  
 10:40 Alan H. Simmons and Patricia A. Hicks; Problems and Progress in Southwest Archaeology: A View from the Heartland  
 11:00 Stephen L. Black and Thomas R. Hester; Research Problems in the Archeology of Greater Southern Texas  
 11:20 Marvin D. Jeter and G. Ishmael Williams, Jr.; Overviewing Louisiana—and the Best Parts of Arkansas

**[28] General Session: EASTERN WOODLANDS**

**NAVAJO C**

Chairperson: Kent G. Lightfoot

**Participants**

- 8:00 John F. Doershuk; Koster Site Structure: the Rise of Sedentism in the American Midwest

- 8:20 Kent G. Lightfoot; The Role of Shellfish Exploitation Among Prehistoric Hunter-Gatherers of Coastal New York  
 8:40 Paul A. Webb; Emergent Mississippian in Southern Illinois: the View from the Pettit Site  
 9:00 Jay F. Custer and R. Michael Stewart; Stratified Holocene Cultural Sequence at the Upper Shawnee Island Site, Monroe County, Pennsylvania  
 9:20 James A. Robertson; Residential Movements and Hunter-Gatherer Settlement Systems  
 9:40 Alan J. Brown, George R. Holley, Neal H. Lopinot and William I. Woods; Cultural and Natural Explanations for Buried Late Prehistoric Sites in the American Bottom  
 10:00 Lawrence Jackson and Heather I. McKillop; Interior Paleo-Indian Settlement Strategies: A Case Study for the Lower Great Lakes  
 10:20 Duane Anderson and Lise Spargo; Modeling Early Historic Oneota Subsistence  
 10:40 Robert L. Thunen; Geometric Enclosures of the Mid South  
 11:00 Steven R. Pendery; Sacred Cows and Boston Brahmins: The Archaeology of the Boston Common

**[29] Symposium: RECENT ARCHAEOLOGICAL RESEARCH IN SOUTHEASTERN MESOAMERICA**

**NAVAJO D**

Organizers and Chairpersons: Marilyn P. Beaudry and Ariadne H. Prater

**Participants**

- 8:00 Arthur A. Demarest; The Ocos Culture in Upper Central America: New Evidence on its Nature and Distribution  
 8:20 James T. Myers and Arthur A. Demarest; New Evidence on the Economic Complexity and Evolution of the Early Preclassic Cultures of Pacific Guatemala  
 8:40 Michael W. Love; The Ceramic Chronology of La Blanca  
 9:00 C. Roger Nance; Guzman Mound, a Late Preclassic Salt Production Station Near Tilapa, San Marcos, Guatemala  
 9:20 Marilyn P. Beaudry and Eugenia J. Robinson; Late Preclassic Settlement Pattern in the Tiquisate Archaeological Zone  
 9:40 Susan M. Colby; Sin Cabezas, Guatemala—The Skeletal Remains  
 10:00 Ariadne H. Prater; Evolution of Art Styles at Kaminaljuyu: Sculptural Evidence  
 10:20 Marion Popenoe Hatch; The Protoclassic: New Evidence from Kaminaljuyu  
 10:40 Brian D. Dillon; Preliminary Ceramic Typology from Abaj Takalik, Retalhuleu, Guatemala  
 11:00 Hector Neff, Ronald L. Bishop and Frederick J. Bove; Compositional Patterning in Ceramics from Pacific Coastal and Highland Guatemala  
 11:20 William R. Swezey; The Cakhay/Cakchiquel Project  
 11:40 William R. Fowler, Jr.; In Search of the Elusive Pipil: An Application of the Conjunctive Approach

**[30] Symposium: EARLY CERAMIC POPULATION LIFEWAYS AND ADAPTIVE STRATEGIES IN THE CARIBBEAN**

**PIMA**

Organizer and Chairperson: Peter E. Siegel

**Participants**

- 8:00 Jay B. Haviser; Insular Adaptive Strategies During the Ceramic Age on Curacao  
 8:20 Aad H. Versteeg; The Internal Organization of a Pioneer Settlement in the Lesser Antilles: The Saladooid Golden Rock Site on St. Eustatius, Netherlands Antilles  
 8:40 Peter E. Siegel; Demographic and Architectural Organization Among Early Ceramic Groups in the Caribbean  
 9:00 Louis Allaire; The Saladooid Occupations of Martinique  
 9:20 Susan D. deFrance; Saladooid and Ostionoid Subsistence Adaptations: Zooarchaeological Data from a Coastal Occupation on Puerto Rico  
 9:40 William F. Keegan; Transition from a Terrestrial to a Maritime Economy: The Isotopic Record

- 10:00 Birgit Faber Morse; Early Saladoid Settlement Pattern and Subsistence System in St. Croix, Virgin Islands  
 10:20 Peter G. Roe; A Grammatical Analysis of Cedrosian Saladoid Vessel Form and Surface Decoration Aesthetic and Technical Styles  
 10:40 Irving Rouse; Transculturation on the Saladoid Frontier in Eastern Hispaniola  
 11:00 Discussants: Arie Boomert, Karl L. Hutterer and Anna C. Roosevelt

**[31] Symposium: THE ECONOMICS OF STORAGE: DEVELOPING AN INTERPRETIVE FRAMEWORK FOR ARCHAEOLOGY**

**MARICOPA**

Organizer: Patricia A. McAnany Organizer and Chairperson: R. Hawkins Bennett

**Participants**

- 8:00 Rhoda H. Halperin; Storage as an Economic Process  
 8:20 Kenneth M. Ames; Storage, Labor and Sedentism in the Interior Pacific Northwest  
 8:40 Randall Schalk; The Role of Food Storage in Long-Term Land Use Change on the Columbia Plateau  
 9:00 Mark S. Cassell; Who's Minding the Stores? Storage Management, Social Change, and Capitalist Development in North Alaska in the Late 19th Century  
 9:20 Susan Kent; Storage Areas and the Organization of Space: A Cross-Cultural Perspective  
 9:40 Leland Seales; Pitted Against Winter: Food Caching and Agriculture of the Middle Missouri Indians  
 10:00 Leslie Raymer; Storage Structures and Mobility Strategies: A View from the Southeast  
 10:20 Mark F. Seeman; The Use and Re-Use of Fort Ancient "Ash" Pits in the Ohio Valley: The Intersection of Two Cultural Subsystems  
 10:40 R. Hawkins Bennett; Reflections in a Distant Mirror: Archaeological Evidence for Storage as an Indicator of Culture Change  
 11:00 Michael P. Smyth; Storage, Wealth and Social Stratification: An Ethnoarchaeological Perspective  
 11:20 Thomas W. Killion and Patricia A. McAnany; A Funny Thing Happened on the Way Through the Formative  
 11:40 Discussant: Barry L. Isaac

**FRIDAY AFTERNOON APRIL 29, 1988**

**[32] Symposium: FIGHTING INDIANA JONES IN ARIZONA**

**NORTH BALLROOM**

Organizers and Chairpersons: A. E. Rogge and Shurban

**Participants**

- 1:00 Carl J. Phagan and Peter J. Pilles; Public Participation Archaeology at Elden Pueblo  
 1:15 Kelley A. Hays; Earthwatch Volunteers and the Homol'ovi Research Program  
 1:30 John W. Hohmann; The Besh-Ba-Gowah Archaeological Project  
 1:45 Charles L. Redman; Archaeological Open Houses as a Way to Reach the Public  
 2:00 Teresa L. Hoffman and Shereen Lerner; Arizona Archaeology Week: Promoting the Past to the Public  
 2:15 Peter J. Pilles; The Arizona Archaeology Advisory Commission and the Site Stewards Program  
 2:30 William H. Doelle and Thomas M. Kolaz; Archaeology and Community Involvement: An Experiment from the Private Sector  
 2:45 Jerry B. Howard and Sam Baar; SWAT, Inc.: A Program in Emergency Archaeology and Public Education  
 3:00 Charles R. Gilbert, Jean Cross and Grace Schoonover; The Arizona Archaeological Society's Avocational Certification and Education Programs  
 3:15 Christian E. Downum, James Gittings, Michael Faught and Arthur Vokes; Use of Archaeology as a Matrix for Job Skills Training  
 3:30 A. E. Rogge and Patti Bell; Teaching Teachers to Teach with Archaeology

- 3:45 Shurban; Archaeology is More Than a Dig  
 4:00 Donna Benge and Jeanne Miller; Archaeology in the Classroom  
 4:15 Susan L. Shaffer and Tami Mikesell; Myth-Making and Myth-Breaking: Museums, Archaeology and Public Education  
 4:30 Barbara J. Gronemann; Free Lancing Archaeology  
 4:45 Discussants: Francis P. McManamon and Alice B. Kehoe

**[33] Symposium: OF TIME AND THE RIVER: CHRONOLOGY AND ADAPTATION OF THE RIO GRANDE ANASAZI**

**SOUTH BALLROOM**

Organizers and Chairpersons: Patricia L. Crown and Robert P. Powers

**Participants**

- 1:00 David H. Snow; Northern Rio Grande Pueblo Prehistory: A Chronological Framework  
 1:20 Patricia L. Crown; Pot Creek Pueblo and the Chronology of the Taos Area Anasazi  
 1:40 Judith L. Miles; Refinement of Utility Ware and Black-on-White Ceramic Date Ranges for the Pajarito Plateau  
 2:00 Linda S. Cordell; The Chronology and Chronological Implications of Rowe Pueblo, NM  
 2:20 David W. Cushman; Obsidian Hydration Dating in the Northern Rio Grande  
 2:40 Anne I. Woosley; Population Aggregation and the Role of Large Pueblos in the Northern Rio Grande  
 3:00 Robert P. Powers; Chronology and Adaptation at Bandelier National Monument  
 3:20 Janet D. Orcutt; Changes in Settlement Organization on the Pajarito Plateau, NM  
 3:40 Genevieve N. Head; Hunting Technology and the Intensification of Agriculture: An Analysis of Projectile Points from the Pajarito Plateau  
 4:00 Katherine A. Spielmann; Changing Faunal Procurement Strategies at Gran Quivira Pueblo, NM  
 4:20 Discussant: Jeffrey S. Dean

**[34] General Session: LITHIC STUDIES**

**APACHE A-B**

Chairperson: M. Steven Shackley

**Participants**

- 1:00 Barbara J. Roth and Bruce B. Huckell; Cortaro Points and Cultural Complexity During the Late Archaic  
 1:20 Kenneth B. Tankersley; Foragers Do Not Live by Chert Alone  
 1:40 Kenneth E. Sassaman; Production for Exchange Among Prehistoric Hunter-Gatherers of the Savannah River Valley  
 2:00 Patricia A. Hicks; Attributes of Debitage as Temporal Indicators  
 2:20 M. Steven Shackley; Obsidian Studies in the Southwest: Geochemical and Archaeological Problems  
 2:40 Gregory M. Haynes; Analysis of Projectile Point Variability within the Kahorsho Site, Flagstaff  
 3:00 Mark Frederick Baumler and Christian E. Downum; Between Micro and Macro: A Study in the Interpretation of Small-Sized Lithic Debitage  
 3:20 C. Michael Barton; Middle Paleolithic Tools: Variability and Human Behavior  
 3:40 Charles A. Hoffman and Nancy Watford Hoffman; Hall Ranch Lithics: Archaic or Late Mogollon?  
 4:00 Kathryn M. Holland and Christy G. Turner II; Why Don't We Find Burins in Aleutian Sites?

**[35] Symposium: PARADIGMATIC BIASES IN EASTERN MEDITERRANEAN HUNTER-GATHERER RESEARCH**

**HOPI B**

Organizer and Chairperson: G. A. Clark

**Participants**

- 1:00 Gary O. Rollefson; Confessions of a Closet Empiricist  
 1:20 Paul R. Fish and Suzanne K. Fish; Modeling the Transition: A Comparative Analysis

- 1:40 Alan H. Simmons; Desperately Seeking Hippos: Early Man and Pygmy Hippopotamus in Cyprus  
 2:00 G. A. Clark; Biases in Levantine Hunter-Gatherer Archaeology: a Personal View  
 2:20 Anthony E. Marks; On Changing Assumptions in Mediterranean Hunter-Gatherer Research—a Personal Perspective  
 2:40 Ofer Bar-Yosef; Paradigmatic Biases in the Study of the Levantine Epipaleolithic and Neolithic  
 3:00 Donald O. Henry; Foraging, Sedentism and Adaptive Vigor: Rethinking the Linkages  
 3:20 Discussant: Arthur Jelinek

**[36] General Session: BIOARCHAEOLOGY**

NAVAJO A  
 Chairperson: Christopher Carr

**Participants**

- 1:00 Christy G. Turner, II and Jacqueline A. Turner; Settlement of the Americas Viewed from the USSR  
 1:20 J. E. Ericson, M. C. Manea-Krichten and C. C. Patterson; Prehistoric Lead Concentrations in Human Bones and Teeth: Initial Results  
 1:40 Douglas R. Mitchell; Mortuary Studies and Social Organization in the Hohokam Classic Period  
 2:00 Cathy J. Lebo; Settlement History and Demographic Stability of the Puebloan Occupation of Northern Black Mesa, Arizona  
 2:20 G. Lain Ellis; Philosophical Rights and Duties, and the Archaeological Exhumation of Human Remains  
 2:40 George R. Milner; The Effect of Intercommunity Conflict on the Adaptive Stance of a Late Prehistoric Midwestern Population  
 3:00 Nathan D. Hamilton and David R. Yesner; Late Woodland Burial Ceremonialism on the Western Maine Coast  
 3:20 Ann F. Ramenofsky, Ann M. Whitmer, Katherine Joiner, Jane E. Buikstra and Della C. Cook; The Relevance of Diagenesis in Bone and Soil for Dietary Reconstruction  
 3:40 William Green and Shirley Schermer; Red Ocher (Terminal Archaic) Physical Characteristics and Mortuary Behavior in the Upper Mississippi Valley  
 4:00 David Reed and Janet Brashler; Health and Status in the Late Prehistoric—The Eastern Fort Ancient Periphery

**[37] General Session: MESOAMERICAN RESEARCH**

NAVAJO B  
 Chairperson: Gary M. Feinman

**Participants**

- 1:00 Charles C. Kolb; Classic Teotihuacan Period Candeleros: A Preliminary Analysis  
 1:20 Patricia S. Plunket; Teotihuacan and the Valley of Atlixco, Puebla, Mexico  
 1:40 Gabriela Ururuela; Colotzingo: New Light on the Puebla Preclassic  
 2:00 Michael E. Smith; Long-distance Trade Under the Aztec Empire: The Archaeological Evidence  
 2:20 Arthur A. Joyce and Marcus C. Winter; Late Formative Highland-Lowland Interactions in Oaxaca, Mexico  
 2:40 Jack S. Williams; Archaeology, Social History, and the Problem of Political Control in Northern New Spain  
 3:00 Edward Williams; Study of the Prehispanic Stone Sculpture of West Mexico  
 3:20 Bruce E. Byland and John M.D. Pohl; Archaeological and Ethnohistoric Evidence for the Classic-Post Classic Transition in the Mixteca Alta  
 3:40 Bruce F. Benz; The "Wild Maize" from Tehuacan Revisited  
 4:00 Ben A. Nelson; Mesoamerica's Northern Frontier: The Need for a Domestic Dimension  
 4:20 Deborah L. Nichols and Thomas H. Charlton; Processes of State Formation: Core Versus Periphery in the Late Postclassic Basin of Mexico

- 4:40 Olivier de Montmollin; Group Stratification and Domestic Cycling in Mesoamerica  
 5:00 John M.D. Pohl and Bruce E. Byland; Ritual and Politics in Mixtec State Development: The Mixtec Historical Codices in Real Space and Time

**[38] General Session: WESTERN UNITED STATES**

NAVAJO C  
 Chairperson: Julie E. Francis

**Participants**

- 1:00 Thomas J. Connolly; A Prehistoric Culture-Historical Model for the Siskiyou Mountain Region of Southwest Oregon and Northern California  
 1:20 James C. Chatters; Prehistoric Exploitation of Freshwater Bivalves in Northwestern America  
 1:40 Margaret Purser; The Way They Tell It: Expanding the Use of Oral History in Historical Archaeology  
 2:00 Pamela E. Endzweig; Of Pipes, Pots, and People: Prehistoric Ceramics of Oregon  
 2:20 James H. Cleland; Stability and Change in the Procurement and Exchange of Coso Obsidian  
 2:40 Melissa B. Hagstrom and John A. Hildebrand; Subsistence Stress in Native Southern California: Kumeyaay Adaptation to European Contact at Wikalokal, San Diego County  
 3:00 Christopher Pierce; California's Millingstone Horizon: Of Mice or Men?  
 3:20 Kelly R. McGuire; Incised Stone Amulets: An Analysis of Style and Prehistoric Social Dynamics in North Central California  
 3:40 Sandra L. Snyder; Prehistoric Land Use Patterns in the Central Oregon Cascade Range  
 4:00 Albert C. Oetting; Holocene Land Use of Buffalo Flat, Christmas Lake Valley, Oregon  
 4:20 Lucy Lewis Johnson; Settlement Patterns in the Outer Shumagin Islands, Alaska

**[39] Symposium: BASIC RESEARCH IN THE MIDDLE LITTLE COLORADO RIVER AREA: BY THE PEOPLE AND FOR THE PEOPLE**

NAVAJO D  
 Organizer and Chairperson: Anne Trinkle Jones

**Participants**

- 1:00 Martyn D. Tagg; Projectile Point Typology for the Southern Colorado Plateau  
 1:25 Lisa C. Young; Lithics and Mobility: The Homol'ovi Chipped Stone Assemblage  
 1:45 Richard C. Lange; Prehistory of the Homol'ovi Ruins State Park, Winslow, AZ  
 2:05 Susan J. Wells; Settlement and Environment at Petrified Forest N.P. and Homol'ovi State Park: A Comparison  
 2:25 Amy A. Douglass; A Regional Perspective on Little Colorado White Ware Exchange  
 2:45 Discussants: George J. Gumerman and E. Charles Adams

**[40] Symposium: HOUSEHOLD AND STATE IN THE CENTRAL ANDES**

NAVAJO D  
 Organizers and Chairpersons: Jerry D. Moore and A.M. Ulana Klymyshyn

**Participants**

- 3:30 Alan L. Kolata; The Rural-Urban Axis and the Organization of the Tiwanaku State  
 3:30 Marc Bermann; Households, Residential Clusters and Domestic Economy at Lukurmata, Bolivia  
 3:50 A.M. Ulana Klymyshyn; Political Structure of the Kingdom of Chimor  
 4:10 Jerry D. Moore; Home is Where the Hearth is?: Domestic Organization and Political Policies on the Southern Frontier of the Chimor Empire (AD 1350-1470)  
 4:30 Terry Y. LeVine and Terence N. D'Altroy; Inka Political Strategy Among 15th Century Wanka Chiefdoms of the Central Andean Highlands  
 4:50 Bruce Owen, Glenn S. Russell and Cathy L. Costin; The Impact of Inka Policy on the Wanka Populace

**[41] Symposium: CERAMIC REPLICATION: DOWN AND DIRTY**

FIMA  
 Organizer and Chairperson: Judith A. Rasson

**Participants**

- 1:30 Kenneth C. Reid; Stone Soup: Replicating Subceramic Northern Meatpots

- 1:20 Ernestine Elster; Small Bowls, Big Roles: So-called Altars in the Neolithic of Southeast Europe  
 1:40 Sherri L. Hilgeman; Replicating Lower Ohio Negative Painted Ceramics  
 2:00 Russell Weisman; Where's the Buff? Replicating Hohokam Buffware Ceramics  
 2:20 Ruth Davis; Ceramic Spalling and the Recognition of Ceramic Manufacturing in Archaeological Sites  
 2:40 Michael B. Schiffer; Effects of Surface Treatment on Heating Effectiveness of Ceramics  
 3:00 Karen D. Vitelli; From Ceramic Technique to Social Behavior  
 3:20 Judith A. Rasson; Experimental Open Pit Firings: Achieving High Temperatures  
 3:40 Discussants: B. Robert Butler and Gordon Bronitsky

**[42] Symposium: RECONSTRUCTING BEHAVIOR AND SOCIAL ORGANIZATION: NEW INTERPRETATIONS FROM SOUTHEAST MESOAMERICA**

MARICOPA

Organizers and Chairpersons: Rosemary A. Joyce and Julia A. Hendon

Participants

- 1:00 Julia A. Hendon; The Distribution of Activities and Structure Use at Las Sepulturas, Copan, Honduras  
 1:20 Rosemary A. Joyce; Studying Activity Within the Site: A Reconsideration of the Data from Cerro Palenque, Honduras  
 1:40 Julie C. Benyo; Material Culture and Intrasite Social Organization  
 2:00 Anthony Wonderly; Toward Defining Ceramic Transformation in the Late Preclassic of Northwestern Honduras  
 2:20 Kazuo Aoyama; Some Socio-Economic Observations on Obsidian and Chert Artifacts in the La Venta Valley, Honduras  
 2:40 Seiichi Nakamura; Interaction Between the Lower Motagua and Northwestern Honduras  
 3:00 Etsuo Sato; Interaction Between La Entrada Region and Surrounding Area in the Preclassic and Classic Period

**SATURDAY MORNING APRIL 30, 1988**

**[43] Symposium: COLUMBIAN QUINCENTENARY SYMPOSIUM, PART III: CONTACT PERIOD STRATEGIES IN TEXAS AND NORTH MEXICO**

NORTH BALLROOM

Organizer: David H. Thomas Organizer and Chairperson: Thomas R. Hester

Participants

- 9:00 James E. Corbin; Spanish-Indian Interaction on the Eastern Frontier of Texas and Coahuila  
 9:20 Kathleen Gilmore; The Indians of Mission Rosario, Texas, from the Books and from the Ground  
 9:40 Anne A. Fox; Archaeological Investigations at Rancho de Las Cabras near Floresville, Texas  
 10:00 Jack D. Eaton; The Gateway Missions of the Lower Rio Grande  
 10:20 Thomas R. Hester; The Indian Response to Missionization on the Texas-Northeast Mexico Borderlands: Perspectives from Material Culture  
 10:40 Solveig A. Turpin; The Iconography of Contact: Spanish Influences in the Rock Art of the Middle Rio Grande

**[44] Symposium: METHODOLOGICAL CONTRIBUTIONS TO LITHIC ANALYSIS**

SOUTH BALLROOM

Organizer: Raymond P. Mauldin Organizer and Chairperson: Daniel S. Amick

Participants

- 8:30 Martin P.R. Magne; The Role of Lithic Reduction Experiments in Modelling Lithic Assemblage Formation Processes

- 8:50 David Pokotylo and Christopher Hanks; Measuring Assemblage Variability in Curated Lithic Technologies: A Case Study from the Mackenzie Mountains, Northwest Territories  
 9:10 Raymond P. Mauldin and Daniel S. Amick; Investigating Patterning in Debitage from Experimental Bifacial Core Reduction  
 9:30 William C. Prentiss and Eugene J. Romanski; Determining the Origins of Distinctive Debitage Assemblages: An Experimental Analysis  
 9:50 Janet M. Kerley; More Than One Way to Skin a Cat: A Comparison of Experimental and Archaeological Mesoamerican Blade-Core Technology  
 10:10 George H. Odell; Experiments in Lithic Reduction  
 10:30 Stanley A. Ahler; Experimental Knapping with KRF and Midcontinent Cherts: Overview and Applications  
 10:50 Brian D. Hayden and W. Karl Hutchings; Wither the Billet Flake?  
 11:10 Christopher A. Bergman, P. Barlow, S. Collyatt, M. Roberts and F. Wenban-Smith; Experimental Studies Applied to the Interpretation of Area A, Quarry 2 at the Lower Paleolithic Site of Boxgrove, West Sussex, England  
 11:30 Discussants: Harold L. Dibble and Lewis R. Binford

**[45] Symposium: ARCHAIC ADAPTATION AND BIOLOGICAL DIVERSITY AT THE FLORIDA WINDOVER SITE**

APACHE A-B

Organizers and Chairpersons: Glen H. Doran and David N. Dickel

Participants

- 8:00 Glen H. Doran; An Overview of the Windover Archaeological Research Project  
 8:20 Scott A. Stout and W. Spackman; Paleoecology of the Windover Farms Archaeological Site as Determined by the Petrology and Chemistry of the Peats  
 8:40 Richard G. Holloway; Palynology of Windover Peats  
 9:00 Lee Newsom; Paleoethnobotanical Remains from a Waterlogged Archaic Period Site in Florida  
 9:20 David N. Dickel; Human Osteology and Adaptation at the Windover Site, Florida (8-BR-246)  
 9:40 Tammy T. Stone; Conservation of Bone from Wet Land Sites  
 10:00 Joan S. Gardner; Conservation of the Windover Fabric and Wood Specimens  
 10:20 Rhonda L. Andrews and J. M. Adovasio; Textile and Related Perishable Remains from the Windover Site  
 10:40 Cynthia D. Dickel, Mary A. Ashley, Philip J. Laipis and William H. Hauswirth; Isolation of Human DNA from Archaeological Remains  
 11:00 Noreen Tuross; Bone Chemistry and Archaeometric Implications  
 11:20 David G. Smith; Windover Serum Protein Phenotypes  
 11:40 Discussant: George Armelagos

**[46] Symposium: EMPIRES IN COMPARATIVE PERSPECTIVE: ECONOMIC AND POLITICAL DYNAMICS**

HOPI B

Organizer: Sander E. van der Leeuw Organizer and Chairperson: Timothy Earle

Participants

- 7:50 Maurizio Tosi; Children of Two Wombs: the Central Asian Empires and their Formative Processes from Herds and Oases  
 8:20 Sander E. van der Leeuw; Roman Expansion: When, How and How Much?  
 8:40 Ross Hassig; Structure and Development of the Aztec Empire  
 9:00 Terence N. D'Altroy; Inka Imperial Strategy: The Wanka Case in Comparative Perspective  
 9:20 Discussant: Gregory Johnson

**[47] General Session: RESEARCH REPORTS—METHODS AND TECHNIQUES**

HOPI B

Chairperson: C. Russell Stafford

Participants

- 9:50 Joel S. Boaz; Recent Mesolithic-Neolithic Excavations on the Dokkfloy, Interior Eastern Norway

## Saturday Morning, April 30

- 10:00 Eugene M. Hattori and Donald R. Tuohy; Technological Analysis of Flaked Stone Crescents
- 10:10 Jenny L. Adams; Preliminary Results from Use-Wear Analysis on Ground Stone Tools
- 10:20 Robert B. Owen and Payson D. Sheets; The Use of Optical Contouring and Holographic Techniques in the Analysis of Archeological Materials
- 10:30 Cindy J. Bunker; From Dentures to Denticulates: The Replication of Chipped Stone Artifacts in Acrylic
- 10:40 Marie M. Selvaggio and Robert J. Blumenschine; Percussion Marks: A New Class of Modification to Bone Surfaces
- 10:50 Michael J. DeNiro and Steven Weiner; Two New Approaches to Preparing Unaltered Organic Material from Prehistoric Bone for Isotopic Analysis
- 11:00 Barbara K. Montgomery; Methodological Issues in Refining Ceramic Cross-Dating
- 11:10 Gloria London; The Identification of Pottery Production Locations Based on Ethnoarchaeological Research
- 11:20 Beth Alpert Nakhai; The Transition from the Late Bronze Age to the Early Iron Age at Tell El-Wawayat, Israel
- 11:30 Mark E. Hall; Iron Working in Viking Dublin
- 11:40 Christopher R. Hoffman; Prehistoric Metallurgy, Technological Change and Cultural Context at Son Matge, Mallorca, Spain

## [48] General Session: SOUTH AMERICAN RESEARCH

## NAVAJO A

Chairperson: Katharina J. Schreiber

## Participants

- 7:40 George J. Gumerman, IV; Dietary Variation on the Scale of the Social Group: An Example from the Prehistoric Site of Pacatnamu, Peru
- 8:00 Coreen E. Chiswell; An Analysis of Architectural Function at Pacatnamu, North Coast, Peru
- 8:20 Mary Houghteling and Garth Bawden; The Wawakiki Complex and Early Hydraulic Cultural Development on the Far South Coast of Peru
- 8:40 David L. Browman; Archaeolinguistic Models: Aymara-Quechua Boundaries and the Wari-Tiwanaku Interface
- 9:00 Joan M. Gero; Early Administrative Centers in the Callejon de Huaylas, Peru
- 9:20 Thomas Pozorski and Shelia Pozorski; Prehistoric State Organization in the Casma Valley, Peru
- 9:40 Cathy L. Costin; Ceramic Exchange Among the Prehispanic Wanka of Highland Peru
- 10:00 Alfred H. Siemens; Wetlands of El Oro, Southwestern Ecuador
- 10:20 John E. Staller; Unifacial Lithic Industry from Lowland El Oro, in Southwestern Ecuador

## [49] General Session: RESEARCH REPORTS—MIDDLE AMERICA AND SOUTH AMERICA

## NAVAJO A

Chairperson: Scott L. Fedick

## Participants

- 10:50 Mary G. Hodge and Leah D. Minc; Locating Aztec Ceramic Production and Distribution Centers
- 11:00 John K. Mallory; Inferences Concerning Structure Function and Social Organization at 9M22-B, a Patio Group at Copan, Honduras
- 11:10 John D. Wingard; A Preliminary Evaluation of the Potential Role of Soils in the Developmental Sequence at Copan, Honduras
- 11:20 James F. Garber, Thomas H. Guderjan and Herman A. Smith; The Archaeology on Ambergris Cay, Belize: The Results of the 1987 Season
- 11:30 Mary DeLand Pohl, Gary Fry, Dolores Piperno and Frederick M. Wiseman; Ancient Maya Coprolites
- 11:40 Kathy Hensler, Jonathan Kent and Vern Hensler; A Nasca 6-8 Cemetery from Acari, Peru
- 11:50 Carl Spath; Isla Puna: Sea Merchants' Hinterland

## Saturday Morning, April 30

## [50] Symposium: ABU HUREYRA AND THE ADVENT OF AGRICULTURE ON THE SYRIAN EUPHRATES

## NAVAJO B

Organizer and Chairperson: Andrew M. T. Moore

## Participants

- 8:00 Andrew M. T. Moore; The Excavation of Abu Hureyra 1
- 8:20 Deborah I. Olszewski; Stone Tool Use at Abu Hureyra 1
- 8:40 Sandra L. Olsen; The Bone Artifacts from Abu Hureyra
- 9:00 Peter A. Rowley-Conwy; Animal Bones from Abu Hureyra: Methods of Study and Their Results
- 9:20 Anthony J. Legge; Steppe Hunting and the Origins of Animal Domestication at Abu Hureyra
- 9:40 Gordon C. Hillman; Plant Food Economy of the Two Settlements at Abu Hureyra: Dietary Diversity, Seasonality and Advent of Agriculture
- 10:00 Theya I. Molleson; The People of Abu Hureyra
- 10:20 Discussant: Frank Hole

## [51] General Session: SOUTHWEST STUDIES II

## NAVAJO B

Chairperson: Owen Lindauer

## Participants

- 10:40 Timothy M. Kearns; The Flat Top Mountain Quarry Sites and Desert Varnish in the Four Corners Region
- 11:00 Susan M. Collins; Architectural Geometry of Mesa Verde Great Pueblo Structures
- 11:20 Bert Zaslow; Programming the Weaving Process to Generate Anasazi Decorations
- 11:40 Deni J. Seymour; Sobaipuri Settlement Along the Upper San Pedro Valley, Arizona

## [52] General Session: METHOD AND THEORY IN ARCHAEOLOGY

## NAVAJO C

Chairperson: Shirley Powell

## Participants

- 7:40 Robert L. Kelly; Shifting Perspectives: A New Look at Hunter-Gatherer Sedentism
- 8:00 Susan Dobyns; The Changing Nature of Status Goods in Intercultural Exchanges
- 8:20 Barry V. Rolett; Origins of Marquesan Culture in the Context of East Polynesia
- 8:40 Shirley Powell and Sylvia W. Gaines; Partitioning the Sources of Variation in Multiproject Survey Data
- 9:00 William B. Lees; Site Formation Processes in Historical Archaeology
- 9:20 Duncan Metcalfe and Kathleen M. Heath; Micro-Refuse and Site Structure: An Archaeological Example
- 9:40 Glenn Davis Stone; Agricultural Intensity and Residential Mobility: An Archaeological Perspective on Boserup

## [53] General Session: RESEARCH REPORTS—SOUTHWEST UNITED STATES

## NAVAJO C

Chairperson: Robert C. Euler

## Participants

- 10:10 Robert C. Euler; Anasazi Responses to Paleoenvironmental Change in Southeast Utah
- 10:20 Donald A. Graybill and Chester W. Shaw, Jr.; Recent Prehistoric Dendroclimatic Estimates and Their Interpretive Significance in Southwestern Archaeology
- 10:30 Kenneth W. Decker and Larry L. Tieszen; Isotopic Reconstruction of Mesa Verde Diet from Basketmaker III to Pueblo III
- 10:40 David G. Robinson and Heather B. Trigg; Chronology and Archaeobotany: Pueblo Period Subsistence Practices in the Middle San Francisco River Valley, West-Central New Mexico
- 10:50 John Allen Peterson; Change or Continuity? Pithouse to Pueblo Transition Along the Middle San Francisco River, West Central New Mexico

## Saturday Morning, April 30

- 11:00 T. J. Ferguson and Barbara J. Mills; Wood Reuse in Puebloan Architecture: Evidence from Historic Zuni Settlements  
Lee Fratt; Use-Wear Analysis of Homolovi Groundstone Artifacts
- 11:20 Jean Landrum; Modeling Mogollon Cultural Change
- 11:30 Stephen Germick, Jr. and John W. Hohmann; Community and Ceremonial Rooms at Salado Sites
- 11:40 Johna Hutira and Jennifer W. Gish; Archaic Adaptations in South Central Arizona: The Tator Hills Archaic Project
- 11:50 Scott L. Fedick and Richard W. Effland, Jr.; Analysis of Prehistoric Hohokam Land Use Patterns: Converging Lines of Evidence from Non-Site Archaeology
- 12:00 David M. Schaller and Douglas R. Mitchell; Ground Stone Artifact Petrography: Geology and Archaeology of Local Trade Patterns for the Phoenix Basin Hohokam
- 12:10 Rose Marie Havel; Water Conservation: When, Where, and Why

## [54] Symposium: A COASTAL CHUMASH CENTER DURING THE CONTACT PERIOD

## NAVAJO D

Organizers and Chairpersons: Lynn H. Gamble and Douglas B. Bamforth

## Participants

- 8:00 Susan Warren-Kunkler, John R. Johnson and Claude N. Warren; Ethnohistoric Research Regarding Helo', a Chumash Village on Mescalitan Island
- 8:20 Thomas K. Rockwell and Lynn H. Gamble; Reconstruction of Original Topography Using Soil Geomorphology at SBa-46
- 8:40 Lynn H. Gamble; The Spatial Analysis of Helo'
- 9:00 Douglas B. Bamforth; Stone Tools, Steel Tools: Contact Period Household Technology at Helo'
- 9:20 Brian K. Glenn, Phillip L. Walker and Natalie Anikouchine; Exploitation of Faunal Resources at SBa-46
- 9:40 Chester D. King; Beads from Helo'
- 10:00 Discussant: Michael A. Glassow

## [55] Symposium: THE MEANING OF IMPORTS

## NAVAJO D

Organizer and Chairperson: Peter S. Wells

## Participants

- 10:30 William W. Fitzhugh; It Comes from Away: An Arctic Perspective
- 10:50 Stephen L. Dyson; Imports and the Reconstruction of Roman Rural Household Rituals
- 11:10 William A. Turnbaugh; Trade and Resistance in 17th Century New England
- 11:30 Peter S. Wells; The Meaning of Mediterranean Imports to Iron Age Europeans

## [56] Symposium: THE COMPLEX TRIBE IN PREHISTORY: RECONSTRUCTING POLITICAL CENTRALIZATION IN THE ARCHAEOLOGICAL RECORD

## PIMA

Organizers and Chairpersons: John W. Hoopes and Michael N. Geselowitz

## Participants

- 9:00 John W. Hoopes; The Complex Tribe in Prehistory: Sociopolitical Organization and the Archaeological Record
- 9:20 John Bower; The "Distribution of Wealth" in the East African Pastoral Neolithic
- 9:40 Tristram R. Kidder; The First North American Chiefdom? Social Complexity in the Poverty Point Culture, 2000-500 B.C.
- 10:00 Michael N. Geselowitz; The Complex Tribe in Early Bronze Age England
- 10:20 C. Clifford Boyd, Jr. and Gerald F. Schroedl; Complex Tribes and Cultural Complexity in the Prehistory of East Tennessee
- 10:40 Philip DeBarros; Political Centralization and the Bassar Iron Industry of Northern Togo

## Saturday Afternoon, April 30

- 11:00 Judith A. Habicht-Mauche; Town and Province: Regional Integration and Economic Interaction Among the Protohistoric Rio Grande Pueblos
- 11:20 Discussants: Robert D. Leonard and Jonathan Haas

## [57] Symposium: THE STATUS AND DIRECTION OF HOHOKAM ETHNOBIOLOGY

## MARICOPA

Organizer: Scott Kwiatkowski Organizer and Chairperson: Robert E. Gasser

## Participants

- 8:40 J. Simon Bruder; A Look at Archaeological/Ethnobiological Collaboration in Hohokam Studies
- 9:00 Robert E. Gasser and Scott Kwiatkowski; Regional Variability in a Temporal Framework: Hohokam Plant Use
- 9:20 Vorsila L. Bohrer; Recently Recognized Cultivated and Encouraged Plants Among the Hohokam
- 9:40 Charles H. Miksicek; New Directions in the Analysis of Biological Remains from Hohokam Flotation Samples
- 10:00 Jennifer W. Gish; Current Trends, Recent Discoveries, and Future Directions in Hohokam Palynology
- 10:20 Marcia L. Donaldson and Suzanne K. Fish; Production and Consumption in the Archaeological Record
- 10:40 Steven R. James; Subsistence Stress and Species Diversity: Monitoring Agricultural Origins in Hohokam and Other Southwestern Archaeofaunas
- 11:00 Christine R. Szuter; Hunting by Prehistoric Horticulturalists in the American Southwest
- 11:20 T. Michael Fink and Charles F. Merbs; Hohokam Paleonutrition and Paleopathology: A Search for Correlates
- 11:40 Discussants: Frank E. Bayham, Paul E. Minnis and David E. Doyel

## SATURDAY AFTERNOON APRIL 30, 1988

## [58] Symposium: BEYOND BOUNDARIES IN TIME AND SPACE: THE UTILITY OF THE SITE CONCEPT

## NORTH BALLROOM

Organizer: Eileen L. Camilli Organizer and Chairperson: Jacqueline Rossignol

## Participants

- 1:00 Robert C. Dunnell; Formation of the Archaeological Record and the Notion Site
- 1:20 James Ian Ebert; The Resolution and Equation of Archaeological and Ethnographic Space and Time
- 1:40 Jacqueline Rossignol; Changing Relationships Between Analytical Units and Interpretive Concepts in a Developing Archaeological Science
- 2:00 Eileen L. Camilli; Artifact Recycling and Spatial Structure in Continuous Surface Distributions
- 2:20 Marek Zvelebil; Lithic Scatters, Archaeological Landscapes and Human Behavior
- 2:40 Mark Edmonds and Robin Torrence; Lost in Space: Linking Lithic Technology to Prehistoric Land Use
- 3:00 John F. Cherry and Jack L. Davis; High Density Distributional Archaeology: A Mediterranean Perspective
- 3:20 Arlene M. Rosen; Beyond the Artifact: Sediments and Microartifacts in Archaeological Analysis
- 3:40 George T. Jones and Charlotte Beck; Chronological Resolution in Distributional Archaeology
- 4:00 Lewis R. Binford; Dimensional Specialization and Archaeological Research
- 4:20 LuAnn Wandsnider; Boundary, Structure, and Content: How Site Determination Methods Influence the Past

- 4:40 C. Russell Stafford and Edwin R. Hajic; Geoenvironmental Approaches to Understanding Prehistoric Settlement Strategies  
 5:00 Discussant: Robert Foley

**[59] Symposium: TROWEL AND ERROR: NEW VIEWS OF PREHISTORIC ARCHAEOLOGY**

SOUTH BALLROOM

Organizers and Chairpersons: Margaret W. Conkey and Carmel Schrire

**Participants**

- 1:00 John W. K. Harris; New Directions in the Archaeology of Human Origins, East Africa  
 1:25 Robert J. Blumenschine; The Taphonomic Trio: Mechanics, Energetics and Ecology  
 1:45 Nancy Howell; The Tasaday and the !Kung: Reassessing Reports of Isolated Hunter-Gatherers  
 2:05 Hilary J. Deacon; Results of Recent Excavations at Klasies River Mouth  
 2:25 Carmel Schrire; The Historical Archaeology of Colonialism in South Africa  
 2:45 Rhys M. Jones; The Pleistocene Colonization of the Pacific  
 3:05 David J. Meltzer; Why Don't We Know When the First People Came to America?  
 3:25 Alison S. Brooks; New Perspectives on Western European Prehistory  
 3:45 Ruth E. Tringham and Margaret W. Conkey; Living with Ambiguity: Social Life of Prehistoric Europe  
 4:05 Discussants: T. Douglas Price and Diane Gifford-Gonzalez

**[60] Symposium: PERSPECTIVES ON CHANGE: ETHNOHISTORICAL AND ARCHAEOLOGICAL APPROACHES TO CULTURE CONTACT**

APACHE A-B

Organizers and Chairpersons: J. Daniel Rogers and Samuel M. Wilson

**Participants**

- 1:00 Robert D. Leonard; History, Ethnohistory, Cultural Evolution and Archaeology: The Persistence of an Explanatory Dilemma in Contact Period Studies  
 1:20 Mary W. Helms; Gods or Devils or Only Men?  
 1:40 J. Daniel Rogers; Objects of Passion: Identifying Social Constraints on Material Change  
 2:00 Thomas H. Charlton and Patricia Fournier G.; Urban and Rural Dimensions of the Contact Period in the Basin of Mexico: A.D. 1521-1620  
 2:20 Janine Gasco; Socioeconomic Change within Native Society in Colonial Soconusco, New Spain  
 2:40 Samuel M. Wilson; Structure and History: The Emergence of the Caribbean Chiefdoms  
 3:00 Gregory A. Waselkov; Historic Creek Indian Responses to European Trade and the Rise of Political Facions  
 3:20 David H. Thomas; Saints and Soldiers at Mission Santa Catalina (Georgia): Alternative Hispanic Designs for Colonial America  
 3:40 Susan A. Kaplan; Eighteenth Century Labrador Inuit Transformations  
 4:00 Discussant: William W. Fitzhugh

**[61] Symposium: THE GOSHEN CULTURAL COMPLEX AND HIGH PLAINS PALEOINDIAN STUDIES**

HOPI B

Organizers and Chairpersons: George C. Frison and Lawrence C. Todd

**Participants**

- 1:00 Gerald R. Clark; Discovery and Investigation of the Mill Iron Site: The Federal Agency Role  
 1:20 Eric E. Ingbar and Mary Lou Larson; Site Structure at the Mill Iron Site, Montana  
 1:40 Lawrence C. Todd and David J. Rapson; Bonebed Analysis and Paleoindian Studies: The Mill Iron Site  
 2:00 George C. Frison and Bruce A. Bradley; Possible Cultural Relationships of Goshen as Expressed in the Mill Iron Site [24CT30] Lithic Materials  
 2:20 Marcel Kornfeld and Kaoru Akoshima; Goshen Complex Technology: A Study of Tool Use and Morphology  
 2:40 John P. Albanese; Geology of the Mill Iron Site [24CT30], Carter County, Montana

- 3:00 Julie E. Francis; Chipped Stone Raw Materials from the Mill Iron Site, Southeastern Montana  
 3:20 Danny N. Walker; Taxonomy of North American Late Pleistocene Bison and the Mill Iron Site Local Fauna  
 3:40 Linda Scott Cummings; Paleoenvironmental Interpretations for the Past 11,000 Years in Southeastern Montana  
 4:00 Ruthann Knudson; A Suggested Centplano Tradition  
 4:20 Discussant: H. M. Wormington

**[62] General Session: BIO-PHYSICAL METHODS AND TECHNIQUES**

NAVAJO A

Chairperson: James Schoenwetter

**Participants**

- 1:00 Renee S. Kra; The International Radiocarbon Data Base: A Progress Report  
 1:20 Karolien Debusschere, Kam-Biu Liu and Douglas W. Owsley; Palynology of Mud Samples Associated with Human Remains in an 18th Century Cemetery in New Orleans, Louisiana  
 1:40 L. Anthony Zalucha; Site Types and Sample Requirements for Vegetational Reconstruction Based on Charcoal  
 2:00 Robert E. Murry, Jr.; Anasazi and Mogollon Mortuary Vessel and Artifact Function as Determined by Pollen Analysis  
 2:20 Mary Jane Berman, Deborah Pearsall and Perry L. Givnecki; Paleoethnobotanical Investigations at an Early Contact Site, San Salvador, The Bahamas  
 2:40 Bruno D. Marino and Michael J. DeNiro; The Use of Stable Oxygen and Hydrogen Isotope Ratios of Cellulose from Archaeological Plants to Reconstruct Past Climate  
 3:00 Mark Schurr and Brian G. Redmond; Expected Carbon Stable Isotopic Compositions of Incipient Maize Agriculturalists

**[63] Symposium: THE SICAN AND THEIR NEIGHBORS: NORTH-CENTRAL ANDEAN INTERACTION**

NAVAJO B

Organizer and Chairperson: Izumi Shimada

**Participants**

- 1:00 Izumi Shimada; The Sican and Their Neighbors: A Tentative Characterization and Issues  
 1:20 Kathryn M. Cleland and Izumi Shimada; Distribution of Sican Styles in the North Central Andean Interaction Sphere: Social, Political, and Economic Inferences  
 1:40 Ryozo Matsumoto; The Cajamarca Culture: Its Evolution and Interaction with Coastal Peer Polities  
 2:00 Herbert H. Eling; The Jequetepeque Valley, North Peru: Its Visitors and Its Autonomy During the Middle Horizon  
 2:20 Jeffrey Quilter; End Game: Late Moche Politics, Society, and Art  
 2:40 Elena Decima and James Richardson; The Upper Piura Valley: Vicus and Piura Occupation  
 3:00 Karen E. Stothert; Reconstructing Prehistoric Coastal Interaction in the Ecuador-North Peru Province in the Period A.D. 600-1000  
 3:20 Allison Paulsen; Prehistoric Relationships Between Ecuador and North Coast of Peru  
 3:40 Karen Olsen Bruhns; Highland Ecuador, Wari and Beyond  
 4:00 Discussants: Richard P. Schaadel and Patricia J. Lyon

**[64] Symposium: APPROACHES TO JAPANESE PREHISTORY**

NAVAJO C

Organizer and Chairperson: Richard Pearson

**Participants**

- 1:00 Clare Fawcett; The Political Significance of Japanese Archaeology  
 1:20 Carl Falk and Peter Bleed; Between the Mountains and the Sea: Fauna and Hunting at Yagi, an Early Jomon Community in Southwestern Hokkaido, Japan

## Saturday Afternoon, April 30

- 1:40 Fumiko Ikawa-Smith; The Kamegaoka Social Networks  
 2:00 Brian S. Chisholm, Hiroko Koike and Nobuyuki Nakai; Prehistoric Diet in Japan: Isotopic Evidence  
 2:20 Nancy L. Vaida; Settlement of the Final Jomon Period in the Lower Kitakami River Area of the Tohoku Region, Japan  
 2:40 C. Melvin Aikens and Takeru Akazawa; Jomon-Yayoi Continuity: Language, Culture, Population  
 3:00 Richard Pearson; Exchange Systems in the Yayoi Period, Southwestern Japan  
 3:20 Gary W. Crawford; The Ezo Period and Northern Japanese Plant Husbandry  
 3:40 Gina L. Barnes; Japanese-like Remains in Korea: What Do They Signify?  
 4:00 William M. Hurley; Computer Analysis of the Yagi Ceramics, Hokkaido

## [65] Symposium: MODELING SUBSISTENCE CHANGE IN THE AMERICAN SOUTHWEST

## NAVAJO D

Organizer and Chairperson: Barbara S. Hildebrandt

## Participants

- 1:00 Barbara S. Hildebrandt; Generalization vs Specialization: Models of Change in Resource Procurement Strategies and Tactics  
 1:20 John D. Speth; Horticulture and Large Mammal Hunting: The Role of Resource Depletion and the Constraints of Time and Labor  
 1:40 Karen H. Clary; Archaeobotanical Approaches Towards Modeling Subsistence Change  
 2:00 David Rhode; Water Control and Agricultural Productivity in the Zuni Watershed  
 2:20 Nancy D. Sharp; Hunting Strategies and the Transition to Agriculture in the Northern Southwest  
 2:40 Paul E. Minnis; The Constant and the Variable in Anasazi Diet  
 3:00 Sarah W. Neusius; Population Growth, Climatic Change and Hunting Strategies Among the Dolores Anasazi  
 3:20 Jerome Zunie and Robert D. Leonard; Slices of Time: Unit Construction and Subsistence Change in the American Southwest  
 3:40 Discussants: Shirley Powell and Donald K. Grayson

## [66] General Session: QUANTITATIVE METHODS

## PIMA

Chairperson: Keith W. Kintigh

## Participants

- 1:00 Bryan A.P. Alvey; Phasing Archaeological Sites by Computer: A Graphic Solution  
 1:20 James J. Hester; Archaeology in the 21st Century.  
 1:40 Frederic W. Gleach; A Distribution Analysis of Lithic and Bone Materials from Cueva Morin, Spain  
 2:00 E. Ivonne De La Cruz; The Spatial Organization of Disposal Activities: A Common Pattern  
 2:20 Linda T. Grimm and Todd Koetje; Implications for Directional Changes in Subsistence Strategies of Spatial Patterning at Solticeux  
 2:40 Jane Stone; Computerized Image Storage and Manipulation: Tools for Archaeology  
 3:00 Thern N. Ladefoged; Settlement Pattern Analysis in Hawaii Volcanoes National Park, Hawaii  
 3:20 Peter Bleed; Event Tree Analysis as a Tool for the Study of Hunting Systems

## [67] Symposium: LARGE SITE ARCHAEOLOGY: PROBLEMS AND METHODOLOGICAL RESPONSES

## MARICOPA

Organizer and Chairperson: Ronald R. Kneebone

## Participants

- 1:00 Michael J. O'Brien; Problems in the Analysis of Large Archaeological Sites  
 1:20 David Webster; Investigations into Mayan Institutions and Culture History at Copan, Honduras

## Sunday Morning, May 1

- 1:40 Robert S. Santley; Craft Specialization, Refuse Disposal, and the Creation of Spatial Archaeological Records in Prehispanic Mesoamerica  
 2:00 Ronald R. Kneebone; An Investigation of Prehispanic Community Structure: Matacapán, Veracruz, Mexico  
 2:20 Steven D. Shellef and Jeffrey H. Altschul; Defining Groups Within Complex Phenomena  
 2:40 Richard C. Chapman and William H. Doleman; Testing Sites into Existence: Implications of Surface Visibility for Defining Large-Scale Low Density Artifact Distributions  
 3:00 James L. Boone and James G. Snyder; Refuse Deposits and Space Use in a Medieval Walled Settlement  
 3:20 Discussants: George L. Cowgill and Charles L. Redman

## SUNDAY MORNING MAY 1, 1988

## [68] Symposium: UNDERSTANDING CULTURAL VARIABILITY IN THE CHACO

## NORTH BALLROOM

Organizers and Chairpersons: Stephen R. Durand and Lonnie C. Pippin

## Participants

- 8:40 W. James Judge; Sun Diggers to Sun Daggers: The Chaco Project in Retrospect  
 9:00 Thomas C. Windes; The Effects of Drought on Chacoan Occupation: Interpretations from Pueblo Alto  
 9:20 Peter J. McKenna; Late Bonito Phase Developments in the Animas Valley, New Mexico  
 9:40 Lonnie C. Pippin; Chaco Outliers and Their Role in the Chaco Phenomenon  
 10:00 Stephen R. Durand; Defining Chaco: A San Juan Basin Perspective  
 10:20 David E. Doyel; Some Observations on Chaco Exchange Networks and Regional Organization  
 10:40 Phillip H. Shelley; Hypotheses of Intraregional Technological Specialization and Exchange  
 11:00 Frances Joan Mathien; Exchange Systems of the Chaco Anasazi  
 11:20 R. Gwinn Vivian; Kluckhohn Reappraised: The Chacoan System as an Egalitarian Enterprise  
 11:40 Discussants: Linda S. Cordell and Cynthia Irwin-Williams

## [69] General Session: RESEARCH IN THE AMERICAN SOUTHWEST—II

## SOUTH BALLROOM

Chairperson: Steadman Upham

## Participants

- 8:00 James R. Allison; Using Anasazi Redwares to Reconstruct Prehistoric Trade Networks  
 8:20 David R. Abbott; Utilitarian and Social Aspects of Hohokam Red Ware: Results from the Las Colinas Project  
 8:40 Thomas R. Rocek; A Navajo Ethnoarchaeological Perspective on Seasonal Site Artifact Assemblages  
 9:00 Gary Huckleberry and Jerry B. Howard; The Value of Particle-size Analysis in Prehistoric Canal Studies  
 9:20 John M. Andresen; Artifacts from Compound F, Casa Grande Ruins National Monument, Arizona  
 9:40 Judy L. Brunson and Scott L. Fedick; Los Guanacos: One Hundred Years Later  
 10:00 Ann Valdo Howard; A Study of Specialized Production: Hohokam Shell Ornament Manufacture in Southwestern Arizona  
 10:20 Karen G. Harry; Social and Economic Implications of the Increase of Obsidian Use at Homolovi III  
 10:40 James D. Wilde and Charmaine Thompson; Changes in Spatial Perception in Anasazi Households in Southeastern Utah  
 11:00 David L. Carlson; Looking at the Big Picture: Large Scale Site Distributional Patterns in the Greater Southwest

## Sunday Morning, May 1

- 11:20 Mary Bernard-Shaw; Evidence for Prehistoric Water Control in the Tucson Basin  
 11:40 Elizabeth A. Brandt and Everett J. Bassett; Oral Histories as Cultural Resources

**[70] General Session: PAPERS IN ECONOMY AND SUBSISTENCE**

APACHE A-B  
 Chairperson: Amy A. Douglass

**Participants**

- 7:40 Carol F. Goldberg, Michael J. DeNiro and Phillip L. Walker; Stable Isotopes, Diet and Cultural Change in Southern California  
 8:00 Peter J. Bush, Kathleen M. Allen and George Grobe; Identification of Prehistoric Foodstuffs from Encrustation Analysis  
 8:20 James G. Cusick; Ceramic Change and its Links to Culture Change at a Contact Period Taino Site  
 8:40 Mollie S. Toll; Botanical Trash at a 16th Century Spanish Encampment in the Rio Grande Valley, New Mexico  
 9:00 Garry J. Cantley; A First Attempt at Modeling the Papago Economic System  
 9:20 Joel C. Janetski; Mobility Strategies of Late Prehistoric Hunter-Gatherers in Utah Valley  
 9:40 Stephen C. Lensink; A Dietary Comparison of Two Plains Village Societies

**[71] General Session: RESEARCH IN THE SOUTHEAST**

APACHE A-B  
 Chairperson: R. Christopher Goodwin

**Participants**

- 10:10 Jeffrey M. Mitchem; The Tatham, Ruth Smith, and Weeki Wachee Mounds: Early Spanish Contact Sites in West Peninsular Florida  
 10:30 Glen T. Hanson; Early Archaic Technological and Spatial Organization at the G.S. Lewis Site  
 10:50 Janet L. Ford; Time and Temper Meets Trend and Tradition  
 11:10 John F. Scarry; Stability and Change in Chiefly Societies: A Case Study of the Apalachee Chiefdom  
 11:30 Charles R. Ewen and B. Calvin Jones; Hernando de Soto's First Winter Encampment: Discovery and First Season of Excavation  
 11:50 David W. Stahle, Malcolm K. Cleaveland and John G. Hehr; Progress on the Prehistoric Dendrochronology of the Southeastern United States

**[72] Symposium: PLANT PROCUREMENT, PLANT PRODUCTION, AND SOCIAL RELATIONS IN THE PREHISTORIC EASTERN WOODLANDS**

HOPI B  
 Organizer and Chairperson: C. Margaret Scarry

**Participants**

- 9:00 Kathryn C. Egan; Minimax Models and Hunter-Gatherer Diet Reconstruction  
 9:20 Dee Anne Wymer; Cultural Change and Subsistence: Middle Woodland—Late Woodland Transition in the Midwest  
 9:40 Gayle J. Fritz; Adding the Plant Remains to Assessments of Pre-Mississippi Period Plant Husbandry  
 10:00 C. Margaret Scarry; Plant Food Production and the Emergence of the Moundville Chiefdom  
 10:20 Sissel Johannessen; Social Production and the Development of Mississippian Culture in the Cahokia Area  
 10:40 Neal H. Lopinot and William I. Woods; Archaeobotany, Environmental Degradation, and the Collapse of Cahokia  
 11:00 Frances B. King; Variation in Late Prehistoric "Oneota" Plant Use in the Upper Midwest  
 11:20 Discussants: Bruce D. Smith and Patty Jo Watson

**[73] Symposium: APPROACHES TO USING MICROCOMPUTERS IN ARCHAEOLOGY**

NAVAJO A  
 Organizer and Chairperson: David V.M. Stephen

- Participants**  
 9:00 Patricia Castalia; Computer Imaging Applications in Archaeology

## Sunday Morning, May 1

- 9:30 David V.M. Stephen; Personal Computers—A Tool for Modern Times?  
 9:50 Anna C. Roosevelt; Microcomputers in the Lower Amazon Project  
 10:10 Linda J. Brown; Data Organization and Retrieval: The Role of Personal Computers in the Field Laboratory  
 10:30 Harold L. Dibble and Shannon McPherron; Applying Micro-Based Computer Graphics to Paleolithic Field Research  
 10:50 Helen L. O'Brien; Collecting and Processing Cartographic Data with Microcomputers

**[74] General Session: THE NON-SITE CONCEPT**

NAVAJO B  
 Chairperson: James Ian Ebert

**Participants**

- 9:00 Claudia Chang; The Cultural Landscape of Pastoralism: Beyond the Site Concept  
 9:20 Sarah H. Schlanger; Place and Space: Persistent Land Use Patterns and Shifting Settlement Patterns  
 9:40 Robert E. Dewar and Kevin A. McBride; Remnant Settlement Patterns  
 10:00 Linda S. Mick-O'Hara; Examining the Complexity of Structural Environments in the Puebloan Southwest  
 10:20 Thomas B. Larsson; Settlement Patterns and Socioeconomic Behavior in Later Swedish Prehistory  
 10:40 Lars L. Forsberg; D-Curve Analysis as A Means of Studying the Patterning of Coarse-Grained Assemblages

**[75] Symposium: DECIPHERING A NORTHWEST COAST SHELL MIDDEN**

NAVAJO C  
 Organizer and Chairperson: Julie K. Stein

**Participants**

- 8:40 James W. Thomson, Cathy A. Gilbert and Bryn Thomas; Historic Treatment of a Prehistoric Northwest Landscape  
 9:00 Fran Whittaker and Julie K. Stein; Shell Midden Rectangles on the Northwest Coast: Plankhouses or Not?  
 9:20 Timothy W. Latas; Fire-cracked Rocks—Real or Imagined  
 9:40 Kim D. Kornbacher; Lithics and Lifeways: Clues from a Northwest Coast Shell Midden  
 10:00 Mark E. Madson; Microdebitage Analysis of Lithic Material in a Northwest Coast Shell Midden  
 10:20 Margaret A. Nelson; Plant Remains on the Northwest Coast: Sampling and Recovery  
 10:40 Pamela J. Ford; Faunal Remains at English Camp, San Juan Island, Where "Seasonality" is an Ethnographic Term  
 11:00 Angela R. Linse; Is Bone Safe in Shell Middens?  
 11:20 Patrick T. McCutcheon; A Procedure for Inferring the Temperature at which Archaeological Bone has been Burned  
 11:40 Discussants: David Sanger and Clement W. Meighan

**[76] Symposium: LONG-TERM CHANGE AND CONTINUITY IN THE SAUSA CULTURE: RESULTS FROM RECENT RESEARCH ON CENTRAL ANDEAN ADAPTATION AND SOCIAL MEDIATION**

NAVAJO D  
 Organizer and Chairperson: Christine A. Hastorf

**Participants**

- 8:00 Geoffrey O. Seltzer; Recent Glacial History of the Central Peruvian Highlands  
 8:20 Ruben Garcia Soto; Early Horizon Settlements in the Upper Mantaro Valley, Peru  
 8:40 Timothy Earle; Warfare and the Dynamics of Andean Chiefdoms  
 9:00 Christine A. Hastorf; Political Change Within Social Continuity in the Sausa Cultural Sequence  
 9:20 Lisa J. LeCount; Social and Economic Causes for the Increased Functional Variability in Sausa Ceramics from the Early Intermediate Period to the Late Horizon, Peru

- 9:40 Glenn S. Russell; Long-term Subsistence Change Among the Sausa of Peru: The Lithic Evidence
- 10:00 Elsie C. Sandefur; Domestic Animal Use in the Central Andes: Early Intermediate Period to Late Horizon
- 10:20 H. E. Wright, Jr. and Barbara C. S. Hansen; Vegetational History of the Central Peruvian Andes
- 10:40 Heidi A. Lennstrom; Botanical Remains from Pancan, Peru
- 11:00 Lynn L. Sikkink; An Ethnoarchaeological Perspective on Household Production and Crop-Processing in the Jauja Region, Peru
- 11:20 Discussants: Jeffrey R. Parsons and Bruce Winterhalder

## ABSTRACTS OF SYMPOSIA

### [1] COLUMBIAN QUINCENTENARY SYMPOSIUM, PART I: CONTACT PERIOD STRATEGIES IN THE SOUTHWESTERN HEARTLAND

The Society for American Archaeology anticipates the 1992 Columbian Quincentenary with a multi-year series of symposia exploring the strategic diversity during the early colonial period in the Spanish American Borderlands. We examine the Spanish strategies employed at the missions, the presidios and the pueblos. Papers likewise investigate the diverse Native American counter-strategies that evolved to cope with European intrusions. The symposia also evaluate the success and relevance of contemporary archaeological inquiry into European-Native American interaction in the Spanish-American Borderlands.

### [2] RECENT RESEARCH IN POST PROCESSUAL ARCHAEOLOGY

Studies incorporating post-processual theory and method in archaeology have in recent years become more common in the contexts of field research and analysis of field data. Examples drawn from ongoing studies illustrate the variety and applicability of post-processual thinking in expanding the interpretive capacity of archaeological inquiry beyond questions of ecology and cultural evolution toward issues of meaning, structure and history. In particular these papers explore the almost invisible political dimension in past societies. They humanize relations of power and ask how culture was used to express resistance to, or to negotiate an existence within, worlds of inequality.

### [3] REFITTING MORE THAN CORES: INTERPRETATION AND INFERENCE OF CONJOINABILITY

Refitting studies have most often focused on lithicdebitage, primarily for identification of manufacturing techniques and activity areas. This symposium explores the application of these kinds of analyses to a wider range of materials, including lithic, ceramic, ground stone and faunal materials. This wider range of conjoinable materials explored by refitting analyses allows for much greater latitude in the kinds of interpretations drawn from such studies. Multiple lines of inquiry can integrate results from distributions of different materials, to provide insight into cultural and natural processes that take place at different rates, greatly enhancing the interpretive power of each.

### [4] VILLAGES AND TOWNS: SOUTHWEST/MISSISSIPPINIAN PARALLELS

This symposium compares developments in the Mississippian and Southwestern parts of the U.S. by focusing on community patterns. Data on site plans, public facilities, household economics, craft production, and ceremonial practices are used to study variability in social organization.

### [5] CHICHEN ITZA: RECENT ADVANCES IN ARCHAEOLOGY, EPIGRAPHY, AND ART HISTORY

Despite intensive study, Chichen Itza remains poorly understood; key questions regarding its dates, extent and economy, as well as the identity of its inhabitants and the nature of its relationship with Tula, remain unanswered. In recent years, however, archaeologists, ethnohistorians, epigraphers, archaeoastronomers, and art historians have begun to debate the issues surrounding this important city. Resolving these questions is of crucial importance because of the pivotal role of Chichen Itza in Mesoamerican archaeology. Understanding the site will help to bridge the gap between the emerging history of the Classic period, especially in the Maya area, and the better documented one of the immediate pre-Conquest era.

### [6] ADOPTION OF AGRICULTURE IN THE SOUTHERN SOUTHWEST

The Chihuahuan desert of New Mexico and the Sonoran desert of Arizona have an important place in the prehistory of agriculture in the Southwest. Recent research projects in the southern Southwest have developed a series of reconstructions of the adoption of agriculture marked by provocative contrasts between the Sonoran and Chihuahuan zones, and between the low deserts and the mountains and plateaus of the northern Southwest. This symposium serves first as a forum for current views on agriculture in the southern Southwest, and second as a methodological critique of archaeological tools for recognizing the adoption of agriculture.

### [7] THE FRYXELL SYMPOSIUM: SOILS, LANDSCAPE EVOLUTION, AND HUMAN OCCUPATION

The first annual Fryxell Symposium will focus on soils in archaeology. Soils are integral parts of the landscape and reflect the passage of time for stable surfaces. Soils also support and record human occupations. In view of these characteristics of soils they can provide data important to archaeological research. Papers in the symposium will discuss soils for use in estimating the age of surfaces and

depositional episodes, for reconstructing past landscapes and landscape evolution, and for providing physical and chemical indicators of human occupation.

#### [11] PRACTICAL APPROACHES TO THE TREATMENT OF HUMAN REMAINS: AN EXAMINATION OF STATE LAWS AND FEDERAL POLICIES

The treatment of human remains is a highly emotional issue which continues to confront the archaeological and Native American communities. This symposium surveys the response to this challenging problem through an examination of state legislation and federal policies which address the treatment of human remains. The variety of approaches under differing administrative frameworks to issues such as burial sites protection, data recovery, analysis, curation, and reinterment provides a useful perspective to concerned archaeologists. Case studies illustrate both pitfalls and constructive options for dealing with the topic.

#### [13] GEOGRAPHIC INFORMATION SYSTEMS APPLICATIONS IN ARCHAEOLOGY

Geographic information systems permit the efficient storage and manipulation of large environmental databases. Archaeologists throughout the U.S. are exploring the applicability of GIS to a variety of analytical and managerial concerns. This symposium examines substantive results from GIS modeling efforts and resource management programs. The utility of GIS and methodological issues associated with their use are examined.

#### [17] PUTTING FLESH ON THE BONES: ETHNOGRAPHIC ANALOGY AND CULTURAL DISCONTINUITY IN MAYAN MESOAMERICA

Much of the flesh we hang on the bones of Maya archaeology originated in the ethnographer's notebook. But are our ethnographic analogies really adequate for reconstructing the evolution of a complex society? The belated discovery of defensive earthworks and intensive agricultural systems suggests that the direct historic approach is inappropriate for explaining much of Lowland Maya prehistory. Are there ways our selection of ethnographic data can be strengthened? The papers in this session address the potential inadequacy of ethnographic analogy for Maya prehistory, while suggesting guidelines for the use of this most valuable of the archaeologist's theoretical tools.

