CAPALDO, S. D., AND R. J. BLUMENSCHINE. 1994. A quantitative diagnosis of notches made by hammerstone percussion and carnivore gnawing on bovid long bones. *American Antiquity* 59:724–48.
CAVALLO, A., AND R. BLUMENSCHINE. 1989. Tree-stored leopard kills: Expanding the hominid scavenging niche. *Journal of Human Evolution* 18:393–99.
DOMÍNGUEZ RODRIGO, MANUEL. 1994*a*. Las razones adaptativas del comportamiento subsistencial de los animales carnivoros y sus estrategias iniciales de consumo de presas: Relevancia en el proceder tafonómico. *Quaderns de Prehistoria y Arqueología de Castelló*, no. 16, pp. 9–17.
———. 1994*b*. Dinámica trófica, estrategias de consumo y alteraciones óseas en la sabana africana: Resumen de un proyecto de investigación etoarqueológico (1991–1993). *Trabajos de Prehistoria* 51(1):15–37.
———. 1998. La formación de las acumulaciones óseas de macrofauna: Revisión de los criterios de discernimiento de los agentes biológicos no antrópicos desde un enfoque ecológico. *Zephyrus* no. 46, pp. 103–122.
El puma. 1984. *Fauna Argentina* 31.
FERNÁNDEZ, J. 1994. "Portrero del Caballo Muerto: Aspectos arqueológicos, cronológicos y paleoambientales del Precerámico tardio en el ecosistema hidrófilo de las vegas puneñas." *Actas del XI Congreso Nacional de Arqueología Argentina*, vol. 2, pp. 22–26. San Rafael, Mendoza, Argentina.
HAYNES, G. 1982. Utilization and skeletal disturbance of North American prey carcasses. *Arctic* 35:266–81.
———. 1988. Longitudinal studies of African elephant death and bone deposits. *Journal of Archaeological Science* 15:131–57.
HILL, A. 1979. Disarticulation and scattering of animal skeleton. *Paleobiology* 5:261–74.
———. 1989. "Bone modification by modern spotted hyenas," in *Bone modification*. Edited by R. Bonnichsen and M. Sorg, pp. 169–78. Orono: Center for the Study of the First Americans.
HILL, A., AND A. K. BEHRENSMEYER. 1984. Disarticulation patterns of some modern East African mammals. *Paleobiology* 10:366–76.
HORNOCKER, M. 1970. Winter territoriality in mountain lions. *Journal of Wildlife Management* 33:457–64.
LYMAN, R. 1994. *Vertebrate taphonomy*. New York: Academic Press.
MAREAN, C. 1991. Measuring the post-depositional destruction of bone in archaeological assemblages. *Journal of Archaeological Science* 18:677–94.
MAREAN, C., AND L. BERTINO. 1994. Intrasite spatial analysis of bone: Subtracting the effect of secondary carnivore consumers. *American Antiquity* 54:748–68.
MAREAN, C., AND L. SPENSER. 1991. Impact of carnivore ravaging on zooarchaeological measures of element abundance. *American Antiquity* 56:645–58.
MONDINI, M. 1995. Artiodactyl prey transport by foxes in puna rock shelters. CURRENT ANTHROPOLOGY 36:520–22.
NASTI, A. 1995. Observaciones tafonómicas sobre la desarticulación natural y supervivencia de partes anatómicas de vertebrados modernos en medioambientes puneños. *Palimsesto* 3: 12–27.
