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THE RADIOCARBON EVIDENCE FOR THE TEMPORAL PRIORITY OF CHAVIN DE HUANTAR

Richard L. Burger

A critical evaluation of radiocarbon measurements taken from recent excavations at Chavín de Huantar, Peru provides the basis for an absolute chronology for the Chavín culture at Chavín de Huantar which spans from 850 B.C. to 200 B.C. Radiocarbon measurements from four coastal sites stylistically related to Chavín de Huantar are reviewed and found to be generally prior in date to the earliest known occupation at Chavín de Huantar.

The antiquity of Chavín de Huantar has remained a focal point of debate since the pioneering investigations of Julio C. Tello. The initial claim by Tello for the temporal priority of Chavín culture at Chavín de Huantar was met with skepticism by many scholars because of the sophistication of its art style and technology. Although stratigraphic evidence at Chavín de Huantar and related sites on the coast of Peru soon served to establish that Chavín culture preceded the other well-known Andean cultures (Moche, Chimu, Inca, etc.), debate continued concerning the age of Chavín de Huantar compared to sites in Casma, Nepeña, and the Moche Valleys which are stylistically related to it.

Arguments revolving around the relative age of Chavín de Huantar and other "Chavín style" sites were first based on competing hypotheses describing the rise of Chavín civilization in the Central Andes. Tello proposed the early establishment of Chavín de Huantar and viewed the related coastal sites as evidence of its expansion (Tello 1943), while Larco Hoyle (1941) maintained that the Chavín cult began on the North Coast, probably Nepeña, and eventually spread to Chavín de Huantar.

During the last two decades, attempts have been made to resolve this impasse by using diverse methodologies and evidence. Rowe (1962) used stylistic seriation of sculpture, the Early Horizon ceramic sequence from Ica, and architectural observations to provide a relative chronology for Chavín de Huantar, and he cautiously extended some of these insights to "Chavín" art from other regions, thereby delineating temporal correlations on the basis of style. This approach was expanded upon by Peter Roe (1974) who attempted to systematize Rowe's seriation at Chavín de Huantar, without making major modifications. Roe went further in assessing the chronological placement of a number of coastal and highland sites solely in terms of Rowe's stylistic sequence

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0002-7316/81/030592-11$1.60/1

for sculpture from Chavín de Huantar. He concluded that there had been a gradual expansion of artistic influence from Chavín de Huantar to other areas in the highlands and coast.

Lumbreras's work followed an approach which related Chavín de Huantar to other regions on the basis of the ceramic sequence derived from his 1966 excavation in the galleries there (Lumbreras 1971). However, this effort was undermined by the lack of stratigraphic evidence relating the two principal ceramic units, Rocas and Ofrendas, and new evidence eventually led Lumbreras to reverse the chronological ordering of the two phases (Lumbreras 1974). Burger made a comparable pan-regional synthesis using the ceramic sequence from his 1975/1976 excavations in Chavín de Huantar (Burger 1978, 1979). Although the ceramics used in the temple and the settlement of Chavín de Huantar were generally similar, Burger found the original terminology proposed by Lumbreras and Amat (1969) to be inadequate to define the local ceramic sequence. The term "Rocas" had originally been coined for a quantity of ceramics deposited on the floor of the Rocas canal. More recently, however, the term has been employed in a broader sense. Lumbreras (1973) applied it to two different ceramic phases which he suggested might bracket the Ofrendas materials in time, while Amat (1976) used the term "Rocas" for three different but sequential phases which he thought predated Ofrendas material. Further, the small size of the original Rocas sample, its nonstratigraphic context, and the ambiguity in the usage of the term "Rocas" in previous publications led Burger to suggest the term Janabarriu for the final phase of Chavín style ceramics. The Janabarriu phase was now defined on the basis of a large sample of excavated ceramics, and the photographs and drawings of the Rocas canal materials fit within this definition.

The term "Ofrendas" had originally been applied to a heterogeneous assemblage of pottery presumably imported and/or manufactured for a special ritual purpose and not recovered by any investigator outside of the Ofrendas Gallery—either in the temple or the settlement of Chavín de Huantar. Thus the term "Ofrendas" is not applicable to any phase of the local ceramic sequence at Chavín de Huantar. Burger (1978) used the terms "Urabarriu" and "Chakinani" to designate the two pre-Janabarriu phases of ceramics there. The results of Burger's study comparing the new Chavín de Huantar ceramic sequence with sequences from other similar ceremonial centers cast doubt on the temporal priority of Chavín de Huantar and demonstrate that its xenith occurred only during the final Janabarriu phase.

