13.

Precolumbian Obsidian Trade in the Northern Intermediate Area: Elemental Analysis of Artifacts From Honduras and Nicaragua

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> The northern part of the Intermediate Area (central Honduras through northern Costa Rica) is terra incognita in lithic sourcing. . . . As more [obsidian] sources are analyzed and as more artifacts can be attributed to sources in this southern Mesoamerica–Northern Intermediate Area zone, the outlines of prehistoric trade, ethnic interaction, and resource exploitation should be better understood.
>
> — Sheets et al. 1990:157

Obsidian artifacts from the northern half of the Intermediate Area hav rarely been chemically analyzed, and detailed geological characterization fo sources in the area remains extremely limited. In this chapter, obsidian arti facts derived from four sites located in two separate regions, northeast Hon duras and southwest Nicaragua, are analyzed and identified to source Detailed elemental results are described, and these indicate that two recentl identified obsidian sources in Honduras (La Esperanza and Güinope), a well as a third source (Ixtepeque) in Guatemala, located hundreds of kilome ters from the archaeological sites of recovery, were being utilized by Inter mediate Area natives for the acquisition of stone-cutting materials. Finally, discussion of the role of obsidian trade and possible exchange mechanisms i provided.

Obsidian is a volcanic glass that was a preferred and highly desired rav material among many ancient stone-tool-using cultures of both the Old an New Worlds (Torrence 1986). In the Americas, where metallurgy was rather late development in the prehistoric era and never widely employed fo tools, obsidian served as a precolumbian substitute for "steel" because o its superb fracturing qualities and extremely sharp cutting edges. In th

Mesoamerican culture area (central and southern México, Guatemala, and Belize) where obsidian use was widespread, even the sixteenth-century Spanish conquistadors, equipped with an array of steel implements, were greatly impressed with the utility of the glasslike stone.

Over the past thirty years, geologists, chemists, nuclear physicists, and archaeologists have worked together to identify major sources of obsidian around the world, analyzing specimens from these localities for their distinctive chemical "fingerprint." Obsidian artifacts from many archaeological sites, representing different cultures and time periods, have now been traced to particular natural sources, providing researchers with important information on ancient obsidian exploitation patterns and trade networks (Cann and Renfrew 1964; Heizer, Williams, and Graham 1965; Renfrew, Dixon, and Cann 1966; Taylor 1977; Weaver and Stross 1965).

In Mesoamerica, there has been considerable progress in identifying natural obsidian sources and tracing artifacts to these outcrops and quarries (Asaro, Michel, and Stross 1978; Graham, Hester, and Jack 1972; Hester, ed., 1978; Jack and Heizer 1968). As the obsidian database has expanded, particularly in the Maya subarea, researchers have begun to produce increasingly sophisticated (and sometimes competing) models of prehistoric exchange and economic interaction (Hammond 1972; Healy, McKillop, and Walsh 1984; McKillop and Healy, eds., 1989; Nelson 1985; Rice et al. 1985; Zeitlin 1982).

Farther south, however, in the adjoining Intermediate Area (see Willey 1959b, 1971:254–359), from Honduras to Ecuador, where archaeological research has been more limited, there have been few trace element analyses of this nature, even though obsidian artifacts are known to occur in the archaeological contexts (particularly in the northern and southern extremities of the area). The absence of an obsidian database from the Intermediate culture area, comparable to that of Mesoamerica, is due partly to insufficient information on both the geology and the archaeology. Collection of these data has also been hindered by major political upheavals over the past two decades. More information is needed, particularly on the location and description of natural obsidian sources lying within the area and on the chemical elemental data for such localities.

Nearly two decades ago, Wolfgang Haberland (1978:424) urged that future archaeological research in the Intermediate Area should focus more on the investigation of ancient trade routes. Haberland was largely interested in the use of sourced trade items (especially pottery) to aid in chronological ordering of cultural sequences and tracing cultural migrations. He was also well aware that prehistoric long-distance exchange of other materials (jade, gold, or obsidian) was likely a crucial, indeed catalytic, factor in the emergence of more complex lower Central American societies, and he continuously searched for evidence of areawide interaction (cf. Haberland 1957a, 1969, 1978, 1986).

Recently, Sheets and colleagues (1990) identified and described two previously unreported obsidian sources in Honduras—La Esperanza and Güinope. These are the first such sources to be located in the northern Intermediate Area, and their identification (and successful chemical fingerprinting) is an important contribution. It again raises questions about prehistoric obsidian usage, sources for obsidian, trade routes, and mechanisms of exchange in this part of the New World.