———. 1996. "Predadores carroñeros y huesos: La acción del puma y el zorro como agentes modificadores de esqueletos de ungulados en la puna meridional." *II Reunión de Tafonomía y Fosilización*. Edited by F. Heiva and M. F. Blasco Sancho, pp. 122–26. Zaragoza.
———. 1998. Tafonomía y etnoarqueología en la puna austral: Criterios integrativos sobre las modificaciones óseas y procesos de formación del regístro arqueológico. Ph.D. diss., Universidad de Buenos Aires, Buenos Aires, Argentina.
OLIVERA, D. 1991. "El Formativo de Antofagasta de la Sierra (Puna Meridional Argentina): Análisis de sus posibles relaciones con contextos arqueológicos agro-alfareros tempranos del noroeste argentino y norte de Chile." *Actas del XI Congreso Nacional de Arqueología Chilena*, pp. 34–51. Santiago: Sociedad Chilena de Arqueología.
———. 1992. Tecnología y estrategias de adaptación en el Formativo (Agro-Alfarero Temprano) de la puna meridional argentina, un caso de estudio: Antofagasta de la Sierra (Provincia de Catamarca, Argentina). Ph.D. diss., Universidad Nacional de La Plata, La Plata, Argentina.
OLIVERA, D., AND M. BARANDICA. 1996. "Procesos de formación del registro arqueológico en vegas de altura de la Puna de Atacama: Aportaciones tafonómicas y geomorfológicas." *II Reunión de Tafonomía y Fosilización*. Edited by F. Heiva and M. F. Blasco Sancho, pp. 271–79. Zaragoza.
OLIVERA, D., AND D. ELKIN. 1996. De cazadores y pastores: El proceso de domesticación de camélidos en la puna meridional argentina. *Zooarqueología de Camélidos*, no. 2, pp. 95–125.
OLIVERA, D., AND A. NASTI. 1991. Introducción al Simposio de Estudios Actualísticos en Arqueología: Tafonomía, etnoarqueología y arqueología experimental. *Shincal* 3(1):28–32.
PALMQVIST, P., B. MARTÍNEZ-NAVARRO, AND A. ARRIBAS. 1996. Prey selection by terrestrial carnivores in a Lower Pleistocene paleocommunity. *Paleobiology* 22:514–34.
SCOTT, J. 1985. *The leopard's tale*. London: Elm Tree Books.
SELVAGGIO, M. 1994. Carnivore tooth marks and stone tool butchery narks on scavenged bones: Archaeological implications. *Journal of Human Evolution* 27:215–28.
TAPPEN, N. 1995. Savanna ecology and natural bone deposition. CURRENT ANTHROPOLOGY 36:223–60.
VRBA, E. 1980. "The significance of bovid remains as indicators of environmental and predation patterns," in *Fossils in the making*. Edited by A. Behrensmeyer and A. Hill, pp. 247–72. Chicago: University of Chicago Press.
WALKER, A. 1980. "Functional anatomy and taphonomy," in *Fossils in the making*. Edited by A. Behrensmeyer and A. Hill, pp. 182–97. Chicago: University of Chicago Press.
WHEELER, J. 1982. Aging llamas and alpacas by their teeth. *Llama Word* 1(2):12–17.
YACOBACCIO, H. 1991. Sistemas de asentamiento de los cazadores-recolectores tempranos de los Andes Centro-Sur. Ph.D. diss., Universidad de Buenos Aires, Buenos Aires, Argentina.
YEPES, C. 1938. Capacidad defensiva de la fauna. *Revista Argentina de Zoogeografía* 2(2):15–32.