A third approach to the problem of chronology lies in establishing the correlations of the sites in question on the basis of radiocarbon measurements. This was not feasible until recently because of the lack of a sufficient number of analyses of samples taken from Chavín de Huantar and related sites. While the technical problems with radiocarbon measurement are well known, it is generally accepted that meaningful patterns do emerge if suites of dates are used rather than isolated dates. The productive and sometimes unexpected results of correlations based on radiocarbon measurements have been most notably demonstrated in European archaeology by Renfrew (1973). Radiocarbon dating is an especially valuable complement to other methods since it does not make use of assumptions concerning stylistic similarity and diffusion. The radiocarbon measurements presented in this article are uncorrected and utilize the Libby half-life.

RADIOCARBON MEASUREMENTS FROM EXCAVATIONS AT CHAVIN DE HUANTAR

Two sets of carbon samples have been analyzed from Chavín de Huantar (Table 1). The most recent set (10 samples) comes from excavations by Burger in the settlement which surrounded the main ceremonial area; an earlier set (10 samples) was recovered by Lumbreras and Amat in excavations within the temple sector (Lubreras and Amat 1969).

The three sequential ceramic phases defined by Burger for the Chavín style occupation at Chavín de Huantar were based on 11 stratigraphic excavations. Chavín style materials were always found immediately above the ancient river terrace, bedrock, or thick deposits of sterile clay. Moreover, a review of materials recovered at Chavín de Huantar in the excavations of Tello, Bennett, and Rowe did not reveal ceramics which could have antedated the proposed sequence (Burger 1978:242–290). Burger therefore argued that his three-phase sequence included

Table 1. Radiocarbon Measurements Cited from Chavín de Huantar, Haldas, Caballo Muerto, Garagay, and Ancón.

Site	Provenience	Comment	Measurement (B.P.)
(measurements made on plant materials)			
Chavín de Huantar	B5-ee	Settlement, Urabarriu Phase	2770 ± 75 (ISGS-486)
	B5-ext.	Settlement, Urabarriu Phase	2900 ± 150 (ISGS-493)
	B5-ext.	Settlement, Urabarriu Phase	2715 ± 100 (UCR-694)
	B5-e	Settlement, Urabarriu Phase	2580 ± 100 (UCR-705)
	B2-c	Settlement, Urabarriu Phase	2190 ± 210 (ISGS-510)
	8-D-X-I-3	Temple, Ofrendas Gallery	2730 ± 110 (Gif-1078)
		Temple, Ofrendas Gallery	2700 ± 85 (GX-1128)
		Temple, "Basement"	2800 (TK-18)
	D1-11	Settlement, Chakinani Phase	2400 ± 100 (ISGS-507)
	D1-vv	Settlement, Chakinani Phase	2350 ± 100 (UCR-693)
		Temple, New Temple Area	2370 ± 100 (Gif-1077)
		Temple, New Temple Area	2360 ± 100 (SI-1213)
	D1-bb	Settlement, Janabarriu Phase	2520 ± 100 (ISGS-506)
	D2-f2	Settlement, Janabarriu Phase	1775 ± 100 (UCR-747)
	E1-r	Settlement, Janabarriu Phase	1635 ± 100 (UCR-748)
	Atrium L5	Temple, Huaras Occupation	2100 ± 100 (Gif-1079)
Haldas		Level below postceremonial occupation	2830 ± 70 (Tx-632)
		Postdates temple	2730 ± 70 (Tx-1011)
	Pit 1/3	Postdates temple	2690 ± 150 (Gak-606)
	Surface	Postdates temple	2500 ± 100 (NZ-211)
	Aa/2	Postdates temple	2360 ± 90 (Tk)
Caballo Muerto	Cuts 1/2	Huaca Herederos Chica	3450 ± 70 (Tx- 1938)
	Cuts 1/2	Huaca Herederos Chica	3040 ± 60 (Tx-1937)
	Mound F	Huaca de los Reyes	3680 ± 80 (Tx-1974)
	Mound F	Huaca de los Reyes	3310 ± 80 (Tx-1972)
	Mound F	Huaca de los Reyes	3140 ± 60 (Tx-1973)
	Mound F	Huaca de los Reyes	2800 ± 60 (Tx-2180)
		Huaca Guavalito, Phase 2	2390 ± 70 (Tx-1939)
Garagay		Temple	3170 ± 80 (Católica-49)
		Temple	2730 ± 70 (Católica-09)
Ancón (PV45-2)	55D	Phase 1-Garagay influence	2990 ± 160 (GX-2384)
	55D	Phase 1-Garagay influence	2760 ± 200 (GX-2478)
	60A	Phase 2-Garagay influence	2875 ± 95 (GX-1429)
	60A	Phase 2-Garagay influence	2965 ± 115 (GX-1438)
	60A	Phase 2-Garagay influence	3295 ± 140 (GX-1235)
	55C	Phase 2-Garagay influence	3295 ± 210 (GX-2477)
	32D	Phase 2-Garagay influence	2990 ± 115 (GX-1349)
	37C2	Phase 3-Garagay influence	2695 ± 110 (GX-1358)
	37D	Phase 3-Garagay influence	2805 ± 115 (GX-1357)
	55B	Phase 3-Garagay influence	2875 ± 90 (GX-2385)
(measurements on bone)			
Chavín de Huantar		Rocas Gallery	2890 ± 125 (SI-1212)
		Rocas Gallery	3025 ± 80 (SI-1210)
		Rocas Gallery	3077 (GX-1127)
		Rocas Gallery	3370 ± 90 (SI-1211)

