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I. A RECONSIDERATION OF THE AGE OF THE LA VENTA SITE¹

Rainer Berger, John A. Graham and Robert F. Heizer

During the excavation of the La Venta site in 1955 by Philip Drucker and Robert F. Heizer on a National Geographic Society—Smithsonian Institution—University of California expedition, nine samples of wood charcoal were collected from the area north of the pyramid (A-2), in what has been termed Complex A. These nine samples (M-528/536) were dated by the University Memorial—Phoenix Project Radiocarbon Laboratory, University of Michigan, in 1957. Costs for the date determinations were paid by the National Geographic Society. The radiocarbon dates for La Venta were published and discussed by Drucker, Heizer and Squier (1957; 1959:264-267) and Crane and Griffin (1958: 1104). The conclusion reached by the excavators was that Complex A of the La Venta site "appears, from the radiocarbon determinations, to have been constructed and used during approximately the four centuries 800 to 400 B.C."

Most archaeologists have accepted for the last decade the age of the La Venta site as falling within the first half of the first millennium B.C. Before 1957 there was less unanimity and more varied opinion on the antiquity of the Olmec sites (cf. Drucker, Heizer and Squier 1959:248-253). A. Medellin Zenil (1960), Stuckenrath (1965:281), and Coe and Stuckenrath (1964:7-20) are among those who either ignore the radiocarbon dates from the La Venta site or believe that these have not been reliably interpreted. Drucker and Heizer attempted (1965:51-54) to clarify some of the points of objection which Coe and Stuckenrath raised concerning the 1957 Michigan dates, and it is in the hope of further clearing up the question of the age of the La Venta site that we have re-examined the 1957 series and added to them other C-14 dates secured since that time. As a result, we are encouraged to present here a "new," or at least modified, proposal of the floruit of La Venta. Dates for a second major Olmec site, San Lorenzo, in southern Veracruz, have recently been published by Coe, Diehl and Stuiver (1967), and their interpretation of the chronological and cultural relationships between the San Lorenzo, La Venta, and Tres Zapotes sites is evaluated.²

It was, in fact, about ten years ago that the original Michigan radiocarbon dates for La Venta (M-528/536) were determined. In the meantime, significant improvements have been achieved in the accuracy and reliability of this dating technique. Besides processing and instrumentation advancements, the half-life ($t_{1/2}$) of carbon-14 has been more accurately determined to

¹ See p. 22 for end notes.

be 5730 ± 30 years. The older value of 5568 ± 30 years is still used in Radiocarbon for purposes of world-wide uniformity among dating laboratories. Furthermore, there have been observed secular variations in the C-14 content of the biosphere which sometimes make a correction of a radiocarbon date necessary. For the time span of interest in this article, these variations appear to be similar to those of the last 2000 years (Suess 1965). When they have been quantitatively determined and checked, a revision of the following newer radiocarbon dates may be of benefit for even greater accuracy.

Through the foresight of the Michigan laboratory, sufficient charcoal of the originally dated samples was preserved to permit re-runs at UCLA in 1967, under the designation UCLA-1283/1287. These are reported below.

Two additional samples, UCLA-902 and UCLA-903, were measured in 1964 by Berger, Fergusson and Libby (1965). They were part of the raw material which was submitted to the laboratory of the U.S. Geological Survey in 1955 and was later forwarded to UCLA.

Finally, there are two archaeologically relevant dates based upon charcoal excavated in 1964 by Squier, which are listed as UCLA-1276A and UCLA-1276B by Berger and Libby (1966).

<u>La Venta Phase I</u>	<u>$t\frac{1}{2}$ 5568</u>	<u>$t\frac{1}{2}$ 5730</u>
UCLA-902 Charcoal from leveled base sands underlying and contemporaneous with Phase I in mound A-2	2940 ± 80	3030 ± 80
UCLA-1285 Charcoal from Phase I platform in mound A-2	2820 ± 60	2905 ± 60
UCLA-1286 Charcoal from artificial fill underlying and contemporaneous with Phase I floor in NW platform	3000 ± 60	3090 ± 60
<u>La Venta Phase II</u>		
UCLA-1284B Charcoal from bottom of Phase II pit 68 in. below surface of NW platform	2550 ± 60	2625 ± 60
UCLA-1284A Same as above but without HCL treatment	2530 ± 60	2605 ± 60

<u>La Venta post-Phase IV</u>	<u>t$\frac{1}{2}$ 5568</u>	<u>t$\frac{1}{2}$ 5730</u>
UCLA-1283 Charcoal from lower margin of post-Complex A occupation windblown sands lying on Phase IV surface W of NE entryway	2380 \pm 60	2450 \pm 60
UCLA-1287 Charcoal from burned area on Phase IV surface W of limestone slab paving near NE entryway	2415 \pm 60	2490 \pm 60
UCLA-903 Identical sample to UCLA-1287 dated in 1964	2460 \pm 80	2530 \pm 80
<u>Refuse zone outside La Venta ceremonial site</u>		
UCLA-1276A Charcoal from yellow-brown sandy clay layer at depth 240-255 cm from surface excavated in Pit C by R. Squier, 1964	2765 \pm 80	2850 \pm 80
UCLA-1276B Charcoal from yellow-brown sandy clay layer at depth 255-270 cm from surface excavated in Pit C by R. Squier, 1964	2930 \pm 80	3020 \pm 80
UCLA-1253 Charcoal from occupation refuse lying directly on clay subsoil at point ca. 300 ft. NW of La Venta pyramid	3060 \pm 90	3140 \pm 90

When all the relevant dates are compared with their Michigan counterparts, certain discrepancies can be recognized. It must be borne in mind, however, that the deviations of ca. ± 300 years associated with the original Michigan dates are the best estimate of the composite uncertainties due to counting statistics, chemical processing, variations in the operation of the counters, and so forth, as cautioned by Crane and Griffin (1958). Among the present re-runs, the newer measurements still fall essentially within that age spread estimated ten years ago, but they are associated with much narrower uncertainties.

