THE END OF CASAS GRANDES

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Abstract. Charles Di Peso believed that Paquimé, the primary center of the Casas Grandes culture, succumbed to an attack in A.D. 1340. He further argued that the culture survived in the Sierra Madre, where it was encountered by early Spanish military adventurers. Other reviews of the data have come to different conclusions. In this essay I examine and discuss the available chronometric data.

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Corrections and other suggestions for improvement are welcome.

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In 1663 the Spanish founded a settlement and mission near Casas Grandes (Di Peso 1974:3:865, 998). As of that year, beyond question, the Casas Grandes culture no longer existed. Based on tree-ring evidence, in 1338 the culture was thriving. Whatever happened to the culture, it must have happened during the intervening 325 years. The purpose of this essay is to once again guess when the Casas Grandes culture came to and end. Whether we utilize history or archaeology, our starting point for any examination of the problem is the enduring scholarship of Charles Di Peso.

Historical Evidence

The new colony at Casas Grandes was not an isolated incident. By 1660, as Di Peso (1966:24, 1974:3:863–864) noted, missionaries and Spanish colonists had infiltrated northwest Mexico. If the Casas Grandes culture was still present, we would have heard of it. As we move backward through time, however, the picture quickly darkens.

Our previous look at the region comes from the Ibarra expedition, which headed north in 1565. In Sonora Ibarra found thriving agricultural societies, Riley's (1985, 1987, 1990) "statelets." He then veered east, across the Sierra Madre, and the expedition "began to discover abandoned houses of two and three stories" (Hammond and Rey [1928:197], cited in Di Peso et al. 1974:4:112). When the Spanish reached Paquimé, it too was abandoned. The local nomads informed the Spanish that Paquimé's occupants had moved a six-day journey north. The locals added that four days to the west were village dwellers. This is in the same direction as the group that forced the Paquimeños to leave—a group described as being "from the other side of the mountains" (Hammond and Rey [1928:207–208], cited in Di Peso et al. 1974:4:114).

Back in time another generation, Spanish records shed the dimmest ray of light on our problem. In 1536, Cabeza de Vaca traversed the south end of the Casas Grandes area (Di Peso et al. 1974:4:58), where Jane Kelley and her colleagues have worked (e.g., Kelley et al. 1999). Cabeza de Vaca described basin-and-range country where the local people spent a third of the year eating meal from wild grasses (*polvos de paja*). In contrast, once in Sonora he found maize-growing, cotton-wearing inhabitants (Di Peso et al. 1974:4:56–57). Based on the evidence given by both Cabeza de Vaca and Ibarra, the prehistoric Rio Sonora culture (Doolittle 1988; Pailes 1978) carried over into historical times. In contrast, if the Casas Grandes culture was still a going concern, we should have learned of it from Cabeza de Vaca—who, after all, heard of the Pueblos, despite passing hundreds of kilometers south of them.

The reach of native geographic knowledge was confirmed three years later, when Marcos de Niza traveled up the west coast of Mexico. In southern Sonora people were aware of the western Pueblos. We may conclude (I have, anyway) that regional geographic knowledge extended at least 500 kilometers, beyond the range of economic interaction. This same range of knowledge was encountered as Coronado passed through Sonora in 1540. Thus, three Spanish parties could have reported on the Casas Grandes culture, if it still existed as of the late 1530s. They did not.

The lack of Spanish reports is not irrefutable evidence that the culture ceased to exist by the 1530s. Di Peso (1974) reached the contrary conclusion, using ethnographic and archaeological data to argue that the Ibarra expedition fought with a remnant group of Casas Grandes people.

Evidence from Paquimé

Before 1536 the historical record goes completely dark, and we must turn to archaeology for answers. The debate on Casas Grandes chronology goes back many years, but much of that debate is now of historical interest only (for a summary, see Whalen and Minnis [2001:38–42]). If we instead focus on the archaeological evidence as it is understood today, the Casas culture must have existed at least as late as 1338—the final non-cutting tree-ring date from Paquimé (Di Peso et al. 1974:4:21). Sadly, Paquimé yielded no cutting dates, so we must depend on Dean and Ravesloot's (1993) computer-based estimate of the numbers of rings missing from Paquimé samples. Their key findings, vis-à-vis this essay, are that Paquimé "was inhabited in the fifteenth century" and that "some construction or repair activity *may have* occurred as late as the A.D. 1470s" (Dean and Ravesloot 1993:93; emphasis added).

Why "as late as the A.D. 1470s"? In a list of estimated felling dates, Dean and Ravesloot (1993: Table 6.2) list not only their algorithmic estimate of the felling date but that date plus two standard deviations, due to "a high probability that the actual dates fall toward the later ends of the ranges" (Dean and Ravesloot 1993:93). One of the "plus two sigma" estimates works out to A.D. 1473 (Table 1).

Because of the fuzziness introduced by the algorithm, however, it's best to take precautions usually reserved for radiocarbon assays. In other words, we should look at patterns rather than at single dates. As it turns out, the A.D. 1473 date estimate falls outside Dean and Ravesloot's pattern (Table 2). Within the pattern, the latest date is 1436. Thus, a cautious interpretation of the algorithmic data is that demonstrable construction at Paquimé ended in the 1430s.

This suggestion is bolstered by the radiocarbon evidence gathered by Di Peso. Radiocarbon samples figure prominently in my effort to date the end of Casas Grandes, so a discussion of my approach is in order. I use only 2 sigma date ranges to interpret the data. The ranges are determined using *Calib 5.0* (Stuiver and Reimer 2005), which calculates the probabilities of single or multiple intercepts of the ranges. When patterns of dates are examined, as opposed to individual dates, ranges with less than 10 percent probability are reasonably ignored. I refer to the remaining ranges, with 10 percent or greater probability, as "spikes." When newly calibrated, and eliminating a humus fraction sample, Di Peso's four radiocarbon dates from Paquimé have two-sigma spikes no later than 1423 (Table 3). More recently, Christopher Casserino submitted bone collagen samples from four Paquimé burials (Casserino 2009, Table 9); applying the same protocol, the four dates yield two-sigma spikes no later than 1406 (Table 3).

