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by

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Mayan Obsidian Trade in Southern Belize*

Abstract. Precise neutron activation analysis has been done on the mesoamerican obsidian from Ixtepeque and El Chayal which are thought to be the major sources of volcanic glass artifacts in pre-Columbian times. These results are compared with obsidian artifacts from Lubaantun, Wild Cane Cay, Frenchman's Cay and Moho Cay.

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Four years ago, one of us (N. H.) sketched a skeletal model for "Obsidian trade routes in the Mayan Area" (1), based on the source attribution of small numbers of obsidian artifacts from 23 archaeological sites of the Classic period (A.D. 300-900) in the Yucatan Peninsula and the highlands of Guatemala. Recently, 48 obsidian artifacts from sites in Southern Belize (British Honduras) have been chemically analyzed by precise methods of neutron activation analysis (2), and the origin of nearly all of the obsidian could thus be determined with certainty.

Some of the artifacts were recovered in the excavations of the joint Cambridge-Harvard projects at Lubaantun, a small major ceremonial center on the southeastern slope of the Maya Mountains some 25 km from the Carribean coast. Others came from surface collection from three of the off-shore coral cays of which the sample from Wild Cane Cay (23 blades) was comparable to that from Lubaantun (22 blades). Samples from Frenchman's Cay and Moho Cay (2 blades) were small. The Lubaantun site is known to have been occupied only in the 7th-9th centuries A.D. (the Late Classic period), while Wild Cane Cay was occupied from the

Late Classic through the Postclassic (A.D. 900-1500). No dating estimates are available for the other two sites, although Late Classic ceramics have been found in Frenchman's Cay.

The sensitivity and precision obtainable by neutron activation analysis made a study of source homogeneity attractive, and the two sources of obsidian that are thought to have been the major suppliers of the volcanic glass in pre-Columbian times, El Chayal and Ixtepeque, were studied in some detail, especially the former. In this paper the results are summarized, to provide a solid basis for comparison with the artifacts.

The El Chayal source samples were collected by one of the authors (F. H. S.) from road cuts at about 23, 24, and 25 km northwest of Guatemala City. The Ixtepeque samples are part of the collection of the Archaeological Research Facility at U. C. Berkeley. These samples had been analyzed by neutron activation (3) prior to the present work. In the neutron activation measurements about 50 elements were searched for, and over 30 observed. Of these elements the ten that best distinguish the Ixtepeque and El Chayal sources are shown in Figs. 1, 2, and 3. Any one of these elements is adequate to distinguish between El Chayal and Ixtepeque Obsidian.

As an example of the reproducibility of the measurements, for the 16 most precisely measured elements it was found (3) that the average root-mean-square deviation was 1.5 percent for 12 El Chayal source samples from two of the road cuts (24 and 25 km), and 1.6 percent for the four samples collected from the other road cut (23 km). With this precision there are considerable differences in chemical composition between the obsidians from the road cut 23 km and the two 24-25 km northwest of from Guatemala City. Those artifacts, attributed to El Chayal, match the latter obsidian source rocks rather closely. Small differences, however, were observed, the largest being in the scandium abundance (about 5 percent). These differences probably indicate that the artifacts from El Chayal do not come from the same part of the deposit as our El Chayal source samples.

The analytical results may be summarized as follows: Of the 23 samples from Wild Cane Cay, 19 are assignable to the Ixtepeque source, and four to El Chayal.

Of the 22 samples from Lubaantun, 21 can be assigned to El Chayal, and one sample matches very closely in composition two obsidian blades from Ucareo, Michoacan (Mexico).

For 20 elements the average difference in abundance for the two blades from Ucareo is only 3.4 percent, and the difference between these and the artifact from Lubaantun is only 3.3 percent. Thus the three artifacts undoubtedly came from the same source although we do not know its location.

The previous model (1) predicted that obsidian at the Lubaantun site should derive from both the El Chayal and Ixtepeque sources. This was only partly correct as none of the 22 Lubaantun artifacts examined derives from Iextepeque. The fact that 95 percent of the specimens come from the El-Chayal source, however, does indicate that a route from southern Belize to the Alta Verapaz highlands in Guatemala (the "cacao route") was probably functioning in the Late Classic period (5).

The obsidian from Wild Cane Cay derives from Ixtepeque (82 percent) and from El Chayal (18 percent), indicating that the coastal and overland trade routes network linked up at this ideal natural harbour. Its nodal function in Mayan trade is confirmed by the quantities of exotic materials, including jade, Plumbate and Tulum Red pottery, and copper artifacts found on site, even though it is structurally unimpressive and physically tiny (4). Presence of these materials implies trade contacts from northern Yucatan to the Pacific coast of Guatemala.