The point may be raised as to whether the charcoal samples, after a decade of storage, were still suitable for dating, especially in the light of atomic weapons testing and perhaps contamination by adsorbed higher-level carbon dioxide. This fear can be immediately set to rest, since the pair of UCLA-1284 samples without (A) and with (B) hydrochloric acid pretreatment

gave practically identical ages, 2530 and 2550 years. Even so, all samples were treated in the accepted manner to remove contaminants. Additional confirmation of stable counter operation over four years is found in comparing the same sample, for example UCLA-903 and UCLA-1287.

The problem of contamination of the charcoal used for dating by pieces of asphalt-like material³ of much greater age was carefully considered, as a sample was found to contain this carbonaceous substance during processing. Subsequently, all samples were carefully screened to exclude the amorphous contaminant. This problem was evidently also encountered by Coe, Diehl and Stuiver (1967), and might explain previously published dates of abnormally great age for the larger Tabasco and Veracruz area.

In February 1967, when on a casual visit of a couple of hours at La Venta, two of us (JAG, RFH) noted, at a point about 300 feet northwest of the great pyramid and about 75 feet south of the edge of the airstrip, a charcoal-loaded sherd deposit near the bottom of a shallow, machine-cut drain ditch. A sample of the charcoal from this deposit, which lay directly upon sterile clay subsoil, was radiocarbon dated in April 1967 at UCLA (UCLA-1253), and is 3050 ± 90 years old (1100 B.C.) as calculated by the old half-life, or 3140 ± 90 years old using the newer value.

The refuse deposit has not been stratigraphically related to the La Venta mound group, but the radiocarbon age of the deposit adds to the picture of an Early Preclassic occupation of the mound group vicinity. By our present radiocarbon age reckoning, the refuse layer from which sample UCLA-1253 came was deposited at about the same time as the Phase I constructions of La Venta were being built.

The rarity of pottery in Complex A prevents reliable, or at least substantial, cross-correlation of the ceremonial site and the adjoining refuse deposits, or cross-correlation of the ceremonial site construction phases and ceramic sequences defined elsewhere.⁴ While nothing found in Complex A at La Venta in deposits laid down through the Phase I-IV time span proves that the construction activities occurred either in Early or Middle Preclassic times, it is important to note that, by the same token, these periods are not ruled out as the time or times of building and use. Since the La Venta ceremonial site is peculiarly difficult to date by cultural associations, radiocarbon age determinations seem to offer the greatest promise for answers.

The absence of occupation refuse beneath the mound constructions and surfaced areas of the La Venta site, taken together with the general occurrence of trash deposits beyond the perimeter of the ceremonial site area (Drucker 1952:10-22), probably means that the ceremonial area was off-limits as a living zone from the time of the earliest large-scale occupation of La

Venta island. That pre-Phase I mound structures and/or plaza surfaces existed—probably in the main ceremonial site area—is suggested by the clay chunks with colored clay wash-surfacings found in some of the fill layers underneath the Phase I structures and in some of the Phase I fills (Drucker, Heizer and Squier 1959:37-38, 44, 67, 124, 298; Drucker and Heizer 1965:41-42). We now suggest that these earlier structures probably were situated in the actual ceremonial site area, but cannot estimate how much older they are than the Phase I constructions named and identified by Drucker, Heizer and Squier (1959). There is no pottery or stone sculpture that can be associated with these evidences of pre-Phase I clay mounds or floors. Apparently La Venta island, or that part of the island where the ceremonial center we know as the La Venta site was built, was not occupied or used until the ceremonial site was established in pre-Phase I times. This inference strongly suggests that the La Venta site is contemporaneous with the oldest refuse deposits on the perimeter of the site. This conclusion, while important, would be even more significant if we knew how to date the pre-Phase I activity in the ceremonial site area, and had reliable dates for the lowest refuse levels in the trash deposits lying just outside the ceremonial site boundaries.

The age of La Venta Phase I can be judged from UCLA-1286 (3000 ± 60), UCLA-1285 (2820 ± 60), and UCLA-902 (2940 ± 80); the average age of these three samples is 2920 years (970 B.C.). Two unchecked dates (M-529, 2860 ± 300 ; M-535, 3110 ± 300) do not contradict this, and if all five are averaged, we have 2946 BP, or 996 B.C.

Phase II is represented by a single sample (UCLA-1284) which is 2550 ± 60 years old, or 600 B.C.

Phase III is undated.

Phase IV beginning or end cannot be dated directly with any samples collected in 1955, but there are two samples of wood charcoal which post-date Phase IV. Certain assumptions must be made of the elapsed time between the abandonment of the site and the deposition of the wood charcoal of samples M-528/UCLA-1283 and M-533/UCLA-1287/UCLA-903. We refer the reader to earlier discussions (Drucker, Heizer and Squier 1957; 1959:260-267) about these samples. Assuming an interval of one century between abandonment of the site at the end of Phase IV and deposition of the charcoal, we can add 100 years to the average of UCLA-1283, UCLA-1287, and UCLA-903, which is 2418 BP (468 B.C.), and derive 568 B.C., which we then round off to 600 B.C., as the time of the end of Phase IV at La Venta.