Paquimé also yielded imported pottery suitable for cross-dating (Di Peso et al. 1974:4:29–33), suggesting an occupation that ended by 1450. Finally, an average of 70 obsidian hydration samples yielded an estimate of A.D. 1417 ± 70 [Di Peso et al. 1974:4:25–33]). While obsidian hydration samples present interpretive problems of their own, the published estimate is at least consistent with a site ending prior to 1450.

Evidence from Other Casas Grandes Sites

As Di Peso pointed out, the Casas Grandes culture could have survived the abandonment of its principal center. I therefore examined available dates from outside Paquimé. We often do not have as much information on older samples as we might wish, but we have enough information to again look for patterns.

Whalen and Minnis (2003:Table 1) report 13 radiocarbon dates from the Tinaja Site, not far from Paquimé, and include two-sigma calibrated date ranges. Only two of the 13 date ranges extend beyond 1300: one is 1270–1400 and the other is 1300–1430. Thus, the Tinaja Site was probably abandoned before 1430.

A second site fairly near Paquimé, Casa del Fuego, yielded two archaeomagnetic dates from burned rooms. Those dates suggest destruction of the rooms between 1300 and 1400 (Schaafsma et al. 2002:Figure 6.8).

The Rancho el Espía Site, on the Rio Casas Grandes well north of Paquimé, is not directly dated but Fritz (1969) reports that the associated sherds include Gila, Tonto, Tucson, and El Paso Polychrome and Rio Grande Glaze A, suggesting a date range of 1200–1450.

At the south end of the Casas Grandes range, Kelley and Stewart (Kelley et al. 1999:Table 4.1; Stewart et al. 2004:Table 11.1) provide a wealth of radiocarbon dates for the Medio period. In 24 cases, the "two-sigma spikes" extend into the 1300–1350 date range. Another 24 spikes extend into the 1350–1400 date range, while 19 spikes extend into the 1400–1450 date range. In contrast, only three of the two-sigma spikes extend into the 1450–1500 date range, and all three overlap extensively with the earlier 50 year ranges (1381–1471 [TO-4126], 1374–1514 [TO-5033], and 1395–1473 [TO-5034]). Again, the evidence suggests a precipitous decline in the culture between 1400 and 1450.

For the Sierra Madre, the one published tree-ring date, of 1374+x (Scott 1966) is consistent with the Medio period ending before 1450. Breternitz (1966) considered that sample non-datable, however. Working briefly in the Sierra Madre, Di Peso obtained a single raw radiocarbon date of 300 ± 90 BP from a post in a room at Casa de Robles. Newly calibrated, it yields two-sigma spikes of 1431–1697 (79 percent) and 1725–1815 (14 percent; Table 3), and is therefore reconcilable (barely!) with a pre-1450 end date for the culture.

Farther west, in Sonora, Beatriz Braniff recovered materials from Ojo de Agua (Son H:2:2), a site within the greater Casas tradition. In 1992 she reported four dates from the site that provide two-sigma spikes of (1) 1379–1891 (87 percent), (2) 1286–1481 (100 percent), (3) 1413–1523 (82 percent) and 1571–1630 (17 percent), and (4) 1453–1643 (100 percent).[1] In other words, two of the dates are strongly consistent with a pre-1450 occupation, a third is weakly consistent with such an occupation, and one is entirely inconsistent with such an occupation. Braniff also recovered sherds of U.S. origin (Babocomari Polychrome, Chupadero Black-on-white, Cloverdale Corrugated, Dragoon Red-on-brown, Gila Polychrome, Santa Cruz Polychrome, Tanque Verde Red-on-brown, and Tonto Polychrome [Braniff Cornejo 1986:Table 1, 1992:2:406]).

In her article and report, Braniff also reviewed data from San José Baviácora originally reported by Victoria Dirst and Richard Pailes (Dirst 1979; Dirst and Pailes 1976; Pailes 1980). While San José is not a Casas site, I will discuss it here, consistent with Braniff's approach. She reported radiocarbon dates from San José of 1075, 1085, 1305, 1315, 1500 ± 90, and 1840 ± 60. The intrusive, non-Casas sherds at San José included Babocomari Polychrome, Dragoon Red-on-brown, El Paso Polychrome, Encinas Red-on-black, Guasave Red, St. Johns Polychrome, Santa Cruz Polychrome, Tanque Verde Red-on-brown, Tucson Polychrome, Tularosa Black-on-white, and Trincheras wares (Braniff Cornejo 1986:Table 3). In 1986, by combining the Ojo de Agua and San José data, Braniff concluded that "the Medio and Tardio periods ... are contemporary and late—fourteenth century plus or minus 100 years (A.D. 1200–1500)" (Braniff Cornejo 1986:77). In 1992, however, Braniff concluded that Ojo de Agua dated from 1300 to 1650 (Braniff Cornejo 1992:2:Table 71).

Using information in Dirst (1979), we can take a new look at the San José radiocarbon data.[2] House B-II-1 yielded four radiocarbon dates; two predate 1300 and the other two yielded two-sigma spikes of 1261–1421 (100 percent) and 1267–1422 (100 percent). House B-I-1 yielded three radiocarbon dates; one is clearly anomalous but the other two bracket floor construction. The earlier, sub-floor date has a two-sigma spike of 1147–1405 (90 percent). The later, above-floor date has two-sigma spikes of 1302–1367 (11 percent) and 1382–1647 (89 percent). Both houses contained Casas Grandes pottery, some of it as part of the floor assemblage of House B-II-1. As a group, the San José dates are consistent with a pre-1450 date for Casas Grandes, and fail to bolster Braniff's arguments for a late dating of Ojo de Agua.