The pattern of obsidian sources attribution at Wild Cane Cay is approximately that predicted (1) for Lubaantun. It would thus seem that the conjunction of the trade networks lay not at the ceremonial center but at the subsidiary location where the large coasting canoes and the smaller river vessels could meet. Whether Wild Cane Cay operated as a "trading port" or a "port-of-trade" in the Classic Period, in the manner that Sabloff and Rathje (6) have suggested for the island of Cozumel in the post Classic Period, is a problem that only further research can elucidate.

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References and Notes

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Figure Captions

Fig. 1. Selected chemical abundances of obsidian from Wild Cane Cay, Ixtepeque and El Chayal. All values are in parts-per-million except the iron abundance, which is in percent. The hatched areas show the root-mean-square deviation in the abundance values. The values in parentheses indicate the number of samples measured.

1st bar--Mean value and root-mean-square deviation for 4 source rocks from Ixtepeque volcano.

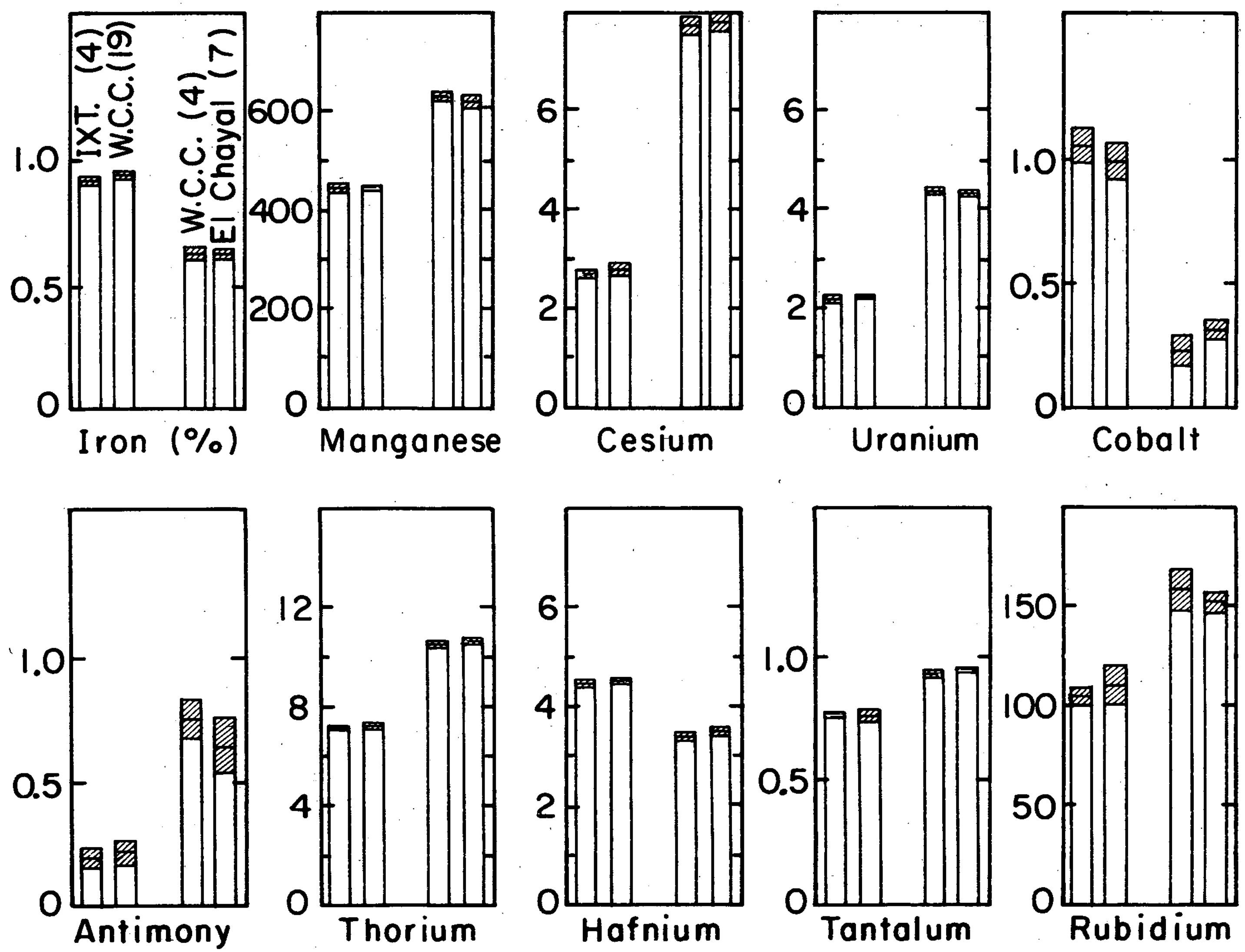
2nd bar--Same parameters as 1st bar for 19 obsidian artifacts from Wild Cane Cay.

