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# *Archaeology of Formative Ecuador*

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## APPENDIX B

### *Formative Period Chronology for the Northern and Central Highlands of Ecuador*

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Although this Appendix should include both the northern highlands (Carchi, Imbabura, and Pichincha provinces) and the central highlands (Bolívar, Chimborazo, Cotopaxi, and Tungurahua provinces), no Formative period material is yet known from the little studied central highlands. In fact, the known material comes from Pichincha and Imbabura provinces. These materials are mostly from inter-Andean sites, which are true sierra sites, and also include materials recently discovered on the western flank of Pichincha province in a subtropical and tropical forest area (the western *montaña*).

The chronology of Formative complexes in this region is based on three dating methods: radiocarbon assays, tephrostratigraphy, and cross-dating. Below brief mention is made of each of the known complexes, their possible affiliations, and—most importantly for our purposes—their chronology. Radiocarbon dates are in Table B1.

Certainly the best known Formative complex of the region is Cotocollao, named after the type-site in the former village of Cotocollao, now a barrio on the north end of the capital city of Quito. Limited work at the site by Padre Pedro Porras (1982) and much more extensive salvage work by a large team led by Marcelo Villalba (1988) has resulted in abundant information on the ceramics and chronology, as well as some understanding of the settlement plan, burial practices, and agriculture. Porras's four radiocarbon dates and stratigraphic analysis of the site were of somewhat dubious provenance and, as was his custom, he published only those three dates that seemed relevant. These are included in

Table B1, as are the five earliest and five latest dates of a total of 55 radiocarbon assays from Villalba.

Villalba defined 34 classes of pottery vessels on the basis of form, decoration, and surface treatment. These classes were arranged into a four-phase sequence (Cotocollao 1a, 1b, 2a, and 2b) according to their stratigraphic relationships, carbon dates, and a seriation that was a hybrid of the Fordian type-frequency method of seriating pottery classes and a type-frequency seriation of individual attributes. Since the site is quite large, the stratigraphy complicated, and the type-frequency seriation method problematic, questions remain regarding details of the ceramic sequence. Nonetheless, the overall chronological record seems fairly well-established on stratigraphic grounds. The multitude of radiocarbon dates suggests a calibrated time span for the Cotocollao site from approximately 1800 to 400 B.C.

The end of the Cotocollao occupation seems to coincide more or less with a major volcanic event in the northern highlands. This is presumed to be the eruption of Pululagua, situated 17 km north of the type-site. The date of that eruption is based on a single radiocarbon assay of a carbonized twig pulled from an ash deposit near the volcano (Hall 1977: 93). Minard Hall mistakenly reported the date in calendar years as 335 B.C. However, the Smithsonian Institution lab, which ran the date, recorded it as 2305 BP, which converts to 355 B.C. (uncalibrated). A second date for Pululagua (GP88-135, 2650 ± 150) may predate the eruption but is not considered reliable (Isaacson and Zeidler 1999: 45–46). Hall's solitary date, also in Table B1, probably falls within the range (calibrated) of 530 to 180 B.C. Porras (1982: 62) believed the site was briefly reoccupied by Cotocollao peoples following the eruption. Villalba (1988) does not address the possibility of recolonization directly, leaving the impression that the eruption was the definitive termination of site occupation. Pululagua's eruption was also a significant cutoff for other sites in the region and may serve as a nonarbitrary temporal boundary for the end of the Formative period in at least part of the northern highlands.

Villalba conducted surveys in the Quito valley and in the Tumbaco and Los Chillos valleys immediately east of Quito, cataloguing some 70 Cotocollao sites in the Pichincha highlands. My extensive but unsystematic 1988 regional survey of much of the western *montaña* of Pichincha, an area of subtropical cloud forest and tropical rainforest on the western flank of the Andes, has identified a handful of sites with a narrow sample of Cotocollao pottery. Test excavations were carried out at one of those sites, Nambillo, resulting in five radiocarbon dates from the earliest paleosol of three. It is this early stratum that contains the Cotocollao material and is separated from later occupations by

deep tephrovolcanic sediments. It is possible that the two earliest dates from that series represent preoccupational charcoal, since they are inexplicably earlier than the Cotocollao dates.

While the Cotocollao ceramics bear some generic Formative period characteristics found in other parts of Ecuador, the Cotocollao complex itself has not yet been identified in either adjacent or more remote areas with the exception of the western *montaña*.

Aside from the Cotocollao culture, the Pichincha and Imbabura highlands may harbor other Late Formative period complexes, though these proposals so far are controversial. The first such candidate was the Espejo complex from the shores of Lake San Pablo in southern Imbabura province. Thomas Myers (1976) defined this complex principally on the basis of a small surface collection. The Early Espejo phase he cross-dated with Valdivia and Late Espejo with Machalilla, both on the Ecuadorian coast. Myers suggested stylistic similarities between this highland complex and the well-known coastal phases, which have been largely rejected. Subsequently, Myers (1978) proposed that some of the Espejo pottery is related to La Chimba.

