tures and interregional interaction in Mesoamerica. It is notable, for instance, that some events do not neatly correspond between Xicotepec and the Basin of Mexico: some battles and conquests recorded from the Basin documentary record do not coherently match the dates for such events in the Xicotepec codex, and the New Fire ceremony celebrated in the Basin in 1455 is not at all mentioned for Xicotepec (although the one marking 1507 is indicated by a tied bundle). Also, both documents contain a large number of placename and personal name glyphs, many of them glossed. Their inclusion in these pictorials adds to our understanding of the conventions by which these glyphs were rendered, the extent of regional variation in styles, and the formulation of "eclectic" glyphs blending indigenous and Spanish elements.

Combined, these two publications are rich in data and stimulating in analysis. The pictorial documents themselves augment a primarily textual record for the Sierra Norte de Puebla. The commentaries, in both Spanish and French, provide comprehensive background and context, and broach significant and at times controversial issues. Although easy agreement will not be reached on matters such as the use of glottochronology (*Lienzos de Acaxochitlan,* p. 86), the acceptance of Tula as an empire (*Lienzos de Acaxochitlan,* p. 26), the reconstruction specifics of Late Postclassic polities in eastern Mesoamerica (*Lienzos de Acaxochitlan,* chapter 13), or the interpretation of specific placename glyphs (e.g., *Códice de Xicotepec,* p. 112), these publications systematically consolidate a large amount of information from a broad documentary base, and are welcome and valuable additions to any Mesoamericanist's library.

Ancient Economy and Alternative Approaches to Stone Tools at Copán, Honduras

Ancient Maya State, Urbanism, Exchange, and Craft Specialization: Chipped Stone Evidence from the Copán Valley and the La Entrada Region, Honduras / Estado, urbanismo, intercambio, y especialización artesanal entre los Mayas antiguos: Evidencia de lítica menor del Valle de Copán y la Región de La Entrada, Honduras. KAZUO AOYAMA. University of Pittsburgh Memoirs in Latin American Archaeology, Vol. 12. University of Pittsburgh, Pittsburgh, 1999. xxviii + 227 pp., figures, tables, appendix, bibliography. $29.00 (paper).

Reviewed by Geoffrey E. Braswell, State University of New York at Buffalo.

The integration of lithic studies in Mesoamerican archaeology is a comparatively recent development. Until the 1970s, few investigators working at post-Archaic sites conducted technological or economic analyses of stone-tool assemblages. Brief and almost invariably non-quantitative typological descriptions focused on bifacial instruments (particularly projectile points), but the organization of lithic production and consumption systems was ignored. In many cases, the most common chipped-stone artifact, the ubiquitous prismatic blade, was not even collected in the field. Casual flake technologies, of central importance to many non-elite households, simply were not on the radar screen.

The concept of the "behavioral typology," employed by Payson Sheets in his pivotal studies of the chipped-stone artifacts of western El Salvador (*Cerámica de Cultura Maya* 8:17–33, 1972; *Current Anthropology* 16:369–391, 1975; Sheets and Dahlin, *The Prehistory of Chalchuapa, El Salvador,* Vol. 2, pp. 8–26, 1978) gave Mesoamericanists the first analytical tool to approach processual issues from the perspective of lithic technology. Coupled with advances in geochemical sourcing techniques, lithic analysts began to study both production and exchange, two key aspects of any economic system. Moreover, microwear studies promised a way to determine the function of stone tools. Nevertheless, relatively few monographs devoted to Mesoamerican lithic artifacts have been published in the past quarter century. The three most important are by John E. Clark (*The Lithic Artifacts of La Libertad, Chiapas, Mexico,* 1988), Irwin Rovner and Suzanne M. Lewenstein (*Maya Stone Tools of Dzibilchaltún, Yucatán, and Becán and Chicanná, Campeche,* 1997), and Lewenstein (*Stone Tool Use at Cerros,* 1987).

