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CHAPTER 4

ABSTRACTION AND JADE EXCHANGE IN PRECOLUMBIAN SOUTHERN MESOAMERICA AND LOWER CENTRAL AMERICA

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With increasing frequency, analytical techniques derived from the chemical and physical sciences are being incorporated into archaeological investigations of exchange. In particular, emphasis has been given to compositional characterization of artifactual materials, seeking either to link the artifacts to a source area, or to establish a level of compositional similarity among a given class of artifacts. To a considerable extent, interpretation of the data generated by compositional characterization rests upon a set of assumptions formalized as the "Provenience Postulate" (Weigand et al. 1977:24). This postulate requires that identifiable compositional differences exist between sources of raw material. A corollary holds that the compositional variation observed between individual raw material sources must be greater than the variation found within individual sources (Bishop, Rands, and Holley 1982:301).

Several problems exist when applying the Provenience Postulate to actual data, including ambiguity about the size or extent of the source area, the proximity of a production site to the source area, and the likelihood that multiple production units drew upon a single source (Bishop, Rands, and Holley 1982:301). Further problems arise from such practical considerations as sampling inadequacies. These problems aside, the power of compositional data to supplement traditional archaeological stylistic and distributional data has been demonstrated on numerous occasions (among others, cf. Bishop and Rands 1982; Kaplan, Harbottle, and Sayre 1982). [1]

Although the compositional data serve to document the presence and directionality of exchange, few studies have considered the reasons for the existence of the inferred exchange, or the mechanisms whereby the exchange took place. In part, this is due to (1) a reasonable reluctance to leave the empirically derived data for what amounts to reasoned speculation, and (2) the often small number of cases that constitute the evidence for exchange. One is even more reticent to speculate when the data appear to counter previously held assumptions regarding prehistoric relationships. Nevertheless, such speculation, while weakly supported, works with the data presently at hand and may serve to direct future research. Our following discussion proceeds in this vein. [1]

PRECOLUMBIAN POLITIES AND EXCHANGE SYSTEMS

Among the characteristics of Precolumbian polities was the exchange of exotic materials between and among the elites in different locations. We distinguish between exchange, in which there is a "trade balance," and extractive exploitation, in which the movement of goods was unidirectional. We also assume that long-distance exchange was a function of the elite element of society.

This paper focuses on the preliminary results emerging from southern Mesoamerican (Motagua Valley, Guatemala) and Lower Central American (northern and central Costa Rica) data (Fig. 4.1). Our research began with an emphasis on Mayan jade sources and artifacts, was expanded to include Costa Rican geological sources, and ultimately incorporated Costa Rican lapidary artifacts. These data show potential to contribute to our knowledge of elite exchange systems between these geographically dispersed areas from ca. 300 B.C.-A.D. 700, as well as within Costa Rica. Here, some views expressed elsewhere are revised and refined (Lange, Bishop, and van Zelst 1981).

These analyses differ from those presented by Stirling (1969), Easby (1968, 1981), and Balser (1980) in that primary emphasis is on the chemical and mineralogical characterization of jade, rather than on design elements or methods of elaboration. This orientation was based on our feeling that before assessing the social and economic role of Precolumbian jade and other greenstone, we must isolate what is actually jadeite.

EXCHANGE PATTERNS AND EXTRACTIVE EXPLOITATION

Sohn-Retel (1978) wrote a critical assessment of exchange mechanisms, applied by him only to historic data, but which is also applicable to the prehistoric record. He focused on two features of exchange systems: (a) the logistical and intellectual requirements

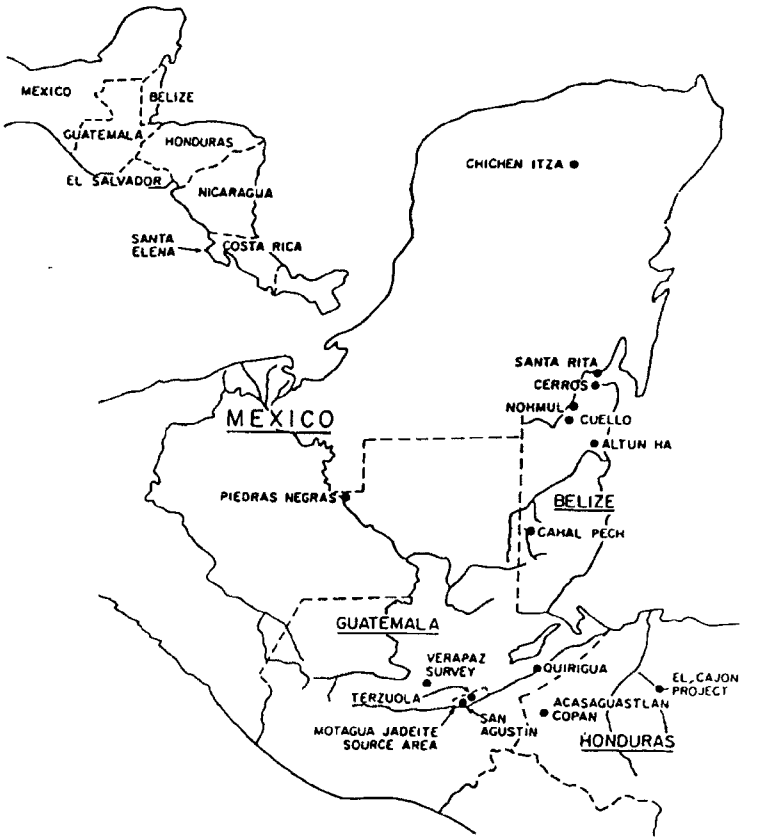

Figure 4.1 — Map showing the relationship between Guatemala, the Motagua Valley, and Costa Rica

necessary for commodity exchanges to take place, and (b) the encumbered status of the materials being transferred during the actual process of trade—this later element is especially important in long-distance relations.

Sohn-Retel saw markets, or other distribution and exchange centers or mechanisms, as requiring the planning ability to coordinate seasonal and multiple resource variables; they also require the development of abstract conversion concepts which can equalize the values of the disparate items being exchanged. For example, he would regard the hypothetical equation that "a dozen obsidian blades was equal to five baskets of maize, but to only one jade or three greenstone amulets" as a significant unification of the material, social, and intellectual worlds.

