REVIEWS

California Lithic Studies: 1. Gary S. Breschini and Trudy Haversat, eds. Salinas: *Coyote Press Archives of California Prehistory* No. 11, 1987, iv + 96 pp., 26 figs., 8 tables, 1 map, $5.95 (paper).

Reviewed by:
ELIZABETH J. SKINNER
INFOTEC Research, Inc., 19524 Hillsdale Dr., Sonora, CA 95370.

The three papers presented in this volume represent diverse studies of California lithic technology. The first, by Gary A. Parsons, addresses thermal alteration of Monterey banded chert from archaeological sites of the central California coast; the second, by Michael F. Rondeau, discusses bipolar reduction in California; and the third, by Clay A. Singer, describes lithic collections from three sites in the Manix Basin of southeastern California.

Parsons sets three goals for his study: (1) to describe physical and structural changes in Monterey banded chert when thermally altered; (2) to discover analytic methods whereby "heat-treated" Monterey banded chert can be distinguished from untreated material; and (3) to speculate on possible techniques of heat treating used by prehistoric peoples of the study area. Parsons examined archaeological collections in the Año Nuevo locality of central California to determine if Monterey banded chert had been heat treated; two recently burned tracts of land were surveyed to identify the effects of massive grass fires on surface-occurring Monterey banded cherts; and thermal (heat treatment) tests were performed with Monterey banded chert.

As a result of the thermal tests, Parsons determined that Monterey banded chert heated to >360° C. exhibits visual thermal traits and begins to lose structural integrity. Monterey banded chert heated to <360° C. becomes easier to flake, but does not show visible thermal traits. Seven analytical tests were used to evaluate the thermally altered control samples for traits that can be used as indicators of the heat-treating process. These tests included scanning electron microscopy (SEM), energy dispersive X-ray (EDX), X-ray powder diffractometry (XRD), sound velocity (T), laser reflectance (ACG), field ionization mass spectrometry (FIMS), and thermogravimetric analysis (TGA). SEM was identified as the most useful technique for determining thermal alteration.

After examining archaeological collections by SEM, Parsons concluded that most of the Monterey banded chert exhibiting *visual* thermal traits came into contact with grass fires or cooking fires, but that a large percentage of the chert not exhibiting visual thermal traits, yet determined by SEM to be thermally altered, was the result of intentional heat treating processes. Parsons also concluded that prehistoric peoples probably buried chert plates about 3-4 inches under cooking fires for a short time to heat treat them. It was determined that acceptable quarry blanks could be produced with untreated chert, but pressure flaking of these was not possible. Parsons found that after heat treating the quarry blanks, pressure flakes were more easily removed, more controllable, and more uniform. Finally, in an appendix, Parsons describes stages of manufacture and the number of items placed in each category.

The proper identification of intentionally heat-treated material as opposed to unintentional thermal alteration (grass, brush, forest, and cooking fires) is important in the interpretation of archaeological lithic specimens. Although many of Parsons' tests and results have been reported in previous studies, heat-treating experiments have never been conducted systematically for Monterey banded chert, and Parsons does provide one additional thermal trait--meandering thermal cryptofractures in colloidal pockets as seen with a SEM--for detecting thermal alteration on visually unaltered Monterey banded cherts. Parsons also repeats the *important* cautionary note concerning the use of visual traits to identify heat-treated material, and provides a general temperature (<360° C.) for the heat treatment of Monterey banded chert.

Although Parsons has provided an apparently previously undiscovered trait to detect thermal alteration, he has not demonstrated satisfactorily that the prehistoric Monterey banded chert specimens he examined had *intentionally* been heat treated. He attributes those pieces with visual thermal traits to massive grass fires intentionally started by Indians, and all pieces that appear to be unaltered, but were determined to be thermally altered under the SEM, to intentional heat treatment. He does not take into account the possibility that wild fires throughout prehistory and into modern times affected not only surface cherts, but buried pieces. If thermal alteration is suspected in a collection, it is necessary to determine where in the reduction sequence heat treatment has taken place and confirm that it is not a random occurrence throughout the entire reduction sequence.