In the boot heel of New Mexico, the Joyce Well Site yielded three dates from a pile of burned corn (Schaafsma et al. 2002:136). DeAtley (1980:Table 3) provided a corrected, averaged date of 1340 ± 68. When newly corrected, the three dates yield two-sigma spikes of 1155–1498, 1212–1498, and 1218–1524. The same site has yielded four archaeomagnetic dates whose ranges end at 1285, 1345, 1360, and 1400 (Schaafsma et al. 2002:Table 6.2), the 1345 end date coming from the same room as the burned corn. Obsidian hydration dates extended as late as 1537 but with large sigmas (Stevenson et al. 1989). Reviewing the data, Carpenter (2002:154) concludes that the Joyce Well Site dates from 1200 to 1450.

DeAtley (1980:Table 3) lists additional radiocarbon dates from Hidalgo County, most of which do not bear on the end of the Medio period. The three most recent yield two-sigma spikes of (1) 1301–1367 (19 percent) and 1382–1517 (79 percent), (2) 1295–1439 (100 percent), and (3) 1206–1330 (77 percent) and 1339–1397 (22 percent).[3] These absolute dates are consistent with the intrusive types that according to DeAtley (1980:Table 2) are present in Animas phase sites: Tularosa Black-on-white, St. Johns Polychrome, Gila Polychrome, Tonto Polychrome, Pinedale Black-on-red, Pinedale Polychrome, Tucson Polychrome, El Paso Polychrome, and Chupadero Black-on-white.

For several other excavated Animas phase sites in New Mexico, we have no independent dates. At the Pendleton Ruin (Kidder et al. 1949), the late intrusive types include Gila, Tonto, Pinto (?), Pinedale, St. Johns, and El Paso Polychrome and Tularosa and Chupadero Black-on-white. At Clanton Draw and Box Canyon, the late intrusive types include El Paso, Gila, Tonto, Tucson, and St. Johns Polychrome and Chupadero Black-on-white (McCluney 1962:Tables 1 and 2).

For the Boss Ranch Site of southeastern Arizona, John Douglas (1996:189) reports two dates that yield two-sigma spikes of (1) 1260–1455 (100 percent) and (2) 1297–1378 (30 percent) and 1377–1483 (70 percent).[4] U.S. types include (among others) Pinto Black-on-red; Gila, Tonto, Tucson, Maverick Mountain, Babocomari, Santa Cruz, St. Johns, and El Paso Polychrome; Tanque Verde Red-on-brown; Tularosa White-on-red, and Chupadero Black-on-white. Other non-Chihuahuan wares include Trincheras Purple-on-red and Trincheras Polychrome. Small numbers of earlier wares are also present (Douglas 1990:Table 16; 1996:Table 1. Douglas dates the Animas phase from 1150 to 1450.

Myers (1985) partly reports a group of Animas phase (?) sites excavated by Cochise College (the Darnell, Price Canyon, Bernardino, Reagan, and J. Cowan Sites) that yielded whole vessels of Ramos Polychrome as well as sherds of Ramos, Babicora, Carretas, Corralitos, Dublan, Huerigos, and Villa Ahumada Polychrome.

In reviewing the data from Animas phase sites in New Mexico and Arizona, Fish and Fish (1999:29) comment that "available dates from most large sites parallel ceramic estimates." Their table indicates that the ceramic dating ranges at the sites in question extend no later than 1450, except at Slaughter Ranch where the estimated end date is 1500 (Fish and Fish 1999:Table 1.2).

Finally, to the east, dates are available from the Villa Ahumada Site. Rafael Cruz Antillón and Tim Maxwell report four calibrated central values from undisturbed contexts, of 1212, 1259, 1278, and 1279, along with two calibrated ranges from disturbed contexts of 1413–1436 and 1522–1648. Elsewhere, Cruz Antillón et al. (2004:165) report "Radiocarbon samples derived from carbonized maize found in Stratum III [that] yielded calibrated dates of A.D. 1244–1290 and A.D. 1255–1294 at one standard deviation. Using OxCal software, a combined date of A.D. 1260–1288 was calculated." Cruz Antillón and Maxwell also report three archaeomagnetic dates; one is early but the other two are 1255–1290 and 1255–1285 (see also Cruz Antillón et al. 2004:165). They conclude that "Excepting the disturbed areas, these results fall within the revised Medio period dates ascribed Casas Grandes" by Dean and Ravesloot (Cruz Antillón and Maxwell 1999:46). The pottery at Villa Ahumada includes El Paso Polychrome and Chupadero Black-on-white (Antillón et al. 2004:Table 9.1).

Evidence from Non-Casas Sites

To provide an independent line of evidence on the dating of the Medio period, Patrick Lyons, Ronna Jane Bradley, and I compiled a list of Casas Grandes pottery from non-Casas sites (Table 4).[5] Casas pottery occurs widely outside its area of origin (see, for example, the sources cited by Wiseman [2006] and Woosley and Olinger [1993:110–111]) but each site tends to yield, at most, a handful of examples. Playas Red and its variants are excluded from the list, as that ware was also made by non-Casas villages (Bradley and Hoffer 1985; Wiseman 1981, 2002, 2004). Based on Table 4, a few non-Casas sites with Casas pottery were occupied after 1450 but none of them appears to have been founded after that year.

When?

What this essay has shown, thus far, is that we can no longer simply bemoan the lack of dates from the Casas Grandes region. Instead, we have finally (and happily) reached the point where compiling and interpreting dates is a bit of a chore. In order to deal with the extensive but somewhat messy data set cited in the previous pages, I will adopt terminology from the U.S. legal system. "Beyond a reasonable doubt," Paquimé was abandoned by 1450—given the amount of work done at the site, if there was a later population we should see evidence of it. We cannot claim that the entire Casas Grandes culture ended before 1450, however, just because the principal site lay empty. Because the regional data have not reached the level of redundancy attained on, for example, the Colorado Plateau, our understanding of regional chronology could change with the next excavation. Thus, even though John Carpenter and I questioned Di Peso's decision to define the post-Paquimé Robles phase (Carpenter 2002; Phillips and Carpenter 1999), it is also easy to question arguments that the Robles phase does not exist.