materials from the earliest settlement of Chavín de Huantar until its abrupt transformation into a small nucleated town at the time of the introduction of the Huaras style (Lumbreras 1970).

Four samples of carbonized organic materials associated with the oldest Chavín occupation were analyzed; one of these was divided for processing by two laboratories. All of the samples came from an activity area approximately two-thirds of a kilometer north of the main ceremonial center. This zone was only utilized during the Urabarriu phase, the earliest occupation, and was abandoned during the subsequent Chakinani and Janabarriu phases. Two trenches uncovered the

remains of a large platform formed by an artificial fill of river cobbles. Below the eastern side of the platform was a small round subterranean structure, possibly a storage chamber; the western side of the platform was placed directly on bedrock. The platform fill contained refuse and ritual offerings, including four human crania, complete pottery vessels, and caches of carbonized wild fruit of the family *Lauraceae* (D. Pearsall, personal communication). On the top of the platform were rustic walls and a thin layer of refuse.

The sample from the soil filling the subterranean structure below the Urabarriu platform yielded a measurement of 2770 ± 75 radiocarbon years: 820 B.C. (ISGS-486). The divided sample from the platform fill above provided radiocarbon ages of 2900 ± 150 years: 950 B.C. (ISGS-493) and 2715 ± 100: 765 B.C. (UCR-694); the other carbon sample from the refuse within the platform was dated to 2580 ± 100 radiocarbon years: 630 B.C. (UCR-705). A sample from the thin layer on top of the platform measured 2190 ± 210 radiocarbon years: 240 B.C. (ISGS-510). Our interpretation of these dates is to accept 820 B.C. ± 100 for the final use of the Urabarriu storage pit, and the mean of 782 B.C. ± 161 for the Urabarriu refuse materials included in the platform. A second standard deviation range of 660 B.C. to 450 B.C. for the use of the platform surface also fits well within this sequence for Chavín de Huantar.

Burger's detailed comparison of the form and decoration of published pottery from the Ofrendas Gallery with the ceramics of the Urabarriu phase indicated that many vessels are related stylistically (Burger 1978, 1979). The dates published for carbonized organic remains from the Ofrendas Gallery accord well with stylistic analysis. The samples definitely associated with the Ofrendas remains (Delibrias et al. 1971; Amat 1976) produced measurements of 780 B.C. ± 110 (Gif-1078) and 750 B.C. ± 85 (GX-1128), approximately the same age measured for the materials from the Urabarriu platform. A third sample found "in the basement of the Chavín de Huantar temple" produced a date of 850 B.C. (TK-18) (Matsuzawa 1978:667).

The second phase defined by Burger for the Chavín occupation at Chavín de Huantar is the Chakinani phase. It is characterized by classic Chavín style incised ceramics. Materials from this period were stratigraphically isolated in excavations on a low ridge about 100 m west of the New Temple. Strata consisting of clay, gravel, carbonized organic remains, bone, and Chakinani style sherds were found above thick layers of sterile clay and below a house and a platform built during the subsequent Janabarriu phase. The two carbon samples taken from these deeply buried Chakinani strata dated to 2400 ± 100 radiocarbon years: 450 B.C. (ISGS-507) and 2350 ± 100 radiocarbon years: 400 B.C. (UCR-693). The UCR-693 sample was recovered from the lowest stratum of the Chakinani deposits, 1.5 m below sample ISGS-507 (which was taken from the uppermost stratum containing Chakinani materials). The mean standard deviation suggests a span of time between 460 B.C. and 390 B.C. for the Chakinani phase. Such an estimate is consistent with the speculation that the Chakinani phase was a relatively short period following the end of the Urabarriu phase (Burger 1978). Two dates are published by Amat (1976) for samples excavated in the New Temple area of Chavín de Huantar: these are 420 B.C. ± 100 (Gif-1077), and 410 B.C. ± 100 (SI-1213). The specific artifactual materials associated with these samples have not yet been published, but they fall within the time period estimated for the Chakinani phase.

