

Lithic Technology at the Late Middle Period Wind Tunnel Site (CA-SMI-609), San Miguel Island, California

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Abstract

Our analysis of 511 chipped stone artifacts from a deflated Late Holocene site on San Miguel Island provides insight into the nature of Island Chumash technology and exchange. Although numerous studies have been conducted on Channel Island stone tool assemblages, relatively little is known about the chipped stone technologies of San Miguel Island, or how such assemblages articulate with regional technological patterns and trade and procurement strategies. Near the end of the Middle period (ca. AD 600 to 1150) San Miguel Islanders used and produced a wide range of microdrills, small projectile points, and other tools, some of which were probably made from Cico chert that occurs locally on the island. These data illustrate the utility of investigating deflated Channel Island archaeological sites, previously thought to have limited research value.

Introduction

Chipped stone artifacts, including projectile points, microblades, and expedient tools, are relatively common in Channel Island archaeological sites (Arnold 1987; Cassidy, Raab, and Kononeko. 2004; Erlandson and Braje 2008; Erlandson, Rick, and Braje 2008; Howard 1991; Taskiran 2001). On the Northern Channel Islands, chipped stone tool assemblages dated to the last 1500 years typically contain abundant microblades and microdrills used in the production of shell beads (Arnold 1985, 1987, 1990; Arnold and Munns 1984; Arnold, Preziosi, and Shattuck 2001; Dietler 2003; Kennett

2005; Perry 2004; Preziosi 2001; Rick 2004). These artifacts generally appear to be made from chert found on eastern Santa Cruz Island, where several outcrop and pit quarries, and abundant microblades, microdrills, and microblade cores have been identified (Arnold 1985, 1987, 1990; Arnold, Preziosi, and Shattuck 2001; Perry 2004). Arnold (1987, 1990, 1991) and others have suggested that eastern Santa Cruz Islanders may have controlled access to these stone resources and traded finished microblades to people living in other parts of the islands. Complicating this scenario, however, is the recent identification of the Cico chert source on eastern San Miguel Island, which overlaps in macroscopic appearance with Santa Cruz Island chert varieties (Erlandson et al. 1997), the Tuqan Monterey chert source on San Miguel Island (Erlandson et al. 2008), and the possibility that other quality toolstone sources exist elsewhere on the islands.

Microblades have been identified in sites on all the Northern Channel Islands, but detailed analyses of microblade assemblages outside of Santa Cruz Island are relatively limited. These include a report of microblades and microdrills from Anacapa and San Miguel islands (Rozaire 1993) and a

few additional analyses of materials from San Miguel and Santa Rosa (Kennett and Conlee 2002; Rick 2004). Rick's (2004, 2007) analysis of Late Holocene sites from San Miguel and northwestern Santa Rosa islands revealed that there were few microblade cores present in these assemblages, suggesting that the microblades at these sites were largely acquired through trade or were made elsewhere at the sites or on the island. The limited amount of data from San Miguel and Santa Rosa, however, makes it difficult to determine the role people of these outer islands played in larger island microblade and other chipped stone industries.

In this paper, we describe a large chipped stone tool assemblage from CA-SMI-609, an extensive deflated site located in the "wind tunnel" on eastern San Miguel Island (Fig. 1). Although faunal remains and other materials at the site have been destroyed by wind erosion and other processes, hundreds of microblades (lacking a drill bit or having one broken off) and microdrills, numerous

projectile points, and other chipped stone artifacts were recovered from the deflated site surface. The abundance of trapezoidal microblades and drills (49% of all microliths), along with leaf-shaped arrow points, suggests a probable late Middle period (ca. AD 600-1150) age for the site. We begin with a brief description of San Miguel Island and CA-SMI-609 to provide a broader context for our description and analysis of the CA-SMI-609 assemblage.