#### [19] AGRICULTURAL ADAPTATIONS TO MARGINAL AREAS OF THE UPPER MIDWEST

Papers in this symposium examine the adoption and development of maize agriculture on the periphery of the Prairie Peninsula. Less abundant resource bases and a shorter growing season in the Upper Midwest required a different set of adaptive responses than those found in the major river valleys such as the Mississippi and Lower Illinois. Economic and technological behaviors were more risk-reduction oriented than those in more stable environments. Ethnobotanical, ethnohistorical, technological, climatological, and settlement data are used to discuss cultural and biological adaptation to marginal conditions.

#### [20] ARCHITECTURE AND INTEGRATIVE RITUALS: ANASAZI ANALYSES

Archaeological study of facilities used for socially integrative rituals is an important source of information on the evolution of agricultural non-state societies; such studies also pose significant problems for archaeologists. The symposium examines some of these prospects and problems, focusing on examples from the Anasazi cultural sequence in the northern U.S. Southwest. Of particular interest are the functions and evolution of a class of prehistoric structures variously called proto-kivas, kivas, and "round rooms". Their relationship to historic Pueblo kivas is also considered.

#### [21] COLUMBIAN QUINCENTENARY SYMPOSIUM, PART II: CONTACT PERIOD STRATEGIES IN THE CALIFORNIAS

The Society for American Archaeology anticipates the 1992 Columbian Quincentenary with a multi-year series of symposia exploring the strategic diversity during the early colonial period in the Spanish American Borderlands. We examine the Spanish strategies employed at the missions, the presidios and the pueblos. Papers likewise investigate the diverse Native American counter-strategies that evolved to cope with European intrusions. The symposia also evaluate the success and relevance of contemporary archaeological inquiry into European-Native American interaction in the Spanish-American Borderlands.

#### [22] THEORY IN POST-PROCESSUAL ARCHAEOLOGY

Current developments in archaeology indicate a renewed interest in history of the use of structural and symbolic analysis, explicitly Marxist and critical theoretical arguments, and the reevaluation of strict logical positivist and nomothetic-deductive methodologies. Post-processual archaeology represents an attempt to move beyond the interpretive restrictions of middle range theory. Recent advances in theory propose the redirection of archaeological thinking toward issues of ideology,

meaning, gender relations, the historical and comparative analysis of political economies, archaeological epistemology and the political manipulation of the past.

#### [23] ARCHAEOLOGICAL APPROACHES TO MEGAFAUNA

Many current models of prehistoric hunter-gatherer cultural adaptation and development in various areas of the world are directly dependent upon our interpretation of human-megafauna relationships. The interpretation of such relationships, however, is in turn directly dependent upon an assessment of the exact role of megafauna in a society's economy; that is, were megafauna a) actively hunted, b) hunted on opportunistic basis only, and/or c) scavenged after death. Papers in this symposium focus on this issue, and employ a variety of theoretical and methodological approaches in various archaeological and ethnoarchaeological contexts.

#### [26] BREAKING THE GORDIAN KNOT: NEW APPROACHES TO UNDECORATED CERAMICS

Although undecorated ceramics comprise the majority of artifacts recovered from diverse sites across the world, efforts to derive useful interpretive information are usually frustrated. A variety of new approaches and technologies are used to confront this problem. Recent insights derived from ethnoarchaeology, compositional studies, and physical property analyses are presented using data from diverse New World and Old World cultures. Interpretive problems examined include ceramic production, vessel durability, technological change, provenience determination, stylistic expression and regional relationships. The success of individual techniques for problem solving is assessed in each case and integrated, multiple technique approaches are proposed by several participants.

#### [27] FROM THE MISSISSIPPI TO THE RIO GRANDE: ARCHEOLOGICAL AND BIOARCHEOLOGICAL SYNTHESIS ON A CONTINENTAL SCALE

During the last three years a large, multi-institutional team has worked to collate, review and synthesize archeological and bioarcheological knowledge for an area covering roughly one-third of the continental U.S. The project has been funded by the U.S. Army Corps of Engineers as the initial phase of work that is planned to be extended nationwide. The synthesis has resulted in significant new perspectives on the area's archeological record, particularly as a result of the comprehensive integration of archeological and bioarcheological data. The project has also generated a broad range of recommendations for COE (and other agencies') cultural resource management activities.

#### [29] RECENT ARCHAEOLOGICAL RESEARCH IN SOUTHEASTERN MESOAMERICA

Continuing investigations on the Pacific Slope and in the Highlands of Guatemala are providing data for refining local and regional sequences as well as for reconstructing the area's development and its role in Mesoamerican prehistory. The papers in this symposium present new information focused on the analysis of settlement patterns, skeletal remains, monumental sculpture, and ceramics (styles and chemical composition). This current research is addressing questions about the entire culture history of this important part of Mesoamerica—from the Early Preclassic Ocós through the Protoclassic to the ethnohistoric era.

#### [30] EARLY CERAMIC POPULATION LIFEWAYS AND ADAPTIVE STRATEGIES IN THE CARIBBEAN

The goal of this session is to address through the method of case studies aspects of Caribbean early ceramic group lifeways and adaptations to local environmental settings as well as to regional demographic processes. The origin, development, and spread of early ceramic groups as a cultural phenomenon is a major issue in Caribbean archaeology, integral aspects of which are the roles of stable vs. shifting dietary patterns, horticultural intensification, settlement stability and organization, and the processes or mechanisms of cultural dispersal. Through carefully selected case studies, a coherent session is offered that contributes to a comprehensive understanding of these groups as functioning cultural entities.

#### [31] THE ECONOMICS OF STORAGE: DEVELOPING AN INTERPRETIVE FRAMEWORK FOR ARCHAEOLOGY

Subsistence related storage is an important component of many New World cultures. Storage has not been adequately described and analyzed even though the archaeological record is replete with its evidence—underground pits, portable containers and architectural facilities. This symposium brings together examples of on-going, substantive studies of storage in both archaeological and ethnohistorical contexts and highlights the associated economic patterns (e.g. production, exchange, consumption). The papers, grouped by geographic region (e.g. Northwest, Southwest, Plains, Mesoamerica), are problem focused and approached from an economic perspective. Topics include the relationships between subsistence and storage, storage and mobility, and environment and storage as well as changes in storage systems through time.

## [32] Fighting Indiana Jones in Arizona

## [32] FIGHTING INDIANA JONES IN ARIZONA

An article in the May 1987 Bulletin proclaimed that "Swashbuckling ain't the way to do archaeology, but how do we convince the public that archaeology is a science?". This symposium highlights a potpourri of approaches being used in Arizona to inform and involve the public in archaeology. The contributed papers describe strategies the discipline at large can use in educating the public to the realities of archaeology as a scientific venture rather than a treasure hunting adventure.

## [33] OF TIME AND THE RIVER: CHRONOLOGY AND ADAPTATION OF THE RIO GRANDE ANASAZI

Recent research provides the basis for critical reassessments of the chronological and adaptational underpinnings of the Anasazi sequence in the Rio Grande Valley. The role of chronometric dates and the contributions of range of dating techniques toward reevaluating the traditional chronological sequences are examined. Rapid, region-wide cultural developments including aggregation, emerging political and social complexity, material culture florescence, and intra- and inter-regional exchange, underscore the complexity of adaptational processes as reassessed within refined chronological frameworks.

## [35] PARADIGMATIC BIASES IN EASTERN MEDITERRANEAN HUNTER-GATHERER RESEARCH

Paradigmatic biases that different workers bring to the study of eastern Mediterranean hunter-gatherers shape perceptions of differences and similarities, stasis and change in the Upper Pleistocene/early Holocene archaeological record of the region. Workers presently active in eastern Mediterranean hunter-gatherer research attempt to make their biases explicit as they articulate the basic premises under which they conduct the research enterprise.

## [39] BASIC RESEARCH IN THE MIDDLE LITTLE COLORADO RIVER AREA: BY THE PEOPLE AND FOR THE PEOPLE

In recent years in the middle Little Colorado River area, archaeologists have worked with volunteers and have provided new data to land managers for public education. The projects at Petrified Forest National Park and Homol'ovi Ruins State Park range from the test excavation of an Archaic campsite to large-scale excavation of late Pueblo sites; from large-scale, intensive survey to the region-wide analysis of ceramic wares. To be most useful to the profession and the public, research results regarding trade and exchange, migration, cultural boundaries and interaction, and changing ceramic and lithic technologies, must be synthesized on the regional level.

## [40] HOUSEHOLD AND STATE IN THE CENTRAL ANDES

Although prehistoric states are well documented in the Andes, the nature of the links between the rulers and the ruled remains poorly known. For specific Andean societies results of recent research illuminate ties between domestic groups and the larger polity. This symposium examines these ties by focusing on Tiwanaku, Chimu and Inka states. In each case the problem is examined through two questions: What is the larger political structure of this state and how are those larger patterns reflected at the household level?

## [41] CERAMIC REPLICATION: DOWN AND DIRTY

Analysis of ceramic technology relies heavily on post hoc reconstructions of past behavior, supplemented with ethnographic and ethnoarchaeological case studies. A complementary and important source of information is replication studies, especially when they are focused on a well-defined problem. These papers share a problem-solving approach to questions of ceramic technology such as paste composition, firing conditions, and vessel function in the prehistoric periods of Europe and North America.

## [42] RECONSTRUCTING BEHAVIOR AND SOCIAL ORGANIZATION: NEW INTERPRETATIONS FROM SOUTHEAST MESOAMERICA

Over the last decade, several large-scale projects in Honduras have produced a great quantity of new data. Analysis of this information will form the fundamental building blocks of any interpretive or theoretical formulations regarding behavior and organization in Southeast Mesoamerica. The papers in this symposium present the first level of data analysis and interpretation, focusing on socioeconomic structure and regional interaction. Topics will include spatial distribution of activities, differential access to resources and intrasite social relations.

## [43] COLUMBIAN QUINCENTENARY SYMPOSIUM, PART III: CONTACT PERIOD

## STRATEGIES IN TEXAS AND NORTH MEXICO

The Society for American Archaeology anticipates the 1992 Columbian Quincentenary with a multi-year series of symposia exploring the strategic diversity during the early colonial period in the

## [56] The Complex Tribe in Prehistory

Spanish American Borderlands. We examine the Spanish strategies employed at the missions, the presidios and the pueblos. Papers likewise investigate the diverse Native American counter-strategies that evolved to cope with European intrusions. The symposia also evaluate the success and relevance of contemporary archaeological inquiry into European-Native American interaction in the Spanish-American Borderlands.

## [44] METHODOLOGICAL CONTRIBUTIONS TO LITHIC ANALYSIS

Variability in lithic assemblages results from several factors including differences in raw material, technology, behavior, and organization. The need for methods which allow unambiguous isolation of these sources of variability in an archaeological context remains a pivotal problem in lithic analysis. This symposium focuses on experimental and ethnographic research which explores the relationship of factors contributing to lithic assemblage variability and improves criteria for distinguishing them analytically. Serious implications regarding the meaning of attributes and typologies commonly employed in contemporary lithic analysis are demonstrated. Alternative analytical methods are suggested to improve inferences about lithic assemblages.

## [45] ARCHAIC ADAPTATION AND BIOLOGICAL DIVERSITY AT THE FLORIDA WINDOVER SITE

The symposium describes the preliminary results of the multidisciplinary investigations of an Archaic burial area preserved in a peat bog. The site provides one of the largest New World skeletal collections older than 7,000 years BP and exhibits remarkable preservation of perishable materials as well as biochemical and molecular features.

## [46] EMPIRES IN COMPARATIVE PERSPECTIVE: ECONOMIC AND POLITICAL DYNAMICS

This symposium will investigate the economic and political systems that provide the basis for empires. It will explore variation in empires, drawing on cases from both the New and Old Worlds so as to assess reasons for the similarities and differences observed. Papers will summarize basic information on scale, political hierarchies, size of armies, systems of communication and economic organization. The internal organization of the empires and the external conditions of conquered societies will be examined to determine the limits to and opportunities for political expansion.

## [50] ABU HUREYRA AND THE ADVENT OF AGRICULTURE ON THE SYRIAN EUPHRATES

The subject of the symposium is the excavation of Abu Hureyra, an unusually large, early village in Syria, with superimposed late Epipalaeolithic (c. 11,500 to 10,000 BP) and early Neolithic (c. 9,500 to 7,000 BP) settlements. Abundant, well-dated samples of artifacts, animal bones, plant remains, and human skeletons recovered in the excavation document the transition from a highly-specialized community of hunter-gatherers to a village of farmers and herders. The contributors examine the interactions between changing culture and economy, and the impact of the adoption of farming on the inhabitants. Their conclusions alter current hypotheses concerning the inception of agriculture in the Levant.

## [54] A COASTAL CHUMASH CENTER DURING THE CONTACT PERIOD

The Chumash settlement of Helo' at Mescalitan Island was the largest town along the California coast observed by members of the first Spanish land expedition in 1769. During excavations at Helo' in the summer of 1986, archaeologists uncovered structural remains and features. The midden soils were washed through 1/8 and 1/16 inch mesh sieves in order to recover small remains such as beads and fish bone. This symposium focuses on the analysis of artifacts and faunal remains, site structure, geological formation processes, and the ethnohistory of Helo'.

## [55] THE MEANING OF IMPORTS

In the literature on prehistoric trade, little attention has been paid to the question of why humans should wish to obtain imported goods—why they often devote extraordinary efforts to acquire particular materials from other societies. Close study of the contexts and the associations in which imports are recovered archaeologically can provide valuable information about the special roles that imported objects play. Insights offered by archaeologists working in different parts of the world yield better understanding of the significance of cross-cultural trade to human societies, not only to their economic systems, but also to their systems of belief, ritual, and expression.

## [56] THE COMPLEX TRIBE IN PREHISTORY: RECONSTRUCTING POLITICAL CENTRALIZATION IN THE ARCHAEOLOGICAL RECORD

Ethnographers have long been aware that various kinds of social complexity, such as ranking, craft specialization, long distance trade or population agglomeration do not necessarily occur in the context of political centralization. Although segmentary tribal-societies are quite capable of these complex

## [57] The Status and Direction of Hohokam Ethnobiology

manifestations, such traits are almost always assumed in the archaeological record to denote the existence of a chiefdom or even state-level society. This symposium defines the "Complex Tribe" as a meaningful archaeological concept.

### [57] THE STATUS AND DIRECTION OF HOHOKAM ETHNOBIOLOGY

This is the first comprehensive symposium on the current understanding of the ethnobiology of the prehistoric Hohokam of southern Arizona. All of the leaders in the field are represented, and each provides insights into their specialty and the state of the art. Although the Hohokam are the focus of the symposium, the topics and methods discussed should appeal to researchers in other parts of the world as well.

### [58] BEYOND BOUNDARIES IN TIME AND SPACE: THE UTILITY OF THE SITE CONCEPT

It is time archaeologists came to terms with the following problem: Given that the traditional notion of 'site' does not directly reflect past human activity, what developments in theory and methodology best address the problem of interpreting material remains as a reflection of the human past? Issues include accommodating natural disturbance; the bounding of artifact distributions both spatially and temporally; developing and selecting appropriate temporal scales of interpretation; and distinguishing relevant variables from extraneous ones. The research presented here serves to link artifacts directly with past human activity as well as define what questions are appropriate for archaeological inquiry.

### [59] TROWEL AND ERROR: NEW VIEWS OF PREHISTORIC ARCHAEOLOGY

The most exciting, if exasperating, aspect of archaeology is its capacity to alter the entire perspective of the discipline with a single new find or re-assessment of previous work using new evidence or analytical techniques. This tendency is illustrated by nine papers which review new methodological approaches in taphonomy and hunter-gatherer studies or which present new discoveries and interpretations regarding major issues in prehistory such as colonization and "first" appearances of new biological cultural forms. Papers cover significant new issues in Africa, Europe, America and the Pacific.

### [60] PERSPECTIVES ON CHANGE: ETHNOHISTORICAL AND ARCHAEOLOGICAL APPROACHES TO CULTURE CONTACT

The study of culture contact in historical context allows the examination of a variety of factors affecting social change. The papers in this symposium represent studies of European interactions with native peoples in diverse areas of North America and Mexico. Some of the themes of concern include theoretical and methodological constraints on the study of the contact period, cultural parameters affecting native and European perceptions of the interaction process, differential effects of contact on various groups within a population, and native and European strategies for maintaining or expanding social and economic control.

### [61] THE GOSHEN CULTURAL COMPLEX AND HIGH PLAINS PALEOINDIAN STUDIES

The Goshen Cultural Complex was first recognized and described as a possible Clovis variant at the stratified, Paleoindian Hell Gap site in southeastern Wyoming. Recently, new evidence for Goshen has appeared at the Mill Iron site 24CT30 in southeastern Montana. Mill Iron is a small bison kill with a bone bed and processing-camp area. The papers in this symposium explore the possible implications and relationships of Goshen to other early Paleoindian Cultural Complexes on the North American High Plains.

### [63] THE SICAN AND THEIR NEIGHBORS: NORTH-CENTRAL ANDEAN INTERACTION

From Moche V to the collapse of the Middle Sican [ca. A.D. 600-1100], the seat of power for the north Peruvian coast resided in the Lambayeque region. Accompanying this northerly shift of power were long-term changes in cultural interaction between (1) Lambayeque and (2) the adjacent North Highlands of Peru and southern Ecuador. Using our fine-grained chronology and comprehensive understanding of the Sican Culture as an organizational framework, this symposium brings to bear accumulated data and insights on (a) coast-highland interaction in northern Peru and (b) coastal interaction between southern Ecuador and northern Peru cross-cutting the boundary between the Central and North Andean Culture Areas.

### [64] APPROACHES TO JAPANESE PREHISTORY

North American archaeologists bring an anthropological perspective to Japanese prehistory which complements indigenous, largely historical approaches. As outsiders, they are also interested in the social and political context of Japanese research. This symposium provides data on many recent discoveries and issues, in addition to new methods and frameworks. Dealing with the Jomon to Kofun

## [76] Long-Term Change and Continuity in the Sausa Culture

periods, it covers topics such as faunal analysis, isotopic evidence for diet, social networks, settlement systems, plant husbandry, cultural transitions, exchange systems, and social and political dimensions.

### [65] MODELING SUBSISTENCE CHANGE IN THE AMERICAN SOUTHWEST

Efforts to develop models related to subsistence practices in the American Southwest are relatively recent. However, many of these models are largely descriptive, primarily concerned with the identification of agriculture or agricultural strategies after agriculture has become a major part of the subsistence base. While these are important studies, the examination of the change in subsistence base is also a consideration. This symposium is concerned with modeling changes in subsistence practices that occurred through time within the context of the continued development of an agricultural system.

### [67] LARGE SITE ARCHAEOLOGY: PROBLEMS AND METHODOLOGICAL RESPONSES

Intra-site spatial analysis has drawn attention to the value of emphasizing the totality of artifact distributions, as opposed to individual elements, within a site. For a variety of reasons, this view has been applied almost exclusively to small scale sites. This same orientation, however, is just as critical when investigating large scale archaeological phenomena. This symposium explores the methodological tactics developed to address specific difficulties in retrieving and interpreting data from spatially extensive sites. Topics will include strategies for data retrieval, appropriate analytical techniques, and available inferential models. Data will be presented from Old and New World as well as historic and prehistoric contexts.

### [68] UNDERSTANDING CULTURAL VARIABILITY IN THE CHACO

Chaco Canyon and the San Juan Basin have been a focus of research and speculation for over a century. Many models have been offered to explain the cultural developments of the San Juan Basin during the late prehistoric period. These models include change through outside influence, the development of a regional redistribution system to counteract unreliable resources, change initiated through climatic fluctuation, and others. This symposium brings together some of the scholars working on understanding the Chaco Phenomenon in an attempt to summarize the last two decades of research in the region and to report on ongoing research.

### [72] PLANT PROCUREMENT, PLANT PRODUCTION, AND SOCIAL RELATIONS IN THE PREHISTORIC EASTERN WOODLANDS

Recent archaeobotanical research has helped to refine and in some cases revise descriptions of plant utilization patterns in the eastern United States. New data and analyses suggest that it is time to reevaluate models of the roles of plant procurement and production in the prehistoric societies of the region. The papers in this symposium go beyond simple description and place the results of archaeobotanical analyses in their cultural contexts. They address questions about the strategies employed to procure and produce plant foods and the relationship between subsistence strategies and social formations.

### [73] APPROACHES TO USING MICROCOMPUTERS IN ARCHAEOLOGY

A growing number of archaeologists are finding that microcomputers can be a valuable research and data management tool when coupled with the appropriate software. The papers presented in this symposium draw on the experiences of several archaeologists who have employed microcomputers and other computerized equipment within the context of their fieldwork and research.

### [75] DECIPHERING A NORTHWEST COAST SHELL MIDDEN

Prehistoric marine adaptations resulted in the accumulation of archaeological debris different from the debris produced by terrestrial adaptations. This symposium examines problems in the interpretation of this type of archaeological record, including the estimation of seasonality, cultural activities, abundance of subsistence remains, preservation, fire-cracked rock typology, and topographic and paleotopographic features. The emphasis in all papers is on methodology as opposed to cultural reconstruction. This research is applicable to shell middens found in most parts of the world.

### [76] LONG-TERM CHANGE AND CONTINUITY IN THE SAUSA CULTURE: RESULTS FROM RECENT RESEARCH ON CENTRAL ANDEAN ADAPTATION AND SOCIAL MEDIATION

This symposium will focus on paths to social hierarchy for one Andean group that was autonomous until A.D. 1460. Based on ethnohistoric and archaeological data, the Sausa have lived in the northern part of the Upper Mantaro Valley for at least 2,000 years. A field project was completed in 1986 including paleoclimatic work, modern household production and material deposition, a site survey, and an excavation of a series of households spanning the EIP through the LIP. Presentations will discuss climatic impacts on the human population, the motivations and forms of resource use change, and social relations that lead to the onset of hierarchy.

## ABSTRACTS OF PAPERS

*Abbott, David R. (Arizona State)*

[69] UTILITARIAN AND SOCIAL ASPECTS OF HOHOKAM RED WARE: RESULTS FROM THE LAS COLINAS PROJECT

Recent studies of a large ceramic collection from the Sedentary and Classic period site of Las Colinas have yielded substantive results concerning Hohokam red ware. Excellent temporal control has permitted the precise reconstruction of developmental trends in the incipient red ware tradition. Studies of vessel forms, technology and recovery contexts have documented the utility and social worth of red-slipped pots within the overall pottery assemblage. New ideas are discussed about the production and use of red ware ceramics in the desert Southwest.

*Abrams, Elliot M. (Ohio) and Ann Corinne Freter (Penn State)*

[24] INTRA-POLITY ECONOMICS AT COPAN, HONDURAS

The socioeconomic structure of production and exchange at the Late Classic Maya center of Copan is considered. An analysis of artifacts relating to construction plaster suggests that control of plaster rested with the maximal lineage administration. This bureaucratic level is modeled as being secondary in power only to the central elite within the Maya sociopolitical structure. The control over production is coupled with that over distribution, with plaster flowing up to the central elite and down to lesser administrators. This suggests that models must recognize multiple centers of production and spheres of exchange.

*Ackerly, Neal W. (Northland Research)*

[12] HOHOKAM IRRIGATION SYSTEMS IN THE EASTERN PHOENIX BASIN

Recent excavations between Mesa and Tempe resulted in the discovery and examination of more than 40 Hohokam canal segments spread over a 3 mile corridor extending south from the Salt River. Direct dates on canal deposits indicate ages ranging between AD 700-1400. This large sample provides new information about the engineering characteristics of main and lateral canals situated in near- and far-river zones. Inferences regarding construction and abandonment episodes, as well as the use-life of different canals, support a cyclical model of Hohokam irrigation in the Phoenix basin.

*Adams, E. Charles (Arizona State Museum)*

[20] WESTERN ANASAZI KIVAS: CONTRASTING PATTERNS IN FORM AND FUNCTION  
FROM A.D. 1000 TO A.D. 1500

Analysis and interpretation of changes in kiva form and frequency at sites occupied by prehistoric pueblo people in northeastern Arizona are the goals of this paper. Between AD 1000–1500 kiva form changes from circular or D-shaped to rectangular. Concomitant with change in form is an apparent change in frequency from one kiva for each 2-3 households to one kiva for each 10–20 households. Interpretation of these patterns involves a synthesis of ethnographic data on kiva use with changing archaeological patterns of space use within the kiva, within the site and between sites.

*Adams, E. Charles (Arizona State Museum)*

[1] PASSIVE RESISTANCE: HOPI RESPONSES TO SPANISH CONTACT AND CONQUEST

Hopi/Spanish contact took place over the course of nearly three centuries (1540-1819). The relationship between the two peoples changed radically during the period. Blessed by geographic isolation, the Hopi developed an effective strategy for at first mitigating and later resisting Spanish influence. As a result, Hopi culture was the Pueblo culture least affected by Spanish contact when relations developed with the U.S. government in the mid-19th century. This paper combines archaeological data with documentary evidence to examine Hopi/Spanish relations during and after the contact period and to explain the Hopi's successful strategy (termed passive resistance) for minimizing Spanish influence.

*Adams, E. Charles (Arizona State Museum) [Discussant 39]*

*Adams, Jenny L. (Arizona State Museum)*

[47] PRELIMINARY RESULTS FROM USE-WEAR ANALYSIS ON GROUND STONE TOOLS

Ground stone tools are often considered the ugly sister of the lithic artifact family. Yet recent experimental and microscopic studies indicate that it may be possible to determine use-wear pattern differences for specific ground stone tool types. Experiments have been conducted using manos, metates, hide processing stones, pottery polishers and grooved and flat abraders on wood and bone. The results indicate that a lot more can be done with ground-stone tools than previously thought.

*Adler, Michael A. (Michigan)*

[20] RITUAL FACILITIES AND SOCIAL INTEGRATION IN NONSTRATIFIED SOCIETIES: A CROSS CULTURAL PERSPECTIVE

Archaeological investigations of Anasazi architecture generally assume kivas provided a context for ritual decision-making above the household level and some domestic activities. This paper approaches these assumptions through a cross-cultural inquiry of socially integrative architecture among several non-stratified societies. Questions considered are: 1) What portion of the society has access to integrative facilities? 2) What range of activities is carried out in the facilities? 3) Is the presence/absence of the facility dependent upon the scale or population of the host community? Resulting generalizations provide a perspective for evaluating possible kiva functions.

*Adovasio, J. M. (Pittsburgh) and R. C. Carlisle (Pittsburgh)*

[25] THE MEADOWCROFT ROCKSHELTER RADIOCARBON CHRONOLOGY: SOME FACTS AND FCTIONS

Ever since the publication of the first of the more than 50 internally consistent radiocarbon dates from Meadowcroft Rockshelter (36WH297), controversy has been generated by frequent assertions that the older than 11,000 BC dates have suffered particulate or nonparticulate contamination. Data bearing on these assertions are assessed in the light of new accelerator mass Spectroscopy (AMS) dates provided by Oxford University. The weight of all the data taken together suggests that this site still represents the best dated evidence for the presence of human beings south of the glacial front in the Americas. That evidence indicates that Native Americans were present in southwestern Pennsylvania by ca. 15,000 BC.

*Adovasio, J. M. (see Andrews, R. L.) [45]*

*Ahler, Stanley A. (North Dakota)*

[44] EXPERIMENTAL KNAPPING WITH KRF AND MIDCONTINENT CHERTS: OVERVIEW AND APPLICATIONS

An experimental program is described which has involved multiple technologies and knappers and more than 300 replications from Knife River flint, Crescent chert and other midcontinent cherts. A computerized data collection program is described. Data analysis has focused on flaking debris. Four types of archeological applications are described which involve study of 1) size distribution of flaking debris, 2) flake typology, 3) flake production rates and production efficiency and 4) correlation between knapper experience and byproduct characteristics.

*Aikens, C. Melvin (Oregon) and Takeru Akazawa (Tokyo)*

[64] JOMON-YAYOI CONTINUITY: LANGUAGE, CULTURE, POPULATION

This paper contests the popular notion that the shift from hunting, fishing and gathering in the Jomon period to wet-rice cultivation during the Yayoi period was due to an overwhelming influx of mainlanders who drove out or absorbed an aboriginal population and implanted the Japanese traditional culture and people we know today. Historical, linguistic, archaeological, population and human skeletal evidence show that the cultural and somatic changes demonstrable between Jomon and recent times in Japan are not attributable, as conventionally believed in the West, to a revolutionary migration event shortly before the beginning of the Christian era, but instead to a transformational process that was under way by middle Jomon times and that has continued to the present day.

*Akazawa, T. (see Aikens, C. M.) [64]*

*Akoshima, K. (see Kornfeld, M.) [61]*

*Albanese, John P. (Casper, Wyoming)*

[61] GEOLOGY OF THE MILL IRON SITE (24CT30), CARTER COUNTY, MONTANA

The site, which contains 11,000 year old artifacts of the Goshen Complex, lies at the crest of a 21 m high, isolated bedrock butte which lies on the northeast margin of the valley of Humbolt Creek, a northwest draining, fourth-order, meandering, low gradient, ephemeral stream. Five paired, geomorphic surfaces which represent former valley slopes have formed during the past 11,000 years due to about 25 m of episodic downcutting. The site lies on the highest of these surfaces. All five surfaces are underlain by a thin veneer of sandy sediment (principally colluvium) which overlies bedrock. The thickest accumulation (2.65 m) occurs at the site where the artifacts are contained within sediments that formed on the margin of a first-order ephemeral stream that formerly drained to the southwest with a gradient of four degrees.

*Allaire, Louis (Manitoba)*

[30] THE SALAOID OCCUPATIONS OF MARTINIQUE

Saladoid sites on Martinique in the Lesser Antilles have been the subject of archaeological investigations for over five decades. Mainly the work of local archaeologists, the often incomplete information is nonetheless abundant. This paper will attempt to synthesize the accumulated evidence, complementing the author's own surveys and collection studies, with an overall emphasis on dating and cultural classification. Despite the almost total lack of ecological remains (especially faunal), site distribution and artifact typologies provide significant data on the people's activities and adaptation to their island environment.

*Allen, Kathleen M. (SUNY at Buffalo)*

[13] MODELING THE DEVELOPMENT OF TRADE PATTERNS USING GIS SYSTEMS

The purpose of this paper is to model the diachronic aspects of trade patterns using ARC/INFO's network system. A large amount of well documented trade goods and ceramics from prehistoric and historic sites in western New York provides the data base. Alternative trade models are constructed based upon formalist and substantivist assumptions. These models are combined with the network algorithms of ARC/INFO to predict the distribution of ceramics and other trade goods. These patterns are compared with the archaeological record. The use of GIS systems in an evolutionary framework to model development of trade networks has wide applications to other areas and time periods.

*Allen, K. M. (see Bush, P. J.) [70]*

*Allison, James R. (BYU)*

[69] USING ANASAZI REDWARES TO RECONSTRUCT PREHISTORIC TRADE NETWORKS

Anasazi redware ceramics were widely traded from relatively small areas which specialized in their production. They form one stylistic sequence, but exhibit technological variation due to differences in resource availability. This variation allows most redwares to be traced to specific manufacturing areas, a crucial step in the reconstruction of trade networks and alliances. However, because few archaeologists have worked with the redware production areas, the current typology is misleading and the redwares are often mistyped. As a result, patterns of distribution and the behaviors that created them are obscured.

*Altschul, Jeffrey H. (Statistical Research)*

[13] RED FLAG MODELS: THE USE OF THE MODELING PROCESS IN MANAGEMENT CONTEXTS

An approach to modeling prehistoric site location is presented which is geared for the day-to-day management of cultural resources. As opposed to sophisticated predictive models which require large investments to develop and often have limited management application, Red Flag modeling utilizes the interactive capabilities of a GIS to provide a dynamic analytic tool. The approach emphasizes sites whose locations are not predictable by a set of environmental variables and provides a series of steps by which these 'red flags' are shifted from being anomalous locations to predictable ones.

*Altschul, J. H. (see Shelley, S. D.) [67]*

*Alvey, Bryan A.P. (Institute of Archaeology, London)*

[66] PHASING ARCHAEOLOGICAL SITES BY COMPUTER: A GRAPHIC SOLUTION

The recording of stratified sites has changed drastically in recent years. This paper presents a 3D micro-based graphics system developed by the author based on the principles of the Harris matrix. It displays 1) composite plans from single stratum drawings, 2) 3D models showing the sequence of deposition of strata making up a phase using single stratum or composite plans as basic data and 3) colors and shading based on output from databases containing written material. The system saves manpower and money and reproduces output to plotter, laser printer and camera.

*Ames, Kenneth M. (Portland State)*

[31] STORAGE, LABOR AND SEDENTISM IN THE INTERIOR PACIFIC NORTHWEST

Archaeologists working with hunter-gatherers have long seen a relationship among storage, sedentism and "complex" forms of social and economic organization. The adoption of a storage economy implies changes in domestically based labor organization. These changes can be tracked through changing domestic architecture. The Intermontane Plateau of western North America provides a 5500 year record of shifting economic and labor strategies in which storage played a crucial role.

*Amick, D. S. (see Mauldin, R. P.) [44]*

*Anderson, Duane (Dayton Museum of Natural History) and Lise Spargo (U.S. State Department, Pakistan)*

[28] MODELING EARLY HISTORIC ONEOTA SUBSISTENCE

Oneota subsistence models have traditionally postulated specific independent variables as causes of change in subsistence rather than focusing on patterns of interaction between subsistence strategies

and the ever-changing constraints of the total cultural and noncultural environment. Using data from the Milford Site, King Hill and the Lane Enclosure, this paper advances a model of early 18th century Oneota subsistence in the prairie/parkland environment based on two assumptions: 1) nonpreferential resource selection and 2) increased aggregation of subsistence units.

*Anderson, Patricia K. (Chicago)*

[7] SYMBOLS OF AUTHORITY AT CHICHEN ITZA: PAUAHTUNS AND CAVES

Analysis of the iconography of the architectural sculpture of the major constructions in the heart of the area traditionally called "Toltec Chichen" at Chichen Itza, Yucatan, Mexico, reveals an iconographic theme consistent with Classic Maya rather than Central Mexican origin. The major buildings of "Toltec Chichen" are seen to be aboveground reconstructions of caves, identified by the presence of Pauahtun figures. Archaeological and ethnological evidence indicate that caves play important roles in Maya cosmology and ritual as sources of supernatural power. Epigraphic evidence further supports the assertion that Chichen Itza should be viewed as a unified Maya site.

*Andresen, John M. (National Park Service)*

[69] ARTIFACTS FROM COMPOUND F, CASA GRANDE RUINS NATIONAL MONUMENT, ARIZONA

The 1930 excavations at this site were never fully reported. The artifact collection contains useful information on lithic, shell, ceramic and perishable artifacts. Artifact and archival analysis illuminates the role of a small compound within a large Classic Hohokam compound group. The site contains evidence for the longest occupation of any site within the Casa Grande Group and has yielded the most abundant evidence of any site for on-site jewelry manufacture. This report draws attention to existing museum collections which contain useful but untapped information.

*Andrews, Rhonda L. and J. M. Adovasio (Pittsburgh)*

[45] TEXTILE AND RELATED PERISHABLE REMAINS FROM THE WINDOVER SITE

Contrary to all expectations, the multiple year excavations at the Windover Bog Site (8BR246) yielded a large number of technologically sophisticated textiles and other perishables from 37 burials. The assemblage currently represents the oldest textiles from the Southeast. Close simple twining and close diagonal twining, both with S twist wefts [paired and trebled], open twining with paired Z twist wefts and balanced plainweave specimens of non-heddle loom woven cloth are present. Represented forms appear to include circular or globular bags, hoods, blankets and clothing. Cordage, braid and fiber construction materials are also noted. Comparisons to other assemblages are offered.

*Anikouchine, N. (see Glenn, B. K.)* [54]

*Anthony, David W. (Hartwick College)*

[15] IDENTIFICATION OF EARLY HORSE RIDING THROUGH MICROSCOPIC BIT WEAR ANALYSIS

The earliest usage of horses as mounts provided a new form of transport that can be associated with expanded exploitative territories, increased warfare, intensified trade and exchange activities and a marked rise in the productivity and predictability of subsistence in grassland environments. These effects appear to be documented in the steppes of the southwestern USSR by 3500-3700 BC, shortly after the local domestication of the horse. Direct evidence for riding is sought through an SEM microscopic analysis of bit wear on horse teeth. A new method for defining the diagnostic traits of bit wear is advanced and its application to archaeological horse specimens is described.

*Aoyama, Kazuo (Japanese Technical Mission in Honduras)*

[42] SOME SOCIO-ECONOMIC OBSERVATIONS ON OBSIDIAN AND CHERT ARTIFACTS IN THE LA VENTA VALLEY, HONDURAS

The obsidian and chert chipped stone industry of the Middle Preclassic to Late Classic La Venta Valley is discussed using behavioral typology and obsidian source determinations. Recent analysis of obsidian artifacts indicates 1) that production of prismatic blades from the Ixtepeque source increased during the Late Classic, replacing a cottage industry using stream cobbles [probably from the Motagua Valley] and 2) the Los Higos Site was the redistribution center of Ixtepeque obsidian, perhaps under Copan control of the La Venta valley.

*Armelagos, George (Massachusetts)* [Discussant 45]

*Ashley, M. A. (see Dickel, C. D.)* [45]

*Baar, S. (see Howard, J. B.)* [32]

*Baker, L. L. (see Langenfeld, K.)* [12]

*Bayforth, Douglas B. (University of Nebraska - Lincoln)*

[54] STONE TOOLS, STEEL TOOLS: CONTACT PERIOD HOUSEHOLD TECHNOLOGY AT HELO'

Flaked stone technology vanished rapidly in most areas with the introduction of metal tools at European contact. Excavations spanning the contact period at the Chumash village of Helo', however, document the persistence of flaked stone tools in household middens up to the abandonment of the site in 1824. In contrast, past excavations in the historic cemetery at the site recovered many metal tools. This paper discusses the patterns of post-contact change and continuity in tool production and use at Helo' and the implications of these patterns for current explanations of technological change.

*Banker, S. (see Feinman, G. M.)* [26]

*Bar-Yosef, Ofer (Weizmann Institute of Science, Israel)*

[35] PARADIGMATIC BIASES IN THE STUDY OF THE LEVANTINE EPIPALEOLITHIC AND NEOLITHIC

Current approaches and assumptions (including the author's) in the research and analysis of Epipaleolithic and Neolithic sites are discussed and their role in paleoanthropological interpretations is evaluated. Preconceived ideas concerning site and assemblage formation processes are viewed as a major source of bias. Detailed lithic analyses which attribute special attention to core reduction strategies are examined in light of experimental archaeology and their influence on cultural designations is evaluated.

*Barlow, P. (see Bergman, C. A.)* [44]

*Barnes, Gina L. (Cambridge)*

[64] JAPANESE-LIKE REMAINS IN KOREA: WHAT DO THEY SIGNIFY?

Documentary evidence suggests the presence of a Japanese military/governmental outpost on the Southern Korean coast in the 4th century AD. Korean scholars have rejected this notion as unfounded, and until recently there has been no material evidence in favor of the Japanese presence. New finds of Japanese-like artifacts and features, however, are raising this question again seriously. Korean interpretations range from postulating trade and interaction to claiming the materials as prototypes for later Japanese imitation. The range and appropriateness of such interpretations are discussed here within a framework of state formation with reference to modern national political tensions.

*Barton, C. Michael (Arizona State)*

[34] MIDDLE PALEOLITHIC TOOLS: VARIABILITY AND HUMAN BEHAVIOR

The meaning of variability in Middle Paleolithic retouched stone tools is addressed in the light of recent evidence from the Iberian Peninsula. A significant amount of lithic variability may be best explained by factors other than style or function in the classic sense, including the size dimensions of tools and the extent and intensity of edge use. Additionally, tools seem more the end result of the use of their component edges than planned implements for which the makers had "mental templates." The implications of these data for the interpretation of human behavior during the Middle Paleolithic are discussed.

*Bartram, L. E. (see Bunn, H. T.)* [23]

*Bassett, E. J. (see Brandt, E. A.)* [69]

*Baumler, Mark Frederick and Christian E. Downum (Arizona)*

[34] BETWEEN MICRO AND MACRO: A STUDY IN THE INTERPRETATION OF SMALL-SIZED LITHIC DEBITAGE

A major part of lithic assemblages recovered today is made up of very small lithic debitage (1 mm - 2 cm). Despite this abundance, most aspects of the relationship between these small pieces and the lithic reduction process remain relatively unexplored or intuitively based. In this paper, the authors investigate and describe the morphological characteristics of small-sized debitage generated by replications involving three fundamental stages in lithic reduction: 1) core reduction/flake production, 2) tool manufacture/retouch and 3) tool maintenance/resharpening. The results of the study are applied to an analysis of small-sized debitage recovered from the Upper Paleolithic site of Gruegraben in Lower Austria.

*Bawden, G. (see Houghteling, M.)* [48]

*Bayham, Frank E. (California State University-Chico)*

[5] THE EFFECT OF THERMAL MAXIMA ON MIDDLE ARCHAIC HABITAT SELECTION IN THE ARID SOUTHWEST

A generalized population increase and range expansion characterizes the Middle Archaic occupation of the Southwest between 5000 and 4000 BP. Traditional explanations of this phenomenon are tied

to post-Altithermal climatic amelioration. Recent paleoclimatic reconstructions support a hot and wet altithermal and suggest a reassessment of this explanation is warranted. Archaeological, geological and paleobiological data from several chronometrically dated Middle Archaic sites in southern Arizona support the general pattern and further indicate a strong correlation between human occupation and global thermal maxima. How thermal maxima effect the suitability of marginal habitats in the arid Southwest is examined.

*Bayham, Frank E. (California State University-Chico) [Discussant 57]*

*Beaudry, Marilyn P. (UCLA) and Eugenia J. Robinson (Tulane)*

[29] LATE PRECLASSIC SETTLEMENT PATTERN IN THE TIQUISATE ARCHAEOLOGICAL ZONE

This paper summarizes results from ongoing field work in a major archaeological zone on the coastal plain of Guatemala. Although the area contains Late Preclassic through Late Classic monumental architecture, sculpture and residential remains, recent research has concentrated on the Late Preclassic settlement. Excavations have been carried out at that period's major center, Sin Cabezas, and surveying has been done from Sin Cabezas to adjacent smaller sites with probable public architecture. Intrasite settlement and community organization within the area are discussed.

*Beck, C. (see Jones, G. T.) [58]*

*Belcher, William R. (Maine)*

[16] ARCHAEOLOGICAL INVESTIGATIONS AT THE KNOX SITE (30-21), EAST PENOBSCOT BAY, MAINE

Excavations at the Knox Site, on Pell Island in East Penobscot Bay, have revealed the remains of eleven prehistoric houses occupied between 750 BC and 950 AD. The artifact assemblage includes one of the best dated ceramic sequences for the Early Ceramic/Woodland Period in Maine. Subsistence remains indicate a maritime orientation, with shellfish, Atlantic cod (*Gadus morhua*) and sculpin (*Myoxocephalus spp.*) dominating the faunal assemblage. The site is proposed to be a fishing station occupied in the late spring to late summer.

*Bell, P. (see Rogge, A. E.) [32]*

*Benco, Nancy L. (Hawaii)*

[4] ORGANIZATION AND TECHNOLOGY OF TRADITIONAL POTTERY PRODUCTION IN MOROCCO

The organization of labor and the technological capabilities of pottery makers directly affect the kinds of vessels they produce. This paper examines the impact of organizational and technological factors on the form and composition of the product itself. It draws on recent ethnoarchaeological studies of two groups of traditional Moroccan potters — part-time household and full-time workshop specialists. The paper presents the results of quantitative and technical analyses of pottery produced by these two groups and discusses the implication of these findings on archaeological investigations of specialized pottery production.

*Bender, Barbara (University College London)*

[22] QUESTIONS OF CHANGE AND STASIS

Recent theoretical inputs from Marxist and cognitive perspectives have permitted a reexamination of questions of long- and short-term change, stasis and processes of dominance and resistance. Socio-economic structures, individual and group perceptions and actions, and form and effect of dominant and alternative ideologies need to be analyzed and integrated in an attempt to understand both our preoccupation with, and elucidation of, the past.

*Benge, Donna and Jeanne Miller (Mesa Public Schools)*

[32] ARCHAEOLOGY IN THE CLASSROOM

This paper recounts the experiences of two educators interested in teaching archaeology in the classroom. It took initiative to take university courses, join archaeological organizations and read independently to overcome the lack of readily available information and resources. Materials were subsequently developed or modified and tested independently in their classrooms, but now curriculum, with potential use throughout the state, is being pursued jointly with archaeologists and other educators. Both archaeologists and educators have similar goals in making students aware of their cultural heritage, but it takes a teacher's perspective to develop any workable education program. Suggestions for successful approaches are offered.

*Bennett, R. Hawkins (Cincinnati)*

[31] REFLECTIONS IN A DISTANT MIRROR: ARCHAEOLOGICAL EVIDENCE FOR STORAGE AS AN INDICATOR OF CULTURE CHANGE

Many studies involving the economics of storage are synchronic investigations of the causes for and nature of the storage practices of a specific group. This paper describes and compares storage strategies over several thousand years in the Ohio Valley and examines them as reflective of subsistence, demography and evolutionary level. By tracing the changes revealed in storage patterns through time in this pivotal area of the Eastern Woodlands, supporting evidence is found for the idea that regional cultural development did not proceed in an uninterrupted unilineal trajectory of increasing sedentism and that early Woodland ceremonial exchange networks may have served as storage analogs.

*Benyo, Julie C. (Harvard)*

[42] MATERIAL CULTURE AND INTRASITE SOCIAL ORGANIZATION

Several attempts to describe and explain the spatial patterning of a prehistoric community in terms of intrasite social organization have been made based almost entirely on architectural data alone. The analysis of artifact function and distribution at La Ceiba, Honduras, has contributed significantly to the understanding of the social system at this site. The research presented here is oriented toward isolating and emphasizing artifact variability over the site and specifically relating these patterns to observed spatial distributions of architectural units.

*Benz, Bruce E. (Universidad de Guadalajara)*

[37] THE "WILD MAIZE" FROM TEHUACAN REVISITED

Recent studies of the earliest maize from two of the Tehuacan Valley cave assemblages indicate that it represents not wild but fully domesticated maize. This conclusion is based upon comparative morphological studies of these remains, of extant Mexican maize races and of a number of other exotic but primitive races. With this dismissal of "wild maize" as an ancestor of maize, both Mangelsdorf's original and recently revised hypotheses can be shown to lack credibility. Other morphological studies of the earliest Tehuacan maize remains provide strong support for Iltis' hypothesis that the maize ear originated from a male tassel spike and argue strongly against Galinat's hypothesis that the maize ear originated from the teosinte female spike.

*Bergman, Christopher A. (London), P. Barlow, S. Colcutt (Oxford), M. Roberts and E. Wenban-Smith (London)*

[44] EXPERIMENTAL STUDIES APPLIED TO THE INTERPRETATION OF AREA A, QUARRY 2 AT THE LOWER PALEOLITHIC SITE OF BOXGROVE, WEST SUSSEX, ENGLAND

The Middle Pleistocene site of Boxgrove is part of a major paleo-landscape which occurs over a 30 km stretch of the coast of southern England. The site was visited by prehistoric man during an interglacial believed to be pre-Hoxnian. Boxgrove is characterized by scatters of flint debitage related to biface manufacture and simple core reduction. The material in Area A has been extensively refitted providing insights into Acheulian flintknapping techniques. The experimental program focused on the methods used to produce the stone tools as well as understanding the horizontal distribution of flakes.

*Berman, Mary Jane (Wake Forest), Deborah Pearsall (Missouri - Columbia) and Perry L. Givenski (Wake Forest)*

[62] PALEOETHNOBOTANICAL INVESTIGATIONS AT AN EARLY CONTACT SITE, SAN SALVADOR, THE BAHAMAS

An early contact Arawak site (AD 1492-1520/1530) on San Salvador Island, the Bahamas, yields plant remains from several chronometrically dated contexts. Analyses of macrobotanical and phytolith samples reveal a variety of wild and domestic species. Attention is paid to the use of the plants in the prehistoric economy of the site occupants. The results of the study are compared to ethnohistoric accounts of vegetation from this and neighboring islands. The degree to which the plant remains confirm some of the earliest descriptions of aboriginal plant use in the New World is evaluated.

*Bermann, Marc (Michigan)*

[40] HOUSEHOLDS, RESIDENTIAL CLUSTERS AND DOMESTIC ECONOMY AT LUKURMATA, BOLIVIA

Extensive excavations in residential zones at the Tiwanaku regional administrative center of Lukurmata have revealed a variety of residential clusters consisting of distinct households with associated interior and exterior features. Such residential clusters were encountered and investigated in widely separated areas of the site and have been associated with a broad temporal span of occupation: from Tiwanaku III-V to post-Tiwanaku, Inca and Colonial periods. This paper will examine the changing

forms and functions of these Tiwanaku and non-Tiwanaku household clusters at the site of Lukur-mata, and will focus on the evidence for specialized economic activities associated with these residential clusters, including potential weaving and fish processing areas.

*Bernard-Shaw, Mary (Institute for American Research)*

[69] EVIDENCE FOR PREHISTORIC WATER CONTROL IN THE TUCSON BASIN

Evidence for Sedentary Hohokam irrigation of the floodplain below the Los Morteros site introduces the first documented canal systems in the Tucson Basin. Moreover, the presence of late Archaic reservoirs, or charcos, in this locale indicates that the advent of the agricultural use of the basin floodplain well preceded the ceramic period. The dating and development of these features at Los Morteros [AZ AA:12:57 (ASM)] contribute to the current view of the early expansion of agriculture by basin inhabitants.

*Bettis III, E. Arthur (Iowa Geological Survey Bureau)*

[10] SOIL MORPHOLOGIC PROPERTIES AND WEATHERING ZONE CHARACTERISTICS AS AGE INDICATORS IN HOLOCENE ALLUVIUM IN THE UPPER MIDWEST

Surface soils developed in alluvial deposits dating from the early through middle Holocene (EMH 10,500-4000 BP) have brown argillic (Bt) horizons, albic (E) horizons if developed under forest vegetation, moderate grade structure, and are well horzonated. Surface soils developed in late Holocene (LH 4000-500 BP) deposits have a cambic (Bw) horizon or A-X profiles, weak grade structure, are dark colored and have weak horzonation. EMH deposits usually exhibit oxidized colors and contain red or brown mottles below the solum. LH deposits are less oxidized (darker colored) and usually do not contain red or brown mottles. These criteria are used to map the distribution of EMH and LH deposits for planning cultural resource surveys and to evaluate the known distribution of prehistoric sites as reflective of settlement patterns.

*Binford, Lewis R. (New Mexico)*

[58] DIMENSIONAL SPECIALIZATION AND ARCHAEOLOGICAL RESEARCH

Spatial observation of artifacts, particularly those exposed on modern surfaces, is a growing area of archaeological investigation. Spatial analyses examine relationships between a selected set of dimensions rather than dimensions that archaeologists are charged with studying holistically and can presuppose some accepted characteristics of a dimension not be investigated. Results of such studies, particularly those from CRM work, impact the kinds of inferences frequently made or even the types of research proposals generated. This paper seeks to integrate the problems of inference justification with various specializations in archaeological work with particular emphasis on large surface surveys.

*Binford, Lewis R. (New Mexico) [Discussant 3]*

*Binford, Lewis R. (New Mexico) [Discussant 44]*

*Bishop, Ronald L., Veletta Canouts (Smithsonian Institution) and Patricia L. Crown (Southern Methodist)*

[9] ANALYTICAL PRECISION AND SENSITIVITY IN CERAMIC ANALYSIS

In order to answer questions of increasingly localized production, the chemical analysis of ceramics must frequently focus on materials derived from the same geological formations. The success of a compositional analysis lies not only with well formulated sampling designs but with the nature of the analytical technique(s) utilized. Substantive findings from analyses of Southwestern Salado Polychromes, with specific data sets derived from 1) X-ray fluorescence analysis, 2) instrumental neutron activation analysis and 3) a simulated INAA data set, are used to explore the analytical concepts of sensitivity and precision as they relate to different levels of specificity posed in the research questions.

*Bishop, R. L. (see Neff, H.) [29]*

*Black, Andrew T. (SUNY Binghamton)*

[2] DEALING WITH CULTURAL CHANGE: AN ANALYSIS OF THE DIAZ HOUSEHOLD, MONTEREY, CALIFORNIA

Shortly after the American annexation of California, Manuel Diaz, a wealthy Mexican merchant, was caught in the turmoil of cultural conflict that was to leave him bankrupt by 1855. His plight was common among Mexican-Americans who were systematically discriminated against by the newly dominant Anglo culture. This paper analyzes how the Diaz family dealt with the change of government and culture by manipulating the material culture of their household to symbolically support or subvert the American takeover. The analysis shows that material culture is a complex and active part of social interaction and cannot be interpreted solely through function or economic worth.

*Black, K. D. (see Metcalf, M. D.) [18]*

*Black, Stephen L. (Harvard) and Thomas R. Hester (Texas, Austin)*

[27] RESEARCH PROBLEMS IN THE ARCHEOLOGY OF GREATER SOUTHERN TEXAS

In a recent overview prepared by the authors for the Southwestern Division Corps of Engineers, the archeology of Greater South Texas was examined in detail. This is the Southwest Division's Region 3, encompassing three Texas archeological areas: Central, South and Lower Pecos. Our focus in this paper is the issue of site significance, a crucial problem in all three subareas. It is our argument that too many dollars are being spent on too many sites. Research funds should be concentrated on those sites with the potential for answering regional problem oriented issues.

*Blackman, M. J. (see Steponaitis, V. P.) [26]*

*Blake, Michael (British Columbia)*

[24] HOUSEHOLDS AT CANAJASTE: INTEGRATING SYMBOLS AND PROCESS IN THE STUDY OF AN EVOLVING POSTCLASSIC MAYA STATE

Symbols of status in archaeological household remains are used to show how processes of 1) interregional exchange, 2) warfare, 3) elite colonization and 4) colonization by whole communities influenced the development of a Postclassic Maya state. Excavated household remains at the Postclassic Maya site of Canajaste, in Chiapas, Mexico, show changing differences between elite and nonelite patterns of house styles, burials, artifacts and subsistence remains. Both symbolic and processual approaches are combined at the level of household analysis in order to explain the evolutionary history of Canajaste.

*Blakeslee, Donald J. (Wichita State)*

[18] TOOLS, TRAILS AND TERRITORIES

Lithic assemblages created by nomadic and seminomadic peoples contain information about territoriality. Stone tools carried to a site are made from materials obtained prior to the occupation of the site. Therefore, analysis of the geologic provenance of stone that occurs in a site allows one to read a record of group movements that occurred shortly prior to the occupation of the site. When traditional routes are known, the level of information that can be obtained is extraordinary. This mode of analysis is applied here to the protohistoric Wichita Indians of Kansas.

*Bleed, Peter (Nebraska)*

[66] EVENT TREE ANALYSIS AS A TOOL FOR THE STUDY OF HUNTING SYSTEMS

Event Tree Analysis - ETA - is an operations research technique that determines the possible outcomes of complex systems. It also calculates their probability of occurrence and so is used by engineers and managers to assess the operating characteristics, potential problems and probable results of industrial systems. Application of ETA to ethnographically reported hunting systems shows that it can as well provide a means of analyzing and modeling preindustrial technologies. This paper shows how hunting systems can be studied as event trees and discusses the problems and potentials of applying ETA to archaeological problems.

*Bleed, P. (see Falk, C.) [64]*

*Blumenschine, Robert J. (Rutgers)*

[59] THE TAPHONOMIC TRIO: MECHANICS, ENERGETICS AND ECOLOGY

Traditional archaeological taphonomy views bones as physical objects prone to various mechanical forces to assess processes of site formation. Interpreting hominid behavior additionally requires archaeological bone to be viewed as former packets of nutrients differentially attractive to carnivores. Bones also contain ecological information relevant to establishing the context(s) within which hominid behaviors were conducted. The reconstruction of hominid lifestyle is suggested to be most productive when the three taphonomic aspects of bones play their respective parts in concert.

*Blumenschine, R. J. (see Selvaggio, M. M.) [47]*

*Blumenschine, R. J. (see Cavallo, J. A.) [4]*

*Boaz, Joel S. (Wisconsin-Madison)*

[47] RECENT MESOLITHIC-NEOLITHIC EXCAVATIONS ON THE DOKKFLOY, INTERIOR EASTERN NORWAY

Survey and testing in the Dokkfloy, a lakeshore environment in interior Eastern Norway, prior to the construction of hydroelectric facilities has produced 50 Mesolithic-Neolithic sites. Five sites were chosen for complete excavation. Presently the excavated sites are thought to reflect extremely brief occupations. While few faunal or floral remains have survived, the lithic assemblage indicates an

extensive use of local (quartzite and rock crystal) and nonlocal (quartzites and flint) raw materials. Current research plans are focused on refitting and quantitative spatial analysis in order to provide a more detailed understanding of the technology and nature of the utilization of this area.

*Bohrer, Vorsila L. (SW Ethnobotanical Enterprises)*

[57] RECENTLY RECOGNIZED CULTIVATED AND ENCOURAGED PLANTS AMONG THE HOHOKAM

The evidence for cultivation of agave and cholla cactus is summarized as well as the morphological reasons for believing Mexican *crucillo* (*Condalia warnockii* var. *Kearneyana*) and little barley grass were domesticated. Certain *Amaranthus* and *Chenopodium* may have been either cultivated or domesticated. Encouraged plants include native cool season annuals, late fall annuals and ones more opportunistic in their seasonality. Native grasses may have played a more important role than was formerly realized. The potential role of tolerated plants by the Hohokam is discussed.

*Boomer, Arie (U of the West Indies)* [Discussant 30]

*Boone, James L. and James G. Snyder (New Mexico)*

[67] REFUSE DEPOSITS AND SPACE USE IN A MEDIEVAL WALLED SETTLEMENT

This paper explores some techniques for analyzing urban site structure in terms of artifact deposition patterns constrained by architecture. Exploratory data analytical techniques are used to delineate patterns of space use at Qsar es-Seghir, a late medieval walled settlement in northern Morocco. Rescaling techniques which facilitate the analysis of infrequently occurring and nonnormally distributed artifact classes are used to analyze the contents of room dumps. Finally, the analysis attempts to refine the measurement and quantitative characterization of "midden catchment."

*Bove, F. J. (see Neff, H.)* [29]

*Bower, John (Iowa State)*

[56] THE "DISTRIBUTION OF WEALTH" IN THE EAST AFRICAN PASTORAL NEOLITHIC

The introduction of domesticated livestock to East Africa offers new opportunities for the establishment of redistributive economies and hierarchical societies with "decision-making elites." Possible indications of these structures are seen in the distribution of highly valued goods in residential areas and cemeteries, goods which include cattle and obsidian. The value of obsidian was especially high in areas remote from the sources. Both obsidian and cattle appear in more or less uniform distribution at Pastoral Neolithic sites, even those remote from obsidian sources. Moreover, most practices are essentially egalitarian. Thus, Pastoral Neolithic sociopolitical structure was more likely to have resembled the "Complex Tribe" model than a chiefdom, and this paper explores some possible explanations.

*Boyd, Jr., C. Clifford (Radford) and Gerald E. Schroedl (Tennessee)*

[56] COMPLEX TRIBES AND CULTURAL COMPLEXITY IN THE PREHISTORY OF EAST TENNESSEE

Cultural evolution during the Woodland Period in east Tennessee is marked by increasing interregional trade, increasing experimentation with domesticated plants and the construction of conical burial mounds. These mounds of the Late Woodland, previously interpreted as constructions resulting from the influence of "big men", are better seen as evidence for a more complex tribal organization than is seen in Early Woodland manifestations. The continued use of these mounds into the Early Mississippian Period, with its greater political complexity, suggests that the Complex Tribe defines an important intermediate step in the cultural evolution of societies in this region.

*Bradley, Bruce A. (Crow Canyon Archaeological Center)*

[20] KIVA USE IN THE THIRTEENTH CENTURY MESA VERDE AREA: A NEW ASSESSMENT

In order to make interpretations about the uses of kivas in the Mesa Verde area, a comparative study of architecture and abandonment assemblages of two 13th century sites has been undertaken. Criteria employed to assess ritual and domestic uses are presented. Although basic architectural and assemblage similarities are seen at Mug House and Sand Canyon Pueblo, the differences are enough to allow the conclusion that most of the Mug House kivas were used primarily for domestic activities while most of the Sand Canyon Pueblo kivas were used primarily for ritual activities.

*Bradley, B. A. (see Frison, G. C.)* [61]

*Brandt, Elizabeth A. (Arizona State) and Everett J. Bassett (Dames and Moore)*

[69] ORAL HISTORIES AS CULTURAL RESOURCES

Individuals who lived at places that are now archaeological sites represent an underutilized "cultural resource." Their recollections can yield information to test archaeological interpretations and sup-

plement the archaeological record with data about on-site activities which left no durable record. Such consultations allow the relationships between the physical evidence and inferred aspects of site function and history to be tested. New video taping and computer technologies for documenting such interview data are discussed. Recent research at early 20th century Apache labor camps is used as a case study.

*Brashler, J. (see Reed, D.)* [36]

*Briuer, Frederick L. (Fort Hood, TX)*

[13] GEOGRAPHIC INFORMATION SYSTEMS AND AUTOMATED ARCHAEOLOGICAL INFORMATION: INVESTMENTS AND DIVIDENDS FOR ARCHAEOLOGICAL RESOURCE MANAGEMENT

Applications of GIS and archaeological data base management will be discussed from the operational perspective of an archaeological resource management program on a large military installation. Day to day coordination of numerous potentially destructive actions is routinely accomplished to avoid unnecessary archaeological destruction. An investment in extensive automated data on 2300 archaeological sites from a ten year survey program covering 90% of this 339 square mile region is now paying significant dividends including the development of objective and replicable methods for selecting a statistically significant sample of sites for priority protection and preservation.

*Bronitsky, Gordon (New Mexico)* [Discussant 41]

*Brooks, Alison S. (George Washington)*

[59] NEW PERSPECTIVES ON WESTERN EUROPEAN PREHISTORY

Recently excavated or reexcavated western European paleolithic sites, together with new techniques of analysis and dating, and alternative approaches to the interpretation of archaeological data have altered previous conceptions of Pleistocene cultural evolution and paleolithic lifeways in western Europe. Controversial issues include: the existence of pre-Brunhes occupation sites, the nonanthropogenic contribution to site formation (particularly prior to 40,000 BP), the relative absence of "fully human" cultural capabilities in lower/middle paleolithic groups, the nature of the middle/upper paleolithic transition and the economic, social and symbolic bases of final Pleistocene societies.

*Brooks, Mark J. and Kenneth E. Sassaman (South Carolina)*

[5] POINT BAR GEOARCHAEOLOGY IN THE UPPER COASTAL PLAIN OF THE SAVANNAH RIVER VALLEY

Early to mid-Holocene alluvial raised terrace/point bar sites in the Upper Coastal Plain of the Savannah River Valley provide an important body of data with reference to paleoenvironmental reconstruction geared toward human paleoecological research. Sedimentological and archaeological data are used to distinguish depositional events and to define occupation surfaces. The temporal controls provided by archaeology enable the determination of 1) the times and rates of net sedimentation, 2) the times and duration of land/occupation surface stability and 3) the times, frequencies and directionality of channel migration and switching patterns that may be linked ultimately to documented sea level changes.

*Brooks, Robert L. (OK Archeological Survey)*

[11] MANAGEMENT AND TREATMENT OF BURIAL REMAINS: AN OKLAHOMA PERSPECTIVE

Treatment of human skeletal remains, including reburial, is one of the most challenging problems confronting the archaeological community. Because of the nature of this problem, it is also a highly emotional issue. In 1987 the state of Oklahoma passed a burial disturbance law which bears directly on the treatment of burial remains. The evolution of this law is followed with particular emphasis on the mandate for the legislation. Basic tenets of the law as they reflect treatment of human remains and the reburial concept are also elaborated. Concluding comments address the successful passage of the legislation and identify two areas of concern regarding the development of future burial legislation in other states.

*Brooks, R. L. (see Hofman, J. L.)* [27]

*Broughton, Jack M. (California State, Chico)*

[15] ICHTHYOFAUNAL QUANTIFICATION ISSUES INVOLVING THE DETERMINATION OF RELATIVE ABUNDANCE

The quantification of relative abundance from ichthyofaunal assemblages can often be problematic due to osteological similarities between related fish, especially those belonging to the order Cypriniformes. Among the problems involved are the calculation of the NISP and the comparability of NISP

and MNI data. If these difficulties are neglected the relative contribution of the various fish species within an assemblage can easily be distorted. Data from 11 prehistoric sites from the Sacramento Valley in California are compared with fish data sets from riverine sites elsewhere in North America to illustrate the nature and scope of these problems and how they may be resolved.

*Browman, David L. (Washington-St. Louis)*

[48] ARCHAEOLINGUISTIC MODELS: AYMARA-QUECHUA BOUNDARIES AND THE WARI-TIWANAKU INTERFACE

New ceramic data from the frontier zone of Moquegua provides alternate interpretations of the interactions of the Wari expansionist empire and the Tiwanaku colonizing federation. Bird, Browman and Durbin's recent paper on maize and Quechua distribution patterns indicates that Quechua was likely introduced into the Cuzco and associated coastal areas via Wari expansion. Continuing analyses of Aymara indicate its close correlation with the spread of Tiwanaku, and investigate possible Pukina or Uru relationships with Middle Horizon political events.

*Brown, Alan J., George R. Holley, Neal H. Lopinot and William I. Woods (SIU-Edwardsville)*

[28] CULTURAL AND NATURAL EXPLANATIONS FOR BURIED LATE PREHISTORIC SITES IN THE AMERICAN BOTTOM

The Goshen site, a buried Emergent Mississippian occupation in the American Bottom has produced stratigraphic evidence suggestive of dynamic land use. The site was established on a colluvial fan that was subsequently aggraded during two separate periods (Mississippian and 19th century Historic) as a result of deforestation of the adjacent uplands. Supportive evidence concerning wood use at Cahokia, distribution of Mississippian settlements and the reconstruction of the area's topography are used to construct a synthetic model of land use during the Mississippian and post-Mississippian periods.

*Brown, Linda J. (Arizona)*

[73] DATA ORGANIZATION AND RETRIEVAL: THE ROLE OF PERSONAL COMPUTERS IN THE FIELD LABORATORY

Personal computers are capable of improving the output and expanding the function of the field laboratory in archaeological excavations. The capabilities of personal computers in this role are examined, including the organization of field observations and initial artifact sorts and the use of data generated from measurement equipment such as scales and calipers. Problems and solutions to organizing archaeological data for computerization and logistical considerations in using computers in the field are considered. These general issues are illustrated with examples drawn from the Lower Amazon Archaeological Project.

*Bruder, J. Simon (Dames and Moore)*

[57] A LOOK AT ARCHAEOLOGICAL/ETHNOBIOLOGICAL COLLABORATION IN HOHOKAM STUDIES

A number of major projects are examined to review the efficacy of recent archaeological/ethnobiological collaboration. This evaluation (1) characterizes the quality of interaction between archaeologists and ethnobiologists and also between biological specialists themselves, (2) determines whether the level of interaction as reflected in interpretive studies is improving or needs to improve and (3) assesses how cooperative efforts in Hohokam studies can contribute to the development and testing of models used to explain the origins and development of diverse subsistence strategies and the intensification of production methods. Finally, specific archaeological expectations are outlined.