These pioneering works each adopt what Clark has called the "bottom up" approach to ancient stone tools. That is, they focus on the details of lithic technology, on experimental replication, and on morphological analysis. The La Libertad study and two recent articles by Clark (*Ancient Mesoamerica* 8:137–159, 1997) and Clark and Douglas Bryant (*Ancient Mesoamerica* 8:111–136) demonstrate the power of an approach rooted in lithic technology and, ultimately, replication experiments. Lewenstein's (1987) work, too, is based on replication, but her analogies are between experimentally derived use-wear patterns and marks observed on ancient stone tools. Rovner and Lewenstein (1997) elaborate on Sheet's behavioral typology and discuss the "activity sets" of each stage of production. They also use non-metric attribute data to sketch out a typological sequence of Maya bifacial implements. Because "bottom up" scholars give special attention to lithic technology and replication, they formulate research questions that focus on production (particularly on the details of how ancient knappers performed their craft) and use. Not surprisingly, a sentiment shared by many "bottom up" lithicists is that the best way to understand stone tools is to learn how to knap.

Other scholars, many of whom are still graduate students, have adopted a "top down" approach to stone-tool collections from Mesoamerica. Unlike their "bottom up" counterparts, few "top down" advocates are knappers

themselves, and many were drawn to lithic analysis by its potential to answer economic questions. Patterns of exchange and consumption (by which I mean the social aspect of access to materials or technology, rather than the functional aspect of tool use) are the foci of their work.

There is no reason, of course, that these two approaches to lithic artifacts should be mutually exclusive. *Ancient Maya State, Urbanism, Exchange, and Craft Specialization,* by Kazuo Aoyama, seeks to define a middle ground, one where broad anthropological questions may be answered without ignoring lithic technology. The work is an important addition to the all-too-short list of critical, book-length studies on Mesoamerican stone tools. That its subject matter is the well-known Copán region and nearby La Entrada makes the monograph even more valuable to Mesoamericanists who do not study stone tools.

Thanks to more than 25 years of continuous investigation, we know much more about ancient Copán than about any other site in Mesoamerica. Studies of its hieroglyphic texts, carved-stone monuments, and architecture abound, but its lithic artifacts also have been the subject of extensive analysis. In recent years, 106,000 chipped-stone artifacts—mostly obsidian—from the Copán region have been typed, measured, sourced, or otherwise studied. Aoyama is the principal lithicist at Copán, and he has analyzed more than two-thirds of this enormous collection. Moreover, he has studied 17,000 additional chipped-stone artifacts from sites in the La Entrada region, located some 40 km northeast of Copán.

Aoyama also is one of the few Mesoamerican lithic scholars who conducts not only technological analyses, but also source attribution and use-wear studies. For this reason, his approach to the stone tools of Copán and La Entrada is unusually broad, and he is able to answer questions related to the organization of production, exchange, consumption, and use. His goal—to investigate the nature and role of craft specialization and distribution systems—is never lost in the minutiae that plague the least-effective "bottom up" studies. We are not treated to detailed descriptions of platform angles, lip retouch, and similar attributes, so perhaps do not learn as much about the particulars of prismatic blade production at Copán as some would like. But Aoyama's focus on anthropological concerns makes his book more useful to the nonspecialist. It holds much for any Mesoamericanist interested in ancient economy, but somewhat less for devotees of lithic technology. Although the work skillfully blends both "bottom up" and "top down" approaches to stone tools, the scope of his research questions require Aoyama to devote more text to the latter.

The work is structured in ten chapters, beginning with a brief introduction to the archaeology of the Copán and La Entrada regions. Chapter 2 presents Aoyama's methodology, with an emphasis on two key aspects of his study: visual source attribution and high-power microwear analysis. Aoyama, in fact, is the first Mesoamerican scholar to adopt and improve upon Lawrence Keeley's approach to use-wear analysis. He has discussed his high-power microwear technique in numerous publications, many of which are written either in Spanish or Japanese. English-only scholars, therefore, will find this section particularly useful, but those who wish to use Aoyama's experimental microwear photographs will need to look elsewhere. To my mind, the section devoted to technological and typological analyses should have been more detailed. Aoyama does not discuss how he defined his types or what attributes led to their identification in the laboratory. Although he scrupulously recorded metric data and used some metric attributes as material "availability indices," he also could have tested his typological categories against these data.