The final phase of Chavín materials at Chavín de Huantar, the Janabarriu phase, was marked by the expansion of the settlement. Janabarriu materials were found stratigraphically above Chakinani materials in two sectors, and above Urabarriu materials in one unit. Moreover, a seriation of form and decoration of Janabarriu ceramics confirms the Urabarriu–Chakinani–Janabarriu ordering of the materials (Burger 1978). It is estimated that the Janabarriu phase lasted from the end of the Chakinani phase, approximately 390 B.C., until the disruption of Chavín de Huantar by the alien Huaras style. A single radiocarbon date of 150 B.C. ± 100 (Gif-1079) is available for the beginning of the "white-on-red" or Huaras style in Chavín de Huantar (Amat 1976). Thus, we would estimate the duration of the Janabarriu phase from 390 B.C. to 200 B.C.

Unfortunately, the three radiocarbon measurements received for samples associated with Janabarriu materials are confusing and inconsistent. One sample of burned organic material was taken from a broken Janabarriu house floor; it had been subsequently covered by Janabarriu refuse. The stratum below the house contained the two Chakinani carbon samples ISGS-507 (450

B.C.) and UCR-693 (400 B.C.). The resulting measurement of 2520 ± 100 radiocarbon years: 570 B.C. (ISGS-506) for the Janabarriu carbon sample conflicts with the internal stratigraphy of the excavation from which it is taken, as well as being at odds with the estimate for the Janabarriu phase. The two other Janabarriu samples produced equally unacceptable measurements of A.D. 175 (UCR-747), 1775 ± 100 radiocarbon years, and A.D. 315 (UCR-748), 1635 ± 100 radiocarbon years. UCR-747 was taken from a carbon lens on the floor of a Janabarriu domestic structure, and sample UCR-748 was recovered from a post-hole in a burned Janabarriu structure. In both cases, the samples were overlain by thick layers of Janabarriu refuse. No explanation of the discrepancy between these measurements and the estimated age, or with the age provided by ISGS-506 has been found. It is hoped that further analyses of other Janabarriu samples from the same excavations will help to clarify the problem.

The ceramics published from the Rocas Gallery by Lumbreras and Amat (1969) fall within the Janabarriu phase on stylistic grounds (Burger 1978). The following measurements were published on analyses of bones from the Rocas Gallery (Amat 1976): 940 B.C. ± 125 (SI-1212); 1075 B.C. ± 80 (SI-1210); 1200 B.C. (GX-1127); and 1420 B.C. ± 90 (SI-1211). The great age indicated by these measurements is not consistent with any of the other dates from Chavín de Huantar, nor can it be reconciled with the late stratigraphic position of Rocas (i.e., Janabarriu) ceramics found by Burger in the Chavín de Huantar settlement and by Lumbreras in the Circular Plaza of Chavín de Huantar (Lumbreras 1977). The difference between this group of radiocarbon dates and the other measurements may be attributable to the difficulties of dating bone, rather than carbonized plant tissue. Another factor may be that the Rocas Gallery was a functioning canal and the bones in it would probably have been subjected to immersion in waters draining from the temple structures, many of which include limestone blocks. Such filtration could have contained contaminating carbonates, known to produce misleading measurements of increased antiquity (Ralph 1971:16).

In conclusion, a tentative radiocarbon chronology is hypothesized for Chavín de Huantar, beginning with the Urabarriu phase: 850 B.C.–460 B.C.; followed by the Chakinani phase: 460 B.C.–390 B.C.; and ending with the Janabarriu phase: 390 B.C.–200 B.C. This sequence is based on a critical evaluation of radiocarbon measurements made by several laboratories on materials excavated at Chavín de Huantar. The principal weakness of the hypothetical sequence comes from inconsistent readings on the Janabarriu samples and the measurements on bone from the Rocas Gallery.

THE CHRONOLOGICAL RELATIONSHIP OF CHAVIN DE HUANTAR WITHIN HALDAS, CABALLO MUERTO, ANCON, AND GARAGAY

The coast of Peru is checkered with large ceremonial centers, few of which have been studied in detail. Many of these centers show some similarity in architecture, iconography, or ceramics to Chavín de Huantar and, on this basis, they are often presumed to be contemporary with Chavín de Huantar. Inasmuch as the most intensively studied architectural and sculptural remains of this genre are from Chavín de Huantar, such coastal sites have often been interpreted as provincial manifestations of the more sophisticated highland center (e.g., Grieder 1975; Lumbreras 1974). Three of the better known coastal centers will be discussed here. The sites of Haldas and Caballo Muerto were selected because they were the only relevant monumental centers from which a large number of radiocarbon results are currently available (Table 1). A third center, Garagay, will be considered despite limited radiocarbon evidence, because we do have in our possession a long series of radiocarbon dates from Ancón (Table 1), a small fishing village approximately 30 km north of Garagay. Ancón can be related to Garagay on the basis of iconography and ceramic style. Fortunately, the three ceremonial centers are widely distributed along the portion of the Peruvian coast where Chavín-related sites have been discovered (Figure 1).