In summary, we propose that Phase I at La Venta dates from 1000 B.C., and that abandonment of the site at the end of Phase IV occurred about 600

B.C. This is a change of 200 years from the age of the site based upon the Michigan radiocarbon dates first published by Drucker, Heizer and Squier (1957).

In view of the fairly considerable revision we propose of the dating of La Venta Phases I-IV, we venture to comment briefly upon some of the possible implications.

Since the La Venta and San Lorenzo sites are the sources of the major portion of the corpus of Olmec monumental sculpture now known, the chronological relationship of the two sites is, and has been, of interest to archaeologists. While there has long been little direct evidence to elucidate their relative dating, most students have tended to place San Lorenzo as following La Venta in time (e.g. Kubler 1962:67; Coe 1965a). With the recent determinations of radiocarbon ages of a series of San Lorenzo locality charcoal samples, Coe, Diehl and Stuiver (1967:1400) have proposed to reverse this arrangement and to have the early occupation of the San Lorenzo site date from the Early Formative (i.e. Early Preclassic), and the La Venta site date from the Middle Formative (i.e. Middle Preclassic). In contrast to both of these views, our suggested revision of the La Venta dating would make this site essentially coeval with the Early Preclassic San Lorenzo phase at the site of San Lorenzo. This is supported by our date for Phase I at La Venta, which is 1000 B.C., and the average of the five reliable San Lorenzo riverbank refuse deposit samples, which is 1074 B.C.

We do not feel that this alignment is at all implausible. We note that in Test Pit C, dug by R. Squier just outside the La Venta site in 1964, there was found a good sequence of Early Preclassic pottery,⁵ and this lends plausibility to, but not, of course, proof of, our Early Preclassic temporal placement of Complex A. With respect to the San Lorenzo—La Venta equation,⁶ the study of the Olmec colossal heads to be published shortly argues—convincingly, we believe—that instead of representing a lengthy stylistic and temporal sequence, the heads are essentially contemporaneous. To this argument, we would add the observation that the great table-top stone altars of San Lorenzo and La Venta are so very similar in many detailed features that they do not support the idea of any substantial time differential between their carving at these sites (cf. Stirling 1955:21). That the major body of Olmec style sculpture at La Venta belongs to the general epoch of Complex A (cf. Coe and Stuckenrath 1964; Drucker and Heizer 1965) we believe cannot be successfully challenged, and we note that Coe, Diehl and Stuiver (1967) believe that the San Lorenzo sculptures probably belong to the period of the San Lorenzo phase. If, as proposed here, the San Lorenzo phase and the La Venta Complex A are contemporaneous, there is no need to suggest (cf. Coe, Diehl and Stuiver 1967:1400) that stone monuments and living leaders were transferred to La Venta when San Lorenzo was abandoned. That suggestion

indicates to us that these students agree with us on the point of the practical identity of some classes of the stone sculptures at the two sites.

A major problem for future investigation, which is presented by our proposed La Venta—San Lorenzo Phase equation, is the nature of the relationship between these two great centers of the florescence of Olmec sculptural art. The far more substantial and elaborate architectural remains at La Venta, the presence of numerous caches of jade, the fact that three times as many large stone sculptures have been found at La Venta than at San Lorenzo, all argue for La Venta's greater importance, but it will remain for future students to elucidate the nature and historical significance of the relationship (cf. Stirling 1955:23).

The suggestion that the La Venta site portion of the corpus of Olmec monumental sculpture dates from the Early Preclassic period raises various important questions. Although there is clearly much still to be learned about the early history of the other great monumental art styles of Mesoamerica, this new dating of the florescence of Olmec style separates it even farther in time from the early horizons now known of the other great traditions. We would not see in this evidence for, or confirmation of, the "mother civilization" thesis argued by some writers, but rather a reaffirmation of the precocious nature of Olmec artistic development. Furthermore, we think it unlikely that while such precocious developments in monumental sculptural art may not have occurred in other early Mesoamerican centers at this time, significant advances in different realms of cultural development probably were being achieved elsewhere. As with that earlier great event of Mesoamerican culture history, the domestication of plants, we incline not to see the whole of Mesoamerican civilization as the creation of a single group of brilliant people. The proponents of mother cultures often have the fault of ignoring the father and siblings.

The Tres Zapotes site, on the basis of ceramics excavated in several localities within the site zone (Drucker 1943; Weiant 1943), has been judged to be later than La Venta by several recent studies (Squier n.d.; Coe 1965a), contrary to earlier evaluations by the excavator (Drucker 1947, 1952). In view of the difficulty of associating the time of the La Venta site with any particular segment of the chronological sequence of the adjoining refuse deposits, the temporal relationships between the several entities comprising (1) the La Venta site; (2) the La Venta refuse deposits; (3) the various Tres Zapotes mound groups; and (4) the Tres Zapotes refuse deposits, may be rather more difficult to work out than has been hitherto assumed by Coe, Squier, and others. If Tres Zapotes Mound Group 1, where Colossal Head TZ 1 was found, does prove to be later than the La Venta and San Lorenzo sites, we will be mildly surprised, since the colossal heads from San Lorenzo and the La Venta sites are believed by us to be of the same age (cf. Drucker, Heizer and