Sohn-Retel's second point was that there are blocks of time (most pronounced in long-distance cases) during which the commodities being exchanged are of no practical or symbolic value to either partner in the exchange. These materials are "encumbered" and temporarily removed from immediate utility, in exchange for future utility, and for the anticipated prestige they will confer through symbolic as well as actual value. As a general rule, the longer the distance the more value can be attributed to exchange objects, not simply in terms of effort and transportation costs, but also in the duration of encumbered and non-useful time relative to anticipated benefits.

Exchange patterns have usually been developed by hierarchically organized societies to guarantee access to scarce commodities essential for either practical or symbolic purposes. Teotihuacan's control of local obsidian sources (Spence 1981; Zeitlin 1982) and added extension of control of other sources through its satellite at Kaminaljuyu are examples of such behavior. Salt (Andrews 1980) was another commodity of highly restricted distribution which was controlled and redistributed; some narcotic substances were also important.

Networks which convey specific commodities from one area to another in return for other commodities to balance respective local shortages are in contrast to extractive exploitation, in which commodities are removed from distant locations and brought to commercial/political centers. This is considered "direct access" and, as Renfrew noted, was more involved with transportation of the material than trade or exchange (1975:41). Similar formulations have been advanced to explain a presumed Olmec presence in Costa Rica (Pina Chan and Covarrubias 1964; Balser 1958, 1980; Quesada Lopez-Calleja 1980); in their view, the Olmec presence was an extension of the trade route to El Salvador and Chalchuapa (Sharer 1978) and was focused on the extraction of jade from sources in northwestern Costa Rica. There are still few archaeological contexts in Costa Rica which are chronologically capable of having interacted with the Olmec (Lange 1984b; Lange and Stone 1984:Appendices 3 and 5) and there are

significant stylistic differences in the treatment of the jade (Pohorilenko 1981; Chenault 1986).

We have recently readdressed questions involving exchange between Costa Rica and Mesoamerica by a program of neutron activation analysis of jade and nonjade source materials and artifacts (Lange, Bishop, and van Zelst 1981). This compositional approach involving the chemical and structural characterization of jade was supplemented by archaeological and geological investigation. The preliminary results of the research have ben commented on by Ryder (1980b), Lange (1984b), Bishop (1983), and Lange, Bishop, and van Zelst (1981). Additional analyses (Bishop, Sayre, and van Zelst 1984) have increased our understanding of the geological and cultural distribution of jadeite and other greenstones ("social jade") in Costa Rica and Central America. The resultant data should serve to indicate directions for further research involving the exchange of jade and the cultural mechanism involved with the movement of that material.

PRECOLUMBIAN JADE IN COSTA RICA

There is wide variation in what different investigators consider "jadeite," both in color and in chemical composition (Leaming 1978:Table 20). Jadeite is a sodium aluminum silicate member of the pyroxene family of minerals ($NaAlSi_2O_6$) of relatively great purity (Fig. 4.2). Minor substitution of the Si by Al occurs as well as limited replacement of the Al by Fe+3; the latter gives rise to jadeite's iron rich, greenish-black isomorph, chloromelanite. The valance state of the iron as well as the amount of chromium oxide present in the mineral contribute to the well-known green color (Rossman 1974); very pure jadeite, however, may occur as essentially colorless needles. Other green stones known to occur with jadeite include albite, aventurine, serpentine, glaucophane, diopside, actinolite, and mica.

> Coleman (1980) has commented on the limiting conditions that must be present to permit the formation of jadeite: Experimental work has revealed that jadeite requires extreme pressures at all temperatures for its formation (for instance, at 250 C. at least 9 kilobars of pressure are needed to form jadeite).... All known occurrences of massive jadeite are found ... with high-pressure low-temperature metamorphism that characterizes ancient tectonic suture zones.

These conditions are associated with the blue-schist metamorphism along the tectonically active continental margins such as the Motagua River Valley of Guatemala—one of only six areas of confirmed jadeite occurrence. Thus, jadeite has the advantage of being readily identified as an exotic artifact anytime it is found away from one of the known sources. However as we will see below, the present

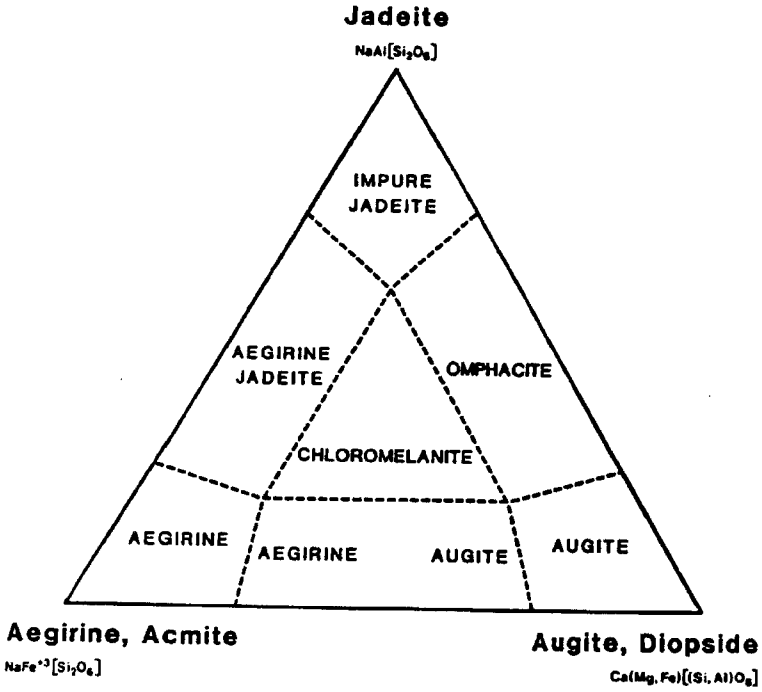

Figure 4.2 — Classification of sodic pyroxenes (after Essene and Fyfe 1967; Leaming 1978)

analyses provide the possibility for an as yet unidentified source somewhere in Central America, and probably in Costa Rica.