Haldas

Haldas is an impressive littoral site which has been the object of many investigations. It is renowned for its massive truncated pyramid and semisubterranean plazas which bear a striking

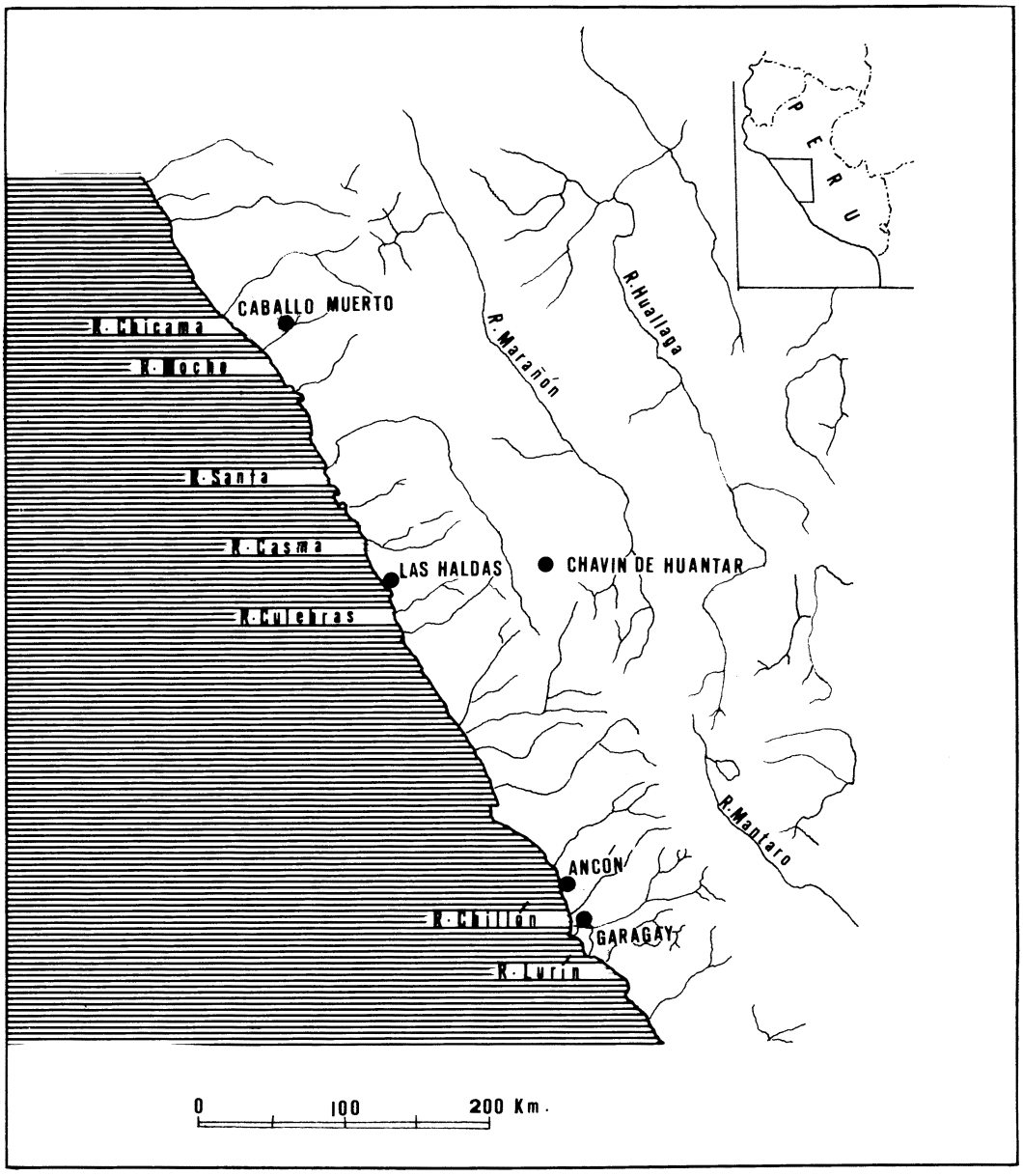

Figure 1. Map showing the location of Chavín de Huantar and the four coastal Peruvian sites compared with it in this article.