We may instead apply a less rigorous standard, "the preponderance of the evidence." Taking the combined pattern of dates rather than individual dates, the Casas Grandes culture collapsed between 1400 and 1450. "Preponderance of the evidence" is a standard that allows for evidence to the contrary, but understands that life requires decisions. Given the evidence we have, a 1450 upper bracket date for Casas Grandes is the least unreasonable conclusion we can reach.

And yet.... Even though Something Bad Happened in the early 1400s, the Paquimeños did not disappear overnight. We should therefore not lose sight of the three most anomalous radiocarbon dates found in this review: one from Casa de Robles (1431 or later), one from Ojo de Agua (1453 or later), and one from Villa Ahumada (1522 or later). None of these dates is compelling, because each comes from a site where the evidence is otherwise consistent with a pre-1450 occupation. Nonetheless, the three dates could reflect the existence of a small relict population in the Casas Grandes region. To put the matter differently, it is not yet clear whether the three dates just cited are examples of the occasional gutter ball one gets with radiocarbon dating, or the first indications of a tail-off in what statisticians call the parent population.

What Happened? And Why?

If we know, tentatively, when Casas collapsed, we also need to ask how that happened. Clearly, the survivors abandoned the outward traces of their culture and therefore became invisible to archaeologists. We also have one indigenous account: the Casas people moved north, after a conflict with people to the west. In that case, the Casas people could have fought with the Rio Sonora peoples—specifically, the Opata—after which they could have retreated north to join the ancestors of today's Pueblos. This scenario is consistent with the sharing of cultural elements by the Casas Grandes and Pueblo peoples, for example, horned serpents, kilted dancers, and polychrome vessels with red elements outlined in black.[6]

Archaeologists have repeatedly suggested a different outcome, namely, that the Casas Grandes people became the Opata (e.g., Braniff 1992; Dirst 1979). The Opata represent a linguistic wedge in the distribution of Piman-speakers (Ortiz 1979:ix, map; see also Wilcox 1986), and one way to

derive the Opata intrusion is to have them abandon northwest Chihuahua in favor of northeast Sonora. Of course, the Opata may have been everyone's nemesis, not only intruding into Piman-speaking territory but being the western people who drove the Casas Grandes people northward.

Other scenarios are possible. We need a few more ugly facts, to help us kill off some of our beautiful theories.

We also need to ask "why." By 1450 we lost a contiguous, sometimes overlapping series of complexes: Classic Hohokam, Salado, Trincheras, Casas Grandes, and the El Paso phase Jornada Mogollon. Strikingly, the complexes that managed to exit the stage at the same time as Casas are the almost exclusive recipients of traded Casas pottery (Table 4). If all this sharing of pottery, followed by disappearance, is a coincidence, it's a whopping one. We need to consider whether all of these archaeological complexes were taken out by a single process.

It may be, as the native account suggests, that the proximate cause was war. Or perhaps it was disease—across the region, people were cramming themselves into villages of unprecedented scale, creating new vectors for contagion. Whatever the explanation, the evidence suggests that once Casas Grandes collapsed, its survivors abandoned a highly productive, easily farmed area—and weren't the only ones to do so. To me, this is the most puzzling aspect of the entire process.

While we don't have any answers yet, we do have a couple of useful hints. First, in the main Casas Grandes area, each valley tends to have a few Medio period sites whose ceramic assemblages and middens indicate substantial time depth. (Also, once we started looking, we started finding Viejo period remains.) At most Medio period sites, however, the architecture is not matched by the trash deposits. The obvious interpretation (to me) is that Casas culture began as a moderate number of farming hamlets and villages, then experienced explosive growth, drawing in populations who adopted Casas ways. If so, it was a boom that quickly busted. Meanwhile, on the fringes, client groups (such as those in the El Paso area and New Mexico boot heel) may have inserted, for a few generations, a time of Casas-style sedentism and ceremony into an otherwise mobile annual round.[7]

The second hint is that Pueblo IV population distributions were inherently uneven: the world was divided into densely occupied areas and empty ones (Cameron and Duff 2008; Clark et al. 2003). Thus, besides the process of aggregation (i.e., larger and larger villages), there was a process of flocculation. To restate this less flippantly, families were not just leaving certain areas, they were congregating in others—responding to a pull, as well as to a push. By 1450, Chihuahua was at the losing end of the process.

Combining the two hints, I hypothesize that during the Medio period, the Casas Grandes area attracted large numbers of outside people—the process of social attraction had begun. After a few generations at most, most people not only left, they walked straight from their homes to other, more promising communities, bypassing eminently habitable areas. We have two obvious candidates for the attractors: the historic Pueblos to the north, and the Sonoran "statelets" to the west. The brief native account collected by Ibarra suggests the former, while the linguistic evidence hints at the latter. Or possibly people went in both directions—not counting any

nomadic groups who bought into Casas when times were good, and who reverted to old habits as soon as things got bad.

In closing, I will repeat the refrain of countless early reports: "More work is needed." There is more to our mystification, however, than a lack of data. Casas was one instance of a recurring pattern of boom and bust. It's something that also happened at Chaco, at least twice in the northern San Juan (Pueblo I and Pueblo III), in southern Nevada, in the Flagstaff area, in west-central Arizona, at least twice in southern Arizona (Sedentary period, Classic period), in the Trincheras area, in southwestern and southeastern New Mexico, and probably elsewhere. At the regional level, something was going on that transcended proximate causes. One of the key challenges facing Southwest archaeology is explaining the inherent fragility of the region's cultural florescences. Who knows, we may learn a few things about the fate of the current boom.