This chapter examines a small sample (n = 10) of obsidian artifacts, recovered from dated proveniences at four archaeological sites located in two regions of the Intermediate Area—northeast Honduras and southwest Nicaragua. The samples were chemically tested at the Lawrence Berkeley Laboratory of the University of California. Elemental analyses indicate the artifacts were derived from these two recently identified obsidian sources in Honduras, as well as a third source, located in the highlands of Guatemala. The sites and samples, along with the method of analysis, are briefly described. Finally, comparison with the few previously sourced obsidian artifacts in the northern part of the Intermediate Area is made, and comments on possible models of prehistoric exchange are presented.

HONDURAS SITES AND SAMPLES

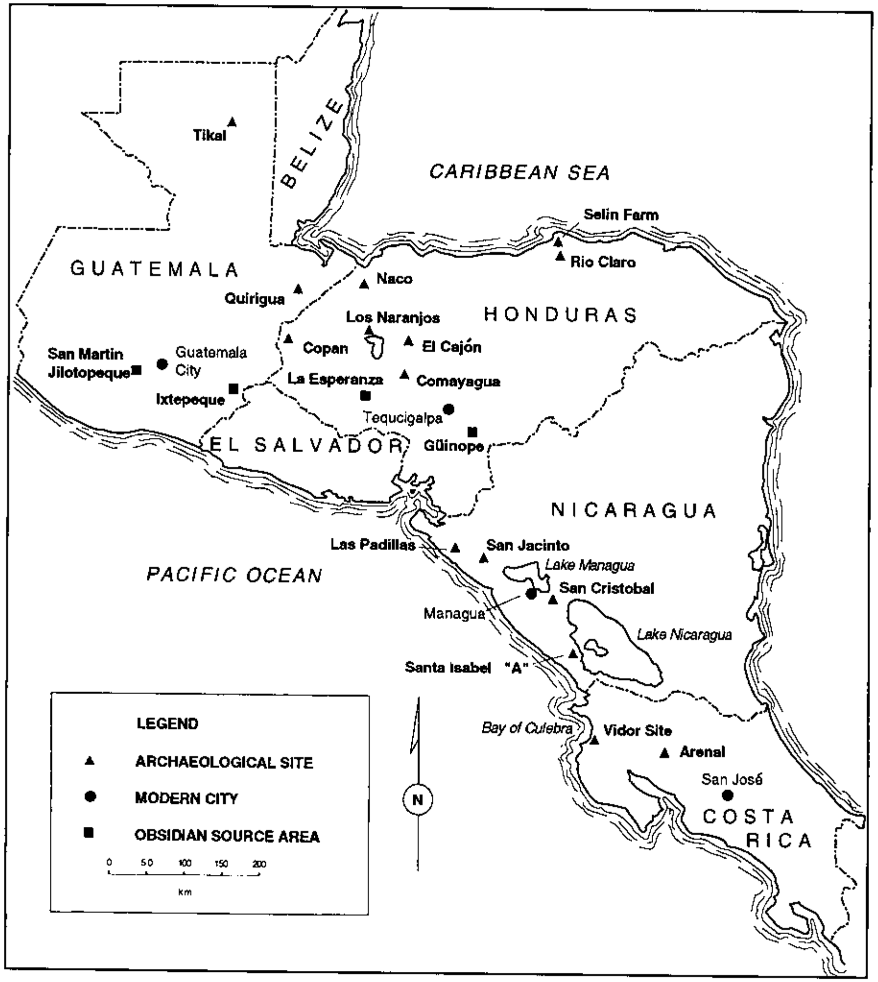
The obsidian artifacts (n = 5) consisted of prismatic blades derived from two sites located in the Department of Colon, northeast Honduras: Selin Farm and Río Claro (Figure 13.1). To the best of our knowledge, there are no sources of obsidian in this part of Honduras, which is nonvolcanic in nature.

Selin Farm, situated on the south shore of the Guaimoreto Lagoon, was excavated in 1976 (Healy 1978a, 1983, 1984a, 1984b). Marked by a series of low earth and shell mounds, the site was occupied during the Selin period (A.D. 300–1000). A pair of prismatic blades, recovered from a Basic Selin (A.D. 600–800) stratum composed of domestic refuse, was analyzed (Table 13.1).

The Río Claro site, a much larger community, was located in the Río Aguan Valley. It was partially excavated in 1975, and dated to the succeeding Cocal period (A.D. 1000–1530) (Healy 1978b). The more than fifty earth and stone mounds, positioned atop a natural flat knoll rising 10 to 12 m above the valley floor, were generally larger and much more densely compacted than those at the Selin Farm settlement. Three prismatic blades were recovered from an Early Cocal (A.D. 1000–1400) context (Table 13.1).