One important distinction between the various greenstones and true jadeite relates to the latter's physical properties. On the Moh's scale of hardness, jadeite is 6.5 to 7 compared to frequently associated pyroxenes and amphiboles with hardness between 5.0 and 6.5 (cf. Hammond et al. 1977:42-43). More important is jadeite's resistance to breakage, or "toughness." Its equigranular intergrowth of prismatic crystals are ten times more resistant to fracture than is quartz (Bradt et al. 1973). Thus, jadeite required considerably more skill for artistic elaboration than was required for other greenstones.

Jadeite and greenstones have been found in Costa Rica almost exclusively in mortuary contexts. It is assumed that during the lifetime of the deceased they represented status, and were of sufficient personal and symbolic importance that they were interred at death, rather than inherited. This contrasts with the Cerros (Belize) data from the Maya area where jade is found as a component of household debris (Garber 1980), but similar to the description of Hammond et al. (1977: 39) that

> the bulk of the jade was turned into jewelry.... In general, jade seems to have been less socially mobile than obsidian, greater proportions of it remaining within the possession in death of the individual whom, from the location and manner of the sepultures, we can assign to the upper, ruling strata of Maya society.

The time range incorporating mortuary finds of jadeite and other greenstones in "ax-god" pendant and other typical forms has been given as ca. 300 B.C.-A.D. 700, or roughly 1,000 years.

In Costa Rica, the time range 300 B.C.-A.D. 700 spans from the latter part of the Zoned Bichrome Period to the middle of the Early Polychrome Period (Lange and Abel-Vidor 1980; Fig. 4.3). The Early Polychrome Period (A.D. 500-800) is marked by the introduction of Polychrome ceramic techniques and influences from the Maya Lowlands. Jadeite and other goods may have flowed along the same routes.

Geographically, the distribution of jade and greenstone is mostly limited to northern Costa Rica (Fig. 4.4). The western part of northern Costa Rica is the southern half of the Greater Nicoya Archaeological Subarea (Norweb 1964). While the entire area is linked by a broad range of ceramics over a 2,500 year period, the northern half (Pacific coastal Nicaragua) and the southern half (Pacific coastal Costa Rica) differ in subsistence and settlement patterns, and in the distribution of obsidian and jadeite/greenstone artifacts. The former is most frequently found in Nicaragua and the latter in Costa Rica.

In 1978 the Brookhaven National Laboratory and the Boston Museum of Fine Arts launched a cooperative Maya Jade and Ceramic