*Bruhns, Karen Olsen (San Francisco State)*

[63] HIGHLAND ECUADOR, WARI AND BEYOND

Integration Period highland Ecuadorian cultures continued earlier patterns of interaction and exchange with coastal and tropical forest regions, extending their contacts as far south as central Peru. Contact with Wari and Wari-influenced cultures is most evident in the Sigsig-Chordeleg region of the southern Ecuadorian highlands. Here Wari influence in metallurgy and ceramics is marked. Although evidence from controlled excavations is virtually lacking, Wari would appear to have been succeeded in importance here by Sican and Chimu. It is possible that this long history of interaction with Peruvian polities was an important factor in the later Inca conquest.

*Brunson, Judy L. (Salt River Project) and Scott L. Fedick (Archaeological Consulting Services, Ltd.)*

[69] LOS GUANACOS: ONE HUNDRED YEARS LATER

One hundred years ago in Tempe, Arizona, the Hemenway Expedition excavated a Hohokam site called Los Guanacos. The site was named after a recovered cache of ceramic figurines resembling llama-like animals. In subsequent years few records were thought to remain from the expedition. The site's name was changed and eventually its actual location was lost. Recent research has recovered

some of the earlier field documents, and the site has been identified and test excavations completed. The findings of the original excavation are discussed. In addition, a comparison of historic records and present day knowledge of the site is presented.

*Buikstra, J. E. (see Ramenofsky, A. E.) [36]*

*Bunker, Cindy J. (San Juan College)*

[47] FROM DENTURES TO DENTICULATES: THE REPLICATION OF CHIPPED STONE ARTIFACTS IN ACRYLIC

Over the years several methods of replicating chipped stone artifacts have been developed. The majority of these are either costly, time consuming or lacking in detail. The method discussed in this paper combines accepted methods for artifact reproduction and techniques of dental technology. It is cost effective and the combination of methods result in casts not only identical in shape and color but accurate in detail, reproducing each microflake scar. Casts made in this manner can be used most effectively as teaching aids and museum piece replacements. The method also has implications for production technology and use-wear studies.

*Bunn, Henry T., Laurence E. Bartram and Ellen M. Kroll (Wisconsin)*

[23] COMPARATIVE ANALYSIS OF BUTCHERY PRACTICES BY HADZA AND KUA SAN HUNTER-GATHERERS

Recent ethnoarchaeological research among hunter-gatherers in Tanzania (Hadza) and Botswana (Kua San) has documented the butchery techniques and tools used by these groups in the processing of large animal carcasses. There are both similarities and differences in the type, frequency and skeletal location of resulting damage to bones, including cut marks, chop marks, impact notches and fracture patterns. The more frequent use of small metal axes by Kua San butchers and differing cooking techniques, for example, yield distinctive patterns of bone damage. The archaeological implications of these data are discussed.

*Burnett, Barbara A. (Arkansas)*

[27] THE BIOLOGICAL CORRELATES OF SUBSISTENCE AMONG THE CADDO OF THE ARKANSAS AND RED RIVERS AND NORTHEAST TEXAS

Bioarchaeological analysis is unique to archaeology and a fundamental prerequisite to the successful interpretation of prehistoric subsistence and economic interpretation. Bioarchaeological synthesis of Arkansas, Texas and Oklahoma indicates that Caddo regional adaptations are effectively predicted by environmental stratification and that the traditional assumption of universal reliance upon maize is questionable. Among the prehistoric residents of the Arkansas River drainage subsistence practices were relatively static throughout the Woodland and Mississippian Periods. Among southern Caddo there are no skeletal indicators of maize dependency with only a few Red River Caddo falling within this category.

*Burton, James H. (Arizona State)*

[26] PLAINWARE PROVENIENCE AND TYPOLOGY: A TRACE MINERALOGIC STUDY

In intrasite and intraregional studies in areas where ceramic traditions are widespread, plainware typologies based on macroscopic visual attributes may be of limited use in differentiating local and nonlocal ceramics. In interregional studies the typologies may lead to erroneous implications of provenience, time period and cultural affiliation. Electron microscopic methods were applied to plainwares from central Arizona to establish mineralogic fingerprints whereby different raw material sources were distinguished. Such detailed mineralogic studies, integrated with other attribute analyses, provide data essential to identifying other, more easily determined provenience relevant attributes.

*Burton, Jeffery F. (Arizona)*

[25] VOLCANISM, OBSIDIAN HYDRATION, AND ARCHAEOLOGICAL REALITY IN THE WESTERN GREAT BASIN

Chronometric data continue to be inappropriately applied to questions of prehistoric demography. For example, obsidian hydration has been used to correlate gaps in occupation with volcanic events in the western Great Basin. The validity of this reconstruction is examined from the standpoint of the accuracy and precision of obsidian hydration analysis. Although many critical factors in hydration have been identified, the combined effects of sampling, environmental factors and other formation processes have been underestimated and obscured. Hypothetical cases using current analytical techniques illustrate that the prehistoric patterns discovered are more artifacts of archaeological analysis than past behavior.

*Bush, Peter J. (SUNY Buffalo), Kathleen M. Allen (SUNY at Buffalo) and George Grobe (SUNY Buffalo)*

[70] IDENTIFICATION OF PREHISTORIC FOODSTUFFS FROM ENCRUSTATION ANALYSIS

The presence of food remains baked onto prehistoric pottery has been noted on Iroquoian sites in northeastern North America. Analysis of the constituents of this substance and its identification as food is important for the partial reconstruction of diet. The direct association of pottery and food leaves no question as to its consumption. Specimens from museum collections, recent excavations and those experimentally produced are analyzed and the relative utility of SEM/EDS (Scanning Electron Microscopy with Energy Dispersive Spectroscopy) and ESCA (Electron Spectroscopy for Chemical Analysis) techniques are reported.

*Butler, B. Robert (Idaho Museum of Natural History) [Discussant 41]*

*Byland, Bruce E. (Lehman College, CUNY) and John M.D. Pohl (UCLA)*

[37] ARCHAEOLOGICAL AND ETHNOHISTORIC EVIDENCE FOR THE CLASSIC-POST CLASSIC TRANSITION IN THE MIXTECA ALTA

Completion of the Tilantongo-Jaltepec survey project has made possible a new analysis of the Classic-Postclassic transition in the region. Previously the transition has been seen as a political reorganization from a few dominant Classic centers to more and smaller Postclassic centers, an interpretation based on scant archaeological information. The combination of archaeological and ethnohistorical evidence yields a more realistic reconstruction of the political dynamics. A complex mosaic of large and small centers, sharing and balancing power has emerged which informs discussion of processes and mechanisms of change.

*Byland, B. E. (see Pohl, J. M.) [37]*

*Cable, John S. (Arizona State)*

[8] THE PROCESSES LEADING TO THE ADOPTION OF AGRICULTURE IN THE PHOENIX BASIN, ARIZONA

Recent excavations in downtown Phoenix, Arizona, have provided the basis for a resynthesis of the earliest phases of the Phoenix Basin Hohokam. The resynthesis suggests that this population was dependent on agriculture from its earliest beginnings at around AD 1. After a lengthy period of low energy floodwater farming lasting for about 300 years, however, more intensive canal irrigation technologies were deployed which greatly increased production, population densities and social complexity. This paper will explore the implications of the resynthesis for studies concerning the adoption of agriculture in the southern Southwest.

*Cameron, Catherine M. (Arizona)*

[14] PROCESSES OF STRUCTURAL ABANDONMENT AT VILLAGE SITES IN ARID AREAS

The way in which settlements and structures within settlements are abandoned has important implications for many aspects of archaeological interpretation, including interpretation of artifact and activity area functions, social organization, ritual behavior and demographic characteristics. Ethnographic, historic and ethnoarchaeological data are used to identify factors which affect the ways in which structures are abandoned and how these factors are related to archaeologically recovered structures. The study focuses on village sites in arid areas in order to construct models of abandonment processes that are applicable to the prehistoric Southwest.

*Camilli, Eileen L. (New Mexico)*

[58] ARTIFACT RECYCLING AND SPATIAL STRUCTURE IN CONTINUOUS SURFACE DISTRIBUTIONS

Reoccupation of locales and accompanying artifact reuse are two post-depositional factors contributing to the formation of continuous surface distributions. The differential visibility, and thus discoverability, of surface artifacts in the past is viewed as determining the likelihood of reoccupation and the degree of prehistoric recycling of surface artifacts. The surface visibility of artifacts in different depositional contexts is demonstrated with surface and subsurface assemblages from south-central New Mexico and lithic artifact recycling as a determinant of the spatial structure of items in continuous surface distributions examined.

*Camilli, E. L. (see Mills, B. J.) [3]*

*Canouts, V. (see Bishop, R. L.) [9]*

*Cantley, Garry J. (Arizona State)*

[70] A FIRST ATTEMPT AT MODELING THE PAPAGO ECONOMIC SYSTEM

An analysis of the historic Papago economic system may begin with the question, why did they continue to plant crops when the apparent cost/benefit ratio was so low? Virtually all researchers

who have studied the Papago have expressed surprise that they would invest any effort at all in this direction. Drawing upon advances in desert ecology, this study suggests a rationale for the Papago practice of farming. The study then expands to model the interrelationships between Papago farming practice and other major components of their economy. Finally, the implications of this systemic model for interpreting the area's archaeological record are discussed.

*Carlisle, R. C. (see Adovasio, J. M.) [25]*

*Carlson, David L. (Texas A&M)*

[69] LOOKING AT THE BIG PICTURE: LARGE SCALE SITE DISTRIBUTIONAL PATTERNS IN THE GREATER SOUTHWEST

The All American Pipeline Project resulted in systematic survey coverage of 1400 miles from Santa Barbara, California, to McCamey, Texas, using a consistent set of survey and collection techniques. Data on 484 sites, over 200,000 artifacts and 500 chronometric dates provide an unparalleled opportunity to study the distribution of archeological sites across the entire Southwest. Comparison of site distributions with climatic, environmental and cultural variability demonstrates the importance of studying locational preferences and settlement patterns which crosscut the regions typically used for such studies.

*Carmichael, David L. and Diana Christensen (Tetra Tech)*

[13] GIS PREDICTIVE MODELING OF PREHISTORIC SITE DISTRIBUTIONS IN CENTRAL MONTANA

The ARC/INFO GIS was used to generate a predictive model of prehistoric sites in a large area in central Montana. The data generated by the GIS were analyzed by logistic regression and a probability surface map of the project area was prepared for environmental planning purposes. Problems associated with very large scale applications of GIS data and the use of preexisting archaeological site records are explored.

*Carr, Christopher (Arizona State)*

[9] THE POTENTIALS OF RADIOGRAPHY IN ARCHAEOLOGICAL CERAMIC ANALYSIS

Inexpensive, nondestructive radiographic procedures exist for studying a broad variety of ceramic technological, functional and stylistic parameters. These include the density, size distribution and general composition of temper particles in ceramic vessels, microcracking from vessel manufacture and use, and other indicators of manufacturing procedures. Also, sherd from individual vessels, subsequently mixed in archaeological deposits, can often be identified and sorted. The relative advantages of industrial radiography, mammography, xeroradiography and petrography in documenting each of these parameters are defined and exemplified using Ohio Woodland ceramics.

*Cassell, Mark S. (SUNY Binghamton)*

[31] WHO'S MINDING THE STORES? STORAGE MANAGEMENT, SOCIAL CHANGE, AND CAPITALIST DEVELOPMENT IN NORTH ALASKA IN THE LATE 19TH CENTURY

This paper examines changes in the structure of food storage management in the North Alaskan Inupiat Eskimo village setting resulting from the late 19th century development of the Euro-American commercial whaling industry. The socioeconomic role of the *umialik* (whaling captain) as keeper and redistributor of the community's stored whale meat was vital to the social reproduction of traditional Inupiat society. By the mid-1880s, the Euro-American commercial whaler had supplanted the *umialik* as the chief provider of the community; the *umialik* became a middleman in the whaler's employ. This change in the social role of food storage management was an integral component of capitalist development in late 19th century North Alaska.

*Castalia, Patricia (Idaeim Studio)*

[73] COMPUTER IMAGING APPLICATIONS IN ARCHAEOLOGY

This paper presents a discussion of computer image analysis as a conceptual tool for archaeological interpretation. The process applies weights to spatial data and combines the results mathematically to create spatial models of human activities. Any data which has a spatial component can be represented in the analysis, including hard geographic "facts", hypothetical patterns approximating past conditions and/or cultural biases affecting the spatial distribution of data. Interactive computer map analysis provides the opportunity to explore complex patterns of behavior which cannot be visualized by any other means. The method is applied to regional settlement patterns and intrasite patterning.

*Castillo, Ed D. (Laytonville, CA)*

[21] THE NATIVE RESPONSE TO THE COLONIZATION OF ALTA CALIFORNIA

Despite an abundance of documentary evidence and scholarly research to the contrary, the Indians of Alta California are still widely viewed as a passive and docile people whose societies rapidly

collapsed when confronted with Euro-American contact. This study will survey the impact of Spanish colonization on the native societies of that area. Native peoples' adaptation and resistance will make up the twin themes to be explored. An analysis and reflection of this experience will complete this paper.

*Cavallo, John A. and Robert J. Blumenschine (Rutgers)*

[4] LARDERS IN THE LIMBS: EXPANDING THE EARLY HOMINID SCAVENGING NICHE

New field observations in the Serengeti National Park, Tanzania, suggest that hominids may have scavenged carcasses of small mammals (size 1 and 2 or the young of larger species) killed and stored in trees by leopards. Data on the duration of temporary abandonments of tree-cached kills and the leopard's pattern of consuming these suggest that the exploitation of this arboreal scavenging niche by hominids could have yielded fleshy skeletal parts similar to those currently attributed to hunting at Olduvai Gorge and Klasies River Mouth.

*Chang, Claudia (Sweet Briar)*

[74] THE CULTURAL LANDSCAPE OF PASTORALISM: BEYOND THE SITE CONCEPT

Pastoralism, like foraging, requires mobile strategies for resource exploitation. Until recently, within the archaeological record, material evidence for pastoralism has been considered ephemeral and scant. Using ethnoarchaeological data from Greece on village pastoralists, I investigate the issue of site visibility and consider the degree to which off-site archaeology is a necessary alternative for examining pastoralism in the archaeological record. Pastoral exploitation of critical resources such as water and pasture will be examined in relation to the cognitive spatial organization of pastoral settlement and dispersal patterns. The modification of cultural landscapes by pastoralists through the construction and use of trails, enclosures, encampments, markers and grazing territories are discussed as an alternative to the 'pastoral site'.

*Chapman, Richard C. and William H. Doleman (New Mexico)*

[67] TESTING SITES INTO EXISTENCE: IMPLICATIONS OF SURFACE VISIBILITY FOR

DEFINING LARGE-SCALE LOW DENSITY ARTIFACT DISTRIBUTIONS

Attempts to understand the organizational elements of behavior underlying the formation of large scale archaeological distributions are critically dependent on the relationship between the behavioral concepts and descriptive methods used to guide analysis of those target phenomena. Recent data from the Tularosa Basin in southern New Mexico are used to illustrate the way in which different methods of data recovery and analysis can result in radically different perceptions of both surface and subsurface distributions and how uncritical acceptance of these can drastically affect interpretations. Research strategies emphasizing behavioral and geomorphic formation processes and appropriate scales of observation are offered as a partial solution to this problem.

*Charlton, Thomas H. (Iowa) and Patricia Fournier G. (Arizona)*

[60] URBAN AND RURAL DIMENSIONS OF THE CONTACT PERIOD IN THE BASIN OF MEXICO: A.D. 1521-1620

Urban and rural differences in the impact of culture contact are examined through the historical archaeology of Mexico City, Cuernavaca, Otumba and Mezquital Valley. Comparisons focus on the differential impact of the Spanish on aspects of indigenous cultures including 1) economic patterns (trade routes, consumption trends) and 2) social status as reflected in urban and rural material culture. The systematic differences in urban and rural archaeological complexes in the first century after conquest reflect variations in the structure and content of contact in each setting.

*Charlton, T. H. (see Nichols, D. L.) [37]*

*Chatters, James C. (Battelle, Pacific Northwest Laboratories)*

[38] PREHISTORIC EXPLOITATION OF FRESHWATER BIVALVES IN NORTHWESTERN AMERICA

Middens of freshwater bivalve shell occur in archaeological sites throughout northwestern America, but little information has been obtained from these middens because the shells are unsuitable for analysis by standard techniques. Lacking substantive data on bivalve use, archaeologists have long assumed that shellfish were exploited primarily in late winter on an emergency basis. A new technique has been applied to 86 shell samples from 16 sites in Washington and California dating from 8000 to 100 BP. The results show that time-honored assumptions about the role of bivalves are seriously in error. There have been marked temporal and geographical differences in the timing and intensity of bivalve exploitation which correlate with environmental conditions and/or overall adaptive strategies.

*Cherry, John E (Cambridge) and Jack L. Davis (Illinois - Chicago)*

[58] HIGH DENSITY DISTRIBUTIONAL ARCHAEOLOGY: A MEDITERRANEAN PERSPECTIVE

Surveys monitor variable artifact distributions, but the use of such data to define "sites" is often idiosyncratic, confuses method with interpretation and makes objective comparisons of results from different regions difficult. However, the high artifact densities usually considered as sites 1) can only be defined relative to the entire regional artifact distribution, 2) represent palimpsests, themselves subject to geomorphological and behavioral alterations and 3) cannot provide adequate information for reconstructing total settlement systems. New work in Greece, where densities are typically high and artifacts very diagnostic, shows promise of solving some of these logistical difficulties.

*Chiarelli, James A. (Brandeis)*

[22] ON HISTORY, POSITIVISM, AND THE POLITICAL USES OF ARCHAEOLOGY

For the past 25 years archaeological theory in America has functioned in a distinct political context which exists within the academic world and in society as a whole. The theoretical construct of logical positivism and the rationalist belief in the possibility of a true science of the past have influenced public, academic and political thinking on the relevance of archaeology to contemporary social experience. Explicitly historical concerns, disdained by most archaeologists since the 1960s, should not be considered antithetical to the relevance of archaeology nor to the rigorous analysis of archaeological data.

*Chisholm, Brian S. (Vancouver, BC), Hiroko Koike (Saitama, Japan) and Nobuyuki Nakai (Nagoya, Japan)*

[64] PREHISTORIC DIET IN JAPAN: ISOTOPIC EVIDENCE

Samples of human bone from a number of sites in Japan, dating from the Early Jomon through the Edo and Modern Ainu Periods, were subjected to stable isotopic analysis to estimate diet parameters. Results indicate that Jomon Period diet varied more between sites, and included more marine species at coastal sites, than in subsequent periods. Yayoi people used fewer marine foods, even in coastal locales, and intersite variability in diet was lower than in the following Kofun and Historic Periods. A number of sites show evidence of two groups of consumers differing significantly from each other in diet.

*Chiswell, Coreen E. (UCLA)*

[48] AN ANALYSIS OF ARCHITECTURAL FUNCTION AT PACATNAMU, NORTH COAST, PERU

The Chimu (AD 1000-1400) occupation of Pacatnamu, a site on the North Coast of Peru, is characterized by a series of truncated pyramids (huacas). Each huaca is associated with a compound of remarkable architectural complexity. The function of these compounds is examined in order to consider social organization. Alternative models of social organization are proposed, each with distinct implications for how the compounds would have been used. Architectural function is assessed in terms of two sets of complementary data: the conclusions of formal architectural analysis and the results of archaeological excavation.

*Christensen, D. (see Carmichael, D. L.) [13]*

*Christenson, Andrew L. (Southern Illinois)*

[25] THE CULTURAL SEQUENCES OF BLACK MESA AND TSEGI CANYON, ARIZONA: A COMPARISON USING MEAN CERAMIC DATING

The technique of assigning absolute dates to sherd assemblages using a mean ceramic date derived from types having known midpoints was tested on a series of tree ring dated sites in the Kayenta Anasazi area. The mean deviation of the ceramic date was less than 20 years. The method was then used on surface collections from Black Mesa (Black Mesa Archaeological Project) and Tsegi Canyon (Rainbow Bridge - Monument Valley Expedition). Although the regions are only 30 km apart, they have different occupation sequences that could indicate large-scale population movement. The possible causes and socioeconomic implications of such movement are examined.

*Claggett, Steve (North Carolina Office of State Archaeology)*

[11] PRAGMATIC ASPECTS OF SKELETAL REINTERMENT: THE NORTH CAROLINA EXPERIENCE

Passage of North Carolina's "Unmarked Human and Human Skeletal Remains Protection Act" marked a legal and archaeological watershed in terms of the protection, recovery and study of skeletal materials. Individual cases may involve no analysis to intensive study accompanied by bone sample retention or analytic destruction. A committee appointed by the N.C. Commission of Indian Affairs

is formally addressing the reinterment issue in terms of the actual means of reinterment plus the types, location and costs of facilities. Other considerations include possible revisions to state law to insure long-term security and administrative support for the program.

*Clark, G. A. (Arizona State)*

[35] BIASES IN LEVANTINE HUNTER-GATHERER ARCHAEOLOGY: A PERSONAL VIEW

Introspection, humor and a thick skin are required to make explicit the paradigmatic biases that underlie research designs. The fuzzy, half-formed and poorly integrated ideas and concepts that make up my theoretical orientation are characterized in this paper. I am a cultural materialist in that I seek to account for patterned sociocultural phenomena by trying to understand the economic infrastructure, which I regard as primary. However, I am a wishy-washy cultural materialist because as an archaeologist, I see little hope for an integrated theoretical perspective when dealing with the realities of archaeological data sets. I am thus forced to be eclectic, opting for a set of theoretical principles that are useful in problem contexts with which I must repeatedly come to grips.

*Clark, Gerald R. (BLM)*

[61] DISCOVERY AND INVESTIGATION OF THE MILL IRON SITE: THE FEDERAL AGENCY ROLE

Investigation of the Mill Iron Site's Goshen Complex provides a useful model for accomplishing federal agency cultural resource management goals while realizing the research interests of an academic institution. The excavation is being used to assess the site's scientific potential and physical condition for management purposes and to advance paleoindian studies. Facilitated by a cooperative agreement between BLM and the University of Wyoming, the project proceeds under a memorandum of agreement with the Advisory Council on Historic Preservation. In addition to meeting management goals, public archaeology is being served through the use of volunteers and planned interpretive displays in area museums.

*Clary, Karen H. (New Mexico)*

[65] ARCHAEOBOTANICAL APPROACHES TOWARDS MODELING SUBSISTENCE CHANGE

The maintenance of an agricultural subsistence system demands the creation of spatial microenvironments stable enough to ensure crop survival on a regular basis. In the American Southwest crop survival is dependent upon the location of fields in areas with sufficient water and nutrients, an adequate growing season and protection from crop predation. The climatic perturbations recorded during the Anasazi occupation of northwest central New Mexico were of sufficient magnitude to have affected tactics by agriculturalists to ameliorate the severity of the changes. These tactics were changed through time and space and were to some extent population dependent. In this paper I will discuss how some of these tactics might be detected in the archaeobotanical record and how this record might be improved by particular sampling approaches.

*Cleaveland, M. K. (see Stahle, D. W.) [71]*

*Cleland, James H. (Dames and Moore)*

[38] STABILITY AND CHANGE IN THE PROCUREMENT AND EXCHANGE OF COSO OBSIDIAN

The Coso area in eastern California served as a major obsidian source for trans-Sierran peoples for at least 8000 years. This paper examines the distribution of the major distinct geochemical groups of Coso obsidian in space and time. Stability and change with respect to direct procurement and exchange models are examined. These patterns are used to examine Moratto's environmental model of culture change in the southern Sierra and Bettinger and Baumhoff's optimal foraging model of the Numic spread in the Great Basin.

*Cleland, Kathryn M. (UCLA) and Izumi Shimada (Harvard)*

[63] DISTRIBUTION OF SICAN STYLES IN THE NORTH CENTRAL ANDEAN INTERACTION SPHERE: SOCIAL, POLITICAL, AND ECONOMIC INFERENCE

Distribution of Early to Late Sican styles in pottery and other media are discussed in terms of the North Central Andean Interaction Sphere. Previous work focused on Moche, Wari and Cajamarca syncretism in Early and Middle Sican. This paper addresses where and why Sican styles spread geographically, and into which socioeconomic contexts. Differential Sican style and artifact distribution within the La Leche Valley during the Middle Horizon and early Late Intermediate (AD 750-1250) is the basis for the inference about use and social class contexts of Sican artifacts there and elsewhere. Pottery is emphasized.

*Cliff, Maynard B. (SMU)*

[17] INDIGENOUS LOWLAND MAYA NUCLEATION — AN ETHNOHISTORICAL PERSPECTIVE

Contrary to earlier models of settlement dispersion, recent archaeological work has shown that settlement nucleation was a factor of Lowland Maya settlement patterns from at least the Late Preclassic onward, and not a late imposition by outsiders as was once thought. The existence of such an indigenous pattern among the Lowland Maya inevitably raises questions in regard to the social role which nucleation played in the evolution of Lowland Maya society. While the ethnographic record does not provide a direct, easily recognizable analog of earlier nucleated communities, it can be a valuable source of information relative to the manner in which the Maya themselves viewed social space and their own communities.

*Coggins, Clemency C. (Peabody Museum, Harvard)*

[7] ON THE SIGNIFICANCE OF OFFERTORY RITUAL AT THE SACRED CENOTE

During eight centuries (AD 750-1550) at Chichen Itza two distinct and sequential offertory complexes were focused on the Sacred Cenote. Both were tied to major calendric observances, but the first (ca. AD 750-1150) involved the offering of the valuable personal belongings of lineage chiefs and the weapons of a warrior elite in the name of Toltec cultural tradition. Later poorer offerings (ca. AD 1250-1539) of dynastic emblems, idols, copal and textiles were exemplary of a provincial Maya society preoccupied with local concerns. There were continuities between the complexes, but the break is more remarkable.

*Cohodas, Marvin (British Columbia)*

[7] MEXICAN VS. MAYA AT CHICHEN ITZA

As the Maya and Mexican influenced architectural styles at Chichen Itza are now considered contemporary, Lincoln explains their contrast in terms of private residential vs public ritual functions. However, the association of Mexican style or costume and martial imagery with the north, in contrast to Maya costume, fertility or dynastic imagery, and the south, characterizes not only the planning and decoration of Chichen Itza's two major downtown complexes, but also the painting and sculptural decoration of Late to Terminal Classic temples elsewhere, notably at Teotihuacan and Cacaxtla. Some explanations for this widespread association of style and symbolism will be explored.

*Colby, Susan M. (UCLA)*

[29] SIN CABEZAS, GUATEMALA — THE SKELETAL REMAINS

Burial remains of 67 individuals from the Late Preclassic Pacific slope site of Sin Cabezas are analyzed as to sex, age, stature and disease patterns, which allow inferences on demographics, health and nutrition to be made. All ages and both sexes are represented. The synergistic effects of dietary deficiencies and disease are implicated in the patterns of lesions. Orientation, position and associations are correlated with age, gender and social status and with patterns of human sacrifice in various spatial and cultural contexts. Ceremonial behavior is revealed in the treatment of human and animal sacrifices.

*Collcutt, S. (see Bergman, C. A.) [44]*

*Collins, James M., George R. Holley, Neal H. Lopinot and William I. Woods (SIU-Edwardsville)*

[6] MISSISSIPPIAN SETTLEMENT DYNAMICS AT CAHOKIA AD 1000-1250: BIG BROTHER, LITTLE BROTHER, NO BROTHER

Since 1984 Southern Illinois University at Edwardsville has conducted a series of integrated archaeological projects at the Cahokia Mounds State Historic Site under the sponsorship of the Illinois Historic Preservation Agency. Data from these investigations, which have included the excavation of nearly 500 features, are presented. The evolution of community configurations through time provides significant insight into the nature, degree and timing of central bureaucratic authority and neighborhood development at the site and the decline of Cahokia as a major polity. Lohmann, Stirling and Moorehead Phase occupations of the site are discussed.

*Collins, Susan M. (Independent Consultant)*

[51] ARCHITECTURAL GEOMETRY OF MESA VERDE GREAT PUEBLO STRUCTURES

Rooms constructed by the northern San Juan Anasazi have two essential shapes, round and quadrilateral, with the D-shape and the ovoid occurring but rarely. Special architectural techniques which adapt the essential shapes to unsuitable spaces include: 1) corner filling to fit round structures in square enclosures and 2) use of the trapezoid to create an illusion of squareness within a curved shelter. In circular structures, the spacing of pilasters suggests that prehistoric architects, while

lacking a precise calculation of pi, may have understood the approximately 1:6 ratio between a circle's radius and its circumference.

*Conkey, Margaret W. (UC Berkeley) and Joan M. Gero (South Carolina)*

[22] BUILDING A FEMINIST ARCHAEOLOGY

This paper addresses the promise and possibilities of using an explicitly feminist social theory in archaeological research and interpretation, particularly in relation to production in prehistory. With gender as an explicit analytical category, and by viewing women as active producers, innovators and contextualizers of the material world, offers the opportunity to inspect how gender operated in past social systems. This, we argue, has the potential for restructuring archaeological assumptions in fundamental ways. Building structure of a feminist archaeology will contribute to discovering the range in sex roles and in sexual symbolism in different societies, to investigating what meanings these may have had and how they may have functioned to maintain social order or to promote social change.

*Conkey, M. W. (see Tringham, R. E.) [59]*

*Connolly, Thomas J. (Oregon)*

[38] A PREHISTORIC CULTURE-HISTORICAL MODEL FOR THE SISKIYOU MOUNTAIN REGION OF SOUTHWEST OREGON AND NORTHERN CALIFORNIA

As a means of ordering the archaeological data from southwest Oregon/northern California in the context of a culture history, assemblage attributes for 32 components from 25 archaeological sites are tabulated and divided into two independent data sets. Assemblages are compared by similarity measures considered appropriate for each data set and provide scores reflecting the degree of relatedness of each assemblage to every other. Assemblages are similarly sorted into three groups with both data sets, which are then interpreted as representing three distinct cultural patterns in the region with independent histories.

*Cook, D. C. (see Ramenofsky, A. E.) [36]*

*Corbin, James E. (Stephen F Austin State)*

[43] SPANISH-INDIAN INTERACTION ON THE EASTERN FRONTIER OF TEXAS AND COAHUILA

Two hundred years after Columbus' landfall in the New World the Spanish initiated several attempts to colonize what is now east Texas to thwart French incursions from the east. The final attempt, initiated in 1721, resulted in a half century of cultural interaction between the indigenous Hasinai Caddo and the Spanish invaders. Recent archaeological research at two mission locations indicates that the small Spanish population, particularly at the missions, was reliant on the Caddo for their survival and economic welfare.

*Cordell, Linda S. (CA Academy of Sciences)*

[33] THE CHRONOLOGY AND CHRONOLOGICAL IMPLICATIONS OF ROWE PUEBLO, NM

The ceramic chronology used in the northern Rio Grande area of New Mexico derives primarily from Kidder's sequence from Pecos. The earlier part of that sequence, relating to the black-on-white wares, was established through excavations at Forked Lightning and Rowe pueblos. Recent excavations at Rowe yielded radiocarbon, archaeomagnetic, tree-ring and obsidian hydration dates for the associated ceramics. Petrographic studies enabled refinement of the ceramic types. The new data and their implications for the northern Rio Grande are explored.

*Cordell, Linda S. (CA Academy of Sciences) [Discussant 68]*

*Costello, Julia G. (UCSB)*

[21] CALIFORNIA MISSIONS: INTERNAL RESPONSES TO EXTERNAL CHANGE

The California missions can be seen as 21 individual economic enterprises all subject to the same external political, economic and social changes that occurred during their tenure between 1769 and ca. 1850. Despite these highly controlled circumstances, the relative success of individual missions, measured in sustained population and production, was quite variable. Causes for this variability are found in local ecological factors, although cultural and historical aspects, some specific to individual missions, were also influential.

*Costin, Cathy L. (Los Angeles County Museum of Natural History)*

[48] CERAMIC EXCHANGE AMONG THE PREHISPANIC WANKA OF HIGHLAND PERU

Ceramics used by the late prehispanic Wanka (AD 1300-1533) circulated in three spheres of exchange: local (traveling less than 10 km from point of production), regional (10-50 km) and long distance (greater than 50 km). There was little change associated with the political transition from several

independent chiefdoms (Wanka II) to a single province within the Inka empire (Wanka III). Local exchange of utilitarian products remained vigorous. Regionally produced and exchanged Inka wares were substituted for local and regional prestige wares as the state cultivated ties with local elites. The decrease in long distance exchange indicates a lessening of alliance building among neighboring elites.

*Costin, C. L. (see Owen, B.) [40]*

*Courtin, J. (see Villa, P.) [3]*

*Cowgill, George L. (Brandeis) [Discussant 67]*

*Crawford, Gary W. (Toronto - Erindale)*

[64] THE EZO PERIOD AND NORTHERN JAPANESE PLANT HUSBANDRY

Recent archaeological research in northern Japan utilizing large scale settlement data, flotation studies, scanning electron microscopy and accelerator radiocarbon dating is discussed. The Ezo Period was a time of close and sustained interaction between the Ezo and Tohoku Japanese. About AD 700, the archaeological record undergoes rapid change in Hokkaido; villages reappeared after a two century hiatus, Tohoku influenced (but indigenous) pottery along with Japanese ceramics appeared, metallurgy began and plant husbandry was practised. This paper reviews these developments as well as developments in prehistoric agricultural research in Japan and emphasizes research results on the protohistoric dry-cropping Ezo agricultural system.

*Crawford, Gary W. (Toronto - Erindale) [Discussant 19]*

*Crerar, J. (see Noble, W. C.) [15]*

*Cross, J. (see Gilbert, C. R.) [32]*

*Crown, Patricia L. (Southern Methodist)*

[33] POT CREEK PUEBLO AND THE CHRONOLOGY OF THE TAOS AREA ANASAZI

Recent research in the Taos area raises questions concerning the accuracy of the traditional sequence used for this area. The lack of chronometric information has made assessment of this sequence difficult and refinement impossible. Recent acquisition of tree-ring, archaeomagnetic and radiocarbon dates permits a reevaluation of the growth and construction sequence of Pot Creek Pueblo and further understanding of the occupation of the Taos area.

*Crown, P. L. (see Bishop, R. L.) [9]*

*Cummings, Linda Scott (PaleoResearch Laboratories)*

[61] PALEOENVIRONMENTAL INTERPRETATIONS FOR THE PAST 11,000 YEARS IN SOUTHEASTERN MONTANA

A stratigraphic pollen record from the Mill Iron Site, which contained evidence of a Goshen Cultural Complex occupation, exhibits evidence of changes in the local environment from 11,000 BP to the present. The local vegetation was typical of a sagebrush steppe environment during occupation, suggesting cooler conditions than present. Changes in the vegetation are relatively abrupt in the pollen record, establishing modern conditions of a sagebrush/grassland mix after fluctuations in the vegetation community. Comparison of the pollen record between this site and others on the High Plains reveals considerable overall agreement, but different local responses to paleoenvironmental conditions are also indicated.

*Cushman, David W. (New Mexico)*

[33] OBSIDIAN HYDRATION DATING IN THE NORTHERN RIO GRANDE

In the nearly thirty years since its development, obsidian hydration has become an important addition to the array of dating techniques currently in use by archeologists in the Southwest and other regions of the world. Limitations on the conditions under which obsidian hydration may be used, however, have recently generated some controversy over its utility as a valid means of dating in archeological research. The purpose of this paper is to review the use of obsidian hydration dating in the Northern Rio Grande region, examine its track record and provide an assessment of its application to current research concerns.

*Cusick, James G. (Florida)*

[70] CERAMIC CHANGE AND ITS LINKS TO CULTURE CHANGE AT A CONTACT PERIOD TAINO SITE

The site of En Bas Saline on the north coast of Haiti is a late prehistoric and contact period Taino Indian village that currently is the main focus of the search for Columbus' 1492 colony of La Navidad. Four field seasons at the site have provided an abundance of aboriginal pottery divided into historic

and prehistoric components. This paper tests the hypothesis that culture change among the Taino after Spanish contact will be reflected in changes in the ceramic record at En Bas Saline from the precontact to postcontact periods. Changes in trade patterns, foodways and group identification will be discussed.

*Custer, Jay E. (Delaware) and R. Michael Stewart (Louis Berger and Associates)*

[28] STRATIFIED HOLOCENE CULTURAL SEQUENCE AT THE UPPER SHAWNEE ISLAND SITE, MONROE COUNTY, PENNSYLVANIA

Recent excavations by Donald Kline at the Upper Shawnee Island Site in the upper Delaware Valley revealed a 7 m deep sequence of stratified archaeological deposits. The lowest levels include a hearth radiocarbon dated to ca. 7380 BC. A second hearth located at a depth of 2 m was dated to ca. 1565 BC. The sedimentary sequence indicates major changes in depositional processes at the site. There is a dramatic decrease in landscape stability and increase in flood deposition during the middle Holocene. Similar sedimentary discontinuities are present in other Delaware Valley sequences and may be indicative of regional changes in climate.

*D'Altroy, Terence N. (Columbia)*

[46] INKA IMPERIAL STRATEGY: THE WANKA CASE IN COMPARATIVE PERSPECTIVE

The flexible strategies of rule in the Inka empire (1438-1532 AD) derived from a need to balance 1) systematic policies required for interprovincial control and 2) accommodations to regional variations in organization of subject societies, logistical and military needs and distribution of resources. The intensive incorporation of the incipiently stratified Wanka societies of the central Peruvian highlands is presented as a case study. The development of the regional Inka administration, economy and settlement organization is examined and interactions with the local society are evaluated.

*D'Altroy, T. N. (see LeVine, T. Y.) [40]*

*Damm, Charlotte (Cambridge)*

[2] EXPLORING HISTORICAL AND INTERACTIONAL FACTORS OF CHANGE THROUGH STRUCTURAL VARIATION

Neolithic burial customs in Denmark during the period 2800-2400 BC are studied to explore specific historical and contextual factors in cultural change and variation. Central to an understanding of the development is change through time and social space in the use and in particular in the reading of megalithic tombs. Local readings must be interpreted as resulting from local historical actions within the context of regional interaction. Methodologically the interpretation of the use and reading of megalithic tombs are reached through a concept of structural change and variation.

*Dancey, William S. (Ohio State)*

[16] THE WATER PLANT SITE: AN EARLY LATE WOODLAND VILLAGE IN CENTRAL OHIO

Systematic surface collection and testing in 1980 at 33-Fr-155 in central Ohio produced evidence of a 3.15 ha early Late Woodland settlement on a 12 m high bluff enclosed by a C-shaped ditch. Chesser Notched points and ceramics resembling Newtown Cordmarked dominate the assemblage. Radiocarbon dates from feature fill samples fall in the 6th century AD. Analysis of the internal layout of the settlement suggests that it was a village occupied by approximately 12 household units.

*David, F. (see Enloe, J. G.) [3]*

*Davis, J. L. (see Cherry, J. E.) [58]*

*Davis, Ruth (Michigan State)*

[41] CERAMIC SPALLING AND THE RECOGNITION OF CERAMIC MANUFACTURING IN ARCHAEOLOGICAL SITES

Potsherds are the most ubiquitous artifacts in many prehistoric sites, yet archaeologists are only now beginning to recognize evidence for the manufacture of pottery. The lack of such recognition is a major handicap in the reconstruction of prehistoric activities at ceramic period sites. This paper reports on experiments in pottery manufacture which show the creation of distinctively shaped sherd spalls during pottery firing. These spalls are particularly characteristic of firing failures, although some may not become apparent until after usage has begun. The particularly characteristic shapes of spalls may, if the analysis proves correct, allow the recognition of the activity of pottery manufacture at a site. Prehistoric site data from central Michigan are compared with experimental data.

*De La Cruz, E. Ivonne (Arizona)*

[66] THE SPATIAL ORGANIZATION OF DISPOSAL ACTIVITIES: A COMMON PATTERN

Examination of discard practices from archaeological, ethnographic and urban societal contexts suggests there is a common pattern in the spatial organization of disposal activities. The pattern

consists of: 1) the removal of refuse from work and family living areas and 2) its disposal surrounding the focal point of human activity. Archaeologically, the pattern is manifested by a zone which is relatively clear of debris immediately around a feature or structure, which in turn is surrounded by refuse dump areas that tend to assume a circular arrangement in space.

*de Montmollin, Olivier (Cambridge)*

[37] GROUP STRATIFICATION AND DOMESTIC CYCLING IN MESOAMERICA

Widely variant sizes of domestic coresidential groups in the prehispanic Mesoamerican settlement record suggest marked variations through time and space in the composition of groups within political stratification systems. Concepts of domestic cycling and group stratification prove helpful for making sense of this variation. Cases from Central Mexico, Oaxaca, and the Lowland and Highland Maya are examined, with particular emphasis on ethnohistorically documented group stratification among the Quiche Maya. Some functional correlates of group stratification are proposed.

*Deacon, Hilary J. (Stellenbosch, So. Africa)*

[59] RESULTS OF RECENT EXCAVATIONS AT KLASIES RIVER MOUTH

Considerable controversy attends the proposition that the oldest fully human populations (*Homo sapiens sapiens*) appear in stratified contexts in South African sites. Reexcavation of deposits at Klasies River throws new light on the findings of previous workers, including Singer, Wymer and Binford, and clarifies the cultural sequence found there, as well as the integrity of the associated human remains.

*Dean, Jeffrey S. (Arizona) [Discussant 33]*

*Deaver, William L. and Lynn S. Teague (Arizona)*

[25] ARCHAEMAGNETISM AS A RELATIVE DATING TOOL

Archaeomagnetic studies in the American Southwest routinely focus on obtaining calendrical ages of archaeological features. This paper explores using archaeomagnetic data as a relative dating tool that can address important archaeological issues in lieu of, and in the absence of, a calendrically calibrated record of past changes in the earth's magnetic field. When used in conjunction with other forms of archaeological data this approach has the potential to produce relative chronologies that are more precise than the calendrical interpretations more commonly used. An example from the Hohokam site of Las Colinas is given.

*DeBarros, Philip (UCLA)*

[56] POLITICAL CENTRALIZATION AND THE BASSAR IRON INDUSTRY OF NORTHERN TOGO

A regional study of the Bassar iron industry of northern Togo has shown that the rise of large scale iron production may lead to higher population densities, larger more stable communities, more aggregated settlement, increased craft specialization and involvement in long distance trade. It does not, however, necessarily result in a significant increase in the degree of political centralization. The largest production center (Bandjeli) apparently never became a chiefdom and is better viewed as a complex tribe. The Bassar chiefdom itself (which did not include Bandjeli) was a late development and may have been defensive in origin, that is, a secondary chiefdom.

*DeBoer, Warren R. (Queens College CUNY)*

[26] THE DECORATIVE BURDEN: MEDIA SHIFTS AMONG POTS, BASKETS, CLOTHING, HOUSES, HUMAN SKIN, AND OTHER CONTAINERS

As durable and common residues, ceramics govern much of what archaeologists claim to know about the recent human past. So subtly pervasive is the reliance on ceramic evidence that it casts an interpretive spell over much prehistory. Often plain pottery marks "dullard" cultures while "fancy" ware incites interest and large literatures. Here this implicit interpretive convention is examined in light of ethnographic (Chachi) and archaeological evidence from the Cayapas basin of coastal Ecuador. Results suggest that a focus upon pottery alone - simply because it is there - will not advance archaeological understanding of decorative elaboration. Many media, some having only indirect representation, must also be considered.

*Debusschere, Karolien, Kam-Biu Liu (LSU) and Douglas W. Owsley (Smithsonian)*

[62] PALYNOLogy OF MUD SAMPLES ASSOCIATED WITH HUMAN REMAINS IN AN 18TH CENTURY CEMETERY IN NEW ORLEANS, LOUISIANA

Nine sediment samples taken from seven burials in an 18th century cemetery in New Orleans, Louisiana, are examined for pollen to provide information concerning the depositional environment and cultural practices of the New Orleans population during the North American Colonial Period. A

high percentage of *Tubuliflorae* pollen is present in three burials. Four hypotheses are discussed to explain the abundant *Tubuliflorae* pollen in terms of redeposition from burial soils, dietary practices, herbal medicine intake and graveside rituals. Modern pollen rain from southern Louisiana is analyzed to aid in the evaluation of these hypotheses.

*Decima, Elena and James Richardson (Pittsburgh)*

[63] THE UPPER PIURA VALLEY: VICUS AND PIURA OCCUPATION

The Far North Coast has been considered a crucial link for the Ecuadorian and Northern Peruvian influences. While the Ecuadorian cultural ties are evident in pre-Vicus times, Vicus marks a switch to a closer interaction with the south. The authors' survey on the Upper Piura shows scant evidence of Moche conquest but rather a special interaction involving the Vicus exploitation of metals and agricultural products. The Piura presence is extensive in the area, but the main administrative centers are found in the Chira Valley. Contact by sea with the south is the speculated explanation for this period.

*Decker, Kenneth W. (Minnesota) and Larry L. Tieszen (Augustana)*

[53] ISOTOPIC RECONSTRUCTION OF MESA VERDE DIET FROM BASKETMAKER III TO PUEBLO III

Isotopic analysis of bone collagen from human skeletal remains from Mesa Verde National Park, Colorado, provides evidence for the importance of maize from Basketmaker III times to the Pueblo III Period in the northern Southwest. Stable carbon isotope ratios indicate that maize was an important and constant contributor to diet, averaging 80% during the entire period of occupation. The shift from incipient horticulture to intensive use of agricultural products must have occurred before the Basketmaker III Period, either in the late Archaic or Basketmaker II Periods.

*deFrance, Susan D. (Florida State Museum)*

[30] SALADOID AND OSTIONOID SUBSISTENCE ADAPTATIONS: ZOOARCHAEOLOGICAL DATA FROM A COASTAL OCCUPATION ON PUERTO RICO

A zooarchaeological analysis of vertebrate and invertebrate remains from the Maisabel Site located on the north coast of Puerto Rico allows for the reconstruction of Saladoid and early Ostionoid subsistence adaptations. Results are presented for several research questions concerning the local economy, including evidence for temporal variability in subsistence adaptations, species and habitat exploitation and probable procurement methods. Subsistence implications for other coastal and noncoastal Saladoid/Ostionoid occupations are discussed.

*Demarest, Arthur A. (Vanderbilt)*

[29] THE OCOS CULTURE IN UPPER CENTRAL AMERICA: NEW EVIDENCE ON ITS NATURE AND DISTRIBUTION

The Ocos and related Barra cultures (ca. 1700-1300 BC) represent the beginnings of sedentism, agriculture and the ceramic traditions of southern and isthmian Mesoamerica. Recent discoveries in Chiapas and Guatemala have changed our view of the nature and economic base of this culture. Meanwhile, new discoveries in Guatemala and El Salvador have shown that this early village culture had a vast distribution. This paper discusses such new evidence, explores its significance and describes ongoing research on the Ocos culture.

*Demarest, A. A. (see Myers, J. T.) [29]*

*DeNiro, Michael J. (UCLA) and Steven Weiner (Weizmann Institute)*

[47] TWO NEW APPROACHES TO PREPARING UNALTERED ORGANIC MATERIAL FROM PREHISTORIC BONE FOR ISOTOPIC ANALYSIS

The use of organic matter extracted by conventional methods from bone as substrates for isotopic analysis can lead to artifactual data. Two new methods, one involving isolation of organic material protected from chemical oxidation by bone mineral and the other involving the use of enzymes, are shown to produce material whose chemical and isotopic compositions indicate the absence of post-mortem contaminants. The use of materials produced from prehistoric bones using these methods as substrates for isotopic analysis will lead to more reliable dietary reconstructions and more accurate radiocarbon dating.

*DeNiro, M. J. (see Goldberg, C. E.) [70]*

*DeNiro, M. J. (see Walker, P. L.) [21]*

*DeNiro, M. J. (see Marino, B. D.) [62]*

*Dewar, Robert E. and Kevin A. McBride (Connecticut)*

[74] REMNANT SETTLEMENT PATTERNS

Most analyses of settlement patterns are compromised because they do not take account of variability in occupation permanence in different settlement systems. Interpreting the archaeological

residue of an ancient settlement system by comparing it to an ethnographic model of a single annual round implicitly assumes site permanence, and changes in year to year variability in occupation location will falsely be attributed to changes in subsistence or environment. The nature of the processes which control year to year variability in sequences of occupation location is illustrated by an analysis of remnant settlement patterns in central Connecticut.

*Dexter, Rick (State Historical Society of Wisconsin)*

[11] WISCONSIN'S BURIAL SITE PRESERVATION PROGRAM

As of 1987 Wisconsin state law protects all human burial sites on both public and private land. The State Historical Society is responsible for identifying and cataloging all burial sites. Decisions on whether burials may be excavated and their final disposition are decided on a case by case basis by the State Historical Society. Problems being addressed include the drafting of administrative rules defining who may claim interest in a burial and testing nondestructive methods for identifying and defining limits of burial areas.

*Dibble, Harold L. and Shannon McPherron (Penn)*

[73] APPLYING MICRO-BASED COMPUTER GRAPHICS TO PALEOLITHIC FIELD RESEARCH

Graphics applications are becoming increasingly available for, and relevant to, archaeological field-work and analysis. This paper summarizes an integrated approach that involves electronic theodolite/EDM recording techniques, horizontal mapping and vertical sections based on vector graphics, digitized image processing and traditional video databasing. This system has been developed for use at two Paleolithic sites in France, Combe-Capelle (Dordogne) and La Quina (Charente).

*Dibble, Harold L. (Penn) [Discussant 44]*

*Dickel, Cynthia D. (Florida), Mary A. Ashley (Columbia), Philip J. Laipis and William H. Hauswirth (Florida)*

[45] ISOLATION OF HUMAN DNA FROM ARCHAEOLOGICAL REMAINS

Over 90 crania from Windover contained intracranial soft tissue. In better preserved specimens gross morphological details and microscopic analysis identified the materials as brain tissue. Nucleic acids were isolated from the cortex of most samples and the presence of human mitochondrial DNA was demonstrated in some. Physical and biological examinations of the integrity and quality of the mtDNA are discussed.

*Dickel, David N. (Florida State)*

[45] HUMAN OSTEOLOGY AND ADAPTATION AT THE WINDOVER SITE, FLORIDA (8-BR-246)

Osteological remains from the Windover Site provide clues about morbidity and mortality. Burial pattern, demographic parameters and pathologies help indicate success of adaptation; skeletal and dental 'wear and tear' as indicated by degenerate joint disease, fractures, infection, activity related dental attrition etc. provide indications of biological cost. By attempting to correlate diverse lines of evidence, the analysis of skeletal remains provide an important clue to the biocultural adaptation of an Early Archaic people.

*Dietler, Michael (UC Berkeley)*

[4] DRIVEN BY DRINK: THE SOCIAL USES OF IMPORTED WINE AND IMPLICATIONS FOR ECONOMIC AND POLITICAL CHANGE IN FRENCH IRON AGE SOCIETIES

Changes in the indigenous Iron Age 'tribal' societies of France following contacts with the expanding Mediterranean states (in the form of trade in wine) are poorly explained by the traditionally employed concept of 'Hellenization'. Rather, a consideration of the possible social uses of imported wine in indigenous contexts (e.g. mobilization of labor through work-party feasts, competitive manipulation of hospitality) and their ramifications in producing changes in social relations enables a more cogent assessment of the processes of economic and political change engendered by these trading contacts.

*Dillon, Brian D. (Cal State University, Long Beach)*

[29] PRELIMINARY CERAMIC TYPOLOGY FROM ABAJ TAKALIK, RETALHULEU, GUATEMALA

Abaj Takalik, on the Pacific piedmont of Guatemala, was occupied from the Middle Preclassic through Postclassic periods. With both Olmec and Early Maya sculpture, the site is recognized as crucial to our understanding of the development of hieroglyphic writing and major Preclassic Mesoamerican art styles. Yet little is presently known about Abaj Takalik's ceramic sequence and interconnections with other sites. The 1987 summer laboratory season at the site resulted in a preliminary pottery typology; this is described and ceramic evidence is correlated with stratigraphic, radiocarbon and obsidian hydration data.

*Dobyns, Susan (Arizona)***[52] THE CHANGING NATURE OF STATUS GOODS IN INTERCULTURAL EXCHANGES**

Identifying elite status markers often is a difficult task. It may be especially difficult in intercultural exchanges where the basic problem of synchronic variation (elite vs non-elite) is compounded by diachronic changes in both the exchange situations and the trade goods themselves. Using late prehistoric/early contact period Hawaii (1778-1830) as an example, this paper examines: 1) the nature of material trade goods themselves, particularly elite status markers, 2) the social and symbolic implications of such goods and 3) the context of these intercultural exchanges.

*Doelle, William H. and Thomas M. Kolaz (Institute for American Research)*

**[32] ARCHAEOLOGY AND COMMUNITY INVOLVEMENT: AN EXPERIMENT FROM THE PRIVATE SECTOR**

The Institute for American Research, a private research and educational organization, has made community involvement an integral part of its long-term research program. Dependent entirely upon outside funding, mostly from a contract archaeology program, the maintenance of such a program is a tremendous challenge. This paper addresses the methods used by IAR to implement and maintain a program that has reached thousands of local residents and visitors.

*Doershuk, John F. (Northwestern)*

**[28] KOSTER SITE STRUCTURE: THE RISE OF SEDENTISM IN THE AMERICAN MIDWEST**

Detailed spatial analyses of Koster site structure indicate substantial changes in hunter-gatherer site use and organization occurred during the Middle Archaic. Social responses to increased risk associated with shifting subsistence opportunities are postulated to have resulted in these changes and increasing sedentism. Analyses of lithic, floral and faunal distributions, in conjunction with geomorphological and feature data, illustrate a hypothesized pathway to sedentism at Koster and permit refinement of existing horizon assignments in terms of site type and structure. Using Koster as a model, regional level questions of settlement strategy are addressed.

*Dohm, Karen M. (Washington State)*

**[14] TRACT HOUSING IN THE PREHISTORIC SOUTHWEST: THE SPATIAL STRUCTURE OF BASKETMAKER II AND III SITES ON CEDAR MESA, SOUTHEASTERN UTAH**

The spatial distribution of artifacts and features provide important evidence in the study of social organization and economic intensification. General expectations for spatial change within settlements under agricultural intensification are tested with an early Anasazi (ancestral Puebloan) example. Findings include Basketmaker III residential/domestic areas smaller than earlier Basketmaker II areas. Hearths and trash deposits decrease in number and diversity. There is increased storage space and some individually larger storage units. Storage unit locations north or northwest of the pithouse are a subset of BM II locations northeast, north or northwest of the pithouse. By contrast, hearth locations become less patterned.

*Doleman, W. H. (see Chapman, R. C.) [67]*

*Donaldson, Marcia L. (Arizona State) and Suzanne K. Fish (Arizona State Museum)*

**[57] PRODUCTION AND CONSUMPTION IN THE ARCHAEOLOGICAL RECORD**

Analysis of botanical materials from archaeological sites provides basic data in the form of resource tabulations. Although biases are acknowledged in the formation of this record, it is usually assumed that sufficiently large samples provide insight into representative resources at a site. It is a further inferential leap to equate recovered resources with either production at that site or with extra-local acquisition. We must attempt to develop criteria for distinguishing evidence of production from consumption in the archaeological record if we are to effectively investigate problems such as resource specialization, trade and redistribution. These distinctions can be approached through direct evidence of productive activities and through circumstantial and comparative argument. Illustrations are drawn from Hohokam contexts in southern Arizona and elsewhere in the Southwest.

*Doran, Glen H. (Florida State)*

**[45] AN OVERVIEW OF THE WINDOVER ARCHAEOLOGICAL RESEARCH PROJECT**

Information on the nature, recovery, content, chronological significance and setting of this Archaic site is presented. The goals of the multidisciplinary project will be considered in a discussion of sampling strategies for studies ranging from archaeomagnetic dating to stomach content analysis and paleodemography of a large (n155) skeletal sample dating to 7400 C14 years BP (uncorrected).

*Dort, Jr., Wakefield, Larry D. Martin, Edward J. Zeller and Gisela M. Dreschhoff (Kansas)*

**[16] HUMAN BONES, INCLUDING CRANIAL PARTS, ASSOCIATED WITH BONES OF EXTINCT FAUNA IN NORTHEASTERN KANSAS**

Part of a human skull, four tibia, arm bones and a rib, have been recovered along with bones of mastodon, muskox, peccary, giant beaver, short-faced bear and other extinct taxa where the lower

Kansas River is downcutting into a presumed paleo-oxbow infilling. These bones appear equally mineralized. Initial analyses, including C-14, radioactivity, ESR and collagen, suggest a Late Pleistocene age. Consulting physical anthropologists have pointed out resemblances to Late Pleistocene *Homo sapiens* found elsewhere.

*Douglass, Amy A. (Arizona State)*

**[39] A REGIONAL PERSPECTIVE ON LITTLE COLORADO WHITE WARE EXCHANGE**

Mineralogical and chemical analyses have demonstrated that Little Colorado White Ware was produced in the Hopi Buttes area between ca. AD 1050 and 1250. Its widespread distribution throughout the Little Colorado River drainage follows a pattern of relatively high concentrations in areas where both cultural and environmental boundaries coincide. Interpretations of this distributional pattern are offered in the context of the structure and function of the Little Colorado White Ware exchange system. Finally, a discussion is presented concerning how a regional perspective can be used to enhance the value of museum collections for informative public exhibits and further archaeological research.

*Downum, Christian E., James Gittings, Michael Faught (Arizona) and Arthur Vokes (Arizona State Museum)*

**[32] USE OF ARCHAEOLOGY AS A MATRIX FOR JOB SKILLS TRAINING**

Project Origins, an archaeologically oriented job skills training program for youth with moderate or severe handicaps, is described. The project uses ongoing archaeological field and laboratory work at the Arizona State Museum as a matrix for skills training, social integration and employment of students with handicaps. Results of the first project year are evaluated in terms of contributions to specific archaeological studies, progress in job skills training and social integration and the interactions of students, parents, special educators and archaeologists. Prospects for the future of the program are evaluated.

*Downum, C. E. (see Baumler, M. E.) [34]*

*Doyel, David E. (Pueblo Grande Museum)*

**[1] THE TRANSITION TO HISTORY IN NORTHERN PIMERIA ALTA**

In less than one generation after the fall of Tenochtitlan in 1519, Spanish reconnaissance had extended to the northern reaches of the Pimeria Alta (southern Arizona). Descriptions of native peoples provided by the early explorers and missionaries do not correlate well with traditional archaeological reconstructions of late prehistoric culture patterns, leaving the question of cultural continuity an open one for the protohistoric period (AD 1540-1700). Recent archaeological and historical investigations will be utilized to outline more clearly the transition from the late prehistoric to the early historic period in southern Arizona.

*Doyel, David E. (Pueblo Grande Museum)*

**[68] SOME OBSERVATIONS ON CHACO EXCHANGE NETWORKS AND REGIONAL ORGANIZATION**

Recent studies of Chacoan community structure have produced new information on the evolution of the Chaco cultural expression. One of the more significant contributions of recent work is the delineation of regional settlement and exchange patterns among Chacoan sites located both within and outside of Chaco Canyon. Detailed analysis of the associated road system has contributed to the refinement of growth models and chronological issues. Continued analysis of architecture, features and artifacts associated with Chacoan communities should provide greater insights into the growth and structure of the regional system.

*Doyel, David E. (Pueblo Grande Museum) [Discussant 57]*

*Drass, Richard R. and Peggy Flynn (Oklahoma)*

**[18] TEMPORAL AND GEOGRAPHIC VARIATIONS IN SUBSISTENCE PRACTICES FOR PLAINS VILLAGERS IN THE SOUTHERN PLAINS**

Investigations at Southern Plains village (AD 900-1450) sites have documented a subsistence pattern based on corn horticulture, gathering of wild plants and hunting, primarily bison and deer. However, comparisons of western Oklahoma villages revealed geographic and temporal differences in exploitation activities. A greater dependence on bison and other prairie resources was evident at villages in the western mixed grass prairie, whereas floodplain forest resources predominated at villages in the eastern tall grass prairie. Although no increase in corn horticulture was found, bison utilization increased through time. Environmental changes and increased availability of bison may account for the shift in exploitation strategies.

Dreschhoff, G. M. (see *Dort, Jr., W.*) [16]

Dunbar, J. (*Florida Dept of State*), Michael Faught (*Arizona*) and D. Webb (*Florida*)

[16] PAGE-LADSON: AN UNDERWATER PALEO-INDIAN SITE OF NW FLORIDA

Results of three years' excavation of karstic river deposits in the Aucilla River of northwest Florida are summarized. Stratigraphic tests have demonstrated 1) substantial preservation of stratigraphic context and organic preservation, 2) cultural materials in dated context from ceramic to Paleo-Indian time, 3) substantial "Bolen" occupation during an inferred hyper-arid interval at about 10,000 BP and 4) cultural materials in strata dated at ca. 12,000 BP.

Dunham, Peter S. (*SUNY Albany*)

[24] SOCIAL PROCESS AND THE MAYA COLLAPSE: THE CLASSIC BALKANIZATION OF THE SOUTHERN LOWLANDS

The Maya collapse can be seen as the disastrous climax of the progressive balkanization of the Southern Lowlands during the Classic Period (AD 250-950). Political fragmentation is believed to have provided an initial vehicle for the widespread growth of the ruling nobility. It is argued that such atomization eventually reduced the resource base of the average city-state and left the overall system without coordinated management. The resultant decline seems to have contributed to the ultimate disintegration of the elite culture. Thus, the social processes and other conditions that encouraged ongoing subdivision were probably major factors in the Maya collapse.

Dunnell, Robert C. (*Washington*)

[58] FORMATION OF THE ARCHAEOLOGICAL RECORD AND THE NOTION SITE

The notion "site" plays a crucial role in almost all archaeological activities. In most roles, it is assumed that sites are empirical entities relevant to archaeological concerns. It is shown that sites are not empirical entities but rather constructions of archaeologists. When the archaeological record is viewed as a sedimentary deposit, the multiple origins of artifact clusters are readily demonstrable. Further, many of the legitimate functions now lumped in the notion site are isolated, and suggestions for their treatment are made.

Durand, Stephen R. (*Desert Research Institute*)

[68] DEFINING CHACO: A SAN JUAN BASIN PERSPECTIVE

The Chaco Phenomenon has grown from an emphasis on the spectacular ruins of Chaco Canyon to encompass a vast area of the northern Southwest, characterized by outlier communities and an extensive road system. Identifying Chaco sites outside of Chaco Canyon has been done explicitly on the basis of architecture, site layout, ceramics and association with a road segment. This paper addresses the problem of defining Chacoan from a San Juan Basin perspective and argues for a classification based solely on architectural style. Explanations for observed architectural change and the timing of the growth of the outlier communities are also considered.

Dyson, Stephen L. (*Wesleyan*)

[55] IMPORTS AND THE RECONSTRUCTION OF ROMAN RURAL HOUSEHOLD RITUALS

Roman rural society is often seen as a combination of export oriented, self sufficient estates, slaves and rural poor. However, recent excavations have shown a range of rural household types, all possessing quantities of imported goods. The display and consumption of these goods were part of complex rituals of status affirmation. This need for imports underlines the complexity of Roman rural economy and society. These points are illustrated by detailed analysis of material found at a luxury villa in Etruria and a "middle class" site from southern Italy.

Earle, Timothy (*UCLA*)

[76] WARFARE AND THE DYNAMICS OF ANDEAN CHIEFDOMS

Warfare is characteristic of chiefdoms. It offers opportunities to expand the polity and its financial base; however, warfare also creates weakness, as an emerging warrior elite is difficult to control. Relying on settlement pattern data derived from a recent intensive survey, this paper examines the cycle of population aggregation-dispersal and defended-undefended locations for the Sausa, as it informs us on the causes and consequences of warfare and political centralization and fragmentation over a two thousand year span (500 BC-1460 AD).

Eaton, Jack D. (*Texas, San Antonio*)

[43] THE GATEWAY MISSIONS OF THE LOWER RIO GRANDE

From 1700 to 1702, three Franciscan missions and a presidio were established near the Rio Grande in northern Coahuila. This complex developed into a community that has been called the Gateway to Spanish Texas. The scattered bands of natives in the region were gathered into the missions to be

instructed in religion, crafts and farming. Each mission formed a small corporate society organized by the Franciscans until secularization in 1797. Little now remains of that once important complex. Archaeological investigations and archival research have helped to reconstruct the physical and social structures that played a significant role in the settling of Texas.

Ebert, James Ian (*Ebert & Associates*)

[58] THE RESOLUTION AND EQUATION OF ARCHAEOLOGICAL AND ETHNOGRAPHIC SPACE AND TIME

Archaeologists tend to overlook major, obvious discrepancies in their basic assumptions until the last possible moment. That moment may finally have arrived for many of our assumptions concerning the bounding of "sites" and "activity areas" in space, a topic of current interest to many. In this presentation I focus on the fact that space as an archaeological dimension is inseparable from time. Changes in the ways we interpret archaeological space require basic alterations in the ways we think about and "use" time as well. Serious consideration of the resolution and bounding of archaeological space and time cast doubts upon their equitability with ethnographic space and time, the possibility of direct reconstructions and the appropriateness of archaeological data as the basis of formulations of culture history and other pseudo-evolutionary scenarios.

Edmonds, Mark (*Reading, England*) and Robin Torrence (*Sheffield, England*)

[58] LOST IN SPACE: LINKING LITHIC TECHNOLOGY TO PREHISTORIC LAND USE

At present traditional subsistence data dependent on settlement sites are extremely rare for the Neolithic and Bronze Age of England. Consequently, a fundamental shift in methodology is needed to alter the highly speculative nature of current reconstructions of economic organization. An alternative approach, focusing on variability in the differential discard of artifacts, is presented and illustrated by the Roystone Grange Project, Derbyshire. Beyond simply collecting data on a different scale, however, inferences about activities depend upon the development of appropriate theory linking the character of stone tool production, use and discard to the structure of behavior within the landscape as a whole.

Effland, Jr., R. W. (see Fedick, S. L.) [53]

Egan, Kathryn C. (*Michigan State*)

[72] MINIMAX MODELS AND HUNTER-GATHERER DIET RECONSTRUCTION

Models have a heuristic value as solutions to archaeological problems of diet reconstruction. Recent subsistence models of hunter-gatherer populations have, however, been severely criticized for 1) assumptions regarding human decision-making (i.e., optimal foraging), 2) neglect of the division of labor and 3) insufficient recognition of the importance of plant resources in the diet. In this paper the merits of minimax and Bayes-minimax strategies are explored and a multistage modeling program is outlined. The model is specifically concerned with predicting the evolution of a mixed subsistence strategy, taking into account risks associated with low payoffs, a divided labor force and cultural ecologically estimated quantities of plant and animal use.

Eighmy, Jeffrey L. (*Colorado State*)

[25] DATING HOHOKAM CANALS BY THE ARCHAEMAGNETIC METHOD

Over 50 archaeomagnetic samples from Hohokam canals have been analyzed for their remanent magnetic directions in an effort to assess the potential of their detrital remanent magnetism to serve as a method for directly dating canal sediments. While controlled experiments investigating the origins, precision and accuracy of detrital remanent magnetism in canal sediments need to be undertaken, preliminary tests are encouraging. In some canal systems, precise results (alpha 95 less than 5.0 degrees) appear to be the norm. Further, calculated virtual geomagnetic pole (VGP) positions appear to be accurate when plotted against master curves derived from the thermal remanent magnetism of independently dated fired clay sources.