NICARAGUA SITES AND SAMPLES

The obsidian sample (n = 5) consists of prismatic blades recovered from two sites in southwest Nicaragua: Santa Isabel "A" (Department of Rivas) and San Cristóbal (Department of Managua) (Figure 13.1). Unlike northeast Honduras, this region of Central America is heavily volcanic, and, though



13.1 Map of the northern Intermediate Area, detailing the location of archaeological sites and obsidian sources noted in text.

none have been positively identified, it is highly likely that local obsidian sources exist.[1]

The Santa Isabel "A" site, a 1-km^2 area marked by low earthen mounds on the Rivas isthmus, opposite Lake Nicaragua, was excavated in 1959 and 1961 (Norweb 1964; Healy 1980:49–57). A pair of obsidian blade fragments were derived from a refuse-filled (ceramics, lithics, bone, and shell) stratum. Ceramics indicate a temporal assignment to the Sapoá period (A.D. 800–1350), particularly the La Virgen phase (ca. A.D. 1000–1200) (Table 13.1).

Table 13.1 *Sample concordance*

LBL Artifact #	Country of excavation	Department	Site name	Excavation unit	Date (period)	Provenience	NAA sample #	sa
TREN-1	Honduras	Colon	Rio Claro	Pit #3 (25-50 cm)	Early Cocal	La Esperanza	2227-V	81
TREN-2	Honduras	Colon	Rio Claro	Pit #3 (25-50 cm)	Early Cocal	La Esperanza		81
TREN-3	Honduras	Colon	Rio Claro	Pit #4 (25-50 cm)	Early Cocal	La Esperanza	2227-W	81
TREN-9	Honduras	Colon	Selin Farm	Pit #2 (0-25 cm)	Basic Selin	Güinope	2227-Z	81
TREN-10	Honduras	Colon	Selin Farm	Pit #2 (0-25 cm)	Basic Selin	Ixtepeque		81
TREN-4	Nicaragua	Rivas	Santa Isabel "A"	Pit #1 (150-175 cm)	Middle Polychrome	Ixtepeque		81
TREN-5	Nicaragua	Rivas	Santa Isabel "A"	Pit #1 (150-175 cm)	Middle Polychrome	Ixtepeque		81
TREN-6	Nicaragua	Managua	San Cristóbal	Pit D (0-10 cm)	Late Polychrome	La Esperanza		81
TREN-7	Nicaragua	Managua	San Cristóbal	Pit D (0-10 cm)	Late Polychrome	Ixtepeque	2227-X	81
TREN-8	Nicaragua	Managua	San Cristóbal	Pit D (0-10 cm)	Late Polychrome	Güinope	2227-Y	81

The San Cristóbal site, located about 1 km south of Lake Managua, is marked by earthen mounds, generally larger in size and more numerous at Santa Isabel "A." The site was excavated between 1977 and 1979 (W 1983). The three obsidian blade fragments were recovered from a si mound stratum dated, on the basis of associated ceramics, to the late Sa period and Ometepe period (A.D. 1200–1520) (Table 13.1).

ANALYTICAL METHODS

The ten obsidian artifacts were analyzed by X-ray fluorescence (XRF), five of the samples being further tested using neutron activation ana (NAA).

Previous research has shown that the most significant elements of ob ian measured by XRF generally are Ba, Rb, Sr, and Zr. Also measured Fe, Ce, Zn, Y, and Nb. The latter may be used in obsidian identifica especially if their abundances are unusually high. With our nondestruc procedure for XRF determinations, errors were introduced due to varia in sample size and shape. Thin artifacts measured against thicker stand tended to have abundances somewhat higher than the true values. By ta abundance ratios of elements with X-rays having nearly the same en (e.g., Rb, Sr, Zr), this error canceled to a large extent. The measurem were calibrated with a thick piece of El Chayal (Guatemala) reference ob ian. With a new methodology (Giauque et al. 1993), it is possible to m nondestructive XRF measurements that are precise and accurate and affected by the shapes and sizes of the artifacts. The measurements in chapter, however, were taken before that methodology was developed.

The abundances (i.e., of Ba) or ratios (i.e., of Rb, Sr, and Zr) are ca lated for the individual samples. For each group of samples having a c mon provenience assignment, the mean values are calculated. In addi the standard deviations or root-mean-square deviations (RMSD) in t values are calculated and compared with statistical errors inheren counting X-rays; this permits evaluation of the performance of equip and procedures.

If the RMSD of the critical element(s) in a group is less than 10 percent and if no sample has abundances diverging by three standard deviations from the mean, all of the artifacts probably have the same provenience. If the RMSD for a provenience group is less than 10 percent and if the group agrees to better than 10 percent with a reference group, it is provisionally assigned to the reference group. A high-precision, destructive, "short" NAA is then made of a representative member of the group. If the abundances of an artifact agree within three standard deviations of the errors of measurement or within three RMSD of the NAA reference group, the assignment of that artifact to the reference group is confirmed. The assignments of all artifacts in the provenience group are then also considered confirmed.