San Miguel Island, the Wind Tunnel, and CA-SMI-609

San Miguel, the westernmost of California's eight Channel Islands, has a maximum elevation of 253 meters and is bisected by numerous ravines, gullies, and dune sheets that cover roughly 37 square kilometers in area. The island has a Mediterranean climate, with mild summers and cool, wet winters, averaging about 14° C in temperature and only 356 millimeters of rain annually. Exposed to the

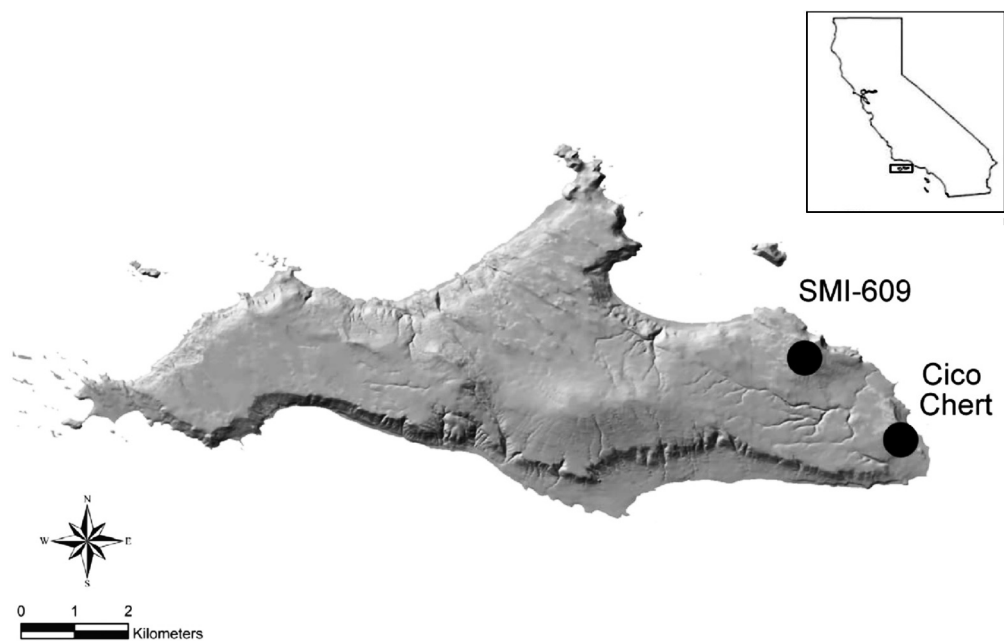


Fig. 1. Map of San Miguel Island and CA-SMI-609.

California Current—a cool, nutrient rich marine current system—San Miguel is often very windy and foggy (Johnson 1980; Schoenherr, Feldmeth, and Emerson 1999). The island's exceptionally productive marine environment fostered human occupation spanning at least 13,000 calendar years (Erlandson et al. 1996; Johnson et al. 2002).

Numerous anecdotal and scientific accounts of San Miguel describe its fierce winds. Data obtained from San Miguel Island's Naval Weather Station (5,635 observations) between January and December, 1999 document winds in excess of 75 kilometers per hour and gusts greater than 100 kilometers per hour. Due to the strength of the prevailing winds and the island's relatively unsheltered coastal location, the San Miguel landscape is strongly influenced by eolian processes (Erlandson, Rick, and Peterson 2005; Johnson 1972, 1980; Rick 2002). The island is dominated by low-lying coastal sage scrub, reflecting its wind exposure, aridity, and proximity to the ocean (Schoenherr, Feldmeth, and Emerson 1999). Both ancient and recent sand dunes cover most of the island, including the upper reaches of San Miguel Hill (253 meters) and Green Mountain (249 meters). Linear sand dunes, some as high as 30 meters, run primarily from northwest to southeast, following the direction of the prevailing winds. Many of the island's archaeological sites occur below, in between, and on top of sand dunes, which often appear to have been anchored and stabilized by shell midden deposits (Erlandson, Rick, and Peterson 2005).

Beginning around AD 1860, San Miguel experienced extensive vegetation stripping by sheep and other introduced livestock, agricultural activities, and drought. In fact, the island also may have experienced several episodes of vegetation stripping throughout the Late Quaternary (Johnson 1980). Prior to AD 1860, historical accounts

describe the island as having considerably more productive terrestrial flora than was found in the late 1800s and early 1900s (Johnson 1980:104). This destruction of the island's vegetation periodically destabilized island dunes and eroded island soils, revealing extensive areas of cemented "dune rock" or caliche formations (Johnson 1972, 1980; Schoenherr, Feldmeth, and Emerson 1999:263). Historical erosion also negatively affected many island archaeological sites (Rick 2002).

