MESOAMERICAN ORIGIN FOR AN OBSIDIAN SCRAPER FROM THE PRECOLUMBIAN SOUTHEASTERN UNITED STATES

Alex W. Barker, Craig E. Skinner, M. Steven Shackley, Michael D. Glascock, and J. Daniel Rogers

EDXRF analysis of an obsidian scraper from the Spiro Mounds, Oklahoma, shows that the source material was from Pachuca, Hidalgo, Mexico. Given the distinctive peralkaline character of the obsidian, the source assignment is considered extremely secure. The artifact was recovered from the east tunnel of Craig Mound, Spiro, immediately after the cessation of commercial digging in 1935, and has been in the Smithsonian's collections since 1937. Despite more than 150 years of speculation regarding supposed contact with and influence from the region, this represents the first documented example of Mesoamerican material from any Mississippian archaeological context in the Precolumbian southeastern United States.

El análisis EDXRF de un raspador de obsidiana de Spiro Mounds, Oklahoma, demuestra que el material es originario de Pachuca, Hidalgo, México. De acuerdo con el carácter peralcalino distintivo de la obsidiana, la identificación del lugar de origen de este material se considera muy segura. El artefacto fue recuperado en el túnel este de Craig Mound, Spiro, inmediatamente después de la terminación de las excavaciones comerciales en el año de 1935, y ha permanecido en las colecciones del Instituto Smithsoniano desde 1937. Este representa el primer ejemplo documentado de material mesoamericano que proviene de los contextos arqueológicos del sureste precolombino de los Estados Unidos, a pesar de más de 150 años de especulación acerca del supuesto contacto e influencia de esta región.

Since the nineteenth century many archaeologists and antiquarians have perceived considerable Mesoamerican influence on the societies of the Precolumbian American Southeast. Researchers have pointed to a series of relatively nebulous shared traits, including mound-and-plaza architecture (e.g., Squier and Davis 1847), shared ceramic forms including stirrup bottles and tripod vessels (Griffin 1966), ceramic decorative techniques including negative painting and paint-added engraving (Du Solier et al. 1947:15–32), and particular forms of dental mutilation (Romero 1958). Native pottery and motifs of the Southeastern Ceremonial Complex (SECC) of the Southeast and trans-Mississippi South have also been compared with various symbolic and artistic complexes of Precolumbian Mexico (Krieger 1953; Phelps 1970), adding to the evidence for prehistoric contacts (see also Webb 1989). Unlike the prehistoric southwestern United States, however, where considerable quantities of objects of Mesoamerican origin have been recovered (Mathien and McGuire 1986), no Mesoamerican imports have previously been recovered from Mississippian Period (A.D. 1000–1500) contexts.

Here, we report on the analysis of a specimen from the Spiro Mounds site in eastern Oklahoma, which is demonstrated by energy-dispersive x-ray fluorescence (EDXRF) characterization to come from the well-documented Pachuca source in Hidalgo, Mexico. The specimen (NMNH 378273, Smithsonian Institution) is a retouched obsidian end-scraper, 8.70 cm in length, 3.84 cm in maximum width, with a maximum thickness of 1.13 cm and weight of 34.9 g. While the distal end is thin, the

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American Antiquity, 67(1), 2002, pp. 103–108