Any artifact whose XRF composition does not conform to the criteria stated is also analyzed by a "short" NAA, and if an assignment still cannot be made, the high-precision NAA is often extended. If the composition still does not match any of the obsidian sources known, it can at least be positively excluded from those sources.

In a "short" or "abbreviated" NAA, the elements measured that are most significant in obsidian analysis are Mn, Dy, Ba, Na, and K. In an "extended sequence" measurement, U, Ba, La, Ce, Sm, Eu, Yb, Co, Sc, Fe, Th, Cs, Rb, Hf, and Ta (as well as other elements) are well determined in most obsidians. The uncertainties of the calibration standard are the major sources of systematic uncertainty after other systematic errors, believed generally to be smaller than the counting errors, have been taken into account. Standard Pottery, however, is one of the very few standards in which the uncertainties are known for nearly all the elements measured. The composition of Standard Pottery, procedural details, and error estimates are described in Perlman and Asaro (1969, 1971). Additional details of the method are given in Stross et al. (1983).

Generally, if an obsidian artifact belongs to a well-defined group, the abundances in the artifacts of the best-measured elements (usually fourteen to sixteen are taken) will deviate from those of the reference group by no more than 2 to 3 percent on the average. Somewhat greater deviations may indicate heterogeneity in the source, and significantly greater deviations normally are taken to indicate a different obsidian source.

ANALYTICAL RESULTS

Of the ten obsidian specimens analyzed, four were determined to have been obtained from the La Esperanza source, and two from the Güinope source, both in Honduras. The other four specimens were determined to have come from the Ixtepeque source in Guatemala. Although all ten samples were subjected to XRF, five of these were tested additionally by "extended" NAA runs for greater confidence. The sample concordance is given in Table 13.1, the XRF data are given in Table 13.2a, b, c, and the NAA data appear in Table 13.3. It is seen in Table 13.3 that the average deviation between artifacts and source abundances is between 1.3 and 2.1 percent for the sixteen most precisely measured elements. This close agreement is consistent with the requirements for a chemical match by high-precision NAA given earlier.

The five northeast Honduran artifacts were attributable to three different obsidian sources. Three of the artifacts, with the Lawrence Berkeley Laboratory (LBL) catalog numbers Tren-1, -2, and -3, were provenienced to the newly described La Esperanza (Honduras) source; one of the artifacts, Tren-9, matched the Güinope (Honduras) source; and one other, Tren-10, was assigned an Ixtepeque (Guatemala) provenience.

Table 13.2a *Elemental abundances or abundance ratios by x-ray flourescence analysis (XRF) of 4 obsidian artifacts assigned to the Ixtepeque source*

Elements	TREN-4	TREN-5	TREN-7	TREN-10	Mean(4) and RMSD(4)	Ixtepeque source*
Ba(ppm)	1022	1097	1186**	1026		1030***
Zr(ppm)	191	183	224**	180		176
Rb/Zr	0.558	0.557	0.565	0.591	0.568 ± 0.016	0.57± 0.01
Sr/Zr	0.887	0.895	0.872	0.907	0.890 ± 0.015	0.90± 0.02

Table 13.2b *Elemental abundances or abundance ratios by XRF of 4 obsidian artifacts assigned to the La Esperanza source*

Elements	TREN-1	TREN-2	TREN-3	TREN-6	Mean(4) and RMSD(4)	La Esperanza source*
Ba(ppm)	924**	798	788	930**		825***
Zr(ppm)	211**	176	173	210**		162
Rb/Zr	0.955	0.909	0.928	0.921	0.928 ± 0.020	0.90 ± 0.03
Sr/Zr	0.954	0.968	0.975	0.958	0.964 ± 0.010	0.97 ± 0.02

Table 13.2c *Elemental abundances or abundance ratios by XRF of 2 obsidian artifacts assigned to the Güinope source*

Elements	TREN-8	TREN-9	Mean(2) and RMSD(2)	Güinope source*
Ba(ppm)	1100	1064		1000***
Zr(ppm)	121	128		134
Rb/Zr	1.37	1.50	1.44± 0.09	1.39± 0.09
Sr/Zr	1.58	1.64	1.61± 0.05	1.53 ± 0.09

* Data for the Ixtepeque source are from Asaro et al. 1978 for all elements except Ba; that entry is from Stross et al. 1983. La Esperanza and Güinope source data are from Sheets et al. 1990.

** Thin samples, such as these, yield higher abundances than the true values with the XRF methodology employed, but these errors tend to cancel out when ratios of element abundances are taken.