On the northeast portion of the island, an active dune field called the Wind Tunnel begins at the east end of Cuyler Harbor and once extended all the way to Cardwell Point at the far eastern end of the island. Here, historical vegetation stripping caused massive movement of sand that formed a sand spit at Cardwell Point more than a kilometer long (Johnson 1980). The wind tunnel also contains numerous deflated archaeological sites that are primarily lag deposits of large ground and chipped stone artifacts, with limited amounts of highly fragmented shellfish and occasional remnant paleosols. Stabilization of island vegetation during the last few decades has greatly improved the preservation of island archaeological deposits. Unfortunately, in the wind tunnel and other areas, several large and deflated lithic scatters provide evidence of once considerably larger deposits. Due to preservation problems, and the presence of other well-preserved sites (Erlandson et al. 1996; Rick 2007), these deflated sites have received relatively limited attention from archaeologists working on the island.

Here we present data from CA-SMI-609, a large lithic scatter located on a rugged caliche and sand surface (Fig. 2). The site, which covers an area roughly 140 meters long and 65 meters wide, consists of numerous clusters of microblades, projectile points, and chipped stone debitage where



Fig. 2. CA-SMI-609 site area looking north. Note person standing at right for scale. (Photo taken by T. Rick.)

the materials accumulated in natural depressions behind small caliche “wind breaks.” Most of the site remains unvegetated (~95%), but a few small, low-lying clusters of lupine and ice plant are present. A few heavily weathered and sandblasted pieces of shell were also noted, but their origins are unknown. The distribution of materials suggests that the site may once have been situated on a linear dune or set of dunes trending northwest-to-southeast, with views towards both Cuyler Harbor and Cardwell Point. The dunes have since been deflated, leaving the more durable site constituents scattered across the caliche hardpan. Today, CA-SMI-609 is bracketed by two linear dunes on the northern and southern margins of the Wind Tunnel.

Methods

CA-SMI-609 was identified by University of Oregon archaeologists hiking back and forth between the Channel Islands National Park research station in upper Nidever Canyon and sites located

on the northeast coast of San Miguel. All of the artifacts reported here were systematically collected from the CA-SMI-609 site surface during fieldwork between 1999 and 2001. The surface of the site was thoroughly searched and all formal tools were collected. Debitage was also recovered during our surface investigation. Because of the movement of sand at the site, we found that each year a large number of additional tools were exposed. Overall, we recovered 511 artifacts, one of the largest assemblages of microblades and other formal tools available from a single site on San Miguel Island.

All collected artifacts were transported to the laboratory for detailed analysis. This included preliminary measurement and identification at the University of Oregon and final identifications and analysis at Southern Methodist University. All materials were identified following standard regional typologies and procedures (Arnold 1987; Arnold, Preziosi, and Shattuck 2001; Pletka 2001; Preziosi 2001; Rick 2004). The maximum

dimensions (length, width, and thickness) were obtained for each artifact using calipers and all tools were also weighed. Preservation of the assemblage was generally good, although many of the tools are heavily polished by wind action. We also attempted to identify the raw material type of each artifact (e.g., Cico, Santa Cruz Island, Monterey, and Franciscan cherts). Because of macroscopic similarities between Santa Cruz Island and Cico cherts (Erlandson et al. 1997; Rick 2004), especially when dealing with small microblades, we have labeled the vast majority of the tools simply as island chert, recognizing that these tools probably come from one of the island sources. Future petrographic or geochemical analyses of these and other tool types may help determine the source of these materials.

Chipped Stone Tools from CA-SMI-609

Of the 511 chipped stone artifacts from CA-SMI-609 (Table 1), microdrills (n=217) and microblades (n=130) were the most common tool types (Fig. 3). The vast majority of the microlithic assemblage was made from trapezoidal (n=169) or triangular

unprepared (n=143) specimens, with only 12 (3%) prepared microblades and 23 undiagnostic specimens (Table 2). The abundance of trapezoidal/unprepared microliths suggests an age probably near the end of the Middle period (Arnold, Preziosi, and Shattuck 2001; Preziosi 2001). A small number of the microliths are similar to small flake drills described by Arnold, Preziosi, and Shattuck (2001:120-121), but the vast majority are generally consistent with trapezoidal microblades in appearance and measurement. (See below.) No definitive microblade cores or other evidence for microblade production were identified at the site. Two specimens had possible microblade scars on them, but these were so heavily abraded by blowing sand that we could not be certain that they were microblade cores.

