

UNIVERSITY OF TEXAS AT AUSTIN RADIOCARBON DATES VIII

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This list reports C¹⁴ measurements made in projects completed in the year ending October, 1969, and some measurements for projects still in progress. Age calculations are based on C¹⁴ half-life of 5568 years and a modern standard of 95% of NBS oxalic acid. Deviations reported are based on counting statistics of sample, background, and modern, and are $\pm 1\sigma$ except that when sample count approaches either modern or background, 2σ limits are reported. The laboratory uses liquid scintillation counting of benzene, with Li₂C₂ and vanadium activated catalyst in preparation. Chemical yields average 88%.

Valastro is in charge of technical operations in the laboratory; he and Davis share administrative responsibilities. Davis handles sample screening and archaeological appraisal, and has compiled this list.

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I. CHECK SAMPLE

In addition to sample below, see Tx-680, in Archaeologic Samples.

Tx-693. Danvers, Illinois

23,880 \pm 490
21,930 B.C.

Wood chips from bed of woody peat, 1.4 m below top of Farmdale silt, 3 mi SW of Congerville, 5 mi NW of Danvers, Illinois (40° 35' 12" N Lat, 89° 14' 40" W Long). Sample was split and the 2 parts prepared and counted separately: 23,520 \pm 640, 24,230 \pm 750. Another part of same sample dated as ISGS-12, 23,900 \pm 200 (Kim, pers. commun.). Subm. by S. M. Kim, Ill. State Geol. Surv., Urbana. *Comment*: excellent agreement.

II. OCEANOGRAPHIC SAMPLES

A. South Gulf Coast, Texas

Padre Island Beach series, Texas

Shells (*Mercenaria mercenaria*) from back shore surface, beach of Padre I., 1/4 mi N of Mansfield Pass channel (26° 34' N Lat, 97° 17' W Long). Shells represent large source of beach material. Source area seems to be offshore Gulf of Mexico. Dated to see whether such an unlikely habitat for this species has existed recently or if shells represent reworking of Pleistocene deposits outcropping offshore. Coll. 1968 by Behrens and Frishman; subm. by E. W. Behrens, Univ. of Texas Marine Sci. Inst., Port Aransas, Texas.

Tx-718.	Padre Island Beach, 1	7180 ± 120 5230 B.C.
Tx-719.	Padre Island Beach, 2	6840 ± 120 4890 B.C.
Tx-720.	Padre Island Beach, 3	4590 ± 70 2640 B.C.
Tx-721.	Padre Island Beach, 4	1240 ± 70 A.D. 710
Tx-722.	Padre Island Beach, 5	2150 ± 90 200 B.C.
Tx-723.	Padre Island Beach, 6	5600 ± 100 3650 B.C.
Tx-724.	Padre Island Beach, 7	5760 ± 100 3810 B.C.
Tx-725.	Padre Island Beach, 8	6280 ± 110 4330 B.C.
Tx-726.	Padre Island Beach, 9	5480 ± 100 3530 B.C.
Tx-727.	Padre Island Beach, 10	5500 ± 100 3550 B.C.

General Comment: (E.W.B.): dates establish existence on continental shelf of an old source for Recent Gulf-beach shell material. Probably shells are being eroded from lagoon sediments deposited during lower stand of sea level.

Tx-760. Laguna Madre Land Cut #7 **30,860 ± 1710**
28,910 B.C.

Shell (*Mercenaria mercenaria*) from surface of spoil bank, E side Intracoastal Canal, opposite Banderia Point, Laguna Madre, Texas (26° 53' 45" N Lat, 97° 27' 40" W Long). Originally dredged from ca. -3.4 m. From interglacial, interstadial or Holocene beach rock (part of Ingle-side Barrier complex?) Several mm. of surface material removed with HCl before submission, to eliminate coatings of younger carbonate and weathered, leached surfaces. Coll. 1968 by Behrens and Kessler; subm. by Behrens. *Comment* (E.W.B.): date establishes major age difference between 2 very similar deposits: present Padre I. Gulf beach and beach-rock within Laguna Madre. Date agrees with high stand of sea level postulated by Milliman and Emery (1968).