similarity to the architectural remains at Chavín de Huantar, approximately 100 km to the east. The most recent reports by Fung (1972b), Grieder (1975), and Matsuzawa (1974, 1978) provide a clear and relatively consistent description of the history of the site, as well as numerous radiocarbon measurements. The earliest occupation of Haldas occurred during the late Preceramic and produced an accumulation of refuse and at least one structure. There was a smooth transition into the layers with early ceramics, during which small-scale permanent constructions were erected. Subsequently, the monumental constructions mentioned above were embarked upon, mostly utilizing rock fill sealed by mud mortar. According to Grieder, a short final period of large-

scale public construction can be distinguished by its innovative use of "granular concrete" instead of mud mortar. The monumental constructions at Haldas were halted suddenly and a short hiatus has been postulated during which time a layer of sand accumulated over the site. The subsequent reoccupation of Haldas had a radically different character, typified by low-quality "small roomlike structures" (Matsuzawa 1978:662) which were made up of "single-faced free standing walls" (Grieder 1975:100).

The postceremonial occupation at Haldas has been dated by four radiocarbon measurements (Grieder 1975; Matsuzawa 1978). These are 780 B.C. ± 70 (Tx-1011); 730 B.C. ± 150 (Gak-606); 550 B.C. ± 100 (NZ-211); and 410 B.C. ± 90 (LH-Aa/2). A fifth date of 880 B.C. ± 70 (Tx-632) was taken from immediately below the postceremonial occupation. These dates led Grieder to conclude that the final occupation lasted from 880 B.C. to 500 B.C., a time span which directly parallels the dates estimated here for the oldest phase at Chavín de Huantar. The LH-Aa/2 sample (410 B.C. ± 90) suggests that the residential community at Haldas may have continued for at least another century, a possibility supported by the similarities of the ceramics from the terminal phase at Haldas with the post-Urabarriu ceramics from Chavín de Huantar.

The ceremonial complex at Haldas would therefore appear to predate the developments at Chavín de Huantar, on the basis of a comparison of radiocarbon measurements. Several radiocarbon measurements from the second millennium B.C., taken from the Initial period constructions, lend force to this conclusion. Grieder estimates the period of monumental construction as extending from 1190 B.C. to 900 B.C., although several contradictory radiocarbon measurements have come from these levels (Matsuzawa 1978:666-667). In summary, the radiocarbon information presently available favors Fung's early suggestion that the monumental architecture of Haldas provides an antecedent for the temple at Chavín de Huantar (Lanning 1967; Fung 1972b), over Grieder's position that the ceremonial constructions could be contemporary provincial versions of structures at Chavín de Huantar itself (Grieder 1975).

Caballo Muerto

Caballo Muerto is an impressive ceremonial complex in the Moche Valley, approximately 190 km north of Haldas and 240 km northwest of Chavín de Huantar. Caballo Muerto is larger in area than Chavín de Huantar and the complexity of its architecture and the abundance of its distinctive adobe sculpture rivals the more famous highland center (Pozorski 1976a, 1976b). There are unmistakable similarities in architecture and iconography between Caballo Muerto and Chavín de Huantar, a fact which has led most scholars to classify it as a Chavín-related site (Lumbreras 1974; Pozorski 1976a). Peter Roe has dated the sculpture friezes to late phase D or early phase EF of the Early Horizon on the basis of the Chavín de Huantar seriation of stone sculpture (Roe 1978:7)

The ruins of Caballo Muerto contain at least eight major major temple mounds, and Pozorski (1976a) hypothesizes three major architectural periods for their construction: Period I (1500-1200 B.C.); Period II (1200-800 B.C.); and Period III (800-400 B.C.). The most impressive public constructions, including Huaca de los Reyes and Huaca Herederos Grande, occurred during Periods I and II. Constructions during Period III were smaller and less frequent, and several of the major temple constructions were no longer in use by this time.

Six carbon dates are available from Caballo Muerto (Pozorski 1976a). Two measurements came from ashy layers of cuts 1 and 2 of Huaca Herederos Chica; the results were 1500 B.C. ± 70 (Tx-1938), and 1090 B.C. ± 60 (Tx-1937). Four other measurements were taken from carbon in postholes in the earliest section of the highest platform at Huaca de los Reyes. The dates are 1730 B.C. ± 80 (Tx-1974); 1360 B.C. ± 80 (Tx-1972); 1190 B.C. ± 60 (Tx-1973); and 850 B.C. ± 60 (Tx-2180). These four radiocarbon dates were made on carbonized cane *(Gynerium sagittatum)* and thus may display the anomalous results known to occur to sugar cane, sudan grass, corn, and other tropical grasses (Bender 1968). Unfortunately, carbon 12/13 analyses were not carried out on the Caballo Muerto samples and no corrections were made by the laboratory.