3rd bar--Same parameters as 1st bar for 4 obsidian artifacts from Wild Cane Cay.

4th bar--Same parameters as 1st bar for 7 obsidian source rocks from a highway cut in the El Chayal deposit about 25 km NW at Guatemala City.

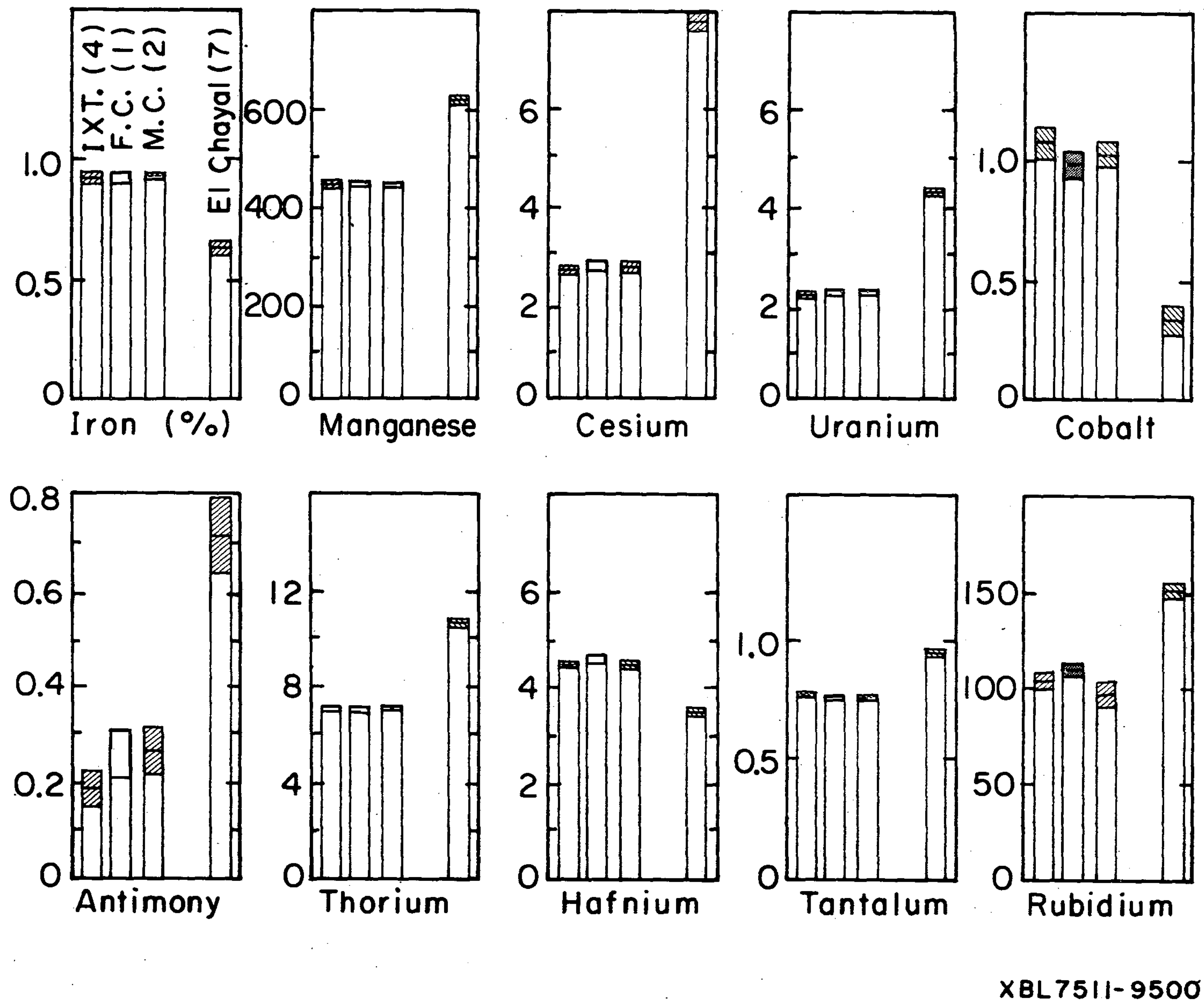
Fig. 2. Selected chemical abundances of obsidian from Frenchman's Cay, Moho Cay, Ixtepeque and El Chayal. All values are in parts-per-million except the iron abundance, which is in percent. The hatched areas in bars 1, 3, and 4 represent the root-mean-square deviation in the abundances. The solid areas on the second bar show the error in a single measurement due to counting statistics. The values in parentheses indicate the number of samples measured. The data for the 1st and 4th bars are the same as in Fig. 1.

Fig. 3. Selected chemical abundances of obsidian from Lubaantun, Ixtepeque, and El Chayal. The representation is very similar to Fig. 2.