The large site of La Chimba, covering several hectares in Pichincha province 55 km northeast of Quito, was first studied by Stephen Athens and Alan Osborn (1974), who found superimposed occupations, named Early, Middle, and Late La Chimba. The Early and Middle phases are separated by a volcanic ash stratum. One late radiocarbon assay was discounted (Athens 1978: 493), leaving the site with an uncalibrated date around 150 B.C. for Middle La Chimba. The La Chimba materials were touted by Athens and others as Late Formative, contemporary in part with Cotocollao, and Early Regional Developmental period since the 1970s, but research on La Chimba was suspended for many years. Myers (1978) argued that La Chimba deposits were mixed together, not stratigraphically separate. But Athens (1978) countered this comparison of Espejo with the coastal Formative and charged that there was no basis for distinguishing Early and Late Espejo.

José Berenguer and José Echeverría (1988) shed light on this murkiness by excavating at the Tababuella site, in the far north of Imbabura province, where they found ceramics similar both to Espejo and La Chimba. From their stratigraphic excavation, they drew three important conclusions: (a) Early and Late Espejo are mixed stratigraphically and do not represent separate phases; (b) Middle La Chimba is a valid phase that occurs in isolation at Tababuella; and (c) Middle La Chimba is not contemporary with Cotocollao, but later.

Villalba and Santiago Ontaneda have collected ceramics from the site of Los Soles in San Antonio de Ibarra, Imbabura province. They believe it is Late

Formative, closely related to La Chimba, and somewhat influenced by Cotocollao (S. Ontaneda Luciano, personal communication, February 1999). With a few known complexes now in northeastern Pichincha and Imbabura provinces that are somewhat similar to La Chimba, the primary objective had to be the secure dating of La Chimba.

Athens resumed work on La Chimba in 1989, and the dating problem may now be resolved with a series of 15 radiocarbon assays from one stratified excavation unit at the site. The dates are generally internally consistent and they cluster around 900 B.C. to A.D. 200 (calibrated), which puts the earlier part of the La Chimba sequence into the Late Formative period prior to the catastrophic volcanic eruption.

Whether La Chimba, Tababuela, Espejo, Los Soles, and similar complexes in Imbabura province and northeastern Pichincha province have some affinity with Cotocollao is unclear. There is no obvious stylistic or morphological connection. Nonetheless, the abandonment of the Cotocollao type-site, and presumably of many other Cotocollao sites in the Quito area with the eruption of Pululagua, could have led to a migration of Formative peoples eastward and northward.

The only other present candidate for Formative “honors” in the region is the Nueva Era phase at the site of Tulipe in Pichincha’s western *montaña*. Discovered by Holguer Jara on a hill overlooking the Tulipe pool complex and excavated by John Isaacson (n.d.), Nueva Era is a new and previously unknown Formative ceramic complex. Though the site is only 18 km north of Nambillo and 35 km northwest of Cotocollao, it appears unrelated to them. Isaacson (n.d.: 331) suggested a link to Momil and Tierra Adentro in Colombia, which I find unconvincing. Lathrap and Isaacson related Nueva Era to brown-incised ware and Quimbaya gold of Colombia (*The New Mexican* 1984). Further analysis has shown that the brown-incised ware from Colombia is not comparable to Nueva Era. A range of radiocarbon dates, however, places Nueva Era firmly in the Formative (see Table B1).

I (1998) have identified a few other sites in the western *montaña* of Pichincha with some sherds generally reminiscent of Formative pottery: thin walled, polished exterior, carinated bowls with nicking or punctuation. However, these cannot yet be positively identified or dated. As I moved farther westward and downward in western Pichincha, I encountered a few sherds similar to Chorrera. This was not surprising, given that the westernmost part of the province, ecologically speaking, is coastal lowlands.

The published and unpublished radiocarbon dates from these various projects along with their calibrations and additional data are presented in Table B1. The

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only known dates that are excluded are 45 of the 55 dates from Cotocollao, since they are repetitive, but complete dates from the Cotocollao site are in Villalba (1988: fig. 136).

A general absence of serious archaeological research on the Formative period in the provinces of Bolívar, Chimborazo, and Tungurahua leaves the central highlands of Ecuador unknown for this time period. Bolívar province, in particular, should contain interesting Formative complexes given its strategic location along trade routes from the Santa Elena peninsula and the Gulf of Guayaquil region to the highlands. A recent reevaluation by Dennis Davies (n.d.) of Chimbo ceramics excavated by Jijón y Camaño around 1920 failed to produce any indication of Formative period pottery in that large curated collection.