Eling, Herbert H. (*Texas Archaeological Research Laboratory*)

[63] THE JEQUETEPEQUE VALLEY, NORTH PERU: ITS VISITORS AND ITS AUTONOMY DURING THE MIDDLE HORIZON

Paul Kosok noted that the Jequetepeque was the crossroad valley on the North Coast. The valley was periodically occupied by its neighbors from Leche/Lambayeque to the north, Cajamarca in the sierra, Moche/Chicama to the south and finally the Inca from the South Highlands. Middle Horizon settlement pattern data and gravelots indicate that the Sican and Cajamarca intrusions were largely confined to hydrologically marginal localities. Within the valley proper they appeared to have maintained their ethnic identity.

*Ellis, G. Lain (Texas A&M)*

[36] PHILOSOPHICAL RIGHTS AND DUTIES, AND THE ARCHAEOLOGICAL EXHUMATION OF HUMAN REMAINS

Three types of agent are morally relevant to the exhumation of human remains: the dead, their living descendants and archaeologists. The types are identical in essential characteristics, but different in accidental ways. By virtue of their essential identity, the agents have identical kinds of rights and duties, but accidental features impose specific duties of beneficence on each type of agent. Duties of beneficence may actually compel archaeological exhumation under certain conditions, while respect for the dead may prohibit it under other conditions.

*Elster, Ernestine (UCLA)*

[41] SMALL BOWLS, BIG ROLES: SO-CALLED ALTARS IN THE NEOLITHIC OF SOUTHEAST EUROPE

Small pottery vessels (called "tripods" or "altars") are recovered from Neolithic sites in Southeast Europe and are reported variously as lamps and censers but without strong contextual data to support these terms. Replicative experiments were undertaken to answer questions concerning manufacture and usage using data from the site of Sitagroi (Greece) as a model. Results indicate 1) one routine is relatively effective in forming and firing, 2) mechanical contingency can be cited as cause for one particular breakage pattern among several in the archaeological sample, 3) use as a lamp is not supported and 4) use as a censer is possible. The replicative experiments allow for interpretations of manufacture and possible function.

*Emerson, Thomas E. (Illinois Historic Preservation Agency) and George R. Milner (Penn State)*

[6] INTERNAL STRUCTURE, DISTRIBUTION, AND RELATIONSHIPS AMONG LOW-LEVEL MISSISSIPPIAN PERIOD COMMUNITIES IN ILLINOIS

Extensive excavations at several Mississippian Period sites in the American Bottom, Illinois, have permitted a delineation of the internal organization and functioning of peripheral communities (sites without mounds), including the definition of discrete residential farmsteads as well as special function features. The latter, which occur infrequently, include structures interpreted as sweatlodges, a public structure and a temple/mortuary complex. They were presumably important elements of community integrating functions. Taken together, this diverse array of features represented a series of dispersed villages, the overall distribution of which was strongly influenced by local topography. This settlement model is compared with contemporaneous settlements elsewhere in Illinois.

*Endzweig, Pamela E. (Oregon)*

[38] OF PIPES, POTS, AND PEOPLE: PREHISTORIC CERAMICS OF OREGON

Oregon has traditionally been characterized by its absence of pottery. While this assessment is valid for the ethnographic period, there is increasing evidence of local ceramic production in the prehistoric record. This paper reviews the distribution of vessels, pipes, figurines and other ceramic items in Oregon. Spatial, temporal and stylistic relationships to adjacent areas such as California and the Great Basin are examined for their bearing on regional cultural historical issues. Finally, the behavioral context of the ceramics is explored in relation to site function and permanence.

*Enloe, James G. (New Mexico) and Francine David (CNRS)*

[3] FOOD SHARING IN THE PALEOLITHIC: REFITTING CARCASSES AT PINCEVENT

Refitting of lithic debitage and hearth stones provides equivocal evidence for contemporaneity and sequence of occupation for several hearths at one level of the Magdalenian site of Pincevent. While these kinds of materials exhibit the potential for reuse over long periods of time, the meat, marrow and other edible byproducts of reindeer carcasses brought into the site are much more limited in their usable life span. Refitting of bones is used to evaluate questions concerning 1) contemporaneity of the occupation of hearth complexes and 2) patterns of carcass distribution among commensal units. Sharing of carcasses is suggested by the distribution of pieces of individual animals.

*Epperson, Terrence W. (Temple)*

[2] ARCHAEOLOGIES OF RACISM AND RESISTANCE IN BRITISH COLONIAL AMERICA

The formulation during the late 17th and early 18th centuries of essentialist, biogenetic concepts of race were closely linked to elaboration of explicitly racialist, as opposed to religious and political-economic, justifications of slavery. Post-processual analysis must examine: 1) the processes of differentiation whereby hierarchical dichotomies such as race and gender become "naturalized", 2) the role of spatial control in the maintenance or challenging of hierarchy and 3) the possible co-occurrence of hegemonic and counter-hegemonic conceptions of space and their preservation in the archaeological record. These issues are addressed through reanalysis of several colonial period sites.

*Ericson, J. E., M. C. Manea-Krichten (UC Irvine) and C. C. Patterson (Cal Tech)*

[36] PREHISTORIC LEAD CONCENTRATIONS IN HUMAN BONES AND TEETH: INITIAL RESULTS

Prehistoric levels of lead in human tissue are critically important to evaluate modern exposures to this toxin. Ultraclean chemical analysis of Pb, Ba and Ca by isotopic dilution mass spectrometry of tooth enamel, femur and rib of two cemetery populations from Malibu, California, and Rainbow Bridge, Arizona, are reported upon. Variability of concentrations due to effects of age, gender and dietary differences among individuals and populations is considered. Most importantly, a protocol to determine soil moisture contamination of bone tissues is tested and discussed.

*Euler, Robert C. (Arizona State)*

[53] ANASAZI RESPONSES TO PALEOENVIRONMENTAL CHANGE IN SOUTHEAST UTAH

Archaeological survey in southeast Utah reveals numerous Anasazi sites that vary chronologically with elevational changes. Comb Wash (1370 m), for example, has several large PI and PII-PIII sites; John's Canyon (1460 m) has only a few BMII and BMIII sites, no PI; Cedar Mesa (1980 m) has Basketmaker and PII-PIII sites, no PI; higher, on Elk Ridge (2440 m), PI sites outnumber all others. These data are related to climatic spatial and temporal variability and cultural changes such as mobility, territoriality, abandonment, subsistence mix and social integration in a test of hypotheses previously put forth.

*Ewen, Charles R. (Florida Bureau of Archaeological Research) and B. Calvin Jones (Florida Bureau of Archaeological Research)*

[71] HERNANDO DE SOTO'S FIRST WINTER ENCAMPMENT: DISCOVERY AND FIRST SEASON OF EXCAVATION

Hernando de Soto spent the winter of 1539-1540 in the Apalachee village of Anhaica. The discovery of 16th century Spanish artifacts in association with a late Fort Walton Period village site suggests that the site of de Soto's encampment has been located. The material and historical evidence for the identification of the site and implications for further research are discussed in light of the recent excavations.

*Falconer, Steven E. (Arizona)*

[4] EARLY URBANISM, RURALISM AND SOCIAL COMPLEXITY IN SOUTHWESTERN ASIA

Early complex societies in southwestern Asia commonly are stereotyped as "urbanized." Regional measures of social complexity (e.g. n-tiered settlement hierarchies) emphasize similarities and obscure structural contrasts between these societies. Alternatively, urban communities can be defined as those that expanded beyond agricultural self-sufficiency. Urban and rural site size classes are proposed for ancient southwestern Asia based on ethnographic and textual data. Comparison of settlement patterns shows that, while urban nucleation characterized Mesopotamia, "rural complexity" in the southern Levant was based on proliferations of diversified villages. A paradigm of nonurbanized complexity can be considered for other geographical regions as well.

*Falk, Carl and Peter Bleed (Nebraska)*

[64] BETWEEN THE MOUNTAINS AND THE SEA: FAUNA AND HUNTING AT YAGI, AN EARLY JOMON COMMUNITY IN SOUTHWESTERN HOKKAIDO, JAPAN

Faunal remains are rare in Jomon village sites, but excavations at the early Jomon Yagi site yielded a comparatively large collection of heavily fragmented calcined fish, bird and mammal bone debris. Analysis of this assemblage presented a number of technical and logistical problems, but identified remains reflect a mix of land and marine hunting and fishing. The economic and technological implications of this faunal assemblage are interpreted in light of a theoretical model of optimal hunting patterns developed for the immediate Yagi area.

*Farley, James A. and W. Fredrick Limp (Arkansas Archeological Survey)*

[13] THE THEORETICIANS WORKBENCH: INTEGRATING GIS, REMOTE SENSING, EDA AND DATABASE MANAGEMENT

The integration of a number of currently available techniques for the management and analysis of environmental and archaeological site location data is capable of narrowing the gap between archaeological theory and method. A "tool box" approach is presented in which DBM, GIS, remote sensing and EDA are used for pattern discovery and the application of axiomatic choice theory to location selection processes. Substantive results from examinations of historic and prehistoric populations in north central Arkansas suggest a diachronic shift in selection criteria in which environmentally based decision making is replaced by a location criterion emphasizing infrastructure and kinship ties.

*Farris, Glenn J. (Sacramento Dept of Parks and Recreation)*

[21] THE RUSSIAN IMPRINT ON THE COLONIZATION OF CALIFORNIA

The main stimulation to the Spanish settlement in Alta California in 1769 was the Russian presence in the north Pacific. Fort Ross, as the embodiment of the Russian expansion on Spanish claimed territory provided a dramatic and different colonial interaction with the native peoples. The Russian arrival offered the local Native Americans an alternative to the mission system. A remarkable society of Russians, ethnic Finns, Aleuts, Creoles, Alaskan Indians, Coast Miwok and Kashaya Pomo grew up on the Sonoma County coast. The archaeological finds were mixed. The artifacts (e.g. ceramics, glass, trade beads) reflected the trade patterns of the Pacific coast, whereas the architecture and metrology were Russian.

*Faught, M. (see Dunbar, J.) [16]*

*Faught, M. (see Downum, C. E.) [32]*

*Fawcett, Clare (McGill)*

[64] THE POLITICAL SIGNIFICANCE OF JAPANESE ARCHAEOLOGY

The themes of archaeology as (1) historical science, (2) a means of combating ideology and (3) a way of rewriting history are implicit in contemporary Japanese research. This paper will use interviews with Japanese archaeologists to examine the political importance of archaeology in Japan. It will then show how the political context of Japanese research has affected method and theory.

*Fedick, Scott L. and Richard W. Effland, Jr. (Archaeological Consulting Services, Ltd.)*

[53] ANALYSIS OF PREHISTORIC HOHOKAM LAND USE PATTERNS: CONVERGING LINES OF EVIDENCE FROM NON-SITE ARCHAEOLOGY

Interest in Hohokam agricultural systems has led to an increased awareness of information found in areas away from habitation sites. The possibility of agave cultivation has emerged as a significant aspect of this research. Archaeological investigations of land use patterns were recently conducted on one of the last remaining undisturbed sections of the Salt River terrace near Phoenix. Analysis of land resources, paleobotanical materials, excavated features and artifact distributions from a controlled collection within more than 126,000 square m all combined to suggest an array of activities were carried out in this 'non-site' context. Results of this analysis are presented along with a perspective on methodological issues directed at non-site phenomena.

*Fedick, S. L. (see Brunson, J. L.) [69]*

*Feinman, Gary M. and Sherman Bunker (Wisconsin - Madison)*

[26] A TECHNOLOGICAL PERSPECTIVE ON CHANGES IN THE ANCIENT OAXACAN GREYWARE CERAMIC TRADITION

The Valley of Oaxaca (Mexico) has had a long prehispanic sequence of reduced pottery which is antecedent to the region's renowned contemporary black ware. Though generally plain, this prehispanic 'gris' ceramic tradition underwent several significant changes in surface finish, thickness and paste composition. A series of preliminary analyses, including petrography and firing temperature experiments, were employed to identify more precisely the technological parameters of these ceramic shifts. Given these analytical and other findings, interpretive attention is focused on the often controversial Classic-Postclassic transition in 'gris' plainwares.

*Ferguson, T. J. and Barbara J. Mills (New Mexico)*

[53] WOOD REUSE IN PUEBLOAN ARCHITECTURE: EVIDENCE FROM HISTORIC ZUNI SETTLEMENTS

Patterns of wood reuse in puebloan architecture are investigated using more than 500 tree-ring dated pieces of structural wood from Zuni Pueblo and three historic Zuni farming villages. Patterns in the shapes of date distributions are identified for individual roofs, buildings, stockpiles of construction timbers and settlements. The interpretive model presented by Ahlstrom (1985) and analysis of historic photographs are used to identify reused beams versus initial construction and repair beams. The effects of several variables on beam reuse are assessed including wood species, beam size, beam function, room and site function and construction rates.

*Ferring, C. Reid (North Texas State)*

[10] ALLUVIAL SOILS AND GEOARCHAEOLOGICAL RESEARCH

In addition to their stratigraphic, geomorphic and paleoenvironmental significance, alluvial soils provide fundamental data on archaeological site histories. Variability in age, parent material and post-depositional environments are discussed as they relate to soils correlation and site formation pro-

cesses. Applications in several Southern Plains basins illustrate how soils studies improve strategies for site survey, excavation and formation analysis.

*Fink, T. Michael (Soil Systems, Inc.) and Charles F. Merbs (Arizona State)*

[57] HOHOKAM PALEONUTRITION AND PALEOPATHOLOGY: A SEARCH FOR CORRELATES

Recent study of Classic Period noncremated skeletons provides an opportunity to study the relationship between Hohokam paleonutrition and paleopathology. Several interpretive problems are identifiable. Foremost among these is that most of the so-called nutritional lesions observed in these remains reflect childhood rather than adult stress episodes. Additional analyses involving adult remains are thought necessary before a more accurate assessment of the Hohokam dietary regimen can be based on osteological evidence.

*Fish, Paul R. and Suzanne K. Fish (Arizona State Museum)*

[35] MODELING THE TRANSITION: A COMPARATIVE ANALYSIS

Strong parallels as well as significant differences can be found in the archaeological record of transition from mobile hunting and gathering economies to sedentary food production in arid North America and the Middle East. In each area models have been proposed for processes leading from one classificatory endpoint to the other on a scale of transitional progress. Many of the same criteria are employed for judging the position of assemblages, sites or archaeological cultures along this scale, with similar lack of consensus among Old World and New World researchers. Problems of confirmation and refutation for alternative positions as well as promising new approaches are discussed.

*Fish, Paul R. (Arizona State Museum) [Discussant 8]*

*Fish, P. R. (see Fish, S. K.) [6]*

*Fish, Suzanne K., Paul R. Fish (Arizona State Museum) and John Madsen (Arizona)*

[6] EVOLUTION AND INTEGRATION OF A MULTI-SITE COMMUNITY IN THE HOHOKAM CLASSIC PERIOD

In the northern Tucson Basin of southern Arizona two earlier settlement clusters coalesced in the Classic Period to form a single multi-site community covering 146 square km. A platform mound site was centrally located within this integrated complex spanning basin floor to mountain flanks. Levels of productive specialization and some consumptive patterns have been demonstrated that are commensurate with a strong network of exchange. Large scale settlement data have produced quantified distributions for components of horizontal and vertical differentiation.

*Fish, S. K. (see Donaldson, M. L.) [57]*

*Fish, S. K. (see Fish, P. R.) [35]*

*Fisher, Jr., John W. (Smithsonian)*

[23] PRESENT-DAY ELEPHANT BUTCHERY

As a means of helping to reconstruct the history of ancient assemblages of proboscidean bones, observations were made on present day elephant butchery in Africa performed by people using simple metal tools. The extent to which carcasses are cleaned of meat and the extent of carcass dismemberment vary considerably. The number of bones taken from the butchery site to the campsite/processing site also varies greatly. Dismemberment techniques include chopping through bones and severing soft tissues at joints. Bones are chopped into pieces and boiled to obtain grease. Meat is dried in large quantities on racks over fires.

*Fitzhugh, William W. (Smithsonian)*

[55] IT COMES FROM AWAY: AN ARCTIC PERSPECTIVE

Examination is made of materials and artifacts (including European and Asian derived materials) imported into selected arctic archaeological sites. The origin and role of these imports is investigated in regional and chronological perspective. Historical documentation reveals a wide set of motives involved in obtaining, distributing, refabricating and refunctioning nonlocal materials. Prevalence of "irrational" behavior in procurement of materials suggests that social and ideological factors should be given more consideration in the development of trade theory.

*Fitzhugh, William W. (Smithsonian) [Discussant 60]*

*Fletcher, Thomas (SUNY at Buffalo)*

[24] 'CLOSED' AND 'OPEN' VILLAGE ECONOMIES AND WEALTH STATUS EXPRESSION AMONG HOUSEHOLDS

Richard Wilk has defined 'closed' and 'open' village economies in terms of differences in the expression of wealth/status inequalities among households in villages practicing community based

versus externally oriented economic strategies. This paper tests the validity of these concepts in three highland Maya communities studied by the Coxoh Ethnoarchaeological Project. Architectural features are explored as potentially useful material correlates of 'closed' and 'open' households. Possible relationships between economic strategies, wealth/status differences and their expression are examined.

*Flynn, P. (see Drass, R. R.)* [18]

*Foley, Robert (Cambridge)* [Discussant 58]

*Ford, Janet L. (Miss.)*

#### [71] TIME AND TEMPER MEETS TREND AND TRADITION

Subregions within the Midsouth have often presented a confusing picture of diachronic changes in temper and decoration. The two attributes have been regarded as having moved as a unit. It now seems, however, that tempering and surface finish functioned separately, radiating from different geographic localities. Clay tempering apparently spread north and west throughout the region, while cord-marking spread south into the areas, as Caldwell had earlier proposed. An accurate dating of these phenomena transforms a large body of hitherto indistinct pottery into accurate temporal indicators.

*Ford, Pamela J. (Washington)*

#### [75] FAUNAL REMAINS AT ENGLISH CAMP, SAN JUAN ISLAND, WHERE "SEASONALITY" IS AN ETHNOGRAPHIC TERM

Questions archaeologists tend to ask about faunal remains from Northwest Coast sites center on seasonality and assume that season of resource procurement and season of site occupation are one and the same. Questions about seasonality stem from one view of the ethnographic record for the region and ignore ethnographic information that illustrates the potentially complex nature of the archaeological record for subsistence. A second glance at the ethnographic record and the history of European contact in the Northwest indicates that other questions may provide more insight into prehistoric subsistence strategies. Faunal remains from the English Camp shell midden, excavated as part of the San Juan Island Archaeological Project provide one set of data to address questions about faunal resource procurement, use and disposal.

*Forney, S. (see Mead, R. A.)* [13]

*Forsberg, Lars L. (Umea, Sweden)*

#### [74] D-CURVE ANALYSIS AS A MEANS OF STUDYING THE PATTERNING OF COARSE-GRAINED ASSEMBLAGES

It is argued that assemblages are results of complex formation and post-depositional processes, an historicist approach in which the goal is to reconstruct particular events in prehistory is incompatible with the nature of the archaeological record. If, however, there are enough data which show systematic patterning, these must be the result of patterned human action. An analysis of the patterning of coarse-grained assemblages from interior northern Sweden by application of D-curve analysis is discussed as a means of solving the special problems of distinguishing behaviorally relevant units in time and space.

*Fournier G., P. (see Charlton, T. H.)* [60]

*Fowler, Jr., William R. (Vanderbilt)*

#### [29] IN SEARCH OF THE ELUSIVE PIPIL: AN APPLICATION OF THE CONJUNCTIVE APPROACH

Recent archival research has amassed an impressive corpus of data on the early colonial Pipil of Guatemala and El Salvador. In spite of efforts by several scholars, the archaeology of protohistoric and early colonial Pipil settlements remains in an initial state. The location and study of these settlements poses special problems of archaeological method. Analysis of the ethnohistoric data allows the formulation of hypotheses concerning Pipil economic and sociopolitical organization that can be tested with archaeological evidence.

*Fox, Anne A. (Texas, San Antonio)*

#### [43] ARCHAEOLOGICAL INVESTIGATIONS AT RANCHO DE LAS CABRAS NEAR FLORESVILLE, TEXAS

Each of the 18th century Spanish missions in San Antonio maintained a ranch at some distance from the town where cattle, sheep and goats were raised to support the mission population. The Franciscans delegated the responsibility of overseeing these ranches to specially trained Indians. The fact that the residents of the ranches were isolated from the direct influence of the mission allowed

them some leeway in the way they lived. After five years of archaeological investigations at one of these ranches, we are able to make some observations on the influences of mission life on the way of life of these people.

*Francis, Julie E. (Office of the Wyoming State Archaeologist)*

#### [61] CHIPPED STONE RAW MATERIALS FROM THE MILL IRON SITE, SOUTHEASTERN MONTANA

This paper examines raw material source areas exploited by the paleoindian occupants of the Mill Iron Site in southeastern Montana. The chipped stone assemblage is classified by geologic age and formation, resulting in the identification of several potential source areas across the Powder River Basin and surrounding geologic uplifts. Procurement and utilization strategies between local and nonlocal raw materials are compared, and potential settlement rounds are suggested. Problems with inferring settlement rounds based on raw material identifications are also discussed.

*Fratt, Lee (Arizona)*

#### [53] USE-WEAR ANALYSIS OF HOMOLOVI GROUNDSTONE ARTIFACTS

Knowing what kind of material groundstone tools were used to process facilitates identifying groundstone tool function and understanding assemblage variability. The Homolovi Research Program's groundstone use-wear experiments have produced information about traces of wear on sandstone tools used to grind and abrade corn, wood, bone, shell and clay. This paper reports the results of using this information to analyze prehistoric groundstone tools recovered from excavations at Homolovi III and discusses the negative effects of weathering on trace wear analysis of groundstone artifacts recovered during survey.

*Freter, A. (see Abrams, E. M.)* [24]

*Frison, George C. (Wyoming) and Bruce A. Bradley (Crow Canyon Archaeological Center)*

#### [61] POSSIBLE CULTURAL RELATIONSHIPS OF GOSHEN AS EXPRESSED IN THE MILL IRON SITE (24CT30) LITHIC MATERIALS

Three radiocarbon dates (11,320, 11,340 and 11,360 years BP) from the Mill Iron Site are interpreted as having blown from a small cultural surface hearth. Two others (10,760 and 11,010 years BP) are from charcoal of uncertain origin. If these dates prove correct, there are several possibilities of Goshen cultural relationships. It could be a Clovis variant, something between Clovis and Folsom, a Folsom variant or something as yet unknown. All of these possibilities are discussed based on the lithic technology expressed in the tools and projectile points.

*Frison, G. C. (see Kay, M.)* [23]

*Fritz, Gayle J. (Michigan)*

#### [72] ADDING THE PLANT REMAINS TO ASSESSMENTS OF PRE-MISSISSIPPI PERIOD PLANT HUSBANDRY

The relationship between agricultural intensification and social elaboration has been central to discussions of culture change across the Eastern Woodlands. Assessments of which societies were agricultural, however, have been drastically revised, and interpretations differ substantially among researchers. For the pre-Mississippian period Lower Mississippi Valley, plant remains have rarely been available as direct data, and inferences have been based on settlement types, material culture and bioarchaeological indicators. Flotation recovery at the Toltec Mounds Site (AD 700-900) furnished a large archaeobotanical assemblage crucial for subsistence reconstruction with native starchy seeds and *Cucurbita* rind, but little maize, serving as evidence for food production.

*Fry, G. (see Pohl, M. D.)* [49]

*Gailey, Christine Ward (Northeastern)*

#### [22] GENDER, KINSHIP, AND RESISTANCE IN CLASS AND STATE FORMATION

Recent theories of precapitalist state formation generated in Marxist and idealist traditions have focused on reproduction as a central arena of social conflict or accommodation. This paper addresses two problems with many of these theories: 1) the assumption that activities associated with women are primarily reproductive and 2) the presumption of omnipotence and consistency on the part of emerging civil authorities. The dialectic of kinship and gender in class formation are explored as means of orchestrating production and reproduction and as the foci of efforts by civil authorities to control producing communities. Regionalism and ethnicity are frequently created in the process and become arenas of cultural forms of resistance.

*Gaines, S. W. (see Powell, S.) [52]*

*Gamble, Lynn H. (UCSB)*

**[54] THE SPATIAL ANALYSIS OF HELO'**

The internal structure of activities at the Chumash village of Helo' are analyzed by examining the following: (1) features such as clay floors, hearths and trash lenses, (2) the association of artifacts and midden constituents with these features, (3) the comparative spatial distribution of artifacts, midden constituents and features throughout the site and (4) natural processes such as bioturbation that move artifacts and midden constituents. Quantitative methods of analysis such as the k-means approach are used when applicable.

*Gamble, L. H. (see Rockwell, T. K.) [54]*

*Garber, James F (Southwest Texas State), Thomas H. Guderjan (Institute of Texan Cultures) and Herman A. Smith (Corpus Christi Museum)*

**[49] THE ARCHAEOLOGY ON AMBERGRIS CAY, BELIZE: THE RESULTS OF THE 1987 SEASON**

During the summer of 1987 excavations were carried out at the sites of Ek Luum and Chac Balam. Both were occupied from the Late Classic through the Early Postclassic and both are strategically situated in coastal settings to control or service various aspects of coastal canoe traffic. At Chac Balam 15 burials were encountered, one of which was associated with an enlargement of the site's largest mound. It was a high status individual as indicated by the presence of exotic pottery, jade, a bloodletter and a carved shell blood receptacle.

*Gardner, Joan S. (Carnegie Institute)*

**[45] CONSERVATION OF THE WINDOVER FABRIC AND WOOD SPECIMENS**

The preservation of the extremely fragile and degraded fabric and wood specimens recovered from the Windover Site involved several carefully planned stages—1) packaging for shipment so dampness and structural integrity were maintained, 2) unpacking and storage in a climate controlled room, 3) study and documentation (both written and photographic), 4) desalination, 5) conservation treatment, 6) freezing and later freeze-drying and 7) repacking for permanent storage and shipment. The treatments found most effective are discussed along with those tested and discarded. The preservation effort required weeks to months and is discussed in detail.

*Gasco, Janine (UC Santa Barbara)*

**[60] SOCIOECONOMIC CHANGE WITHIN NATIVE SOCIETY IN COLONIAL SOCONUSCO, NEW SPAIN**

The variability that characterized Indian participation in the Spanish colonial economy is still poorly understood. Although some forms of participation are well documented, little is known about native populations whose involvement in the colonial economy went beyond either subsistence agriculture or dependence on large Spanish enterprises. In the colonial Province of Soconusco (southeastern New Spain), native participation in the colonial economy was somewhat unique because the Indians controlled the production of cacao, a commodity that was in great demand in the international market. Archaeological and documentary data provide both complementary and contradictory evidence about how this affected socioeconomic organization within native communities in colonial Soconusco.

*Gasser, Robert E. (State Historic Preservation Office, Arizona State Parks) and Scott Kwiatkowski (Soil Systems, Inc.)*

**[57] REGIONAL VARIABILITY IN A TEMPORAL FRAMEWORK: HOHOKAM PLANT USE**

The available archaeobotanical data is evaluated for regional patterning during each Hohokam period. The northern periphery, Salt River valley, Queen Creek, middle Gila, upper Tucson basin and lower Tucson basin areas are considered. Certain plants are found to be characteristic of different areas. It is concluded that, despite differences in water availability and plant distributions, the behavior of individual groups of Hohokams affected plant use as much as environmental factors.

*Gernick, Jr., Stephen (Northern Arizona) and John W. Hohmann (Arizona State)*

**[53] COMMUNITY AND CEREMONIAL ROOMS AT SALADO SITES**

During the last 50 years research in central Arizona dealing with the Salado phenomenon has failed to delineate ceremonial architecture. Recent research within this region, especially excavations conducted at Besh-Ba-Bowah (a 200+ room Salado pueblo), has identified architectural units whose function appears specialized, associated with community and ceremonial activities. A description of these architectural units and their associated assemblages is presented along with reconstructed behavioral interpretations.

*Gero, Joaa M. (South Carolina)*

**[48] EARLY ADMINISTRATIVE CENTERS IN THE CALLEJON DE HUAYLAS, PERU**

This paper reports the results of the Callejon de Huaylas (Peru) Early Intermediate Period mapping project, describing the ridgeline locations, the elongated site layouts and the characteristic white-on-red ceramic assemblages of what appear to be the earliest civic or administrative centers in the region (200 BC - 400 AD). The replicative settlement locations and redundant site forms are used to evaluate the notion of peer polity interaction, and it is argued that the functions of these sites may have included the production of prestige goods.

*Gero, J. M. (see Conkey, M. W.) [22]*

*Geselowitz, Michael N. (Peabody Museum)*

**[56] THE COMPLEX TRIBE IN EARLY BRONZE AGE ENGLAND**

The political basis of the social florescence of the "Wessex Culture" of late 3rd/early 2nd millennium southern England has long been debated by archaeologists. The appearance of great wealth in some of the mortuary assemblages, along with the labor intensive construction of tombs and, most significantly, the erection or elaboration of impressive monuments such as Stonehenge, has led some researchers to consider the society a "paramount chiefdom." However, other scholars have viewed these manifestations to be the work of "tribal confederacies", while still others hedge altogether on the nature of Wessex political organization. This paper examines the extant data for this organization in light of the concept of the "Complex Tribe" in order to shed some new light on this interesting cultural manifestation.

*Gibbon, Guy (Minnesota) [Discussant 19]*

*Gifford-Gonzalez, Diane (U C Santa Cruz) [Discussant 59]*

*Gilbert, C. A. (see Thomson, J. W.) [75]*

*Gilbert, Charles R., Jean Cross and Grace Schoonover (AZ Archaeological Society)*

**[32] THE ARIZONA ARCHAEOLOGICAL SOCIETY'S AVOCATIONAL CERTIFICATION AND EDUCATION PROGRAMS**

Eleven years ago AAS created a certification department modeled upon programs in Arkansas and New Mexico. One representative from each of the society's 14 chapters and five professional archaeologists oversee the program which includes eight courses of approximately 60 hours each. More than 500 avocational archaeologists have participated. To enhance appreciation of archaeological resources beyond the membership, an education department was recently established. An overview of activities and techniques being used by the various chapters in their communities is presented.

*Gill, Richardson B. (Texas - Austin)*

**[24] THE GREAT MAYA DROUGHTS**

Periods of drought in the Yucatan Peninsula follow periods of cool summers in northern Europe. These periods can be reconstructed for the past by analyzing tree rings and lake varves from northern Sweden, as well as other paleoclimatic evidence. Mayan history has repeated periods of turmoil and disruption which can be correlated with cool summers in northern Europe. The turmoil and, especially, the Collapse are caused by drought which deprives the Maya of drinking water. Crops are affected also, but it is lack of drinking water which brings the Classic civilization to its end.

*Gilman, Antonio (Cal State Northridge)*

**[22] MARXISM IN ANGLO-AMERICAN ARCHAEOLOGY**

Anglo-American archaeologists have used Marxist ideas to criticize the two major strands of the New Archaeology: its use of a reductionist cultural ecology as an explanatory framework for the past and its positivist approach to archaeological reconstruction. The emphasis on class analysis, on the one hand, and on "critical" theory, on the other, converge, however, with a sophisticated cultural ecology and with a traditional historicist idealism, respectively. Only a uniformitarian commitment to understanding the past for its present political significance will permit the development of a specifically Marxist prehistory.

*Gilman, Patricia A. (Amerind Foundation)*

**[8] ARCHITECTURAL MEASURES OF AGRICULTURAL RELIANCE**

Investigation of ethnographic pit structures and pueblos (surface structures) from around the world suggests that the two kinds of building generally reflect less and more agricultural reliance, respectively. The initial use of surface structures as habitations in a region should therefore parallel increasing agricultural reliance. Environmental differences between the Chihuahuan and Sonoran deserts in the southern Southwest affect both the timing of the initial use of surface structures and the varying

forms that both pit structures and pueblos take. Both regions have relatively late transitions to surface structures and to agricultural reliance, although for different reasons.

*Gilmore, Kathleen (North Texas State)*

[43] THE INDIANS OF MISSION ROSARIO, TEXAS, FROM THE BOOKS AND FROM THE GROUND

The Karankawa Indians of Mission Rosario, Goliad County, Texas, were known from the time LaSalle found them on the Gulf Coast of Texas in 1687. They earned the reputation of being fierce savages by the Spaniards and were hunted by the Anglo settlers. Bolton, the historian, considered them at the lowest cultural level. The cultural bias of the Europeans did not take into consideration their adaptive strategies to a harsh climate or their achievement of a relatively sophisticated technology, as evidenced by their material culture found at the mission.

*Gish, Jennifer W. (Northland Research)*

[57] CURRENT TRENDS, RECENT DISCOVERIES, AND FUTURE DIRECTIONS IN HOHOKAM PALYNOLOGY

Several major pollen studies of the Hohokam have been conducted in recent years. These include the Salt-Gila Aqueduct projects, Price Road, La Ciudad, Las Colinas, Brady Wash, Akchin and Santa Rosa Canal projects. New insights into the diversity of Hohokam subsistence strategies and variety of utilized plants (such as *Hoffmannsegia glauca* and a 5-colpate *Cruciferae*) have been gained. Interpretive advances include the use of scanning and systematic recording of pollen aggregates. To promote revisions in the Hohokam concept, the need for a greater focus on synthesizing data in reports with existing ethnobotanic studies is apparent.

*Gish, J. W. (see Hutira, J.) [53]*

*Gittings, J. (see Downum, C. E.) [32]*

*Gladfelter, Bruce G. (Illinois)*

[10] SOILS AND LANDSCAPES IN SOUTHERN SINAI DURING THE LATE PLEISTOCENE

The sedimentary record in the upper basin of Wadi Feiran demonstrates that on numerous occasions between about 65,000 and 12,000 BP, palustrine marls formed and Upper Paleolithic (Ahmarian) sites are found nearby some of these strata. One well documented sequence contains seven marls with 20 m of alluvium. Some exhibit pedogenic properties. Two contrasting reconstructions can be suggested: 1) paleoenvironmental uniformity throughout this interval but with soil formation only where and when waning sedimentation locally provided surfaces for pedogenesis and 2) multiple phases of soil formation connoting changing environmental conditions and paleoclimatic periodicity. Either interpretation constitutes an unparalleled picture of paleoenvironmental conditions for this region.

*Glass, Margaret E. (Calgary)*

[4] SETTLEMENT PATTERN CHANGE FROM THE EARLY TO LATE NEOLITHIC IN CENTRAL EUROPE

The association of early Neolithic sites with certain environmental characteristics, such as loess-based soils and specific temperature and precipitation zones, has long been recognized in Central Europe. In contrast, late Neolithic settlements are found in a greater variety of settings. Explanations for this trend include: 1) population growth and expansion into marginal agricultural areas, 2) acculturation of indigenous hunter-gatherers and 3) economic differentiation, including an increased emphasis on pastoralism. These three alternatives are explored using data from recent investigations in Germany.

*Glassow, Michael A. (UCSB) [Discussant 54]*

*Gleach, Frederic W. (Chicago)*

[66] A DISTRIBUTION ANALYSIS OF LITHIC AND BONE MATERIALS FROM CUEVA MORIN, SPAIN

In addition to the stone tools from this Paleolithic site, a large amount of bone was recovered from one level, some of which has been described as being worked by humans. Previous debate has centered on the bone objects themselves. Factor analysis is used here as a means of comparing spatial distributions of both lithic and bone materials from the site. The site and assemblage contexts are thus brought into the analysis, in order to apply all available data to the questions of spatial patterning in this assemblage.

*Glenn, Brian K., Phillip L. Walker and Natalie Anikouchine (UCSB)*

[54] EXPLOITATION OF FAUNAL RESOURCES AT SBA-46

Studies of faunal remains from Helo', a coastal Chumash village, show that exploitation of a diversity of marine and terrestrial habitats persisted into the contact period. Remains of fur seals and

porpoise are abundant in contact period deposits at the site. Analysis of shellfish species shows that the local estuary habitats were intensively exploited. Although nearshore schooling fish predominate in the fish remains, species from other habitats are also represented.

*Gnivecki, P. L. (see Berman, M. J.) [62]*

*Goldberg, Carol E., Michael J. DeNiro (UCLA) and Phillip L. Walker (UC Santa Barbara)*

[70] STABLE ISOTOPES, DIET AND CULTURAL CHANGE IN SOUTHERN CALIFORNIA

Analysis of stable carbon and nitrogen isotopes in human bone collagen is used to examine the development of marine resource utilization in the southern California area. The populations analyzed span 8000 years of occupation on the mainland coast, interior and both the northern and southern Channel Islands. It is found that previous models of dietary change within the various regions are inadequate. Not only are localized dietary specializations present, but the data also indicate that cultural practices such as trade, seasonal migration, residence patterns and gender dependent dietary differences can be identified using isotopic analysis.

*Goldberg, Paul (Hebrew University, Israel)*

[10] MICROMORPHOLOGY, SOILS AND ARCHAEOLOGICAL SITES

Soils are not uncommon in archaeological contexts and are normally studied with classical laboratory techniques used in geology or pedology: grain-size and chemical analyses (e.g., iron, carbon and nitrogen). These techniques, however, often fail to unravel successive pedogenic, geogenic or anthropogenic events that can be superimposed upon the same substrate. This paper attempts to show how micromorphology - the study of soils and loose materials in thin section - is an effective means to tackle such problems. Examples of micromorphological applications to soils and sediments from archaeological sites in the Middle East and Europe illustrate how palaeoenvironmental and site developmental history can be inferred.

*Graham, Elizabeth A. (Toronto) and Grant Jones (SUNY, Albany)*

[17] ETHNOHISTORICAL MODELS FOR THE ARCHAEOLOGY OF THE CONQUEST PERIOD MAYA

Based on information provided in ethnohistoric documents, several models about changes in Maya societal and economic structure in Belize at the time of the conquest were developed as a framework for archaeological investigation of two Historic Period sites in Belize. The results of the research at Tipu and Lamanai will be discussed with a view toward suggesting how the use of ethnohistoric data and the framework for archaeological investigations can be strengthened.

*Graybill, Donald A. and Chester W. Shaw, Jr. (Arizona)*

[53] RECENT PREHISTORIC DENDROCLIMATIC ESTIMATES AND THEIR INTERPRETIVE SIGNIFICANCE IN SOUTHWESTERN ARCHAEOLOGY

Southwestern prehistoric tree ring chronologies are used to develop quantitative estimates of past climate for southern Arizona and the prehistoric Mogollon area in New Mexico. The estimates do not support ideas about the adaptive significance of alternating cycles in seasonal rainfall predominance. The estimates support current views of Southwestern Holocene climate as a time of unpredictable winter climate and a time of predictable summer climate. Findings concerning seasonal differences in past climate are explored along two lines: 1) how these probably influenced adoption of maize agriculture in the areas concerned and 2) how these could have led to integrated social networks in these areas.

*Grayson, Donald K. (Washington) [Discussant 65]*

*Green, Thomas J. (Idaho State Historical Society)*

[11] THE UNMARKED GRAVE ACT IN IDAHO

In 1984 the Idaho legislature passed a law which protects unmarked graves from vandalism and regulates their excavation by archaeologists. Since 1967 University of Idaho archaeologists have regularly consulted with Plateau Indians concerning grave excavations. The paper describes the history of Indian/archaeologist relations in Idaho before and after the 1984 legislation.

*Green, William (Office of the State Archaeologist, Iowa) and Shirley Schermer (Iowa)*

[36] RED OCHER (TERMINAL ARCHAIC) PHYSICAL CHARACTERISTICS AND MORTUARY BEHAVIOR IN THE UPPER MISSISSIPPI VALLEY

The Red Ocher horizon is well documented throughout the Great Lakes area and central Midwest. However, little is known of the westernmost Red Ocher sites along the Upper Mississippi River in Iowa. We analyze and interpret excavated Iowa Red Ocher burial sites, focusing on mortuary structures and inferred activities, evidence of long distance trade or acquisition and a comparative interpretation

of social relations. Health and diet are addressed and the results of osteological examination are compared with bioanthropological data from other Red Ocher populations. Evidence of violence at the time of death is similar to that seen in several Red Ocher groups.

*Greenfield, Haskel J. (Indiana)*

[4] LATE NEOLITHIC SUBSISTENCE ECONOMY OF THE CENTRAL BALKANS

(YUGOSLAVIA)

The large Late Neolithic communities of the central Balkans have often been characterized as emerging complex sociopolitical systems (ranking), with evidence for the redistribution of exotica. However, there is little evidence for the redistribution of locally produced goods (such as ceramics) and, by implication, of foodstuffs. This paper will present newly collected zooarchaeological data from the region and will discuss the relationship between subsistence and exchange. It will show that there was little exchange between major highland/lowland communities in animal or animal products. Instead, there appears to be evidence for such exchange between major centers and satellite settlements.

*Grimm, Linda T. (Oberlin College) and Todd Koetje (Tennessee)*

[66] IMPLICATIONS FOR DIRECTIONAL CHANGES IN SUBSISTENCE STRATEGIES OF SPATIAL PATTERNING AT SOLVIEUX

Central to the interpretation of spatial patterning in Upper Paleolithic sites are models of human induced material patterning derived from ethnoarchaeological work. Much of this work suggests that material near hearths reflects intensive or repetitive activities while material distant from hearths reflects more dispersed (or extensive) activities. This dichotomy and predictions based in Binford's collector-forager subsistence continuum have been used to suggest directional changes in subsistence organization across the Middle/Upper Paleolithic boundary. Solvieux level M, an Upper Perigordian, open air occupation surface, is examined using several independent spatial analysis techniques, suggesting that initial interpretations may have been overly simplistic.

*Grobe, G. (see Bush, P. J.) [70]*

*Gronemann, Barbara J. (Southwest Learning Sources)*

[32] FREE LANCING ARCHAEOLOGY

A private enterprise approach to developing anthropological and archaeological curriculum materials and programs for schools is described and evaluated. The marketability of a variety of products and services is discussed including 1) classroom materials and kits, 2) specialized classroom instruction for students, 3) workshops for teaching staff and 4) general consulting for teachers and administrators regarding materials, programming and educational formats. Actual experience in establishing a small business to free lance archaeology (among other subjects) is summarized and the strengths and challenges of such a strategy for archaeological outreach are discussed.

*Guderjan, T. H. (see Garber, J. E.) [49]*

*Gumerman, IV, George J. (UCLA)*

[48] DIETARY VARIATION ON THE SCALE OF THE SOCIAL GROUP: AN EXAMPLE FROM THE PREHISTORIC SITE OF PACATNAMU, PERU

Research at the prehistoric urban center of Pacatnamu, located on the north coast of Peru, focuses on understanding subsistence practices during the Chimu occupation of the site. Concepts derived from evolutionary and ecological theory are used to examine general subsistence at the site in comparison to other contemporaneous site types. The research goes beyond the generalized comparison by examining diet at Pacatnamu on a much finer scale: the social group. A stratified sample of pyramids, with associated room groups, was excavated to test the approach and determine specific dietary variation between social groups at Pacatnamu. Architectural and artifactual data were used as socioeconomic indicators, while floral and faunal remains were collected, analyzed and quantified in order to define dietary diversity. The research provides a much more detailed understanding of subsistence in Andean South America in particular, and complex societies in general.

*Gumerman, George J. (Southern Illinois) [Discussant 39]*

*Haas, Jonathan (School of American Research) [Discussant 56]*

*Habicht-Mauche, Judith A. (Harvard)*

[56] TOWN AND PROVINCE: REGIONAL INTEGRATION AND ECONOMIC INTERACTION AMONG THE PROTOHISTORIC RIO GRANDE PUEBLOS

Traditionally, the Rio Grande Pueblos have been viewed as independent, self-sufficient and egalitarian communities. Archaeological evidence for regional craft specialization and trade has led to a

reevaluation of this model of social and economic organization. Ethnohistoric evidence for multi-village alliances or "provinces" at the time of European contact has contributed to this debate. This paper presents a critical review of archaeological and ethnohistorical evidence for social and economic alliances among the protohistoric Rio Grande Pueblos. The structure and function of these regional networks is analyzed within the framework of the Complex Tribe as formulated by Habicht-Mauche et al. (1987).

*Hagstrum, Melissa B. (UCLA) and John A. Hildebrand (UCSD)*

[38] SUBSISTENCE STRESS IN NATIVE SOUTHERN CALIFORNIA: KUMEYAAY ADAPTATION TO EUROPEAN CONTACT AT WIKALOKAL, SAN DIEGO COUNTY

That the European presence in native America impacted indigenous groups dramatically is a well known fact. Less well known are the ways in which these groups adapted to multiple stresses wrought by this presence. With archaeological data recovered from Wikalokal (the Buckman Springs Site), we endeavor to explain Kumeyaay adaptation to subsistence stress using the economic principle of marginal cost. As access to resources became increasingly restricted and competition for resources increasingly stringent, the Kumeyaay, traditional hunters and foragers, relied more heavily on foraged foodstuffs.

*Hajic, E. R. (see Stafford, C. R.) [58]*

*Hall, Mark E. (California, Berkeley)*

[47] IRON WORKING IN VIKING DUBLIN

Chemical and metallographic specimens were taken from 33 edged iron tools and weapons dating from the late 9th to 12th centuries AD. All are from well stratified and dated levels from the excavations at Dublin, Ireland. The dominant manufacturing technique was the welding of martensitic steel to ferrite in one of two ways. In both cases, the martensite was used for a cutting edge, while the ferrite was used to protect the brittle steel. Comparisons with other contemporary metal-work are made. The chemical data are used to elucidate some possible origins of the iron ore.

*Hally, D. J. (see Skibo, J. M.) [26]*

*Halperin, Rhoda H. (Cincinnati)*

[31] STORAGE AS AN ECONOMIC PROCESS

This paper reviews the conceptual literature (e.g., Kent n.d. Testart 1982 Ingold 1984) on storage. It examines the assumptions in that literature, especially with regard to the relationships between forms of storage, processes of production, distribution (exchange) and consumption and the evolution of cultural systems. The paper then proposes some models and analytical frameworks within which storage forms can begin to be analyzed in a comparative (cross-cultural) perspective.

*Hamilton, Nathan D. (Southern Maine) and David R. Yesner (Alaska-Anchorage)*

[36] LATE WOODLAND BURIAL CEREMONIALISM ON THE WESTERN MAINE COAST

Systematic excavation of the Great Moshier Burial Site was undertaken in 1979 and 1987. The earlier work recovered an eroded prehistoric grave which contained the remains of 17 well preserved human burials and associated grave goods which radiometrically date to ca. 900 BP. Recent fieldwork focused on the adjacent habitation area with the aim of reconstructing Late Woodland subsistence and settlement patterns. The artifactual data and faunal remains support isotopic analysis conducted on the burials in indicating a dominant maritime diet. The data suggest a short-term summer occupation focused on ceremonial activities probably related to the adjacent human burials.

*Hamilton, N. D. (see Thayer, C. A.) [5]*

*Hammond, Norman (Rutgers)*

[24] NOHMUL: EVOLUTION OF A MAYA CITY

The site of Nohmul, the largest in northern Belize, was occupied for some two millennia (1000 BC—AD 1000), and in its length, strength and diversity of occupation can be seen as a "successful" community that weathered many changes. Four seasons of survey, test excavation in the settlement area, examination of drained-field complexes in the surrounding wetlands and major investigation of civic architecture in the site center, together with post-excavation analyses of carbon dating samples, obsidian and ceramics, have allowed two periods of florescence in the Terminal Preclassic and Terminal Classic to be defined. The paper addresses questions of sequence continuity, chronology and urban evolution in the light of current knowledge of Nohmul and its place in Maya culture history.

*Handsman, Russell G. (American Indian Archaeological Institute)*

[2] RE-WRITING THE ARCHAEOLOGICAL ATLAS ON COLONIALISM

This paper describes a global project for post-processualists—archaeological studies against, or an anti-science of, the last five hundred years. Normally, atlases make native peoples in colonized landscapes either passive or invisible, suggesting that colonialism is inevitable. Examples from museum exhibits and disciplinary practices are used to reveal aspects of the normal atlas. Simultaneously this atlas is rewritten to admit native resistance and to indicate how native peoples made their own histories, expressing them through material culture. Thus this anti-atlas of the relations between native Americans and archaeologists can provide another dimension for understanding political controversies today.

*Hanks, C. (see Pokotylo, D.) [44]*

*Hansen, B. C. (see Wright, Jr., H. E.) [76]*

*Hanson, Glen T. (South Carolina)*

[71] EARLY ARCHAIC TECHNOLOGICAL AND SPATIAL ORGANIZATION AT THE G.S.

LEWIS SITE

Analyses of Kirk Phase materials from a 404 square meter contiguous excavation block at the G.S. Lewis Site (38AK228) have focused on technological organization and spatial utilization in order to partially evaluate a model of Early Archaic mobility in the Savannah River watershed (South Carolina and Georgia). The lithic tool assemblage is examined in the context of raw material availability and seasonally organized logistical mobility. At the intrasite level, differential artifact and feature distributions substantiate a conclusion that the site represents a seasonal base camp, rather than extractive camp. Implications of this record support a regional model of Early Archaic seasonal residential stability.

*Hard, Robert J. (Smithsonian Institution)*

[8] MEASURING AND POSTDICTING THE EMERGENCE OF FARMING

It is suggested that increasing dependence on agriculture is a forced response to imbalances between population and wild resources. Size of groundstone tools is proposed as an index of agricultural dependence. The relationship is supported by ethnographic data. Wild food availability is measured with a ratio between plant productivity and biomass. Relatively when and where increased dependence on cultigens occurred is retrodicted and evaluated for the southern Southwest.

*Harmon, Anna M. (Arkansas)*

[27] BIOARCHAEOLOGY OF THE LOWER MISSISSIPPI VALLEY IN HISTORICAL PERSPECTIVE

The term "bio-archaeology" first appeared in the literature a decade ago (Buikstra 1977). The meaning of the term, the theoretical premises it represented and the implementation of those premises largely remained to be articulated, demonstrated and integrated into both the physical anthropological and archaeological cultural resource management frameworks. A bioarchaeological synthesis conducted in the Lower Mississippi Valley, from northeastern Arkansas to the Gulf Coast, is presented as one example of what bioarchaeology has been and could be.

*Harris, John W. K. (Wisconsin-Milwaukee)*

[59] NEW DIRECTIONS IN THE ARCHAEOLOGY OF HUMAN ORIGINS, EAST AFRICA

A program of field and laboratory research has recently been initiated that sets out to test propositions regarding changing adaptive patterns of behavior by *Homo erectus* populations after 1.5 million years ago as compared with those of earlier Plio-Pleistocene and early Pleistocene archaeological sites in contrasting paleoenvironmental contexts in East Africa. Applying new survey, excavation and retrieval techniques and embarking on exploratory lab research will address questions about changing foraging and subsistence patterns.

*Harry, Karen G. (Arizona)*

[69] SOCIAL AND ECONOMIC IMPLICATIONS OF THE INCREASE OF OBSIDIAN USE AT HOMOLOVI III

Data recovered from Homolovi III indicate that during the 14th century the site's inhabitants began regularly incorporating obsidian into their tool assemblages. The abrupt increase in obsidian utilization coincides with other changes in the site's artifact assemblage and mirrors important transformations occurring throughout the region, including the general expansion of trade networks and increased regional interaction. The implications of the sudden appearance at Homolovi III of obsidian, originating from a source located some 125 km to the northwest, are discussed.

*Hart, John P. (Northwestern)*

[19] VARIATION IN MISSISSIPPIAN MAIZE PRODUCTION ACROSS ENVIRONMENTAL GRADIENTS: SITE CATCHMENT ANALYSIS

It is generally believed that Upper Mississippian economies were less dependent upon maize agriculture, and more dependent on wild resources, than Middle Mississippian economies because of marginal growing conditions for maize. This environmental hypothesis has never been adequately tested. As a first phase in testing this hypothesis, site catchment analysis is performed on Late Woodland-Mississippi period sites in a transect encompassing several environmental gradients stretching from southern Illinois through Wisconsin. Results indicate that although there are differences in potential resource exploitation from south to north, the differences are not necessarily consistent with the environmental hypothesis.

*Hassig, Ross (Columbia)*

[46] STRUCTURE AND DEVELOPMENT OF THE AZTEC EMPIRE

The Aztec Empire underwent dramatic changes in internal structure as well as external expansion and control throughout its century of dominance. Its initial development may be understood as internally generated, but successful expansion gives rise to new problems, creates new internal responses and patterns further external expansion. Social, political, economic and ethnic relations are constantly realigning in light of the changing Aztec situation to sustain external expansion as well as to maintain internal stability.

*Hastorf, Christine A. (Minnesota)*

[76] POLITICAL CHANGE WITHIN SOCIAL CONTINUITY IN THE SAUSA CULTURAL SEQUENCE

Recent research suggests that the Sausa lived in the Upper Mantaro area for at least 2,000 years without direct external control until the Inka conquest. Although there is evidence of indirect influence, local continuity is seen, especially in the household social unit. Subsistence production changes but shifts into a new system only when there is increased internal political pressure. In the final pre-conquest phase evidence is seen of negotiation for inequality using norms like reciprocity and opposition.

*Hatch, Marion Popeno (Universidad Del Valle de Guatemala)*

[29] THE PROTOCLASSIC: NEW EVIDENCE FROM KAMINALJUYU

On the basis of the particular utilitarian wares represented at archaeological sites, four prehistoric cultural traditions are outlined for the Guatemala highlands and South Coast. Ceramic changes within these regional traditions provide insights into local cultural developments, with special attention given to new information regarding the transition from the Preclassic to the Classic Period. A brief comparison is made of the archaeological evidence based on ceramic analysis and that provided by linguistic and ethnohistoric data.

*Hettori, Eugene M. (California Academy of Sciences) and Donald R. Tuohy (Nevada State Museum)*

[47] TECHNOLOGICAL ANALYSIS OF FLAKED STONE CRESCENTS

Distinctively shaped flaked stone crescents are found along former shorelines of extinct, late Pleistocene to early Holocene water bodies in the western U.S. Previous functional interpretations for crescents included surgical implements, scrapers, sickle blades and projectile points. Extensive crescent collections from the Great Basin are being studied using light and scanning electron microscopy. Detailed analysis of manufacture, use and post-manufacture modification of these tools reveals alternative interpretations for edge damage attributed to several of the proposed functions.

*Hanswirth, W. H. (see Dickel, C. D.) [45]*

*Havel, Rose Marie (Northern Arizona)*

[53] WATER CONSERVATION: WHEN, WHERE, AND WHY

Prehistoric water conservation devices are frequently encountered in the Western San Juan region of the Southwest. However, little has been done to develop a predictive model for when, where or for whom these features occur. This paper evaluates the basis for a model utilizing the spatial relationship of prehistoric water conservation devices with their physical environment and adjacent cultural features.

*Haviser, Jay B. (AAINA)*

[38] INSULAR ADAPTIVE STRATEGIES DURING THE CERAMIC AGE ON CURACAO

This paper presents an overview of general human adaptation and culture specific adaptive responses in the same insular, semi-desert environment by different Amerindian societies who inhabited Cur-

acao. Data were collected from site catchment analyses, archeological excavations, anthropological insights, historical documentation and concepts of contagious vs. symbiotic settlement patterns to allow for suggestions about the social organization and socio-economic subsystems during the Ceramic Age on Curacao. Based on the above mentioned data sources, this paper questions the theory long supported by historians that the prehistoric inhabitants of Curacao were subservient to a larger political chiefdom on the South American mainland.

**Hawkes, K. (see O'Connell, J. E.) [23]**

**Hayden, Brian D. (Simon Fraser) and W. Karl Hutchings (Toronto)**

**[44] WITHER THE BILLET FLAKE?**

A number of flintknappers have questioned whether billet flakes are distinctive or can be accurately identified. Using experimental procedures and elementary statistics we demonstrate that the hardness of the percussor dramatically affects the ratio of platform size to flake size, as well as other flake features. We conclude that where bulbous areas are preserved it should be possible to recognize soft vs. hard hammer flake origins. This enables archaeologists to address a wide range of theoretical questions regarding cost advantages and disadvantages of soft hammer flaking and the conditions under which it is likely to be used.

**Hayden, Brian D. (Simon Fraser) [Discussant 17]**

**Haynes, Gary (Nevada-Reno)**

**[23] ELEPHANT BONESITES: GRAVEYARDS OR SLAUGHTERHOUSES?**

Our "knowledge" of prehistoric human use of mammoths and other proboscideans is probably only folk wisdom. As illustrated in this presentation, nonculturally created bonesites of modern megafauna are often indistinguishable from fossil locales that have been conventionally interpreted as human kills or butchery sites. Explicit interpretive standards are called for, and examples discussed, in the context of describing African, Australian and North American deathsites of free roaming elephants, camels, horses, bison and other large mammals that are probable analogues for Pleistocene megafauna.

**Haynes, Gregory M. (Northern Arizona)**

**[34] ANALYSIS OF PROJECTILE POINT VARIABILITY WITHIN THE KAHORSHO SITE,**

**FLAGSTAFF**

The Kahorsho assemblage is assumed to be basically utilitarian. The analyzed sample is evaluated against a larger, comprehensive sample of points encompassing the range of temporal, spatial and functional variability within the Northern Sinagua region. The study asks 1) is the site-specific assemblage a good representative of Northern Sinagua projectile points as a whole? 2) or is it temporally, spatially and/or functionally specific? 3) what variability is seen within the site and not in the larger sample? 4) what variability is seen within the larger sample and not in the site?

**Hays, Kelley A. (Arizona)**

**[32] EARTHWATCH VOLUNTEERS AND THE HOMOL'ovi RESEARCH PROGRAM**

Earthwatch is an organization that brings inquisitive and enthusiastic individuals together as a team to experience and support research projects. Excavation, survey and lab work at the proto-Hopi Homol'ovi pueblos near Winslow, Arizona (which are being developed as a state park), were conducted in 1987 by the Arizona State Museum, University of Arizona and Earthwatch volunteers. Questionnaires returned by volunteers report an interesting and enjoyable vacation experience. The quality and quantity of work done by the Earthwatch teams compare favorably with previous seasons' work using other forms of assistance. Publicity focusing on the volunteers makes archaeology more accessible and interesting to the general public.

**Head, Genevieve N. (UCLA)**

**[33] HUNTING TECHNOLOGY AND THE INTENSIFICATION OF AGRICULTURE: AN ANALYSIS OF PROJECTILE POINTS FROM THE PAJARITO PLATEAU**

It is postulated that a stress induced increase in Anasazi use of agricultural products during the 13th and 14th centuries was accompanied by exploitation of a wider range of plant and animal foods. Such changes in the subsistence system are expected to be reflected in hunting technology. A typology of projectile points from the Pajarito Plateau, collected by the Pajarito Archeological Research Project and the Bandelier Archeological Survey, is considered with ceramic and environmental data from both surveys to test the hypothesis that hunting patterns on the plateau change in response to subsistence stress.

**Heath, K. M. (see Metcalfe, D.) [52]**

**Hegmon, Michelle (Michigan)**

**[20] CERAMICS AND STYLE IN EARLY PUBLIC ARCHITECTURE IN THE NORTH AMERICAN SOUTHWEST**

Ceramic style and assemblage composition are used in the interpretation of public architecture in sites in southwest Colorado dating to AD 700-950. Ethnographic information on style and ceramics is synthesized to develop expectations for ceramics used in integrative and specialized ritual settings. Site and floor ceramic assemblages are compared from contexts where 1) pithouses are the primary (non-communal) dwelling units, 2) pit structures or oversized pit structures are shared by a few or many households and 3) pit structures have specialized ritual features.

**Hehr, J. G. (see Stahle, D. W.) [71]**

**Helmer, D. (see Villa, P.) [3]**

**Helms, Mary W. (North Carolina-Greensboro)**

**[60] GODS OR DEVILS OR ONLY MEN?**

The meeting of native peoples and Europeans is viewed as the conjunction of distinctive cosmological systems with differing interpretations of "foreigners" or "strangers". Native peoples regarded Europeans as supernaturally powerful ancestors, spirits or demons, or as "wise strangers" with mystical power because these were the types of "beings" that inhabited the distant cosmographical places from which Europeans derived. European cosmology regarded native peoples as wild men, barbarians or nonhuman beings because these were the types of beings that inhabited the distant cosmographical frontiers of European cosmology. The early years of native-European culture contact were strongly conditioned by these conflicting patterns of cosmological interpretation.

**Henderson, T. Kathleen (Northland Research)**

**[6] ORGANIZATIONAL CHANGE AT LA CIUDAD: IMPLICATIONS FOR THE HOHOKAM REGION**

The focus of this study is La Ciudad, a pre-Classic Hohokam village. A spatial and temporal reconstruction of the site led to the identification of two major organizational components: courtyards and cemetery loci. However, these components were not formalized at La Ciudad until approximately AD 900, some two centuries after the village was initially occupied. The differences between the pre- and post-AD 900 community patterns suggest underlying differences in social structure. These differences are posited to reflect a shift in the integrative level of tribal organization. Implications of the changing organization of La Ciudad and possible causal factors are explored.

**Hendon, Julia A. (Harvard)**

**[42] THE DISTRIBUTION OF ACTIVITIES AND STRUCTURE USE AT LAS SEPULTURAS, COPAN, HONDURAS**

The nature of the Late to Terminal Classic Period settlement in the Sepulturas zone is explored using data from three years of excavation. The functions and spatial patterning of artifacts recovered from primary contexts are analyzed in order to identify kinds of activities and their location. Not only are differences in the location of different activities revealed but also a patterned relationship between these activities and certain kinds of rooms and buildings. These relationships and their implications for the reconstruction of the social organization of the residents of Las Sepulturas are discussed.

**Henry, Donald O. (Tulsa)**

**[35] FORAGING, SEDENTISM AND ADAPTIVE VIGOR: RETHINKING THE LINKAGES**

Traditionally, sedentary foraging societies in both ethnographic and archaeological contexts have been viewed as examples of secure, stable adaptive systems that emerged in extraordinarily rich environmental settings. An alternative perspective is offered in which "foraging" and "sedentism" are viewed as contradictions in the context of a society's long-term survival. The systemic evolution of a sedentary foraging society, the Natufian, is traced over a 2000 year period.

**Hensler, Kathy (CA Institute for Peruvian Studies), Jonathan Kent (Metropolitan State College) and Vern Hensler (CA Institute for Peruvian Studies)**

**[49] A NASCA 6-8 CEMETERY FROM ACARI, PERU**

During the 1987 field season in Acari (south coast, Peru) a very extensive cemetery dating to Nasca 6-8 was revealed by a farmer while grading his field. Operating under an emergency excavation permit from the INC, we excavated 39 tombs from the cemetery (approximately 8% of the total). Many of these were relatively intact. The graves and associated offerings are described along with inferences

regarding affiliations and possible status markers. Plans for continuing the work in the coming year are discussed.

*Hensler, V. (see Hensler, K.)* [49]

*Herbich, Ingrid (UC Berkeley)*

**[9] DIFFERENTIATING BETWEEN THE SOCIAL CONTEXTS OF CERAMIC MANUFACTURE AND USE IN AN AFRICAN SOCIETY AND THE QUESTION OF STYLISTIC SIGNALLING OF ETHNIC BOUNDARIES**

Aspects of an ethnoarchaeological study among the Luo of Kenya are discussed. Ceramic micro-styles within a region result almost entirely from features of the social context of manufacture (e.g. post-marital learning patterns and potter interaction). Examination of distribution and use patterns makes it clear that ceramic style plays no symbolic role for users in making ethnic or social group distinctions despite a strong, competitive sense of ethnic group boundaries. Implications for the current debate concerning the role of material culture style in signaling ethnic identity are considered.

*Hesse, Brian (Alabama-Birmingham)*

**[15] THE OUTER LIMITS: ESTIMATING THE PARAMETERS OF A BAG OF BONES**

Information about stratigraphic contexts and content can be combined with zooarchaeological statistics describing animal mortality and bulk density to estimate the social and temporal limits of a sample of bones. These procedures are necessary because while zooarchaeological inferences depend on associations between samples and defined social units, the nature of economies guarantees that the social units will be multiple, overlapping and extend beyond the limits of the "site", and redefinition means that samples will have temporal limits irreducible to the "ethnographic present". An example of the application of these techniques is provided using samples from Philistine Ekron.

*Hester, James J. (Colorado)*

**[66] ARCHAEOLOGY IN THE 21ST CENTURY.**

The conduct of archaeological research in the 21st century (beginning in only 13 years) will feature widespread use of technology already available. These technologies feature automated data recording, digitizing of data and computerized data storage, sorting and retrieval. We anticipate there will be widespread reliance on Geographic Information Systems and Artificial Intelligence for CRM and the development of research designs. Given the premise that "the present is the key to the future", the ramifications of these changes in archaeological methods are examined in terms of research concerns, training, professional skills and management needs.

*Hester, Thomas R. (Texas, Austin)*

**[43] THE INDIAN RESPONSE TO MISSIONIZATION ON THE TEXAS-NORTHEAST MEXICO BORDERLANDS: PERSPECTIVES FROM MATERIAL CULTURE**

A number of Spanish missions in southern Texas and northeastern Mexico have been excavated in the past two decades. In most cases, the Indian quarters were at least partially studied. A wealth of data on the material culture of the "Mission Indians" allow archaeologists to examine the process of cultural change in the mission context. We are also able to recognize aspects of Indian material culture that persisted through the mission era, especially in the manufacture and use of stone tools.

*Hester, T. R. (see Black, S. L.)* [27]

*Hicks, Patricia A. (Desert Research Institute)*

**[34] ATTRIBUTES OF DEBITAGE AS TEMPORAL INDICATORS**

In many areas a large portion of the archaeological record is composed of surface scatters of flaked stone tools and debitage that are not datable by traditional methods. These sites are often eliminated from consideration in model building and testing owing to the lack of temporal control. This can lead to erroneous regional and cultural interpretations because a considerable portion of the data base may have been omitted. This paper examines the potential for using debitage attributes as temporal indicators. The results of a temporally oriented analysis of a sample of debitage from 34 dated and undated contexts in northern New Mexico are then presented and evaluated.

*Hicks, P. A. (see Simmoas, A. H.)* [27]

*Hildebrand, J. A. (see Hagstrum, M. B.)* [38]

*Hildebrandt, Barbara S. (Zuni Archaeology Program)*

**[65] GENERALIZATION VS SPECIALIZATION: MODELS OF CHANGE IN RESOURCE PROCUREMENT STRATEGIES AND TACTICS**

During the Puebloan period three distinct settlement patterns are documented in the Zuni River Valley during which varied means of resource procurement are employed. A suite of explanatory

models which illuminate the generalization or specialization of resource procurement strategies and tactics is developed incorporating climatic variables, resource potential and population estimates. Conditions of agricultural intensification are examined through studies of available potential resources, local and regional climatic reconstructions and population estimates as well as site density and settlement location within a given time range.

*Hilgeman, Sherri L. (Indiana)*

**[41] REPLICATING LOWER OHIO NEGATIVE PAINTED CERAMICS**

Negative-painted, or resist-painted, ceramics are an important diagnostic of the Mississippian period in the lower Ohio River valley, especially at sites of the Angel and Kincaid Phases. While Shepard has outlined a plausible general procedure for decorating ceramics in this fashion, no experiments thus far have attempted to produce such results. The successes and failures of experiments to replicate colors, finish and design are summarized.