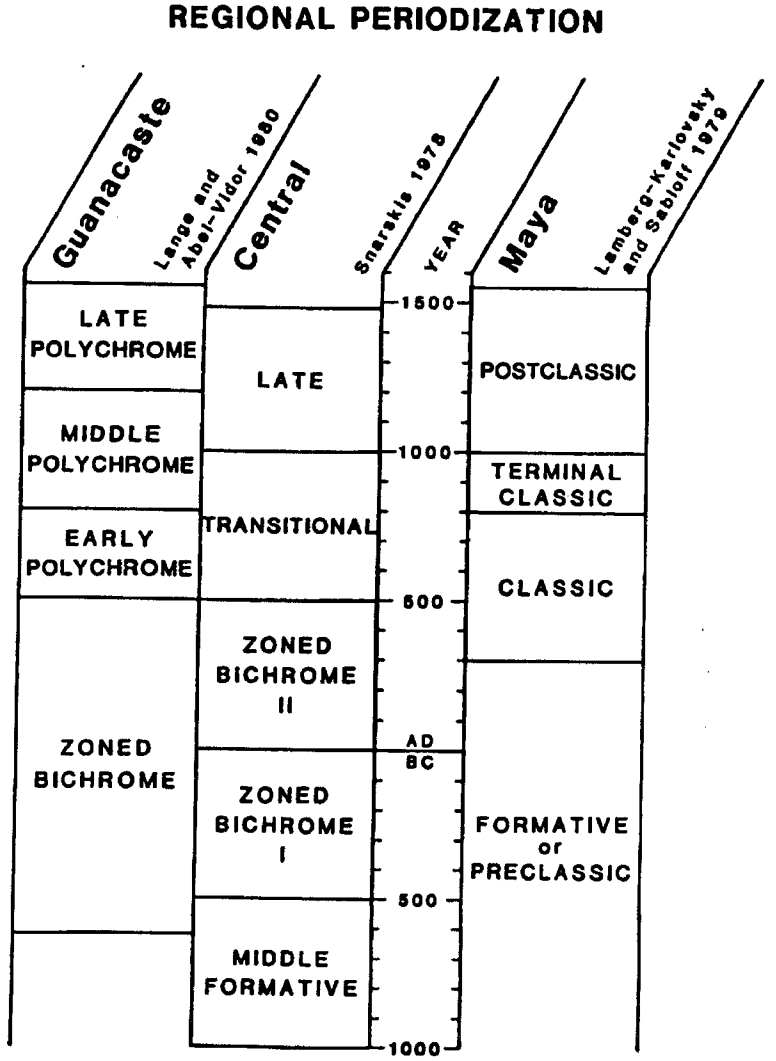

Figure 4.3 — Chronological chart for Costa Rica and adjoining areas

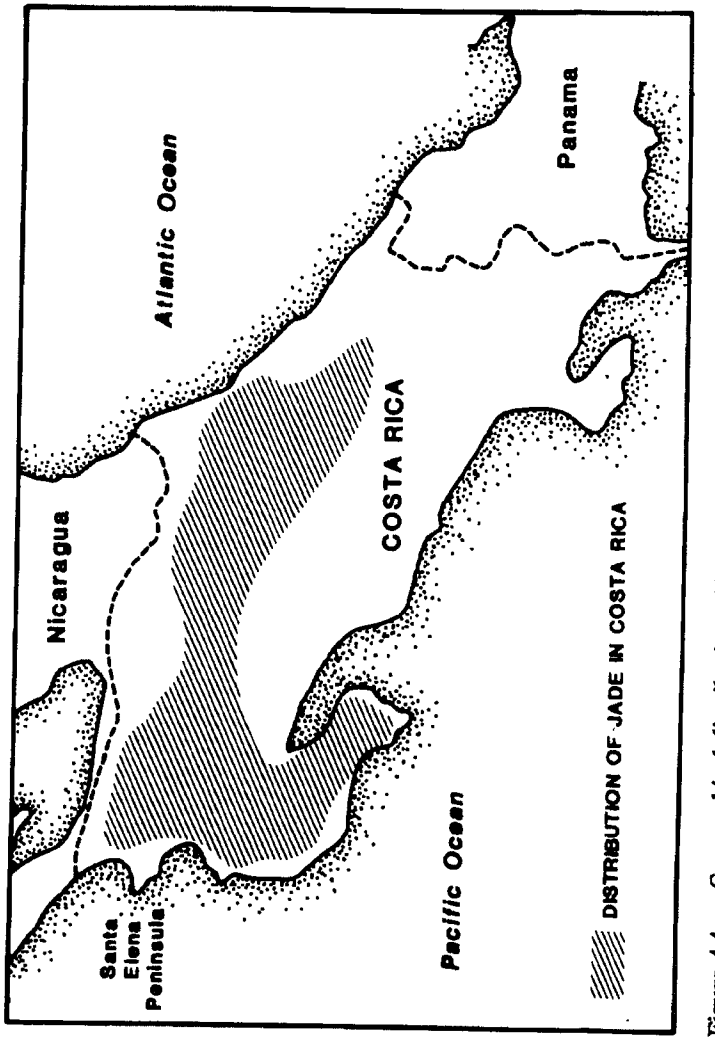

Figure 4.4 — Geographical distribution of jadeite and greenstone artifacts in Costa Rica

Research Project. While the focus was on Maya jades, Bishop concluded that it would be valuable to obtain comparative source samples from Costa Rica in order to acquire greater compositional perspective.

At about this same time, restudy of the Hartman jade collection in the Carnegie Museum in Pittsburgh (Fonseca and Scaglion 1978), discoveries of jade/greenstone artifacts at the sites of Tibas (Snarskis 1979) and Grecia (Lange 1979a; Guerrero 1980) in the central highlands and on the Atlantic watershed of Costa Rica (Snarskis 1984), and looted jades/greenstones from the Nosara area (Abel-Vidor and Bernstein 1977; Gamboa 1979; Chan 1977) on the Pacific coast had stimulated new interest in the purported Costa Rican sources.

Historically, emphasis on assumed jade sources had focused on the Santa Elena Peninsula in Guanacaste Province. Early travelers' accounts had referred to "serpentine," "jade," and similar materials along the Pacific coast of Central America, but these identifications had never been subjected to serious scrutiny. Jade essentially became a generic term for greenstone artifacts and even non-greenstone objects which had the form of objects usually made from greenstone. Thus, initial identification of a Santa Elena jade source was claimed by a U.S. mining engineer in the late 1950s/early 1960s, and was reportedly confirmed by a geologist. Also, persons in Costa Rica, who, for many years, have manufactured "reproductions" and "fakes" of Costa Rican "jade artifacts" reportedly obtained their raw materials from the Santa Elena area. This contrasted with commonly held ideas that Precolumbian jade sources in Costa Rica had been "exhausted," "lost," "submerged," or "buried." More recently, satellite imagery had also supported the speculation that the Santa Elena Peninsula was a section of Costa Rica where the geological conditions reflected the strong potential for jadeite formation.

Field Survey

It was against this background that Bishop and Sue Marshall, a graduate student in geology from Yale University, arrived in Costa Rica in February 1979 to obtain samples from the Santa Elena Peninsula. In cooperation with the National Museum of Costa Rica, and as part of the overall program of Guanacaste research under Lange's general direction, a four-day field survey was designed not only to collect geological samples, but also to locate nearby archaeological sites which might have been contemporary with the period of jade utilization.

Survey Results

None of the geological specimens collected in 1979 proved to be jadeite, but rather diopside or actinolite. The late 1950s/early 1960s samples were subsequently located and were found to be serpentine. Only one archaeological site was found in the backlands of Potrero Grande and it was located in the woods west of the estuary. Exact site

boundaries could not be determined because of dense vegetation. There was some shell deposition, but no real middens, suggesting a light occupation.

Cultural materials (pottery and shell) were encountered in the walls of the open "huaquero" (looter) pits. Ceramics collected included Murillo Applique (Baudez 1967:142-44; Healy 1980:167-188) and Madeira Polychrome (Healy 1980:140-46). One sherd with a Cervantes style punctuation (Baudez 1967:108-110) was also found. Recent consultation among persons working in the Greater Nicoya area at the Greater Nicoya Ceramic Conferences (Lange et al. 1984) held in 1982, 1983, and 1984 has led to an agreement to alter the status of Cervantes from a type to a decorative mode [2]. Cervantes decoration seems to occur most frequently during the Early Polychrome Period, but with the exception of this single sherd, all other decorated ceramics date from after A.D. 700.

The Potrero Grande site had been fairly extensively damaged by "huaquero" activity. One human bone was found, suggesting that mortuary features may have been present. Only one small fragment of any of the types of stone found during the geological survey was collected from the archaeological site. A higher site density and greater time depth were found by Coe in his earlier work on the north side of the peninsula (1962a). Although limited in scope, Coe's testing at Chahuite Escondido yielded no examples of raw or finished products from the Santa Elena lithic sources (Sweeney 1975).

Farther to the south on the Nicoya Peninsula, we also carried out a rapid survey of an area near Nosara which showed some geological potential for jadeite formation but again the results were negative [3]. Whereas the Santa Elena Peninsula lies outside the known distribution of jadeite/greenstone artifacts, the Nicoya area is in the center of such distributions and greater site densities would be a more likely source location.