Measurement of the microblades and microdrills demonstrates that the CA-SMI-609 microliths are relatively small in size, with maximum length ranging from 6.9 to 36.2 millimeters and an average of 13.6 millimeters. Thickness ranges from 1.1 to 5.3 millimeters and averages 2.5 millimeters, and width ranges from 2.4 to 9.9 millimeters and

Artifact type	Quantity	Percent of total
Trapezoidal microblades	48	9.4
Trapezoidal microdrills	121	23.7
Triangular microblades, unprepared	68	0.8
Triangular microdrills, unprepared	75	13.3
Triangular microblades, prepared	4	1.6
Triangular microdrills, prepared	8	14.7
Undiagnostic microblades	10	2.0
Undiagnostic microdrills	13	2.5
Projectile points and fragments	15	2.9
Bifaces and biface fragments	6	1.2
Macrodrills	3	0.6
Utilized/Retouched Flake	9	1.8
Debitage	131	25.6
Total	511	--

Table 1. Chipped Stone Artifacts from CA-SMI-609.

Micro lithic type	Count	Percent of grand total	Average length (mm)
Trapezoidal	169	48.7	
Microblades	48	13.8	14.80
Microdrills	121	34.9	12.47
Triangular unprepared	143	41.2	
Microblades	68	19.6	15.34
Microdrills	75	21.6	11.75
Triangular prepared	12	3.5	
Microblades	4	1.2	19.90
Microdrills	8	2.3	12.34
Undiagnostic	23	6.6	
Microblades	10	2.9	21.38
Microdrills	13	3.7	13.00
Total Microblades	130	37.5	
Total Microdrills	217	62.5	
Grand Total	347		

Table 2. *Micro lithic assemblage from CA-SMI-609.*



Fig. 3. *Trapezoidal microdrills from CA-SMI-609. (Photo taken by Torben Rick.)*

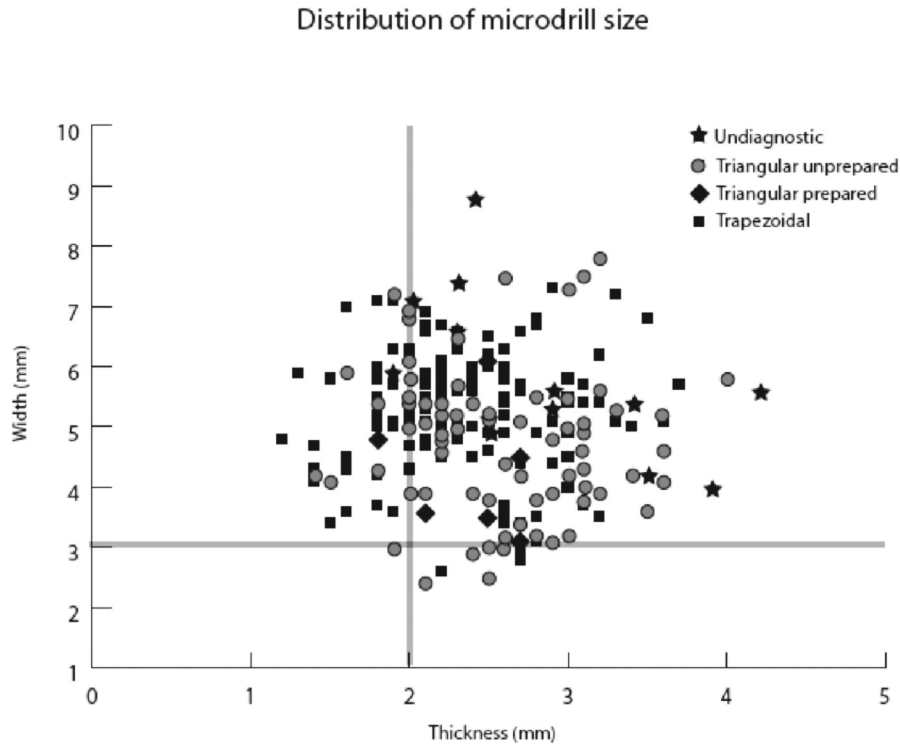


Fig. 4. Microdrill size distribution for CA-SMI-609. The X-axis line at 2 millimeters, and Y-axis line at 3 millimeters, mark Arnold's (1987) cutoff for Santa Cruz Island "failures."