It was difficult to follow many of Parsons' statements because of the poor editing of his paper; there are many nonsentences and misspellings that detract from the substance. It also was disturbing that Parsons apparently has not read some of the articles he cited, as shown by the lack of proper reference to Weymouth and Mandeville's (1975) paper, possibly because it is cited in "Rick and Asch" (1978) without being included in their references. Parenthetically, "Rick and Asch" (1978) is generally referenced as just Rick (1978).

Rondeau's paper is a review of bipolar reduction in California. He first defines the technique, then cites two ethnographic reports of the use of bipolar reduction in northern California. He suggests that the bipolar technique was used for three purposes: (1) to produce small flakes for use as informal tools; (2) to produce flake blanks for the manufacture of small arrow points; and (3) to shape tools. He states that this latter technique has not been documented in California. The geographic distribution--which seems to be limited primarily to those collections examined by Rondeau himself--and the potential time depth of the bipolar technique are reviewed, with Rondeau concluding that bipolar flaking seems to occur more in northern California than in southern California and that the time depth for this technique could be considerable.

A variety of attributes for bipolar cores and debitage--including opposing attributes, orange wedges, linear shatter, and shear attributes--is discussed. Rondeau concludes by emphasizing the importance of recognizing bipolar cores and debitage. First, identification allows the inference of a specific activity. Second, if this technique is not recognized, misinterpretation of the reduction sequence may occur. Third, use of the bipolar technique may be related to changes in environment or may be temporally or spatially diagnostic.

This short paper alerts researchers to the presence of the bipolar technique in California, which largely has been ignored or denied but appears to have been widely employed. Although Rondeau states that the use of the bipolar technique for tool shaping has not been documented for sites in California, at least one instance where this technique seems to have been employed has been recorded (Skinner and Ainsworth 1984). Rondeau's list of attributes of bipolar cores and debitage is quite limited. It would have been enhanced with a mention of attributes reported from previous studies on bipolar flaking, such as those by Honea (1965), Kobayashi (1975), and Leaf (1979).

Singer's paper concerns his analysis of flaked stone assemblages from three sites in the Manix Basin of the Mojave Desert. The bulk of the analysis reported in this paper consists of a description and the results of Singer's refitting studies, where he conjoined pieces of identical material from given loci. Once these items were refitted to the point where no additional pieces could be added, the reduction sequence was determined and the products and byproducts were analyzed. For each site and locus, he describes what is present, what could be refitted, and the inferred reduction sequence. He then speculates on what had been removed from each locus.

Singer compares the collections from these three sites with collections from other sites in the area, including the Calico "Early Man Site," Newberry Cave, the Sayles site, and sites at Fort Irwin. Finally, he notes that sites containing only the initial activities of stone tool manufacture are generally ignored or dismissed, classified as quarry-workshops or simply flake scatters. Singer proposes a preliminary typology for quarry-workshop and base-camp sites: (1) Source-Quarry (Type 1); (2) Source-Quarry-Workshop (Type 2); (3) Workshop-Camp (Type 3); and (4) Base Camp (Type 4). An appendix follows the paper, which is the artifact catalogue for each of the sites.

The paper represents an addition to previous studies of desert pavement quarry-workshops and demonstrates again the kinds of interpretations that can be obtained from refitting.

It has been demonstrated elsewhere that many of the bifaces found at desert pavement quarry-workshops are bifacial cores, often left behind while the flakes--the intended product of the reduction--were removed to be made into tools (Skinner 1984; Bergin and Ferraro 1987). In at least one case at Fort Irwin, these bifacial cores were manufactured during the Saratoga Springs period (A.D. 500-1000). The cores then were transported to the habitation site where they were heat treated. Flakes then were detached from the cores and were used in the production of Rose Spring points (Bergin and Ferraro 1987). Although it is difficult to tell from Singer's terminology, apparently he believes that these bifaces are early-stage preforms intended for the manufacture of dart points or knives.