A comparison of the measurements cited above with those from Chavín de Huantar suggests

that the two principal building periods at Caballo Muerto, which included the "Chavinoid" murals and sunken rectangular courtyard of Huaca de los Reyes, preceded the establishment of Chavín de Huantar. It is noteworthy that Pozorski's estimate for the principal construction period at Caballo Muerto parallels the time proposed by Grieder for the monumental constructions at Haldas.

Further credence is lent to the chronological analysis of Pozorski by a seventh date of 440 B.C. ± 70 (Tx-1939); this sample was associated with the second phase of Huaca Guavalito, a Period III construction in Caballo Muerto. It is significant that Janabarriu-related ceramics were found by Pozorski at Huaca Guavalito and one other Period III mound (Pozorski 1976a). The Huaca Guavalito measurement meshes with the estimates provided for the Janabarriu phase at Chavín de Huantar. Watanabe (personal communication) recovered Janabarriu-related ceramics which had been thrown on the surface of Huaca Herederos Chica after that temple building ceased to function.

Ancón and Garagay

The third site to be considered is Ancón, a small littoral settlement 250 km south of Haldas and 230 km southwest of Chavín de Huantar. Although it was not an important ceremonial center, it has attracted interest for several decades because of the discovery by Uhle of early ceramics among its thick midden deposits. The subsequent identification of Chavín influence by Tello (1943) and its characterization as a colony of Chavín de Huantar by Carrión Cachot (1948) has received considerable scrutiny (Matos 1962; Rosas 1970; Scheele 1970; Patterson 1971; Burger 1972). Burger defined seven ceramic phases with "Chavín influence" at Ancón on the basis of stratigraphic excavations by Patterson. The two oldest phases with "Chavín influence" were associated with the following radiocarbon measurements (Patterson 1972): 1345 B.C. ± 140 (GX-1235); 1345 B.C. ± 210 (GX-2477); 1040 B.C. ± 115 (GX-1349); 1040 B.C. ± 160 (GX-2384); 1015 B.C. ± 115 (GX-1438); 925 B.C. ± 95 (GX-1429); and 810 B.C. ± 200 (GX-2478). The mean and standard deviation of the seven measurements is 1074 B.C. ± 201. These measurements of the earliest period of ceramics with "Chavín influence" at Ancón are in accord with five radiometric measurements for the "Colinas zoned bichrome and punctate" ceramics which stratigraphically preceded the materials showing "Chavín influence"; the dates for the late Colinas ceramics averaged 1269 B.C. ± 162 (Patterson 1972).

At this point it is plausible to conclude that the earliest ceramics at Ancón with "Chavín influence" probably predate Chavín de Huantar. A reconsideration of the iconography of the ceramics in question show them to be more closely related to the murals at the nearby U-shaped ceremonial center of Garagay than to the stone sculpture at Chavín de Huantar. Furthermore, the ceramics from Ancón are more similar to the sherds found at Garagay than to any pottery known from Chavín de Huantar. Thus, the radiocarbon measurements for the first two phases of "Chavín influence" at Ancón may be best interpreted as dating the emergence of Garagay as a major ceremonial center of the Central Coast which, like Haldas and Caballo Muerto, was in part antecedent to the public constructions at Chavín de Huantar. The third phase of Ancón ceramics showing Garagay influence was associated with three radiocarbon measurements averaging 842 B.C.

A series of architecturally associated carbon measurements has not yet been published from the recent studies at Garagay (Ravines and Isbell 1976). However, two samples from these excavations were analyzed at the recently established laboratory of the Pontifícia Universidad Católica del Perú, Lima (Cárdenas 1979). The results, 1220 B.C. ± 80 (Católica-49), and 780 B.C ± 70 (Católica-09), are consistent with the Ancón measurements for the time period of Garagay influence.

DISCUSSION

An evaluation of the radiocarbon measurements available suggests that the ceremonial centers of Caballo Muerto, Haldas, and Garagay were prospering on the coast of Peru between 1200 B.C.

and 900 B.C. In contrast, the earliest phase of the religious center at Chavín de Huantar is estimated as lasting from 850 B.C. to 460 B.C., on the basis of two sets of radiocarbon analyses. The architectural and iconographic features found in these coastal sites may therefore be considered as possible antecedents for similar traits found at Chavín de Huantar. The delineation of the organizational principles and developmental processes of these precocious coastal centers is essential to understanding the early growth of Chavín de Huantar since the establishment of the temple there may be seen as the culmination of early developments on the coast of Peru. While this idea has been proposed by many scholars, most notably Lanning (1967), Patterson (1971), and Fung (1972a), it was not possible to evaluate it previously using nonstylistic evidence. Radiocarbon measurements have been utilized for that purpose in this article and while some contradictory or inconsistent measurements exist for all of the sites considered, the pattern of the results generally supports the hypothesis that the antecedents for the temple of Chavín de Huantar are found on the central and northern coast of Peru. We are aware of the need for critical review of these findings based upon other methods, as well as a future reevaluation using new radiocarbon measurements.