Acknowledgments

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In 1961, Ray Thompson similarly dated the Medio period using the occurrence of Casas Grandes sherds in non-Casas sites (Thompson 1961). Given the limited information then available, Thompson's analysis was remarkably on the mark—it was overshadowed, however, by the chronology deriving from the excavations at Paquimé. In this paper, I have followed in Ray's footsteps.

End Notes

[1] In 1986, Braniff reported two samples but one date: 1420 ± 70 (A-1911, A-1912; Braniff Cornejo 1986:76). In 1992 she provided detailed information on four dates, including from the two samples reported earlier (Braniff Cornejo 1992:2:547). The two dates run by the University of Arizona are reported as already corrected. The two dates run by INAH were not reported as corrected and are assumed to be raw dates on wood charcoal, and were corrected accordingly.

A-1911, Cuadro 1, Capa 4, 370 ± 180 BP, one-sigma spike of 1398–1681 (98 percent), two-sigma spike of 1379–1891 (87 percent)

A-1912, Mont. J, Cuarto 2, Piso 2, 530 ± 70 BP, one-sigma spikes of 1316–1354 (37 percent) and 1389–1442 (63 percent); two-sigma spike of 1286–1481 (100 percent)

420-INAH, Cuadro 1, Capa 4, 428 ± 41, one-sigma spike of 1427–1491 (93 percent); two-sigma spikes of 1413–1523 (82 percent) and 1571–1630 (17 percent)

421-INAH, Cuadro 2, Capa 3, 344 ± 38, one-sigma spikes of 1480–1527 (37 percent) and 1554–1533 (63 percent); two-sigma spike of 1453–1643 (100 percent).

[2] According to Doolittle (1988:36–37), the 1075 and 1085 dates from San José calibrated to 1080–1200, while the later non-anomalous dates calibrated to about A.D. 1320. The San José Baviácora dates summarized by Braniff are as follows (Dirst 1979:94–95, 99, 103, Table 3).

House in pit B-II-1, remodeled? Floor assemblage included a Carretas Polychrome jar and 13 Chihuahua polychrome sherds. Four radiocarbon dates were obtained.

UGA-1502, charcoal, 1075 = 875 BP ± 60; one-sigma spikes of 1045–1094 (32 percent), 1120–1141 (13 percent), and 1147–1222 (56 percent); two-sigma spike of 1029–1262 (100 percent)

UGA-1503, charcoal, 1085 = 865 BP ± 60; one-sigma spikes of 1048–1085 (23 percent), 1123–1137 (8 percent), and 1150–1229 (60 percent); two-sigma spike of 1032–1265 (100 percent)

UGA-1504, charcoal, 1305 = 645 BP ± 60; one-sigma spikes of 1283–1324 (45 percent) and 1345–1393 (55 percent); two-sigma spike of 1261–1421 (100 percent)

UGA-1505, charcoal, 1315 = 635 BP ± 60; one-sigma spikes of 1287–1326 (43 percent) and 1343–1394 (57 percent); two-sigma spikes of 1267–1422 (100 percent).

Surface House B-I-1. Associated sherds (not from the floor, however) include five types of Chihuahua polychrome. Three radiocarbon dates were obtained.

GaK-6243, charcoal from subfloor trash, 1200 = 750 BP ± 90; one-sigma spikes of 1170–1306 (89 percent) and 1363–1385 (11 percent); two-sigma spike of 1147–1405 (90 percent)

GaK-6242, charcoal from above floor, 1500 = 450 ± 90; one-sigma spikes of 1400–1523 (74 percent) and 1572–1629 (25 percent); two-sigma spikes of 1302–1367 (11 percent) and 1382–1647 (89 percent)

UGA-1610, charcoal from above floor, 1840 = 110 ± 60; one-sigma spikes of 1684–1734 (29 percent) and 1806–1929 (70 percent); two-sigma spikes of 1668–1782 (40 percent) and 1797–1954 (60 percent)

Rectangular Enclosure A-1. One radiocarbon date was obtained from a feature thought to predate the enclosure.

UGA-1506, charcoal, 1000 = 950 BP ± 60; one-sigma spike of 1024–1155; two-sigma spike of 972–1224

Dirst (1979:110) also reports on three radiocarbon samples from Ojo de Agua, a site with Chihuahua pottery but not to be confused with Braniff's Ojo de Agua. Two of the three samples from the post in a room proved too modern to date so the third radiocarbon date (which Dirst reports as A.D. 1660 ± 55, UGA-1511) is best ignored.

[3] DeAtley did not stipulate the material being dated but she adjusted the maize dates from Joyce Well, so she would have done so for her other dates had they been from material other than charcoal. Assuming

that charcoal was being dated, the three relevant dates (DeAtley 1980:Table 3), including new calibrations, are as follows.

UCLA 2122A, Site HS-1, 490 ± 60 BP: one-sigma spike of 1394–1458 (90 percent); two-sigma spikes of 1301–1367 (19 percent) and 1382–1517 (79 percent).

UCLA 2122h, Site HS-75, 560 ± 60 BP: one-sigma spikes of 1312–1358 (54 percent) and 1387–1427 (46 percent); two-sigma spike of 1295–1439 (100 percent).

UCLA 1948a, Site HS-32, 720 ± 60 BP: one-sigma spikes of 1237–1301 (80 percent) and 1367–1382 (15 percent); two-sigma spikes of 1206–1330 (77 percent) and 1339–1397 (22 percent).

[4] The two Boss Ranch Site dates reported by Douglas (1990:Table 26; 1996:189) are as follows.

Beta 11283, on charred beans; 590 ± 80; one-sigma spikes of 1298–1370 (69 percent) and 1379–1413 (31 percent); two-sigma spike of 1260–1455 (100 percent)

Beta 25703, on outer rings of mesquite post; 510 ± 50; one-sigma spikes of 1325–1344 (19 percent) and 1394–1447 (81 percent); two-sigma spikes of 1297–1373 (30 percent) and 1377–1483 (70 percent)

[5] Douglas and Quijada's (2004) report on the upper Bavispe, while valuable, serves to illustrate why Table 4 is largely restricted to excavated sites. Their late sites frequently include Carretas, Huerigos, and Ramos Polychrome but their A.D. 1200–1500 date for those late sites are based on their estimates for the Casas Grandes polychromes (Douglas and Quijada 2004:98). In general, at surveyed sites where Casas pottery was found in association with other diagnostic types, the danger of creating circular arguments about pottery dates is very real.