North Padre Island series, South Texas

Shells (*Mulinia* sp.) from general depth of 18.9 m on N part of Padre I. (South Bird quad.), 10 mi S of Bob Hall pier (27° 27' N Lat, 97° 18' W Long). Samples are rotary drill cuttings from shell bed at

base of Padre I. sand. Coll. 1968 and subm. by K. A. Dickinson, Office of Marine Geol. and Hydrol., U.S. Geol. Survey, Corpus Christi, Texas.

Tx-800. North Padre, 04-1 **27,380 ± 1100**
25,430 B.C.

Tx-801. North Padre, 04-2 **29,980 ± 1070**
28,030 B.C.

Comment (K.A.D.): shell bed is believed to represent lagoon deposition during last Pleistocene sea-level rise. Dates fit Shepard's (1963, Fig. 3) curve showing sea level ca. 15.2 m below present from 30,000 to 26,000 B.P. Shell bed is probably from about same horizon as Fisk's *Mulinia* sp. bed with C^{14} age of $23,400 \pm 1800$ (0-630, Sample 19; Fisk, 1959, p. 123, 149). Fisk considered this age anomalously young.

Oolite coating series, Baffin Bay, Texas

Oolites are sand grains with concentric $CaCO_3$ coatings. Assays in table below result from development of method whereby coatings can be serially removed from sand grain nucleus and coating fractions dated. Oolites were taken from 0.25 to 0.30 mm fraction of sand, chosen for its high percentage of oolitic grains, few uncoated shell fragments and foraminifera tests, and maximum number of grains with non-carbonate nuclei. Serial stripping of coatings was accomplished by calculating volume of 3N HCl necessary to dissolve a desired weight of $CaCO_3$ from previously weighed sand sample. Examination of thin secs. verified nearly uniform removal of coatings. For complete statement of technique, see Frishman (1969).

Material is from swash zone along windward shore at Kleberg Point, Baffin Bay, a normally hypersaline bay on S Gulf coast of Texas (27° 17' N Lat, 97° 37' W Long). Coll. 1968 and subm. by S. A. Frishman and E. W. Behrens, Dept. Geol. Sciences, Univ. of Texas, Austin.

General Comment (S.A.F.): except for Tx-698, 713, and 716, agreement of triplicate samples indicates uniformity of stripping process. Average age of total carbonate in each sample (Tx-702, -703), obtained by dissolving entire sample in excess of acid, is older than average age of coatings, since older carbonate nucleus is included. C^{14} enrichment (ave. $\delta C^{14} = +54.7 \pm 1.8\%$) in outer 1/5 of coatings means that at least some of coatings (ca. 27% by weight) were formed after beginning of nuclear bomb testing in early 1950's. In general, dates show that coating has proceeded sporadically for 730 yr, the extrapolated age of initiation of oolite formation in this sample. This extrapolation is made on a plot of C^{14} vs. % coating removed by acid leaching.

B. Baffin Bay sediment study, South Texas coast

Sediments deposited in Baffin Bay, S Gulf coast of Texas, in study of Holocene depositional history of bay. Coll. by Behrens and assoc.; subm. by E. W. Behrens.

TABLE 1

Sample name and coating fraction (by weight)	C ¹⁴ age (yr)	δC ¹⁴ (‰)
Tx-697. BB-a, outer 1/5	anomalous	61.0 ± 9.1
Tx-712. BB-b, outer 1/5	anomalous	55.0 ± 8.2
Tx-715. BB-c, outer 1/5	anomalous	48.0 ± 7.6
Tx-698. BB-a, middle 2/5	230 ± 70	-28.5 ± 6.2
Tx-713. BB-b, middle 2/5	90 ± 60	-11.4 ± 5.6
Tx-716. BB-c, middle 2/5	70 ± 50	-9.1 ± 5.0
Average, middle 2/5	130 ± 40	
Tx-699. BB-a, inner 2/5	500 ± 70	-60.5 ± 7.0
Tx-714. BB-b, inner 2/5	530 ± 70	-64.0 ± 6.0
Tx-717. BB-c, inner 2/5	550 ± 70	-66.2 ± 5.7
Average, inner 2/5	530 ± 40	
Tx-702. BB-a, total CaCO ₃	410 ± 80	-50.2 ± 6.8
(500 ± 60	-60.5 ± 5.4
Tx-703. BB-b, total CaCO ₃		
(2 runs)	440 ± 70	-53.6 ± 6.1
(
(average	470 ± 50	
Average, total CaCO ₃	440 ± 50	