SURVEY FOLLOW-UP

When field evaluation of the geological samples strongly suggested that none were jadeite, it became imperative to obtain jadeite (or presumed jadeite) artifacts and geological specimens from Costa Rican museum collections to include in the Brookhaven analyses. Permission was sought and obtained from the National Insurance Institute (Instituto Nacional de Seguros) and the National Museum of Costa Rica (Museo Nacional de Costa Rica) to export 130 visually selected artifacts of suspected jadeite and other greenstone for analysis. While we purposely included some control objects that distinctly were not jadeite, the majority of the sample was selected on the basis of a potential classification as jadeite. At the National Insurance Institute we were unable to borrow finer jadeite and greenstone objects on exhibi-

tion. At the National Museum of Costa Rica we had access to all materials, with the exception of the two major artifacts from the Tibas excavations (Snarskis 1979). In selecting from both collections, aesthetics were a secondary consideration, with primary emphasis on variation in geological material, form, and, occasionally, iconography.

The analyses leading to this report were conducted at two levels: (1) visual/tactile and (2) instrumental. As noted, visual analysis was utilized in selecting the sample suite for laboratory analysis. We estimated that only approximately 15 percent of the objects catalogued as jade in the National Museum of Costa Rica and in the museum of the National Insurance Institute were potentially jadeite. It is interesting to note that this percentage correlates with that derived by Fonseca and Scaglion (1978) from study of the Hartman collection. The Hartman collection, incidentally, is the largest contextually documented collection of Precolumbian jade and greenstone from Costa Rica. David Grove (1980) reported a somewhat higher percentage of jadeite (29 percent) as part of the jadeite/greenstone assemblage at Chalcatzingo (Mexico). However, 88 of the 107 jadeite objects in his inventory were small, subspherical beads. These beads may represent a limited number of bracelets, necklaces, or other pieces of adornment. Also, Grove's jadeite was defined on the basis of visual/tactile criteria rather than instrumental analysis.

Based on heavy liquid and X-ray diffraction analyses, Bishop found that nearly 50 percent of the visually selected "jadeite" was quartz or some other mineral. Similar results were reported by Hammond et al. (1977:63), when six Costa Rican "blue jade" beads that were supposedly of Olmec origin tested as chalcedony. If findings such as these continue, they will represent a drastic reduction in the presumed quantity of jadeite in the collections. This raises the question of whether or not the Precolumbian artisans could, or cared to, distinguish these differences. Softer stones are also much more widely utilized than we had previously thought. Vaillant (1945:87) had previously noted the overlap in forms produced from jadeite and other greenstones:

> Many greenish stones, like porphyry, serpentine, and wernerite, the native jewelers worked in a manner similar to jade. Perhaps they could not distinguish these minerals from jade, or perhaps they knew that through the substitution of softer stones they could attain the same effect achieved in the harder and rarer medium.

It should be recalled that the focus of the program of trace-element analysis of jadeite was to characterize the known Motagua source area and, subsequently, to compare Maya jadeite artifact compositions to that source. The preliminary findings of that investigation are reported elsewhere (Bishop, Sayre, and van Zelst 1984). In brief, 180 Motagua Valley jadeite source samples, 377 Maya jadeite artifacts, and 72 greenstone artifacts from Costa Rica were submitted to neutron activation analysis. The elemental concentrations for the elements chromium, cobalt, europium, hafnium, iron, lutetium, manganese, scadium, sodium, and ytterbium were submitted to cluster and group evaluative statistical procedures. Jadeite samples from the Motagua zone could be chemically partitioned into two groups, differentiated according to their mafic content. While many of the Maya jadeite artifacts had significant statistical probabilities of belonging to either the light or dark Motagua source area reference groups, over one-half of the Maya artifacts did not. Of the latter, a large group could be formed, notable for its high chromium content and bright apple-green color, as well as a smaller group of artifacts heavily weighted toward a provenience at Chichen Itza, on the northern Yucatan Peninsula.

As in the Motagua source samples, most of the Costa Rican jadeite artifacts formed a light ($n = 37$) and a dark group ($n = 14$) which could be chemically distinguished from the Maya groups (Fig. 4.5). When each compositional reference group was taken in turn, and an individual artifact's probability of belonging to a group was calculated using its Mahalanobis distance from the group centroid, some overlap between the Costa Rican and Mayan material was noted. From the Maya sites, 10 artifacts were found to have trace-elemental profiles which were compositionally consistent with the light Costa Rican group. Five samples from the analyzed Costa Rican specimens revealed compositional patterning matching the Motagua light source area reference group. The 10 remaining Costa Rican artifacts contained significant amounts of minerals other than jadeite or were unable to be otherwise chemically assigned to our present reference groups. To the extent that the trace-elemental profiles provide an accurate indicator of raw material resource differences, movement of jadeite between Costa Rica and Guatemala appears to be indicated but not in overwhelming frequency.

Of considerable interest are the number of Maya jadeite samples that did not relate to the source samples. Incomplete sampling of the Motagua region or the ancient exploitation of unknown sources are equal possibilities—although a general "Motagua" composition of rather broad spatial extent has been defined. Additional source areas for the procurement of jadeite may have existed outside the Motagua. One that traditionally has been suggested is the Rio Balsas of Mexico, but jadeite from there has not been verified. The formation of distinctly different Costa Rican jadeite compositional groups also suggests raw material procurement outside of the extant Motagua source area.

In the balance of this chapter, we will be concerned primarily with the finding that some of the Costa Rican artifacts had compositional profiles consistent with those of one of the Motagua source area reference groups. Our discussion is biased in this direction because of Bishop's "feeling" of greater security of compositional character-