It's worth noting that four decades ago, Ray Thompson (1963) conducted a similar exercise, at a time when the Chihuahuan polychromes' temporal placement was very much up in the air. By examining heir co-occurrence with firmly dated types in U.S. sites, Thompson anchored the Chihuahuan polychromes "in the 14th century" (Thompson 1963:5). This was soon eclipsed by Di Peso's estimate, based on his reading of tree-ring and radiocarbon evidence from Paquimé, that the Medio period centered on the 13th century. It now appears that Thompson shot much closer to the gold than Di Peso: the Medio period was 14th century and early 15th century.

[6] There is, admittedly, a problem here. The nearest Sonoran villages were roughly 100 km to the west, which divided by four days works out to 25 km a day. Thus, six day's travel to the north would be roughly 150 km—enough to take the residents of Paquimé to the El Paso area to the northeast, but not to the southernmost Pueblo villages of the time. Either the Paquimeños did not join the protohistoric Pueblos, or the account was inaccurate or garbled in translation, or all three.

[7] Consider, for example, Douglas's (1996:186) comment that "Animas phase sites tend to be shallow and lack clear stratigraphy or extensive *de facto* refuse."

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Table 1. Estimated Tree Felling Dates for Room Construction.

(Source: Dean and Ravesloot 1993, Table 6.2)

Computer Estimate	Estimate plus Two Sigmas	Room, Sample
1419	1473	14-26b, CG(D) 223
1382	1436	14-28b, CG(D) 187
1376	1430	14-33b, CG(D) 180
1355	1409	14-27a, CG(D) 189
1349	1402	14-24a, CG(D) 182
1390	1444	8-21c, CG(D) 118
1384	1439	8-7a, CG(D) 20
1359	1413	8-15c, CG(D) 26
1337	1391	8-6b, CG(D) 106
1328	1382	8-18b, CG(D) 48
1326	1380	8-21b, CG(D) 103
1321	1375	13-15, CG(D) 166
1319	1373	16-30b, CG(D) 369
1301	1355	14-30b, CG(D) 190
1299	1353	12-26, CG(D) 281
1282	1335	16-6a, CG(D) 391
1276	1330	8-9b, CG(D) 19
1272	1325	16-22b, CG(D) 342
1256	1310	14-23a, CG(D) 173
1253	1306	8-29a, CG(D) 362
1250	1303	14-36b, CG(D) 220
1245	1299	14-43b, CG(D) 321
1243	1295	16-12a, CG(D) 344
1239	1292	16-20a, CG(D) 346
1224	1277	8-27, CG(D) 361

Table 2. Computer Estimates of Felling Dates from Paquimé, by 50 Year Interval.

(Source: Dean and Ravesloot 1993, Table 6.2)

Interval	Number of Estimated Felling Dates	Number of Dates after Adding Two Sigmas
1201–1250	5	0
1251–1300	6	4
1301–1350	6	6
1351–1400	7	7
1400–1450	1 (@ 1419)	7 (last @ 1436)
1450–1475	0	1 (@ 1473)

Table 3. Di Peso and Casserino's Radiocarbon Dates.

Sample	Context	Material	Uncorr.	Plus or Minus	Date Spike, 1 Sigma	Relative Area	Date Spike, 2 Sigma	Relative Area	Refs.
				Paquimé Samples					
A-226	Room 21c-8 post	Wood	740	100	1175-1316	83%	1118-1412	92%	(1)
A-412	Pit Oven 4-1	Charcoal	640	30	1289-1319; 1351-1390	43%, 57%	1281-1401	100%	(1, 3)
A-415a	Room 38-11 post	Wood	820	50	1168-1265	100%	1147-1283	85%	(1)
A-415b	Room 38-11 post	Humus fraction	560	180	1277-1524	83%	1149-1694	92%	(1)
A-612	Room 24-11 hearth	Maize cobs	470	90	1217-1321	73%	1152-1423	97%	(1, 2)
	Burial 19, Unit 13	Bone collagen	689	42	1219-1279	100%	1158-1299	99%	(4)
	Burial 27, Unit 14	Bone collagen	650	40	1226-1294	100%	1207-1318; 1352-1390	88% 12%	(4)
	Burial 19A, Unit 1	Bone collagen	570	40	1283-1318; 1352-1390	47% 53%	1274-1403	100%	(4)
	Burial 17, Unit 6	Bone Collagen	567	42	1284-1319; 1351-1390	46% 54%	1274-1406	100%	(4)
				Other Samples					
A-411	Chih D:9:14 upper floor	Charcoal	710	40	1258-1305; 1364-1384	78%; 22%	1218-1323; 1346-1393	76%; 24%	(1)
A-609	Chih D:9:14, House No. 1, Fill No. 2, 8th floor	Charred twigs	740	115	1164-1321; 1349-1391	81%; 19%	1039-1414	100%	(1, 2)
A-610	Chih G:2:3, Room 2, post.	Charred wood	300	90	1466-1665	96%	1431-1697; 1725-1815	79%; 14%	(1, 2)

References: (1) Di Peso et al. 1974:4, (2) Haynes et al. 1966; (3) Damon et al. 1964; (4) Casserino 2009, Table 9. All date spikes calculated with CALIB 5.0.

Table 4. Casas Grande Pottery as Trade Wares in Dateable Non-Casas Sites.