Although the constructions at Chavín de Huantar adopted the general organization and some of the distinctive architectural features of the coastal centers, the resultant temple differed from all of the known antecedents, reflecting the independence of the new ceremonial complex. The Chavín de Huantar cult utilized a new set of motifs and stylistic conventions which were emblematic of the temple and its elite. The sculpture at Chavín de Huantar differs from that of the coastal centers in its religious content (Moseley and Watanabe 1974; Ravines and Isbell 1976) and it can be inferred that the Chavín de Huantar temple was dedicated to an innovative and distinctive ideological system whose inspiration was partially drawn from the tropical lowlands. Chavín de Huantar probably coexisted and competed with coastal centers like Garagay and Caballo Muerto during the ninth century B.C., and possibly during the following centuries as well.

The period of intrasite expansion and maximum pan-regional influence of Chavín de Huantar is estimated as lasting from 390 B.C. to 200 B.C. This conclusion leads to a second rarely considered proposition. The increased importance of Chavín de Huantar in the Early Horizon may be directly related to the decline of important Initial period ceremonial complexes on the coast. The principal constructions at Garagay, Haldas, and Caballo Muerto preceded the xenith of Chavín de Huantar by several centuries and all three coastal centers had gone into decline by the fifth or fourth centuries B.C. At least two of these sites were experiencing abandonment of major temples while the rulers of Chavín de Huantar were embarking on the ambitious construction of the New Temple.

It is during the Janabarriu phase of the Chavín de Huantar sequence that the settlement around the temple reaches its maximum extent, stretching 1.2 km along the western bank of the Río Mosna and spanning both sides of the Río Huachecsa. There is evidence for craft production and social differentiation in the settlement by this time, and the inhabitants of Chavín de Huantar were active participants in the system of long distance exchange which flourished during the Early Horizon. The evidence for a substantial residential population around the Chavín de Huantar temple during the Early Horizon can be contrasted with the lack of materials showing similar population concentrations around the late Initial period temples at Garagay, Caballo Muerto, and Haldas. While this difference may reflect only the limitations in sampling, it is more likely that the Early Horizon occupation at Chavín de Huantar marks the evolution of a proto-urban center from an earlier pattern of the empty ceremonial center.

Acknowledgments. My research in Chavín de Huantar was supported by the National Science Foundation (BNS 75 18062) and by a Fulbright Hays Fellowship (HEW). Special thanks are due to Donald Lathrap and the ISGS laboratory for providing additional measurements, R. E. Taylor of the radiocarbon laboratory at the University of California, Riverside, for his sympathetic cooperation, and to Thomas Patterson for permission to utilize his unpublished manuscript.

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THE INCORPORATION OF SMALL CONTRACT PROJECTS INTO A REGIONAL SAMPLING DESIGN

Shirley Powell and Glen E. Rice

This paper evaluates the research potential of small contract surveys conducted in the greater Phoenix metropolitan area. It is argued that if the data produced by small project surveys are to be used to answer regional questions, it is necessary to treat each small survey as a sample unit within a region and to synthesize the data from several such surveys. Statistical techniques are employed to determine the representativeness of the greater Phoenix small survey sample. Preliminary archaeological results of the surveys conducted within the Phoenix area are presented and guidelines for the conduct of future surveys are suggested.

The small archaeological contract survey can be defined in several different ways. At Arizona State University we have a very materialistic definition: a survey is small if it costs less than $4,000. Clearly though, the essential attribute of archaeological surveys in general is area, rather than cost. In an attempt to standardize the definition of small areal surveys, we examined a total of 69 surveys conducted in the Phoenix metropolitan area between 1976 and the Spring of 1978 by the Office of Cultural Resource Management of Arizona State University.

The histogram in Figure 1 shows that the survey areas are skewed towards the upper end of the scale. The median survey size is slightly greater than 40 acres, while the mean survey size is about 100 acres. Several properties of this histogram are worth noting: first, that there is in fact such a thing as a "small survey" and it occurs in relatively large numbers. It is thus worthwhile to examine the uses, designs, and properties of such projects. Second, this particular curve primari-

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0002-7316/81/030602-09$1.40/1