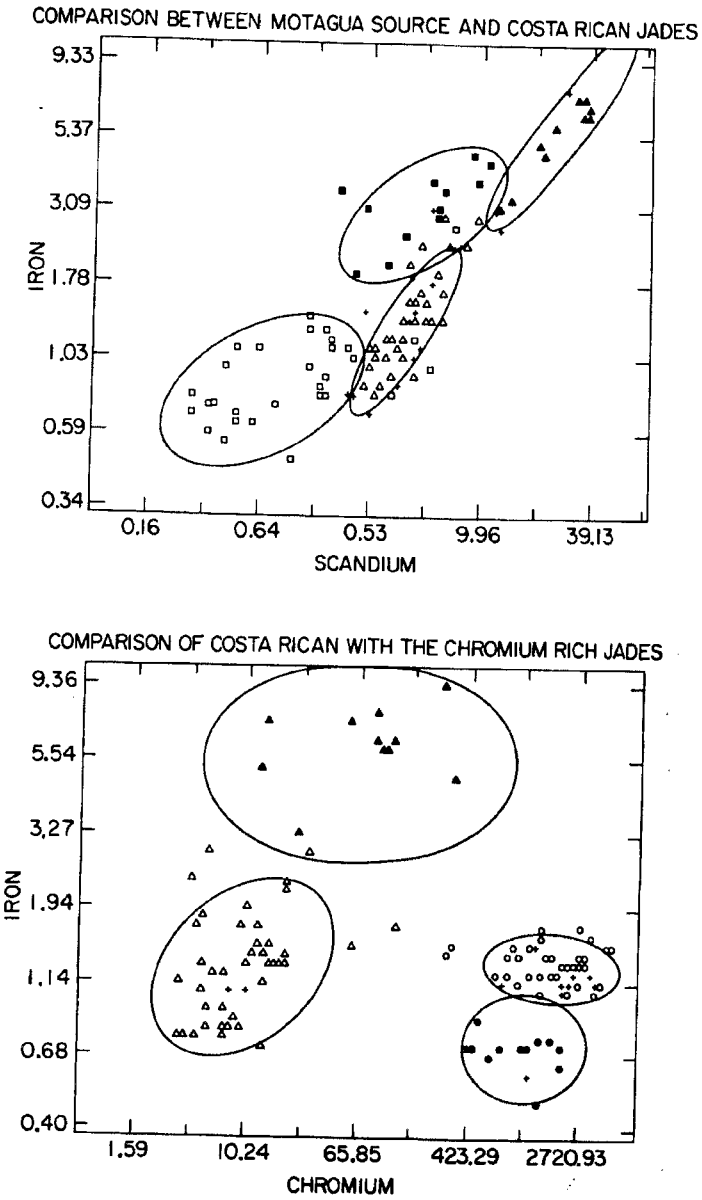

Figure 4.5 — Elemental correlation plots comparing various compositional groups from Central America

ization of the Motagua group. To be sure, as was observed in Fig. 4.5, there is significant separation between the Costa Rican reference units and the Motagua source and Maya artifacts groups. However, before too much is made of the match of some of the Maya artifacts to the Costa Rican groups, additional understanding is required of the jadeite compositional systems.

A lower percentage of actual jadeite in Costa Rica than previously thought suggests a concomitant reduction in any hypothesized level of trade, exchange, or other forms of contact symbolized by its presence. We also do not know the specific sources or distribution patterns of the nonjadeite greenstones, although they are less restricted in their natural distribution than jadeite. It would therefore be much more difficult, if not impossible in a practical sense, to isolate specific source areas. However, without some efforts in this direction we will be unsure whether only jadeite was being circulated, or both jadeite and other greenstones.

External Contacts

The transportation of jadeite from the Motagua Valley in Guatemala to northern Costa Rica or in the other direction would be an example of symbolic long-distance exchange, as well as lengthy "float time" while in transit. For many decades it was assumed that Costa Rica had only been a source of Precolumbian jade traded into Mesoamerica, but it now appears, based on the trace-elemental data, that some jade found in Costa Rica was brought or sent from sources some 700 kms distant "as the crow flies." Coastal trade routes would have involved even greater distances, although perhaps utilizing simpler trade networks. Although limited contextually, the archaeological record indicates that trade in jadeite and other greenstone material was carried out for almost one thousand years, with the principal period of activity between A.D. 1 and A.D. 600. (Hartman 1907; Lange and Scheidenhelm 1972). This time frame appears consonant with what is known of the development of the jade trade in the Motagua source area. Similarly, the disappearance of jade in the archaeological record in Costa Rica seems to coincide with major political upheavals in the Maya Lowlands (Sharer 1984) which are known to have severely disrupted trade routes and presumably information transfer as well.

Distribution of Jade and Greenstone within Costa Rica

Jadeite and other greenstone artifacts with the same form, design, and apparent function are found throughout northern and central Costa Rica. Such artifacts occur on the Pacific coast, in the Central High-lands, and on the Atlantic watershed.

While the context in all three areas is mortuary, not all cemeteries of the same time period in any one zone contain either jadeite or greenstone forms. This reinforces the interpretation that status

differentiation is represented when these artifacts are present. In Guanacaste, such artifacts were common at Las Huacas (Hartman 1907; Fonseca and Scaglion 1978), Las Pilas (Lange and Scheidenhelm 1972; Balser, personal communication), and Nosara (INS collection documentation and Guerrero 1986). On the other hand, they were absent from sites of similar time periods at Mojica (Ryder 1980a, 1986), Mendez (Norr 1979), and from all sites tested thus far on the Bay of Culebra (Lange and Abel-Vidor 1980; Vazquez 1986). Nearly identical forms are found in all three geographic areas, suggesting a system of religious beliefs and an elite network which transcended the ecological boundaries.

The Motagua-Costa Rica Dispersal Route

Was jadeite in raw or finished form transported between the Maya area and Costa Rica over land, by sea, or both? One route of contact could have been along the Caribbean coast, the San Juan River, and the extensive river network dissecting the San Carlos Plain of Costa Rica. Based on finds at La Fortuna and other sites, it has long been thought that the San Carlos area may have been a major commercial zone in Precolumbian times (Stone and Balser 1965; Baudez and Coe 1966). Most principal Greater Nicoya ceramic types are present in the collection of the Regional Museum of Chontales, Juigapla, east of Lake Nicaragua, indicating contacts between the Atlantic coast and the Pacific along the major river drainages.

Seaborne dispersal would seem likely, since there is no evidence for a "jade trail" leading south from the Motagua source area to a Costa Rican destination, to Panama, or to points farther south. Whether by land or by sea, the movement of jadeite from the Motagua seems to have been little more than a trickle. It is unclear at this point whether such movement was even purposeful, or perhaps only sporadic and opportunistic. In the latter view, occasional imports from the Motagua area were simply incorporated into the existing lapidary system.