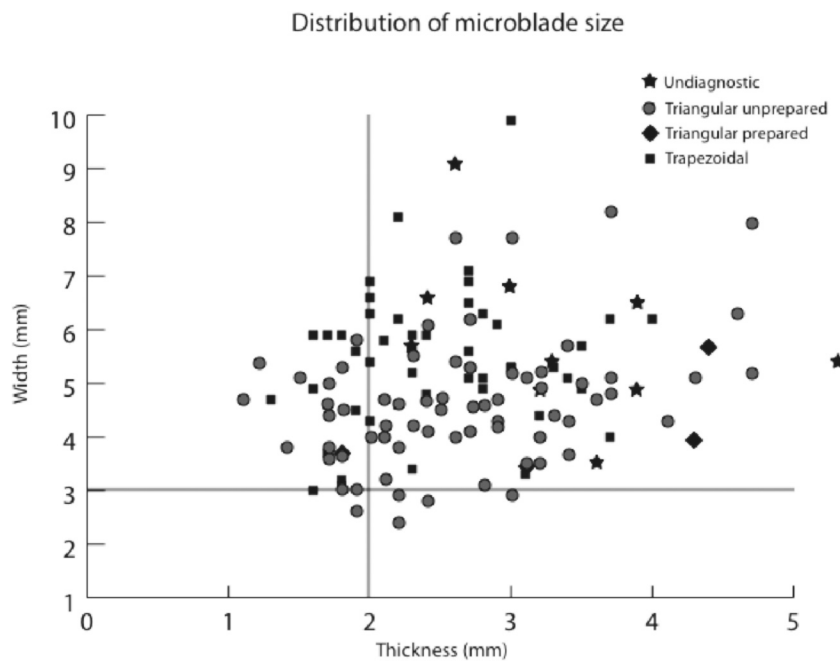


Fig. 5. Microblade size distribution for CA-SMI-609. The X-axis line at 2 millimeters, and Y-axis line at 3 millimeters, mark Arnold's (1987) cutoff for Santa Cruz Island "failures."

averages 5.0 millimeters (Figs. 4 and 5). Moreover, 42 (19%) of the microdrills fall into Arnold's (1987:86) "failure" category (<3 millimeters wide or <2 millimeters thick), made up of specimens thought to be too thin or small to be used as drills. This use of such small microdrills at CA-SMI-609 demonstrates that people were thoroughly using the microlithic tools.

The 164 non-microlithic artifacts include 131 pieces of debitage, 15 projectile points and projectile point fragments, 6 bifaces (i.e., tools worked on both sides but not clearly a projectile point or other definitive artifact type), 8 unifacial tools, 3 macrodrills, and a utilized flake. Of the projectile points, all but two appear to be small leaf-shaped arrow points, and a few had small stems, or were slightly flattened at the base (Fig. 6). The other two projectile points were base fragments with well-defined stems. Two of the points were made on flakes with only minimal retouch. The projectile points range in length from about 21-42 millimeters, in width between approximately 9.4-

14.4 millimeters, and thickness between roughly 1.9-5.9 millimeters. Most of the debitage consists of small flakes and other materials, many of which may be part of the microlithic tool assemblage, but fell well out of the range of our microdrills.

All of the tools identified in the CA-SMI-609 assemblage were made of chert or chalcedony. With the recent identification of new island chert sources on San Miguel and other islands (Erlandson et al. 1997, 2008; Rick 2007), it has become increasingly difficult to confirm the precise source location of the chert used to make stone tools through macroscopic identifications. This is particularly true for small artifacts such as microblades or microdrills. Because we did not conduct geochemical analyses of the materials to determine their origin, we have not assigned definitive stone sources to these materials. We note that of the non-microlithic tools, about 44 (94%) are consistent with Cico chert available on San Miguel Island about 2 to 3 kilometers from the site. However, of the microliths about 78 (22.5%) are



Fig. 6. Projectile points from CA-SMI-609. (Photo taken by Torben Rick.)

macroscopically similar to Cico chert, while the others could be from the well-known eastern Santa Cruz Island source, from Cico, or from elsewhere. Given the site's proximity to the Cico source, it is possible that many of the microblades were made of Cico chert, but the lack of clear evidence for microblade production at CA-SMI-609 and other San Miguel sites (e.g., CA-SMI-163; Rick 2007) suggests that these microblades may have been traded in from Santa Cruz Island. Future geochemical analysis could help confirm or deny this proposition. One green projectile point appears to be made of Franciscan chert from the adjacent mainland, with other specimens likely coming from Santa Cruz Island, Cico, Tuqan, and other deposits.