The Postclassic Mesoamerican World System[1]

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In April 1999, 12 scholars met by invitation at Michigan State University for a weeklong research conference on Postclassic Mesoamerica. The purpose of the conference was to bring together current data on Postclassic Mesoamerica and to construct a new synthesis of the economic, political, and cultural dynamics of the time period. The past two decades have seen an explosion of research on Postclassic societies, and a number of scholars had felt that it was time for a comprehensive and

interdisciplinary synthesis of new data and ideas. The participants, representing the approaches of archaeology, ethnohistory, art history, and epigraphy, were Frances Berdan, Elizabeth Boone, Geoffrey Braswell, Janine Gasco, Nikolai Grube, Dorothy Hosler, Susan Kepecs, Philip Kohl, Marilyn Masson, John Pohl, Helen Pollard, and Michael Smith. This group includes specialists in many regions of Postclassic Mesoamerica, from western Mexico to Yucatan and the southwestern Maya highlands. Papers were circulated in advance, and discussion focused on key issues and themes. The conference was funded by the Wenner-Gren Foundation for Anthropological Research, with additional support from the University at Albany, SUNY, and California State University, San Bernardino.

Mesoamerican societies of the Postclassic period stood out from earlier societies in a number of ways, and participants' first task was to identify the major changes that produced the Postclassic social, political, economic, and ideological patterns. Compared with earlier time periods, Postclassic Mesoamerican societies were characterized by larger regional populations, smaller polities, a higher volume of long-distance exchange, a greater diversity of trade goods, a more highly commercialized economy, new standardized forms of pictorial writing and iconography, and new patterns of macroregional stylistic interaction. Participants agreed that these developments came about in two broad cycles of change. The first was a series of transitions from the major Classic-period civilizations to new Epiclassic/Early Postclassic patterns. These transitions, often labeled "collapses," occurred at varying times and rates in different areas. The second cycle of change was notable for its occurrence at roughly the same time throughout Mesoamerica—the 12th century—and for the similarity of economic and cultural changes across much of Mesoamerica. In areas with refined Postclassic chronologies, this transition occurred between the Early and Middle Postclassic periods; in areas with rougher chronologies, the transition marked the change from the Early to the Late Postclassic periods. Discussion at the conference focused more on the second of these cycles of change and on the resulting dynamics of the Middle-to-Late Postclassic period. The Epiclassic and Early Postclassic periods are far less well known and require a separate effort at analysis and synthesis. In the remainder of this report, the term "Postclassic" is used for convenience to refer to the post-12th-century, Middle-to-Late Postclassic time period.

WORLD-SYSTEMS THEORY AND POSTCLASSIC MESOAMERICA

One of the goals of the conference was to evaluate the usefulness of world-systems theory for understanding Postclassic Mesoamerica. Participants agreed that none of the published versions of archaeological world-systems theory (e.g., Algaze 1993, Peregrine 1996) provides an adequate model for the social and cultural dynamics under discussion. Wallerstein's original model of the modern capitalist world system is generally viewed by archaeologists as too restricted and of limited relevance to ancient societies. Participants agreed that many later adaptations of the world-systems approach, such as that of Chase-Dunn and Hall (1997), relax the model beyond usefulness by identifying world systems among all types of societies, including hunter-gatherers. Many considered the most relevant example of world-systems analysis to be Abu-Lughod's (1989) historical analysis, applying a generalized world-systems approach to empirical data.

In spite of their dissatisfaction with existing world-systems models, participants found concepts from the world-systems literature crucial for understanding Post classic Mesoamerica. All were comfortable in labeling Postclassic Mesoamerica a world system, defined as a widespread system of interaction that cuts across political boundaries. The basic division of labor in Mesoamerica extended far beyond the borders of any single state or empire, and actions and processes in one area affected societies in distant areas. Chase-Dunn and Hall's view of world systems as composed of four spatially distinct interaction networks (bulk-goods, political-military, prestige-goods, and information) was considered particularly useful. One benefit of this approach is that it encourages consideration of stylistic and cultural factors in addition to the economic phenomena that typically dominate discussion of world systems.

Most participants agreed that the spatial extent of the Postclassic world system, as defined by exchanges of goods and information, corresponds to the traditional culture area of Mesoamerica as defined long ago by Paul Kirchhoff and others in terms of a list of traits. Postclassic Mesoamerican societies interacted with peoples to the north and south, obtaining turquoise from the American Southwest and bronze technology and perhaps other items from South America and lower Central America. Although this might suggest that the relevant world system included these distant areas, the intensity of economic and stylistic interaction was far higher within Mesoamerica than between Mesoamerican societies and other groups, leading participants to agree that Mesoamerica is indeed a useful scale of analysis during the Postclassic period.

Following the lead of Abu-Lughod (1989), participants identified several geographical subsystems or interaction zones within the Postclassic world system within which exchanges were particularly intensive. These subsystems include western Mexico (Michoacan and Jalisco), the Aztec empire, the Maya realm, and a southern Pacific coastal zone. Participants were dissatisfied with the concepts of core and periphery for Postclassic Mesoamerica. Within empires (e.g., the Aztec and Tarascan cases), cores dominated peripheries both politically and economically, but the terms "core" and "periphery" do not advance our understanding beyond normal considerations of capitals extracting tribute from provinces. Apart from empires, however, the concepts of core and periphery have less meaning for ancient societies. In current archaeological world-systems theory (e.g., Peregrine 1996), ancient world systems exhibited "core-periphery differ-

entiation" (in which cores and peripheries have different levels of political and economic activity) but not "core-periphery hierarchy" (in which cores dominate peripheries economically as in the modern capitalist world system). If cores did not dominate peripheries in ancient systems, then perhaps these concepts are unnecessary. Participants in the conference noted that some areas did have higher levels of political and economic activity than others and agreed that these could be termed "core zones" for lack of another term. A working definition of such zones focused on areas of high population where economic, political, and ideological power were highly concentrated, leading to a high level of economic and intellectual production.