Squier 1959:262). In this respect, we note that Tres Zapotes Mound Group 1 has received very little excavation, and that the large ceramic collections, made and reported upon by Weiant and Drucker and on which Squier and Coe base their analyses, were obtained in other sections of the general site area. If, however, Tres Zapotes Mound Group 1 does prove to be later than La Venta and San Lorenzo, the associated colossal head (TZ 1) may be explained as (1) an older piece of sculpture moved to a later site (cf. Coe 1965a:694), or, (2) a copy by later people of an earlier form of monumental sculpture made at San Lorenzo and/or La Venta. Among alternative possibilities is the one that Tres Zapotes Mound Group 1 was built, and Colossal Head TZ 1 was sculptured, at the very end of the occupation of San Lorenzo and La Venta, which was also the time when all of the San Lorenzo colossal heads (SL 1-6) and La Venta colossal heads (LV 1-4) were sculptured. In this case, Tres Zapotes Mound Group 1, according to the chronology proposed here, would have been erected about 800 B.C. The same arguments hold, we believe, for the Nestepe mound group (about whose archaeology we know nothing), where Colossal Head NS 1 (earlier referred to by Heizer, Smith and Williams 1965, as Tres Zapotes Colossal Head No. 2; and by Stirling 1965:733, as Tres Zapotes Monument Q) was found. Another alternative is that we are incorrect in believing that the twelve San Lorenzo, La Venta, Tres Zapotes, and Nestepe colossal heads were all sculptured at about the same time. By "about the same time" we mean within a period of not more than one century. Our opinion in this respect runs counter to those who see the colossal heads as comprising a sequential series rather than a stylistically and temporally closely related group of one particular kind of Olmec sculpture.

Only further excavation and additional radiocarbon dates will solve the problem of where Tres Zapotes fits in the Olmec culture sequence.

With respect to the origins of Olmec monumental sculpture itself, it seems probable to us that this is not to be looked for either at the San Lorenzo or La Venta centers. We would search for this in an area with abundant and easily exploited large stones, where early sculptors could have developed a long familiarity with stone carving on a monumental scale. There are hints at La Venta that the site may have been planned and built by persons already familiar with the use of stone in architecture. Purely as a hypothesis, we could point to earlier occupation in the area of the abundant stone deposits of the Tuxtla Mountains, where also is to be found a highly favorable environmental setting for early farmers. The failure thus far to find such early remains in that locality we attribute to insufficient exploration, as well as to the strong probability that such remains would be obscured or buried beneath sheet deposits of volcanic ash.

Turning now from beginnings to endings, we are struck by the apparent approximately coeval abandonment of the San Lorenzo and La Venta ceremonial

sites. According to Coe, Diehl and Stuiver (1967), after the abandonment of San Lorenzo there ensued in this locality a complete hiatus in occupation until long into post-Olmec (Late Classic) times. Why the Middle and Late Preclassic peoples avoided the San Lorenzo locality is an important question. One wonders if further search may not produce some evidence of continuing occupation in the area during these times. At La Venta, there continued in Middle and Late Preclassic times to be some utilization of the island after the abandonment of Complex A, and we cannot be certain that there was no continuation of Olmec ceremonialism at other (now largely destroyed) mound groups on the island. We know of no certain association of Olmec monumental sculpture with these other constructions, and we are inclined to see the end of active Olmec monumental art production and ceremonialism on La Venta island as concomitant with the abandonment of Complex A.

The widespread distribution of Olmec-related ceramics and sculpture in Mesoamerica during the Middle Preclassic period has evoked much comment by various writers. The area of these manifestations extends from El Salvador in the south to central Mexico in the north. Such remains have, in large part, become known through illegal excavation and sale of the contraband materials. The archaeological context of most of the objects of portable size is unknown, and in those few cases where controlled excavation was practiced, the data either are not published, or are so casually published as to prevent their effective utilization. Boulder or cliff sculptures, such as those at Chalchuapa, Salvador, and Chalcatzingo, Morelos, are not directly datable. Because this body of information is so difficult to deal with, it is not surprising that there are different opinions as to the age of the sites, attribution of authorship, and reasons for their existence. One hypothesis holds that these sites are evidence of an Olmec empire which was formed by military conquest; another has it that they were local seats for administering a far flung commercial establishment; and still another, that they are manifestations of religious proselytizing by evangelically minded missionaries. With the presently proposed dating of the end of the La Venta and San Lorenzo centers at about 800 to 600 B.C., such interpretations seem even less plausible than they might have previously. We think it worth considering as a hypothesis that the apparently coeval end of the two large Olmec centers of the southern Veracruz-northern Tabasco heartland reflects some great and momentous happening which resulted in the widespread dispersal of the culture carriers, and that this movement is evidenced in such localities as Chalchuapa (Salavador), San Isidro Piedra (Guatemala), Chalcatzingo (Morelos), Tlatilco and Tlapacoya (Valley of Mexico), and Las Bocas (Puebla), to name a few of the better known places (cf. Coe 1965b; Drucker, Heizer and Squier 1959:253-259; Piña Chan and Covarrubias 1964).