Discussion and Conclusions

The CA-SMI-609 lithic assemblage contains a variety of tool types, but like many Late Holocene Channel Island assemblages is dominated by microliths. Other than CA-SMI-609, relatively few Late Holocene lithic assemblages from San Miguel Island have been reported. Rozaire (1993) presented the analysis of microliths from CA-SMI-1 and CA-SMI-261 (Daisy Cave). These include 39 microblades and drills from CA-SMI-1 (15 trapezoidal microblades, 17 triangular prepared microblades, and 7 triangular prepared microdrills). Most of the materials from Daisy Cave were found in a beadmaker's kit—including 50 specimens (31 trapezoidal microblades, 1 trapezoidal microdrill, 15 triangular microblades, and 3 triangular microdrills)—¹⁴C dated to about AD 1190 to AD 1330. An additional triangular microblade, triangular microdrill, and microblade core were also found at Daisy Cave (Rozaire 1978:46-47). Rozaire (1978:108) also reported one microdrill each from CA-SMI-251 and CA-SMI-460. Survey and/or small-scale testing projects by Walker and Snethkamp (1984), Greenwood (1978), and others have also identified some microblades, but these assemblages are too small for comparison.

Rick (2007) reported on microlithic assemblages from CA-SMI-163 (n=101) near Cuyler Harbor, and CA-SMI-468 (n=77), CA-SMI-470 (n=6), and CA-SMI-481 (n=1) near Otter Harbor. The distributions of various types of microblades at these sites are consistent with their chronology. The CA-SMI-163 and CA-SMI-470 assemblages are Late or Historic period in age, for example, and are dominated by prepared forms. The CA-SMI-468 assemblage dates to the Transitional period (ca. AD 1150-1300) and contains mostly unprepared specimens with a few prepared forms. The single specimen from CA-SMI-481 is late Middle period in age and was of an undiagnostic type. Similar to CA-SMI-609, evidence for microblade production was extremely limited, with only one core identified at these sites (CA-SMI-163). Although no quantified data are presented, Kennett and Conlee (2002) also noted the presence of triangular prepared microblades at CA-SMI-602 on Point Bennett, CA-SMI-163, and CA-SMI-470.

The most detailed analyses of microblades from the Channel Islands come from Santa Cruz Island, where production sequences and microlith types have been identified from a number of chert quarries, villages, and other sites (Arnold 1985, 1987, 1990; Arnold, Preziosi, and Shattuck 2001; Dietler 2003; Perry 2004; Preziosi 2001). The CA-SMI-609 assemblage, and, to an extent, the other San Miguel assemblages, differ from some of these Santa Cruz Island materials in key ways. The most significant difference is the abundance of microblade manufacturing materials at the eastern Santa Cruz sites closest to the high-quality chert sources (Arnold, Preziosi, and Shattuck 2001:120). The dearth or absence of cores and other evidence for production from CA-SMI-609, other San Miguel sites, Santa Rosa Island (Rick 2004), and at sites on Santa Cruz Island located away from the east end quarries (Arnold, Preziosi, and Shattuck 2001:120-121) contrasts with the eastern

Santa Cruz sites. These data suggest that either people elsewhere on the islands were producing microblades at undocumented locations, or that they were obtaining them through trade. Due to the difficulty of identifying the precise source of the microblades, it is currently not possible to effectively determine where the raw materials were procured without geochemical analysis. It seems likely that many of these came from the well-known production centers on Santa Cruz Island, but our research at CA-SMI-609 suggests that people may have made some microblades from local Cico chert sources.

Another interesting variable of the CA-SMI-609 assemblage is the size of the microblades and microdrills and the number of undiagnostic specimens (nearly 7% of all microliths). Preziosi (2001) measured Santa Cruz Island microblades to infer the degree of standardization. She noted that maximum length is highly variable ranging from 9.5 to 30.9 millimeters, and generally not useful for inferring standardization, a factor confirmed by our variable length ranges (6.9 to 36.2 millimeters). However, the range of the width of microdrills declined through time on Santa Cruz Island, from 9.14 millimeters in the Middle period to 5.99 millimeters in the Late period (Preziosi 2001:161). This may be related to increased standardization of microblades and the often smaller widths of triangular microblades (Arnold 1987:245; Preziosi 2001). Microblade widths from CA-SMI-609, like most Middle period assemblages, are highly variable (2.4 to 9.9 millimeters), suggesting limited standardization. Our average microblade width is 5.0 millimeters, an average fairly consistent with the Middle period Santa Cruz Island mean of 4.71 reported by Preziosi (2001:161).