*Hillman, Gordon C. (London)*

**[50] PLANT FOOD ECONOMY OF THE TWO SETTLEMENTS AT ABU HUREYRA: DIETARY DIVERSITY, SEASONALITY AND ADVENT OF AGRICULTURE**

Abu Hureyra has generated the largest and most diverse assemblage of plant food remains of any hunter-gatherer and early agrarian settlement in Southwest Asia excavated so far. For the hunter-gatherers of the Epipalaeolithic, they reveal a startling degree of dietary diversity; over 150 different plant foods were gathered from three distinct ecosystems, and they suggest that the site was probably already occupied year-round. With the arrival of crop husbandry in the Neolithic, dietary diversity contracted dramatically, although the cereal and pulse crops include a broader range than at any other Neolithic site in Southwest Asia.

*Hodder, Ian (Cambridge)* [Discussant 22]

*Hodder, Ian (Cambridge)* [Discussant 2]

*Hodge, Mary G. (Houston-Clear Lake) and Leah D. Minc (Michigan)*

**[49] LOCATING AZTEC CERAMIC PRODUCTION AND DISTRIBUTION CENTERS**

A two year project to reanalyze Aztec period ceramic collections gathered by the Valley of Mexico Survey projects in the Chalco, Xochimilco, Ixtapalapa and Texcoco regions was initiated in summer 1987. The first season's work concentrated on reassessing ceramic types and identifying design elements typical of specific Early and Late Aztec period production zones and mapping the distribution of these elements in the southern portion of the Valley of Mexico. Models of exchange developed from the ceramic data are compared with ethnohistorically derived models of Early and Late Aztec (AD 1150-1350 and AD 1350-1520) exchange patterns.

*Hoepfner, Christine (Pennsylvania)*

**[2] "POPULAR INTEREST" AND PRIVATE INTENT: CONFLICTS IN THE CONSTRUCTION OF THE AMERICAN PAST, 1880-1920**

An analysis of both the donations of objects in the Smithsonian's American Historical Collections and the decisions made concerning the public exhibition of these objects as history demonstrates that curators and donors did not share a single unified vision of the framework upon which American history should be constructed, despite their common class interests. The existence of a variety of viewpoints on the national past held by different class fractions has implications for understanding the formation and function of both a national ideology and professionalization. This intraclass conflict also raises broader questions about the relationship of power and knowledge and the very definition of a dominant ideology.

*Hoffecker, John F. (Argonne National Laboratory) and W. Roger Powers (Alaska)*

**[5] LATE GLACIAL PREHISTORY AND LOESS STRATIGRAPHY IN THE NENANA VALLEY, CENTRAL ALASKA**

Fifteen years of research in the Nenana Valley, located in the northern foothill belt of the Alaska Range, has revealed a rich and complex record of Late Glacial settlement. Occupation horizons are contained in a thick loess mantle that spans the terminal Pleistocene and Holocene. Buried soils may be used as stratigraphic markers for cross-correlation of individual site profiles, and absolute chronologic control is provided by radiocarbon and TL dating. Archaeological remains are often associated with the buried soil horizons as well as cryogenic and tectonic disturbance features. The Late Glacial record comprises two archaeological complexes dating to the 12-10,000 BP interval; the older complex appears to lack the microblade technology common to interior Alaska during this time range.

*Hoffman, Charles A. (Northern Arizona) and Nancy Watford Hoffman (George Washington)*

[34] HALL RANCH LITHICS: ARCHAIC OR LATE MOGOLLON?

This paper voices a note of concern that we may be placing certain lithic objects, specifically projectile points, into a chronological sequence in the American Southwest, the dating of which could be incorrect. Archaeological investigations in eastern Arizona revealed lithic scatters apparently part of a late Mogollon ceremonial hunting complex. Because of their crude appearance, the points would seem to be part of the Concho Complex, or the Oshara Tradition, both reportedly Archaic. We argue here that there is no strong evidence to place either the Concho or the Oshara in such an early time period.

*Hoffman, Christopher R. (California)*

[47] PREHISTORIC METALLURGY, TECHNOLOGICAL CHANGE AND CULTURAL CONTEXT AT SON MATGE, MALLORCA, SPAIN

The metals and material culture associated with metal technology excavated from the rock shelter site of Son Matge present an interesting opportunity for the investigation and discussion of technological change and cultural context. The early second to middle first millennium BC levels contain materials from the chalcolithic Pretalayotic to Iron Age Post-talayotic periods. The metals represented during these various time periods and cultural contexts and the technologies involved in their production can be used to discuss a range of interrelated technological, cultural and theoretical issues.

*Hoffman, N. W. (see Hoffman, C. A.) [34]*

*Hoffman, Teresa L. and Shereen Lerner (SHPO-Arizona)*

[32] ARIZONA ARCHAEOLOGY WEEK: PROMOTING THE PAST TO THE PUBLIC

Arizona is reaping the benefits of one of the most innovative statewide public awareness efforts in archaeology: Arizona Archaeology Week, coordinated by the Arizona State Historic Preservation Office. In six years this program has developed into a strong force in Arizona archaeology, actively cultivating public appreciation for Arizona's cultural resources. The greatest strength of this initiative is the partnership of the federal and state agencies, universities, museums, avocational groups, municipalities, corporate sponsors and others. A discussion of the history, growth and components of this program provides a model for others seeking positive public involvement in archaeology.

*Hofman, Jack L. and Robert L. Brooks (OK Archeological Survey)*

[27] BLACK HOLES AND BRIGHT LIGHTS: ARCHEOLOGICAL DATA INVENTORY AND INTERPRETATION OF THE SOUTHERN GREAT PLAINS

An archeological overview of the Southern Great Plains, including portions of Colorado, Kansas, New Mexico, Oklahoma and Texas, has documented substantial variability in temporal and spatial patterning in research intensity, data recording and type of research. Indicators used to evaluate these functions are numbers of recorded sites, National Register properties and excavated sites. The utility of these indicators is discussed for identifying research needs and goals and documenting historical changes in research. The information derived can be used to design research and management programs from a regional rather than state perspective.

*Hohmann, John W. (Arizona State)*

[32] THE BESH-BA-GOWAH ARCHAEOLOGICAL PROJECT

The Besh-Ba-Gowah Archaeological Project integrates scientific research and community needs in an interpretive city park. Situated in an economically depressed mining community, the program provides opportunities for local residents to develop construction and archaeological skills and it illustrates that archaeology is more than a swashbuckling adventure. With its focus on enrichment of the human experience, the program is apparently successful; it won the 1987 Governor's Award for Historic Preservation in the educational project category.

*Hohmann, J. W. (see Germick, Jr. S.) [53]*

*Hole, Frank (Yale)* | Discussant 50

*Holland, Kathryn M. and Christy G. Turner II (Arizona State)*

[34] WHY DON'T WE FIND BURINS IN ALEUTIAN SITES?

The lack of burins and complete absence of any metal tools in prehistoric Aleutian archaeological sites has puzzled archaeologists since these sites are known to have large bone and wood industries with many incised and elaborately decorated bone and wood artifacts. Use-wear examination of nearly 2000 stone tools from the Chulka site on Akun Island in the Aleutians has led to the discovery of a large number of previously unidentified gravers. These were expedient tools made very simply on

ridged flake debitage, and were quickly discarded. Reasons for the use of expedient vs more formal tools such as burins are explored.

*Holley, G. R. (see Brown, A. J.) [28]*

*Holley, G. R. (see Collins, J. M.) [6]*

*Holliday, Vance T. (Wisconsin)*

[10] SOIL FORMATION, TIME AND ARCHAEOLOGY

Soil development requires some time to elapse so the effects of climate, plants, animals and relief can modify the parent material. Because of this soils are useful as age indicators. Moreover, soils in a sedimentary sequence mark the passage of time between depositional episodes under conditions of landscape stability, whereas sediments (the soil parent material) may have accumulated quite rapidly. This is exemplified at the Lubbock Lake Site (Texas plains) and Wilson-Leonard Site (central Texas). This situation probably obtains at many other sites and can profoundly influence interpretations of cultural chronology.

*Holloway, Richard G. (Eastern New Mexico)*

[45] PALYNOLGY OF WINDOVER PEATS

Pollen analysis of a column from the Windover Site provides new data on early Holocene vegetational changes. Five sedimentary units are recognized and reflect changes from an early Holocene coniferous woodland to one dominated by *Quercus*. Cheno-am pollens dominate the record from 7000 to ca. 3-4000 years BP. After 3000 BP there is a return to more forested conditions. Additional taxa appear in the more recent past. Paleoenvironmental interpretation, combined with other data (coprolites, features etc.), provides insights to this population's adaptation to the physical environment.

*Hoopes, John W. (Peabody Museum)*

[56] THE COMPLEX TRIBE IN PREHISTORY: SOCIOPOLITICAL ORGANIZATION AND THE ARCHAEOLOGICAL RECORD

The "complex tribe" closely resembles a "chiefdom" but is distinguished by the absence of evidence for lack of centralized political authority. It is evidenced by the remains of large architectural features, craftsmanship, long distance trade, differential wealth or settlement patterns which indicate population nucleation in the absence of evidence for the existence of a paramount chief with centralized political control. This paper examines models of sociopolitical organization which could explain these patterns.

*Hoover, Robert L. (Cal Polytechnic State)*

[21] SPANISH-NATIVE INTERACTION AT A CALIFORNIA MISSION WITHIN A WORLD SYSTEMS FRAMEWORK

Several models for the measurement of acculturation are examined using examples from Spanish colonial sites. Subsistence, economics, social and political organization, religion and technology at Mission San Antonio de Padua in California are compared with the local prehistoric cultures. Acculturative changes at the mission are placed in a larger world systems framework.

*Hornbeck, David (Cal State Northridge)*

[21] ECONOMIC GROWTH OF THE CALIFORNIA MISSIONS

At the outset of Spanish settlement in California missions were not considered economic entities, rather they were founded to convert, protect and civilize the California Indians. The analysis proposed here is based on an economic variable common to all California missions, one that was instrumental in changing the focus of mission settlement. My thesis is that surpluses arising from Indian labor were initially allocated to the task of encouraging more Indians into the mission, but in time these surpluses were allocated to endeavors that supported the missions as commercial enterprises.

*Houghteling, Mary and Garth Bawden (New Mexico)*

[48] THE WAWAKIKI COMPLEX AND EARLY HYDRAULIC CULTURAL DEVELOPMENT ON THE FAR SOUTH COAST OF PERU

The Peruvian far southern coast has traditionally been regarded as a peripheral component of political and economic systems centered in the adjacent Titicaca Basin. Recent work (1986-7) has demonstrated a contrasting pattern of long lasting indigenous coastal development based on ecological self-sufficiency. The Wawakiki Complex describes a coastal culture dating at least to 200 BC utilizing painted pottery and agriculture many centuries earlier than previously suspected in the region. Settlement distribution studies and excavation indicate that coastal populations were at this early date already evolving the distinctive pattern of micro-zonal exploitation by means of specialized

subsistence strategies that much later provided the economic foundation for the better known Chiribaya culture.

*Howard, Ann Valdo (Archaeological Consulting Services, Ltd)*  
**[69] A STUDY OF SPECIALIZED PRODUCTION: HOHOKAM SHELL ORNAMENT MANUFACTURE IN SOUTHWESTERN ARIZONA**

Recent excavations at pre-Classic period Hohokam village sites within the Vekol and Santa Rosa valleys in the western Papagueria region of southwestern Arizona have resulted in the collection of a large body of data that reflects the local manufacture of marine shell ornaments. Detailed technological, taxonomic, functional and stylistic analyses on the shell assemblages suggest that specialized production occurred and focused on a single ornament type made from a single shell genus. The organization of production appears to have involved a village industry in which multiple households participated in shell ornament manufacture for use in networks of interregional interaction.

*Howard, Jerry B. (Soil Systems) and Sam Baar (Southwestern Archaeological Team)*  
**[32] SWAT, INC.: A PROGRAM IN EMERGENCY ARCHAEOLOGY AND PUBLIC EDUCATION**

The Southwestern Archaeological Team (SWAT) was recently incorporated as Arizona's first emergency salvage organization. Trained volunteers target sites endangered by private development that do not fall under state or federal regulations and lack the necessary funding for professional contract excavations. Public education is fostered through direct experience in fieldwork, laboratory analyses, report writing and presentation of papers at professional meetings. SWAT provides avocationalsists with the opportunity to directly contribute to historic preservation and our understanding of local prehistory.

*Howard, J. B. (see Huckleberry, G.) [69]*

*Howell, Nancy (Stanford)*

**[59] THE TASADAY AND THE !KUNG: REASSESSING REPORTS OF ISOLATED HUNTER-GATHERERS**

The 30 or so Tasaday people of the Philippines complained in 1986 that they were never rewarded as promised for acting the part of naked, cave-dwelling primitives, meeting the outside world for the first time. The !Kung research, while not fraudulent, failed to discover the history of complex economic activity of San people over centuries, despite the efforts of 20 investigators over 25 years. Reasons for the failure lie in the focus upon "the ethnographic present", in language problems of investigators, in the self-interest of !Kung to present their lives dramatically and in wishful thinking. The need for an interdisciplinary concern with history is clear.

*Huckell, Bruce B. and Lisa W. Huckell (Arizona State Museum)*

**[8] CROPS COME TO THE DESERT: LATE PRECERAMIC AGRICULTURE IN SOUTHEASTERN ARIZONA**

By the beginning of the Late Archaic Period (1000-500 BC), groups substantially dependent on agriculture occupied the arid and semiarid river valleys of southeastern Arizona. Architectural, botanical, osteological and geological data from a series of recent archaeological investigations are used to support this proposition. The implications of this dependence are examined in light of theoretical expectations for the adoption and spread of agricultural systems, and are also compared to current archaeological models. A revised model and timetable for the movement of agriculture into this area are proposed.

*Huckell, B. B. (see Roth, B. J.) [34]*

*Huckell, L. W. (see Huckell, B. B.) [8]*

*Huckleberry, Gary and Jerry B. Howard (Soil Systems)*

**[69] THE VALUE OF PARTICLE-SIZE ANALYSIS IN PREHISTORIC CANAL STUDIES**

While previous investigations of prehistoric canals have included particle-size analysis, the resulting data have been limited to confirming field descriptions with little consideration of process. Preliminary results of recent particle-size analysis of Hohokam irrigation canals and associated soils indicate other applications. Particle-size distributions help define active vs post-abandonment sediments which is essential to defining artifact context. Empirical critical velocity data used in conjunction with particle-size data qualify discharge retrodictions derived from open channel equations. It is recommended that sediment sampling not be restricted solely to channel proveniences as adjacent soils can contain textural facies related to canal operation.

*Huelsbeck, David R. (Santa Clara)*

**[23] THE ECONOMIC AND ECOLOGICAL CONTEXT OF NORTHWEST COAST WHALING**

Although whales were scavenged by all Northwest Coast peoples, only the occupants of the west coast of Vancouver Island and the Olympic Peninsula hunted whales. Archaeological and ethnographic evidence indicate that whales were relied on and that the utilization of whales varied within the whale hunting area. Reliance on whales in this part of the Northwest Coast and not in adjacent areas is to be expected given the relative resource availability throughout the Northwest Coast. Furthermore, the nature of the resource base in the whaling area suggests that active whale hunting developed in response to demographic stress.

*Hurley, William M. (Toronto)*

**[64] COMPUTER ANALYSIS OF THE YAGI CERAMICS, HOKKAIDO**

Pottery recovered from the Yagi site indicate Initial to Late Jomon (ca. 6300—2000 BC). As numerous ceramic "types" were recovered, a computer code was devised to examine Japanese ceramic types (or Shikis) determined by myself and local archaeologists, techniques and locations of decorations and types of cordage used on these northern Jomon ceramics. Comparisons are made between traditional approaches to the analysis of pottery to ascertain differences and to determine the validity of the Shiki concept with the ultimate aim of greater accuracy in descriptions of each type of Shiki.

*Hutchings, W. K. (see Hayden, B. D.) [44]*

*Hutira, Johna and Jennifer W. Gish (Northland Research)*

**[53] ARCHAIC ADAPTATIONS IN SOUTH CENTRAL ARIZONA: THE TATOR HILLS ARCHAIC PROJECT**

Recent excavations in south central Arizona identified two Archaic Period sites. These sites appear to represent the transition from a primarily mobile hunting-gathering society to an agriculturally based settlement system. The pollen and flotation data from these well preserved, stratified sites are used in a reconstruction of environmental characteristics as well as resource procurement activities. A model suggesting a tethered-foraging subsistence regime is presented.

*Hutterer, Karl L. (Michigan) [Discussant 30]*

*Ikawa-Smith, Fumiko (McGill)*

**[64] THE KAMEGAOKA SOCIAL NETWORKS**

Although tribal social networks are by definition nonhierarchical, three levels of social networks can be distinguished for the Kamegaoka phenomenon, characterized by the wide distribution of distinctive special purpose vessels, figurines and other ritual items. Persistence in northern Japan of the Jomon ceramic tradition and the hunting-gathering-fishing economy for several centuries after Yayoi wet-rice cultivation began in the southwest indicates the structural resilience of later Jomon societies. Possible causes for the network formation may be sought in the physical and social environments of the last millennium BC in Japan.

*Ingbar, Eric E. (New Mexico) and Mary Lou Larson (UC Santa Barbara)*

**[61] SITE STRUCTURE AT THE MILL IRON SITE, MONTANA**

Site structure is the study of the patterned arrangement of artifacts within archaeological deposits. Through an examination of site structure at the Mill Iron Site, a paleoindian locality in southeastern Montana, the geomorphic context and activity structure of the site is evaluated. The site structure of the Mill Iron Site is then considered in relation to other paleoindian and more recent sites.

*Ingbar, E. E. (see Larson, M. L.) [3]*

*Irwin-Williams, Cynthia (Desert Research Institute) [Discussant 68]*

*Isaac, Barry L. (Cincinnati) [Discussant 31]*

*Jackson, Lawrence (Northeastern Archaeological Associates) and Heather I. McKillop (UC Santa Barbara)*

**[28] INTERIOR PALEO-INDIAN SETTLEMENT STRATEGIES: A CASE STUDY FOR THE LOWER GREAT LAKES**

Since the 1960s survey strategies for locating Early Paleo-Indian sites in the lower Great Lakes region have focused on the glacial Lake Algonquin strandline. Probing the overlooked question of interior land use, we present results from intensive survey of a 120 square km late glacial stream valley in southern Ontario, Canada. We identify more than 70 localities of prehistoric activity including the easternmost activity area of the Parkhill Complex and small sites with Gainey, Barnes,

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Crowfield, Hell-Gap, Hi-Lo and Holcombe points. This is the first relatively complete picture of Paleo-Indian settlement articulation in the interior.

**Jackson, L. (see McKillop, H. I.) [24]**

**James, Steven R. (Arizona State)**  
**[57] SUBSISTENCE STRESS AND SPECIES DIVERSITY: MONITORING AGRICULTURAL ORIGINS IN HOHOKAM AND OTHER SOUTHWESTERN ARCHAEOFAUNAS**

A model for evaluating prehistoric subsistence stress and species diversity using data from faunal assemblages is developed in order to examine the transition from hunter-gatherer adaptations to agriculture in the Southwest. Most archaeofaunas from this transitional period are found to be inadequately reported with the exception of Ventana Cave which follows the predictions of the model. Comparisons are made between these data and later archaeofaunas from several hunter-gatherer and Hohokam agricultural sites.

**Janetski, Joel C. (BYU)**  
**[70] MOBILITY STRATEGIES OF LATE PREHISTORIC HUNTER-GATHERERS IN UTAH VALLEY**

Mobility strategies of hunter-gatherer groups in desert lake settings is currently of considerable interest among Great Basin anthropologists. At issue are population densities and social-political complexity in the vicinity of Great Basin lakes which are often characterized as highly productive biomes for hunter-gatherers. Thomas (1985) has offered two alternative strategies which might have operated in the vicinity of such lacustrine systems: limnosedentary and limnomobile. Archaeological research at two Late Prehistoric sites in Utah Valley, Utah, suggests the hunter-gatherers who lived here were following a limnosedentary strategy. Evidence includes a wide array of artifacts and bone scrap and numerous features such as hearths and probable storage pits.

**Jelinek, Arthur (Arizona) [Discussant 35]**

**Jeske, Robert J. (Northwestern)**  
**[19] AGRICULTURAL TECHNOLOGY AND SOCIAL INTERACTION AT THE EDGE OF THE PRAIRIE PENINSULA**

Two contemporaneous northeast Illinois Mississippian period (1000-1500 AD) cultural groups, Langford and Fisher, are traditionally distinguished by differences in ceramic technology and styles. Vegetation reconstructions and site distributions as well as technological, floral and faunal data are used to argue that both groups depended upon a mixed horticulture/hunting-gathering economy but used different techniques for cultivation requiring different local environmental variables (e.g., water, ground cover and soils).

**Jeter, Marvin D. and G. Ishmael Williams, Jr. (AK Archeological Survey)**  
**[27] OVERVIEWING LOUISIANA—AND THE BEST PARTS OF ARKANSAS**

More than 20,000 prehistoric components and 200 phases have been defined in Louisiana and the southeast half of Arkansas. Prehistoric cultural traditions (e.g., Caddoan, Mississippian, Plaquemine) show continuities with historic groups such as the Kadohadacho, Quapaw and Natchezans. Historic nonaboriginal sites are also numerous. Major modern excavations are relatively rare and sites are increasingly threatened by modern cultural and natural factors. This overview provides entree to this immense database and suggests priorities for Corps sponsored research.

**Jody, Margaret A. (Smithsonian)**  
**[3] FITTING TOGETHER FOLSOM: REFITTED LITHICS AND SITE FORMATION PROCESSES AT STEWART'S CATTLE GUARD SITE**

Lithic refit studies conducted on a Folsom assemblage from southern Colorado provide data from which inferences are drawn concerning the horizontal and vertical distributions of cultural material within a homogenous sand dune matrix. Core reduction sequences are uncommon in the collection, and the refits include resharpening flakes, biface thinning and fluting flakes and fragments of large hammerstone/anvil tools and thermally exploded tools. The conjoined pieces radiate vertically from a buried bison bone level associated with the Folsom occupation and horizontally separated bone, and artifact concentrations are linked by these lithic specimens.

**Johannessen, Sissel (Minnesota)**  
**[72] SOCIAL PRODUCTION AND THE DEVELOPMENT OF MISSISSIPPAN CULTURE IN THE CAHOKIA AREA**

Food production patterns from three cultural periods in the American Bottom area (Late Woodland, Emergent Mississippian and Stirling Phase Mississippian) are used to examine the association between

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changing food production patterns and the growth of social hierarchy that culminates in the florescence at Cahokia. Changes in food production patterns are placed in their social contexts by examining the storage practices, community patterns and site hierarchies of the three periods. The correlations suggest that increased production, especially of maize, was essential in forging new social relationships and was partly a social, rather than a purely caloric, phenomenon.

**Johnson, Gregory (Hunter College) [Discussant 46]**

**Johnson, John R. (Santa Barbara Museum of Natural History)**  
**[21] THE CHUMASH AND THE MISSIONS**

Through ethnohistoric research the impacts of the California mission system on Native American culture may be fruitfully studied. This paper focuses on some of the demographic, social and economic consequences of missionization on Chumash culture. Mission documents, especially the registers of baptisms, marriages and burials, have been studied to examine patterns of recruitment into mission communities and to reconstruct vital statistics of the Chumash population at the missions. The implications of this research for archaeological investigations are discussed.

**Johnson, J. R. (see Warren-Kunkler, S.) [54]**

**Johnson, Lucy Lewis (Vassar College)**

**[38] SETTLEMENT PATTERNS IN THE OUTER SHUMAGIN ISLANDS, ALASKA**

Three seasons of field work in the Outer Shumagin Islands have revealed 70 prehistoric sites distributed on the six major islands and four smaller islands. These islands are particularly important in North Pacific prehistory since they lie on the historical boundary between Aleut and Eskimo cultural zones. Analysis of the dated sites indicates the pattern of initial occupation of the islands and how this pattern changed through time in response to influences from the Aleutian Islands to the west and Kodiak Island to the east.

**Johnson, Matthew H. (Cambridge)**

**[2] THE TRANSFORMATION OF THE MEDIEVAL HOUSE: A STUDY OF STRUCTURE AND AGENCY**

The reflexive relationship between social structure and human agency is examined empirically with reference to the domestic architecture of 16th century Suffolk, England. Medieval houses are interpreted as expressing an ideology legitimating "feudal" social relationships. Changes in spatial organization and architectural detail of the 1500s are linked, through specific houses and owners, with individuals and groups actively pursuing social goals and expressing varied sets of ideas through the form of their dwellings. The intended and unintended consequences of these changes are seen as leading in turn to a wider social and economic transformation and ultimately to the "rise of capitalism".

**Joiner, K. (see Ramenofsky, A. E.) [36]**

**Jones, B. C. (see Ewen, C. R.) [71]**

**Jones, George T. and Charlotte Beck (Hamilton College)**

**[58] CHRONOLOGICAL RESOLUTION IN DISTRIBUTIONAL ARCHAEOLOGY**

As distributional perspectives shift from sites to landscapes, many routine chronological approaches meet with difficulties. While it is often concluded that dense artifact accumulations in spatially constricted settings represent temporally limited events because of spatial association, when artifacts are sparsely distributed over a wide area, contemporaneity can no longer be based on that criterion. However, there is little comfort in only suggesting that a landscape has a long history of use when cultural change is of interest. This paper presents approaches for chronological resolution in nonsite studies using archaeological case examples from southeastern Oregon and eastern Nevada.

**Jones, G. (see Graham, E. A.) [17]**

**Jones, N. B. (see O'Connell, J. E.) [23]**

**Jones, Rhys M. (Australian National)**

**[59] THE PLEISTOCENE COLONIZATION OF THE PACIFIC**

Recent exploration, surveys and excavations have altered our view of Pacific colonization by revealing deep stratified sites in Melanesian islands such as New Ireland. This throws a new light on the early occupation of Australia by revealing that the tropical zone colonization occurred at the same time as the invasion of the Australian savanna.

*Joyce, Arthur A. (Rutgers) and Marcus C. Winter (INAH)*

[37] LATE FORMATIVE HIGHLAND-LOWLAND INTERACTIONS IN OAXACA, MEXICO

Archaeological research in several parts of Oaxaca indicates that the Late Formative was a period of economic and possibly militaristic expansion by the Monte Alban state that significantly affected populations in these areas. Research currently being conducted in the Rio Verde valley on the western coast of Oaxaca suggests that direct social interactions with the highlands were not important at this time. However, archaeological and sedimentological data indicate that geomorphological changes resulting from highland landscape modification may have dramatically affected the ecology and possibly the social evolution of Rio Verde valley populations.

*Joyce, Rosemary A. (Harvard)*

[42] STUDYING ACTIVITY WITHIN THE SITE: A RECONSIDERATION OF THE DATA FROM CERRO PALENQUE, HONDURAS

Excavation and analysis at Cerro Palenque, a Terminal Classic center of the lower Ulua Valley, aimed to define intrasite variation between and within groups of structures. Certain classes of structures were identified with regular size ranges, placement within groups and features. Artifact distributions supported these identifications and suggested associated activities. Similarities to, and differences from, patterns recently described for the larger database from Copan's Sepulturas section will be discussed.

*Judge, W. James (Southern Methodist)*

[68] SUN DIGGERS TO SUN DAGGERS: THE CHACO PROJECT IN RETROSPECT

This paper attempts an overall synthesis of the results of the Chaco Project, a long-term research endeavor in the Chaco Canyon area funded by the National Park Service. The results are summarized and evaluated with reference to the original project goals, to archaeological models in vogue at the beginning of the project and to more current models. Although note is made of "by-products" of the project leading to long-term resource preservation, the focus is on the character of archaeological understanding of the Chaco Phenomenon achieved as a result of the project.

*Julien, Michele (Centre National de la Recherche Scientifique)*

[3] REFITTING HEARTH STONES IN THE STUDY OF A PREHISTORIC HABITATION: PINCEVENT

Pincevent is an open air site on the banks of the Seine. The occupation surface is characterized by numerous hearths (shallow basins bordered by rocks), concentrations of debitage and bones, ash dumps and burned rocks dispersed over the surface. To resolve the problems of delimitation of habitation units and of attribution of isolated concentrations, refitting was undertaken between the fragments of burned rocks in the hearths and those found in the dumps, the satellite hearths or dispersed on the surface. The connections, joining hearths from different habitation units, allow investigation of the relationships between the units, of hearth function and of relative duration of use.

*Kafafi, Zeidan (Yarmouk), Rolfe D. Mandel (Kansas) and Alan H. Simmons (Desert Research Institute)*

[4] THE 'AIN GHAZAL SURVEY: HUMAN OCCUPATION OF THE WADI ZARQA, CENTRAL JORDAN

A survey was recently conducted in central Jordan near 'Ain Ghazal, a massive Neolithic settlement. One objective was to locate outlying Neolithic sites and another was to document the vicinity's occupational span. Eighty one sites [Middle Paleolithic through Umayyid] were located. All Neolithic sites were small, task specific occurrences. Although occupation of the area continued after the Neolithic, most sites are small and do not reflect the considerable developments that occurred only a few km away. One explanation for this is that intense Neolithic land use so degraded the immediate environment that it was unsuitable for substantial later settlement.

*Kaiser, Timothy (Toronto)*

[9] VINCA SUBSISTENCE AT OPOVO: FUNCTIONAL INFERRENCES FROM HOUSEHOLD CERAMICS

During the late Neolithic in the Balkans, competition and cooperation among village households involved an intensification of subsistence related activities. This paper treats ceramics from three Vinca houses at Opovo, Yugoslavia, analyzing them in terms of their behaviorally relevant morphological and physical properties. These analyses are used to make inferences regarding changing subsistence activities and are related to the development of agricultural economic systems in the middle Danube basin and Opovo's changing role in the region.

*Kaldenberg, R. (see Schneider, K. A.) [11]*

*Kaplan, Susan A. (Bowdoin)*

[60] EIGHTEENTH CENTURY LABRADOR INUIT TRANSFORMATIONS

Scholars working in Labrador, an eastern Arctic region, have generated a wealth of information concerning the environmental and cultural history of the area. The activities of colonizing European groups have been examined, the climatic and environmental changes have been investigated and pre- and postcontact Inuit culture has been studied. This paper utilizes archaeological, ethnohistorical, ecological and geographical data to examine increases in political and economic complexity of 18th century Labrador Inuit society. How this Native American group dealt with a changing food resource base while aggressively exploiting Europeans for exotic goods—and in the process transforming Eskimo culture—will be explored.

*Kay, Marvin (Arkansas) and George C. Frison (Wyoming)*

[23] THE TECHNOLOGY OF BIG GAME KILLS: EXPERIMENTAL APPROACHES TO TOOL FUNCTION

Prehistoric terrestrial big game kills required the use of stone, bone or ivory implements to kill and butcher a menagerie of now largely extinct animals. The actual use of these artifacts is often assumed but not confirmed by reference to artifact form and archaeological context. Experimentally produced microwear traces, however, may provide an empirical basis to judge the likely use of these archaeologically derived artifacts. To further this goal, this paper discusses microwear examinations of experimental chipped stone tools used as projectile points and butchering tools on dead African elephants.

*Kearns, Timothy M. (Division of Conservation Archaeology)*

[51] THE FLAT TOP MOUNTAIN QUARRY SITES AND DESERT VARNISH IN THE FOUR CORNERS REGION

Desert varnish is a natural phenomenon that is occasionally noted on flaked stone artifacts. In the American West desert varnish has been employed as a relative dating technique. However, the origin, rate of development and factors affecting varnish formation are controversial subjects. Also, age estimates of considerable antiquity have been challenged by a new dating technique. Two quarry sites in southeast Utah with desert varnish coated artifacts represent the first documented occurrence of this phenomenon in the Four Corners region. Baseline data describing the site assemblages and varnish appearance is presented. This data, in combination with evidence from other Four Corners sites, is used to address the relevance of desert varnish to Four Corners prehistory and its use as a relative dating technique.

*Keegan, William E. (Florida State Museum)*

[30] TRANSITION FROM A TERRESTRIAL TO A MARITIME ECONOMY: THE ISOTOPIC RECORD

Faunal assemblages from Taino sites exhibit a shift from terrestrial to marine sources of animal protein through time. It has been hypothesized that: 1) the initial emphasis on terrestrial prey reflects a continuation of the riverine/tropical forest economy of the Taino's South American homeland, and 2) the subsequent shift to marine protein sources reflects the optimal path of diet-breadth expansion. This paper reviews the results of a stable isotope study that was undertaken to determine whether this record of food consumption conforms to the hypothesis. Bone collagen from 25 skeletons from a transitional Saladoid/Elenoid site in Puerto Rico was analyzed.

*Keboe, Alice B. (Marquette) [Discussant 32]*

*Kelly, John E. (Southern Illinois University—Edwardsville)*

[6] CHANGES IN THE LATE WOODLAND-EMERGENT MISSISSIPPIAN COMMUNITY PLANS OF THE AMERICAN BOTTOM

Extensive investigations of Late Woodland-Emergent Mississippian sites in the American Bottom portion of the central Mississippi valley have resulted in the delineation of a variety of community plans. The sequence of plans at one of the sites, Range, provides an important contextual basis for examining the processes involved in the development of large Mississippian mound centers such as Cahokia. This presentation will discuss the shift from small villages (AD 600-900) to large nucleated villages (AD 900-1000) at the Range Site, the spatial variability in site plans at other sites and the sociopolitical and symbolic role of these changes.

*Kelly, Robert L. (Louisville)*

[52] SHIFTING PERSPECTIVES: A NEW LOOK AT HUNTER-GATHERER SEDENTISM

The sedentization process is an important area of research since it is the evolutionary context of many "complex" sociopolitical forms. Sedentism has been explained as the result of innate "desires",

population increase and the lifting of constraints that cause foragers to move. An energetics approach, however, suggests sedentism is an adaptation to a particular resource configuration, the result of an adaptive shift from maximizing return rates to decreasing subsistence risk. Sedentism results when mobility is no longer feasible, not when it is no longer needed, with concomitant changes in socio-political organization. The archaeology of western Nevada, where a post-1500 BP shift toward more sedentary use of marsh resources occurred, is used to illustrate the argument.

*Kent, J. (see Hensler, K.) [49]*

*Kent, Susan (Old Dominion)*

[31] **STORAGE AREAS AND THE ORGANIZATION OF SPACE: A CROSS-CULTURAL PERSPECTIVE**

The relationship between how people organize storage areas and how they organize space in general at domestic camps is discussed using archaeological and ethnographic Navajo sites as case studies. Differences between formal and informal storage areas are explored. The cross-cultural validity of the findings from the Navajo data is evaluated with data collected during ethnoarchaeological fieldwork conducted this summer among Basarwa (San, "Bushmen") and Bakgalagadi (Bantu speakers).

*Kerley, Janet M. (Tulane)*

[44] **MORE THAN ONE WAY TO SKIN A CAT: A COMPARISON OF EXPERIMENTAL AND ARCHAEOLOGICAL MESOAMERICAN BLADE-CORE TECHNOLOGY**

Blade-core experiments have been useful in identifying classes of debitage and explaining attributes found in Prehispanic Mesoamerican assemblages. However, none of these experiments has successfully replicated these assemblages and, in many cases, resulted in more questions than answers about the technology of prismatic blade manufacture. The contributions and controversies of experimentally derived data are compared with the excavated obsidian blade-core workshop from Tula de Allende, Mexico.

*Kessell, John L. (New Mexico)*

[1] **SPANIARDS AND THE PUEBLOS: FROM CRUSADING INTOLERANCE TO PRAGMATIC ACCOMMODATION**

Once Onate and his consortium had demonstrated the unprofitability of New Mexico, the Spanish crown, responding to an appeal by the Franciscans, turned the colony into a government subsidized ministry to the Pueblo Indians. Seventy years later, in 1680, the Pueblos—the colony's main reason for being—rose and cast the Spaniards out. A dozen years of independence, followed by Spanish recolonization under Vargas, strained old strategies and called new ones into play as Spaniards, the Pueblos and others struggled for survival.

*Kidder, Tristram R. (Peabody Museum)*

[56] **THE FIRST NORTH AMERICAN CHIEFDOM? SOCIAL COMPLEXITY IN THE POVERTY POINT CULTURE, 2000-500 B.C.**

The Poverty Point culture of the Lower Mississippi River Valley is considered by some to have been the first chiefdom level society in North America. Current archaeological research, as well as new theoretical concepts of cultural complexity in hunter-gatherer and chiefdom societies, reveals a different perception of Poverty Point social patterns. This paper reviews the model of Poverty Point chiefdoms and offers new evidence which contradicts the previous formulation. The social systems of Poverty Point were, in fact, a mosaic of differing levels of complexity; the society never attained the chiefdom level of social control. A model based on recent archaeological data is outlined which describes the different structures of social complexity which were manifested in the Poverty Point culture.

*Killion, Thomas W. (Cincinnati) and Patricia A. McAnany (Boston)*

[31] **A FUNNY THING HAPPENED ON THE WAY THROUGH THE FORMATIVE**

Transformations in the organization of "Formative" agriculture in Mesoamerica resulted in a major shift in the use of portable ceramic containers and underground storage facilities. By the onset of "Classic" times both the tecomate vessel form and bell-shaped pits or cists are a much reduced feature of the archaeological record. Environmental, demographic and land use factors are examined in light of what they can tell us about storage and culinary practices in the early farming villages of Mesoamerica. The inverse relationship between the intensity of agriculture and the presence of tecomates and underground storage facilities is discussed.

*King, Chester D. (Chester King and Assoc.)*

[54] **BEADS FROM HELO'**

Most beads recovered from excavations at Helo' are types made and used during the early colonization of California. The most common types of shell beads underwent regular changes between 1769

and 1804 when most of the occupation occurred in the vicinity of recent excavations. One change involves the replacement of stone drills by iron needles. The other change is an increase in the average diameters of the beads. The bead collection from Helo' contributes to the refinement of the chronology of these changes. Knowledge of these changes enables the dating of features and site areas at Helo'.

*King, Frances B. (Pittsburgh)*

[72] **VARIATION IN LATE PREHISTORIC "ONEOTA" PLANT USE IN THE UPPER MIDWEST**

Comparison of the archaeobotanical floras of various late prehistoric Oneota sites suggests that the intensity of maize agriculture was not uniform and that considerable regional variation existed in plant procurement strategies. Although intensive maize agriculture apparently gave rise to elaborate ridged fields in southeastern Wisconsin, plant remains from the central Illinois Morton Site reflect an economy based on the utilization of a broad spectrum of wild and cultivated plants including nuts, fruits and native starchy-seeded cultigens such as knotweed, chenopod and little barley.

*Kintigh, Keith W. (Arizona State)*

[6] **THE ORGANIZATION OF PREHISTORIC VILLAGES IN THE CIBOLA AREA OF THE SOUTHWEST**

In the Cibola area villages display configurations ranging from dispersed pueblos with several rooms to ridgeline roomblock clusters that may include 25 roomblocks, 440 groundfloor rooms and a great kiva to large planned pueblos with up to 800 groundfloor rooms. Settlement pattern, architectural and excavation data are employed with ethnographic data from Zuni to evaluate organizational models associated with the differing community forms. It is suggested that strong networks of social relations that crosscut kin ties are required to make the larger villages viable and that lack of these networks may account for the apparent instability of the earlier large pueblos.

*Kisselburg, J. (see Rice, G. E.) [6]*

*Klima, B. (see Vandiver, P.) [9]*

*Klymyshyn, A.M. Ulana (Central Michigan)*

[40] **POLITICAL STRUCTURE OF THE KINGDOM OF CHIMOR**

In a series of conquests beginning perhaps before AD 1000, the kings of Chimor expanded their rule over most of the north coast of Peru. Information on the political structure of the Chimor Empire comes from a few ethnohistoric documents and from excavation and survey both in and around the capital (Chan Chan) in the Moche Valley and in outlying provinces. A synthesis of this information is presented in this paper. The focus is on the effect of the political organization on production for domestic and elite consumption and the distribution of these goods.

*Kneebone, Ronald R. (New Mexico)*

[67] **AN INVESTIGATION OF PREHISPANIC COMMUNITY STRUCTURE: MATACAPAN, VERACRUZ, MEXICO**

Past attempts to develop models for the archaeological identification of residential space have focused on activities within the household compound. While valuable, these models present significant logistical difficulties for archaeologists interested in community-wide patterns of residence. More recent ethnoarchaeological investigations, focusing on the use of space and the resultant patterning of material residues of the entire household as a unit of analysis, may provide a more efficient means of examining community structure. These models are applied to data gathered through a systematic intensive surface survey of the site of Matacapan on the Southern Gulf Coast of Mexico. The results of this investigation are presented and critiqued.

*Knudson, Ruthann (CA Academy of Sciences, Woodward-Clyde Consultants, SE, CA)*

[61] **A SUGGESTED CENTPLANO TRADITION**

For forty years, there has been a paleoindian mystery in the western central Plains that we can now address with new data and new concepts. There is an outline of a Centplano tradition focused on flaked stone of lenticular-bedded chert raw material, biface reduction and heavily reused projectile points and knives. The reuse pattern is itself stylized. The tradition is reflected in assemblages from the Meserve, Lime Creek and Red Smoke sites in Nebraska and the Ray Long site in South Dakota. New research suggests that this tradition may be contemporary with, if not technologically related to, the Goshen Complex.

*Koetje, T. (see Grimm, L. T.) [66]*

*Kohl, Philip L. (Wellesley College)*

[22] **LIMITS TO A POST-PROCESSUAL ARCHAEOLOGY (OR THE DANGERS OF A NEW SCHOLASTICISM)**

This paper attempts to evaluate recent developments in a post-processual or "critical" archaeology. First it summarizes features that distinguish a post-processual approach from the formerly dominant

"new" or "processual" archaeology which the former aspires to replace. Then the paper analyzes the accomplishments and potential contribution of post-processual archaeology for better understanding of the past. And finally, it discusses the dangers inherent in shifting a "paradigm" so dramatically from a secure world of positivism to an uncertain relativist universe of post-modernism, suggesting that certain current trends have no relevance for archaeology and constitute the beginnings of a dangerously narcissistic scholastic tradition which only can be appreciated and rejected in terms of the sociology of the discipline.

*Kohler, Timothy A. (Washington State) [Discussant 13]*

*Koike, H. (see Chisholm, B. S.) [64]*

*Kolata, Alan L. (Chicago)*

**[40] THE RURAL-URBAN AXIS AND THE ORGANIZATION OF THE TIWANAKU STATE**

Interdisciplinary research over the past two years in the immediate rural hinterland of Tiwanaku has begun to clarify the nature, intensity and organization of regional settlement in that ancient Andean state. This research suggests that human populations and their productive capacities in the Tiwanaku hinterland were administered in a hierarchical fashion through the medium of (imposed) urban or urbanized centers. A sharp analytical distinction between household production and corporate production with separate emphases and forms of organization in the Tiwanaku state appears justifiable. This paper analyzes the structural differences embedded in these two forms of the organization of production and their relevance to understanding the nature of the Tiwanaku state.

*Kolaz, T. M. (see Doelle, W. H.) [32]*

*Kolb, Charles C. (Mercyhurst)*

**[37] CLASSIC TEOTIHUACAN PERIOD CANDELEROS: A PRELIMINARY ANALYSIS**

Ceramic candeleros, literally, but incorrectly, translated as "candlesticks" (Penafiel 1900), were manufactured in infinite variety by artisans during the Classic Teotihuacan Period (ca. 50-750 AD) in the Mesoamerican Meseta Central. As a chronological "marker" of Teotihuacan culture and influence, these portable, "personal" censers were used to burn the resin copal, presumably during rituals or ceremonies. Found in surface collections and excavations in urban and rural sites, candeleros have never been adequately reported (cf. Seler, Gamio, Linne, Sejourne, Noguera, etc.). The results of physicochemical analyses of contents and ceramics, provenience studies and a preliminary phase typology of over 150 varieties are presented. Correlations with ceramic types are also provided.

*Kornbacher, Kim D. (British Columbia)*

**[75] LITHICS AND LIFEWAYS: CLUES FROM A NORTHWEST COAST SHELL MIDDEN**

Lithics from the Garrison Bay site on San Juan Island, Washington, provide clues about the prehistoric inhabitants of the area. Analyses of technological data and assemblage variability provide information about manufacturing stages, lithic resource procurement strategies, changing patterns of tool use and the nature of related site activities. Interpretations address questions about the character of the occupation (e.g., was the site utilized as a specialized procurement/processing camp or as a more permanent residential location?), and the evidence is evaluated to determine how the adaptation may have changed over time.

*Kornfeld, Marcel (Mass., Amherst) and Kaoru Akoshima (New Mexico)*

**[61] GOSHEN COMPLEX TECHNOLOGY: A STUDY OF TOOL USE AND MORPHOLOGY**

The Mill Iron tool assemblage is used to discuss early paleoindian settlement and subsistence strategies. Modification of tool edges, including characteristics such as angle, length, shape and type of retouching, is analyzed from this perspective. In addition, microwear characteristics are investigated and used in a conventional manner to infer analogous wear patterns and in an unconventional way to describe various site formation processes. Finally, the spatial distribution of retouch and wear patterns is utilized to discuss the structure and organization of the Mill Iron Site. Some cultural processes of the Goshen Complex are inferred with this data.

*Kra, Renee S. (Yale)*

**[62] THE INTERNATIONAL RADIOCARBON DATA BASE: A PROGRESS REPORT**

The International Radiocarbon Data Base is being established as a global information center for radiocarbon data in New Haven. Several planning workshops have been held and a universally accepted data entry format has been adopted by the radiocarbon and archaeological communities of both the United States and Europe. A nine-field format has been designed. Laboratory directors, archaeologists and participating scientists will supply information to the mainframe computer where the data base will be stored and maintained. Researchers will be able to search and retrieve data quickly and

efficiently in an open international exchange of cooperation, communication and dissemination of knowledge.

*Krakker, James J. (Smithsonian)*

**[19] LATE PREHISTORIC CORN HORTICULTURE AND SOCIOCULTURAL SYSTEMS IN SOUTHEAST MICHIGAN**

Increased importance of corn horticulture during the last 1000 years of prehistory in southeast Michigan involved changes not only in subsistence activities but also in community and regional sociocultural systems. These changes can be understood in terms of the operation of a hierarchy of regulatory subsystems. Subsistence decisions and practices act on environmentally based corn yield uncertainty. Remaining yield uncertainty and other variables are operated on at the community and regional levels. Some support of predicted community organization and regional interaction patterns is evident in settlement pattern, mortuary treatment and stylistically encoded information.

*Kristan-Graham, Cynthia B. (California—Los Angeles)*

**[7] IDENTIFICATION OF LINEAGE MEMBERS IN THE ART OF CHICHEN ITZA**

Many painted and relief figures at Chichen Itza are said to depict confrontations between generic "Mayans" and "Mexicans". An analysis of costumes and name signs identifies some Mayans specifically by lineage and may help to explain some of the geopolitical referents of Chichen's imagery. A reexamination of the Temple of the Warriors suggests that its imagery addresses a conflict between two Mayan families, the Cocom and the Tutul Xiu, for political power in Postclassic Yucatan. This accords with recent explanations of Chichen Itza as a Mayan entity rather than a Mexican conquest state.

*Krochok, Ruth J. (Texas at Austin)*

**[7] EPIGRAPHIC EVIDENCE FOR POLITICAL CHANGE AT CHICHEN ITZA**

In the hieroglyphic inscriptions of the southern lowland Maya sites, individual rulers record the outstanding events of their lives, such as birth, heir designation, accession and conquests, in order to legitimize their right to rule. At Chichen Itza the life histories of individuals are never documented. Instead, the proposed rulers are often recorded as participating in contemporaneous events, most likely the dedication ceremonies for the structures on which they appear. It is demonstrated that the pattern of recording these dedication ceremonies implies differences between the political structure of Terminal Classic Chichen Itza and the Classic southern lowland sites.

*Kroll, E. M. (see Bunn, H. T.) [23]*

*Krupnik, Igor I. (Institute of Ethnography—Academy of Sciences, USSR)*

**[23] PREHISTORIC ESKIMO WHALERS IN THE ARCTIC: BABY SLAUGHTERERS OR INNATE ECOLOGISTS?**

Two series of bowhead whale skulls were measured in 1977-78 at prehistoric Eskimo sites in the Canadian and Siberian Arctic. Both show a predominance of infants and juveniles, which is consistent with ethnographic data and local tradition. Similar patterns are evident for prehistoric harvesting of gray whales off Chukotka Peninsula. Whether the selective hunting of calves was ecologically disruptive or was an efficient form of game management remains a matter of considerable controversy. Finally, features of Eskimo whaling strategies and whale bone utilization have parallels among Upper Paleolithic mammoth hunters of the Central Russian Plain.

*Kvamme, Kenneth L. (Arizona State Museum)*

**[13] GIS ALGORITHMS, ANALYSIS PROCEDURES, AND REGIONAL ARCHAEOLOGICAL SPATIAL ANALYSIS**

GIS in raster format provides a powerful analytical tool for regional archaeological investigations. Environmental terrain features often are thought to have influenced the placement of prehistoric activities in a region and GIS can be used to obtain a variety of environmental data at known prehistoric activity locations. These data then can be subjected to various forms of analysis or modeling to seek associations between, or to test hypotheses about, prehistoric activity placement and environment. This paper examines the nature of some fundamental GIS algorithms and how they can influence analysis results. Examples are taken from several GIS based studies.

*Kwiatkowski, S. (see Gasser, R. E.) [57]*

*Ladefoged, Thegn N. (Hawaii at Manoa)*

**[66] SETTLEMENT PATTERN ANALYSIS IN HAWAII VOLCANOES NATIONAL PARK, HAWAII**

Past interpretations of settlement patterns in the Hawaiian archipelago have stressed univariate or bivariate causality. In contrast, three social processes are considered. These include social stratifica-

tion, the seasonal movement of people to different environmental zones and ideological transformations which occurred with Western contact. The three processes are synthesized into a model of the settlement pattern. A relational data base is used to inventory the 14,754 architectural features recorded in a 467 hectare study area of Hawaii Volcanoes National Park. Nine statistical tests indicate differential land usage and tend to confirm the proposed model.

*Laipis, P. J. (see Dickel, C. D.) [45]*

*Lambert, P. M. (see Walker, P. L.) [21]*

*Landrum, Jean (Texas-Austin)*

**[53] MODELING MOGOLLON CULTURAL CHANGE**

Viewing the Mogollon culture in the Middle San Francisco River Valley of west central New Mexico as a system of interlinking, interacting parts allows for increased definition of the cultural systems' parts and hence the quantification of change in this system. To this end, this paper reports on the initial work to expand Renfrew's (1984) cultural simulation model. By using this model, the growth in the sophistication of cultural subsystems' interactions is simulated, enabling the projection of their course, possibly as early as pithouse times.

*Lange, Frederick W. (Colorado Museum)*

**[12] ARCHAEOLOGY IN THE YELLOW JACKET AREA, SW COLORADO**

Research at Yellow Jacket focuses on relationships between Basketmaker villages, pueblo house-block units and a large [124 kivas] adjacent site. Occupation began after 500 AD and ended in the late 13th century; a 700-900 AD hiatus was probably environmentally related. Ceramic and architectural data show stronger Kayenta contacts than with Chaco. The main Yellow Jacket developments are consistent with local Mesa Verde area patterns. Data on archaeoastronomical alignments and cannibalism provide regional comparative data and contribute to the development of large site research in the Four Corners region.

*Lange, Richard C. (Arizona State Museum)*

**[39] PREHISTORY OF THE HOMOL'ovi RUINS STATE PARK, WINSLOW, AZ**

Since 1984 the Homol'ovi Research Program of the Arizona State Museum has relied on volunteer involvement in conducting research at the Homol'ovi pueblos in northeastern Arizona. The research is investigating regional prehistory as well as providing material for public interpretation at the new Homol'ovi Ruins State Park. Surveys, excavations and ancillary studies provide important information on prehistoric technologies, periodic occupation and abandonment of the area by people, changing patterns of settlement and land use and the implications for trade and regional interaction indicated by the presence of yellow ware, macaws, piki stone and cotton in the latest period of occupation.

*Langenfeld, Kristin and Larry L. Baker (San Juan College)*

**[12] SITE VARIABILITY IN TANQUES CANYON, NM AND ITS IMPLICATION FOR LARGO-GALLINA COMMUNITY STRUCTURE**

Largo-Gallina culture has been considered to represent an aberrant and perhaps singular phenomenon among late Puebloan adaptations in the northern Southwest. Cultural resource management surveys conducted by San Juan College during 1986 and 1987 have identified 26 Largo-Gallina sites in Tanques Canyon, New Mexico. The study area is described with an emphasis on site type, variability and placement. Site variability includes habitation sites, seasonal camps and special activity areas. A hypothesis regarding community level action and exchange is presented. The implications of the Tanques Canyon community in relationship to Largo-Gallina culture, as currently defined, are examined.

*Larson, Daniel O. (California-Santa Barbara)*

**[14] IMPACTS OF CLIMATIC VARIABILITY ON THE VIRGIN BRANCH ANASAZI**

Two major drought episodes, AD 1000-1015 and AD 1120-1150, contributed to significant change in the adaptive strategies of the Virgin Branch Anasazi. The first extreme climatic event promoted the adoption of several alternative buffering strategies including intensive agricultural practices, increased reliance on storage and the organization of large residential labor groups. The second drought, which followed 150 years of favorable climatic conditions and high levels of population growth, had a devastating impact upon the Virgin Branch Anasazi resulting in the complete abandonment of the southwestern Great Basin by that group. It is suggested that preconditions of population growth set the various levels of sensitivity to extreme climatic events and determined the precise nature of the culture changes.

*Larson, Mary Lou (UC Santa Barbara) and Eric E. Ingbar (New Mexico)*

**[3] THE NATURE OF REFITTED ASSEMBLAGES**

The majority of refitting studies deal solely with single sites and their assemblages. In this paper, refitted chipped stone assemblages from more than one hunter-gatherer archaeological site are compared. The range of variation in these refitted assemblages and the ramifications for deriving meaningful statements about hunter-gatherer technological organization are discussed. Rather than inferring differences in reduction strategies, the investigation will consider implications for investigating site structure and differential resource selection and use.

*Larson, M. L. (see Ingbar, E. E.) [61]*

*Larsson, Thomas B. (Umea-Sweden)*

**[74] SETTLEMENT PATTERNS AND SOCIOECONOMIC BEHAVIOR IN LATER SWEDISH PREHISTORY**

Much prehistoric behavior (conscious human action) is regarded as the product of the social organization of production and the organization of social reproduction. Production and reproduction are considered to be two vital concepts in discussing and reconstructing prehistoric human activities and behavior. The theoretical position taken is exemplified by settlement data from the Swedish Bronze and Iron Ages.

*Latady, Jr., W. R. (see McFaul, M.) [5]*

*Latas, Timothy W. (Seattle)*

**[75] FIRE-CRACKED ROCKS—REAL OR IMAGINED**

Fire-cracked rocks are probably the most common artifacts in Pacific Northwest sites. Yet, the physical and chemical properties used to identify fire-cracked rocks are poorly defined by archaeologists. If this artifact is defined in sedimentological terms, then the attributes of fire-cracked rock would indicate that the rocks were derived from local sources, transported by humans, deposited in fire-cracking environments and fractured and oxidized by fire-cracking activities. Reconstructing the depositional history of possible fire-cracked rock from the English Camp midden on San Juan Island, Washington, found that commonly used fire-cracked rock attributes are not reliable and attributes based in sedimentological terms offers a viable definition.

*Lebo, Cathy J. (Indiana)*

**[36] SETTLEMENT HISTORY AND DEMOGRAPHIC STABILITY OF THE PUEBLOAN OCCUPATION OF NORTHERN BLACK MESA, ARIZONA**

Archaeological surveys of northern Black Mesa reveal the episodic character of the area's settlement history. Tied to population shifts in the greater Kayenta region, Black Mesa underwent significant population expansion in AD 830, AD 960 and AD 1050, and abandonment by AD 1150. A survival analysis of the Black Mesa mortuary series examines group composition and life expectancy during settlement change. Age and sex ratios are consistent. Life expectancy varies with environmental conditions for agriculture and population density. Sharp declines in life expectancy precede population reductions and abandonment by several decades.

*LeCount, Lisa J. (UCLA)*

**[76] SOCIAL AND ECONOMIC CAUSES FOR THE INCREASED FUNCTIONAL VARIABILITY IN SAUSA CERAMICS FROM THE EARLY INTERMEDIATE PERIOD TO THE LATE HORIZON, PERU**

Principle component analysis was used to construct functional categories from variables that measure ceramic vessel constriction. The data show an increase in the number of functional categories from the Early Intermediate period to the Late Horizon. It is hypothesized that this increase was due to social and economic change. Increased reliance on maize and potatoes necessitated new food preparation and storage techniques. Change from an egalitarian society to the incorporation of the Sausa within the Inka empire intensified and concentrated social activities within elite households.

*Lee, G. (see Neuerberg, N.) [21]*

*Lees, William B. (Kansas State Historical Society)*

**[52] SITE FORMATION PROCESSES IN HISTORICAL ARCHAEOLOGY**

Consideration of site formation processes is increasingly recognized as an important part of archaeological inquiry. Using a comparative data base of culturally diverse historic sites, models of *in situ* de facto site formation, site formation through primary refuse disposal and site formation through secondary refuse disposal are examined. Two conclusions result and are elucidated in this paper: 1) site formation processes cause important biases in archaeological patterns that can significantly affect

interpretation and 2) site formation processes result in discrete archaeological patterns which can be recognized and controlled for using the proper analytical approaches.

*Legge, Anthony J. (London)*

[50] STEPP HUNTING AND THE ORIGINS OF ANIMAL DOMESTICATION AT ABU HUREYRA

The seasonal gazelle and onager kill at Abu Hureyra (Syria) suggests that these species were migratory, present in the area for a brief period of the year, while other animals were more locally continuous available. The migration routes are reconstructed from early travelers' accounts. The mass-kill strategy appears to have been stable and productive. The mass killing of gazelle at the other end of their annual migration appears later in the Neolithic at about the same time as the rapid replacement of gazelles by caprines at Abu Hureyra. A causal link between these two events is suggested.

*Lekson, Stephen H. (Arizona State Museum)*

[8] SUBSISTENCE GEOGRAPHY IN THE ETHNOHISTORIC SOUTHERN SOUTHWEST

The biotic resources of the Colorado Plateau and the low deserts of the Chihuahuan and Sonoran zones differ in ways significant to the structuring of hunter-gatherer adaptations. This paper will review the ethnohistoric subsistence of groups in these areas and assess the implications of biotic differences for the adoption of agriculture by hunter-gatherer groups. Patterns evident in the ethnohistoric record will be applied to the archaeology of these regions and in particular the frameworks used for understanding prehistoric agriculture in the southern Southwest.

*Lekson, Stephen H. (Arizona State Museum)* [Discussant 20]

*Lennstrom, Heidi A. (U of Minnesota)*

[76] BOTANICAL REMAINS FROM PANCAN, PERU

Excavations at the Highland site of Pancan, Peru, have yielded abundant botanical remains. Four occupation levels suggest continuous habitation from the Early Intermediate through the early Late Intermediate Period. Preliminary palaeoethnobotanical analysis indicates a significant increase in the frequency of *Zea mays* in flotation samples through time. In contrast, the native grain, *Chenopodium*, is nearly ubiquitous throughout the sequence. This could indicate several different events: 1) a gradual acceptance of an exotic crop, 2) a change in environment or 3) a change in access to crops by the inhabitants of Pancan. The merits of each hypothesis will be evaluated.

*Lensink, Stephen C. (Iowa)*

[70] A DIETARY COMPARISON OF TWO PLAINS VILLAGE SOCIETIES

Two distinct contemporaneous cultures comprised the Plains Village tradition in western Iowa between AD 900 and 1500. In this paper the subsistence data from the Mill Creek culture of northwestern Iowa is compared with those of the Nebraska culture in the Glenwood Locality of south-central Iowa. A proposed model of household economies based on cost-minimizing strategies combined with differential involvement in Mississippian trade appears to account for the similarities in aquatic faunas as well as the differences in terrestrial megafaunas. The model indicates that climatic changes were not necessarily responsible for dietary transitions.

*Leonard, Robert D. (New Mexico)*

[60] HISTORY, ETHNOHISTORY, CULTURAL EVOLUTION AND ARCHAEOLOGY: THE PERSISTENCE OF AN EXPLANATORY DILEMMA IN CONTACT PERIOD STUDIES

Contact period studies, in embracing a suite of disciplines, often operate atheoretically, profitably utilizing the methodologies of those disciplines, but at a loss for an operative explanatory framework. In this context, contact period studies confront legitimate concerns for anthropology. What are the relationships between anthropology, history, cultural evolution and science? Does the investigator incorporate a framework that views culture evolution and contact as "explained" by purposive acts of individuals/institutions, or alternatively by nomothetic considerations of process? Considering the work of pioneering anthropologists who addressed these issues, and incorporating examples from the Zuni, New Mexico, area, conclusions are presented regarding the construction of valid explanations in contact period studies.

*Leonard, Robert D. (New Mexico)* [Discussant 56]

*Leonard, R. D. (see Zunie, J.)* [65]

*Leone, Mark P. (Maryland)* [Discussant 22]

*Leone, Mark P. (Maryland)* [Discussant 2]

*Lerner, S. (see Hoffman, T. L.)* [32]

*LeVine, Terry Y. (UCLA) and Terence N. D'Altroy (Columbia)*

[40] INKA POLITICAL STRATEGY AMONG 15TH CENTURY WANKA CHIEFDOMS OF THE CENTRAL ANDEAN HIGHLANDS

Data on Inka political and economic organization, derived from documents, settlement pattern study and excavation, indicate that the Inka designed their policy to balance between specific Wanka needs and broader imperial needs for ruling the northern half of the empire. They show that the Inka 1) constructed a hierarchy of leadership over the sizable population incorporating Wanka elites, 2) imposed Inka installations on the landscape for effective control of the population, 3) shifted Wanka settlements for convenience in regulating labor and facilitating resource extraction and 4) organized management of the extracted surplus using a storage distribution intended to meet local and interregional needs.

*Lightfoot, Kent G. (California—Berkeley)*

[28] THE ROLE OF SHELLFISH EXPLOITATION AMONG PREHISTORIC HUNTER-GATHERERS OF COASTAL NEW YORK

The current perspective on prehistoric shellfish exploitation differs among archaeologists working in coastal New York and the rest of New England. The divergent interpretations imply that the nature of coastal adaptations varied markedly along the Atlantic Seaboard. This paper examines these implications in light of new information on shellfish exploitation from eastern Long Island. This information is based on a sectioning study of *Mercenaria mercenaria* samples collected from prehistoric middens of Shelter Island, New York.

*Lightfoot, Ricky R. (Crow Canyon Archaeological Center)*

[3] REFITTING STUDIES AT THE DUCKFOOT SITE, AN EARLY ANASAZI PUEBLO

Refitting studies are used as an analytic method at the Duckfoot Site, a Pueblo I Anasazi hamlet in southwestern Colorado. The studies include ceramic vessel reconstruction and refitting of partial vessels between architectural units. A promising new approach to the study of site use patterns and artifact storage and disposal patterns involves evaluating the fit between grinding surfaces of stationary metates and portable manos. Preliminary results indicate some divergence from the expected pattern of storing manos in the same structure as the metates on which they were used. These techniques contribute to the interpretation of abandonment behavior, site formation process, use-area function and social organization.

*Lightfoot, R. R. (see Varien, M. D.)* [20]

*Limp, W. Fredrick (Arkansas Archeological Survey)*

[27] AN OVERVIEW OF THE OVERVIEW: MANAGING SYNTHESIS ON A CONTINENTAL SCALE

During the last three years a large, multi-institutional team has worked to collate, review and synthesize archaeological and bioarchaeological knowledge for an area covering roughly one-third of the continental U.S. The history and conceptual framework of the effort are discussed. Particular emphasis is placed on the use of the adaptation type and a classificatory construct for wide regional synthesis at the continental scale.

*Limp, W. F. (see Farley, J. A.)* [13]

*Lincoln, Charles E. (Harvard)*

[7] DUAL KINGSHIP AT CHICHEN ITZA, YUCATAN

The mythic history of Chichen Itza provides evidence of two rulers: Kakupacal and Kukulcan, "Fire Shield" and "Sprouting Serpent". These terms apparently label a pair of icons often associated in bas-relief and painting: Sun Disk and Plumed Rattlesnake. It is hypothesized that these are not individual names but titles of twin leaders of a complex polity. Kakupacal equates with the Aztec Huey Tlatoani and Kukulcan matches the Cihuacoatl of Tenochtitlan as governors charged with the external and internal affairs of state, respectively. Antecedents for this system exist in the Maya Classic of Yaxchilan and Piedras Negras, but not at Teotihuacan or Tula. Dual kingship as a governmental institution derives ultimately from the ancient pattern of bilateral kinship reckoning characteristic of the Lowland Maya.

*Lindauer, Owen (Arizona State)*

[3] CERAMIC CONJOINABILITY: A SOUTHWESTERN EXAMPLE

Ceramic conjoinability studies have potential because 1) sherds are commonly recovered by archaeologists and 2) useful inferences may be made concerning the fracture and dispersal of objects which

conjoin. This paper evaluates conjoinability methodology in its application to studies of ceramics made by sedentary agricultural groups in the American Southwest. The investigation of the problem of whether nonlocal ceramics were exchanged as vessels or introduced as sherds is presented as an example where both positive and negative joins are applied to the interpretation of the occurrence of black-on-white sherds from Shoofly Village. Potential strengths of ceramic conjoinability studies are discussed.

**Linse, Angela R. (Washington)**

**[75] IS BONE SAFE IN SHELL MIDDENS?**

Many archaeologists are aware that hydroxyapatite, the major mineral component of bone, is highly soluble in acid environments (low pH). Few are aware that hydroxyapatite is also soluble under alkaline conditions (high pH). Bone from the San Juan shell midden was examined to demonstrate this relationship. Fish vertebrae from strata with pH values higher than 7.88 (the point above which hydroxyapatite decomposes) were compared to fish vertebrae from strata with values less than the critical pH. Bone preservation is influenced by the dissolution of hydroxyapatite at pH measurements above 7.88.

**Lipe, William D. (Washington State)**

**[20] SOCIAL SCALE OF ANASAZI INTEGRATIVE FACILITIES**

The size, frequency and location of facilities used for integrative rituals provide information on the sizes of groups served by these rituals, as well as on whether different types and levels of social integration are present. Literature on Pueblo I-III northern San Juan Anasazi architecture and settlement structure is reviewed to establish patterns of social scale for types of integrative facility, and to determine if and when changes in these patterns occurred.

**Little, B. J. (see Shackel, P. A.) [2]**

**Liu, K. (see Debusschere, K.) [62]**

**Livingston, Stephanie D. (Washington)**

**[15] A TAPHONOMIC ANALYSIS OF TWO GREAT BASIN AVIFAUNAL ASSEMBLAGES**

Two archaeological avifaunas from the Great Basin are compared with published avifaunal data to demonstrate that 1) the relative frequency of anatomical parts is not significantly different between paleontological and archaeological sites or between archaeological sites in different environments and 2) a ratio used to distinguish anthropogenic from naturally deposited avian specimens in European sites reflects locomotor differences in the Great Basin birds, rather than processes of deposition.