Overall, the papers in this volume reflect an increasing interest in flaked stone technology and the implications of such studies for the understanding of past human behavior. They represent the study of three aspects of lithic systems that are most often ignored or discounted by archaeologists: the presence and role of heat treatment in lithic reduction systems; the initial reduction stages including the locating and testing of lithic materials; and the use of the bipolar technique.

REFERENCES

Bergin, K. A., and D. D. Ferraro
1987 Interim Analysis Report: Data Recovery of Bow Willow Wash South. Fort Irwin Archaeological Project, Research Report No. 19. Salinas: Coyote Press.

Honea, K. H.
1965 The Bipolar Flaking Techniques in Texas and New Mexico. Texas Archaeological Society Bulletin 36:259-267.

Kobayashi, H.
1975 The Experimental Study of Bipolar

Flakes. In: Lithic Technology: Making and Using Stone Tools, E. Swanson, ed., pp. 115-127. The Hague: Mouton.

Leaf, G.
1979 Variation in the Form of Bipolar Cores. Plains Anthropologist 24(83):39-50.

Rick, J. W.
1978 Heat-Altered Cherts of the Lower Illinois Valley: An Experimental Study in Prehistoric Technology. Northwestern University Archeological Program Prehistoric Records No. 2.

Skinner, E. J.
1984 Data Recovery of a Portion of Bow Willow Wash North (Sites CA-SBR-4240, -4241, -4242, and -4520), Fort Irwin, San Bernardino County, California. Fort Irwin Archaeological Project, Research Report No. 11. Salinas: Coyote Press.

Skinner, E. J., and P. W. Ainsworth
1984 Flake Attributes and Technological Behavior in Basalt Biface Reduction Systems in the Central Mojave Desert. Paper presented at the Great Basin Anthropological Conference, Boise.

Weymouth, J. W., and M. Mandeville
1975 An X-Ray Diffraction Study of Heat-Treated Chert and Its Archaeological Implications. Archaeometry 17(1):61-67.

Archaeological Resource Study: Morro Bay to Mexican Border. Larry J. Pierson, Gerald I. Shiller, and Richard A. Slater. Cardiff, CA.: U.S. Department of the Interior, Minerals Management Service, Vol. 1, 199 pp.; Vol. 2, unpaginated appendix folio of folded 37 blueline maps, 5 figs., 4 tables, 1987, no price given (paper).

Reviewed by:
STEPHEN P. HORNE
Ojai Ranger District, Los Padres National Forest, Ojai, CA 93023.

Just off the shore of California lies an underwater frontier. While the general characteristics of the continental shelf are known to us, a watery cloak of mystery veils its deepest secrets. Among the most intriguing is the wealth of cultural resources scattered along its strandlines and among its reefs, canyons, and plains. While many recognize that shipwrecks are a cultural resource, far fewer know that prehistoric artifacts and *in situ* archaeological sites are also included in the cultural resources of the coast.

This study parts the veil just a little and makes a useful and timely contribution. The area of interest includes the Santa Maria Basin (vicinity of Point Estero to Point Conception) and the "Southern California Bight," that sweeping coastal indentation spanning from Point Conception to the vicinity of San Diego.

The research primarily is a compilation and synthesis of data and information gathered in technical geophysical and cultural resources studies conducted for planning offshore development. These technical studies are numerous, unpublished, and only narrowly distributed. Their existence is known only to a concerned few; they are used by even fewer. This study provides a useful service by tapping deeply into this well of information and attempting to both summarize and interpret.

An understanding of the distribution and preservation of offshore cultural resources depends in large part on an even more basic knowledge--the geological and morphological characteristics of the continental shelf. The report gives considerable attention to this foundation. Details of sediment depth and such morphological features as submerged terraces, extinct beachlines, and "drowned" stream channels and estuaries have been combined into a surprisingly complete idea of ancient coastlines and once-exposed landforms now sealed by marine sediments and water.