In what we have written above, we have attempted to refrain from sounding positive, and have also tried not to push our admittedly limited evidence

beyond reasonable limits of interpretation. Our proposal, that the site of La Venta was built and maintained during the period 1000 B.C. to 600 B.C., will be objected to by many of our colleagues. Some will say that they wish to wait until there is more evidence before they commit themselves; a few colleagues will embrace the proposal because it sounds unusual. To all of these, whether they be doubters, unbelievers, or accepters, we can offer nothing more helpful than the reminder that the Olmec area of southeastern Mexico is one that offers great returns for a little hard work. What is desperately needed here is additional intensive archaeological survey and excavation, for in the whole region of southern Veracruz and northern Tabasco there has been pitifully little investigation done. New and important sites await discovery and exploration. He who fancies himself as a rough-and-ready field archaeologist need only secure a permit from INAH, equip himself with a knowledge of Spanish, some high boots for protection against the fer-de-lance, insect repellent, water purifier, dysentery remedies, a four-wheel drive vehicle, plenty of money, considerable patience, and some reserve nerve for unpleasant confrontations, and go into the field and locate a new batch of ten-ton sculptures. The trail has been blazed, the easy discoveries have been made, the ceramic chronology has been blocked out. All that is needed is some hard work. It is abundantly clear that some very important things were going on in this region just before and just after 1000 B.C., and we should learn more about this as soon as we can. We would recommend the lower slopes of the eastern border of the Tuxtla Mountains as a locality that should be productive of new sites and monuments. The Nestepe mound group, just north of Tres Zapotes, may well hold a great wealth of stone sculpture which will be the harvest of the first investigator to carry out the right kind of exploration. There are some really impressive large mound groups on the flat-lands just west of the Tuxtla Mountains that can be seen on the road to the village of Salina Roca Partida. There are dozens of what appear, from the air—in the Veracruz-Minatitlan CMA plane—to be ideal site locations on flat terraces which truncate into the ocean along the northern edge of the Tuxtla Mountains. None of this exploration will be easy; some of it will be difficult, even hazardous, but it will be done, and those who try it first will find the best.

We do not know how many people are interested in the problems of Olmec chronology. To our minds, the proposal to shift the La Venta site two centuries farther back in time is important to culture historians primarily because it emphasizes even more strongly an achievement unique at the time in the whole of the New World, of the development of planned architecture, of monumental sculpture in quantity, and of extraordinary sophistication. If the Olmec genius was, as it seems to have been at this degree of remove, truly unparalleled, then we have available one of the most unusual experiments in the history of man's culture. Here is an opportunity to study this remarkable culture in terms of its generation, its form, its duration, and its

termination. It is this, we think, that is important about prehistoric Olmec culture in southeastern Mexico, and we regret only that these people were such excellent jade carvers and modelers of clay, for it is the presence of such products of the Olmec artists, as well as the greed of some modern men, that has caused and encouraged the destruction of essential information that might ultimately allow us to understand the Olmec culture more completely.

APPENDIX I

RADIOCARBON DATES FROM LA VENTA CEREMONIAL SITE AND LA VENTA ISLAND REFUSE DEPOSITS

Samples M-528/536 have been available since 1957, and published references to discussions of these are given on the first page of this paper. The re-dating of two of the Michigan series (UCLA-902/903) was done in 1964, and these have been discussed in papers cited in the foregoing text. Re-dating of additional samples of the Michigan series (UCLA-1283/1286), plus a second re-dating of M-533 (UCLA-1287), was done at UCLA in May and June 1967, and these dates are here published for the first time. They will appear, with appropriate comments, in Radiocarbon, Vol. 10, as part of UCLA Date List VII. Samples UCLA-788B-D were dated in 1964, and were published in Radiocarbon, Vol. 8:474-475, 1966. UCLA-1276A/B were determined in June 1967, and are here published for the first time. These will appear in Radiocarbon, Vol. 10, in UCLA Date List VII. The same is true of UCLA-1253, UCLA-1280A/B, and UCLA-1281B.

Samples enclosed in brackets are two age determinations made from same original sample batch

Sample No.	Age (calculated with 5568 ± 30 yr. half life)	Age (calculated with 5730 ± 30 yr. half life)	Remarks
M-528 UCLA-1283	2400 ± 250 2380 ± 60	2475 ± 250 2450 ± 60	Both age determinations the same
M-530 UCLA-1284B UCLA-1284A	2760 ± 300 2550 ± 60 2530 ± 60	2845 ± 300 2625 ± 60 2605 ± 60	Michigan (1957) age older by 210 and 190 years than UCLA (1967) ages
M-531 UCLA-902	2560 ± 300 2940 ± 80	2540 ± 300 3030 ± 80	Michigan (1957) age younger by 380 years than UCLA (1967) age
M-532 UCLA-1285	2650 ± 300 2820 ± 60	2730 ± 300 2905 ± 60	Michigan (1957) age younger by 170 years than UCLA (1967) age
M-533 UCLA-1287 UCLA-903	2130 ± 300 2415 ± 60 2460 ± 80	2195 ± 300 2490 ± 60 2530 ± 60	Michigan (1957) age younger by 285 years than UCLA (1964, 1967) ages
M-534 UCLA-1286	2670 ± 300 3000 ± 60	2750 ± 300 3090 ± 60	Michigan (1957) age younger by 330 years than UCLA (1967) age
M-529	2860 ± 300	2950 ± 300	Not re-dated by UCLA because of insufficient sample material