The almost total absence of jade artifacts in neighboring Nicaragua has been particularly enigmatic. We initially considered this scarcity to reflect the very limited research which has been done there (Bransford 1881; Norweb 1964; Magnus 1974; Healy 1980). However, visits to Nicaragua by Lange in the fall of 1982 and by Lange and Sheets in the spring of 1983 (Lange and Sheets 1986), discussions with personnel of the National Museum of Nicaragua, and conversations with long-time private collectors made it clear that the perceived lack of jade or greenstone artifacts from Nicaraguan territory reflects reality. Examination of the Nicaraguan collections obtained in the late 19th and early 20th centuries, now housed in the Smithsonian Institution, suggested the limited presence of greenstone and some jadeite artifacts on Ometepe Island and in the Isthmus of Rivas.

The restricted Costa Rican distribution of jadeite helped fuel the belief in a northwestern Costa Rican jade source. However, neither the presence nor absence of such a source can explain why jadeite or other greenstone artifacts were not traded across the boundary between the southern part of Greater Nicoya (Costa Rica) and the northern part (Nicaragua) along with ceramics, which were widely distributed (see note 2). The Costa Rican ceramic type Guinea Incised (Baudez 1967:73-79), a type with Mesoamerican Usulutan technique decoration (Demarest and Sharer 1982), is also almost entirely absent from Nicaragua. It is coeval with part of the period of jadeite use in Costa Rica, and its scarcity in Nicaragua is worth noting.

There are numerous unresolved ambiguities in artifact distributions in and around Greater Nicoya during the time period in which jade and greenstone artifacts were commonly utilized in the Costa Rican sector. It has been recently observed that the crouching figure motif seen on many jades also occurs in much larger representation on the famous Chontales stone columns (Bruhns 1982). This commonality of theme and difference in scale remains to be thoroughly studied and explained.

No cache of Motagua jadeite blanks, or debitage, has been found in Costa Rica, suggesting two possible manufacturing and distribution alternatives:

1. The total sequence of production of jadeite artifacts was carried out in the Guatemalan source area, or
2. Supply was so infrequent that only the previously mentioned trickle reached Costa Rica at any given time, where it was worked into well-established local forms. This second alternative correlates best with the available data.

Application of Renfrew's Modes to the Data Base

The ten-stage model set forth by Renfrew (1975:42) has been frequently utilized for archaeological interpretation. Application of his trade modes to the Costa Rican case helps to define the potential types of relationships between the Motagua Valley and northern Costa Rica that may be represented by the data:

Mode 1, Direct Access: Renfrew (1975) stated that this mode is limited to exploitation of local resources within 200-300 km of a home base. It involves no real trade or exchange, but only the transportation of goods to the home base. While specific measures of distance need to be adjusted on a case by case basis, the distance between the Motagua Valley and northern Costa Rica (700+ km) seems to preclude direct access as a means by which Precolumbian Costa Ricans obtained jadeite from the Motagua source area.

Mode 2, Home-base Reciprocity: Again, the distance involved rules this out.

Mode 3, Boundary Reciprocity: During the Postclassic Period, the Motagua Valley is on the northern edge of the Mesoamerican "frontier" (Fox 1981) and Costa Rica is on the southern edge. More generally, Lange (1979b) has referred to the intervening area as a "buffer" zone. It is tempting to consider that Precolumbian Costa Ricans and the Maya met somewhere in this boundary area to exchange jadeite and other goods. At the present, however, there is no archaeological support for such an interpretation.

Mode 4, Down-the-Line: This is one of the most feasible modes for representing the Motagua-Costa Rican connection. The distribution gap across Nicaragua continues to present a problem, but a down-the-line system that involved both land and water segments thus bypassing Nicaragua would be possible.

Mode 5, Central Base Redistribution: This mode may have been employed for distribution of Motagua jadeite and other greenstones within Costa Rica, but we need better contextual data than we have at present to demonstrate its validity. In describing this mode, Renfrew wrote "A takes his produce P and renders it to B (no doubt receiving something in exchange, ***then*** or ***subsequently***) (italics ours)" (1975: 43). The idea of subsequent payment mirrors some of the same concepts of abstraction and encumbrance for anticipated value set forth by Sohn-Retel.

Mode 6, Central Place Market Exchange: The presence of formal markets is unknown in Precolumbian Costa Rica.

Mode 7, Middleman (Freelance) Trading: The relatively low frequency of Motagua jadeite in Costa Rica suggests the possibility of this form of exchange. In this mode, person C (the middleman) is under the control of neither A (the Motagua source in this case) nor B (the Costa Rican consumer) (Renfrew 1975:43). The highly limited context of jadeite in Costa Rica suggests that its possession, use, and ultimate deposition were tightly controlled.

Mode 8, Emissary Trading: This is described as a system in which an agent is sent to a location for the purpose of exchanging goods. Under the earlier Olmec/Maya stimulus model, emissary trade would have been a consideration, but with the current data it does not work.

Mode 9, Colonial Enclave: This is the mode most favored by the "Olmec exploitation of the Costa Rican source" model. It is not supported by the available data.

Mode 10, Port-of-Trade: Available data do not support the application of the mode. It remains to be seen to what extent the San Carlos Plain may have functioned as a regional port-of-trade (or central place for redistribution, mode 5).

Renfrew also presented (1975:51) a variation of the down-the-line (mode 4) model, which he referred to as the "prestige-chain trade," noting:

> The transfer of prestige goods often takes place between specific notable persons, and it is likely that exchange partners at this level will, on the average, reside a greater distance apart than the average for ordinary . . . exchange. Secondly, these goods are not expended or utilized in daily life. (Renfrew 1975:50)

The fall-off rate of the occurrence of a particular commodity is much more gradual in prestige-chain trade than in directional, down-the-line, or freelance modes (Renfrew 1975:51). In each of the latter, percentages of occurrence dip to about 10 percent, or slightly more, at a distance of about 600 km (and in the case of the Motagua–Costa Rica distance we are considering 700+ km), while the percentage under prestige-chain trade remains above 60 percent beyond 600 km.

The limited occurrence of Motagua jadeite in Costa Rica initially would seem to suggest the absence of prestige-chain trade and to largely negate elite interaction as a basis for the exchange network. However, we would seem to be in error to focus exclusively on jadeite in making our comparisons. Perhaps by combining jadeite and other foreign mortuary materials we may find that we are dealing with the components of a prestige-chain mode of exchange.