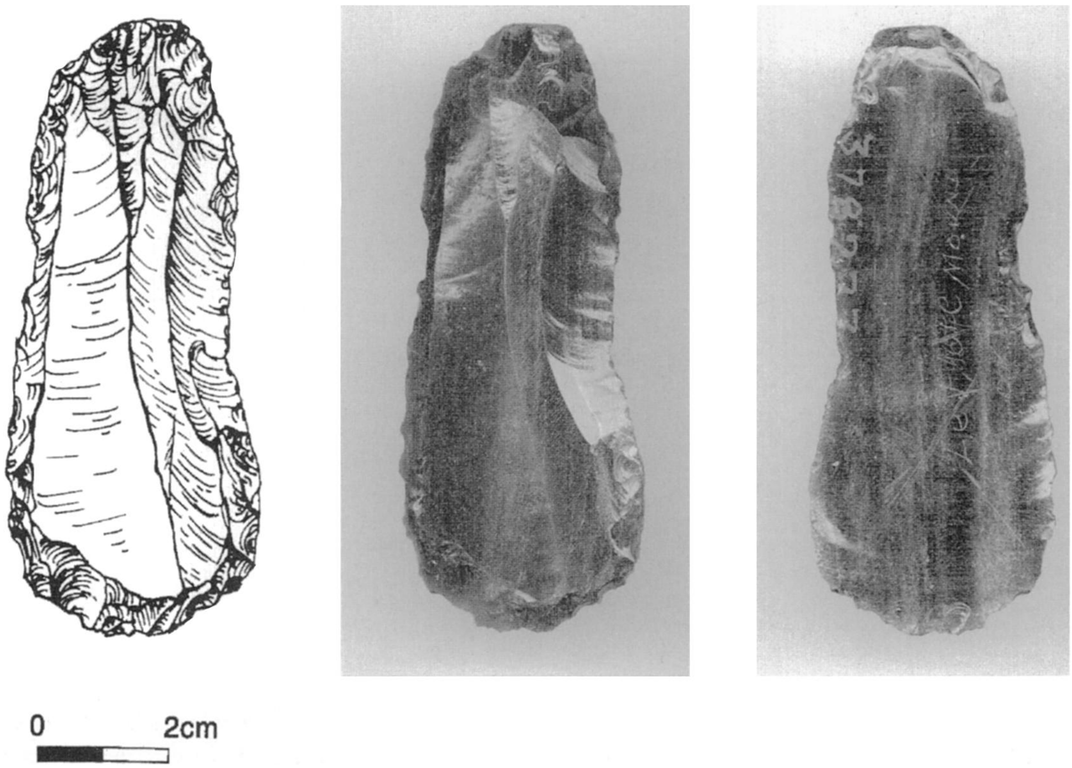

Figure 1. Obsidian scraper (NMNH 378273) from Craig Mound, Spiro Site, Oklahoma. Line drawing courtesy of National Museum of Natural History, Smithsonian Institution, scanned image courtesy of Northwest Research Obsidian Studies Laboratory.

retouching along the edge is steep, and similar marginal retouching is observed along both distal and lateral margins (Figure 1). The material is a banded goldish-green rhyolitic obsidian.

The specimen was collected in December 1935 from the east tunnel of the Craig Mound at the Spiro site in eastern Oklahoma by J.G. Braecklein and accessioned by the Smithsonian in 1937. Spiro (34LF46) lies along the western margin of the known distribution of Mississippian sites and has produced the most spectacular and extensive assemblage of SECC material currently known. Craig Mound, the largest mound at the site (ca. 107-x-35-x-10 m maximum height prior to excavation), represents a complex construction sequence including a series of at least four discrete but overlapping mound cones running southeast-northwest along the Arkansas River terrace, together comprising the "saddle-backed" form evident in early photographs. A large central feature of the largest (northern) cone, called the Great Mortuary, was discovered by relic hunters in the summer of 1935 and accessed by three tunnels, with the largest of these entering from the north. Braecklein visited the site immediately after expiration of the commercial lease and recovered the artifact from what he called the eastern tunnel.[1] Braecklein's credibility regarding the scraper's source is good, and circumstantial evidence supports the provenience. Correspondence accompanying Braecklein's gift to the Smithsonian carefully distinguished between items he had found himself in situ at the site (including the obsidian scraper) and artifacts he had been given or had purchased from the landowner. Other items recovered by Braecklein can be refitted with artifacts recovered from secure contexts by later Works Progress Administration (WPA) excavations at the site. His collection included fragments of Cup 237 (the raccoon tree cup; Phillips and Brown 1978:pl. 237), also represented by fragments recovered from both B-36 and B-62 gravelots (known fragments include NMNH 423289, UOSM LfCrI B62-70, B36-15d, and HMFA 63-221b). Context B-36 is a Spiro IVB double burial associated with the Great Mortuary floor (Brown 1996:689–690), while

Table 1. Analytical Results of EDXRF Analysis of Obsidian Scraper from Craig Mound, Spiro, and Source Samples from Pachuca, Hidalgo, Mexico.