*** Neutron activation analysis values

Table 13.3 *Element abundances* from neutron activation analysis of selected Nicaraguan and Honduran prismatic blades*

	TREN -7		Ixtepeque source**		TREN -1		TREN -3		La Esperanza source**		TREN -8		TREN -9		Güinope source**	
	Abund.	Err.	Abund.	Err.	Abund.	Err.	Abund.	Err.	Abund.	Err.	Abund.	Err.	Abund.	Err.	Abund.	Err.
Ba	1048	26	1030	27	765	21	815	22	825	17	995	26	1022	27	1000	20
Ce	42.2	0.6	43.3	0.9	52.1	0.7	50.5	0.7	50.7	0.6	51.1	0.6	50.2	0.6	50.8	0.8
Co	1.01	0.06	1.05	0.08	0.76	0.06	0.71	0.06	0.86	0.04	0.57	0.05	0.49	0.05	0.59	0.05
Cs	2.72	0.09	2.71	0.17	4.59	0.12	4.54	0.12	4.52	0.05	8.10	0.16	8.03	0.17	7.88	0.10
Dy	2.43	0.10	2.30	0.11	2.24	0.09	2.24	0.09	2.36	0.07	2.47	0.10	2.74	0.06	2.52	0.10
Eu	0.547	0.008	0.541	0.013	0.492	0.008	0.498	0.009	0.501	0.006	0.494	0.008	0.506	0.008	0.504	0.008
Fe(%)	0.922	0.015	0.923	0.019	0.904	0.016	0.925	0.016	0.897	0.009	0.879	0.016	0.868	0.015	0.872	0.016
Hf	4.42	0.06	4.44	0.12	3.97	0.08	3.99	0.08	4.14	0.05	3.11	0.05	3.10	0.05	3.28	0.06
K(%)	3.94	0.25	3.61	0.26	4.33	0.27	3.75	0.26	3.75	0.17	3.95	0.25	3.78	0.25	4.09	0.25
La	23.3	0.6	23.5	0.9	28.5	0.7	28.6	0.7	28.9	0.4	28.2	0.7	28.5	0.7	28.3	0.6
Mn	453	9	449	9	429	9	428	9	427	9	518	10	525	10	519	10
Na(%)	3.04	0.06	3.05	0.05	2.82	0.06	2.81	0.06	2.84	0.06	2.69	0.06	2.71	0.06	2.70	0.05
Rb	98	4	103	6	156	5	149	5	163	15	160	5	168	5	161	20
Sb	0.27	0.04	0.19	0.04	0.32	0.05	0.25	0.04	0.24	0.14	0.36	0.05	0.41	0.05	0.48	0.07
Sc	2.09	0.02	2.11	0.05	2.58	0.03	2.56	0.03	2.54	0.03	2.11	0.02	2.12	0.02	2.13	0.02
Sm	2.59	0.03	2.65	0.03	2.99	0.03	2.96	0.03	3.02	0.03	2.95	0.03	2.99	0.03	2.98	0.03
Ta	0.759	0.008	0.76	0.02	0.960	0.010	0.944	0.009	0.959	0.01	0.880	0.009	0.891	0.009	0.894	0.009
Th	7.04	0.07	7.17	0.10	11.68	0.12	11.76	0.12	11.7	0.1	12.10	0.12	12.12	0.12	12.06	0.13
U	2.22	0.02	2.30	0.05	3.40	0.03	3.36	0.03	3.53	0.04	3.83	0.04	3.93	0.04	3.93	0.04
Yb***	1.894	0.027	1.91	0.04	1.593	0.027	1.562	0.028	1.62	0.03	1.78	0.027	1.83	0.03	1.82	0.03
A. D.#	1.3%				2.1%		2.1%				1.4%		1.3%			

* Abundances and errors are in ppm except when otherwise indicated. Errors are usually the estimated uncertainties in counting gamma rays. Errors for the Ixtepeque reference group, however, are the root-mean-square-deviations for six measurements.

** Data for the Ixtepeque source are from Asaro et al. 1978 for all elements except Ba, which is from Stross et al. 1983. Data for the La Esperanza and Güinope sources are from Sheets et al. 1992.

*** Yb values are based on a recalibrated abundance (F. Asaro and H.R. Bowman, unpublished data) of 2.96 ± 0.06 ppm in Standard Pottery, 5.7% higher than originally published (Perlman and Asaro 1969).

\# A. D. = Average deviation of artifact abundances from source values for 16 usually most-precisely-measured elements [excluding Co, Dy, K(%) and Sb]

From southwest Nicaragua, the five artifacts were also attributable to the three separate locations, the same trio of sources identified for northeast Honduras. Three of the five artifacts, with the LBL numbers Tren-4, -5, and -7, were provenienced to Ixtepeque; one artifact, Tren-6, to La Esperanza; and another, Tren-8, to Güinope.