**Lomawaima, Hartman H. (Lowie Museum)**

**[1] HOPIFICATION, A STRATEGY FOR CULTURAL PRESERVATION**

In the 16th century Castillians began settling an area they called "the northern provinces of New Spain". To later Euro-American arrivals the region became known as "the Greater Southwest". The Hopi are among several Native groups who have persisted through these and even earlier incursions (e.g. migrations of Southern Athapaskan speaking peoples into the area). While European perceptions of the area and its inhabitants have differed due to political and geographical orientations, Native perceptions of Europeans, since first contact experiences, have remained rather constant. This paper will consider Native perceptions as strategies for understanding and coping with alien populations and influences.

**London, Gloria (Hebrew Union)**

**[47] THE IDENTIFICATION OF POTTERY PRODUCTION LOCATIONS BASED ON ETHNOARCHAEOLOGICAL RESEARCH**

Archaeologists rarely find pottery production locations and have attributed this dearth to 1) the small percentage of each site excavated, 2) the propensity to ignore the space around the site and 3) the tendency to excavate domestic and public buildings rather than industrial zones. Recent ethnoarchaeological research among Filipino and Cypriot craft specialists reveals that production areas contain few elements which would be preserved archaeologically or identified as potters' tools. Most tools are perishable or reused objects. The multifunctional use of space and lack of long-term raw material storage are also factors.

**Lopinot, Neal H. and William I. Woods (SIU-Edwardsville)**

**[72] ARCHAEOBOTONY, ENVIRONMENTAL DEGRADATION, AND THE COLLAPSE OF CAHOKIA**

Archaeobotanical data are presented that document significant changes in resource exploitation strategies at Cahokia, spanning ca. AD 1000-1250. These changes correlate with alterations in the

structure and content of a sampled Mississippian neighborhood at the Cahokia ICT-II. It is argued that the collapse of Cahokia was due partly to overexploitation of wood resources and concomitantly to increasing agricultural risks in the American Bottom floodplain.

**Lopinot, N. H. (see Brown, A. J.) [28]**

**Lopinot, N. H. (see Collins, J. M.) [6]**

**Love, Michael W. (California, Berkeley)**

**[29] THE CERAMIC CHRONOLOGY OF LA BLANCA**

Excavations at the site of La Blanca in coastal San Marcos, Guatemala, collected a large corpus of Middle Preclassic ceramics from stratified deposits. These data make possible a substantial revision of the chronology proposed for this period by Coe in 1961. The Conchas 2 Phase, as described by Coe, now appears to be a spurious mixture of Middle and Late Preclassic styles. This study proposes a four part division of the Conchas Phase based on frequencies of wares, vessel forms and decorative motifs.

**Lowell, Julie C. (Northern Iowa)**

**[14] THE DEVELOPMENT OF MOIETY SYSTEMS IN THE PUEBLO SOUTHWEST: AN ETHNOGRAPHIC AND ARCHAEOLOGICAL ANALYSIS**

In ethnographically known Pueblo villages moieties may be absent, may define ceremonial divisions or may define both ceremonial and political divisions. They are reflected architecturally in a variety of ways including residence on different sides of a village, dual plazas, dual kivas or dual moiety houses. The architectural data from prehistoric Turkey Creek Pueblo suggest a dual social system. It is hypothesized that moiety organization here is, in part, a response to initial aggregation. Architectural data from other prehistoric pueblos are examined to identify possible moiety systems, their functions and the circumstances under which they develop.

**Lupo, Karen D. (Utah)**

**[15] ANATOMICAL PART SELECTION AND BONE MODIFICATION AMONG MODERN HADZA HUNTER-GATHERERS**

Analyses of archaeological faunal remains use data on anatomical part representation and bone damage morphology as sources of inference about settlement organization, the importance of hunting vs scavenging and the degree of reliance on food storage. Many assumptions which underlie these analyses are, at present, poorly supported. Ethnoarchaeological data provide a test for these assumptions. This paper reports the analysis of data on bone assemblages from five sites produced by Hadza hunters in 1985-1986, with particular attention to damage morphology and element representation. Certain assumptions commonly made by faunal analysts are evaluated in light of this data.

**Lupo, K. D. (see Zeanah, D. W.) [4]**

**Lycett, Mark T. (New Mexico)**

**[1] SPANISH CONTACT IN THE RIO GRANDE VALLEY, NEW MEXICO: THE ARCHAEOLOGY OF DEMOGRAPHIC COLLAPSE**

Until recently, efforts to evaluate the impact of Spanish colonial expansion into the northern Southwest have emphasized Spanish strategies and institutions designed to effect change in Pueblo cultural systems, while focusing less attention on the demographic consequences of contact. Introduction of infectious disease by the Spaniards resulted in shifts in the age structure as well as the magnitude of mortality, producing transgenerational population decline. Development of a productive framework for archaeological investigation of the contact period in the Rio Grande Valley requires consideration of the organizational implications of both sets of processes, which include long term alterations in the scale and organization of regional economic, settlement and land use systems.

**Lyneis, Margaret M. (Nevada—Las Vegas)**

**[14] CERAMIC PRODUCTION AND EXCHANGE AMONG THE VIRGIN ANASAZI**

This section analysis establishes the Uinkaret Plateau north of the Grand Canyon as the locale of production of two varieties of ceramics found in Anasazi communities in southern Nevada. Moapa Gray Ware and a newly identified type of Shinarump Gray Ware comprise about 30% of the ceramics at Main Ridge and other Moapa Valley sites at about AD 1050. Distribution of other commodities, including Kayenta redwares and shell beads of marine origin, may be tested for spatial congruence against the exchange network providing this major flow of pottery into southern Nevada.

**Lyne, Patricia J. (Institute of Andean Studies) [Discussant 63]**

**MacNeish, Richard S. (Andover Foundation for Archaeological Research)**

**[5] THE BEGINNINGS OF AGRICULTURE IN THE AMERICAN SOUTHWEST AS SEEN FROM THE ARCHAIC CHIHUAHUAN TRADITION**

A summary of the Archaic archaeological sequence of the Hueco-central Rio Grande region will be presented: Gardner Springs, 6000-4000 BC; Keystone, 4000-2500 BC; Fresnel, 2500-900 BC and Hueco,

900 BC-200 AD. It will be noted that this is a tertiary development of agriculture with such coming very slowly and late, 900 AD, in part because of a primary desert efficient subsistence system and in part because of the rich uncircumscribed resources of the Rio Grande. Although incipient agriculture and domesticates were known for millennia (at least 3000 years), it is only with a worsening of climatic conditions (700-900 AD) and increasing population and other factors that they take it on at all in this region. This evolution shall be contrasted with that of the Oshara-Anasazi tradition in the Rio Cuervo region where a quick secondary development took place for other causes. With these two hypotheses about why agriculture came about in the Southwest in two sub-areas, speculations will be offered about why it happened in the Mogollon and Hohokam sub-areas.

*Madsen, J. (see Fish, S. K.) [6]*

*Madson, Mark E. (Washington)*

[75] MICRODEBITAGE ANALYSIS OF LITHIC MATERIAL IN A NORTHWEST COAST SHELL MIDDEN

Recent work on microartifacts has indicated the potential of small sized objects in archaeological research. Comparison of macroartifact and microartifact distributions from a Northwest Coast shell midden site provides information regarding lithic manufacturing activity. When large concentrations of microdebitage and macrodebitage are found together, and macrodebitage consists of non-utilized debris, the deposit is interpreted as an area where lithic manufacturing took place. When microdebitage concentrations are low, and macrodebitage is restricted to utilized and broken lithics, the deposit is interpreted to be an area where use-related activities occurred. Such interpretations are supported by faunal remains and macroartifacts.

*Magne, Martin P.R. (Alberta Archaeological Survey)*

[44] THE ROLE OF LITHIC REDUCTION EXPERIMENTS IN MODELLING LITHIC ASSEMBLAGE FORMATION PROCESSES

Experimental and intuitive models of lithic reduction range from purely bifacial, single stone type efforts to more comprehensive ones. The nature of the reduction model chosen has a great effect on assemblage interpretations in terms of site occupation span and group mobility. This is illustrated through discussion of a number of key variables which have been applied in selected North American situations. Implications of the findings for modeling assemblage formation under varying conditions of lithic resource availability and group mobility are presented.

*Magnes-Gardiner, Bonnie (Arizona)*

[4] INTERPRETING PATTERNS OF CERAMIC DISTRIBUTION: HISTORICAL SOURCES IN SECOND MILLENNIUM B.C. SYRIA

In the past few years scholars have been developing new approaches to ceramic analysis in an attempt to achieve a better understanding of how patterns of pottery production and distribution reflect the organization of the society which produced it. Examination of historical texts in the palace archives of Mari, Alalah and Ugarit provides one more means of interpreting these patterns. Administrative documents and letters provide information on the contents, quantities, sources and directions of pottery exchange as well as the social, economic and political contexts in which such exchanges occur.

*Mallory, John K. (UCSC)*

[49] INFERRENCES CONCERNING STRUCTURE FUNCTION AND SOCIAL ORGANIZATION AT 9M22-B, A PATIO GROUP AT COPAN, HONDURAS

Complete excavation of a Late Classic Period patio group reveals structure function and inferred extended family social organization through analysis of artifact distribution and structure layout. Densities of a variety of lithic, ceramic and groundstone artifacts, burnt daub and organic materials, associated with structures of differing types, are graphically presented to support arguments concerning activities carried out in different areas of the site. Conclusions are drawn concerning the probable family structure of the Late Classic inhabitants.

*Mandel, Rolfe D. (Kansas)*

[10] HOLOCENE LANDSCAPE EVOLUTION IN CENTRAL AND SOUTHWESTERN KANSAS: IMPLICATIONS FOR ARCHAEOLOGICAL STUDIES

Geomorphic and radiocarbon data indicate that small streams in central and western Kansas are downcut between ca. 9000 and 4000 BP, supplying large volumes of sediment to the main valleys of the Pawnee and Smoky Hill rivers. The early and middle Holocene alluvium is stored in terrace fills that include strongly-developed buried soils. Late Holocene alluviation in small stream valleys was characterized by intermittent episodes of rapid deposition followed by periods without significant

aggradation during which soils formed. This model of Holocene landscape evolution gives insights into where buried archaeological sites from each cultural period are likely to be found.

*Mandel, R. D. (see Kafafi, Z.) [4]*

*Manea-Krichten, M. C. (see Ericson, J. E.) [36]*

*Marino, Bruno D. and Michael J. DeNiro (UCLA)*

[62] THE USE OF STABLE OXYGEN AND HYDROGEN ISOTOPE RATIOS OF CELLULOSE FROM ARCHAEOLOGICAL PLANTS TO RECONSTRUCT PAST CLIMATE

The study of the relationship between climate and culture is fundamental to a full understanding of cultural development. We present here results of studies that indicate stable oxygen and hydrogen isotope ratios of cellulose from archaeological plants can be used to reconstruct climate from the same theoretical base as that used in the interpretation of stable isotopic data from tree rings. Stable isotope studies using archaeobotanicals represent a new approach in climatic reconstruction and should provide unique opportunities to study in detail the relationships among people, plants and the environment.

*Markman, Charles W. (Northern Illinois)*

[19] THE MISSISSIPPIAN PERIOD IN NORTHERN ILLINOIS: HEDGING BETS AND MAINTAINING TRADITION

Adhering to a tradition of grit-tempering, the ceramics of Mississippian period sites north of the Upper Illinois River show technological advances towards improved heat transfer and heat resistance. These are improvements that have been related to an increased emphasis on starch boiling. Other data show that by 1000 AD, northerly adapted 8-row varieties of corn were already being utilized. However, even with the early incorporation of corn into the subsistence regime, a highly diversified economy was necessary given the productive unpredictability at this latitude.

*Marks, Anthony E. (Southern Methodist)*

[35] ON CHANGING ASSUMPTIONS IN E MEDITERRANEAN HUNTER-GATHERER RESEARCH—A PERSONAL PERSPECTIVE

Since archaeologically derived data tend toward the phantasmagoric, implicitly or explicitly, we all have underlying assumptions which permit us to put some meaning into the bits and pieces of our and others' fieldwork. Although there are now groups which express univariate approaches to the understanding of archaeological data, it is likely that most people who actually have carried out fieldwork for any length of time have undergone many shifts in their underlying assumptions concerning the relative merits of typology, technology, site conditions and types, faunal associations, etc. for putting meaning into their data. This paper will examine, from a personal perspective, these shifts in assumptions over about 30 years of fieldwork and why more should be expected in the next 20.

*Marezas, Bryan A. and James A. Zack (Environmental Systems Research Institute)*

[13] THE USE OF A GEOGRAPHIC INFORMATION SYSTEM TO MEASURE INDEPENDENT VARIABLES FOR ARCHAEOLOGICAL SITE LOCATION STUDIES

The application of a simple correlational model in a large-scale regional site location study required 47,672 measurements of various environmental variables. Such a large number of measurements necessitated an automated means for calculating values, a feat well suited to the conveniences of a Geographic Information System. The development of these automated data collection procedures relied upon the transformation of digital elevation models (DEM) into two data handling structures within the ARC/INFO surface modeling subsystem called TIN. The capability and accuracy of each data structure will be discussed in the context of providing archaeologists with a site probability model.

*Martin, L. D. (see Dort, Jr., W.) [16]*

*Mason, Owen K. (Alaska)*

[5] GEOARCHAEOLOGICAL CORRELATIONS OF NORTHWEST ALASKA BEACH RIDGES

Pioneering researchers in Kotzebue Sound used the horizontal stratigraphy of beach ridges to predict site location and establish cultural chronology. Recent sedimentological, photogrammetric and pedologic studies allow correlations between depositional units in four complexes. The southern complexes at Cape Espenberg and Choris contain elevated and transgressive ridge sets dating from 2800-2200 BP and from 1000-200 BP, due to increased northerly storm activity. Between 2200-1200 BP extensive progradation occurred with differing wind conditions. Major cycles of erosion characterize the same periods at the northern Cape Krusenstern and Sesualik complexes, while progradation dominated at Cape Krusenstern before 2200 BP and after 1200 BP.

*Mathes, R. Michael (California)*

[21] **BAJA CALIFORNIA: A SPECIAL AREA OF CONTACT AND COLONIZATION—1535-1697**

The arid, mountainous, 900 mile long peninsula of Baja California presented unique obstacles to Spanish colonization and acculturation of its inhabitants, the Piricu, Guaycura and Cochimi. Isolated from Hispanic population and supply centers and devoid of sources of great wealth, between 1535 and 1697 the peninsula was subject to periodic contact between Spanish maritime explorers and indigenous peoples which produced some detailed ethnographic information and familiarized the sparse marginal native population with some aspects of European culture. Definitive settlement of Baja California through establishment of missions by the Society of Jesus in 1697 similarly presented unique differences from other areas of New Spain.

*Mathien, Frances Joan (New Mexico)*

[68] **EXCHANGE SYSTEMS OF THE CHACO ANASAZI**

Several models of exchange have been proposed for the Chaco Anasazi and their neighbors, including a long distance network linking them to inhabitants of central Mexico for procurement of exotic items and a redistribution model for trade within the San Juan Basin to obtain other goods. An evaluation of long distance trade indicates that centers in Chaco Canyon were not closely tied to a regulated long distance trade network originating in Mexico, but that Chacoans obtained elite goods through several links in a down-the-line network. With regard to a redistribution model in the San Juan Basin, the available data neither support nor negate the model.

*Matson, R. G. (British Columbia)*

[8] **THE ADOPTION OF AGRICULTURE IN THE SOUTHWEST: THE VIEW FROM CEDAR MESA, UTAH**

By 2000 years ago the BM II on the Colorado Plateau relied extensively on maize agriculture as demonstrated by settlement patterns, coprolite, midden and stable carbon isotope analyses. Colorado Plateau agriculture is at the end of a long chain of changes beginning with the original Mexican rainfall dry farming. A model based on the reconstruction of this chain puts the Basin and Range province in an important and clearly described role for the kind of agriculture, type of maize and timing of agricultural dependency. Current knowledge will be compared with this model along with a discussion of the differences in conditions for agricultural reliance between the Sonoran Basin and Range and Plateau areas.

*Matsumoto, Ryozo (Tokai University, Japan)*

[63] **THE CAJAMARCA CULTURE: ITS EVOLUTION AND INTERACTION WITH COASTAL PEER POLITIES**

Investigations by the Japanese Scientific Expedition to Nuclear America have greatly elucidated the heretofore poorly known Cajamarca culture of the North Highlands of Peru. The changing distribution of the distinct ceramics seems to be a telling barometer of the political strength of the coastal polities. From the Moche IV-V transition to the end of the Early Sican, Middle Cajamarca ceramics had an unprecedented distributional, technical and stylistic coherence throughout much of the Peruvian highlands and portions of the coast. With the expansion of the Middle Sican polity, however, the distribution of Late Cajamarca ceramics became greatly reduced.

*Mauldin, Raymond P. and Daniel S. Amick (New Mexico)*

[44] **INVESTIGATING PATTERNING IN DEBITAGE FROM EXPERIMENTAL BIFACIAL CORE REDUCTION**

Variability in debitage morphology produced by three core reductions under well controlled conditions is compared. The goal of each reduction episode was the production of a bifacial blank by percussion flaking from a high quality chert nodule. Use of the same knapper, toolkit, raw material type, reduction strategy and lab analysts provided controls for comparing interassemblage differences that indicate the magnitude of sample variability. Results of comparisons between flakes produced by different percussors and the sequence of removal for each flake implicates our analytical techniques as well as the ability to address these problems archaeologically.

*McAnany, P. A. (see Killion, T. W.) [31]*

*McBride, K. A. (see Dewar, R. E.) [74]*

*McCartney, Allen P. (Arkansas) and Edward D. Mitchell (Arctic Biological Station, Quebec)*

[23] **BONES AND ZONES: HUMAN ECOLOGY AND THULE ESKIMO WHALING**

Prehistoric Thule Eskimo sites (ca. AD 1000-1600) in the Canadian Arctic are often characterized by highly visible and impressive remains of semisubterranean dwellings constructed from bowhead

whale bones. This has led some researchers to suggest bowhead whales were the primary resource, others to suggest they were hunted on an opportunistic basis only and still others to suggest that only beached whales/skeletons were utilized. Analysis of Thule settlement patterns and associated archaeofaunas from the perspective of predator-prey relationships and economic zonation strategies, however, demonstrates that bowhead whales were indeed central to the economy of most Thule Eskimo societies.

*McCutcheon, Patrick T. (Washington)*

[75] **A PROCEDURE FOR INFERRING THE TEMPERATURE AT WHICH ARCHAEOLOGICAL BONE HAS BEEN BURNED**

A series of tightly controlled experiments designed to define a set of physical and chemical criteria that allow the temperature at which archaeological bone has been burned to be securely inferred is in the process of being conducted. This information will make burned bone a more sensitive indicator of thermal events. Results are provided and applied to burned bone specimens from a shell midden in coastal Washington.

*McFaul, Michael (LaRamee Soils, Laramie) and William R. Latady, Jr. (Office of Wyoming State Archaeologist)*

[5] **COLUVIAL/ALLUVIAL PROCESSES AND ARTIFACT PRESERVATION, UNTA COUNTY, WYOMING**

Geoarchaeological investigations along the eastern flank (The Hogsback) of Muddy Creek indicate diversion of an ancestral Muddy Creek to the Bear River (34,300 BP). This misfit drainage then witnessed Paleoindian, Archaic, late Prehistoric and historic occupations. Artifact recovery, pedology and sedimentology indicate preservation potential highest in debris-fall pressure ridges, distal fan sediments, accumulation terraces and floodplains. Sediment-artifact size grading, slope analyses and cultural dating evidence a correlation between slope processes and paleoclimates. These methods also permit site integrity analyses.

*McGowan, Kevin P. (Illinois)*

[16] **LATE WOODLAND RELATIONSHIPS: A SHELBYVILLE LOCALITY PERSPECTIVE**

Recent research on Late Woodland component sites from the Shelbyville locality of east central Illinois provides new data regarding local cultural development and possible regional relationships. The local developments are illustrated through the presentation of survey and excavation data obtained over the past eight years. A summary of the data is provided through the presentation of a phase chronology. Possible regional relationships are examined through a critical review of comparable Late Woodland materials from throughout the Midwest.

*McGuire, Kelly R. (Far Western Anthropological Research Group)*

[38] **INCISED STONE AMULETS: AN ANALYSIS OF STYLE AND PREHISTORIC SOCIAL DYNAMICS IN NORTH CENTRAL CALIFORNIA**

Perhaps one of the largest portable rock art assemblages described in the United States, 1632 incised stones were recovered from four sites in the Sacramento River Canyon. Inferred to be amulets, they were recovered from components dating from 5000 to 3000 BP. Stylistic analysis indicates these artifacts were not simply manifestations of a passive artistic tradition, but, in accordance with the norms of information exchange, were of potential adaptive value through the stylistic reinforcement of group affiliation. The abrupt fluorescence of this stylistic tradition was perhaps in response to some level of intergroup resource competition.

*McGuire, Randall H. (SUNY Binghamton)*

[1] **THE ARCHAEOLOGY OF PROTOHISTORIC SONORA**

Ten years after the conquest of Tenochtitlan Nuno Guzman established Culiacan on the northern edge of Mesoamerica, but it took nearly 250 years for Spanish settlement to reach Tucson. The Spanish were ill prepared to deal with the aboriginal social formations of contact period Sonora. Archaeologists today find themselves little better prepared to understand contact period Sonora. We are limited by the nature of documentary sources, the paucity of archaeological research in the region and, more fundamentally, by a reification of aboriginal cultures as objects that the Spanish acted upon.

*McKenna, Peter J. (National Park Service)*

[6] **LATE BONITO PHASE DEVELOPMENTS IN THE ANIMAS VALLEY, NEW MEXICO**

The Anasazi occupation of the Aztec Ruins is associated with the Late Bonito through the Mesa Verde Phases. Models of Chacoan adaptation during these periods are of particular interest as the focus on the dissolution of the San Juan Basin system. Work in the Animas Valley since Earl Morris' [redacted] is applied to a reevaluation of traditional interpretations of the Aztec Ruins and the scope

of the Chacoan influence in the Animas Valley. Data from recent survey and testing in the Aztec Ruins vicinity is applied to the evaluation of models that have been used to explain the cultural variability in the northern San Juan Basin.

*McKillop, Heather I. (UC Santa Barbara) and Lawrence Jackson (Northeastern Archaeological Associates)*

[24] DEVELOPMENT OF MAYA SEA TRADE: EVIDENCE FROM WILD CANE CAY, BELIZE

Evidence from the coastal Maya site of Wild Cane Cay, Belize, provides new insights into the nature and development of long distance Maya sea trade and its integration in Maya society. Chemical sourcing, analyses of exotic trade good densities and study of production efficiency help identify Wild Cane Cay as a coastal trading station. A dramatic Postclassic Period increase in trading activity mirrors settlement data from other coastal sites in Belize. Comparison of obsidian sources and densities from other lowland Maya sites forms the basis for a developmental model of long distance Maya sea trade along the Belizean coast.

*McKillop, H. I. (see Jackson, L.) [28]*

*McManamon, Francis P. (National Park Service)*

[11] THE DEPARTMENT OF THE INTERIOR GUIDELINES FOR THE TREATMENT OF HUMAN REMAINS FROM ARCHAEOLOGICAL SITES

In 1982 DOI issued guidelines for the disposition of human remains recovered from archaeological sites. The guidelines aim to provide archaeologists and resource managers within Interior bureaus with a framework within which to make decisions regarding disposition of human remains recovered purposefully or inadvertently from archaeological sites by bureau activities. The guidelines emphasize that in situ preservation is preferred. Where this is not possible, notification of and consultation with related or interested groups are required. The religious, cultural and scientific values of the remains are to be considered in reaching a decision on disposition.

*McManamon, Francis P. (National Park Service) [Discussant 32]*

*McPherron, S. (see Dibble, H. L.) [73]*

*Mead, Roy A., Kent A. Schneider and Sandi Forney (USFS)*

[13] APPLICATIONS OF A GEOGRAPHIC INFORMATION SYSTEM FOR CULTURAL RESOURCES ON THE OCALA NATIONAL FOREST

Several applications of the use of a GIS for managing cultural resources are given. These applications demonstrate direct management benefits by making it possible to consider the spatial relationships (both intra and inter) of known site locations and other natural resource characteristics. The GIS also provides the framework for conducting pure and applied research which could not have been done with maps used only in a manual mode. The applications described in the paper make cultural resource managers more efficient in their work and assist in identifying the resources that should be avoided. Finally, the paper demonstrates the usefulness of a GIS in developing maps for meeting and reports.

*Meighan, Clement W. (UCLA) [Discussant 75]*

*Meltzer, David J. (Southern Methodist)*

[59] WHY DON'T WE KNOW WHEN THE FIRST PEOPLE CAME TO AMERICA?

Nearly 400 years ago scholars first wondered in print about the age of the early peopling of America; today the question remains unanswered. This lack of resolution is not solely attributable to a factual gap. Data from an array of fields have narrowed the time frame within which migrations to the Americas had to have taken place, and still estimates of the timing of the earliest of these migrations range from 12,000 BP to 200,000 BP. Clarifying why this apparently straightforward empirical question has defied resolution requires understanding of the history, evolution and rules of the debate and the character of the late Pleistocene archaeological and geological records.

*Merbs, Charles F. (Arizona State)*

[1] EFFECTS OF EUROPEAN CONTACT ON PATTERNS OF HEALTH AND DISEASE IN SOUTHWESTERN INDIANS

Thanks to the development of new techniques and renewed interest by anthropologists, many aspects of health and disease in the prehistoric Southwest are coming into focus. These include high levels of infant mortality, the frequent occurrence of anemia in children and extensive dental pathology. Evidence of tuberculosis in the area is quite convincing, but its overall effect on the population is still poorly understood. The coming of Europeans exposed the native populations to previously

unknown infectious diseases such as smallpox, which resulted in massive depopulation, and diet related conditions, such as adult-onset diabetes, that plague many Southwest Indians today.

*Merbs, C. F. (see Fink, T. M.) [57]*

*Metcalf, Michael D. and Kevin D. Black (Metcalf Archaeological Consultants)*

[18] EARLY ARCHAIC PIT HOUSE ARCHITECTURE IN THE COLORADO ROCKIES: IMPLICATIONS FOR SEASONAL SEDENTISM AND YEAR-ROUND HABITATION OF HIGH ALTITUDES

The Harmony Pit House (5EA799) is a large semisubterranean dwelling with four slab-lined storage bins and other floor features dating 6320 ± 90 BP. The structure is located at an elevation of 2146 m in the upper Colorado River drainage in an ecologically diverse mountain valley. A large assemblage of chipped and ground stone, as well as an unusually well preserved faunal assemblage, indicate residential base activities. Results of faunal, chipped stone raw material and architectural analyses, together with cross-cultural and modern game animal studies, suggest new interpretations of prehistoric use of the Southern Rocky Mountain high country.

*Mescalie, Duncan and Kathleen M. Heath (Utah)*

[52] MICRO-REFUSE AND SITE STRUCTURE: AN ARCHAEOLOGICAL EXAMPLE

Recent studies have demonstrated that both secondary disposal and trampling by the occupants of a site can affect the distribution of refuse. Both processes have been shown to have size related consequences and the distribution of small items (micro-refuse) from deposits immediately underlying activity areas may be the only reliable evidence of the types of activities conducted there. The character and distribution of the micro-refuse recovered from a Fremont domestic structure is examined and implications for further research are discussed.

*Mick-O'Hara, Linda S. (New Mexico)*

[74] EXAMINING THE COMPLEXITY OF STRUCTURAL ENVIRONMENTS IN THE PUEBLOAN SOUTHWEST

Large structural ruins have acted as focal points on the landscape in the placement and organization of human systems. Unlike rockshelter and cave environments, this structural space may be altered to meet the changing needs of a human group. An examination of structural space and the refuse it contains provides us with insights into the organization of systems during, and at times, after the major occupation of structural areas. Data from both the ethnographic and archaeological record of the Puebloan Southwest are used to identify how data collection and analysis can provide clues to the organization we seek to understand.

*Mikesell, T. (see Shaffer, S. L.) [32]*

*Miksicek, Charles H. (Arizona)*

[57] NEW DIRECTIONS IN THE ANALYSIS OF BIOLOGICAL REMAINS FROM HOHOKAM FLOTATION SAMPLES

Hohokam archaeobotanists have tended to exploit only a small portion of the information potential in each flotation sample. Even though wood charcoal is the most abundant material in any sample, it is almost never identified. Charcoal data could provide detailed palaeoenvironmental reconstructions, useful clues to crossdating features and important guidelines for selecting radiocarbon samples. The identification of aquatic and terrestrial mollusks could also provide critical paleoecological information. The analysis of ostracods from canal sediments could yield clues to ancient water temperature and salinity.

*Milbrath, Susan (Florida State Museum)*

[71] SEASONAL PATTERNS OF SUNLIGHT IN THE BALL COURT COMPLEX OF CHICHEN ITZA

The Lower Temple of the Jaguars faces the position of the rising sun at the time of the solar nadir in late November and late January. The reliefs in the temple may relate to a warrior cult active at this time. On the other hand, the facade of the Upper Temple of the Jaguars is oriented toward the solar zenith sunset in late May and late July. This temple may be dedicated to rituals enacted when the sun, Venus and the Pleiades were all near the western horizon during the rainy season at the time of the solar zenith. The two temples may symbolize the alternation of the rainy and dry seasons and the alternation of ritual activities relating to agricultural and warrior cults.

*Miles, Judith L. (National Park Service)*

[33] REFINEMENT OF UTILITY WARE AND BLACK-ON-WHITE CERAMIC DATE RANGES FOR THE PAJARITO PLATEAU

Ceramic types provide a primary means of dating Anasazi sites in the northern Rio Grande Valley, but broad temporal ranges assigned to some ceramic types are of limited utility in determining site

occupation spans. In the 20 years since Breternitz's assignment of Southwest ceramic date ranges using tree-rings, numerous investigations have produced supplemental chronometric information. This paper uses tree-ring and other datable materials in an attempt to refine ceramic date ranges for early Pajarito Plateau black-on-white and utility wares.

*Miller, J. (see Benge, D.) [32]*

*Miller, Mary Ellen (Yale) [Discussant 7]*

*Miller, Virginia E. (Illinois-Chicago)*

[7] **PROCESSIONAL BANQUETTES AT CHICHEN ITZA**

One of the distinguishing features of Chichen Itza's architecture is the polychrome carved or painted banquette depicting a procession of seated lords, standing armed warriors and captives. The benches of the Temples of the Chacmool and Warriors and the Mercado, among others, will be compared with other reliefs at the site in order to determine the function of the banquettes, the identity of the figures represented and the meaning of the processional events. Similar reliefs are found at Tula and at Tenochtitlan, where they have been identified as scenes of royal autosacrifice following military success.

*Mills, Barbara J., Eileen L. Camilli and LuAnn Wandsnider (New Mexico)*

[3] **SPATIAL PATTERNING IN CERAMIC VESSEL DISTRIBUTIONS**

Sherds of a single ceramic vessel may be widely dispersed on a landscape. Indeed, parts of the same vessel can occur in functionally and temporally disparate contexts. Dispersion of sherds from identified vessels is attributed to (1) vessel recycling, (2) the reuse of constructed facilities during which distributions are enlarged through trampling, clean-up and other activities and (3) natural postdepositional processes facilitating sherd movement. Dispersion patterns are described for functional classes of vessels from desert basin surface assemblages in south-central New Mexico and compared with ethnographic observations on ceramic vessel and facility reuse.

*Mills, B. J. (see Ferguson, T. J.) [53]*

*Milner, George R. (Penn State)*

[36] **THE EFFECT OF INTERCOMMUNITY CONFLICT ON THE ADAPTIVE STANCE OF A LATE PREHISTORIC MIDWESTERN POPULATION**

Archaeologists tend to concentrate on the natural environment when assessing the adaptive stance of organizationally simple societies, minimizing the effect of the social landscape on their long-term success. An Illinois Oneota skeletal series illustrates the importance of considering the social as well as the natural environment when studying tribal level societies. This population experienced continual raiding resulting in the violent deaths of one-third of all adults. Social predation evidently affected their ability to fully exploit the abundant natural resources of the region. This contributed to a comparatively low level of community health, as indicated by hard tissue markers of disease stress.

*Milner, G. R. (see Emerson, T. E.) [6]*

*Minc, L. D. (see Hodge, M. G.) [49]*

*Minnis, Paul E. (Oklahoma)*

[65] **THE CONSTANT AND THE VARIABLE IN ANASAZI DIET**

In discussing changes in Anasazi diet, there has been a tendency to view agriculture as an invariant suite of strategies. Cultivation is, however, extremely variable. Prehistoric dietary change is understood only by breaking it down into its constituent parts. Various data sets are considered to model change in Anasazi diet. I argue that while maize is the constant cultigen on the Colorado Plateau by at least AD 500, the nature of agricultural techniques and the use of naturally available resources varied tremendously. Factors responsible for this variation are specified.

*Minnis, Paul E. (Oklahoma) [Discussant 57]*

*Mitchell, Douglas R. (Soil Systems)*

[36] **MORTUARY STUDIES AND SOCIAL ORGANIZATION IN THE HOHOKAM CLASSIC PERIOD**

During recent excavations at two Classic Period Hohokam sites in Phoenix, Arizona, over 150 burials were recovered. The burials from Casa Buena and the Grand Canal Ruins span the Soho and Civano cultural phases, allowing a diachronic view of changing mortuary practices. Mortuary profiles and associated artifact assemblages are used to examine social organization at the community level. The analysis results suggest a lack of clear intrasite social or spatial stratification and the implications

are explored. Models are developed to explain the observed mortuary variability in relation to local organization and the greater Hohokam society.

*Mitchell, D. R. (see Schaller, D. M.) [53]*

*Mitchell, E. D. (see McCartney, A. P.) [23]*

*Mitchem, Jeffrey M. (Florida State Museum)*

[71] **THE TATHAM, RUTH SMITH, AND WEEKI WACHEE MOUNDS: EARLY SPANISH CONTACT SITES IN WEST PENINSULAR FLORIDA**

Excavations and analyses of collections from three aboriginal burial mounds in the central Florida Gulf coast areas have resulted in a large corpus of data on early 16th century (AD 1500-1560) Spanish/Indian contact. The European assemblages from the three sites are very similar, suggesting contact with the same group of Spanish explorers (probably either Narvaez or Soto). When combined with osteological and ethnohistorical information, these data allow interpretations to be made concerning the nature of the initial contact, including exchange, warfare and disease epidemics.

*Moffat, Charles R. (American Resources Group, Ltd.)*

[38] **INVESTIGATIONS AT THE LITTLE MUDDY SHELTER, JACKSON COUNTY, ILLINOIS**

During 1985-1986, the American Resources Group excavated the Little Muddy Shelter, a stratified site with 13 components dating from ca. 7200—ca. 650 BP. The site is located in the till plains of southern Illinois on a low terrace adjacent to a large tributary of the Big Muddy River. It features a particularly detailed Late Archaic and Woodland Period sequence. Preliminary analysis of feature data and subsistence remains suggests that throughout its occupation the shelter was a late fall/winter campsite occupied by a small band engaged primarily in deer hunting and nut gathering.

*Molleson, Theya I. (British Museum)*

[50] **THE PEOPLE OF ABU HUREYRA**

Analysis of the skeletal remains from Abu Hureyra highlights some of the changes that the advent of agriculture wrought on the way of life of the people. Many individuals bear the marks of the intensive labor required of them in the production of the new foods and the maintenance of their houses. Although nutritional standards were adequate, the introduction of cereal products into the diet together with an increase in the density of the population led to the spread of infection, albeit at a very low level. The distribution of burials suggests that they had developed a sophisticated social organization.

*Montgomery, Barbara K. (Arizona)*

[47] **METHODOLOGICAL ISSUES IN REFINING CERAMIC CROSS-DATING**

Ceramic chronologies in the American Southwest are based on tree-ring dated ceramic types. But these chronologies are often weakened by inadequate attention to the association between tree-ring samples and pottery. Analysis of surface collections and floor assemblages of whole vessels is used to develop a method for evaluating depositional context and for refining ceramic dating. Data from Chacoas Pueblo in the mountains of east central Arizona, occupied from AD 1263—1290s, illustrate this analytic refinement.

*Moore, Andrew M. T. (Yale)*

[50] **THE EXCAVATION OF ABU HUREYRA**

Abu Hureyra, excavated during the Euphrates dam archaeological salvage campaign, has two superimposed settlements. The basal settlement, Abu Hureyra 1, consists of pit dwellings and huts inhabited by a sedentary hunter-gatherer community over 1500 years. It is succeeded by a long-lived agricultural village of mudbrick houses, Abu Hureyra 2, that rapidly expands to cover 11.5 hectares. This village demonstrates some consequences of the adoption of agriculture for a community in an especially favorable location. The two settlements provide a rare opportunity for studying contrasting ways of life on the same site during a crucial period of economic and cultural change.

*Moore, Jerry D. (UCSB)*

[49] **HOME IS WHERE THE HEARTH IS?: DOMESTIC ORGANIZATION AND POLITICAL POLICIES ON THE SOUTHERN FRONTIER OF THE CHIMU EMPIRE (AD 1350-1470)**

A variety of policies were used to integrate commoner households into the Chimú Empire in the Casma Valley, Peru (AD 1350-1470). On one hand, the Chimú accepted a domestic organization based on permanent, independent, self-sustaining families who engaged in a variety of economic activities and may have worked for the Chimú Empire on an episodic short-term basis. At the other extreme, the Chimú Empire also established—at the same time—a state planned community consisting primarily of male agricultural laborers who worked for and were maintained by the Chimú. These policy

differences are exemplified by the distribution of economic activities associated with hearths at two contemporary sites in the Casma Valley.

*Morse, Birgit Faber (Yale)*

[30] EARLY SALADOID SETTLEMENT PATTERN AND SUBSISTENCE SYSTEM IN ST. CROIX, VIRGIN ISLANDS

The St. Croix artifact assemblages from four major collections have been analyzed and their typology established. At least nine settlements produced artifacts belonging to the Prosperity phase, dating from Period IIa. Seven of these are within 1 km of the coast and most are located near rivers, thus providing access to both coastal and terrestrial resources. The remaining two settlements are 3–4 km inland within river valleys, and one is upstream from the Salt River Site, the largest and most continuously occupied known coastal settlement throughout the Ceramic Age in the Virgin Islands. Comparisons will be made with the settlement pattern and subsistence system of the Hacienda Grande phase in Vieques and Puerto Rico.

*Murry, Jr., Robert E. (Texas A&M)*

[62] ANASAZI AND MOGOLLON MORTUARY VESSEL AND ARTIFACT FUNCTION AS DETERMINED BY POLLEN ANALYSIS

Pollen washes from interior surfaces of mortuary vessels and groundstone artifacts were examined microscopically to determine pollen content. This data is compared with pollen data from similar artifacts in nonburial associations to determine how specific mortuary uses of these artifacts differ from normal uses. The database consists of a total of 112 pollen washes, representing 20 Kayenta Anasazi burials from Black Mesa, Arizona, 20 Mimbres Mogollon burials from southeastern Grant County, New Mexico, and nonmortuary artifacts from both areas.

*Myers, James T. and Arthur A. Demarest (Vanderbilt)*

[29] NEW EVIDENCE ON THE ECONOMIC COMPLEXITY AND EVOLUTION OF THE EARLY PRECLASSIC CULTURES OF PACIFIC GUATEMALA

Ongoing research in the Mar Azul zone of Pacific coastal Guatemala has recovered extensive new evidence on the entire series of Early Preclassic cultures (e.g. Ocos, Cuadros, Jocotal, Conchas). This paper describes the nature of these discoveries and their possible implications for interpretations of the chronology, economy and cultural evolution of these earliest complex societies of the region. Research problems and the directions of ongoing and future research are described.

*Nakai, N. (see Chisholm, B. S.) [64]*

*Nakamura, Seiichi (Japanese Technical Mission in Honduras)*

[42] INTERACTION BETWEEN THE LOWER MOTAGUA AND NORTHWESTERN HONDURAS

Recent investigations in northwestern Honduras by the La Entrada Archaeological Project have yielded important data for the reconstruction of communication routes and socioeconomic organization in the Southeastern Maya periphery. A notable indication of interaction is the "quadrangle" site pattern of the Motagua Valley in the La Entrada project area. Some problems of interaction and its implications based on similarity and difference in architectural patterns between these regions are considered. The presence of quadrangle site patterns is considered essential to an understanding of interaction between the areas.

*Nakhai, Beth Alpert (Arizona)*

[47] THE TRANSITION FROM THE LATE BRONZE AGE TO THE EARLY IRON AGE AT TELL EL-WAWIYAT, ISRAEL

Objectives of the study of this small rural site include studying cultural continuity/discontinuity during the LBA-EIA horizon. Attention to the transition from Canaanite to Israelite populations contributes to our knowledge of Israelite origins and ethnicity. At Wawiyat, continuity from LBA to EIA is demonstrated in one of the two large structures excavated. The cultural break comes late in the EIA, as architecture changes from large-scale, specialized buildings to those of a poor village settlement.

*Nance, C. Roger (Alabama at Birmingham)*

[29] GUZMAN MOUND, A LATE PRECLASSIC SALT PRODUCTION STATION NEAR TILAPA, SAN MARCOS, GUATEMALA

Excavation of a small mound in a salt flat on the South Coast produced potsherds of crudely formed jars with thickened rims and thin body walls. Attribute analysis of large rim sherds from the entire mound sequence indicates a slowly developing vessel form which might have served in boiling water to extract salt. Fine ware types date the mound to the Late Preclassic. The crude utility ware, large

amounts of ash and charcoal and the lack of blades, grinding stones and food remains all support the interpretation that Guzman Mound was a work station for the production of salt.

*Neff, Hector, Ronald L. Bishop (Smithsonian Institution) and Frederick J. Bove (California, Santa Barbara)*

[29] COMPOSITIONAL PATTERNING IN CERAMICS FROM PACIFIC COASTAL AND HIGHLAND GUATEMALA

Subgroups within a 1000+ specimen data set produced by neutron activation analysis of Pacific slope ceramics are attributed to geographically localized production zones. Temporal and spatial assignments of the compositional groups are: Late Preclassic Valley of Guatemala (three groups), Late Preclassic Coastal Escuintla (two groups), Late Classic Coastal Escuintla (one group), Late Preclassic/Late Classic Tiquisate zone (one group) and Late Classic-Early Postclassic Rio Naranco zone (three groups). More specific geographical attributions within these zones are discussed. Temporal shifts in Pacific slope ceramic exchange are inferred from contrasts between the distributions of specimens assigned to the various groups.

*Nelson, Ben A. (SUNY Buffalo)*

[37] MESOAMERICA'S NORTHERN FRONTIER: THE NEED FOR A DOMESTIC DIMENSION

In Zacatecas and Durango archaeologists have modeled the growth of several semiperipheral components of the Mesoamerican world system. The models, while provocative and plausible, have been tested primarily with data from the ceremonial precincts of large sites. Data from residential areas will increase our understanding of the development of such centers as Alta Vista and La Quemada. Such data will allow observations about changing modes of production, emergence of social classes and long distance exchanges of valued goods. This paper describes progress toward identification and analysis of residential areas at the site of La Quemada.

*Nelson, Margaret A. (Washington)*

[75] PLANT REMAINS ON THE NORTHWEST COAST: SAMPLING AND RECOVERY

Early historic records for the Northwest Coast depict a material culture dominated by wood products and a subsistence base that included as an integral component a variety of berries, bulbs, tubers and nuts. If these resources were utilized prehistorically, they should be expressed in the plant remains in the archaeological record. The abundance and taxonomic variety of plant remains from a series of separate deposits from a shell midden on San Juan Island, Washington, is examined to address this question, and the adequacy of the sampling design in recovering a representative sample from different kinds of depositional units assessed.

*Neuerberg, Norman (CSUDH) and Georgia Lee (UCLA)*

[21] THE CALIFORNIA INDIANS AS ARTISTS BEFORE AND AFTER CONTACT

California Indian motifs tend to be symbolic, stylized or abstracted rather than realistic. The Indians produced baskets, rock art, body and sand painting, pottery and small scale sculptures. Only basketry remained unchanged with the coming of the Spaniards. Wall painting was done by neophytes under the direction of the missionaries and the designs were primarily of European origin, though some resembled native motifs. There is clear evidence in the rock art of native Californians of the impact of culture change and the diffusion of ideas and design motifs.

*Neusius, Sarah W. (Indiana University-PA)*

[65] POPULATION GROWTH, CLIMATIC CHANGE AND HUNTING STRATEGIES AMONG THE DOLORES ANASAZI

Anasazi groups inhabiting the Dolores River Valley of southwestern Colorado between ca. AD 600 and 950 had a mixed economy based on farming, hunting and gathering. However, it has been suggested that population trends and climatic change influenced relative reliance on farming versus hunting and gathering over time. Unfortunately, preliminary analyses have indicated a poor fit between expectations concerning relative reliance and subsistence data. More thorough analysis of the faunal data clarifies the types of hunting strategies employed, particularly with respect to the role of garden hunting versus large game procurement.

*Newsom, Lee (Florida State Museum)*

[45] PALEOETHNOBOTANICAL REMAINS FROM A WATERLOGGED ARCHAIC PERIOD SITE IN FLORIDA

The Windover Site (8Br246) provides evidence of plant usage by people living in Florida approximately 7000 years ago. Bottle gourd (*Lagenaria siceraria*), a plant believed to have originated in Africa, has been identified in at least three contexts at the site. A radiocarbon date of  $7290 \pm 120$  BP was obtained from one gourd associated with a human burial. The occurrence of bottle gourd at Windover

and the implications of its presence at such an early date is discussed. Several human burials from the site were so well preserved that abdominal contents were recovered. The seeds of fleshy fruits are particularly abundant in these samples, along with the remains of other edible plants.

*Nichols, Deborah L. (Dartmouth) and Thomas H. Charlton (Iowa)*

[37] PROCESSES OF STATE FORMATION: CORE VERSUS PERIPHERY IN THE LATE POSTCLASSIC BASIN OF MEXICO

A model is presented suggesting that Aztec city-states in the central Basin of Mexico followed trajectories of economic development distinct from those in peripheral areas. The model expands upon currently proposed explanations of Late Postclassic state evolution by integrating available archaeological data from Huexotla, Xico, Otumba and Tepeapulco.

*Noble, William C. and Jacqueline Crerar (McMaster)*

[15] NEUTRAL IROQUOIS DEER MANAGEMENT

Unique to North America, the protohistoric/historic Neutral Iroquois of the Niagara Frontier Region were managing white-tailed deer for purposes of innovative long distance trade to Chesapeake Bay to obtain marine whelks. Analyses of Neutral settlements and four major deer collections indicate that: 1) ca. 1605-1651 AD selected deer were intensively culled for valued leather products, 2) butchering practices differ between the Neutral protohistoric and historic periods, 3) osteological measurements differentiate age/sex ratios, 4) settlement patterns shift temporally to deer yarding in white cedar swamps and 5) Chief Tsouharissens' deliberate policy of managing young deer is corroborated zoologically.

*O'Brien, Helen L. (Pima Community College, Arizona)*

[73] COLLECTING AND PROCESSING CARTOGRAPHIC DATA WITH MICROCOMPUTERS

The increasing memory and processing power of microcomputers, as well as the rapid rise in reasonably priced software, has made them useful in collecting and processing cartographic data. Data entry methods include keyboard entry, digitizing and uploading from manual or automatic field data collectors. Software packages can produce a wide variety of maps without reentry of data. Maps produced include both field and final versions of planimetric maps of sites or features, soil profiles, topographic net maps and magnetometer contour maps.

*O'Brien, Michael J. (Missouri)*

[67] PROBLEMS IN THE ANALYSIS OF LARGE ARCHAEOLOGICAL SITES

Analysis of large sites has long been a problem in archaeology in terms of understanding internal complexity (e.g., site function(s) and growth through time) and the relation of a site to others in a regional settlement system. Myriad methods and techniques have been used to address the problem, but most were developed for use on small scale sites and lose their appeal when the archaeologist is faced with a site which is of another order of magnitude in size. A review of such methods and techniques is instructive, especially in terms of their limitations vis-a-vis large site analysis.

*O'Connell, James F., K. Hawkes (Utah) and N. Bl Burton Jones (UCLA)*

[23] HADZA HUNTING AND SCAVENGING AND THEIR ARCHAEOLOGICAL IMPLICATIONS

The recent literature on archaeological faunal analysis contains a number of common sense assumptions about differences in the condition and treatment of carcasses acquired by hunting and scavenging, respectively. Though not well supported theoretically or empirically, these assumptions are routinely used as the bases for inferences about certain details of past human behavior as reflected in faunal assemblage composition. These assumptions are evaluated in light of recently acquired ethnographic data on large mammal hunting, scavenging and carcass processing among the Hadza of northern Tanzania.

*O'Shea, John M. (Michigan)*

[19] MARGINAL AGRICULTURE OR AGRICULTURE AT THE MARGINS: MAIZE AGRICULTURE IN THE UPPER GREAT LAKES

Agriculture has always been a risky business, particularly when it is practiced at or near its environmental limits. Yet, despite the risks, such adaptations are surprisingly common and robust, suggesting that they represent a unique kind of agricultural system and not simply a pale reflection of agricultural economies in more desirable settings. In this paper the general character and operation of such agricultural systems are considered and illustrated by reference to archaeological and ethnographic data relating to maize agriculture in the Upper Great Lakes region.

*Odell, George H. (Tulsa)*

[44] EXPERIMENTS IN LITHIC REDUCTION

Experiments with an experienced flintknapper were conducted in 1980 reducing a flake core, four blade cores, a Snyders point, a Hardin-barbed point and a large biface. Considerable attention was given to collecting debitage in stages and selecting replicable variables for quantitative analysis. Discrimination of debitage has been sought along several lines: 1) large from small bifaces, 2) bifacial reduction from blade and flake core reduction and 3) among stages in a bifacial reduction sequence. Perhaps the most interesting question, however, concerns chronological aspects, comparing an Archaic reduction sequence with a Woodland one.

*Oretting, Albert C. (Heritage Research Assoc.)*

[38] HOLOCENE LAND USE OF BUFFALO FLAT, CHRISTMAS LAKE VALLEY, OREGON

Recent work in the northern Great Basin has tested 77 open lithic scatters, four containing buried cultural components. Rare for open sites, these are radiocarbon dated to the early Holocene (8000-11000 BP). Projectile point cross-dating indicates human use of this arid area throughout the Holocene. While site distributions suggest that spatial patterns of land use have changed during this time, site assemblages reveal some continuities, including a long tradition of large-scale rabbit drives. These data are used to revise the Christmas Valley land use model which is compared with other regional Great Basin models.

*Olive, B. W. (see Steele, D. G.) [27]*

*Olsen, Sandra L. (John Hopkins)*

[50] THE BONE ARTIFACTS FROM ABU HUREYRA

The nearly 500 pieces of worked bone from Abu Hureyra constitute one of the largest collections of its kind from a prehistoric site in the Levant. The excellent state of preservation enables reconstruction of the manufacturing techniques employed and the pieces also retain clear evidence of use, resharpening and repair. Techniques applied to the analysis of this collection include experimental replication of manufacture and use, metric analysis and examination of surficial traces with a scanning electron microscope. The collection provides a valuable comparison with other assemblages of worked bone from the Levant.

*Olszewski, Deborah I. (Arizona State)*

[50] STONE TOOL USE AT ABU HUREYRA 1

Occupations at the settlement of Abu Hureyra 1 (Late Epipaleolithic) in northern Syria occur over the span of a millennium and a half, from ca. 11,500 to ca. 10,000 BP. During this period a gradual shift in the emphasis on certain chipped stone tools occurs. This chronological change in stone tool use is examined in the context of the Abu Hureyra 1 economy(ies) and settlement type(s). Finally, the Abu Hureyra 1 chipped stone data are assessed from a regional perspective, stressing comparisons between the northern and southern Levant.

*Orcutt, Janet D. (NPS)*

[33] CHANGES IN SETTLEMENT ORGANIZATION ON THE PAJARITO PLATEAU, NM

Recent studies have shown a relationship between high frequency temporal and spatial variability in climate and aspects of culture. This paper describes spatial and temporal variability in climate for the Pajarito Plateau and for the upper Rio Grande region. The patterns of climatic variability are used to derive expectations for changes in settlement organization on the Pajarito Plateau. The expectations are evaluated using data on the distribution of population in elevation zones, the formation of population aggregates and changes in the spatial relationship between habitations and field houses.

*Ortiz, Alfonso (New Mexico) [Discussant 20]*

*Owen, Bruce, Glenn S. Russell (UCLA) and Cathy L. Costin (Los Angeles County Museum of Natural History)*

[40] THE IMPACT OF INKA POLICY ON THE WANKA POPULACE

Inka policies of territorial integration had clear repercussions in the domestic economy of the 15th century Wanka in the central highlands of Peru. The Inka coopted Wanka elites, providing state prestige foods and reducing their agricultural labor and storage needs, while maintaining existing status distinctions in diet, architecture and access to fine ceramics and metals. Demilitarizing the region and extracting crops, metals and textiles required changes in labor and settlement patterns which indirectly altered diets, living conditions and life expectancies. Nevertheless, the Inka achieved their goals with minimal direct intervention in household activities.

Owen, Robert B. and Payson D. Sheets (Colorado)

[47] THE USE OF OPTICAL CONTOURING AND HOLOGRAPHIC TECHNIQUES IN THE ANALYSIS OF ARCHAEOLOGICAL MATERIALS

An experimental assessment is made of the usefulness of two optical technologies, optical contouring and holography, for the analysis and recording of archaeological material. Optical contouring overlays an analytical topographical pattern on an artifact to measure and record shape. Holography records complete optical information. Both methods could have significant applications for archaeology. Optical contouring is inexpensive and quite straightforward to apply, but lacks the versatility of holography. Holography provides 3-D image storage and detailed measurement, but is expensive and elaborate. Optical contouring is therefore of more immediate value and a brief demonstration of this technique will be provided.

Owsley, Douglas W. (Smithsonian)

[27] BIOARCHEOLOGY IN THE SOUTHERN PLAINS: PAST TRENDS AND NEW PERSPECTIVES

A survey of bioarcheological resources in 209 counties in the Southern Plains identified 300 sites with documented evidence of human skeletal remains. Sample sizes and spatial and temporal distribution of these mortuary components will be defined. Although attention will be given to past research themes in Southern Plains osteology, the primary research emphasis will be on the current application of a comprehensive research design that will facilitate future comparative studies. This project is supported by grants from the National Science Foundation and a contract with the Arkansas Archeological Survey/United States Army Corps of Engineers.

Owsley, D. W. (see Debusschere, K.) [62]

Parsons, Jeffrey R. (U of Michigan) [Discussant 76]

Patterson, C. C. (see Ericson, J. E.) [36]

Patterson, Thomas C. (Temple)

[22] HISTORY AND THE POST-PROCESSUAL ARCHAEOLOGIES

This paper examines some recent developments in U.S. archaeology: 1) the emergence of processual archaeology, 2) the advent of post-processual archaeologies and 3) the renewed interest in history manifested at the last annual meeting of the Society for American Archaeology. It contextualizes these in terms of wider social currents and considers their implications.

Paulsen, Allison (Institute of Andean Studies)

[63] PREHISTORIC RELATIONSHIPS BETWEEN ECUADOR AND NORTH COAST OF PERU

The earliest evidence of prehistoric contact between Ecuador and the North Coast of Peru dates from the 4th millennium BC during the Valdivia occupation of Ecuador when ceramics were still unknown in Peru. These interregional connections apparently continued during the Machalilla and Engoroy/Chorrera Periods. They were intensified with the introduction of big seaworthy rafts in the Guangala and Manteno Periods, an event which promoted maritime trade and interregional commerce along the Andean coast. This long distance exchange network constituted a significant part of the economic underpinnings of the states and empires of later Peruvian prehistory.

Payne, Robert W. (Massachusetts)

[22] POST-STRUCTURAL ARCHAEOLOGY AND THE POLITICS OF EVERYDAY LIFE

Post-structural archaeology offers a number of critiques of the New Archaeology, including its epistemology of hypothesis testing, its ontology of systems theory, a commitment to positivism and a behaviorist understanding of human life. Critiquing the value neutrality of positivism has been accomplished by presenting the New Archaeology as structuralism as ideological practice. Less effort has been devoted to probing post-structuralism as ideological practice. Everyday life is a powerful place to begin an analysis of any ideology. To the end of better understanding concepts of power and agency, changes in the American academy are presented as an important source conditioning choices in post-structuralist thought.

Pearsall, D. (see Berman, M. J.) [62]

Pearson, Richard (British Columbia)

[64] EXCHANGE SYSTEMS IN THE YAYOI PERIOD, SOUTHWESTERN JAPAN

This paper discusses the occurrence of tropical shell bracelets in Yayoi burial sites in Kyushu (ca. 300 BC—300 AD). They are known to have come from Okinawa, some 500-800 km to the southwest. Sources, methods of manufacture and local context are described, mechanisms of exchange postulated and effects of the exchange discussed.

Pendery, Steven R. (Boston City Archaeology Program)

[28] SACRED COWS AND BOSTON BRAHMINS: THE ARCHAEOLOGY OF THE BOSTON COMMON

Public open space is often ignored as a significant resource in American urban archaeology. Recent archaeological investigation of the Boston Common, the nation's oldest public park, reveals the development of the meaning and use of the public park in urban New England between 1630 and 1930. A core/periphery model is used to develop an archaeological research strategy focusing on broad patterns of urban park use. However, specific configurations and timing of transitions in land use are explained more completely in the context of shifting ideology of dominant urban groups in such areas as recreation, immigration and education.

Peters, G. (see Schneider, K. A.) [11]

Peterson, John Allen (Texas—Austin)

[53] CHANGE OR CONTINUITY? PITHOUSE TO PUEBLO TRANSITION ALONG THE MIDDLE SAN FRANCISCO RIVER, WEST CENTRAL NEW MEXICO

Regional survey data are crucial to interpreting the transition from Pithouse period to Pueblo period settlement patterns. Results of systematic survey conducted as part of the WS Ranch Site Project in Alma, New Mexico, suggest that there may be discontinuous occupation between early Pithouse and later Pithouse/Pueblo settlements. Further, there may be a variety of contemporaneous pithouse and pueblo structures on the same site during the "transitional" period. Recent survey data are discussed along with results of preliminary analysis of recent excavations in the vicinity of Reserve and Alma, New Mexico.

Petraglia, Michael D. (Smithsonian)

[3] ARTIFACT REFITTING AT THE ABRI DUFAURE: INTERPRETATION OF PREHISTORIC BEHAVIOR AND NATURAL FORMATION PROCESSES

Archaeologists have recently become engaged in artifact refitting in order to further understand prehistoric behavior and to detect the impact of natural processes. The reassembly of stone artifacts at the Abri Dufaure (Les Landes, France) has been useful for 1) identifying reduction areas, a cache and a dump, 2) proving the intact nature of the deposits (rockshelter border and slope) and 3) demonstrating the existence of minor disturbances.

Phagan, Carl J. (Museum of Northern Arizona) and Peter J. Pilles (USFS)

[32] PUBLIC PARTICIPATION ARCHAEOLOGY AT ELDEN PUEBLO

This paper describes a program of public participatory archaeology at Elden Pueblo near Flagstaff, Arizona, jointly conducted since 1981 by the Coconino National Forest and MNA. The program has involved amateur archaeologists, local and long-distance volunteers, YCC and YACC groups, USFS para-archaeologists, handicapped students, public school teachers and elementary and secondary school students. A conservation approach of appropriate site use provides a hands-on learning and recreational experience while contributing to archaeological goals. Archaeological care and excavation quality are not compromised to achieve the program's educational and participatory goals.

Pierce, Christopher (Desert Research Institute)

[38] CALIFORNIA'S MILLINGSTONE HORIZON: OF MICE OR MEN?

In California, pocket gophers and other burrowing rodents commonly inhabit archaeological deposits in large numbers. Exposure to their burrowing can cause severe yet predictable alterations in the content and organization of these deposits. There are four principal effects of burrowing: large objects move down within deposits; small objects move up in deposits; fragile objects such as bone, shell and charcoal are destroyed; and sedimentary structures and cultural features are disturbed. Examination of data from three Millingstone Horizon sites indicates that many of their diagnostic features were probably produced by extensive rodent burrowing rather than prehistoric cultural behavior as traditionally inferred.

Pilles, Peter J. (USFS)

[32] THE ARIZONA ARCHAEOLOGY ADVISORY COMMISSION AND THE SITE STEWARDS PROGRAM

In 1980 then-Governor Bruce Babbitt assembled a group of archaeologists to advise him on archaeological issues. In 1985 this group became a statutory body as the Arizona Archaeology Advisory Commission. The Commission has been successful in obtaining legislation, funding and public awareness for archaeology. One of its major efforts is the Site Stewards Program, where volunteers patrol sites in coordination with law enforcement and land management agencies. The accomplish-

ments of the Commission are discussed as a model example of cooperation between every aspect of the archaeological community, all levels of government, Native American groups and the public.

*Pilles, P. J. (see Phagan, C. J.)* [32]

*Piperno, D. (see Pohl, M. D.)* [49]

*Pippin, Lonnie C. (Desert Research Institute)*

**[68] CHACO OUTLIERS AND THEIR ROLE IN THE CHACO PHENOMENON**

One of the more distinctive, if not key, aspects of the Chaco Phenomenon is a network of nucleated Chaco outliers superimposed over a pattern of regionally differentiated hamlet settlements. Evidence from Guadalupe Ruin and other sites indicates this pattern was established during or only shortly after the initial rise of Great Pueblos in Chaco Canyon and that throughout their histories Chaco outliers were closely related to organized developments in the Canyon. Nevertheless, occupants of outlying Chaco towns had a material culture (ceramics) like that of the regionally differentiated village populations. This paper will examine the character of this settlement system and its significance in understanding the Chaco Phenomenon.

*Plog, Stephen (Virginia)*

**[20] RITUAL, EXCHANGE AND THE DEVELOPMENT OF REGIONAL SYSTEMS**

The importance of ritual in integrating Southwestern societies has long been recognized. From Steward's study of room:kiva ratios to more recent studies, we have examined the frequency of ritual structures to infer aspects of community organization. Less frequently addressed has been the importance of ritual in the initial development of larger regional networks of exchange and alliance. The latter topic will be addressed using data from the northern Southwest as well as comparative information from highland Mesoamerica.

*Plunket, Patricia S. (Americas-Puebla)*

**[37] TEOTIHUACAN AND THE VALLEY OF ATLIXCO, PUEBLA, MEXICO**

The prehistory of the Valley of Atlixco, in the western part of Puebla, has until recently been virtually unknown. Research during the past 18 months by the University of the Americas and the Centro Regional de Puebla (INAH) has identified what appears to be a small Xolalpan Phase Teotihuacan administrative center located along a major communication route linking the Valley of Puebla-Tlaxcala with the fertile lowland regions of Puebla and Morelos. The nature and chronology of the Teotihuacan presence in this "core-margin" area will be discussed.

*Pohl, John M.D. (UCLA) and Bruce E. Byland (Lehman College, CUNY)*

**[37] RITUAL AND POLITICS IN MIXTEC STATE DEVELOPMENT: THE MIXTEC HISTORICAL CODICES IN REAL SPACE AND TIME**

The Mixtec historical codices are native Mesoamerican accounts of the process of political change through a period from about 900 through 1500 AD. Recent archaeological survey in Tilantongo and Jaltepec have allowed the direct identification of many of the key sites discussed in the codices. We can now study the ritual, genealogical and historical information recorded in the codices in terms of real site distribution, size complexity and ecological setting. What emerges is an archaeological account of the rise of the stable small states of the Mixteca Alta which is informed by local history.

*Pohl, J. M. (see Byland, B. E.)* [37]

*Pohl, Mary DeLand (Florida State), Gary Fry (Youngstown State), Dolores Piperno (Temple) and Frederick M. Wiseman (MIT)*

**[49] ANCIENT MAYA COPROLITES**

We will discuss our analysis of coprolites from Early Postclassic household refuse at Tikal, Guatemala, and from Early-Middle Preclassic wetland fields on Albion Island, northern Belize. Techniques of analysis include identification of larger organic remains (plant macrofossils, bone, hair, parasites) in addition to pollen and phytoliths. The study is a test of the application of phytolith analysis to coprolites. We will integrate the coprolite data with other types of evidence for prehistoric Maya agriculture, diet and household activities as well as environment.

*Pokotylo, David (British Columbia) and Christopher Hanks (Prince of Wales Northern Heritage Centre, Canada)*

**[44] MEASURING ASSEMBLAGE VARIABILITY IN CURATED LITHIC TECHNOLOGIES: A CASE STUDY FROM THE MACKENZIE MOUNTAINS, NORTHWEST TERRITORIES**

Regional variability in lithic assemblages from the Mackenzie Mountains, Northwest Territories, Canada, is studied using archaeological, experimental and ethnoarchaeological data. The potential of current lithic analysis methods to differentiate site classes from assemblages produced under condi-

tions of high settlement mobility and curated technological organization is evaluated by analysis of archaeological assemblages from the Drum Lake locality and experimental artifact replication. Ethnoarchaeological data on Mountain Dene Indian settlement patterns are also used to evaluate sources of variability that may affect lithic assemblage composition.

*Polzer, Charles W. (Arizona State Museum)*

**[1] THE SPANISH COLONIAL SOUTHWEST: NEW TECHNOLOGIES FOR OLD DOCUMENTS**

The traditional approach to the discussion of the Spanish presence in northern New Spain, indeed in all of the Americas, has been from the viewpoint of institutions—presidios, missions and haciendas. A contemporary approach, however, that might serve the historian, anthropologist or archaeologist better is the comprehensive analysis of primary documents. Too much previous research has been restricted to specific monographs and extensive generalizations. Modern information technology can now aid the social scientist in crafting descriptions that will be of major service to archaeological searches and interpretations.

*Potter, Jr., Parker B. (NH Division of Historical Resources)*

**[22] JACQUES LACAN, PSYCHOANALYSIS, RADICAL EPISTEMOLOGY AND ARCHAEOLOGY**

One of the first principles of the positivist epistemology for archaeology is a sharp break between the observing subject and the object of observation. A keystone of many radical epistemologies is a dissolution of this boundary. A central problem then becomes avoiding analytical paralysis in a morass of relativism. One set of solutions is to examine rigorously and self-reflectively the conditions which impinge upon perfectly objective observation. When what impinges is social and involves class relations, one productive perspective is the political philosophy of the Frankfurt School. When what impinges is inside the observer and personal rather than social, psychoanalysis is called for. Thus the focus of this paper is on Jacques Lacan, his reformulation of Freud and the value of Lacan to archaeology.

*Powell, Shirley (Northern Arizona) and Sylvia W. Gaines (Arizona State)*

**[52] PARTITIONING THE SOURCES OF VARIATION IN MULTIPROJECT SURVEY DATA**

Vast quantities of data have been generated from archaeological surveys and literature developing or testing various theoretical models from such data are rife with interpretive discrepancies—discrepancies that focus on prehistoric behavior. Yet, a significant and controllable portion of the fuel for such debates may arise from the wide range of methodological variation between projects, between investigators and over the several decades of archaeological inquiry. The potential contribution of methodological variation on archaeological survey results is evaluated here.