	Spiro Mounds Artifact		Pachuca Source
Element	Abundance (ppm)	Analytical Uncertainty (±)	Range (n=7)
Zn	266	8	214–305
Rb	206	4	202–214
Sr	5	7	5–9
Y	113	3	107–114
Zr	914	7	892–931
Nb	86	2	87–91
Ba	18	14	1–28
Ti	1063	96	897–1152
Mn	1137	48	923–1188
Fe_2O_3	2.23	0.11	1.78–2.40
		Peak Ratios	
Fe:Mn	17.6	-	17.6–20.3
Fe:Ti	66.5	-	63.2–68.0

Note: All values reported in parts per million (ppm), except Fe_2O_3 which is reported as weight percent oxide.

B-62 is a Spiro IVB gravelot from the largest of the litter burials encountered by WPA crews (Brown 1996:699–670). Contemporary documents (MacDonald 1935; cited in full in Brown 1996:43–45) confirm Braecklein's presence at the site in December 1935 and describe his recovery of small artifacts from the tunnel. The location of the find was scribed on the ventral surface of the specimen, making confusion of context unlikely, and Braecklein was generally recognized for the care with which he recorded the provenience of artifacts. Harrington (1943:173), for example, noted that Braecklein "carefully marked each specimen in his large collection with the place of finding and often other information." All of the artifacts in this accession (145540) derive from Spiro, and none of Braecklein's other gifts to the Smithsonian include material from Mesoamerican sites. Braecklein was not paid for the collection, nor did he attach any particular significance to the scraper at the time of donation or in later correspondence.

The artifact was originally noted by the senior author during collections research at the Smithsonian Museum Support Center in Suitland, Maryland, and subsequently loaned to the Archaeological XRF Laboratory at the University of California and Northwest Research Obsidian Studies Laboratory in Corvallis, Oregon, for analysis under SI research loan 2015342. X-ray fluorescence analytical methods, with their ability to nondestructively and accurately measure trace-element concentrations in obsidian, have been widely adopted for obsidian characterization (Harbottle 1982; Williams-Thorpe 1995). We nondestructively analyzed the specimen using a Spectrace 5000 EDXRF spectrometer at the Northwest Research Obsidian Studies Laboratory in Corvallis. The system is equipped with a Si(Li) detector with a resolution of 155 eV FHWM for 5.9 keV X-rays (at 1,000 counts per second) in an area 30 mm^2. Signals from the spectrometer are amplified and filtered by a time-variant pulse processor and sent to a 100 MHZ Wilkinson type analog-to-digital converter. The X-ray tube employed is a Bremsstrahlung type, with a rhodium target, and 5 mil Be window. The tube is driven by a 50 kV 1 mA high-voltage power supply, providing a voltage range of 4 to 50 kV. Additional details regarding the analytical methods employed in this investigation are available online (Northwest Research Obsidian Studies Laboratory 2001).

Using an electronic database manager, the more robust diagnostic trace-element values and peak ratios (Rb, Sr, Y, Zr, Nb, Ba, Fe:Mn, and Fe:Ti) used to characterize the sample were compared directly with unpublished trace-element data collected through analysis of geologic source samples in the Northwest Research Laboratory reference collection. Artifacts are correlated to a parent obsidian source or chemical source group if diagnostic trace-element values fall within about two standard deviations of the analytical uncertainty of the known upper and lower limits of chemical variability recorded for the source.