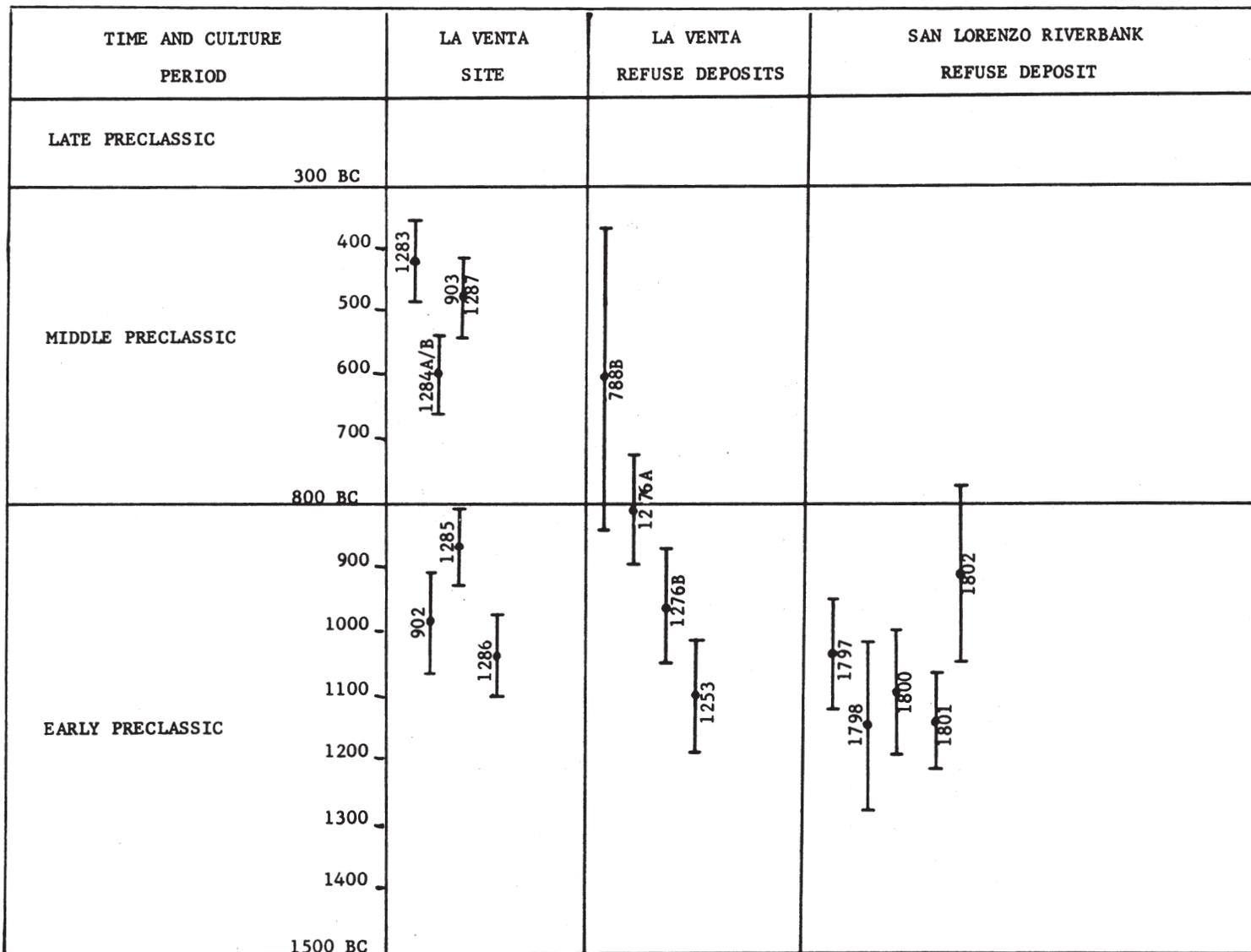
Age determinations [cont'd.]

Sample No.	Age (calculated with 5568 \pm 30 yr. half life)	Age (calculated with 5730 \pm 30 yr. half life)	Remarks
M-535	3110 \pm 300	3205 \pm 300	Not re-dated by UCLA because of insufficient sample material
M-536	2530 \pm 300	2605 \pm 300	Not re-dated because sample cannot be correlated with La Venta site building phases
UCLA-788B	2560 \pm 240	2640 \pm 240	Associated with "latest Early Pre-classic or earliest Middle Preclassic activity in area." From R. Squier's Pit C-1964 in refuse deposits near La Venta site, depth from surface 210-214 cm
UCLA-1276A	2765 \pm 80	2850 \pm 80	From R. Squier's Pit C-1964, depth from surface 240-255 cm
UCLA-1276B	2930 \pm 80	3020 \pm 80	From R. Squier's Pit C-1964, depth from surface 255-270 cm
UCLA-788C	3760 \pm 80	3875 \pm 80	From R. Squier's Pit C-1964, depth from surface 270-285 cm. Charcoal probably contaminated with asphalt; date unacceptable
UCLA-788D	9750 \pm 160	---	From R. Squier's Pit C-1964, depth from surface 360-365 cm. Charcoal contaminated with asphalt, date unacceptable

UCLA-1253	3050 ± 90	3140 ± 90	From sherd-rich refuse layer lying directly on clay subsoil ca. 300 ft. NW of the La Venta pyramid; not in ceremonial site area but in occupation refuse outside borders of Complex A
UCLA-1281B	1760 ± 155	1815 ± 155	From depth of 148-153 cm below surface in R. Squier's Pit B-1964 "some distance southeast of Pit C," outside ceremonial site area. Date does not agree with excavator's expected age of 1300-1400 B.C.
UCLA-1280A	1835 ± 90	1880 ± 90	From depth of 114-119 cm below surface in R. Squier's Pit B/1-1964 (extension of Pit B-1964). Date does not agree with excavator's expected age of 1200-1300 B.C.
UCLA-1280B	1720 ± 180	1775 ± 180	From depth of 153-160 cm below surface in R. Squier's Pit B/1-1964 (extension of Pit B-1964). Date does not agree with excavator's expected age of 1300-1400 B.C.