The presence of a number of projectile points at CA-SMI-609 is also intriguing. This raises the question of what people were doing with small

arrow points on an island with few terrestrial mammals to hunt. It is possible they were used for obtaining birds, marine mammals, and possibly fish, and conceivably for defensive purposes. Like the other tools, some of these projectile points appear to have been made of Cico chert and the presence of inclusions on many of the points suggests people were working with stone raw materials that were of moderate quality. Others were made from high quality Monterey cherts that could be from the newly identified Tuqan chert source at the east end of San Miguel (Erlandson, Rick, and Braje 2008) or from mainland or other sources that are very similar macroscopically. Why the relatively malleable Tuqan chert cobbles were not used to manufacture microblades at CA-SMI-609 remains a mystery.

A broader lesson from CA-SMI-609 concerns the utility of analyzing materials from deflated or otherwise disturbed archaeological sites. Because of the excellent integrity of many Channel Islands archaeological sites, researchers often focus on the numerous well-stratified island midden sites, with only limited attention given to lithic scatters and disturbed sites. The exception to this is analysis of quarry sites (Arnold 1987; Erlandson et al. 1997; Perry 2004). Similar to Erlandson and Braje's (2008) analysis of diagnostic artifacts from CA-SMI-679 at Cardwell Bluffs, the data from CA-SMI-609 illustrate the utility of analyzing chipped stone and other materials from lithic scatters and deflated sites. While the resolution of data from deflated sites is not as high as most island studies, they nonetheless provide an interesting assemblage of tools that can inform issues of artifact production, procurement, and exchange.

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Households. Master's Thesis, Department of Anthropology, University of California, Los Angeles.

References Cited

- Arnold, Jeanne E.
 1985 The Santa Barbara Channel Islands Bladelet Industry. *Lithic Technology* 14(2):71-80.
 1987 Craft Specialization in the Prehistoric Channel Islands, California. *University of California Publications in Anthropology* 18. University of California Press, Berkeley.
 1990 Lithic Resource Control and Economic Change in the Santa Barbara Channel Region. *Journal of California and Great Basin Anthropology* 12(2):158-172.
 1991 Transformation of a Regional Economy: Sociopolitical Evolution and the Production of Valuables in Southern California. *Antiquity* 65:953-962.
- Arnold, Jeanne E., Aimee M. Preziosi, and Paul Shattuck
 2001 Flaked Stone Craft Production and Exchange in Island Chumash Territory. In, *The Origins of a Pacific Coast Chieftdom: The Chumash of the Channel Islands*, ed. Jeanne Arnold, pp. 113-131. University of Utah Press, Salt Lake City.
- Cassidy, J., L. Mark Raab, and Nina A. Kononeko
 2004 Boats, Bones, and Bifaces: The Early Holocene Mariners of Eel Point, San Clemente Island, California. *American Antiquity* 69(1):109-130.
- Dietler, John E.
 2003 The Specialist Next Door: Microblade Production and Status in Island Chumash Households. Master's Thesis, Department of Anthropology, University of California, Los Angeles.
- Erlandson, Jon M., and Todd J. Braje
 2008 Five Crescents from Cardwell: The Context and Chronology of Chipped Stone Crescents at CA-SMI-679, San Miguel Island, California. *Pacific Coast Archaeological Society Quarterly*, (this issue).
- Erlandson, Jon M., Douglas J. Kennett, B. Lynn Ingram, Daniel A. Guthrie, Don P. Morris, Mark A. Tveskov, G. James West, and Phillip L. Walker
 1996 An Archaeological and Paleontological Chronology for Daisy Cave (SMI-261), San Miguel Island, California. *Radiocarbon* 38:355-373.
- Erlandson, Jon M., Douglas J. Kennett, Richard J. Behl, and Ian Hough
 1997 The Cico Chert Source on San Miguel Island, California. *Journal of California and Great Basin Anthropology* 19:124-130.
- Erlandson, Jon M., Torben C. Rick, and Todd J. Braje
 2008 Tuqan Chert: A "Mainland" Monterey Chert Source on San Miguel Island, California. *Pacific Coast Archaeological Society Quarterly*, (this issue).
- Erlandson, Jon M., Torben C. Rick, and Curt Peterson
 2005 A Geoarchaeological Chronology for Holocene Dune Building on San Miguel Island, California. *The Holocene* 15:1227-1235.