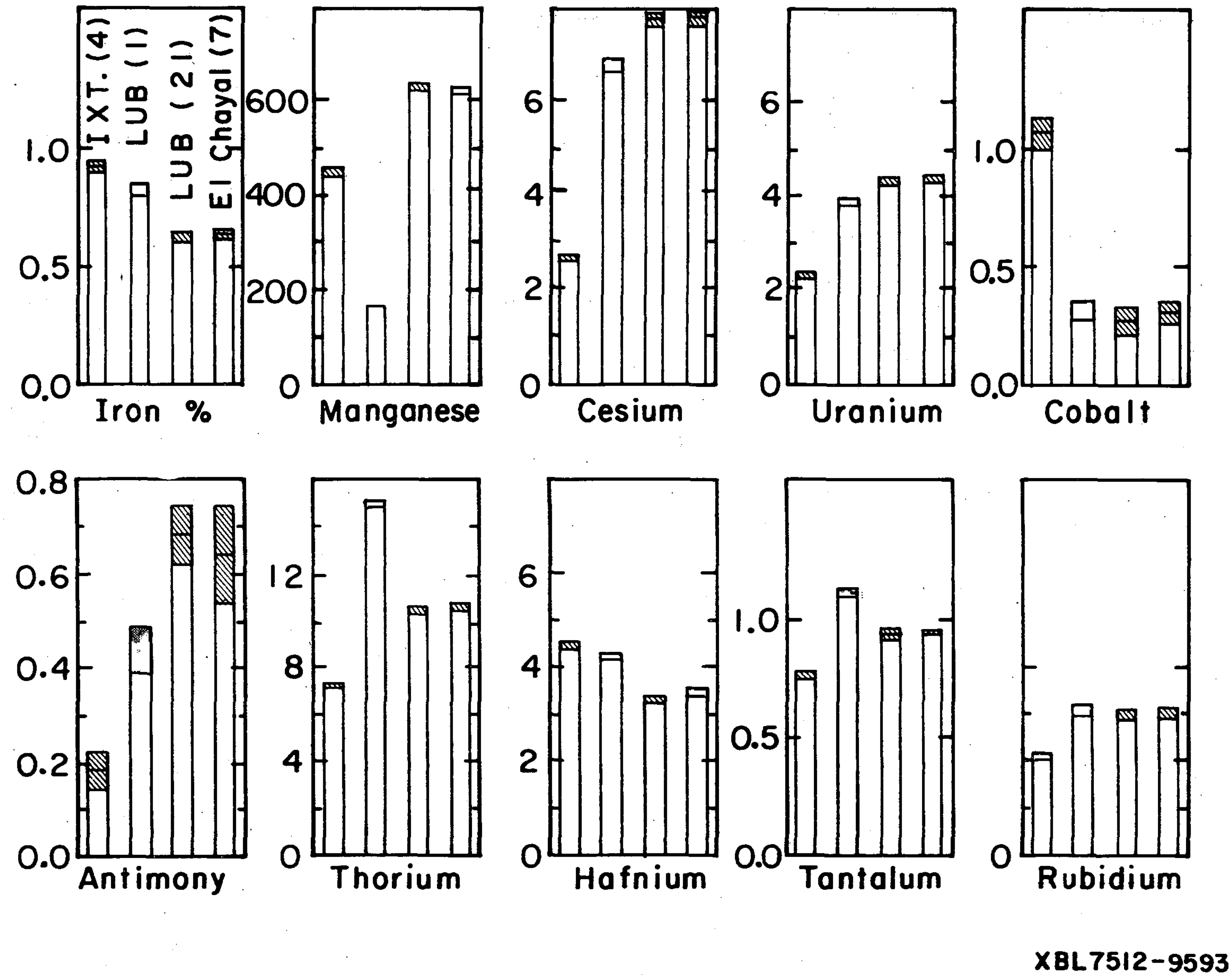
XBL7511-9501

Fig. 1



IXT. (4)
F.C. (1)
M.C. (2)
El Chayal (7)
Iron (%)
Manganese
Cesium
Uranium
Cobalt
Antimony
Thorium
Hafnium
Tantalum
Rubidium
XBL7511-9500

Fig. 2



IXT. (4)
LUB (1)
LUB (21)
El Chayal (7)
1.0
0.5
0.0
Iron %
600
400
200
0
Manganese
6
4
2
0
Cesium
6
4
2
0
Uranium
1.0
0.5
0.0
Cobalt
0.8
0.6
0.4
0.2
0.0
Antimony
12
8
4
0
Thorium
6
4
2
0
Hafnium
1.0
0.5
0.0
Tantalum
0
Rubidium
XBL7512-9593

Fig. 3

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