Compiled by David A. Phillips, Jr., Patrick Lyons, and Jane Bradley

Site	Casas Grandes Sherds	Local Dating	References
New Mexico			
LA 416, Pottery Mound	Ramos Poly. (1), Ramos or Babicora Poly. (3), Villa Ahumada Poly (1).	1350 to 1500	Maxwell Museum, UNM, Cat. No. 69.32.1
LA 625	(see note)		
LA 1549, Henderson Site	Babicora Poly. (16), Carretas (?) Poly. (2), Villa Ahumada Poly. (1), Ramos Poly. (3), unident. (9)	1250/1275 to ca. 1400	Wiseman 2004
L 1671, La Cabrana-Mata Ranch	Ramos Poly.; Ramos Black; Casas Grandes incised; unid. Chihuahua poly.	1300–1400	Bradley 1983; Foster and Bradley 1984
LA 2113, Smokey Bear Ruin	Ramos Poly.	pre 1400	Wiseman et al. 1971
LA 2282 (?), Bradfield Site	Rampos Poly., Babicora Poly.	1200 to 1400	Lehmer 1948
LA 2292, Pinnacle Ruin	Ramos Poly. (5)	1240 to 1400	Karl Laumbach and Stephen Lekson, p.c. 2007, 2008
LA 2528, Bloom Mound	Ramos Poly. jar and sherds	1400–1450 (note)	Kelley 1984:475; Wiseman 1970:9
LA 5793, Ormand Village	Ramos Poly. (1)	1300–1450	Wilson 1998:209
LA 6783, Dinwiddie Site	Ramos Poly. (39), Carretas Poly. (1)	1200–1450	Mills and Mills 1972
LA 8706, Dutch Ruin	Ramos Poly. (3 jars, sherds), Villa Ahumada Poly. (jar, sherds), Babicora Poly., Carretas Poly., Dublan Poly, Huerigos Poly.		Lekson 2002
LA 12077, Janss Site	Chihuahuan polychrome (1)	1300–1450	Nelson and LeBlanc 1986
LA 15021, Disert Site	Ramos Poly. (10)	1300–1450	Nelson and LeBlanc 1986
LA 18839, Stailey Site	Chihuahuan polychrome (1)	1300–1450	Nelson and LeBlanc 1986
LA 46326, Robinson Site	Ramos Poly. (32), Babicora Poly. (3), Villa Ahumada Poly. (1) (note)	1150–1500	Stewart et al. 1991; Wiseman 1991
LA 68188, Fox Place	Babicora Poly. (4), Ramos Poly. (1)	1250 to 1425	Wiseman 2002
LA 71167, Tintop Cave, Lincoln Co., NM	Babicora Polychrome (9) Victoria or Anchondo Red-on-brown (2)	1100/1150, to 1300	Wiseman 1996

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Site	Casas Grandes Sherds	Local Dating	References
LA 97128, Meyer Pithouse Village	Chihuahuan sherds (11)	1150–1200	Peterson 2001
LA 97768 (FB 9657), Meyer Shallow Pit Village	Chihuahuan sherds (3)	1100–1400	Peterson 2001
Alamogordo Sites 1 and 2	Ramos Poly.; Babicora Poly. (1)	1200–1400	Lehmer 1948
Multiple sites of the southern San Andres Mountains		1140/1150, to 1350/1500	Kemrer 2007
Site near Sta. Theresa (excavated by D. Batcho)			Karl Laumbach, p.c. 2007
Phillips Site	House Unit 46: Ramos Poly. (6) (Note)	1200–1450	Kelley 1984
Fleck Draw and Cottonwood Draw site cluster, NM	Chihuahuan polychromes	1275–1400	Kemrer 2007
Texas			
41EP2, Hueco Tanks	Ramos Poly. (10)	1100 to 1200	Kegley 1980:31
41EP5 (FB6363), Hot Wells Pueblo	Chihuahuan ware (1) per Peterson 2001; Ramos Poly. per Davis 1968	1100 to 1400	Davis 1968; Peterson 2001
4EP499 (FB6442), Hot Wells Reservoir	Chihuahuan ware (8)	1100 to 1400 (note)	Peterson 2001
41EP823 (FB 6425)	Chihuahuan ware (4)	1200 to 1300	Church et al. 2007
41EP1647 (FB 6831)	Chihuahuan black-on-white (1)	Pre-1100	Church et al. 2007
EPAS-10, Castner Annex Range Dam Site	Ramos Poly.	200-1450	Bilbo 1972
EPAS-60, Sgt. Doyle Site	Ramos Black, Carretas Poly., Villa Ahumada Poly, unid. plainware	1200 to 1450 (note)	Green 1969
FB6273, Pueblo sin Casas	Villa Ahumada Poly. (2); probable Chihuahua plainware (5)	pre-1450	Foster 1993
Sabina Mountain Site	El Paso Poly. (10)	1200–1450	Brook 1980
Tobin Ranch cache	Ramos Poly. (7 vessels,), Villa Ahumada Poly. (2 vessels)	1200 to 1450 (note)	Moore and Wheat 1951
La Junta sites	Villa Ahumada Poly., Babicora Poly., Madera B/R (?), Ramos Black (?)	1200 to 1400 or 1450	Kelley 1985:156