The following seven chapters are organized chronologically from the Early Preclassic through the Early Postclassic. In his discussion of 129 obsidian artifacts from Copán dating to the Early and Middle Preclassic periods, Aoyama corrects an important error regarding early trade patterns. A former researcher of the PAC II project reported that most of the early material at Copán came from San Martín Jilotepeque (SMJ) rather than from the nearer Ixtepeque (IXT) source area (both located in Guatemala). This error probably reflects the expectations of the student who conducted the analysis; in much of the Maya region, Middle Preclassic obsidian assemblages are dominated by SMJ obsidian. Independent of Aoyama, I analyzed the same set of artifacts and was surprised that I could find no obsidian from SMJ. The importance of Aoyama's correction is that Copán now can be placed squarely with all other sites in the Southeastern Periphery. From the earliest times, these communities depended on IXT or Honduran sources for their obsidian, and were not well-integrated with procurement systems focused on SMJ or El Chayal, the two principal sources of the central Guatemalan highlands.

It may surprise lithicists working elsewhere in Mesoamerica to learn that prismatic blade production did not begin in the Copán region until c. A.D. 150/250–400, corresponding to the Late Bijac phase of a prolonged regional Protoclassic period. Until that time, lithic assemblages were dominated by percussion and bipolar flake industries. Bifacially worked projectile points also were quite uncommon before this period. From a technological perspective, the Middle Preclassic through early Protoclassic chipped-stone tools of western Honduras have more in common with contemporary assemblages from lower Central America than they do with collections from Mesoamerica. This is consistent with the hypothesis advanced by ceramicists and other researchers that until the Bijac phase, the dominant inhabitants of the Copán valley were not Maya. Following a model proposed by John E. Clark, Aoyama sees the introduction of prismatic blade technology as the result of developing political elabora-

tion. This, in turn, may have been stimulated by the arrival of (highland Guatemalan?) Maya peoples in western Honduras 200–300 years before the founding of the Copán dynasty. It is important to remember that later retrospective texts refer to two predynastic rulers. One of these, nicknamed "Mak'ina Leaf Ajaw," was in power at 8.6.0.0.0 (A.D. 159), the beginning of the Late Bijac phase.

Two chapters on the Early and Late Classic periods form the core of Aoyama's text. During the fifth through early ninth centuries, Copán was the regional distribution center for IXT obsidian. Based on his comparative analysis of obsidian availability at elite and non-elite sites, Aoyama argues that obsidian was not subject to market exchange. Instead, it was redistributed in the form of prepared cores. Aoyama further suggests that redistribution of this important utilitarian commodity "may have been important as a means of reinforcing status differences as well as creating and maintaining political power" (p. 177). He notes that there is no evidence from either Copán or La Entrada for full-time specialization in chipped-stone tool production. Nonetheless, relatively few people in the rural zone surrounding Copán were able to produce blades. These agricultural producers obtained most of their prismatic blades through exchange or redistribution, and relied heavily on casual and informal flake production. That is, there is a clear distinction between the core-blade technology of the urban center and the simpler percussion industry of the rural zone. We may wonder, too, if this technological difference reflects ethnic as well as social distinctions. Outside of the major centers, Classic-period lithic producers of western Honduras continued to practice the lithic industries of their Preclassic, presumably non-Maya, ancestors.