A graphic representation of site dates is shown on page 16.

GRAPHIC REPRESENTATION OF SITE DATES



All La Venta dates are UCLA; all San Lorenzo dates are Yale. Dates considered in error due to asphalt contamination are omitted here. See Appendix I.

APPENDIX II

AN ILLUSTRATION OF THE DANGERS OF MANIPULATING RADIOCARBON DATES

In April 1967, an earlier version of this paper was written by Graham and Heizer. As a result of our thinking about the problem, we decided to ask Professor James B. Griffin if any of the original carbon material was being kept at Ann Arbor. Griffin sent us nine small boxes which contained what we assumed were the solid carbon scrapings of M-528/536, but which actually turned out to be additional charcoal from the original samples; that is, the material left over after the M-528/536 dates were determined. We thus unexpectedly found ourselves in the position of being able to re-date M-528, M-530, M-532, and M-534 in much the same way that M-531 and M-533 had been re-dated in 1964.

However, before they knew that there was available additional undated original charcoal from the 1955 La Venta excavations, Graham and Heizer had suggested, in the April 1967 draft of this paper, that a correction factor of +350 years could be applied to the 1957 Michigan dates, and the following is what they wrote at that time. We venture to cite verbatim this now abandoned and incorrect proposal because it illustrates the kind of manipulation of available data which archaeologists often perform. In this case, we were saved from committing ourselves in print by the unanticipated availability of sufficient amounts of the original carbon samples to determine ages. What follows is what might have been published, and it serves as a cautionary example. We should add that Dr. Berger had nothing to do with the writing of the April draft, and that he is free of the onus of such bad guessing.

"It is our assumption that the M-531/UCLA-902, M-533/UCLA-903 pairs are two sets of identical twins. If two laboratories, at an interval of seven years, determine that the age of one individual of each of two assumed identical twins is different, then we should try to explain this. We suggest that the difference may be due to something inherent in the laboratory determinations. Without knowing how to explain the different dating results, we assume that between 1957 and 1964 laboratory procedures have improved, or been made more precise, and that the 1964 dates are to be preferred to the 1957 ones. We may be wrong about this, and we have no special knowledge that enables us to support our decision to prefer the 1964 dates; however, that is the position that we now take. In doing this, we are in effect

saying that if the nine carbon samples which were dated at Michigan in 1957 had been run at UCLA in 1964, it is our opinion that the UCLA age determinations would have been older than those secured from the Michigan laboratory in 1957. This assumption rests upon the two samples which serve as checks; for the other seven there is no means of verification. Readers who feel that two checks out of nine are insufficient to establish some sort of correction factor need read no further. Similarly, readers who feel that Coe and Stuckenrath (1964) have successfully challenged the archaeological interpretation of the La Venta dates and their associations need read no further. In this paper we are not re-arguing the validity of the association of the dates, but rather are seeking to adjust the radiocarbon age measurements themselves.

"The age determined for UCLA-902 is 380 years older than that for its twin, M-531. The age for UCLA-903 is 330 years older than that for its twin, M-533. The difference, considering the probability that we are dealing with charcoal 2.5 thousand years old, may not appear to be very great. Yet the inter-sample difference (330 and 380 years) is substantially greater than the intra-sample difference (50 years), and it is this which seems to argue for a standard, non-accidental difference between the two sample twins.

"There may be some statistical probability method that would permit us to choose the best figure to represent the probable real difference, but we elect to take the rounded-off average difference, which is 350 years. Applying this figure as a standard correction factor to the 1957 Michigan dates, we have:

La Venta Site	Sample No.	Age (yrs. BP) (Michigan 1957)	Correction factor (yrs.)	Corrected age (yrs. BP)	Corrected Date (B.C.)
Phase I	M-535	3110	+350	3460	1510
	M-529	2860	+350	3210	1260
	M-534	2670	+350	3020	1070
	M-532	2650	+350	3000	1050
	M-531	2560	+350	2910	960
Phase II	M-530	2760	+350	3110	1160
post-Phase IV	M-528	2400	+350	2750	800
	M-533	2130	+350	2480	530

"We are aware of the inconsistency of having accepted the UCLA radiocarbon ages of samples UCLA-902 and UCLA-903 as accurate, and then proceeding immediately to reduce the age of one and increase the age of the other, however slightly, by imposing the average difference as a correction factor.

"At this point, we should point out explicitly that we do not wish to minimize the difficulties of answering the questions which Coe and Stuckenrath (1964) have raised about the interpretation of the 1957 La Venta radiocarbon dates. Drucker and Heizer (1965) took the position that the age of the charcoal samples collected in 1955 was approximately contemporaneous with the time the fill layers were carried to the site and laid down. At the same time, this cannot be literally true, especially in view of the rather wide spread of ages of the five Phase I samples, whose corrected dates range from 960 to 1510 B.C. In short, we are not arguing that Phase I at La Venta did cover a span of 550 years. The radiocarbon sample which provides the greatest difficulty here is M-531, which has a corrected age of 2910 years, and which should be about the same age as, or slightly earlier than, M-535, whose corrected age is 3460 years. If M-531 seems too young and M-535 too old, the three other Phase I attributed samples (M-529, M-534, M-532), which are fairly close together in time and whose average date is 1127 B.C., may indicate (assuming the charcoal to have been reasonably contemporary with the fill deposition activities) the probable age of the constructional elements from which the charcoal was secured.