DISCUSSION AND COMPARISONS

As noted earlier, there have been few previous elemental analyses of obsidian undertaken from sites in the northern zone of the Intermediate Area. To the best of our knowledge, the obsidian samples described here from northeast Honduras are the first specimens to be characterized, identified to source, and published. Obsidian is an exotic here, with no known local source(s).

The analyses, taken site by site, period by period, indicate that natives of northeast Honduras acquired their obsidian from multiple sources. There also is evidence, though admittedly based on a tiny sample, that source reliance shifted diachronically. During the Selin period (A.D. 300–1000), as shown by the Selin Farm samples, obsidian was procured from sources more than 200 km (Güinope) and 350 km (Ixtepeque) away. In the succeeding Cocal period (A.D. 1000–1520), as exhibited by the Río Claro samples, obsidian was being derived from yet a third source (La Esperanza), approximately 250 km away.[2]

From the Greater Nicoya subarea, obsidian has been noted previously in site collections from both Nicaragua and Costa Rica (Creamer 1983; Healy

1980:285; Lange et al. 1992; Snarskis 1981a:38; Wyss 1983:46, 49). Ther are as yet, however, no positively identified obsidian sources in the subare and only a handful of previously sourced archaeological specimens.

In regard to the latter, Sheets et al. (1990) chemically identified nin obsidian artifacts from southwest Nicaragua and four obsidian artifacts fror adjacent northwest Costa Rica. Six of the nine Nicaraguan artifacts wer produced from obsidian extracted at Güinope, and the other three were quar ried from Ixtepeque. Of the Costa Rican specimens, one came from Ixte peque, one from Güinope, one from Río Pixcaya (San Martin Jilotepeque) another highland Guatemala source, and the fourth matched an obsidiar (pebble) sample from the northeast shore of Lake Nicaragua (Figure 13.1).

From the present study sample, reviewed spatially and temporally, it i apparent that multiple obsidian sources were being mined in the north, witl some of this material making its way into the Greater Nicoya subarea o lower Central America (Lange 1984b). During the Sapoá period (A.D. 800–1350), as evident from the pair of obsidian samples from Santa Isabel "A," Ixtepeque obsidian was imported over a distance of about 450 km. In the succeeding Ometepe period (A.D. 1200–1520), as shown from the San Cristóbal samples, Ixtepeque continued to be used, but obsidian from Güinope, about 180 km away, and from La Esperanza, approximately 270 km away, was also being acquired.

The picture that emerges is a complex one. In a recent publication on the archaeology of Pacific Nicaragua, Lange et al. (1992:163) have suggested that the local needs for lithics were predominantly met with local materials. They also report that overall 10 percent of the obsidian artifacts they collected in a regional site survey in 1983 were produced in the Mesoamerican tradition of core-blade technology (Lange et al. 1992:174). Based on detailed studies of the probable production technology, artifact types, and more limited provenience studies, these authors suggest that this (Mesoamerican) obsidian trade or exchange was concentrated in the León-Managua region and constituted only a thin, spotty veneer compared to the use of largely local materials (Lange et al. 1992:163). They found a very distinct decrease in obsidian abundance between northern Pacific Nicaragua and the Rivas region in the south, and the abundance was particularly low in the region just east and north of Lake Nicaragua. Farther south, into Costa Rica, they found that obsidian was low and concentrated in sites near to the modern Nicaraguan border. Indeed, at the interior site of Arenal, only two obsidian artifacts were found among 9,000 chipped-stone artifacts (Sheets et al. 1990:153).

Table 13.4 tabulates some of the recent data on abundances of lithic artifacts, obsidian artifacts, and obsidian prismatic blades in Nicaragua, northeast Honduras, and Costa Rica, as well as the provenience of the obsidian (when known). The data for Nicaragua are given as a function of the archaeological zones proposed (for lithics) by Lange et al. (1992:55).[3]