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Site	Casas Grandes Sherds	Local Dating	References
Webb Island Site	Carretas Poly. (1)	1000–1800	Campbell 1956
Sonora			
Cerro de Trincheras	**Surface:** Babicora Poly .(3), Ramos Poly (4), Chihuahua poly. (8). **Excavation:** Ramos Poly. (ca. 300), Babicora Poly. (ca. 150), Carretas Poly. (ca. 50), Villa Ahumada (?) (few), other (50–70) (note)	1300 to 1450 or 1500	Gallaga Murrieta 1998, 2004; McGuire et al. 1999; Villalpando 2000
La Playa	Huerigos Poly. (2), Villa Ahumada (1)	(note)	Sánchez et al. 1998
San José Baviácora	(see text)		
Arizona			
AZ T:12:1 (ASM), La Ciudad	Babicora Poly. (1)		Wilcox 1987:Table 4.3.
AZ U:9:1 (ASM), Pueblo Grande, Habitation Area 7	Carretas Poly. (2); Ramos Poly.; Ramos Black; Chihuahua plain smudged	1200–1400 (late Soho-Civano/Polvorón)	Foster 1994, p.c. 2008
AZ V:9:11 (ASM), Besh Ba Gowah	"Pottery pieces" incl. 1 Ramos Poly. effigy		Vickery 1939
AZ BB:11:27 (ASM), Elliott Site	Ramos Poly. imitation (1 vessel)		Lyons 2008
AZ CC:2:3 (ASM), Curtis Site	Ramos Poly., Babicora Poly., Carretas Poly., Dublan Poly., Villa Ahumada Poly.		Mills and Mills 1978
AZ CC:2:64 (ASM), Epley's Ruin	Ramos Poly. (1), Babicora Poly.? (1)		Anna Neuzil, p.c. 2007
AZ CC:8:16 (ASM)	Ramos Poly. (4), Babicora Poly (1)	Site 800 B.C. to A.D. 1450, relevant contexts post-1300	Lascaux and Montgomery 2007
AZ CC:15:1 (AF)			Mills and Mills 1940–1949
AZ ___ (ASM), Shamrock Dairy Site, Tucson	Ramos Poly.	Tucson phase, A.D. 1350 to 1500	Edgar Huber and Robby Hekcman, p.c. 2007
AZ EE:12:36 (ASM), Hereford Site	Babicora Poly. (1 jar)		Mills and Mills n.d., examined by P. Lyons (p.c. 2008)
AZ FF:2:2 (ASM), Kuykendall Site	Ramos and Carretas Poly., ca. 104 sherds plus restorable vessels	1300 to 1450 (Fish and Fish 1999, Table 1.2)	Mills and Mills 1969a, 1969b

Table 4. Casas Grande Pottery as Trade Wares in Dateable Non-Casas Sites.

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Site	Casas Grandes Sherds	Local Dating	References
AZ FF:3:8, Ringo Site, Cochise Co.	Babicora Poly., Villa Ahumada Poly, Dublan Poly, Madera B/R, Playas R incised	1250 to 1350	Johnson and Thompson 1963
AZ FF:6:4 (ASM), Webb Site	Ramos Poly. (3), Carretas Poly. (3), Mexican polychromes		Mills and Mills 1955, examined by P. Lyons (p.c. 2008)
AZ FF:11:56 (ASM), Slaughter Ranch Site	Ramos Poly. (2 jars, 84 sherds), Carretas Poly. (29), Dublan/Villa Ahumada Poly. (3)		Mills and Mills 1971
Babocomari Village	Ramos Poly. (3), Babicora Poly (3)	1200 to 1450	Altschul et al. 1999; Di Peso 1951
Casa Grande		1200 to 1450	Gladwin and Gladwin 1929:29, Plate V
Gila Pueblo	Ramos Poly.		Thompson 1963
Garden Canyon	Ramos Poly. (2)	1200 to 1450	Jones 199[5 or 6], cited in Altschul et al. 1999
Glass Ranch Site	Carretas Poly. (13); unident. Mexican polychromes		Mills and Mills 1966
Point of Pines	Ramos Poly.		Thompson 1963
Reeve Ruin	Ramos Poly. (1); Chihuahua incised? (3)	1200 to 1450 (note)	Di Peso 1958
Tres Alamos Site	Described as present; no details	1200 to 1450 (note)	Tuthill 1947
University Indian Ruin	Ramos Poly.		Thompson 1963

Notes: **Pecos Pueblo,** NM: "In the vicinity of the old pueblo of Pecos, to the east of Santa Fe in New Mexico, are found ... 'Ramos Polychrome,' ..." (Thompson 1963:4). **Bloom Mound**, NM: dating per Speth's (2004) comments that the site was probably occupied shortly after the final abandonment of the Henderson Site. **Robinson Site,** NM: sherd counts based on an examination of the Robinson Site collections at the Maxwell Museum, UNM, by M. Devitt and A. Barnes, 2008. The count shown in the table includes positive identifications and probable examples. Also found: 11 possible Ramos Poly., 1 possible Babicora Poly., 2 possible Villa Ahumada Poly., 62 Chihuahuan sherds not identified as to type, and one possible Mexican-made copy of Gila Poly. (not Escondida Poly.; Lot 1093). **Phillips Site,** NM: "Another room [excavated by a private collector] was said to contain restorable Ramos and Gila Polychrome vessels" (Kelley 1984:214; see also Kelley 1984: Plate 16). **Hot Wells Reservoir,** TX: date by association with Hot Wells Pueblo. **EPAS-60, Sgt. Doyle Site,** TX: based on the standard dates for the El Paso phase.

Tobin Ranch cache, TX: date inferred from presence of El Paso Polychrome, Tucson Polychrome, and Chupadero Black-on-white. **Cerro de Trincheras,** Son.: the surface counts are from the 1991 mapping project (O'Donovan 2002, Table 4.3). The excavation counts are preliminary and from a partial analysis of the assemblage (Gallaga Murrieta 1998). The other sources listed under "References" confirm the presence of the same types in excavated contexts. Together, the various references provide the local dating for the types. **La Playa,** Son.: the radiocarbon dates reported by Sánchez et al. (1998, Figure 2) mostly relate to the Archaic period occupation; only one, A-8743 relates to the late occupation of the site. This date is presented in a graphic so cannot be newly calibrated; it falls between 1000 and 1400. Because the site had such along occupation, and because Sánchez et al. (1998:994) use the Chihuahuan pottery as part of their argument for identifying a late phase of occupation at La Playa, it is probably best to not draw temporal inferences about the age of Chihuahuan pottery from this site. **Reeve Ruin,** AZ: based on other diagnostic types. **Tres Alamos Site,** AZ: based on other diagnostic types.