"An alternative is to take the two charcoal samples from the lowest levels of Mound A-2 (M-531, M-532) as referring to a time close to the beginning of construction of Complex A (cf. Drucker, Heizer and Squier 1959:264-265, fig. 10). These are the two youngest samples attributed to Phase I. The average of their corrected dates (M-531, 960 B.C.; M-532, 1050 B.C.) is 1005 B.C., a figure only one century later than that derived by the selective averagings described above.

"Let us look at the problem from the standpoint of the two post-Phase IV carbon samples (M-528, M-533). Their corrected dates are 800 B.C. (for M-528) and 530 B.C. (for M-533). Both samples were deposited after the abandonment of the La Venta site. Since we are unable to explain how this charcoal came to be laid down there, or to account for the 270 year time discrepancy between the two, we again take the simple average of the two, which is 665 B.C., add the estimated century interval between abandonment of the

site and deposition of the fire charcoal (Drucker, Heizer and Squier 1959:267), and come up with the figure of 765 B.C., rounded off to 800 B.C., as the approximate date of abandonment of Complex A of the La Venta site.

"The average age of Phase I at La Venta (based upon corrected age of samples M-535, M-529, M-534, M-532, and M-531) is 3050 years (1100 B.C.), or 3077 years (1127 B.C.) if based upon M-529, M-534, and M-532, or 2520 years (1005 B.C.) if only samples M-531 and M-533 are considered. The first two averagings are 300 years older than the 800 B.C. beginning date which has, until now, been generally accepted.

"We conclude from this that the La Venta site should now be dated by radiocarbon age determinations as lying within the time span of 1100 B.C. to 800 B.C. It should be noted that we are dealing in uncorrected radiocarbon years. If these radiocarbon ages are adjusted for the difference in the Libby half life and the Cambridge value, as well as the C-12/C-14 fluctuation in the biosphere reservoir, then somewhat different B.C. dates would be obtained."

APPENDIX III

NOTE ON ASPHALT CONTAMINATION OF CHARCOAL IN OLMEC SITES

We have learned that there is a possibility of asphalt being present and mistaken for wood charcoal in some levels of Olmec sites. Coe, Diehl and Stuiver (1967:1400) ascribe the obviously too great age of sample Y-1799, from the riverbank at Tenochtitlán (near the site of San Lorenzo), to the probable presence of asphalt.

A sample of what was apparently wood charcoal collected by us in February 1967, in the cutbank of the Arroyo Hueyapan, near the site of Tres Zapotes and at the locus of Drucker's Trench 26 (Drucker 1943) was found to contain asphalt. After the asphalt was removed, too little wood charcoal remained to be dated.

A careful examination of a sample of apparent wood charcoal collected by Squier in his Pit C at La Venta in 1964, at a depth of 335 cm below the surface, showed this to consist of mixed wood charcoal and asphalt. A sample submitted by Squier for radiocarbon age determination in 1964, collected by him from the same Pit C at a depth of 360-365 cm below the surface, was assumed to be charcoal and was dated as 9750 ± 160 years old (UCLA-788D). This impossibly old date can be proved to be due to the presence of asphalt.

It is probable also that sample UCLA-788C was also somewhat contaminated with asphalt, though this cannot be demonstrated. As a date for ordinary hearth charcoal from this level, it appears too old, and for this reason the sample is best ignored.

Notes

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2. Coe, Diehl and Stuiver's dates are calculated on the basis of the old half life of radiocarbon (5568 ± 30 years). In this paper dates are cited according to the same basis. We have also provided, for possible future use, ages based upon the newer half life of 5730 ± 30 years.

3. This asphalt-like material was presumably derived from the petroliferous deposits of the Veracruz basin, especially the Isthmian Saline basin and the Yucatan peninsula.

4. It is interesting to note that Sanders points to a number of similarities in the pottery of La Venta and the Chiapa I and II Phases at Chiapa de Corzo. With respect to La Venta Complex A itself, Sanders (1961: 51-52) points to Chiapa II ties in the pottery of La Venta Offerings 5, 14, 15, 18, and 19, which span Phases I-III. Chiapa II is not securely dated in absolute terms, but is generally considered early Middle Preclassic. We must note the terminological confusion here, which results from regarding Early-Middle-Late Preclassic as fixed chronological periods, but defined on the basis of insecurely dated ceramic phases which are surely not precisely chronologically equivalent everywhere.

5. The rather casual report by Piña Chan on his stratigraphic testing at La Venta in 1958 (Piña Chan and Covarrubias 1964:16-24) is the first definite statement on Early Preclassic occupation of the locality.

6. While we have no reason to doubt the proposed ceramic-time equivalence of the lower levels of the San Lorenzo site and the stratigraphic section on the riverbank from which the charcoal for samples Y-1797/1802 was secured, it is interesting to note that Coe, Diehl and Stuiver, like ourselves, are making certain assumptions on the basis of two quite separate localities. Carbon from the San Lorenzo excavations of 1966 and 1967 seasons will doubtless be dated.

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