Table 13.4 *Pattern of prismatic blade abundance*

Nic. Lithic Zones (L1)	Site	References	# lithic artifacts	# obsidian artifacts	# prismatic blades	(# pris. blades) / (# obsidians) (%)	(# pris. blades) / (# lithics) (%)	(# other obsidians) / (# lithics) (%)	Provenience: # from Ixtepeque	# from La Esperanza	# from Güinope
Nicaragua											
1		L1	17	14	0	0	0 (+11 - 0)	82			
	Las Padillas	L2		320	1	0.3	≤0.3 (+0.7 -0.3)				
	San Jacinto	W	538		13		2.4 (+0.9 -0.7)				
2		L1	274	177	11	6	4.0 (+1.6 -1.2)	.61			
	San Cristóbal	This work			3				1	1	1
3		L1	107	19	4	21	3.7 (+2.9 -1.8)	14			
	Nindiri	S			6				3	0	3
	Santa Isabel "A"	This work	72	3	3	100	4.2 (+4.1 -2.3)	0	2		
4		L1	210	3	1	33	0.5 (+1.2 -0.4)	1			
Costa Rica											
	Bay of Culebra	S			1				1	0	0
Northeast Honduras											
	Rio Claro	This work			3				0	3	0
	Selin Farm	This work			2				1	0	1

Nic. Nicaraguan
\# Number
pris. prismatic
S Sheets et al. 1990
L1 Table 7.1 Lange et al. 1992
L2 Page 54 Lange et al. 1992
W Lydia Wyckoff (1976) mentioned on page 173 of Lange et al. 1992

Some of the more usual modes of prehistoric distribution of obsidian have been characterized as supply zone (direct procurement) or down-the-line (Renfrew 1975, 1977:77, 1982). Direct procurement has a very slow "fall-off" with distance from the source, but the down-the-line distributions drop off rapidly. For Nicaragua, it is seen in Table 13.4 that the largest proportion of obsidian among total lithic artifacts is found, by far, in the northern zone. If all of the nonprismatic blade obsidian had the same provenience, then the fall-off rate would be a factor of sixteen to twenty from San Jacinto (León) to Santa Isabel "A" (Rivas), a distance of about 160 km. If the proveniences were not all the same, then some provenience group would have to fall off even faster. (The abundance of obsidian artifacts at León is taken as 100 percent of the lithic artifacts because the abundance of prismatic blades relative to obsidian was given as about the same as found for lithics.) This fall-off pattern suggests direct procurement of obsidian (for general use) was *not* the predominant exchange mode, and it gives an upper limit on down-the-line trade of obsidian in Pacific Nicaragua.

The ratio of the abundance of prismatic blades relative to obsidian artifacts for Nicaragua increases dramatically as the abundance of the obsidian artifacts declines. For example, it is 0.3 percent for Las Padillas in Zone 1, 6 percent in Zone 2, 21 percent in Zone 3, and 33 percent in Zone 4. On the other hand, the abundance of prismatic blades divided by the abundance of lithic artifacts is roughly constant, averaging slightly over 3 percent (when values are weighted by the number of blades) from San Jacinto (León) at the bottom of Zone 1 to Santa Isabel "A." The ratio for Zone 4 (north and east of Lake Nicaragua) may be smaller than 3 percent, or the apparent difference may be due to the small numbers involved.

These data suggest that there was a distinct need for obsidian prismatic blades, and this need could *not* be met by local sources of lithic raw materials. It appears, then, that there was a distribution network available and functioning that could supply those needs. It is reasonable to conclude that the prismatic blades were prestige items and, hence, decreased in abundance at a much slower rate with distance from the original source than other, less important lithic artifacts (Renfrew 1977:78). The network (or possibly networks) seems to have supplied prismatic obsidian blades as far south as the Santa Isabel "A" site in southwest Nicaragua and possibly as far south as the Bay of Culebra in northwest Costa Rica (Sheets et al. 1990; Lange et al. 1992:124, sample 8139 G from Ixtepeque). The obsidian prismatic blade network probably did not extend much farther south or inland, judging from the limited obsidian abundance (0.2 percent) at Arenal.

There are some difficulties with using a prestige-chain model to explain obsidian prismatic blades in Nicaragua. There is, for example, no apparent decrease of abundance with distance from the originating source, as would be expected even for an exchange model such as this. But this incongruity could be due to the large uncertainties in the values. Also, the abundance of prismatic blades relative to total lithic artifacts at Las Padillas seems distinctly lower than that found at San Jacinto and farther south.

Obsidian prismatic blades are taken as one of the key indicators of Mesoamerican connections with what is termed lower Central America (Lange and Stone 1984b; Lange et al. 1992:163; Sheets 1975), or the northern part of the Intermediate Area. The evidence noted here from Pacific Nicaragua demonstrates that obsidian prismatic blade distribution followed a different pattern of exchange than that of ordinary obsidian artifacts and that it was more like a prestige-chain than a down-the-line model. The present work also suggests that the Ixtepeque source was the most heavily used obsidian source for this distribution, that an exchange network for obsidian blades extended south at least to the Rivas region, and that the extent of the trade, or exchange, in Pacific Nicaragua corresponded to about 3 percent of the lithic material utilized. However, because of the prestige nature of the material, its "value" may have constituted significantly more than 3 percent of the lithic trade or exchange. With control over this type of material, with a high potential profit margin, Mesoamerican influence may have been quite significant even at distances of several hundred kilometers.