*Powell, Shirley (Northern Arizona) [Discussant 65]*

*Powers, Robert P. (National Park Service)*

**[33] CHRONOLOGY AND ADAPTATION AT BANDELIER NATIONAL MONUMENT**

A model explaining Anasazi Coalition and Classic period (A.D. 1150-1600) cultural developments on the southern Pajarito Plateau is presented. Chronological control, demographic change, subsistence depletion and alteration, resource exchange and social complexity emerge as elements critical to understanding Classic period florescence. Virtual abandonment in the late 16th century is linked primarily to economic and political disruption and secondarily to drought. Relevant portions of the model are examined utilizing survey data collected at Bandelier National Monument. Revisions are made, problems discussed and remedies proposed.

*Powers, W. R. (see Hoffecker, J. E.)* [5]

*Pozorski, S. (see Pozorski, T.)* [48]

*Pozorski, Thomas and Shelia Pozorski (Pan American)*

**[48] PREHISTORIC STATE ORGANIZATION IN THE CASMA VALLEY, PERU**

An Initial Period (1800-900 BC) prehistoric state on the north coast of Peru is examined in light of recent investigations conducted in the Casma Valley. Excavated evidence, especially from the site of Pampa de las Llamas-Moxeke, the earliest planned city in the New World, suggests that early state organization was both coercive and integrative in nature. Though lacking strong military force, an elite ruling class nevertheless controlled access and redistribution of important resources such as food, textiles and exotic items. This evidence of resource control by at least 1500 BC provides a basis for examining early state development in other nuclear areas of the world.

*Prater, Ariadne H. (UC Berkeley)*

[29] EVOLUTION OF ART STYLES AT KAMINALJUYU: SCULPTURAL EVIDENCE

Stone sculpture represents one of the most significant artifact types by which Mesoamericanists are able to evaluate cultural development and diversification. Regional and pan-Mesoamerican diversification and trait distribution can be studied and combined with ceramic analysis to provide a more concrete view of regional and extra-regional development. In addition, sculptural style and trait distributions allow for a more detailed evaluation of the cultural history of the region. This paper addresses the issue of regional development rather than the diffusion of pan-Mesoamerican traits.

*Prentiss, William C. (Simon Fraser) and Eugene J. Romanski (South Florida)*

[44] DETERMINING THE ORIGINS OF DISTINCTIVE DEBITAGE ASSEMBLAGES: AN EXPERIMENTAL ANALYSIS

Experimental research is presented focusing on Sullivan and Rozen's (1985) debitage typology and archaeological pattern recognition. Implications for the use of the typology are considered in light of the effects of variable raw material types and technologies, size sorting and trampling. It is argued that minimally, the addition of a simple size variable to the typology is critical for its use in identifying processes affecting debitage assemblage content. Conclusions are drawn regarding the relationships between debitage assemblage patterns and the events which conditioned their formation.

*Price, T. Douglas (Wisconsin-Madison)* [Discussant 59]

*Purser, Margaret (Lowie Museum of Anthropology, UC Berkeley)*

[38] THE WAY THEY TELL IT: EXPANDING THE USE OF ORAL HISTORY IN HISTORICAL ARCHAEOLOGY

Oral history frequently plays a significant role in the identification and interpretation of historical sites. It can supplement a spotty documentary record in identifying occupants or functions of specific features, or place poorly documented sites in the broader context of local economic and social history. Data from the 19th century town of Paradise Valley, Nevada, suggests expanding the focus from oral history as collections of facts to assembled texts about the past. These texts bring changing local perceptions of the past to bear on the historical archaeology of the town, significantly expanding its possible interpretations.

*Pyburn, K. Anne (New Mexico State)*

[17] WARRING TRIBES, TRADER CHIEFDOMS, FEUDAL STATES: ANALOGIES AND REALITIES IN THE EVOLUTION OF NOHmul

Some ethnographic analogies are more appropriate than others for reconstructing the cultural systems of the prehistoric Lowland Maya, but deciding between the possibilities is extremely difficult. Fortunately, some predictions common to ethnographically based analogies can be tested in the field. In this paper two recent models derived from ethnographic data are evaluated in the light of settlement data from the site of Nohmul, Belize. An argument for more rigorous qualifications in the use of ethnographic analogies to interpret Maya data is presented.

*Quilter, Jeffrey (Ripon College)*

[63] END GAME: LATE MOCHE POLITICS, SOCIETY, AND ART

The well known shift in the content of late Moche iconography is explored with the assumption that such changes may be interpreted as direct or indirect expressions of sociopolitical events. Ethnohistoric and archaeological data are used to augment discussion. This paper builds upon earlier inferences from The Revolt of the Objects Theme. The presence, absence or roles of specific characters ("deities" or "beings"), militaristic emblems such as clubs, maritime and other scenes are discussed in order to more accurately identify the troubles of late Moche society from both *emic* and *etic* perspectives.

*Ramenofsky, Ann F., Ann M. Whitmer, Katherine Joiner (LSU), Jane E. Buikstra (Chicago) and Della C. Cook (Indiana)*

[36] THE RELEVANCE OF DIAGENESIS IN BONE AND SOIL FOR DIETARY RECONSTRUCTION

Recently dietary reconstructions based on the elemental composition of buried bone have been a subject of some interest to archaeologists and physical anthropologists. While researchers acknowledge that understanding diagenetic processes is crucial for making inferences about past diets, few studies have focused solely on diagenesis. In this paper we summarize preliminary investigations into one aspect of diagenesis, transportation of elements from bone to soil and soil to bone. Chemical analyses of metals taken from archaeological bone and soil samples are presented and evaluated

against a chemical diffusion model. Implications of this research for paleodietary research are considered.

*Rapson, David J. (New Mexico) and Lawrence C. Todd (Denver)*

[3] CONJOINS, CONTEMPORANEITY, AND SITE STRUCTURE: DISTRIBUTIONAL ANALYSIS OF THE BUGAS-HOLDING SITE

Assessing the relative degree of contemporaneity of contextually associated archaeological materials is a basic component in the interpretation of distributional patterns. Unlike stone tools, which have the potential for long term reuse and recycling, faunal remains have a restricted use life. Refitting studies at the Bugas-Holding site, a winter occupation located in northwestern Wyoming, have yielded over 390 sets of fragmented bison (*Bison bison*) and mountain sheep (*Ovis canadensis*) bones interconnecting a series of 9 features. Analysis of fracture morphologies, distances between conjoined pieces, distributional differences by species and skeletal element and relationships of conjoined groups to spatially fixed features reveal a patterned or "staged" movement of body parts among feature centered activity areas. These indications of organizational contemporaneity suggest a single occupational event and are used as a foundation for further spatial analysis.

*Rapson, D. J. (see Todd, L. C.)* [61]

*Rasson, Judith A. (Pacific Lutheran)*

[41] EXPERIMENTAL OPEN PIT FIRINGS: ACHIEVING HIGH TEMPERATURES

Ceramic technology is most often studied by reconstructing the processes of production based on ancient wares. Replicative experiments were carried out to clarify the effectiveness of different fuels for ceramic production using open pit firings. The fuel used (wood or dung), the temperature achieved and the length of firing time were controlled to evaluate success in firing, especially in achieving high temperatures. Success was judged by chemical alteration in the clay body and by the survival of vessels using different tempering materials. Implications drawn from the temperatures reached (and the relative success of the firings) are applied to Neolithic ceramics from Southeast Europe.

*Raymer, Leslie (Oklahoma)*

[31] STORAGE STRUCTURES AND MOBILITY STRATEGIES: A VIEW FROM THE SOUTHEAST

The relationship between subsistence food storage structures and mobility strategies, as it appears in the archaeological record, remains poorly understood. The cross-cultural examination of a worldwide sample of pit using societies indicates that this relationship is complex. The comparative ethnographic data show that food storage pits are used for a variety of reasons (general storage, concealment, processing) by groups with a wide range of mobility strategies (nomadism, seminomadism, semisedentism and sedentism). This paper reports on the results of using these ethnographic data to study relationships between food storage pits and settlement patterns in the archaeological record of the southeastern United States.

*Redman, Charles L. (Arizona State)*

[32] ARCHAEOLOGICAL OPEN HOUSES AS A WAY TO REACH THE PUBLIC

During each of the past four years, a two day Open House has been held at Shoofly Village Ruins in central Arizona. Lectures, demonstrations, a self-guided tour and opportunities to talk with excavators are essential elements of the Open House. This activity has grown in popularity each year to the point where over 2200 people attended during the Open House weekend in 1987. Questionnaires were distributed and we have collected information about who attends these events and what attracted them there. We have also experimented with allowing the public to participate in the excavations under controlled conditions. All of this has led to what we believe to be a very effective means of reaching the public.

*Redman, Charles L. (Arizona State)* [Discussant 67]

*Redmond, B. G. (see Schurr, M.)* [62]

*Reed, David (Pennsylvania State) and Janet Brashler (USDA, WV)*

[36] HEALTH AND STATUS IN THE LATE PREHISTORIC—THE EASTERN FORT ANCIENT PERIPHERY

The internal variation of the Fort Ancient culture provides the backdrop for cultural study issues in southern West Virginia. This paper reports on the nutritional health, social status differentiation and mortuary practices of a burial sample from Man, a Late Prehistoric village, part of the eastern periphery of Fort Ancient. Paleonutritional studies of the skeletal remains indicate common nutri-

tional stress within or between age, sex or status factors. Spatial analysis of the graves and their associated goods indicates a social structure based upon age and adornment.

*Reher, Charles A. (Wyoming)*

[18] CULTURE CHANGE AND CONTINUITY ON THE PREHISTORIC HIGH PLAINS

A three year NSF EPSCoR excavation program in southeast Wyoming is aimed at defining patterns of High Plains culture change. Current evidence suggests an especially dynamic culture history for the western shortgrass Plains, perhaps twenty or more occupational events involving large scale population movements. This paper discusses ecological processes that can cause periodic migrations into grassland regions and the implications of such processes for human prehistory. Also discussed are the methods being utilized to recognize such a sequence of events in closely spaced components and preliminary results from several sites in the study area.

*Reid, Kenneth C. (Washington State)*

[41] STONE SOUP: REPLICATING SUBCERAMIC NORTHERN MEATPOTS

The ethnography of Northwestern North American hunters contains many references to simmering meat and rendering fat in unfired or underfired pots made from various mixtures of clay, blood, organic fibers and mineral aplastics. Replicative experiments in making and using such pots for both insulation ("stone boiling") and conduction cooking are reported. The archaeological implications of the results are discussed.

*Rhode, David (Zuni Archaeology Program)*

[65] WATER CONTROL AND AGRICULTURAL PRODUCTIVITY IN THE ZUNI WATERSHED

Water control was essential for agricultural subsistence in the Zuni River watershed, west-central New Mexico. The variety and distribution of water control devices in the region provides a measure of the nature, scope and diversity of agricultural practices. A model is developed relating environmental conditions and functional parameters of water control features to the requirements of cultivars. It allows estimation of the distribution and productivity of agricultural systems in the region through time.

*Rice, Don (Virginia)*

[17] HISTORICAL ANALOGY IN THE STUDY OF THE MAYA CLASSIC TO POST-CLASSIC TRANSITION

This presentation departs from ongoing debate over the use of ethnographic models in Mayan studies to explore, in brief, written histories as sources of analogical arguments for archaeologists. The case of the Lowland Maya Classic to Post-Classic transition will be discussed in the context of both Mayan Post-Conquest documents and demographic and economic records far removed from the Maya in time and space. In so doing, the paper critiques the value of non-Mayan event and structure specific histories in the interpretation of the substance and process of Mayan cultural transformations.

*Rice, Glen Eugene and Jodi Kisselburg (Arizona State)*

[6] HOHOKAM TRIBAL INFLUENCE IN THE SOUTHWEST

The Hohokam were organized as tribes during the Colonial and Sedentary Periods. Studies of households and public facilities in pre-Classic villages suggest the operation of a moiety-like dual division related to social and ceremonial functions. The emergence of these units at AD 800 provided an integrative mechanism not based on kinship and helped to reduce the centrifugal tendencies of a clan based society. On this basis the Hohokam constructed a massive irrigation system, maintained large and stable villages and extended their influence as far eastward as New Mexico. More complex [chiefdom-like] forms of organization develop during the Hohokam Classic Period, but the successes of the early Hohokam exemplify the strengths of tribal society, demonstrating that complex achievements are not always a function of complex organization.

*Rice, Prudence M. (Florida) [Discussant 26]*

*Richardson, J. (see Decima, E.) [63]*

*Riley, Thomas J. (Illinois)*

[19] FROM HORTICULTURE TO AGRICULTURE IN THE PRAIRIE PENINSULA AND ITS NORTHERN PERIPHERY

The development of agricultural systems in the Prairie Peninsula of North America in prehistoric times depended on a variety of ecological, technological and organizational factors, as well as the presence of storable germ plasm that fit the requirements of cultural and natural environment. It is likely that horticulture was practiced on the Prairie Peninsula as early as the Middle Archaic. The ecological, technical and organizational requirements for the development of field agriculture involv-

ing maize and beans, however, are not completely met until about AD 800-1000 with a northward progression over time. A convergence of elements is postulated for this northern expansion of agriculture, and a simple model is presented for this expansion.

*Roberts, M. (see Bergman, C. A.) [44]*

*Robertson, James A. (Michigan State)*

[28] RESIDENTIAL MOVEMENTS AND HUNTER-GATHERER SETTLEMENT SYSTEMS

The purpose of this paper is to identify the variables conditioning the presence or absence of specific economic activities at a series of Archaic sites from the Saginaw Valley region of Michigan. A model based on radial transportation networks is used to understand how periodic, residential movements by hunting and gathering peoples can cause significant intersite differences. The results of this analysis demonstrate that intraseasonal movements are often necessary. This produces sites with very different material assemblages despite having similar seasonal indicators.

*Robertson, Robin (SMU)*

[17] IS THE END THE BEGINNING? TERMINATION RITUALS IN THE LATE PRECLASSIC

At Cerros, Belize, the identification of primary depositional contexts and activity areas and a functional analysis of the pottery have made it possible to define a series of rituals associated with the reconstruction or abandonment of Late Preclassic architecture for the first time. It is argued that these termination rituals served to increase, as well as validate, the importance of extra-kin, publicly oriented activities during the Lowland Maya transformation from chiefdom to state. Thus, they seem to have differed in purpose from the rituals of the Conquest Period making use of the ethnohistoric material problematic for the interpretation of the Late Preclassic. The possibilities for and limitations of the use of direct historical analogy under such circumstances will be explored.

*Robinson, David G. (Texas-Austin) and Heather B. Trigg (Michigan)*

[53] CHRONOLOGY AND ARCHAEOBOTANY: PUEBLO PERIOD SUBSISTENCE PRACTICES IN THE MIDDLE SAN FRANCISCO RIVER VALLEY, WEST-CENTRAL NEW MEXICO

Radiocarbon, obsidian hydration and dendrochronological studies have refined the sequence of Pueblo occupation and community change in the Middle San Francisco River region of west-central New Mexico. Archaeobotanical surveys and studies of behavioral contexts and of architectural constructions have applied their findings to this temporal framework. The combined strategy of wild food gathering and cultivation persisted throughout the Pueblo period in the region. The selection of nonfood plant resources increased through time, to a degree that may have required group procurement trips and thus may have widened the region's direct resource procurement zone.

*Robinson, E. J. (see Beaudry, M. P.) [29]*

*Rocek, Thomas R. (Delaware)*

[69] A NAVAJO ETHNOARCHEOLOGICAL PERSPECTIVE ON SEASONAL SITE ARTIFACT ASSEMBLAGES

Although variation in artifact assemblages among archeological sites is often explained by reference to function or seasonality, few quantitative data regarding such variation on ethnoarchaeologically known sites are available. Navajo sites investigated by the Black Mesa Archaeological Project on Black Mesa, Arizona, provide insight into seasonal variation. Forty single component habitation sites reliably dated from 1920 to 1960 permit direct association of artifacts with informant assisted seasonal identification. By keeping site function constant [only habitation sites are considered], patterns of seasonal variation and change through time are demonstrated.

*Rockwell, Thomas K. (San Diego State) and Lynn H. Gamble (UCSB)*

[54] RECONSTRUCTION OF ORIGINAL TOPOGRAPHY USING SOIL GEOMORPHOLOGY AT SBa-46

Analysis of intact and truncated soil profiles at SBa-46 in Goleta, California, indicates historical removal of up to two meters of soil and midden in some areas of the site and up to one meter of burial in others. Criteria applied to this analysis include (1) average undisturbed A horizon thickness, (2) average undisturbed Bw horizon thickness, (3) average total thickness to the base of the Bw, where exposed, and (4) differentiation of natural midden from redeposited midden and imported fill based on up to six additional characteristics.

*Roe, Peter G. (Delaware)*

[30] A GRAMMATICAL ANALYSIS OF CEDROSIAN SALADOID VESSEL FORM AND SURFACE DECORATION AESTHETIC AND TECHNICAL STYLES

Much recent debate centers upon the variability within the Antillean, or Cedrosian, Saladoid ceramic series. One position defines a new "Huicoid", or "Guapoid", series as representing a horti-

cultural migration anterior to the hitherto recognized Cedrosian Saladoid series. Conversely, this material may be fully Saladoid, merely representing a different sub-style within it. An examination of the technological and artistic styles of each complex in terms of a grammatical analysis of the components and rules of vessel form construction and surface decoration, via the "Linear Incised Ware" relatable to both, suggests these sub-styles represent related ethnic groups within the Cedrosian Saladoid series.

**Rogers, J. Daniel (UCLA)**

**[60] OBJECTS OF PASSION: IDENTIFYING SOCIAL CONSTRAINTS ON MATERIAL CHANGE**

Archaeological studies of culture contact offer a unique opportunity to examine the relationship between material and social change. The complex interrelationships between ideological, social and economic factors become especially evident when historical contexts are taken into consideration. A study of the Arikara (AD 1700-1862) clarifies how objects may be differentially retained, adopted or rejected on the basis of changing views of the relationship between groups involved in the contact interaction and the cultural parameters affecting the perceived role of newly available objects, such as European trade goods.

**Rogge, A. E. (Danes & Moore) and Patti Bell (Arizona)**

**[32] TEACHING TEACHERS TO TEACH WITH ARCHAEOLOGY**

In 1985 the Arizona Archaeological Council organized an Archaeology for the Schools Committee with the goal of enhancing appreciation of archaeological resources among the state's younger citizenry. The activities of the committee are reviewed with special emphasis on 1) the "ethnography" of the school system, 2) designing an appropriate "delivery system" for the committee's message, 3) the special values of archaeology for "integrative" teaching and 4) the very real limits of volunteerism.

**Rolett, Barry V. (Yale)**

**[52] ORIGINS OF MARQUESAN CULTURE IN THE CONTEXT OF EAST POLYNESIA**

Recent archaeological research suggests that disparate Polynesian cultures followed distinct patterns of transformation in their independent development from a common ancestral tradition. Excavation of a coastal habitation site on Tahuata, in the Marquesas, has yielded new data for assessment of the relationship between changes in subsistence patterns, material culture and ecology during the 1000+ year long archaeological sequence. These data support the hypothesis that island cultures underwent similar patterns of change and that between-island group variation reflects adaptation to different ecological settings.

**Rollefson, Gary O. (San Diego State)**

**[35] CONFESSIONS OF A CLOSET EMPIRICIST**

Prehistoric human behavior is often treated as a series of ecological responses to environmental constancy and change. The use of models assumes that both the cultural samples and the environmental data are congruent for a particular region, but this approach falters when models developed for one area are applied to the newly emerging record of relatively unexplored archaeological settings. Detailed patterns of artifact manufacture, use and discard must be identified and the ranges of environmental variability must be established, before explanations of human behavior can be confidently established.

**Romanski, E. J. (see Prentiss, W. C.) [44]**

**Roosevelt, Anna C. (American Museum of Natural History)**

**[73] MICROCOMPUTERS IN THE LOWER AMAZON PROJECT**

A project of geophysical survey and archaeological excavation has been computerized through collaboration of archaeologists, geophysicists, surveyors and computer specialists. The goal of computerization was to create a system with direct data logging from surveying instruments onto computer medium, communication of field data to data bases and computerized excavation records. Minark, Surfer and homemade programs comprised the software. The hardware included Topcon EDMs, Hewlett-Packard hand held computers, Zenith lap-top computers, Diconix printers and an ARCO solar powered battery charging system.

**Roosevelt, Anna C. (American Museum of Natural History) [Discussant 30]**

**Rosen, Arlene M. (Albright Inst. of Archaeological Research)**

**[58] BEYOND THE ARTIFACT: SEDIMENTS AND MICROARTIFACTS IN ARCHAEOLOGICAL ANALYSIS**

The concept of activity area analyses in time-specific strata is problematic at deeply stratified sites such as Near Eastern tells where artifacts from earlier periods are reintroduced into later strata.

Characteristics of the sediment matrices and microartifacts can determine the primary, secondary or tertiary nature of refuse. For example, floors with microlaminations contain primary artifact remains. Secondary refuse often has tiny bits of digested bone from scavenger feces, and tertiary remains from brick collapse are commonly larger in size and have a discontinuous grain-size distribution.

**Rossignol, Jacqueline (Navajo Nation)**

**[58] CHANGING RELATIONSHIPS BETWEEN ANALYTICAL UNITS AND INTERPRETIVE CONCEPTS IN A DEVELOPING ARCHAEOLOGICAL SCIENCE**

The coming of age of archaeology as an independent intellectual endeavor which can elucidate human behavior is realized in recent developments in theory and method. The structure of inquiry of successful archaeological research is elucidated and compared with the history of development of other disciplines. This structure of inquiry is grounded in the realization that the research agenda for archaeology must be generated from those insights derived from characteristics of the archaeological record *per se*, and not borrowed from history, ethnology or any other humanity or science. Specific examples of this development of appropriate variables (i.e. those that relate simultaneously to human behavior and the archaeological record) are analyzed.

**Roth, Barbara J. (Arizona) and Bruce B. Huckell (Arizona State Museum)**

**[34] CORTARO POINTS AND CULTURAL COMPLEXITY DURING THE LATE ARCHAIC**

Within the last five years, a distinctive style of projectile point has been recognized in the Sonoran Desert associated with Late(?) Archaic sites. This paper will focus on the morphology and technology of the point, as well as its spatial and chronological distribution. Theoretical postulations on the role of style in information exchange are used to propose that these points may represent a sociological unit bounded in both time and space. The documentation of another point style adds complexity to our efforts to understand the shift from hunting and gathering to agriculture and settled village life.

**Rouse, Irving (Yale)**

**[30] TRANSCULTURATION ON THE SALAOID FRONTIER IN EASTERN HISPANIOLA**

Recent radiocarbon measurements indicate that the Cedrosian Saladoid peoples invaded the West Indies from South America in the first centuries BC and established a frontier with the previous inhabitants on the eastern tip of Hispaniola. During the 800 years that this frontier was in existence, the El Caimito people who lived beyond it retained their Archaic settlement and subsistence patterns but acquired pottery making from the Hacienda Grande people of Puerto Rico. They were only able to reproduce the simpler vessel forms and modeled-incised designs of the latter's pottery; zoned incised crosshatching and painted designs were beyond their capabilities.

**Rowley-Conwy, Peter A. (Cambridge)**

**[50] ANIMAL BONES FROM ABU HUREYRA: METHODS OF STUDY AND THEIR RESULTS**

Gazelle dominates the very large sample of well stratified animal bones in the Epipalaeolithic settlement (Abu Hureyra 1) and the early phases of the Neolithic village (Abu Hureyra 2). Evidence is presented for a strongly seasonal kill concentrated in May. A method of mass killing of whole herds was used. Other faunal evidence suggests that the site was occupied for the greater part of the year. Large mammals form almost all the kill, and there is little evidence for broad-spectrum hunting.

**Russell, Glenn S. (UCLA)**

**[76] LONG-TERM SUBSISTENCE CHANGE AMONG THE SAUSA OF PERU: THE LITHIC EVIDENCE**

The relationship of long-term subsistence and social change among the Sausa, a prehistoric group located in the Upper Mantaro Valley, Peru, will be evaluated through comparisons of changing inventories of stone tools including groundstone, flake and blade tools. Comparisons of tools and raw materials among households and sites from the Early Intermediate (ca. 200 BC-AD 400) through the Wanka III (AD 1460-1532) periods will form the basis for a discussion of intensification of production and changing patterns of resource acquisition and their relationship to the shift from egalitarian to stratified social organization.

**Russell, G. S. (see Owen, B.) [40]**

**Saitta, Dean J. (Wilbur Smith Associates)**

**[2] TRIBAL POLITICAL ECONOMY AND SOUTHWESTERN SOCIAL CHANGE**

Among the theoretical concerns raised by a post-processual archaeology is an interest in the surplus labor process and its structural position in society. This paper outlines some ideas about the labor process in so-called "tribal" societies: its form, characteristic tensions and wider social effects. The productivity of these ideas for research into tribal social change is illustrated using data from the prehistoric American Southwest.

*Salmon, Merrilee H. (Pittsburgh)* [Discussant 2]

*Salmon, Merrilee H. (Pittsburgh)* [Discussant 22]

*Sandefur, Elsie C. (UCLA)*

[76] DOMESTIC ANIMAL USE IN THE CENTRAL ANDES: EARLY INTERMEDIATE PERIOD TO LATE HORIZON

Faunal remains from households of the Early Intermediate Period to the Late Horizon reflect animal utilization as agriculture intensifies. As more plant foods dominate the subsistence of the Sausa, animal foods change from a reliance on llama and deer to an increasing use of alpacas, suggesting the continual use of llamas to transport agricultural products combined with a growing textile industry. Animal burials throughout 2000 years reflect the importance of various species. Expanding state and imperial herds under different administrative controls have little effect on domestic meat consumption. Only the contributing species change.

*Sandor, Jonathan A. (Iowa State)*

[10] SOILS AT PREHISTORIC AGRICULTURAL TERRACING SITES IN NEW MEXICO AND PERU

Ancient farming sites offer an opportunity to observe long-term effects of agriculture on soils and landscapes. Two studies of prehistoric agricultural terraces in semiarid mountainous regions are presented to illustrate different long-term impacts of agriculture on soils. Soils cultivated between about 1000 and 1150 AD near the Mimbres Valley, New Mexico, still exhibit degradation, including accelerated erosion, compaction and losses of organic matter and nutrients. In contrast, soils cultivated during the past 1500 years or more in the Colca Valley, Peru have enriched fertility and favorable physical characteristics because of traditional soil management practices.

*Sanger, David (Maine)* [Discussant 75]

*Santley, Robert S. (New Mexico)*

[67] CRAFT SPECIALIZATION, REFUSE DISPOSAL, AND THE CREATION OF SPATIAL ARCHAEOLOGICAL RECORDS IN PREHISPANIC MESOAMERICA

Recent work on craft specialization has focused on variability in assemblage content and assemblage location as a basis for reconstructing facets of the economy of large urban centers in prehispanic Mesoamerica. Much of this work assumes that the contexts where assemblages are found represent the location where they were produced. Recent studies of site formation processes, however, show that the manner in which solid waste is disposed of is highly variable, depending on factors such as site population density, the availability of suitable dumping areas, the type of material discarded and the scale of the industry. Failure to take mode of waste management into account can therefore lead to faulty conclusions about the structure of urban economies. This problem is illustrated with case examples from Central Mexico, the Maya lowlands and the South Gulf Coast.

*Sassaman, Kenneth E. (South Carolina)*

[34] PRODUCTION FOR EXCHANGE AMONG PREHISTORIC HUNTER-GATHERERS OF THE SAVANNAH RIVER VALLEY

Social complexity is a function of the scale and organization of production. Among so-called egalitarian societies, production is organized domestically, with products valued for use, not exchange. Conversely, production for exchange is indicative of extralocal nonegalitarian relations which in eastern North America are well established by 4000 BP (e.g. Poverty Point). Fifteen hundred years earlier in the Savannah River Valley, certain individuals manufactured bifaces at an unprecedented scale. Based on the debitage and manufacturing failures at one of their production locations, the product output of their activity is calculated and this scale suggests that tools were produced for exchange. The implications of their activity for ensuing patterns of Late Archaic economic intensification are discussed.

*Sassaman, K. E. (see Brooks, M. J.)* [5]

*Sasso, Robert E. (Northwestern)*

[19] ASPECTS OF ONEOTA AGRICULTURE AND SETTLEMENT IN WESTERN WISCONSIN

Investigations of Oneota ridged field sites in the area of LaCrosse, Wisconsin, have yielded data pertaining to the nature of late prehistoric corn agriculture on the northern margin of the Prairie Peninsula. A recently completed settlement study provides a more complete regional perspective on the Oneota utilization of this environment. Taken as a whole, these studies form the basis for a reinterpretation of the Oneota adaptation in general and, in particular, for the role of corn agriculture within this adaptation.

*Sato, Etsuo (Japanese Technical Mission in Honduras)*

[42] INTERACTION BETWEEN LA ENTRADA REGION AND SURROUNDING AREA IN THE PRECLASSIC AND CLASSIC PERIOD

Analysis of ceramics of the La Venta Valley has provided important indications of possible ceramic relationships between the La Venta Valley and surrounding area from the Middle Preclassic to the Late Classic Period. The La Entrada region is located in a key cultural zone whose ceramics reflect influence from many other regions. This paper considers some processes of interaction between the area and the Copan Valley, Santa Barbara Region, Naco Valley, Sula Valley and Lower Motagua Valley based on new ceramic data.

*Saunders, Jeffrey J. (Illinois State Museum)*

[23] MAMMOTH PROCUREMENT BY CLOVIS PALEOINDIANS

Mammoth procurement strategies of North American Paleoindians are inferred from 12 localities where mammoth (*Mammuthus sp.*) remains (MN153) are associated with Clovis fluted projectile points (NISP56). Taphonomic analyses of assemblages from these localities focus attention on cultural factors in mammoth procurement. Five models have been proposed to identify the nature and implications of the man-mammoth interaction in North America, including 1) scavenging, 2) age-selective culling, 3) stampeding, 4) herd confrontation and 5) opportunistic culling. Evidence does not yet allow the ranking of these by importance but does not support (2) and indicates that (1) may have been more important than hitherto supposed.

*Savelle, James M. (Manitoba)*

[23] APPROACHES TO HUMAN-MEGAFAUNA RELATIONSHIPS IN PREHISTORY

An understanding of prehistoric hunter-gatherer adaptation and development in many parts of the world is directly dependent upon the interpretation of the relationship between these societies and local megafauna (e.g. whales, mastodons, mammoths, elephants). The interpretation of the nature and extent of such relationships, however, is in turn directly dependent upon an assessment of the role of megafauna in a society's economy. That is, do the archaeomegafauna represent active hunting, opportunistic hunting or opportunistic scavenging (including skeletons for feature construction), or some combination of the three? This paper outlines the nature of the problems inherent in, and current approaches to, such assessments.

*Scarborough, Vernon L. (Texas El Paso)*

[14] A TRANSITIONAL PERIOD PITHOUSE VILLAGE

The pithouse-to-pueblo transitional period in the American Southwest has received considerable attention. Excavation of over 70% of the principal residential areas within a small, single component late pithouse village (AD 1150-1200) near El Paso, Texas, provides behavioral definition to the period. Through an examination of trash location and artifact size, feature fill use sequencing and overall community plan, a "core activity area" for Meyer Pithouse Village has been established. This "caa" is the material correlate of structured supra-family cooperation, a condition held necessary in the acceptance of aboveground modular pueblo roomblock design.

*Scarry, C. Margaret (Florida State)*

[72] PLANT FOOD PRODUCTION AND THE EMERGENCE OF THE MOUNDVILLE CHIEFDOM

Buffering agricultural risk resulting from dependence on field production of maize is one of the most frequently cited explanations for the emergence of the Mississippian chiefdoms. Archaeobotanical data from the Black Warrior Valley in west central Alabama indicate increasing dependence on maize during the emergence of the Moundville polity. Comparison of environmental data and maize growth requirements indicates that the risk of valley wide crop failure is extremely low and that crop losses could have been buffered at the household or community level. Alternative explanations for apparently concurrent changes in food production and social relations are suggested.

*Scarry, John F. (Florida State)*

[71] STABILITY AND CHANGE IN CHIEFLY SOCIETIES: A CASE STUDY OF THE APALACHEE CHIEFDOM

Chiefdoms, particularly complex chiefdoms, are known as unstable organizational forms that emerge, collapse and reemerge. Most recent studies of organizational fluctuations in the Mississippian chiefdoms of the southeastern United States have concentrated on describing and explaining the causes of such political changes. An alternative approach is to ask why chiefly organizations persist. The Apalachee chiefdom of northwestern Florida underwent several periods of dramatic political change between ca. AD 1400 and 1650 but retained the organizational structure of a complex chiefdom. The changes are described and explanations for this organizational persistence are proposed.

Schaedel, Richard P. (Texas—Austin) [Discussant 63]

Schalk, Randall (Washington State)

[31] THE ROLE OF FOOD STORAGE IN LONG-TERM LAND USE CHANGE ON THE COLUMBIA PLATEAU

Two fundamentally different models of long-term land use change have been proposed for the archaeological record of the Columbia Plateau. One model postulates that "collector-like" systems, with substantial dependence upon food storage, would have been present from initial occupation of the region by humans. A second model proposes that early Holocene land use systems were "forager-like", in character with minimal dependence upon food storage. This model recognizes the initial evidence for "collector-like" land use systems in the middle Holocene, with intensified storage dependence through the late Holocene. These contrastive models are examined to illustrate current methodological approaches to determining the nature of storage dependence in the archaeological record.

Schaller, David M. (Arizona State) and Douglas R. Mitchell (Soil Systems)

[53] GROUND STONE ARTIFACT PETROGRAPHY: GEOLOGY AND ARCHAEOLOGY OF LOCAL TRADE PATTERNS FOR THE PHOENIX BASIN HOHOKAM

Recent petrographic analyses of Hohokam ground stone artifacts have linked production areas in the northern periphery of the Phoenix Basin to large village sites, some 30 to 40 km distant. The artifacts have been recovered at quarry and village sites dating from the late Colonial Period through the Classic Period. Petrographically, the basalt from which the artifacts are made contains an unusual combination of minerals, unlike other volcanic outcrops in this area. The geology of this basalt is described and the implications for local trade systems in the Phoenix Basin are discussed.

Schermer, S. (see Green, W.) [36]

Schiffer, Michael B. (Arizona)

[41] EFFECTS OF SURFACE TREATMENT ON HEATING EFFECTIVENESS OF CERAMICS

This paper reports experiments on the effect of surface treatments on heating effectiveness of cooking vessels. Replicas of vessels having different surface treatment, including smudging, polishing and texturing, were used in simulated cooking episodes. The results were quantified and implications drawn for understanding how the potter may have manipulated surface treatments in the design of cooking vessels.

Schiffer, M. B. (see Skibo, J. M.) [26]

Schlanger, Sarah H. (Zuni Archaeological Program)

[74] PLACE AND SPACE: PERSISTENT LAND USE PATTERNS AND SHIFTING SETTLEMENT PATTERNS

Survey and excavation programs in southwestern Colorado suggest that the Dolores Valley was at times the focus of sedentary occupations and at other times a resource for non-sedentary populations. When settlement systems that make use of functionally differentiated loci shift position across a landscape, the role which particular areas play in the system may remain constant, while particular places exhibit functional changes. Long-term stability in the use of areas within the valley is examined through the surface distribution of "isolated finds" and long-term continuity in use of places is addressed through comparisons of surface and subsurface assemblages at those places.

Schneider, Kent A. (USFS), Russell Kaldenberg (Santa Barbara County) and Gordon Peters (USFS)

[11] USDA-FS REGIONAL POLICY ON THE TREATMENT OF HUMAN REMAINS

The Southern and Eastern Regions of the Forest Service have met the treatment of human remains issue with a policy that tries to accommodate the major concerns. Excavation and removal of human skeletal remains and grave goods are restricted. The policy provides for scientific study and reburial. In preparing this policy, Native Americans, SHPOs, members of the archaeological community and others have been consulted. This paper describes the policy, its formulation and how it affects concerned parties.

Schneider, K. A. (see Mead, R. A.) [13]

Schoonover, G. (see Gilbert, C. R.) [32]

Schröder, Carmel (Rutgers)

[59] THE HISTORICAL ARCHAEOLOGY OF COLONIALISM IN SOUTH AFRICA

Excavation and analysis of material from an early Dutch fort in South Africa reveals the associated material culture of European colonists as well as of the indigenous pastoral foragers. Dietary remains

suggest that incursions were being made into more than cattle trade, as attested in historical sources, and that the colonial invasion of indigenous resources may have contributed strongly to the conquest and subjugation of Khoisan people.

Schroedl, G. E (see Boyd, Jr., C. C.) [56]

Schuldenrein, Joseph (Gilbert Commonwealth, Inc.)

[10] IMPLICATIONS OF SUB-SOIL LAMELLAE FOR RECONSTRUCTING PREHISTORIC OCCUPATION SURFACES

Subsoil lamellae are thin iron and clay enriched bands bracketed in Late Quaternary sedimentary sequences throughout the world. Their geographic distributions are not governed by any single obvious environmental or climatic parameter. Often they occur as stacked bands, and in such contexts they often articulate with stratified archeological deposits. Chemical and mechanical analyses suggest that these deposits are organically enriched, strongly calcareous and are dominated by fine-medium sands. Artifacts are sometimes aligned with lamellar planes. Arguments in support of pedogenic, hydro-morphic and anthropogenic origins are entertained with supporting data from archeological sites in several ecological zones.

Schurr, Mark and Brian G. Redmond (Indiana)

[62] EXPECTED CARBON STABLE ISOTOPIC COMPOSITIONS OF INCIPIENT MAIZE AGRICULTURALISTS

The biochemistry of collagen synthesis and ethnohistorical accounts of dietary practices show that carbon stable isotope ratios of bone collagen could produce biased estimates of maize consumption for populations undergoing the transition to maize agriculture. The carbon-13 content of bone collagen from incipient maize agriculturalists of prehistoric eastern North America may therefore be enriched and variable. Data from an early Late Woodland skeletal population from the western basin of Lake Erie are used to test these predictions.

Searles, Leland (Iowa State)

[31] PITTED AGAINST WINTER: FOOD CACHING AND AGRICULTURE OF THE MIDDLE MISSOURI INDIANS

This paper reviews results of an experiment involving the storage of native crops from northern Plains tribes and related attempts to monitor the effects of soil characteristics and microclimate on, and assess changes in, the edibility and nutrient content of food stored for winter. Tentative conclusions derived from the experiment are used to look at data on the storage of garden surpluses at Middle Missouri and Coalescent Tradition village sites. Statistical analyses of these data examine temporal variation in Middle Missouri and Coalescent Tradition storage with particular regard to the influence of soil characteristics on site selection and to changes in food cache capacity.

Seaman, Mark F. (Kent State)

[31] THE USE AND RE-USE OF FORT ANCIENT "ASH" PITS IN THE OHIO VALLEY: THE INTERSECTION OF TWO CULTURAL SUBSYSTEMS

This paper explains how these large, numerous and typically Fort Ancient facilities were used and discusses the implications for the scarcity of these deep, often bell-shaped pits in contemporary cultural complexes elsewhere in the Ohio Valley region. Data bearing on the use of "ash" pits for food storage and refuse disposal, as well as information on the relationship of these features to the development of specific taphonomic environments, are summarized and serve as a basis for general conclusions about long-term storage strategies.

Seltzer, Geoffrey O. (Minnesota)

[76] RECENT GLACIAL HISTORY OF THE CENTRAL PERUVIAN HIGHLANDS

Moraines of alpine glaciers above 4800 m a.s.l. in central Peru are common about 100 m below the present ice fronts. Their largely unvegetated surfaces form a sharp contrast with grass-covered older moraines of the last glaciation. The ice retreated from these positions by 1200 years ago. Subsequent minor readvances may have occurred between the 14th and 19th centuries AD, as recorded by several minor recessional moraines. Recession of the glaciers since 1961 has been particularly rapid. The climatic changes recorded by this glacial history have probably been minor.

Selvaggio, Marie M. and Robert J. Blumenschine (Rutgers)

[47] PERCUSSION MARKS: A NEW CLASS OF MODIFICATION TO BONE SURFACES

The micromorphology of pits and grooves inflicted during hammerstone-on-anvil breakage of mammal bones is reported systematically for the first time. Micromorphological and contextual criteria serve to distinguish percussion marks from other types of bone modification, especially carnivore

tooth marks, to which they can bear a superficial resemblance. The distinction is based on the association with percussion marks of straight, parallel microstriations oriented transversely to the bone's long axis and by their predictable anatomical location. The implications of percussion marks for interpreting the integrity of archaeological bone assemblages are discussed.

**Seymour, Deni J. (Arizona)**

**[51] SOBAIPURI SETTLEMENT ALONG THE UPPER SAN PEDRO VALLEY, ARIZONA**

Recent survey along a segment of the upper San Pedro River Valley, Arizona, has provided data on Sobaipuri occupation of the area. Information obtained on material culture, site structure and settlement patterns are discussed and compared with data from contemporaneous sites elsewhere in southern Arizona. In addition, previous notions about the nature and locations of sites visited by Kino and others in the 17th and 18th centuries are evaluated using Spanish documents and data from excavated sites.

**Shackel, Paul A. (Maryland) and Barbara J. Little (George Mason)**

**[2] THE STRUCTURING OF MEANING IN ANNAPOLIS, MARYLAND**

Defining and practicing post-processual archaeology is a struggle that promises conflicting and varying results. We are optimistic about the possibilities but recognize the difficulties of the theoretical and methodological issues. This paper is an attempt to explain some basic premises of post-processual thinking and to illustrate methods and results from case studies in Annapolis, Maryland. Meanings and alternative or neutral meanings are discussed. The sources of meaning are both the historical context and the present.

**Shackley, M. Steven (Arizona State)**

**[34] OBSIDIAN STUDIES IN THE SOUTHWEST: GEOCHEMICAL AND ARCHAEOLOGICAL PROBLEMS**

Recently, comprehensive geochemical and archaeological studies of obsidian sources in the Southwest have begun to mature on a level commensurate with research in California and Mesoamerica. Recent archaeological and petrological research in the region indicates at least five previously unreported sources in Arizona, Sonora and western New Mexico. Initial semi-quantitative X-ray fluorescence (XRF) analyses of archaeological silicic glass sources in this region identified a number of technical problems relevant for archaeological and petrological research. Chemical variability within some Southwestern sources appears to be relatively extensive and new data from the San Francisco Volcanic Field modifies the results of earlier research.

**Shafer, Harry J. (Texas A&M)**

**[14] MATERIAL EVIDENCE OF MIMBRES SOCIAL ORGANIZATION: ARCHITECTURAL AND MORTUARY PATTERNING AT THE NAN RANCH RUIN, GRANT COUNTY, NEW MEXICO**

Architectural and mortuary data from the NAN Ranch Ruin provide an unprecedented opportunity to factor out patterns in the residential and social structure of the ancient Mimbres. The data from two room blocks and outdoor areas of this large Classic Mimbres site reveal clues as to how this pueblo community was structured. Levels of architectural units include households, household clusters, room blocks and community. Evidence of social structure within these units is indicated in the mortuary patterning.

**Shaffer, Susan L. and Tami Mikesell (Heard Museum)**

**[32] MYTH-MAKING AND MYTH-BREAKING: MUSEUMS, ARCHAEOLOGY AND PUBLIC EDUCATION**

At the heart of every museum are collections. Using collections, museums attempt to fulfill various missions including research and education (dissemination). The three—collections, research and education—must go hand-in-hand. The museum constituency is diverse: adults, children, residents and visitors. Programs can be structured to reach specific audiences through effective public programming, teacher education, group tours/travel, succinct publications and a meaningful, relevant exhibition program. Using collections resources, museums are excellent local centers which can inform the public about archaeological methods, build appreciation for archaeological heritage, promote site preservation and examine the considerable lessons of human cultural diversity.

**Sharp, Nancy D. (Washington)**

**[65] HUNTING STRATEGIES AND THE TRANSITION TO AGRICULTURE IN THE NORTHERN SOUTHWEST**

Differences in dependence on agriculture may be used to predict variation in 1) the number and kinds of animal species exploited by prehistoric groups and 2) how particular species were processed

for transport and consumption. Examination of published data shows that Archaic, Fremont and Anasazi groups in the northern Southwest exploited the same range of animal species despite clear differences in settlement pattern and reliance on domesticated crops. However, analysis of selected Archaic and Formative faunas suggests that a shift in collection and processing of similar suites of animals does occur with the transition to agricultural subsistence.

**Shaw, Jr., C. W. (see Graybill, D. A.) [53]**

**Sheets, P. D. (see Owen, R. B.) [47]**

**Shelley, Phillip H. (Eastern New Mexico)**

**[66] HYPOTHESES OF INTRAREGIONAL TECHNOLOGICAL SPECIALIZATION AND EXCHANGE**

Evidence of lithic specialization from a Chacoan outlier, Salmon Ruin, is summarized. From this evidence several possible hypotheses concerning intercommunity and intracommunity production and exchange are proposed. These hypotheses are examined using the temporal and spatial distribution of ground stone axes in Chacoan and Mesa Verdean Anasazi sites. Systemic implications of these data are compared and contrasted to inferences of Chacoan timber and fuel use, dendrochronological studies of Chacoan structural wood and models of wood resource acquisition. Hypothesis refinement and suggestions for future research are discussed.

**Shelley, Steven D. and Jeffrey H. Altschul (Statistical Research)**

**[67] DEFINING GROUPS WITHIN COMPLEX PHENOMENA**

Defining meaningful groups is a problem faced at all levels of archaeological research. For complex phenomena, such as a city or region, distinguishing groups of constituent elements is especially difficult. At this level individual elements are usually recorded as sites, which by themselves represent complex entities. This paper outlines an approach which differentiates groups of sites using artifact assemblages. Two examples are presented. The first describes the search for internal social and political organizations of the Mesoamerican city of Teotihuacan. The second examines differentiating Heobikam habitation from nonhabitation sites using surface data from the Avra Valley of southern Arizona.

**Shimada, Izumi (Harvard)**

**[68] THE SICAN AND THEIR NEIGHBORS: A TENTATIVE CHARACTERIZATION AND ISSUES**

Ongoing research in Batan Grande has established a fine grained regional chronology and elucidated the character and evolution of the major material, organizational and ideological diagnostics of the Sican culture. This remarkable "Fusional" culture of the Middle Horizon was centered in the Lambayeque region. The Sican florescence (AD 900-1100) was partially the result of creative interplay with surrounding cultures including the Cajamarca culture of the adjacent highlands and the Manteno and Milagro cultures of coastal Ecuador. Complementary coast-highland and maritime coastal interaction may have originated at the time of Moche V transformation and northward relocation.

**Shimada, I. (see Cleland, K. M.) [63]**

**Shurben, (Arizona State Museum)**

**[69] ARCHAEOLOGY IS MORE THAN A DIG**

A program designed to offer information, materials and ideas for the study and teaching of archaeology to fourth through eighth grade students is described. The course involves presenting the methods and theories of archaeology through a two day introductory training session at a prepared site. Both preliminary and follow-up study plans complete the package. This unit offers firsthand experience in field techniques for the student, a chance to learn about the prehistoric past and the opportunity to turn learning into an enjoyable experience. The development and implementation of the program in the Tucson, Arizona, school district serves as a basis for evaluating this outreach strategy.

**Siegel, Peter E. (C.I.J.P.R.)**

**[70] DEMOGRAPHIC AND ARCHITECTURAL ORGANIZATION AMONG EARLY CERAMIC GROUPS IN THE CARIBBEAN**

Until very recently demographic and architectural organization have not been addressed in Caribbean prehistory. If our models of horticultural intensification and the processes of cultural dispersal are to be adequately evaluated, then serious attempts must be made to understand the organization and temporal stability of the settlements within which these processes are occurring. The present study addresses this deficiency by considering all known early ceramic Caribbean structures in terms of demographic correlates. Appropriate ethnographic analogues are incorporated into the analysis to

provide a set of baseline relationships between architecture and demography. Using well-excavated data in combination with the ethnographically based population figures, household demographic estimates are obtained for early ceramic period settlements in the Caribbean.

*Siemens, Alfred H. (British Columbia)*

[48] WETLANDS OF EL ORO, SOUTHWESTERN ECUADOR

Recent investigations of wetlands within the Tahuin Project have clarified the changing relationships of land and sea levels, the processes that molded this lowland habitat, as well as physical environmental influences on settlement and subsistence. Wetland forms have been classified, their distributions mapped, their topographic situations closely profiled and their stratigraphy sampled. Diagnostic aspects of the hydrological and botanical context have been isolated and microfossils are under study. Ethnographic inquiry has tested current perceptions and use. The wetlands concentrate an ample array of resources for complementary hunting, gathering and agriculture, and provide opportunities for the minimization of risk.

*Sikkink, Lynn L. (U of Minnesota)*

[76] AN ETHNOARCHAEOLOGICAL PERSPECTIVE ON HOUSEHOLD PRODUCTION AND CROP-PROCESSING IN THE JAUJA REGION, PERU

Ethnography on harvest and crop-processing, along with ethnobotanical data from the actual deposition which records these activities, is presented as a way to understand present-day Sausa household resource use in the Central Andes. The farming techniques employed by peasant farmers have both traditional and modern aspects, although there appear to be many similarities between modern peasants and their prehistoric counterparts from this region of Peru. This research provides information for interpreting archaeological deposits, furthering the goal of understanding prehistoric resource use.

*Simmons, Alan H. and Patricia A. Hicks (Desert Research Institute)*

[27] PROBLEMS AND PROGRESS IN SOUTHWEST ARCHAEOLOGY: A VIEW FROM THE HEARTLAND

Part of a recent overview for the U.S. Corps of Engineers Southwestern Division dealt with what many consider the Southwestern heartland. This paper summarizes that study, taking a critical view of problems encountered during its commission. The area is so rich in archaeological resources that there is an embarrassment of literature, although little consensus exists on many issues. These include problems of gray literature, methodology, inadequate or inappropriate publication, archaeological profiteering and a general lack of communication. Despite this, however, much archaeological research in the region remains innovative and continues its contribution to the discipline.

*Simmons, Alan H. (Desert Research Institute)*

[35] DESPERATELY SEEKING HIPPOS: EARLY MAN AND PYGMY HIPPOPOTAMUS IN CYPRUS

Recent testing at Akrotiri Aetokremnos in Cyprus has revealed an apparent association of cultural remains with pygmy hippopotamus. Initial dates of ca. 9500 BC suggest that the site is the earliest in Cyprus. Equally significant is the presence of pygmy hippopotamus, presumed to have been extinct before man's arrival. Investigations thus far have been extremely limited and the scenario discussed above is tentative. However, the reaction of the archaeological community has been striking and includes an inflexible mindset refusing to acknowledge even the possibility of this scenario. This paper summarizes the data and discusses these reactions and their implications.

*Simmons, A. H. (see Kafafi, Z.) [4]*

*Simon, Arley W. (Arizona State)*

[26] AN INTEGRATED CERAMIC ANALYSIS OF INTERSITE RELATIONSHIPS USING CENTRAL ARIZONA PLAINWARES

Complex village sites which produced predominantly plainwares characterize much of the prehistoric American Southwest. These undecorated ceramic collections have been considered of little interpretive value. A systematic test of intersite relationships using plainwares from central Arizona sites was undertaken with Integrated Ceramic Analysis. This approach uses typological attributes, performance characteristics and compositional attributes integrated through experimental design matrices. Results indicate that by using an integrated approach, plainware analysis has interpretive potential in the resolution of technological and methodological questions.

*Simon, Brona G. (Massachusetts Historical Commission)*

[11] AN EVALUATION OF THE RESULTS AND ARCHAEOLOGICAL BENEFITS OF THE IMPLEMENTATION OF THE UNMARKED BURIAL LAW IN MASSACHUSETTS

Massachusetts unmarked burial legislation, in effect since 1983, has proven to be an effective tool for the protection of sites located on both public and private property. It requires the careful archae-

ological investigation of burial sites and has resulted in private support of archaeological surveys and the systematic physical analysis of skeletal remains. It allows for the reburial of Native American skeletal remains and has resulted in the emergence of Native American constituency support for archaeological site preservation. The development and results of Massachusetts burial legislation are described and evaluated from an archaeological, anthropological and public policy point of view.

*Smith, Michael E. (Massachusetts)*

[2] FORAGING FOR MEANING: SEEKING STRUCTURE IN PALAEOLITHIC SOCIETY

Paleolithic archaeology has become narrow in outlook. Explanations are in terms of risk, adaptation and exploitation strategies. This results from 1) the search for behavioral generalizations and 2) a limited conception of what the 'data' reveal. Despite calls for a contextual approach, little has been done. This is not a product of impoverishment, but rather a limited imagination. A contextual approach comes with meaningful questions. This paper attempts to make clear some of these. One fruitful advance lies in the relationship between economy, social structure and technology, outlined by recent French technological thinking, and Marxist work on egalitarian societies.

*Skibo, James M. (Arizona), David J. Hally (Georgia—Athens) and Michael B. Schiffer (Arizona)*

[24] THE MANUFACTURE AND USE OF FIBER-TEMPERED POTTERY FROM THE SOUTHEASTERN UNITED STATES

This paper reports the results of a technological and use-wear study of Late Archaic fiber tempered pottery from the southeastern United States. Radiographic and technical analyses of sherds from coastal and inland sites provide information on how the vessels were formed. The original firing temperature of the vessels is determined by dilatometry (measurement of thermal expansion). Use-wear analysis of the sample tests the hypothesis that fiber tempered pottery of the Late Archaic was used for cooking over an open fire. The results, placed within the context of the Late Archaic adaptation in the Southeast, add to the growing body of information about how the first ceramics in North America were made and used.

*Smith, Bruce D. (Smithsonian)*

[6] THE CORPORATE AND DOMESTIC SPHERES OF HOPEWELLIAN FARMING SOCIETIES

The food production patterns, corporate/ceremonial centers and habitation settlements of Hopewellian societies are examined over a two century span (AD 0-200) over a broad area of the midlatitude eastern United States. Representing the domestic sphere of Hopewellian polities, habitation sites appear to be limited to small, apparently self-sufficient and egalitarian 1-3 household farming settlements dispersed along river and stream valley corridors. Spatially separated and seemingly partitioned behaviorally from such domestic sphere small farming settlements, Hopewellian corporate/ceremonial centers exhibit considerable evidence of large scale group integration and complex belief systems.

*Smith, Bruce D. (Smithsonian) [Discussant 72]*

*Smith, Craig S. (Mariah Associates)*

[18] INTRASITE SPATIAL RELATIONSHIPS AND PREHISTORIC HUNTERS AND GATHERERS OF SOUTHWEST WYOMING

A first step toward understanding subsistence and settlement strategies of prehistoric hunter-gatherers is the delineation of the kind, time of year and location of past activities at specific sites. Examination of intrasite spatial relationships of features and other recovered remains provides clues to the use patterns that took place. Comparisons of these patterns with the results from ethnoarchaeological studies of modern hunter-gatherers indicate possible types of activities. Recent excavations at sites in southwest Wyoming provide an excellent opportunity to explore this approach.

*Smith, David G. (California)*

[45] WINDOVER SERUM PROTEIN PHENOTYPES

Soluble serum proteins (approximately 1 mg/gm bone) were removed by saline extraction from bone samples of 75 individuals. Protein phenotypes were separated electrophoretically, transferred to nitrocellulose membrane and stained using an enzyme-linked double antibody assay. Proteins studied included albumin, transferrin, haptoglobin, third complement component (C3) and vitamin D-binding protein (Gc). Some phenotype patterns can be resolved and additional studies attempting to characterize the genetic structure of the Windover population are underway.

*Smith, H. A. (see Garber, J. E.) [49]*

*Smith, Michael E. (Loyola)*

[37] LONG-DISTANCE TRADE UNDER THE AZTEC EMPIRE: THE ARCHAEOLOGICAL EVIDENCE

This paper presents an archaeological model of Aztec long-distance trade based upon regional distributions of Late Aztec ceramics and obsidian outside of the Basin of Mexico and localized

occurrence of Aztec and other imports in excavated residential contexts in Morelos. Among the implications of the model, considered together with ethnohistoric data, is a high volume of exchange within the empire, with much of this trade not under imperial control. Elite demand was an important factor structuring exchange relationships, although access to exotic goods was not limited to the elite in most areas.

*Smith, Monica L. (UCLA)*

[4] ROMAN IMPERIAL EXPANSION AND THE PRICE OF COLONIALISM: AN EXAMPLE FROM ROMAN BRITAIN

Roman expansion into Western Europe from the 1st century BC to the 1st century AD combined military strength with economic motives, one of the most important of which was the need for an increased grain supply. Cost-benefit analysis of colonial expansion shows that a favorable balance must be achieved between the political and military costs of conquest and the economic return. With these variables a model for predicting the success of any particular colonial acquisition can be developed. The Roman decision to keep the British colony despite an initial and continual high military cost is better understood in light of the increase in grain and metal production immediately before and during the Roman occupation.

*Smith, William C. (Central Washington)*

[13] SAGEBRUSH AND GRASS: GIS PREDICTIVE MODELING

This paper describes the use of GRASS (Geographical Resources Analysis Support System, a GIS recently released by the U.S. Army Construction Engineering Research Laboratory) in developing an inductive model for prediction of prehistoric site locations on the Yakima Firing Center, a 250,000 acre military training installation in the semiarid foothills of central Washington. Emphasis is put on the value of a GIS for such simple (but often practically difficult) tasks as land area measurement, proportional assessment of surveyed vs unsurveyed areas, chi-square evaluation of expected and actual site distributions and use of Landsat Thematic Mapper imagery in conjunction with USGS digital terrain data.

*Smyth, Michael P. (New Mexico)*

[31] STORAGE, WEALTH AND SOCIAL STRATIFICATION: AN ETHNOARCHAEOLOGICAL PERSPECTIVE

Recent research into maize storage behavior among the Yucatec Maya has enabled the development of a storage model based on the organizational structure of spatial usage and activity scheduling at modern households. This model provides an interpretive framework for storage identification by revealing the spatial patterning of material residues. Contemporary household information also indicates that storage plays an important role in the development of economic differences. These data show how different organizational aspects of storage behavior in association with other household variables provide a means to monitor differential wealth. Using storage as a surrogate measure of status/wealth could significantly improve our understanding of social stratification.

*Snow, David H. (Cross Cultural Research Systems)*

[33] NORTHERN RIO GRANDE PUEBLO PREHISTORY: A CHRONOLOGICAL FRAMEWORK

Cultural and historical processes evident in or inferred from the archeological record require the support of continuing resolution of temporal boundaries. The growth of Rio Grande Pueblo culture from Developmental through early historic times requires periodic resynthesis, particularly in the light of changing archeological research questions, issues and methodological strategies. The degree to which spatial and temporal variability in pueblo processes can be recognized or modeled depends on a firm chronological framework. This paper reviews changes in the earlier temporal frameworks in the northern Rio Grande.

*Snyder, J. G. (see Boone, J. L.) [67]*

*Snyder, Sandra L. (Oregon)*

[38] PREHISTORIC LAND USE PATTERNS IN THE CENTRAL OREGON CASCADE RANGE

Relationships between site locations and the distribution of major resources within a 1/2 mile radius of that point offer an explanation for montane settlement patterns. Of particular interest are nonforested environments, both wet and dry, which support 85% of Cascade's flora and provide primary forage for deer and elk. These landtypes are shown to be more frequently associated with upland site areas than expected. A natural tendency toward self-perpetuation suggests a level of predictability for aboriginal populations seasonally exploiting plant and animal resources at all elevation zones in these mountains.

*Soffer, O. (see Vandiver, P.) [9]*

*Soto, Ruben Garcia (Universidad de San Marcos)*

[76] EARLY HORIZON SETTLEMENTS IN THE UPPER MANTARO VALLEY, PERU

The occupation of the Upper Mantaro Valley during the Early Horizon is characterized by a low density of settlements, herding of camelids as the main economic activity with complementary agriculture and a good deal of short and long distance exchange of goods. Our earliest phase, Yaouran, is represented by two habitation sites with ceramics of the late Initial Period, one of them associated with ceremonial architecture. Ataura is so far the only settlement in the whole valley with Janabari-like pottery, suggesting that it could be a "Chavin colony." More sites date to the latest Cochachongos phase. Most of them appear to be seasonal, but with a very distinctive ceramic assemblage that might show the actual beginnings of the development of the Sausa as a distinct local society.

*Spackman, W. (see Stout, S. A.) [45]*

*Spargo, L. (see Anderson, D.) [28]*

*Spoth, Carl (Wyoming)*

[49] ISLA PUNA: SEA MERCHANTS' HINTERLAND

A systematic baseline survey of the aboriginal settlement system on Puna Island, southwest Ecuador, was undertaken in the latter half of 1987. The development of this key Conquest Period trading center is manifested in the structure and distribution of inland settlement in relation to resources through time and in the appearance of exotic trade items in core and hinterland locations. Sites ranging from Preceramic through Spanish Colonial Periods demonstrate the emergence of a dynamic and influential mercantile culture. The relationship between external exchange and internal development is explored.

*Spoth, John D. (Michigan)*

[46] HORTICULTURE AND LARGE MAMMAL HUNTING: THE ROLE OF RESOURCE DEPLETION AND THE CONSTRAINTS OF TIME AND LABOR

Faunal remains from many prehistoric horticultural village sequences in the American Southwest display a distinctive trend through time toward increasing relative emphasis on larger mammals, especially ungulates. This trend runs counter to the one that most archaeologists would anticipate on the basis of arguments from classic diet breadth models—a decrease through time in the ratio of large to small mammals. It is suggested that the faunal shift reflects fundamental changes in the socioeconomic sphere, caused by the aggregation of populations into more residentially stable and more territorially based communities. The consequences of these socioeconomic changes are explored using a variety of comparative ethnographic data.

*Spindler, Katherine A. (Arizona State)*

[55] CHANGING FAUNAL PROCUREMENT STRATEGIES AT GRAN QUIVIRA PUEBLO, NM

Enclosed data from trash middens at Gran Quivira Pueblo document major shifts in the source of meat in the Gran Quivira diet. Local fauna, principally antelope, is replaced at around AD 1500 by bison. At approximately the time of historic contact, small fauna then replace bison in the archaeological record. These patterns in the faunal data are discussed in the context of changing local faunal resource availability, the development of long distance trade with Plains nomads and Spanish disruption of this trade system in the seventeenth century.

*Spindler, Katherine A. (Arizona State)*

[56] COLONISTS, HUNTERS, AND FARMERS: PLAINS/PUEBLO INTERACTION IN THE SEVENTEENTH CENTURY

Prior to Spanish contact Plains hunting populations and Pueblo farmers had developed an ongoing exchange system in which corn and other Pueblo goods were traded for bison products. Spanish colonization of the Rio Grande Valley in the early 1600s had profound effects on the nature of Plains/Pueblo trade. This paper discusses the responses of the Plains/Pueblo interactive system to those aspects of Spanish colonization which were most significant to this interaction. These include 1) the allotment of land grants to Spanish colonists, 2) the introduction of domestic stock and new species of crops and 3) Spanish trade with Plains groups.

*Stafford, C. Russell (Indiana State) and Edwin R. Hajic (Illinois—Urbana)*

[55] CENSOENVIRONMENTAL APPROACHES TO UNDERSTANDING PREHISTORIC SETTLEMENT STRATEGIES

Prehistoric archaeology has focused in part on the density of prehistoric debris across a region. One approach to discrimination of settlement strategies is the construction of models congruent with

potential change in geomorphic processes and landscapes and spatio-temporal scales of environmental variation. Archaeological and geoenvironmental data from the Mississippi and lower Illinois Valleys are used to build settlement models that consider 1) viewing the landscape at different scales, 2) landform-sediment assemblages and 3) the cumulative nature of the archaeological record under a distributional approach.

*Stahle, David W., Malcolm K. Cleaveland and John G. Hehr (Arkansas)*

[71] PROGRESS ON THE PREHISTORIC DENDROCHRONOLOGY OF THE SOUTHEASTERN UNITED STATES

Five millennia-long bald cypress (*Taxodium distichum*) tree-ring chronologies have been developed in the Southeast and additional 800 to 1000-year series are under development. These new chronologies should be useful for the tree-ring dating of wood remains from Mississippian Period archaeological sites and all are sensitive to growing season climate conditions. The longest cypress chronology has been used to reconstruct a drought index for North Carolina from AD 372 to 1985 which indicates statistically significant changes in growing season climate between many 30-year intervals, particularly during the Medieval Warm Epoch.

*Staller, John E. (SMU)*

[48] UNIFACIAL LITHIC INDUSTRY FROM LOWLAND EL ORO, IN SOUTHWESTERN ECUADOR

In an intensive settlement survey a lithic industry was identified at 374 sites which range from Early Formative (3300-1500 BC) to the Integration Period (AD 800-1100). The main components are identified and assessed for their significance regarding subsistence. Comparisons are drawn between the plant processing tools of this assemblage and those from better known culture complexes of the west coast. The industry has technological affinities to others of the Intermediate Area, suggesting technological and adaptive continuity and long distance interaction, but also fundamental differences in subsistence adaptations.

*Steele, D. Gentry and Ben W. Olive (Texas A&M)*

[27] TRENDS IN BIOARCHEOLOGICAL RESEARCH IN CENTRAL AND SOUTHERN TEXAS: CHANGES IN THE DATA BASE AND THEORETICAL ORIENTATION

Bioarchaeological research followed the North American trend of shifting interests from distinguishing temporal and spatial samples to paleodemography and paleopathology. Additionally, a spatial shift in skeletal samples was documented; single interments were typically recovered in western Texas during the first half of the century, while more recent research has concentrated upon recovery of material from multiple interment sites in eastern Texas. Changes in collecting procedures and curation have also occurred. Earlier recovered remains were sporadically collected and inconsistently curated while more recent materials from multiple interment sites have been more systematically collected and curated. These shifts in the data base have altered the nature of the questions which can be addressed by bioarchaeologists as much as the questions asked have affected the nature of the samples recovered.

*Stein, Julie K. (Washington)*

[10] ORGANIC MATTER: A CLUE FOR INTERPRETING LANDSCAPE EVOLUTION

The organic matter of both buried archaeological deposits and existing soils is one element often studied to interpret landscape evolution. The depositional history and post-depositional cycling of organic matter, in both ancient and modern sites, can be interpreted by determining the source of the organic material, how it was transported to the site and, most importantly, how it has been altered since deposition. Soils that have developed in archaeological parent material contain organic matter that has accumulated in a fashion that is similar to soils from uninhabited sites. The principal difference between organic matter from cultural and noncultural settings lies in the amount of organic matter, its location in the solum and the amount of time that chemicals and weathering products have been interacting with the organic matter.

*Stein, J. K. (see Whittaker, E)* [75]

*Stephen, David V.M. (Pima Community College)*

[73] PERSONAL COMPUTERS—A TOOL FOR MODERN TIMES?

The early endeavors to utilize personal computers in field archaeology were considered a novelty by many members of the profession. With the decreased size and increased capabilities of personal computers, a growing number of researchers are finding personal computers can be a valuable tool if used in an appropriate manner. However, the simple addition of a personal computer or piece of computerized equipment seldom results in the anticipated increase in productivity without careful

planning and proper implementation. Rationale and strategies for using personal computers will be presented and cases of successful and unsuccessful attempts in using personal computers discussed.