The trace-element composition of the analyzed artifact correlated very well with laboratory reference samples from the Pachuca source (Table 1). In addition, the color of the specimen corresponded very

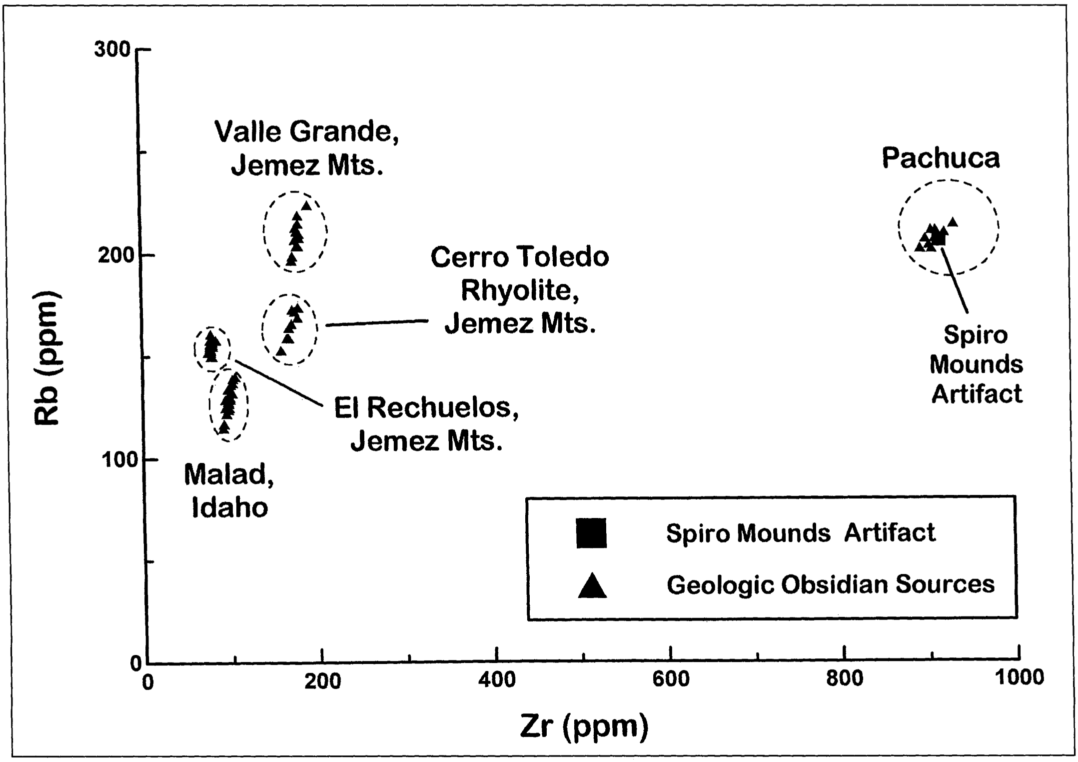

Figure 2. Scatterplot comparing the rubidium (Rb) and zirconium (Zr) trace element values of the obsidian artifact from Craig Mound, Spiro, Oklahoma, with the Pachuca, Hidalgo, Mexico source and other geochemically identified sources for Oklahoma obsidian artifacts.

closely with the distinctive greenish-gold color typical of that obsidian source. Although the Northwest Research Laboratory source-reference collection for major obsidian sources in the western United States is very extensive, the comparative collection for sources located to the south of Spiro Mounds in Mexico and Central America is incomplete. In order to rule out any other geochemically similar obsidian sources, we turned to the more complete comparative collections of Mexican obsidian located at the Archaeometry Laboratory at MURR (Glascock et al. 1998; Glascock 2001) and the Berkeley Archaeological XRF Laboratory (Shackley 2001). Examination of the source reference collections at these two facilities corroborated the initial finding that the scraper from Spiro was made of Pachuca obsidian (Figure 2). Using the concentrations of four elements measured by both neutron activation analysis (NAA) and EDXRF, a Euclidean distance search of the 15,000 obsidian samples in the MURR NAA database was conducted using log-transformed concentrations for Rb, Zr, Mn, and Fe_2O_3. The EDXRF results for the Spiro artifact matched the Pachuca source but lay significantly outside the range of values for the next nearest source (Dead Horse Flats, Nevada) for three of the four concentrations measured (Rb, Zr, and Mn).