Chapter 9 presents an important and exciting description of lithic production and exchange during the Early Postclassic Ejar phase, c. A.D. 950–1050/1100. After a century or so of abandonment, the El Bosque zone of Copán was re-occupied by a small population who used highly distinctive ceramics. Just as Ejar pottery cannot be confused with Late Classic Coner-phase ceramics, both lithic technology and exchange patterns reflect important and clear breaks with the past. These are sufficiently great that we may wonder if the Postclassic inhabitants of the Copán region were Maya or Lenca. Aoyama discusses some 781 chipped-stone artifacts from four primary contexts in El Bosque. I have analyzed an additional 2,526 obsidian artifacts from other Ejar-phase structures excavated by T. Kam Manahan. My analyses support all of Aoyama's observations. There is no evidence for the local production of prismatic blades during the Early Postclassic period. In Aoyama's words: "There is a strong correlation between the collapse of the Copán state and the decline in obsidian prismatic blade production" (p. 191). Instead, Ejar-phase occupants made casual percussion flakes on imported spalls and small nodules, and scavenged throughout the site for Classic-period artifacts large enough to use or reduce into informal flake tools. Crude, bifacially worked projectile points also are quite abundant in both chert and obsidian. These points do not resemble their Classic counterparts. Moreover, changes in obsidian procurement reflect the breakdown of the Classic-period redistribution pattern. Proportionally greater quantities of central Mexican obsidian—particularly from the Pachuca and Ucareo source areas—appear in Ejar-phase contexts. These were imported as finished prismatic blades, all of which have pecked-and-ground platforms. Finished blades of IXT obsidian also were imported, many (if not all) of which also have pecked-and-ground platforms. These highly distinctive features of the Ejar obsidian assemblage were not described in studies that report seemingly Postclassic hydration dates for proximal prismatic blade fragments. That the existence of ground- and-pecked platforms was not even noted is further evidence that these late dates are seriously in error, and were derived from blades produced during the Classic period. As Aoyama notes, "both ceramic and chipped stone data do not support the model of gradual population decline [at Copán] lasting until A.D. 1250" (p. 189).

Aoyama's command of English is admirable, but few readers will confuse his prose with that of a native speaker. A small flaw in this sterling study is that the University of Pittsburgh did not carefully edit the manuscript; a work of this importance surely deserved better. The Spanish translation, although clear, often loses the subtle nuances of more problematical English passages. A second aspect of the Spanish text also is worthy of note. Lithic terminology is highly variable in Mexico and Central America. The translation employs some technical terms used in Honduras but less common elsewhere. For example, 'prismatic blade' is translated as *hoja* and *hoja prismática* instead of *navaja prismática* (Guatemala), *navajilla* (Yucatán), or even *cuchillo* (Nicaragua). Another example of regional vocabulary is *lasca* ('flake'), which is common in Central America but less so in southeastern Mexico (where *lámina* often is used). Some Mexican and Central American scholars, therefore, may find the terminology confusing.

Ancient Maya State, Urbanism, Exchange, and Craft Production is an important contribution to the small but growing body of research on lithic studies in Mesoamerica. It fills a critical gap in the published literature on Copán, which has focused on many important issues but has tended to overlook the structure of ancient economy. Thanks to Aoyama, it is fair now to say that we know more about lithic production, use, and exchange at Copán than at nearly any other Mesoamerican site. The methodological implications of Aoyama's work are at least as important as his substantive contributions. Although more text is devoted to the "top down" approach to lithic artifacts, this is the first monograph on Mesoamerican stone tools that attempts to balance both "bottom up" and "top down"

analytical strategies. The application of high-power microscopy to use-wear analysis is a particularly important "bottom up" contribution, about which many Mesoamerican lithicists will want to learn more. Similarly, "top down" scholars will be interested in Aoyama's discussion of obsidian availability indices, used to understand differences in the lithic consumption patterns of the elite epicenter of Copán and sites in the rural zone. Aoyama ably demonstrates that both "top down" and "bottom up" approaches are valid and indispensable ways to study ancient stone tools.

As more archaeologists turn to lithic artifacts to answer economic questions, the value of this book will only increase. But Aoyama's work also is significant because he outlines a general methodological strategy for the study of ancient economy that can be used with a wide variety of materials. Ceramicists and other specialists would do well to develop measures similar to his availability indices, and to design sampling strategies that yield similar quantified data. All students going into the field or laboratory to study ancient Mesoamerican economy should keep this monograph close at hand.