Also, to the extent that local distribution and utilization of greenstones and jadeite appear to have been controlled in Costa Rica, materials from the Motagua Valley appear to have entered the system at the level of local control. The rank implications and symbolic meaning of the lapidary work were therefore clearly perceived, regardless of the source of the material.

For the present, it seems that jadeite would have reached Costa Rica via one of the modes (4, 5, or 7) that shows a pronounced fall-off beyond 600 km. Of these three modes, either mode 4 or mode 7 seems to present the best potential to represent the Motagua-Costa Rica flow—current data would give a further edge to mode 4. As noted, mode 5 may well represent the pattern of distribution of jadeite within Costa Rica.

These modes all imply trade or exchange, however sporadic, and in all cases we discussed the southern movement of jadeite without noting northward-moving goods. Either mode 4 or mode 7 might have moved jadeite southward as only one item in a broad exchange pattern; goods sent northward might also have been either so diverse, or so perishable (cotton, cacao, purple dye, narcotic plants), as to be unrecognizable archaeologically. Both the down-the-line and freelance patterns also leave considerable room for blurring the pattern as various goods are exchanged along the way.

Viewing jadeite as part of a broader trade assemblage would also help to explain, in conjunction with posited models, its almost millenium-long occurrence in the archaeological record. Rather than maintaining a "jade trade route" through elite ties over a long period of time, as we suggested earlier (Lange, Bishop, and van Zelst

1981:172), we would suggest that jadeite was obtained relatively infrequently (albeit still through elite-controlled networks).

Within Costa Rica, jadeite was incorporated into an established cultural system and elaborated in the same manner as locally available greenstone material. Its use was highly restricted for personal adornment by elite persons and ultimately destined for burial with the individual rather than being inherited. We can also define the jade users as those whose ties did not extend into the area of contemporary Nicaragua, even though they did bridge the major ecological boundary within what is now Costa Rica, the dry Pacific and wet Atlantic watershed and highlands.

The cultural context, and function, of the jade as it was en route between Guatemala and Costa Rica is also of interest. As stated above, jade either took a direct route from the source area to its Costa Rican destination (more likely), or was withheld from, or rejected by (considered highly unlikely), intermediate societies. During the transit period the jade was beyond the control of the source area and of no use to it; it had also not yet been received by, and was of equally no use to, its intended recipients. No commodity has intrinsic value, but only that assigned by incorporation into a specific cultural context. Again, we need to know whether we are looking at conscious exchange, or more casual practices.

PROSPECTS FOR FUTURE RESEARCH

The research reported here is really only a beginning with which we have defined several avenues for further investigation. Among the most important are the analyses of covariation between different geological materials (jadeite and other greenstones), artifact forms, and technical and iconographic attributes. If jadeite occurs only in a limited range of forms and carries a limited range of iconographical information, then we may be able to conclude that its acquisition, preparation, and the use of symbols placed on it were tightly restricted. Such analyses will require examination of large collections and a significant increase in the recovery of scientifically excavated specimens. We also need to determine if there is continuity in the distribution of jadeite from the source area, or disjunction and change as Zeitlin (1982) demonstrated for the obsidian trade in southern Mesoamerica.

SUMMARY

As Robert Heilbronner (1981:52) wrote in reviewing Sohn-Retel's book, "The division between the 'higher' learning and the 'lower' crafts and skills is the rationale that elevated the priest above

his flock, the justification of the privileges of the manager and the duties of the workers, and, not the least, the gulf between the intellectual and the masses on the street." This would have included the skills of equating values of disparate goods, scheduling acquisition and distribution, and a whole host of abstract concepts requisite for long-distance contacts and communication. In Mary Helms's account of the symbolic value of gold artifacts among the Cuna (1979:148-49) we have some glimmer of what the significance of jadeite and other greenstones "might" have been.

In complex societies, planning and action based on abstract concepts are common. Materials such as jadeite reflect the distribution and exchange of valued goods, but the cultural context which made them valuable is poorly understood. The data requiremants for the study of complex societies and their political and economic systems are considerable, especially when we are tracing the distribution of a particular class of artifacts across space and time. An analysis of historical data regarding how prestige items circulated among elites may help us to better utilize archaeological data. The research reported here is also a demonstration of the manner by which speculative interpretations of long standing can be addressed by a combination of archaeological investigation and instrumental analysis.

NOTES

[1] We are grateful to Robert Dirks (Illinois State University) for his comments on an earlier version of this paper. Field research in Costa Rica was carried out under permit from the National Museum of Costa Rica; Luis Diego Gomez P., then Director of the National Museum, Don Hector Gamboa P., then head of the Department of Anthropology and History, and Dona Mrs. Maria Eugenia Jimenez de Roy, then President of the Board of Directors of MNCR, were instrumental in these efforts and helped greatly in expediting matters when it became apparent that material would have to be exported for analysis. Lic. Zulay Soto de Andrade, Director of the Jade Museum of the National Insurance Institute (Instituto Nacional de Seguros) and Don Ricardo Monge O., Executive Director of that organization, as well as Don German Serrano P., Executive President at the time, facilitated loan of materials from that collection.

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[2] Greater Nicoya Ceramic Conference, 1982-1984. Three conferences have been held with the support of the JFM Foundation, Denver. Suzanne Abel-Vidor, Claude Baudez, Ron Bishop, Winifred Creamer, Jane Day, Juan Vincente Guerrero, Paul Healy, Fred Lange, Robert Stroessner, Silvia Salgado, and Alice Tillett have met to begin to refine the ceramic sequence and nomenclature for Greater Nicoya. Preliminary reports have been circulated and final publications are in progress.

[3] With respect to a still presumed Costa Rican source, our inability to identify it geologically is frustrating. Such sources should not disappear; higher quality stone may be played out, but the context and lesser quality matrix should remain. It would appear that both the carefully studied (L. Lew, personal communication) and only superficially studied Nicoya areas warrent further investigation.

CHAPTER 5

JADEITE, GREENSTONE, AND THE PRECOLUMBIAN COSTA RICAN LAPIDARY