*Steponaitis, Vincas P. (North Carolina), M. James Blackman (Smithsonian Institute) and Russell Weisman (SUNY Binghamton)*

[26] CHEMICAL AND MINERALOGICAL CHARACTERIZATIONS OF MISSISSIPPAN POTTERY

Assemblages dominated by undecorated sherds present special problems when studying interregional exchange because one is forced to use compositional criteria to identify nonlocal wares. This paper describes the results of a pilot study in which samples of Mississippian pottery from many different regions of southeastern U.S. were examined by means of three techniques: neutron activation analysis, heavy minerals analysis and conventional thin-section analysis. The relative effectiveness of the three techniques in discriminating production loci is evaluated and the nature of interregional differences in composition is discussed.

*Stewart, R. Michael (Louis Berger and Associates)*

[5] STRATIGRAPHIC SEQUENCES AND ARCHAEOLOGICAL SITES IN THE DELAWARE VALLEY: IMPLICATIONS FOR PALEOENVIRONMENTAL CHANGE IN THE MIDDLE ATLANTIC REGION, EASTERN U.S.

Discontinuities in soil profiles at upland sites indicate one or more episodes of erosion 6000 BC and 4000 BC. Stratigraphic sequences in floodplain settings show a general increase in depositional rates and a decrease in long-term landscape stability beginning at about the same time. Reduced vegetation cover and changes in precipitation rates or altered seasonal cycles of rainfall are the conditions implied by these phenomena. Aeolian depositions occur throughout the past 10,000 years and suggest some degree of continuity in the conditions fostering wind activated processes. These data are compared with the results of local and regional palynological studies and alternative hypotheses are explored.

*Stewart, R. M. (see Custer, J. E)* [28]

*Stodder, Ann L.W. (Colorado)*

[27] THE STATUS OF BIOARCHEOLOGICAL RESEARCH IN THE AMERICAN SOUTHWEST

Results of the Bioarchaeological Resources Survey of the U.S. Army Corps of Engineers Albuquerque District (encompassing New Mexico, south central Colorado and Trans-Pecos Texas) are summarized in this paper. Information from approximately 600 archaeological sites with cultural affiliations ranging from Archaic to Historic is used to trace the development and assess the current status of research on the biology of Southwestern populations. While a great deal of research remains to be done, much of the valuable bioarchaeological data is hidden in dissertations and dispersed in hundreds of CRM reports which should be systematically integrated into research oriented databases.

*Stone, Glenn Davis (School of American Research)*

[52] AGRICULTURAL INTENSIFICATION AND RESIDENTIAL MOBILITY: AN ARCHAEOLOGICAL PERSPECTIVE ON BOSERUP

Boserup's model of agricultural intensification is widely used in archaeology, but has been criticized for denying migration and residential mobility. From an archaeological perspective, it is more fruitful to see the model as applying only to a limited part of the trajectory from hunting and gathering to industrial agriculture. However, the basic premise of increasing investment in land under rising population applies to the entire evolutionary sequence and helps explain the relationship between population density and mobility. Examples are provided from an ethnoarchaeological study of agrarian settlement patterns in the West African savanna.

*Stone, Jane (Montana State)*

[66] COMPUTERIZED IMAGE STORAGE AND MANIPULATION: TOOLS FOR ARCHAEOLOGY

Computerized storage offers the potential to facilitate and expand the uses of images (photographs, drawings, maps, video). The automation of data recording for cataloging or mapping, collections housing, museum archives, educational programs and electronic publishing are accomplished without compromising either the artifact or the original image. The system, developed for a museum, demonstrates the potential of a low cost system for image manipulation which may be customized for any project. Measurements or other data can be recorded directly into a database or drawings and maps created directly from the image. Examples of current capabilities and planned enhancements are discussed.

*Stone, Tammy T. (Arizona State)*

[45] CONSERVATION OF BONE FROM WET LAND SITES

Large quantities of waterlogged bone were recovered from the Windover Site near Titusville, Florida. Long-term exposure to a water saturated matrix can lead to structural changes causing the bone to become unstable. Consolidants, including Polyethylene Glycol and Rhoplex AC-33, were utilized in an attempt to stabilize the bone. The merits and drawbacks of each will be discussed, especially the implications for long-term structural and chemical stability of the material.

*Stothert, Karen E. (Texas—San Antonio)*

[63] RECONSTRUCTING PREHISTORIC COASTAL INTERACTION IN THE ECUADOR-NORTH PERU PROVINCE IN THE PERIOD A.D. 600-1000

This paper is a summary of the scant archaeological evidence of the coastal (especially maritime) peoples of Ecuador in the period AD 600-1100 and it suggests the nature of their sociocultural systems and the spheres of interaction in which they participated. Historical and ethnographic information as well as archaeological data from earlier periods are employed to model the possible relationships with northern Peruvian peoples in this period.

*Stout, Scott A. (Southern Illinois) and W. Spackman (Pennsylvania State)*

[45] PALEOECOLOGY OF THE WINDOVER FARMS ARCHAEOLOGICAL SITE AS DETERMINED BY THE PETROLOGY AND CHEMISTRY OF THE PEATS

The peats of the Windover Farms Archaeological Site (Titusville, Florida) were examined microscopically and chemically to aid in reconstructing the local vegetation and hydrologic conditions over the past 11,000 years. Microtomed thin-sections of paraffin embedded peat cubes (along with various chemical analyses) throughout a continuous 3.2 m core through the deposit revealed five distinct peat facies. Our observations show that the site was dominated by a hardwood swamp community (*Cephalanthus-Myrica-Salix*) during the time of aboriginal occupation.

*Sullivan, Alan P. (Arizona)*

[3] SHERD REFITTING AND THE RECONSTRUCTION OF HOUSEHOLD CERAMIC TECHNOLOGY

The implications of refitting an entire ceramic collection (sherds and whole vessels alike) recovered from a small Anasazi village near the Grand Canyon are explored. Analysis of refitting patterns and the number of sherds and weight of each reconstructed vessel or vessel fragment illustrate how refitting allows archaeologists to (1) develop reliable interpretations of the meaning of ceramic artifacts from different contexts (e.g., floor vs fill, floor features vs room floors) and (2) advance strong inferences about the effects of different behavioral and nonbehavioral processes on the production of ceramic assemblage variability.

*Swezey, William R. (Centro de Investigaciones Regionales de MesoAmerica (CIRMA))*

[29] THE CAKHAY/CAKCHIQUEL PROJECT

CIRMA's Cakhay project is part of a larger regional analysis of the Cakchiquel speaking area of Guatemala which involves ethnographic, linguistic, historic, ethnohistoric and archaeological research. Phase I involved a thorough surface survey of the site of Cakhay (old Solola) recovering some 32,000 sherds. Phase II involved the excavation of stratigraphic pits to determine the order of deposition. Evidence of Tohil Plumbate was found more than 2 m below a sealed floor located under a heavy deposition of Amate ware. The third phase involved a large regional survey to determine the size, location and periods of major occupation at the sites located in the Cakchiquel speaking region.

*Szuter, Christine R. (Arizona)*

[57] HUNTING BY PREHISTORIC HORTICULTURALISTS IN THE AMERICAN SOUTHWEST

This paper examines the impact of horticulture and associated socioeconomic changes on animal procurement among prehistoric Southwestern groups. The subsistence base was altered due to 1) the introduction and intensification of agriculture, 2) increases in both population and site size and 3) diversification of site activities that modified the environment. These socioeconomic, demographic and environmental factors affected animal populations. They also led to changes in the hunting of large and small game as well as differences in the diversity of species in archaeofaunal assemblages. Alterations in hunting patterns will be discussed specifically for the Hohokam and more generally for other Southwestern groups.

*Tagg, Martyn D. (USFS)*

[39] PROJECTILE POINT TYPOLOGY FOR THE SOUTHERN COLORADO PLATEAU

A time-sensitive projectile point typology for the southern portion of the Colorado Plateau has been developed using information from ongoing archeological survey work sponsored by four different

agencies. Recent work at Petrified Forest National Park (National Park Service), Apache-Sitgreaves National Forests (U.S. Forest Service), Homolovi State Park (State Lands) and Bureau of Land Management sponsored projects in the vicinity has recovered a large number of projectile points representing a virtually complete chronological series. Examples from each temporal period are illustrated and discussed.

*Tankersley, Kenneth B. (Glenn A. Black Laboratory of Archaeology)*

[34] FORAGERS DO NOT LIVE BY CHERT ALONE

For the past 30 years scholars have emphasized that the selection of high quality lithic material for the manufacture of fluted projectile points restricted foraging strategies and settlement mobility. Based on the petrographic analysis of more than 700 fluted points from Indiana, Kentucky and Ohio, this paper will defend the position that early Paleoindians in the Midwestern United States displayed a pattern of unrestricted lithic exploitation and highly mobile foraging, regardless of their geomorphological setting. It is argued that settlement was controlled primarily by the availability of food and water resources rather than the availability of high quality lithic raw material.

*Taube, Karl A. (Yale)*

[7] THE ICONOGRAPHY OF LIGHTNING AT CHICHEN ITZA

Representations of lightning at Chichen Itza are diachronically considered in terms of contemporary Yucatec belief and prehispanic concepts of lightning. Certain lightning beliefs are found to be extremely old and may be traced to the origins of the Classic Period in both Central Mexico and the Maya region. It is argued that the symbolism of lightning at Chichen Itza does not derive from a contrived merging of Central Mexican and Mayan beliefs, but rather from an older shared cultural background.

*Teague, L. S. (see Deaver, W. L.) [25]*

*Thayer, Cynthia A. (Pittsburgh) and Nathan D. Hamilton (Southern Maine)*

[5] PREHISTORIC SETTLEMENT PATTERNS AND THE PALEOHYDROLOGY OF THE MOOSEHEAD LAKE BASIN

Dam reconstruction in the Moosehead Lake Basin of north central Maine has resulted in the drainage of 19 square km of inundated landscape. Detailed analysis of the exposed land through archaeological, geological, hydrological and air photo studies were undertaken in 1983 and 1987. Archaeological survey has identified ca. 150 prehistoric sites and abundant cultural remains, many assigned to temporal periods. The goal of this research is the reconstruction of Holocene hydrological regimes and their relationship to prehistoric settlement patterns. The data thusfar suggest one or more periods of high lake levels with associated sites over 1 km from the modern hydrologic features.

*Thomas, B. (see Thomson, J. W.) [75]*

*Thomas, David H. (American Museum of Natural History)*

[1] INTRODUCTION TO THE COLUMBIAN QUINCENTENARY SYMPOSIA

This is the initial symposium sponsored by the Society for American Archaeology to anticipate the 1992 Columbian Quincentenary. This three year series of symposia will explore the strategic diversity evident during the early colonial period in the Spanish Borderlands. Participants—including archaeologists, historians, Native Americans, geographers and art historians—examine the Spanish strategies employed and the diverse Native American counter-strategies that evolved to cope with European intrusions. Papers will also evaluate the success and relevance of contemporary archaeological inquiry into European/Native American interaction in the Spanish-American Borderlands.

*Thomas, David H. (American Museum of Natural History)*

[6] SAINTS AND SOLDIERS AT MISSION SANTA CATALINA (GEORGIA): ALTERNATIVE HISPANIC DESIGNS FOR COLONIAL AMERICA

The character of European settlement in the Spanish Borderlands differed radically from the colonial strategies employed to the north. Recent excavations at Mission Santa Catalina de Guale (St. Catherine Island, Georgia) are not only fleshing out the specifics of the Hispanic-Native American interface, but they also highlight the importance of religious conversion as a mechanism for extending Spanish hegemony throughout 16th and 17th century La Florida.

*Thompson, C. (see Wilde, J. D.) [69]*

*Thomson, James W., Cathy A. Gilbert (National Park Service) and Bryn Thomas (Eastern Washington)*

[5] HISTORIC TREATMENT OF A PREHISTORIC NORTHWEST LANDSCAPE

Upon their 1860 arrival at Garrison Bay, San Juan Islands, the British Royal Marines chose for their permanent area the site of a former prehistoric fishing village. Fourteen years of occupation by the

marines caused considerable changes to the prehistoric midden and the surrounding landscape. An illustrated talk will show combined research efforts by an historic landscape architect and archaeologists to produce a design characterizing the British manipulation of the prehistoric landscape. This information will provide park managers guidance in the protection of both the historic scene and the remaining prehistoric landscape and also assist University of Washington researchers in directing their excavations of the midden area.

**Thunen, Robert L. (North Florida)**

**[28] GEOMETRIC ENCLOSURES OF THE MID SOUTH**

Geometric enclosures are key architectural remains to an archaeological understanding of the social complexities of the Middle Woodland Period. An architectural analysis of enclosures in the Mid South is presented. Seven geometric enclosures are examined within the context of their form and the degree of site planning. All seven enclosures are found to lack the degree of planning and structural complexity of enclosures found in Ohio.

**Tieszen, L. L. (see Decker, K. W.) [53]**

**Todd, Lawrence C. (Denver) and David J. Rapson (New Mexico)**

**[61] BONEBED ANALYSIS AND PALEOINDIAN STUDIES: THE MILL IRON SITE**

Excavation and analysis of multi-animal bonebeds have been fundamental to paleoindian studies. In recent years, many of the accepted interpretive conventions have been demonstrated to be inadequate. Analysis of the bison bonebed at the Mill Iron Site incorporates several taphonomic techniques in the investigation of the deposit's formation history. Although documentation of assemblage and spatial attributes of bone weathering and deterioration, skeletal disarticulation, preferred orientation and post-occupational modifications can be used to study the unique formation history of a bonebed, results of such specific analyses must be incorporated into a more general interpretive framework. Comparison of the Mill Iron Site to other High Plains bonebeds expands our understanding of the range of variability in paleoindian hunting strategies.

**Todd, L. C. (see Rapson, D. J.) [3]**

**Toll, Mollie S. (New Mexico)**

**[70] BOTANICAL TRASH AT A 16TH CENTURY SPANISH ENCAMPMENT IN THE RIO GRANDE VALLEY, NEW MEXICO**

Flotation and macrobotanical remains from this site offer an intriguing combination of morphometric consistency with local Pueblo Indian farm products and complete disregard for the ample variety of wild plant food resources available in the immediate surroundings. Flotation assemblages from Archaic and Puebloan sites, regularly characterized by a wide array of weedy annuals augmented by grasses and perennial fruits and nuts, stand in distinct contrast. Certain aspects of this sizeable floral assemblage provide compelling evidence of distinctive Spanish dietary patterns; yet, shallow deposits and attributes of the assemblage itself suggest mechanical and biological deterioration have reduced and systematically shaped the remaining assemblage. Charcoal at the site suggests the Puebloans had depleted much of the shrub wood of the river terraces and the Spanish were depending on coniferous and riparian woods from farther afield.

**Tomka, Marybeth S.E. (Texas-Austin)**

**[14] SOCIETAL IMPLICATIONS OF THE GREAT KIVA AT THE WS RANCH SITE**

Previous interpretations of the role of great kivas in Southwestern United States development focused primarily on their role as redistributive centers, but to a large extent ignored any implications for social evolution. Complex society theory has been selectively used and models of theocratic evolution, accepted as explanations worldwide, are unused. The results of artifact and architectural feature analysis of the Great Kiva and surrounding room block at the WS Ranch Site, combined with data from other great kivas, are explored utilizing theocratic models of complex society.

**Tomka, Steve A. (Texas—Austin)**

**[15] SITE FUNCTION AND BONE ASSEMBLAGE VARIABILITY**

Ethnoarchaeological research among transhumant agro-pastoralists in SW Bolivia indicates significantly different bone assemblages at the settlements used. Upper pastoral settlement assemblages consist of complete juvenile skeletons and low meat utility (MU) adult skeletal elements. Main sites contain low and high MU elements from adult individuals. Low altitude agricultural settlements have high MU adult skeletal elements. These intersettlement differences are explained by conditioning factors such as climate, number of inhabitants, camelid sociobiology and overall activity scheduling. It is suggested that similar intersettlement patterning may be expected in archaeological contexts subject to similar factors.

**Torrence, R. (see Edmonds, M.) [58]**

**Tosi, Maurizio (IsMEO, Roma)**

**[46] CHILDREN OF TWO WOMBS: THE CENTRAL ASIAN EMPIRES AND THEIR FORMATIVE PROCESSES FROM HERDS AND OASES**

While the first cities and state structures develop in southern Central Asia after 3000 BC, political and economic integration among its main regions is not accomplished until two millennia later. The main physical constraint was the scattered distribution of farmland surrounded by vast expanses of desert and steppe. Although experienced very early, urbanism remained in the whole of Central Asia an ephemeral phenomenon, undergoing a long period of instability. Interregional integration became possible with the introduction of camels and horses, but these in turn were the result of the intensive exchange activities developed during the 3rd millennium BC as part of the first urban phase. Moreover, the archaeological evidence from all Bronze age sites so far explored shows the early development of all major economic structures that made possible the successful aggregation of the "Empires of the Steppe."

**Trigg, H. B. (see Robinson, D. G.) [53]**

**Tringham, Ruth E. and Margaret W. Conkey (UC Berkeley)**

**[59] LIVING WITH AMBIGUITY: SOCIAL LIFE OF PREHISTORIC EUROPE**

Although recent research in European prehistoric archaeology has not yielded many "new finds" to revolutionize our interpretations, it has become increasingly popular to think that, especially in European prehistory, we can access cognition, power or social relations and the like. Using specific examples from recent research and publications in European prehistory, this paper explores how different strategies for acquiring knowledge may affect our reconstructions of different regional/areal prehistories. Why are there, in fact, different archaeologies? Must an archaeology of social life demand a tolerance for ambiguity?

**Tuohy, D. R. (see Hattori, E. M.) [47]**

**Turnbaugh, William A. (Rhode Island)**

**[55] TRADE AND RESISTANCE IN 17TH CENTURY NEW ENGLAND**

Archaeological and ethnohistorical sources document the complex nature of cross-cultural exchange between 17th century Algonquians and Europeans in southern New England. Trade did more than facilitate discourse, supply essential needs or create new economic relationships. Introduction of unfamiliar goods and technologies stimulated a wide range of fundamental cultural responses. Three categories of goods will be examined: European objects received by native societies, native goods within native contexts and native products created specifically for exchange with Europeans.

**Turner II, C. G. (see Holland, K. M.) [34]**

**Turner, II, Christy G. and Jacqueline A. Turner (Arizona State)**

**[36] SETTLEMENT OF THE AMERICAS VIEWED FROM THE USSR**

Beginning February 1, 1987, by means of the US and USSR Academies of Sciences, we spent five months studying 1400 dentitions belonging to 40 Soviet cranial series. Ranging in age from Paleolithic to modern times, they came from sites as far apart as Estonia to the Kurils, and old Finland to Turkmenistan. We examined Pleistocene and more recent artifacts from Mongolia, Amur and Altai sites and visited the latter. Teeth, artifacts and/or sites are supportive of views that envision Native Americans originating east of Lake Baikal, entering Alaska as multiple migrations and arriving in terminal Pleistocene times.

**Turner, J. A. (see Turner, II, C. G.) [36]**

**Tuross, Noreen (Geophysical Laboratory, Washington D.C.)**

**[45] BONE CHEMISTRY AND ARCHAEOOMETRIC IMPLICATIONS**

Preservation of the inorganic and organic matrices of Windover skeletal material is the general theme. While the hydroxyapatite crystals in the bone have increased in size diagenetically, no contaminating crystal forms such as calcite were observed. Several proteins (IgG, albumin, osteonectin and transferrin) were identified by size and immunological reactivity to human antibodies. Possible archaeometric use of these preserved proteins will be discussed. Stable isotope analysis of carbon and nitrogen from bone collagen from many individuals suggests a marine subsistence orientation. The methods used to extract and identify collagen from bone and the range of stable isotope values found in this population will be presented.

*Turpin, Solveig A. (Texas)*

[43] THE ICONOGRAPHY OF CONTACT: SPANISH INFLUENCES IN THE ROCK ART OF THE MIDDLE RIO GRANDE

Spanish expansion into the Middle Rio Grande was frustrated by difficult terrain and the scarcity of permanent water. Their influence, however, is recorded in rock art sites that show European material culture or conform to Plains iconography. The initial colonizing missions and later retaliatory expeditions provide terse accounts that serve as a context for the rock art. The advent of the Plains Indians is chronicled, the expansion and retraction of the Spanish frontier traced and environmental conditions inferred.

*Underhill, Anne P. (British Columbia)*

[4] THE ORGANIZATION OF CERAMIC PRODUCTION DURING THE LATE PREHISTORIC PERIOD OF NORTH CHINA

Interpretations regarding changing organization of ceramic production during the Longshan (final pre-state) period of North China are made based upon examination of vessels from archaeological work stations and museums in Henan and Shandong provinces for variability in techniques used in different steps of production (preparation of paste, shaping, decorating, firing). Methods of analysis include calculation of diversity of techniques used to produce individual functional classes of vessels (defined primarily by morphological attributes). The proposition in the Chinese and western archaeological literature that specialist production was prevalent is evaluated and changes in the organization of production are discussed.

*Upham, Steadman (New Mexico State)*

[1] SOUTHWESTERN REGIONAL SYSTEMS: DEMOGRAPHY, ECONOMY, AND SOCIOPOLITICS PRECEDING CONTACT

During the two centuries preceding European contact, populations occupying the central and northern Southwest developed sociopolitical and economic systems at regional scales. These systems appear largely autonomous when certain kinds of material distributions, like ceramics, are considered. Yet population relocation and reorganization following contact suggest that interregional connectivity and integration existed prior to contact, that a more inclusive level of interregional organization was present. In this paper I define and describe these systems and posit an organizational model that partially accounts for the demographic reorganization that occurred among native southwestern groups following the Spanish entrada.

*Ururuela, Gabriela (Americas-Pueblo)*

[37] COLOTZINGO: NEW LIGHT ON THE PUEBLA PRECLASSIC

The role of the Puebla region during the Mesoamerican Preclassic is poorly understood due in large part to a lack of archaeological documentation. Recent research by the University of the Americas and the Centro Regional de Puebla (INAH) in the Atlixco Valley of western Puebla indicates that this area of the Central Highlands played an important part during this time period since the archaeological materials recovered show relationships not only with the Olmec tradition, which had spread to neighboring sites (e.g., Chalcatzingo and Las Bocas), but also with cultural developments in West Mexico.

*Vaida, Nancy L. (Michigan)*

[64] SETTLEMENT OF THE FINAL JOMON PERIOD IN THE LOWER KITAKAMI RIVER AREA OF THE TOHOKU REGION, JAPAN

In the Final Jomon of the Tohoku region the elaborate Kamegaoka pottery style signals the culmination of the long hunting and collecting Jomon adaptation and the shift to large scale rice cultivation. This study focus on a group of sites in northeast Miyagi Prefecture around the Kitakami River. These sites all have components of the early Obora pottery type of the first half of the Final Jomon. By examination of the sites' geographic positions relative to natural features and to other contemporaneous sites, propositions are developed with regard to regional patterns of resource use and social interaction.

*van der Leeuw, Sander E. (Cambridge)*

[46] ROMAN EXPANSION: WHEN, HOW AND HOW MUCH?

By comparing the extent and speed of Roman expansion into three different provinces, and relating these variables to structural variables such as area, size of integrated population, settlement pattern, degree of aggregation of settlements, nature of organizational structure before and after the Roman impact etc., it will be shown that underlying structural characteristics of Roman expansion are of a form which will allow comparison with those of other empires.

*van der Leeuw, Sander E. (Cambridge)* [Discussant 26]

*Van Tuerenhout, Dirk (Tulane)*

[17] FROM CONTINUITY IN FORM TO CONTINUITY IN MEANING: THE ROLE OF ETHNOGRAPHIC ANALOGY IN MAYA ARCHAEOLOGY

The use of ethnographic analogy as a means of reconstructing a prehistoric society should not be rejected. However, strict guidelines need to be laid out to make this effort worthwhile. This paper will attempt to define some of the limitations in the application of such analogy. 1) The value of all data with potential explanatory power must be assessed. Certain factors (e.g., ecology, intercultural contacts) may make the use of ethnographic analogies superfluous. 2) Whenever such analogies are deemed appropriate, the link between continuity in form and continuity in meaning is an absolutely necessary one to validate any explanation made. Data will be drawn from the literature and from archaeological fieldwork in Belize to illustrate these points.

*Vandiver, Pamela (Smithsonian Institution), Olga Soffer (Illinois) and Bohuslav Klima (AU CSAV)*

[9] VENUSES AND WOLVERINES—THE ORIGINS OF CERAMIC TECHNOLOGY CA. 26,000 B.P.

While it is widely known that the production and firing of clay objects is at least 26,000 years old, ceramics made some 15,000 years before pots have received scant attention to date. This paper presents the results of the first in-depth multidimensional study of the 1) composition and raw materials used, 2) construction, modeling and decorating sequences, 3) range of objects made and 4) heat treatments used to produce fired clay figurines found in large numbers at the Dolni Vestonice and Pavlov Upper Paleolithic sites in Moravia, Czechoslovakia. The ceramic technology will be contrasted with the pigment technology.

*Varien, Mark D. and Ricky R. Lightfoot (Crow Canyon Archaeological Center)*

[20] RITUAL AND NONRITUAL ACTIVITIES IN MESA VERDE AREA PROTOKIVAS

In the northern Southwest "protokivas" are defined as pit structures that lack the architectural attributes of kivas, but are thought to have functioned as ritual/integrative structures. This paper attempts to characterize ritual versus nonritual activities in Pueblo I structures in the Mesa Verde region. The study involves an activity area analysis of pit structure and surface structure floor assemblages from well preserved contexts. The results indicate that pit structures were shared by two to three households for domestic activities. Ritual activities are represented, but it is more difficult to determine the scale at which an individual pit structure was used for rituals.

*Versteeg, Aad H. (Leiden State University, Netherlands)*

[30] THE INTERNAL ORGANIZATION OF A PIONEER SETTLEMENT IN THE LESSER ANTILLES: THE SALADOID GOLDEN ROCK SITE ON ST. EUSTATIUS, NETHERLANDS

The investigation of the midden and adjacent areas of the Golden Rock site (1984-87, 2800 square meters) yields four functional areas. A yard area has a central position within the settlement. Two circular houses are situated in it: one has a diameter of 8 meters, the other is a large 19 meter diameter maloca. The midden (dump area) and a burial area are situated side-by-side south of the yard. A ceremonial area, north of the yard, is made up of two pottery caches, a stone cache and one skeleton with a burial gift.

*Vierra, Bradley J. (New Mexico)*

[14] A SIXTEENTH CENTURY SPANISH CAMPsite IN THE TIGUEx PROVINCE

The findings of the recent excavation of a 16th century Spanish campsite situated north of Albuquerque, New Mexico, will be presented. Based on this information it will be suggested that the site may represent part of Coronado's original expedition (1540-1542) into the American Southwest. The site consists of a series of 15 shallow dugouts including 16th century pueblo pottery, domesticated sheep bone and metal artifacts. The use of both archaeological and historical multidisciplinary research will help us understand a very complex and interesting period for the middle Rio Grande.

*Villa, Paola (Colorado), Jean Courtin and Daniel Helmer (CNRS)*

[3] REFITTED BONES FROM FONTBREGOUA CAVE: THE CASE FOR CANNIBALISM

Conjoining of bone fragments, rearticulations and studies of butchering marks are used to interpret 13 clusters of human and animal bones found in the Neolithic levels of Fontbregoua Cave (southeastern France). The degree of integrity of each group of bones and the former existence of two disturbed clusters are assessed using vertical projections and refitting links. The analysis shows that human and animal carcasses were processed using essentially the same butchering procedures: dismembering, selection of parts for differential use, removal of meat from bones, marrow fracturing

and discard of refuse in a small pile. The use of ordinary butchering procedures in the processing of humans is strong evidence for cannibalism. Conjoining of bone fragments has proved essential to the success of the analysis.

**Vitelli, Karen D. (Indiana)**

**[41] FROM CERAMIC TECHNIQUE TO SOCIAL BEHAVIOR**

Experimental pottery making acquaints the archaeologist with the series of choices made by the ancient potter. Seen from that perspective, differences among sherds become differences in the choices exercised and can lead to interesting questions about the larger context of ceramic production. Experimental replications of the Thessalian Greek Neolithic "scraped" style produced visually similar results with several different techniques, at least two of which are represented on sherds from the same deposit at Plateia Magoula Zarko. The larger question raised is why the prehistoric potters, working at the same time in the same social context, used different techniques to achieve visually similar results.

**Vivian, R. Gwinn (Arizona State Museum)**

**[68] KLUCKHOHN REAPPRAISED: THE CHACOAN SYSTEM AS AN EQUALITARIAN ENTERPRISE**

Recent models have explained Chacoan culture growth in terms of ranked, hierarchically organized sociopolitical systems that emerged in response to redistributive needs in the San Juan Basin. It is argued that observed Chacoan settlement and architectural variability reflects organizational differences of two social groups that shared many cultural attributes but which were not organized as a single coherent functioning entity. It is further proposed that organizational differences of the two groups do not reflect egalitarian versus ranked social systems but two contrasting egalitarian modes, one utilizing a process of rotating sequential hierarchies to accommodate a larger population base.

**Vokes, A. (see Downum, C. E.) [32]**

**Wagner, Gail E. (Center for American Archaeology)**

**[19] THE IMPLICATIONS OF THE ADOPTION OF NORTHERN FLINT CORN**

The central Ohio River Valley marks the southwesternmost zone of pure northern flint corn during the early Mississippian period, AD 1000-1300. Previous agricultural developments leading to the dominance of a starchy seed complex in this area paralleled developments in other parts of the Midwest, but by AD 1000 corn had attained greater importance here than along the Mississippi Valley. The mechanics and implications of the adoption of northern flint corn are examined using botanical studies coupled with heavy carbon isotope analyses.

**Walker, Danny N. (Office of the Wyoming State Archaeologist)**

**[61] TAXONOMY OF NORTH AMERICAN LATE PLEISTOCENE BISON AND THE MILL IRON SITE LOCAL FAUNA**

Multivariate analyses of bison biometrics suggest evolutionary changes seen in bison horn cores, used for many years as the primary taxonomic criterion for the genus, may simply reflect an allometric relationship with evolutionary changes in body size. Principal component regressions between body size and horn core mean measures indicate populations of late Pleistocene and Holocene North American bison "species" conform to the same allometric model suggesting a high degree of relatedness between the "species." As bison body size diminished during late Pleistocene and Holocene because of life history adaptations to environmental changes, horn core size and shape responded. Multivariate analyses of bison skull morphology suggest recognizing the following species: *Bison priscus*, *B. latifrons*, *B. antiquus* and *B. bison*. Environmental changes contributing to these morphological differences can be substantiated in part by other vertebrate members of the Mill Iron local fauna.

**Walker, James B. (Archaeological Conservancy)**

**[12] PROTECTION TOOLS FOR ARCHEOLOGICAL SITES**

During this century a number of significant archeological sites that had both major research and interpretive potential have been destroyed. Complex land ownership and conflicting needs of present populations in densely settled areas mean that unique methods are required to save archeological sites in urban areas from destruction by development, looting and farming. This paper reviews several recent cases and outlines tools, such as archeological easements, that can be used to preserve important archeological sites.

**Walker, Phillip L., Patricia M. Lambert (UC Santa Barbara) and Michael J. DeNiro (UCLA)**

**[21] THE EFFECTS OF EUROPEAN CONTACT AND MISSIONIZATION ON THE DIET AND HEALTH OF SOUTHERN CALIFORNIA INDIANS**

Analysis of archaeological data and historical records provides evidence for dramatic changes in the diet and health status of Indians living in Southern California during the protohistoric and mission

periods. Isotopic and faunal studies indicate a marked decrease in marine resource exploitation and dietary diversity during the mission period. Skeletal studies show a gradual increase in density dependent diseases through time.

**Walker, P. L. (see Goldberg, C. E.) [70]**

**Walker, P. L. (see Glenn, B. K.) [54]**

**Wandsnider, LuAnn (New Mexico)**

**[58] BOUNDARY, STRUCTURE, AND CONTENT: HOW SITE DETERMINATION METHODS INFLUENCE THE PAST**

Sites are the basic unit of inventory in American CRM archaeology. These sites also often serve as the fundamental unit of analysis as we strive to understand the prehistory of regions. Yet, the determination of site boundaries is the most variable, least standardized practice in American archaeology today. What effect does this inconsistency in method have on the structure and content of the archaeological record that lies in our archives? This question is explored through simulation of site determination practices on high resolution surface distributions from the American West.

**Wandsnider, L. (see Mills, B. J.) [3]**

**Warren-Kunkler, Susan (CAL State, Sacramento), John R. Johnson (Santa Barbara Museum of Natural History) and Claude N. Warren (Nevada, Las Vegas)**

**[54] ETHNOHISTORIC RESEARCH REGARDING HELO', A CHUMASH VILLAGE ON MESCALITAN ISLAND**

The large community of Helo' was uniquely situated on an island in the middle of the Goleta estuary. Helo's prominence as an important political center is highlighted by the fact that four Chumash chiefs resided there. This study examines the sociopolitical organization of Helo' based on genealogical data gleaned from the Santa Barbara Mission registers and reconstructs Helo's role in the regional social interaction network through the study of Chumash marriage patterns.

**Warren, C. N. (see Warren-Kunkler, S.) [54]**

**Warren, Robert E. (Illinois State Museum)**

**[13] PREDICTIVE MODELING OF ARCHAEOLOGICAL SITE LOCATION: TWO CASE STUDIES FROM THE MIDWEST**

Predictive models from two distinct physiographic regions show contrasts in 1) the environmental correlates of prehistoric site location, 2) the statistical ramifications of different sampling strategies and 3) the methodological implications of common algorithms for data transformation. Both models are fine-grained logistic regressions derived from data created by a GIS. One model, developed for the rugged Ozark Hills of southern Illinois, predicts that site probabilities are high on the crests of upland ridges and on elevated terraces near streams. The other, developed for the level upland prairies of central Illinois, predicts high probabilities along creeks and on the tops of upland knolls.

**Waselkov, Gregory A. (Auburn)**

**[60] HISTORIC CREEK INDIAN RESPONSES TO EUROPEAN TRADE AND THE RISE OF POLITICAL FACTIONS**

During the colonial period, the Creek Indians maintained a vital and innovative culture while interacting socially, politically and economically with neighboring English, French and Spanish colonies. Their prolonged independence was due primarily to the rise of factions favoring relations with one or another of the colonial powers. Complementary analyses of trade goods price lists, presents lists and archaeological burial assemblages show the course of culture change and elucidate the origins and development of factions among the Creeks.

**Waters, Michael R. (Texas AeM)**

**[5] GEOARCHAEOLOGICAL INTERPRETATIONS OF LANDSCAPE CHANGE ON THE SANTA CRUZ RIVER FLOODPLAIN, ARIZONA**

Environmental changes over the last 11,000 years on the floodplain of the Santa Cruz River have affected the formation of the archaeological record and Hohokam settlement patterns in the Tucson Basin. The Holocene alluvium contains late Archaic, Hohokam and Protohistoric artifacts, but Paleoindian and early and middle Archaic remains are absent because they were eroded from the basin during channel erosion and widening from 6000 to 3500 BC. Landscape changes on the floodplain (three arroyo cutting and filling episodes, periods of ciénega and dune formation) between AD 800 and 1450 led to the disruption, reorganization and abandonment of Hohokam agricultural settlements along the river.

*Watson, Patty Jo (Washington University—St. Louis)* [Discussant 72]

*Webb, D. (see Dunbar, J.)* [16]

*Webb, Paul A. (Southern Illinois)*

**[28] EMERGENT MISSISSIPPIAN IN SOUTHERN ILLINOIS: THE VIEW FROM THE PETITT SITE**

Recent large-scale excavation of the Petitt site in extreme southwest Illinois has provided a substantial data base on the Emergent Mississippian Dillinger Complex of this area. Information on internal site organization, the artifact assemblage and subsistence activities is used to characterize the Petitt occupation and, in conjunction with other data, provides a basis for comparing this Emergent Mississippian manifestation with coeval developments in the American Bottom to the north. While similarities in diet and material culture are apparent, available data on settlement distribution and organization suggest possible differences between the two regions.

*Webster, David (Penn State)*

**[67] INVESTIGATIONS INTO MAYAN INSTITUTIONS AND CULTURE HISTORY AT COPAN, HONDURAS**

Maya archaeological research has traditionally been heavily oriented toward large centers which were the focus of ritual, economic and social activity, as well as elite residence, and has largely ignored other elements of Maya cultural systems. As a result many crucial issues necessary to reconstruct Maya demography and sociopolitical institutions remain unresolved. At Copan, Honduras, seven years of research in areas outside the Royal Center have yielded a vast amount of new information on Mayan institutions, particularly through large scale horizontal excavations of household remains on all social levels, as well as settlement survey and test pitting.

*Weiner, S. (see DeNiro, M. J.)* [47]

*Weisman, Russell (SUNY Binghamton)*

**[41] WHERE'S THE BUFF? REPLICATING HOHOKAM BUFFWARE CERAMICS**

The technology of buffware ceramics is discussed and the development of "buff" color explained using data from thin section and replicative studies. It is shown that the surface color of Hohokam Red-on-Buff pottery is not the result of a surface coating ("slip" or "wash") as reported in the literature. Replicative studies indicate that the "buff" color results from a chemical reaction during firing between salt and calcium carbonate in the paste. Under certain conditions, normally red-burning clays can be manipulated to burn buff. The parameters of this reaction are presented and discussed. Temporal and spatial variation in the conditions favoring the "buff" reaction are also reviewed.

*Weisman, R. (see Steponaitis, V. P.)* [26]

*Welch, John R. (Arizona)*

**[14] RAPID SUBSISTENCE CHANGE: THE SHIFT FROM HORTICULTURE TO AGRICULTURE IN THE GRASSHOPPER REGION**

The transition from gardening-gathering-hunting to agriculturally focused subsistence requires adaptive system reorganization. Ecological theory lends analytical insights into the economic, social and ideological implications of this reorganization. Where the transition occurred prehistorically, investigation demands archaeological methods and data. Data from 25 years of multidisciplinary research in the Grasshopper region indicate shifting land use, demography and settlement patterns between AD 1275 and 1325. Analyses of botanical, faunal and human skeletal remains, the morphology and location of soil and water control features and habitation sites, and the agricultural potential and distribution of the area's soils support a reconstruction of this transition at Grasshopper.

*Wells, Peter S. (Minnesota)*

**[55] THE MEANING OF MEDITERRANEAN IMPORTS TO IRON AGE EUROPEANS**

Greek, Etruscan and Roman luxury goods played special roles in festivals and funeral rituals in Iron Age temperate Europe. Analysis of the contexts in which the imports occur, including pictorial representations and burial assemblages, yields information about the social and psychological uses to which they were put. The evidence enables us to suggest why these particular imported objects became so important to affluent and powerful central Europeans that they redirected much of their communities' economic efforts to assuring a regular supply of them.

*Wells, Susan J. (National Park Service)*

**[39] SETTLEMENT AND ENVIRONMENT AT PETRIFIED FOREST N.P. AND HOMOL'ovi STATE PARK: A COMPARISON**

Three transects running the length of the park provide data for an analysis of prehistoric settlement at Petrified Forest National Park. Of interest are differences in occupational history corresponding to

various environmental zones which include the badlands of the Painted Desert and Petrified Forest as well as desert grasslands. Evidence of contact with neighboring Homol'ovi sites during the Pueblo IV period leads to a comparison of Petrified Forest and Homol'ovi settlement patterns from Basket-maker through Pueblo Periods.

*Wenban-Smith, F. (see Bergman, C. A.)* [44]

*West, G. James (Bureau of Reclamation)*

**[21] EARLY HISTORIC VEGETATION CHANGE IN CALIFORNIA: THE SUB-FOSSIL EVIDENCE**

California's plant communities, particularly grasslands, have undergone significant changes initiated during the earliest stages of Spanish settlement. Though poorly documented, few places on Earth have had such a rapid replacement of native plants by introduced species. Concomitant with the floristic changes were major shifts in human subsistence/settlement patterns. The shift from hunting and gathering to large scale subsistence rancherias drastically altered human interaction with California's biosphere. In many instances macroscopic and microscopic plant remains provide the only evidence of these changes.

*Whalen, Michael E. (Tulsa)* [Discussant 8]

*Whitmer, A. M. (see Ramenofsky, A. E.)* [36]

*Whittaker, Fran and Julie K. Stein (Washington)*

**[75] SHELL MIDDEN RECTANGLES ON THE NORTHWEST COAST: PLANKHOUSES OR NOT?**

Topographic ridges, arranged in a rectangular shape around a central depression, have been found in one area of the San Juan Island National Historic Park at English Camp, Washington. Previous excavations (1950, 1985) have revealed that these rectangular ridges are composed of shell midden. In 1986 the surface expression of these features was mapped, followed in 1987 by the reconstruction of the subsurface contours (paleotopography) through coring and augering. We believe that these data may support the interpretation that the features represent the accumulation of refuse around an ancient dwelling. This refuse has been disturbed by mass wasting, limestone dissolution and logging activity.

*Whittington, Stephen L. (Penn State)*

**[24] SPATIAL AND TEMPORAL VARIATION IN THE CLASSIC MAYA POPULATION OF COPAN, HONDURAS**

Analysis of lower class skeletons from Copan reveals that significant intergroup differences in demographic measures exist when the population is divided along the lines of phase or location (urban/rural), but not when divided by sex or residential compound size. Frequencies of various types of bone lesions in the groups reveal details about relative health and causes of intergroup demographic differences. Comparison of Copan's demographic measures with those of other pre-modern groups helps to expose the degree to which the population was under stress around the time the polity collapsed.

*Wilde, James D. and Charmaine Thompson (BYU)*

**[69] CHANGES IN SPATIAL PERCEPTION IN ANASAZI HOUSEHOLDS IN SOUTHEASTERN UTAH**

The Nancy Patterson Archaeological Project focused on a large Anasazi village in Montezuma Canyon. Two major periods of occupation, early Pueblo II and mid-to-late Pueblo III, were identified. Households representing these periods were studied to determine differences in subsistence and spatial utilization. Both components exhibited intensive use of space, but for different reasons. Earlier occupants were restricted to the top of a small mesa. Later inhabitants only casually utilized the mesa top, choosing instead to repeatedly use an area on the floodplain below. These distinct patterns reflect major differences in spatial perception between the Pueblo II and Pueblo III inhabitants.

*Wilk, Richard R. (NMSU)*

**[17] A NON-TRADITIONAL VIEW OF TRADITION, APPLIED TO MODERN KEKCHI MAYA**

Ethnographic analogy often rests on an outmoded concept of culture and an inadequate understanding of cultural continuity. This paper redefines the notion of 'tradition' using a theory of culture as praxis rather than as a set of rules or traits. It suggests that the most archaeologically visible aspects of culture (agricultural techniques, artifacts, settlement patterns) are the most changeable, while the least visible linguistic and ideational elements of culture provide the greatest continuity. Examples are given from ethnographic studies of the Kekchi Maya of southern Belize.

*Williams, Jr., G. I. (see Jeter, M. D.)* [27]

*Williams, Edward (Institute of Archaeology, London)*

[37] STUDY OF THE PREHISPANIC STONE SCULPTURE OF WEST MEXICO

Classification of the Prehispanic stone sculpture of West Mexico (Jalisco, Colima, Nayarit, Michoacan) includes three main groups: anthropomorphic, zoomorphic and anthropo-zoomorphic. Five major iconographic themes are presented, described and analyzed using data from ethnohistory as well as ethnographic analogy primarily with West Mexican Indian groups such as the Huichol. Cultural connections between West Mexican sculpture and that of other areas (e.g., Central Mexico, Central America, the American Southwest) are analyzed on the basis of stylistic similarities between different sculptural traditions.

*Williams, Jack S. (Arizona)*

[37] ARCHAEOLOGY, SOCIAL HISTORY, AND THE PROBLEM OF POLITICAL CONTROL IN NORTHERN NEW SPAIN

Parallel research interests of archaeologists and social historians can be combined in a single theoretical framework as part of behavioral archaeology. The approach advocated here differs from previous research in its emphasis on integrating unpublished archival sources with other classes of material culture. The study of documents and their formation processes by archaeologists is argued to be as essential as analysis of stone tools or pottery. Problems of imperial control in New Spain are explored to illustrate the potential of this approach.

*Wilshusen, Richard H. (Colorado)*

[20] UNSTUFFING THE ESTUFA: RITUAL FLOOR FEATURES IN ANASAZI AND PUEBLO PIT STRUCTURES, A.D. 600-1900

Pit structures, kivas or estufas typically have associated ritual features. By Pueblo I there are a number of important ritual features, such as altars, sipapus and floor vaults (foot drums), that can be consistently identified in certain pit structures. By recognizing the salient morphological aspects of a feature such as a floor vault, it is possible to see that this feature is more widespread than has been previously acknowledged and to note important diachronic changes in the distribution of this feature type.

*Wilson, Samuel M. (Chicago)*

[60] STRUCTURE AND HISTORY: THE EMERGENCE OF THE CARIBBEAN CHIEFDOMS

The contact period in the New World poses a challenge to the archaeologist and ethnohistorian who is interested in long-term processes of culture change. In the Greater Antilles, for example, our ethnohistoric glimpse of the Taino Culture spans barely 20 years following Columbus' first voyage. Yet from this synchronic and structural set of observations, we must try to understand the diachronic historical processes by which the sociopolitical institutions of the Taino came into being. Using archaeological evidence and ethnohistorical accounts conjunctively, this paper attempts to draw inferences about the ways the Taino chiefdoms expanded in both geographical area and sociopolitical complexity in the centuries preceding European contact.

*Windes, Thomas C. (National Park Service)*

[68] THE EFFECTS OF DROUGHT ON CHACOAN OCCUPATION: INTERPRETATIONS FROM PUEBLO ALTO

Most models explaining Chacoan adaptation to Chaco Canyon were developed before completion of work at Pueblo Alto (and Salmon Ruins) in the late 1970s. Excavations during previous decades, including several from the early 1900s, in large Chacoan greathouses lack reliable artifact context and feature documentation on which to build firm foundations for modeling. Information pertinent to an understanding of the Chacoan occupation in Chaco Canyon is presented from the work at Pueblo Alto, particularly that which coincides with major dry periods. The Alto results and their effect on various models of the Chacoan Phenomenon are then discussed.

*Wingard, John D. (Penn State)*

[49] A PREMININARY EVALUATION OF THE POTENTIAL ROLE OF SOILS IN THE DEVELOPMENTAL SEQUENCE AT COPAN, HONDURAS

Based on recent research in Copan, Honduras, this paper investigates the role agricultural soils played in the developmental sequence of the Classic Maya at this site. First, the distribution of soils of varying quality is examined in relation to the distribution of known housemounds. Second, the roles of nutrient depletion and soil erosion as contributing factors in the collapse of Classic Maya society at Copan are evaluated. Finally, the capacity for Postclassic habitation in the Copan valley is considered.

*Winter, M. C. (see Joyce, A. A.)* [37]

*Winterhalder, Bruce (U of North Carolina, Chapel Hill)* [Discussant 76]

*Wiseman, E. M. (see Pohl, M. D.)* [49]

*Wonderly, Anthony (Cornell)*

[42] TOWARD DEFINING CERAMIC TRANSFORMATION IN THE LATE PRECLASSIC OF NORTHWESTERN HONDURAS

A major change occurred in the pottery of the Sula Plain at about 100 BC involving a shift from an apparently localized tradition to membership in what has been called the Upala ceramic sphere. While we suffer from no lack of hypotheses advanced to explain the alteration, the precise nature of the phenomenon remains poorly understood. Seeking to determine the distinguishing features of the change, the presentation examines ceramic decoration and its articulation with vessel form and social setting in pottery samples chronometrically dated immediately before and after the "event."

*Woods, W. I. (see Brown, A. J.)* [28]

*Woods, W. I. (see Lopinot, N. H.)* [72]

*Woods, W. I. (see Collins, J. M.)* [6]

*Woolsley, Anne I. (Amerind Foundation)*

[33] POPULATION AGGREGATION AND THE ROLE OF LARGE PUEBLOS IN THE NORTHERN RIO GRANDE

Lt. Hernando de Alvarado reported a single pueblo on the Taos Plateau during Spanish explorations of the northern Rio Grande in 1540. Yet, for a period spanning some 500 or 600 years prior to contact, hundreds of settlements are documented to occur across the plateau region. This paper examines specific cultural and environmental factors that contributed to a shifting settlement pattern, from highly dispersed, small settlements to increasingly aggregated large pueblos over time. The role of large pueblos is discussed in terms of their function as an adaptive mechanism to ameliorate increasing instability characteristic of the overall settlement system.

*Wormington, H. M. (Colorado College)* [Discussant 61]

*Wright, Jr., H. E. and Barbara C. S. Hansen (Minnesota)*

[76] VEGETATIONAL HISTORY OF THE CENTRAL PERUVIAN ANDES

Lakes of glacial origin in the Andean puna record the history of the east-Andean forest, for pollen is carried from the forest to the high mountains by the dominant easterly winds. In the eastern cordillera as much as 40% of the pollen is derived from the forest below, whereas in the western cordillera this component decreases to a few percent. During the last glaciation before 11,000 years ago the east-Andean forest was much diminished compared to the present and was perhaps largely replaced by shrubland. Reduction in forest cover also occurred some time after 3000 years ago, but in this case the forest clearance near the tree line may have been a result of early farming.

*Wright, Rita P. (William and Mary)*

[2a] THE IDENTIFICATION OF PRODUCTION UNITS IN THE ANALYTICAL STUDY OF CERAMICS

This paper presents a model for identifying production units of ceramics. It first outlines the types of laboratory analysis that may be employed in ceramic studies and a method by which to identify production units. Delineating production units is a means of categorizing the number of different stages in the production process that may be inferred from macro- and microscopic data for individual products that are morphologically similar. By correlating production units with contextual evidence, it may be possible to determine the total number of production units at a site and whether they represent separate or single units, workshops or household groups.

*Wymer, Dee Anne (Licking County Archaeology and Landmarks Society, OH)*

[72] CULTURAL CHANGE AND SUBSISTENCE: MIDDLE WOODLAND—LATE WOODLAND TRANSITION IN THE MIDWEST

The development and disappearance of one of the most striking archaeological phenomena—Hopewell—has often been attributed to subsistence factors, as well as to the disparity between Ohio and Illinois Hopewell. However, recent paleoethnobotanical research in central Ohio invalidates both hypotheses and forces a closer look at the archaeological record. The paper presents data from Middle and Late Woodland sites in central Ohio and compares the material to Illinois data from the same periods. The various theories explaining the cultural change for the two periods are subsequently evaluated.

*Yates, Timothy (Cambridge)*

[22] READING THE PAST: FROM RECONSTRUCTION TO DECONSTRUCTION IN ARCHAEOLOGY

Working from the philosophy of Jacques Derrida and its applications in literary criticism, the nature and interrelationship of context and ideology in archaeological interpretation is explored. In place of existing paradigms, deconstruction—the analysis of the process and conditions of the production of meaning—is proposed as both an interpretive and critical concept. In particular, deconstruction addresses the problem of masking ideologies which an archaeology conceived on reconstruction had created. Both approaches recognize the archaeological “text” as a construct; the difference, it is argued, lies in the manner in which that construct is treated in interpretation.

*Yesner, David R. (Alaska-Anchorage)* [Discussant 23]

*Yesner, D. R. (see Hamilton, N. D.)* [36]

*Young, Lisa C. (Arizona)*

[39] LITHICS AND MOBILITY: THE HOMOLÖVI CHIPPED STONE ASSEMBLAGE

Upham has proposed that many pueblo period lithic scatters in the American Southwest were not limited activity sites of farmers, as commonly assumed, but instead were created by hunter-gatherers occupying the “interstices” between the pueblos. To evaluate Upham’s arguments, recent studies addressing the impact of mobility on lithic technology are reviewed and general characteristics of a mobile technology are outlined. Based on these characteristics, spatio-temporal variation in chipped stone materials collected near Winslow, Arizona is examined and the likelihood of hunter-gatherer populations living contemporaneously with the Homolovi pueblos is assessed.

*Zack, J. A. (see Marozas, B. A.)* [13]

*Zagarell, Allen (Western Michigan)*

[22] HISTORY, AGENCY, STRUCTURE AND PRODUCTION

Based on comparative analysis of several early state societies, societies are viewed as systems consisting of hierarchically organized subsystems with their own internal logic of development. Particular systems of production establish an internal systemic dynamic, replete with built-in structural oppositions. However, even societies sharing similar structural oppositions and systemic dynamics do not necessarily experience similar social transformations. The actual relationship of social classes, their momentary relative power, in context of particular social structures, influences forms of social struggle and oppositional resolution—humans creating their own history. The resolution of class oppositions cannot be determined *a priori*. This puts into question the assumption that general laws of development (ahistorical laws) can be devised.

*Zalucha, L. Anthony (Paleoethnobotanical Consulting)*

[62] SITE TYPES AND SAMPLE REQUIREMENTS FOR VEGETATIONAL RECONSTRUCTION BASED ON CHARCOAL

Charcoal is the primary data for lifeway and vegetational reconstructions based on plant macrofossils. Two production/deposition models, random and nonrandom, compete as the proper basis for its interpretation. Conclusions based on specimen counts depend on extremely large samples or on collections which can reasonably be assumed to have been produced and deposited randomly. The multicomponent Bachman site (47SB202) provides an ideal setting for random-based charcoal analysis because of the nature of its occupations: short-term camps. Extensive sampling of well preserved contexts highlights both Wisconsin lowland forest dynamics and cultural wood use preferences over the last 2500 years.

*Zaslow, Bert (Arizona State)*

[51] PROGRAMMING THE WEAVING PROCESS TO GENERATE ANASAZI DECORATIONS

At least four different types of ceramic decorations having unusual geometric properties appear on a variety of Anasazi wares from Pueblo III times. The decorations can be generated by painting design detail on weaving elements, assembling the painted elements to form weaves and then separating structures observable within the resultant decorative array. Symmetry rules for placing design detail on weaving elements serve as programming instructions, analogous to the contemporary generation of computer graphics. Geometric skill exceeding that ordinarily employed in producing decorations in the prehistoric Southwest and Mesoamerica is evident. A discussion is presented on utilizing these patterns for temporal and geographical studies.

*Zeanah, David William and Karen D. Lupo (Utah)*

[4] SEXUAL SEGREGATION OF ACTIVITY AREAS: THREE ETHNOARCHAEOLOGICAL EXAMPLES

Analysts of prehistoric intrasite spatial organization have often assumed that sexually segregated groups perform refuse producing activities at discrete locations. This paper tests that assumption by comparing behavioral data from the Ache, Alyawara and Hadza. There is considerable variation among the three groups, with the Alyawara being the most highly and the Ache the least segregated. Although sexually distinct activity areas may occur in some cases, archaeologists have an imperfect understanding of factors determining variability between cases. The roles of predator pressure and food sharing in conditioning this aspect of site structure are considered.

*Zeller, E. J. (see Dort, Jr., W.)* [16]

*Zubrow, Ezra (SUNY at Buffalo)*

[13] THE EVOLUTION OF DEMOGRAPHIC ASPECTS OF SETTLEMENT PATTERN USING GIS SYSTEMS

This paper uses GIS systems to predict the changing structure and form of settlement patterns through time. Alternative demographic regimes based upon stable and unstable models, as well as one, two and three sector transition models, are combined with ARC/INFO’s network system to create the predictive machinery. The predictions from these alternative models are then verified by comparison with the size and location of actual settlements through an extended period of time. The data base consists of several thousand prehistoric and historic sites in western New York.

*Zuni, Jerome (Zuni Archaeology Program) and Robert D. Leonard (New Mexico)*

[65] SLICES OF TIME: UNIT CONSTRUCTION AND SUBSISTENCE CHANGE IN THE AMERICAN SOUTHWEST

How do we construct the theoretical frameworks that allow us to monitor change in subsistence practices in the prehistoric Southwest? What are the components of agricultural systems and how are they represented archaeologically? The construction of theoretical and empirical units necessary to the study of change is addressed in the context of the assumption that subsistence systems in the American Southwest have changed in response to selective pressures, and that identifying those pressures provides a means of constructing explanations of culture change. Implications for unit construction derived from an examination of traditional agricultural practices near Zuni, New Mexico, will also be considered.

*Zvelebil, Marek (Sheffield, England)*

[58] LITHIC SCATTERS, ARCHAEOLOGICAL LANDSCAPES AND HUMAN BEHAVIOR

Structuring of archaeological evidence in terms of discrete spatio-temporal units—sites—is conceptually unsatisfactory, often inapplicable and seldom justified. As a result, large portions of archaeological data are either misunderstood or not fully utilized. Lithic scatters can be used as a point of departure for a more comprehensive approach, designed to recover archaeological landscapes rather than individual sites. The present contribution deals with three levels of landscape oriented research: (1) formation of lithic scatters and their controlled recovery, (2) reconstruction of archaeological landscapes and (3) identification of past patterns of land-use and other behavioural variables. Surface collected and excavated data from southern Ireland are used as an example in this study.

## ABSTRACTS OF POSTERS

*Anderson, J. A. (see Elder, D. E.)*

*Bloomer, William W. (Washington State)*

### AN ARCHITECTURAL ANALYSIS OF MOON HOUSE, CEDAR MESA, SOUTHEASTERN UTAH

Moon House is an exceptionally well preserved 13th century cliff dwelling. An analysis of construction methods, room function and construction sequence for Moon House and two associated cliff dwellings indicates recurrent reconstruction, remodeling and reorganization of functionally distinct rooms. The early occurrence of similar household units at each of the three cliff dwellings contrasts with the latest room reorganization. The final late A.D. 1260s reconstruction and reorganization resulted in functional differentiation and interdependence between the three cliff dwellings and a high ratio (6:1) of useable storage rooms to living rooms, and is the basis for suggestions of seasonal habitation.

*Carroll, Mary S. (Arizona State)*

### A DYNAMIC ARCHAEOLOGICAL DATABASE FOR THE MICROCOMPUTER: THE SHOOFLY VILLAGE EXAMPLE

The nature of archaeological information is such that careful thought must be given to the translation of data to a computer format. The commercially available software programs dBase III+ (Database) and R&R (Relational Report Writer) are used to create and implement an integrated, dynamic, user-friendly database system for the Payson Archaeological Research Expedition. This system is designed to be efficient and flexible by utilizing the powerful relational capabilities of both dBase III+ and R&R. Data files are linked by specimen number to provenience files, thereby eliminating repetitive compilation of locational information. The system's capabilities are demonstrated through examples of data management and simple data manipulation.

*Chavez, P. S. (see Elder, D. E.)*

*Durand, S. R. (see Henton, G. H.)*

*Elder, Diana Frances (USGS), Carl J. Phagan (Museum of Northern Arizona), Jeffery A. Anderson*

*and Pat S. Chavez*

### (USGS) EXAMINATION OF PROJECTILE POINTS UTILIZING DIGITAL IMAGE PROCESSING FOR TOPOGRAPHIC ENHANCEMENTS

Problems in projectile point typology are often the result of qualitative and/or subjective descriptions of projectile point characteristics. When a photograph of the projectile point is converted into a digital image, certain characteristics can be analyzed through existing image-processing algorithms. Enhancement procedures developed for digital terrain analysis, when applied to images of projectile points, can produce a quantitatively derived sketch, enhance flake scars and indicate degree of roughness (directly associated with the amount of production input).

*Fenicle, D. (see Myers, C. L.)*

*Gundersen, James N. (Wichita State) and Bruce D. Smith (Smithsonian)*

### THE LITHOLOGY OF THE BIRGER "BAUXITE" FIGURINE

A number of Mississippian Tradition effigy figurines have been identified as made of "fire-clay" or "bauxite". X-ray powder diffractometry (XRD) of the Birger figurine reveals its dominant mineralogy to be boehmite and its total mineral composition matches that of other such effigy carvings. Arkansas bauxite, typically, is gibbsite-rich and all but one of the numerous varieties of fire-, burley-, diaspore- and flint-clays from Missouri are diaspore- or kaolinite-rich and devoid of boehmite. One exception, boehmite-rich "burley-flint clay", suggests that the provenance of the "boehmite-bauxite" of the Birger figurine might be in Missouri.

*Henton, Gregory H. and Stephen R. Durand (Desert Research Institute)*

### RASTER BASED PROJECTILE POINT MEASUREMENT

Traditionally, projectile points are measured using mechanical devices, a time consuming process prone to random and interpretive errors. Capturing point silhouettes with a video camera and digitizing software is quick and less prone to error. The data obtained is raster based and allows for direct comparison of different images by simple computer routines. Relational data, such as change of point width along the midline, are easily obtained and compared. The display demonstrates the acquisition and analysis of raster data from a sample of projectile points from southern Nevada. The results are compared with traditional techniques.

*Hull, D. (see Myers, C. L.)*

*Moore, K. M. (see Murray, M. L.)*

*Murray, Matthew L., Katherine M. Moore and Margaret J. Schoeninger (Harvard)*

**PREHISTORIC DIET FROM BONE CHEMISTRY: PROBLEMS AND SUGGESTIONS**

Analysis of prehistoric diets using stable isotope ratios of nitrogen and carbon in bone collagen is an expanding methodology based on studies of biological systems. Application of these techniques to archaeological samples demands attention to diagenetic alteration and curation practices. Analysis of European Iron Age bone in various states of preservation identifies samples unusable for stable isotope analysis and suggests methods which overcome such problems. Additional studies simulate effects of 1) preservatives in bone and 2) the removal of preservatives and fats from bone on stable isotope ratios of bone collagen.

*Myers, Cindy L. (Janus Associates), Diane Fenicle, Deborah Hull and A. E. Rogge (Dames & Moore)*

**RECONSTRUCTING SOCIAL HISTORY: A CASE FOR THE ROLE OF HISTORICAL ARCHAEOLOGY**

As the "new archaeology" was being developed two decades ago, historians simultaneously promulgated a "new social history", emphasizing the role of ordinary or plain people [that is, the non-elite] in historical analyses. A study aimed at reconstructing the social history of several temporary dam construction camps in central Arizona (ca. 1890s-1940s) is described. Research into demography, daily living conditions, the work environment and ethnic relations is evaluated as a means to prosessual understanding of the realities, in contrast to the popular myths, of the settlement of the American West.

*O'Brien, H. L. (see Roman, J. A.)*

*Phagan, C. J. (see Elder, D. E.)*

*Rogge, A. E. (see Myers, C. L.)*

*Roman, Judy A. and Helen L. O'Brien (Pima Community College, Arizona)*

**USING PERSONAL COMPUTERS FOR CARTOGRAPHY**

Personal computers can be used to produce a wide variety of graphic output for archaeological mapping needs. Output from five readily available types of software produced on output devices ranging from dot-matrix printers to large format plotters is presented. Site maps, feature maps, topographic maps, magnetometer maps and sketch maps are displayed along with a description of the hardware and software used to create them.

*Schoeninger, M. J. (see Murray, M. L.)*

*Schwab, Angela (Crow Canyon Archaeological Center)*

**ARCHAEOLOGY AND PUBLIC EDUCATION**

Educational programs at the Crow Canyon Archaeological Center are designed so that participants receive a background in southwestern archaeology and research methods prior to field work. Participation in excavation and lab analysis give students a sense of the research process. Carefully prescribed excavation techniques and close supervision help to insure the quality of the research program. In addition to offering a means by which interested lay persons can assist in archaeological research, such educational programs benefit the professional community by developing a broad base of public support for archaeology and communicating the importance of cultural resource preservation.

*Smith, B. D. (see Gundersen, J. N.)*

**INDEX TO EXHIBITORS**

Tables 7 & 8	Academic Press Inc 1250 Sixth Av San Diego CA 92101 Scientific and Technical Books and Journals.
Table 30	Amigos de Paquime The Amerind Foundation Inc PO Box 248 Dragoon AZ 85609
Table 26	Ancient Life Pottery HCR Box 300 Elgin AZ 85611 Replicas of Hohokam pottery—made from local materials, using primitive technology.
Table 24	Archeological Assistance Division National Park Service PO Box 37127 Washington DC 20013 The National Archeological Database: Reports Portion and Projects Portion
Tables 9 & 10	Association of American University Presses 1 Park Avenue, Suite 1103 New York City NY 10016
Tables 1 & 2	Cambridge University Press 32 East 57th Street New York NY 10022 Academic books and journals
Table 25	Hammon, Jensen, Wallen & Assoc 8407 Edgewater Dr Oakland CA 94621 Photogrammetric mapping and measurements of archaeological sites and building elevations; Aerial and terrestrial photogrammetry; HABS/HAER photography.
Table 19	University of Nevada-Reno Historic Preservation Program & Department of Anthropology Reno NV 89557 Department of Anthropology and the Historic Preservation Program, in conjunction with the Division of Continuing Education at the University of Nevada-Reno, will be displaying and distributing material promoting its Continuing Education Program in Cultural Resources Management, designed specifically for historic preservation and CRM professionals, as well as those in related

Table 20

fields; also on display will be materials on the Anthropology department's PhD program and material on the Historic Preservation Program.

Table 15

ITD Space Remote Sensing Center  
Building 1103 Suite 118  
NSTL MS 39529  
SRSC is exhibiting a display introducing the Remote Sensing Center and our capabilities. We are also demonstrating the use of the GRASS Geographic Information System on a Masscomp 5400.

Mayfield Publishing Company  
1240 Villa Street  
Mountain View CA 94041  
Booth will be set up to display college texts for the appropriate disciplines.

Table 5

Plenum Publishing Corporation  
233 Spring Street  
New York NY 10013  
Featuring JOURNAL OF WORLD PREHISTORY (Wendorf/Close); Interdisciplinary Contributions to Archaeology series (Jochim); and individual titles by Bamforth, Geselowitz/Gibson, Nitecki/Nitecki, Nicholas, Soffer, and Spencer-Wood

Table 16

Smithsonian Institution Press  
955 L'Enfant Plaza #2100  
Washington DC 20560  
Scholarly books on archeology, anthropology and related fields. Catalogs. Smithsonian bags (free).

Table 29

The National Association of Student Anthropologists  
Department of Anthropology  
University of New Mexico  
Albuquerque NM 87131

Table 21

The University Museum  
33rd and Spruce Streets  
Philadelphia PA 19104  
Monographs and journals on archaeology and anthropology; unique items from the University Museum Shop (pins, mugs, T-shirts).

Table 14

The University of Alabama Press  
PO Box 2877  
Tuscaloosa AL 35487  
Display of scholarly books

Table 27

UCLA Institute of Archaeology  
405 Hilgard Av  
Los Angeles CA 90024

Publication of preliminary and final excavation reports, symposia proceedings and substantive papers in method and theory in four series: *Monumenta Archaeologica*, *Monographs*, *Occasional Papers*, and *Archaeology Research Tools*.

Table 6

University of Arizona Press  
1230 N Park #102  
Tucson AZ 85719  
Books

Tables 17 & 18 University of New Mexico Press  
220 Journalism  
Albuquerque NM 87131  
Books!

Tables 12 & 13 University of Oklahoma Press  
1005 Asp Avenue  
Norman OK 73019  
Exhibit books published by the University of Oklahoma Press.

Tables 3 & 4 University of Texas Press  
PO Box 7819  
Austin TX 78713  
Scholarly books in the field of Archaeology published by the University of Texas Press