- Greenwood, Roberta
1978 Archaeological Survey and Investigation, Channel Islands National Monument, California. Report on file at the Central Coast Information Center, University of California, Santa Barbara.
- Howard, William J.
1991 Over the Edge: An Archaeological Investigation of Lithic Raw Material on the Eastern Escarpment of San Clemente Island, California. M.A. thesis, Department of Anthropology, CSU Northridge.
- Johnson, Donald L.
1972 Landscape Evolution on San Miguel Island, California. Ph.D. dissertation, University of Kansas. University Microfilms International, Ann Arbor.
1980 Episodic Vegetation Stripping, Soil Erosion, and Landscape Modification in Prehistoric and Recent Historic Time, San Miguel Island, California. In *The California Channel Islands: Proceedings of a Multidisciplinary Symposium*, edited by D. Power, pp. 103-121. Santa Barbara Museum of Natural History, Santa Barbara.
- Johnson, John R., Thomas W. Stafford, Jr., Henry O. Ajie, and Don P. Morris
2002 Arlington Springs Revisited. In *Proceedings of the Fifth California Islands Symposium*, edited by D. Browne, K. Mitchell, and H. Chaney, pp. 541-545. Santa Barbara Museum of Natural History, Santa Barbara.
- Kennett, Douglas J., and Christi Conlee
2002 Emergence of Late Holocene Sociopolitical Complexity on Santa Rosa and San Miguel Islands. In *Catalysts to Complexity: Late Holocene Societies of the California Coast*, edited by J. M. Erlandson and T. L. Jones, 147-165. Perspectives in California Archaeology, Vol. 6, Cotsen Institute of Archaeology, University of California, Los Angeles.
- Perry, Jennifer E.
2004 Quarries and Microblades: Trends in Prehistoric Land and Resource Use on Santa Cruz Island. In *Foundations of Chumash Complexity*, edited by J. E. Arnold, pp. 113-132. Perspectives in California Archaeology, Vol. 7, Cotsen Institute of Archaeology, University of California, Los Angeles.
- Pletka, Scott M.
2001 Bifaces and the Institutionalization of Exchange Relationships in the Chumash Sphere. In *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by J. E. Arnold, pp. 133-149. University of Utah Press, Salt Lake City.
- Preziosi, Aimee M.
2001 Standardization and Specialization: The Island Chumash Microdrill Industry. In *The Origins of a Pacific Coast Chiefdom: The Chumash of the Channel Islands*, edited by J. E. Arnold, pp. 151-163. University of Utah Press, Salt Lake City.
- Rick, Torben C.
2002 Eolian Processes, Ground Cover, and the Archaeology of Coastal Dunes: A Taphonomic Case Study from San Miguel Island, California, U.S.A. *Geoarchaeology* 17:811-833.
2004 Daily Activities, Community Dynamics, and Historical Ecology on California's Northern Channel Islands. Ph.D.

- dissertation, Department of Anthropology, University of Oregon. University Microfilms International, Ann Arbor.
- 2007 *The Archaeology and Historical Ecology of Late Holocene San Miguel Island*. Cotsen Institute of Archaeology, University of California, Los Angeles.
- Rozaire, Charles
- 1978 A Report of the Archaeological Investigations of Three California Channel Islands: Santa Barbara, Anacapa, and San Miguel. Report on file at the Central Coast Information Center, University of California, Santa Barbara.
- 1993 The Bladelet Industry on Anacapa and San Miguel Islands, California. In, *Archaeology on the Northern Channel Islands of California: Studies of Subsistence, Economics, and Social Organization*, edited by M. A. Glassow. Archives of California Prehistory 34:63-74. Coyote Press, Salinas.
- Schoenherr, Allan A., C. Robert Feldmeth, and Michael J. Emerson
- 1999 *Natural History of the Islands of California*. University of California Press, Berkeley.
- Taskiran, A. N.
- 2001 Flaked-stone Technological Organization on the Channel Islands, California. Ph.D. dissertation, Department of Anthropology, University of California, Riverside.
- Walker, P. L., and P. E. Snethkamp
- 1984 Archaeological Investigations on San Miguel Island—1982: Prehistoric Adaptations to the Marine Environment. Report on file at the Central Coast Information Center, University of California, Santa Barbara.