The list of core zones included the areas around Chichen Itza, El Tajin, Cholula, and Tula in the Early Postclassic period, Mayapan and Cholula/Tlaxcala in the Middle Postclassic, and the Basin of Mexico, Central Michoacan, and Cholula/Tlaxcala in the Late Postclassic. Although other areas were differentiated from these zones, participants felt that "periphery" was not an appropriate term for them, since nearly all areas of Mesoamerica were involved in intensive production activities and long-distance exchange networks and these did not necessarily focus on core zones. Thus their view of the Mesoamerican world system had cores but not peripheries. Although some world-systems theorists may find this formulation objectionable, participants were more interested in producing a better understanding of the Mesoamerican data than in achieving theoretical purity.

Some areas were more heavily involved in production for exchange than others, however. The term "affluent production zone" was suggested for areas with dense populations whose economic activities were intimately tied in to international exchange networks. For example, in Middle Postclassic central Mexico, Morelos and the Basin of Mexico were affluent production zones and the Cholula/Tlaxcala area was a core zone. In the Late Postclassic period, the Cholula/Tlaxcala area remained a core zone, the Basin of Mexico became one, and Morelos remained an affluent production zone. One new development in Postclassic Mesoamerica was an expansion of these affluent production zones far beyond their extent in earlier periods. A number of "resource extraction zones," where important raw materials such as obsidian, metal, and salt were obtained, were also identified.

POLITICAL AND ECONOMIC NETWORKS

One of the characteristic patterns of Postclassic Mesoamerica was the prevalence of city-states or small polities. In most areas, the regional systems of small interacting polities documented in the 16th-century ethnohistorical record had their beginnings in the 12th century. Exceptions to this pattern were the powerful Middle Postclassic Mayapan state in Yucatan (where the transition to small polities occurred later) and the Late Postclassic Tarascan empire of central Michoacan. Although the territorially extensive Aztec empire receives much discussion in the literature, it can be viewed as a weak imperial veneer over a foundation of city-states in both its core region (the Basin of Mexico) and its provinces. The Tarascan empire of western Mexico employed more direct strategies of control than the Aztec empire, and its processes of political centralization showed a trend opposite to that in many areas.

The small size of the polities of Postclassic Mesoamerica was conducive to the expansion of commercial exchange. The archaeological record reveals larger quantities of imported goods in Postclassic contexts, and ethnohistoric accounts describe marketplaces, professional merchants, and the use of money throughout Mesoamerica at the time of Spanish conquest. The Polanyi/Chapman concept of "port of trade" for long-distance commerce (Chapman 1957) was examined and found inadequate. Instead the Late Postclassic had a number of international trade centers. Whereas traditional "ports of trade" were described as occurring between hostile polities, most international trade centers were located either near the boundaries of the major exchange subsystems or between them, particularly in coastal settings along the Gulf and Pacific coasts.

Much discussion at the conference focused on key commodities in the Postclassic world system. These were goods whose production and exchange had major impacts within city-states. Prestige goods such as feathers and exotic jewelry of greenstone, turquoise, rock crystal, and metal were widely traded and had important economic and social roles. Archaeological and ethnohistoric evidence does not suggest that the production, exchange, and consumption of prestige goods were controlled by or limited to elites in the Postclassic period, as in the "prestige-goods economy" model. The high level of commercialization in the Postclassic economy, particularly the prevalence of marketplace exchange, rules out this model. Excavation data from several areas show that both elites and commoners had access to imported prestige goods, probably because of the operation of regional marketing systems.

Bulk luxuries such as salt, cacao, and textiles played particularly important roles in the Postclassic economy. The production of obsidian reached new heights in the Postclassic period, with shaft mines used at a number of extraction zones. The volume of obsidian in circulation increased greatly. New research on copper-bronze metallurgy helps document technological and exchange processes and shows the importance of Michoacan and Jalisco within the overall world system.

INFORMATION NETWORKS

Stylistic and iconographic evidence of information exchange between regions was a major topic of discussion, and new understandings were reached with regard to the "Mixteca-Puebla" phenomenon that has confused Mesoamericanists for decades. Participants identified a broad class of widely distributed international styles. The term "Mixteca-Puebla style" was considered best used to denote the distinctive polychrome painting style

of the Mixteca-Puebla region proper in the Middle and Late Postclassic periods. This style includes the Mixtec and Borgia-group codices, Mixtec and Puebla-Tlaxcala polychrome ceramics, and murals at Mitla, Tizatlan, and other sites in the Puebla-Tlaxcala area. Objects and manuscripts painted in the Mixteca-Puebla style helped cement interpolity alliances and confederations among "peer-polity" city-states in the Mixteca-Puebla region, where there was an intimate relationship between public ritual and political process.