In northeast Honduras, where virtually all obsidian had to be imported, the early inhabitants secured this exotic material at the same time as natives from Greater Nicoya and exploited identical sources in the south hundreds of kilometers away. Without additional comparative data and with such a small database, it is harder to reconstruct likely trade mechanisms or types of operational networks. However, overall, the implication from the northeast Honduras and southwest Nicaragua data is that obsidian exchange was widespread in the northern Intermediate Area and that many different ethnic groups were concurrent recipients of obsidian from the same sources.

How were such exchanges arranged or conducted? To what extent were native groups of the northern Intermediate Area integrated economically (if at all) among themselves? How did they interact with Mesoamerican groups, which likely controlled access to the Ixtepeque and Río Pixcaya sources, and possibly others? The answer, unfortunately, to all these questions is that we simply do not know. Without substantial expansion of the obsidian database, through the addition of a significant number of sourced samples with dated contexts, it will remain difficult to do more than speculate about such prehistoric economic activity.

Ethnohistorical accounts reveal that some Greater Nicoya groups, such as the Chorotega and Nicarao, were obvious immigrants from Mesoamerica, spoke Mesoamerican-derived languages, and practiced many Mesoamerican customs (Abel-Vidor 1981; Coe 1962a; Fowler 1989; Healy 1980; Lothrop 1926). Similarly, the conquistador Hernán Cortés, who conducted some of the first Spanish explorations in northeast Honduras in 1524 and 1525, discovered Nahua-speaking groups there (Healy 1976b:238–239). It is certainly evident from such ethnohistorical accounts that both regions (Greater Nicoya and northeast Honduras) had more than a passing interest in neighboring Mesoamerican groups. Unfortunately, a response to the question of what kind of trade mechanism was operating is complicated not only by the limitations of the obsidian database but also by considerable uncertainty about the precise form of sociopolitical organization of many native groups in the northern Intermediate Area. It is generally accepted that there was great political diversity, with native societies representing different levels of organization along a cultural evolutionary scale.

Creamer and Haas (1985) have focused especially on tribes and chiefdoms of this area. They note that tribal societies typically are decentralized and relatively independent economically, so that interregional, long-distance trade (to acquire obsidian, for example) would tend to be more limited than that of chiefdoms, which are more centralized and often import quantities of valuables and sumptuary goods from outside the local region. Knowledge of the types of sociopolitical systems that existed at different times in the prehistory of the northern Intermediate Area is, presently, a rather crucial missing piece of anthropological information.

Virtually all indications are that the native societies of the northern Intermediate Area, including northeast Honduras and Greater Nicoya, were less centralized economically than their peers in, say, the adjacent Maya subarea of Mesoamerica. Recent assessments of the ancient Maya suggest they functioned at the level of very highly evolved chiefdoms or,

possibly, independent incipient states ruled by dynastic kings (Culbert, ed., 1991). Trade with less developed or at least less centralized economies of Intermediate Area groups to the south may, therefore, have necessitated intermediaries.[4]

CONCLUSION

Archaeology in much of the Intermediate Area is still in a formative stage of development. There remains an immense amount of information that we do not know about these early aboriginal peoples and their societies. As we search for clues to the myriad transformations that occurred in the nature and organization of aboriginal cultural systems here before ca. A.D. 1550, there are many factors worthy of closer examination. In our view, prehistoric exchange is one activity that likely played a central role in the relationships that prevailed among early Intermediate Area polities, and it is, therefore, crucial to an understanding of the overall cultural evolution of these emergent societies.

This chapter provides new information about ancient trade of but one substance, obsidian. It has been possible to identify imported goods, ascertain their date of appearance, and determine their point of origin. We hope that it will serve as a small contribution to what will be a lengthy investigative process of understanding long-distance exchange in the Intermediate Area. Much remains to be done.

Notes

1. Lange et al. (1992:175) mention at least two possible sources of natural obsidian in Nicaragua—one on the west side of Lake Managua, the other on the northeast shore of Lake Nicaragua. No further details were available.
2. Cited distance estimates between archaeological sites and obsidian sources reflect most direct, straight-line measurement and are, therefore, minimum distances the obsidian was transported.
3. Uncertainties in the ratios were estimated from Poisson's statistics (Meyer 1975:203). An upper limit was chosen so that the probability of obtaining the observed value or less was 16 percent. The lower limit was chosen in a similar way. These limits converge to the familiar Gaussian statistics as the numbers become larger and larger.
4. Creamer (1992) has examined regional exchange in the Gulf of Nicoya, arguing that it is an important type of trade network that warrants more investigation.