Obsidian from the Pachuca source, approximately 10 km from the modern city of Pachuca, Mexico, is characterized by its dark green to goldish-green color, a result of its peralkaline character and high concentrations of Fe, often approaching 3 percent by weight (Mahood and Hildreth 1993). Because of its high quality, Pachuca obsidian was one of the main sources used by a number of major Precolumbian state societies in Mexico. It was widely traded and has been found in archaeological contexts as far south as Guatemala and northern Honduras (Neff et al. 1993), although it has not been previously reported north of Mexico. Three subgroups of Pachuca obsidian have been identified by Glascock et al. (1998) using destructive NAA techniques, separated mainly by Cs, Eu, Rb, and Zr. Because differentiation is based on elements (Cs, Eu) not usually acquired through non-destructive EDXRF, we have not characterized the specimen with regard to these subsources.

A number of other dark green peralkaline obsidians occur in the basin and range region of Chihuahua and southern New Mexico (Shackley 1995), but none of these matches the elemental concentrations exhibited by either the Pachuca source or the Spiro scraper. This scraper represents the only obsidian artifact recorded from the Spiro site (Brown 1996), and obsidian is not among the trade items associated with Mississippian or Caddoan contexts in the American Southeast and trans-Mississippi South (Johnson 1994). Previous analyses of obsidian from other Oklahoma sites (Vehik and Baugh 1994) have indicated obsidian sources in either the American Southwest or Great Basin, but we are not aware of any Mesoamerican sources for obsidian from Oklahoma sites regardless of cultural affiliation or time period.[2] A few obsidian artifacts of Mesoamerican origin have been found along the Texas coast and borderlands, but all appear to date to Paleoindian contexts, and none is associated with later Caddoan or Mississippian occupations (e.g., Hester 1988; Hester et al. 1992).

These results are significant because no Mesoamerican artifacts of any kind have been found previously in Mississippian contexts, despite more than a century and a half of speculation on contacts between the two regions. Whether the scraper examined here was the result of direct trade with Mesoamerica or indirect trade through a series of intermediary partners is unknown. Available evidence clearly suggests, however, that the rise of both Spiro and the Southeastern Ceremonial Complex are indigenous phenomena, and not the result of external contact or stimulus. The identification of a single artifact of demonstrable Mesoamerican origin at the site is indicative of the widespread trade and contact characterizing both the cultural complex at Spiro and the SECC, but the nature and significance of that contact, if any, remains to be determined.

Acknowledgments. The specimen was originally noted as part of research by the senior author under an affiliation agreement between the Dallas Museum of Natural History and the Smithsonian Institution. We are grateful to Carolyn Rose, Bruce D. Smith, Deb Hull-Walski, David Rosenthal, Jim Krakker, Tracy Goldsmith Baetz, and Susan Crawford for their assistance in making the specimen available for analysis, locating accession documents and correspondence, and arranging the affiliation agreement. Additional information regarding J. G. Braecklein was provided by Randall Thies of the Kansas State Historical Society and Jim Feagins of the Missouri Association of Professional Archaeologists, as well as Mr. Henry Lang of Raytown, Missouri. We are deeply grateful for the helpful comments and suggestions made by James A. Brown, Tom Hester, Henry Wright, Robert H. Tykot, Peter Sheppard, Susan Vehik, and Marilyn Johnson, and to David Wilson, Phil DeVries, and Carla Penz for translation of the abstract.

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Notes

1. This may in fact refer to the main northern tunnel. Hamilton's reconstruction of the Great Mortuary shows the entrance tunnel offset to the NE, and given the SE/NW orientation of the mound this tunnel may have seemed to enter from the east, especially if the mound orientation was assumed to be north-south. There is some cause to think that at least the relic hunters made this assumption, as evidenced by a map of the mound, collected by Harry Trowbridge on September 7, 1936 from one of the relic hunters, which shows the mound as oriented north-south..

2. Washita River phase sites tend to have material from the Malad, Idaho or Black Rock, Utah sources, while Antelope Creek phase obsidian is generally from New Mexico sources in the Jemez Mountains (Vehik and Baugh 1994).

Received May 30, 2001; Accepted July 30, 2001; Revised July 30, 2001.