**Table B1**  
Formative Period Radiocarbon Chronology for the Northern and Central Highlands of Ecuador, by Site, from the Earliest to Most Recent according to Radiocarbon Year before Present (RCYBP)

Site, culture, and phase	Lab and lab. no.	Uncalibrated date RCYBP	Probability calibrated range		Reference
			68.2% (year B.C.)	95.4% (year B.C.)	
Pichincha					
Cotocollao					
Cotocollao 1a					
	Geochron Labs				
	GX 4768	3495 ± 210	2150-1500	2500-1300	Villalba 1988
	GX 7210	3340 ± 135	1880-1460	2050-1300	Villalba 1988
	GX 8323 <sup>a</sup>	3310 ± 150	1870-1430	2050-1250	Villalba 1988
Cotocollao 1a or 1b					
Geochron Labs					
GX 4766	3135 ± 165	1620-1160	1900-900		
	GX 7207	3100 ± 140	1530-1130	1700-900	Villalba 1988
Cotocollao 2b					
Geochron Labs					
	GX 8340-A	2355 ± 250	800-150	1100-A.D. 200	Villalba 1988
	GX 8326	2325 ± 125	800-200	800-100	Villalba 1988
	GX 8323 <sup>a</sup>	2310 ± 185	800-150	850-A.D. 100	Villalba 1988
	GX 5064	2305 ± 135	800-150	800-50	Villalba 1988
	GX 8339-0	2200 ± 250	800-A.D. 100	900-A.D. 400	Villalba 1988
Cotocollao A					
Nishina Memorial					
	N 2783	3960 ± 115	2900-2300	2900-2100	Porras 1982
	N 2784	3320 ± 115	1750-1450	1950-1300	Porras 1982
	N 2785	2880 ± 70	1210-940	1310-900	Porras 1982
Cotocollao B					
Smithsonian Inst.					
Pulagua volcano end of Formative?	SI 2128	2305 ± 65 <sup>b</sup>	480-200	800-150	Hall 1977 <sup>b</sup>
Atacazo volcano					
Ill. State Geo. Survey					
end of Formative?	ISGS 1228	2290 ± 70	410-200	800-150	Isaacson n.d.
Nambillo					
Early Nambillo?					
Geochron Labs					
	GX 12471	5325 ± 110	4330-4040	4450-3950	Lippi 1998
	GX 12470	4540 ± 80	3370-3100	3550-2900	Lippi 1998
Early Nambillo					
Geochron Labs					
	GX 12473	3330 ± 80	1740-1520	1880-1440	Lippi 1998
	GX 12469	3225 ± 260	1900-1150	2200-800	Lippi 1998
	GX 12472	2315 ± 260	800-100	1100-A.D. 300	Lippi 1998

La Chimba Middle La Chimba?	Dicar and Dicarb Isotope; Case Western Reserve DIC 388 CWR 72	2100 ± 100 1220 ± 140	360 -B.C./A.D. A.D. 670-950	390-A.D. 70 A.D. 500-1200	Athens and Osborn 1974 Athens and Osborn 1974
Imbabura					
Im-11 Middle La Chimba?	Dicar and Dicarb Isotope; Case Western Reserve DIC 195 CWR 62	2770 ± 130 2670 ± 560	1100-800 1600-100	1400-550 2300-A.D. 600	Athens and Osborn 1974 Athens and Osborn 1974
Pichincha					
La Chimba, Unit TP-7 La Chimba, beginning La Chimba	Beta Analytic Beta 34805 Beta 43191 Beta 43192 Beta 45747 Beta 45748 Beta 50487 Beta 50488 Beta 50489 Beta 50490 Beta 50491 Beta 50492 Beta 51690 Beta 51691 Beta 53022 Beta 53023	2320 ± 70 1890 ± 60 2340 ± 50 2640 ± 70 2530 ± 50 1910 ± 70 2130 ± 70 2290 ± 70 2490 ± 60 2530 ± 70 2560 ± 90 2100 ± 50 2100 ± 60 2010 ± 70 2140 ± 60	550-200 A.D. 50-220 520-370 910-780 800-540 A.D. 1-200 360-90 410-200 790-520 810-530 830-530 200-50 340-40 110-A.D. 60 360-100	800-150 40-A.D. 250 800-200 990-540 810-410 100-A.D. 250 380-10 800-150 800-410 810-410 900-400 360-A.D. 10 360-A.D. 20 200-A.D. 130 380-40	Athens 1990, n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d. Athens n.d.
Nueva Era Nueva Era	Ill. State Geo. Survey ISGS 1182 ISGS 1176 ISGS 1175 ISGS 1187	3070 ± 250 2710 ± 100 2620 ± 70 2010 ± 160	1650-1000 990-800 910-600 350-A.D. 200	2000-700 1250-500 930-520 400-A.D. 350	Isaacson n.d. Isaacson n.d. Isaacson n.d. Isaacson n.d.

Notes: All data were compiled by R. Lippi. All calibrations were computed with the Oxcal program (Ramsey 1995).

<sup>a</sup> Two different dates were erroneously given the same lab number in Villalba (1988). <sup>b</sup> Hall erroneously reported this date as 335 B.C.; Smithsonian notes give the date as 2305 BP (355 n.c.).

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*THE NEW MEXICAN*

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