BOOK REVIEWS

Between the Lines: The Mystery of the Giant Ground Drawings of Ancient Nasca, Peru. ANTHONY F. AVENI. University of Texas Press, Austin, 2000. xiv + 257 pp., figures, tables, notes, index. $39.95 (cloth).

Reviewed by Donald A. Proulx, University of Massachusetts, Amherst.

With the recent appearance of yet another book of spurious archaeology by Erich von Daniken (*Arrival of the Gods*, 1998) the time is ripe for a popular, scientifically based book on the famous Nasca Lines—those mysterious ground drawings or geoglyphs etched onto the surface of the desert of southern Peru. This need has been admirably addressed by astronomer/archaeologist Anthony Aveni of Colgate University, who conducted over ten years of fieldwork in Peru and is considered one of the leading authorities on the geoglyphs.

Following an introductory chapter that presents an outline of the book, Aveni proposes in chapter 2 that the Nasca Lines should be considered the "eighth wonder of the world." The next fifteen pages are devoted to a detailed description of the seven wonders of the classical world and the author's update of this list using other examples from the Colosseum to Mount Rushmore. This is followed by a well-illustrated description of both types of geoglyphs: the biomorphs or life forms (birds, monkeys, spiders, etc.) and the geometric forms (trapezoids, spirals, elongated lines) along with technical information on how they were constructed.

According to the author, his goal in chapter 3 ("Nasca Before Columbus") is to "sketch the exploration of coastal western South America" and to seek clues as to why the Nasca Lines were created. The result is somewhat mixed. The first part of the chapter jumps from topic to topic such as pyramid building, agriculture, irrigation, ceramic production—with no systematic overview of the rise and fall of the Nasca Culture. No reference is made to the important Late Intermediate Period when the geoglyphs continued to be made. The chapter concludes with an excellent discussion of Inca Culture and a description of the *ceque* system of Cuzco (invisible radial lines connecting sacred locations). Aveni's collaboration with his colleague, Gary Urton, in the study of the organization of social space and in the analysis of *ceque* lines was critical to the formation of his own views of the function of the geoglyphs.

Chapter 4 presents a thorough history of the discovery of the Lines in the 1920s and the many past interpretations of their function. These include the plausible arguments of Toribio Mejía, who compared them with Inca *ceque* lines and believed that they were meant to be walked on, and Paul Kosok and Maria Reiche's now discredited view that the lines pointed to celestial phenomenon and represented a calendrical system. Crackpot theories—such as von Daniken's claim that the lines were landing strips for alien spacecraft—are also enumerated and skillfully disputed. Aveni does not discuss all of the theories in this chapter, leaving his own interpretations for the next chapter.

Chapter 5, at close to 100 pages, documents the fieldwork of Aveni and his colleagues along with Aveni's views on the function of the Lines. Much of this is a condensation and updating of data presented in his edited volume *The Lines of Nasca* (American Philosophical Society, 1990). The chapter includes Aveni's mapping of ray centers, his term for the locations (usually on the summits of small hills) where lines intersect. Aveni's team has mapped over 62 ray centers and 762 lines, and he argues that all of the ray centers are interconnected, forming a vast network on the pampa. These are compared to the later *ceque* lines of the Incas, and the suggestion is made that they may be prototypes of this communal ceremonial Andean activity. Following ideas elaborated by Johan Reinhard, Aveni also sees an association of some of the lines with sacred mountains (which local legends say are the source of water) and with the location of surface water. Many of the lines appear to conform to the orientation and flow of surface water in the valley while lacking any obvious astronomical alignments. Along with Helaine Silverman and Mejia, the author feels strongly that the lines were ritual pathways, meant to be walked on and perhaps used for pilgrimage to sacred locations. In summary, Aveni argues that the geoglyphs served a multitude of purposes, that they were planned, and that they served as the Nasca's way of organizing the world around them. The final chapter is an attempt to view the Nasca Lines in a larger world context that includes