Another international style is the related but distinct Aztec style, found primarily in Nahua historical and ritual codices, murals at Malinalco and other sites, and imperial Mexica sculpture. This Late Postclassic style spread by emulation throughout much of the Aztec empire in the form of manuscripts used by diverse local elites to track their dynastic histories. Aztec-style histories did not penetrate the Mixteca-Puebla region (part of which was conquered by the empire), probably because the Mixtec had their own ancient historical codices. A third related but poorly understood international style is present in fragmentary murals at the southwestern (highland) Maya cities of Utatlan and Iximche.

Polychrome murals at Tulum, Santa Rita, and several other Maya sites had been previously characterized by Donald Robertson and others as sharing a "Postclassic International Style" with murals in the Mixteca-Puebla region, but participants considered this assessment incorrect. The Maya murals in question were painted in a local Maya style that incorporated a small number of standardized international religious symbols probably derived from the Mixteca-Puebla and/or Aztec styles. The label "Postclassic International Symbol Set" was proposed for these elements. Although their meaning is difficult to reconstruct, they do provide clear evidence for artistic interaction between Yucatan and highland Mexico that probably accompanied commercial exchange. There are numerous examples of central Mexican (Mixteca-Puebla and Aztec) styles and traits in southern Mesoamerica during Postclassic times but few Maya traits in central Mexico. This pattern contrasts with that of earlier periods, when styles and traits spread more evenly in both directions. The conference did not produce a clear explanation of this pattern, but participants agreed that Postclassic styles and symbols were distributed through a vast information network that carried no connotations of political or economic domination. Although more research is needed, the world-systems approach was considered to provide a more satisfactory framework for understanding these patterns than recourse to migrations, conquests, and vague processes of "influence" radiating out of central Mexico.

CONCLUSIONS

Participants agreed that they had made significant progress in advancing knowledge and understanding of the economic and social dynamics of Postclassic Mesoamerica. Bringing together scholars employing a diversity of approaches (archaeology, ethnohistory, art history, and epigraphy) contributed greatly to the comprehensive and integrative character of the discussions. Work has begun on an edited volume to be titled *The Postclassic Mesoamerican World*. Rather than simply publish revisions of the original papers, it was decided to construct a volume from scratch to address the important data and issues identified at the conference. This book will have chapters by various combinations of the 12 participants, grouped into six sections: An Ancient World System, Polities, Economic Networks, Information Networks, Regional Case Studies, and World-System Integration. In Peregrine's (1996) terms, the book will adopt a "world-system perspective" without embracing any single "world-systems theory."

A number of topics were identified as needing research in the future, including analysis of variation in exchange and production between and within regions, the relationship between population size and economic activity, the variable nature of borders and borderlands, more precise identification of commercial networks through archaeometric sourcing of artifacts, and a more comprehensive analysis of the distribution and significance of Postclassic styles and iconography. The refinement of archaeological chronologies is particularly important for the documentation of changes through time and the reconstruction of relationships among regions. It is difficult to examine Postclassic processes in areas like the Valley of Oaxaca, where a single 600-year archaeological phase covers the entire Postclassic epoch. Many of these topics can be approached through problem-oriented archaeological fieldwork that addresses the impact of macroregional processes on local conditions at the household, community, and regional levels. This kind of fieldwork is currently being done in several parts of Mesoamerica by the participants and others, and our understanding of Postclassic economic and social dynamics will only continue to improve in the years to come.

References Cited

ABU-LUGHOD, J. L. 1989. *Before European hegemony: The world system, A.D. 1250– 1350*. New York: Oxford University Press.

ALGAZE, G. 1993. *The Uruk world system: The dynamics of expansion of early Mesopotamian civilization*. Chicago: University of Chicago Press.

CHAPMAN, A. C. 1957. "Port of trade enclaves in the Aztec and Maya civilizations," in *Trade and market in the early empires*. Edited by K. Polanyi, C. M. Arensberg, and H. W. Pearson, pp. 114–53. Chicago: Henry Regnery.

CHASE-DUNN, C., AND T. D. HALL. 1997. *Rise and demise: Comparing world-systems*. Boulder: Westview Press.

PEREGRINE, P. N. 1996. "Introduction: World-systems theory and archaeology," in *Pre-Columbian world systems*. Edited by P. N. Peregrine and G. M. Feinman, pp. 1–10. Madison, Wis.: Prehistory Press.