2310 ± 60**Tx-568. Baffin Bay 3, 94 to 97 cm****360 B.C.**

Carbonate from marl 94 to 97 cm below sediment-water interface, 15.2 m N of Marker 58, Baffin Bay Channel, Lower Baffin Bay (27° 17' N Lat, 97° 28' W Long). Marl (18.5% terrigenous clay, 81.5% CaCO₃) was a layer within core of regularly laminated bay-center mud from hypersaline bay. Sample split into 2 parts, prepared and counted separately; 2440 ± 80, 2170 ± 90. *Comment:* see comment on Baffin Bay Core series, below.

Baffin Bay Core series

Shells, mixture of small species native to grass flats, from cores obtained 10 mi ESE of Riviera Beach near mouth of Baffin Bay, Texas coast (27° 15' 00" N Lat, 97° 30' 00" W Long). From Holocene sediments deposited on grass flat, unconformably overlying Pleistocene surface and overlain by restricted hypersaline bay mud. Coll. 1968. In sample titles, letter indicates core, and numbers are depth(cm) below bay bottom.

Tx-755. Baffin Bay D, 220 to 230**3480 ± 80****1530 B.C.****Tx-754. Baffin Bay D, 230 to 240****4860 ± 190****2910 B.C.**

Tx-753.	Baffin Bay D, 240 to 250	6670 ± 550 4720 B.C.
Tx-752.	Baffin Bay D, 250 to 260	5770 ± 140 3820 B.C.
Tx-751.	Baffin Bay D, 260 to 270	5800 ± 100 3850 B.C.
Tx-748.	Baffin Bay D, 270 to 300	5640 ± 100 3690 B.C.
Tx-761.	Baffin Bay D, 300 to 325	6060 ± 140 4110 B.C.
Tx-762.	Baffin Bay D, 325 to 350	5420 ± 220 3470 B.C.
Tx-763.	Baffin Bay D, 350 to 375	6080 ± 120 4130 B.C.
Tx-756.	Baffin Bay E, 202 to 233	5620 ± 120 3670 B.C.
Tx-757.	Baffin Bay C, 350	3750 ± 80 1800 B.C.

General Comment on Baffin Bay 3 and Core series (E.W.B.): dates indicate shelly, muddy sands deposited on grass flats under nearly normal salinity ca. 6000 to 5000 B.P. (Tx-761-763, 748, 751-756). Grass flats seldom flourish in water deeper than 1 m, so sea level was ca. 4 m below present level; this agrees well with results in Florida (Scholl *et al.*, 1969). Between 5000 and 3500 B.P. (Tx-754, 755, 757) major circulation change caused bay to become restricted and hypersaline, which it still is. Marls of Tx-568, 758 represent time of especially intense precipitation of non-skeletal CaCO₃ under these conditions.

Kleberg Point series

Shell (mostly *Anomalocardia cuneimeris*) from genetically related group of spits at Kleberg Point, N shore Baffin Bay, between Alazan Bay and Cayo del Grullo (27° 17' N Lat, 97° 37' W Long). Coll. 1967. Some samples split and 2 parts prepared and counted separately, as shown. Samples listed in presumed order of increasing age, based on detailed mapping.

Tx-733.	Kleberg Point G	960 ± 60 A.D. 990
Tx-728.	Kleberg Point A	1440 ± 90 A.D. 510
Tx-729.	Kleberg Point B	840 ± 50 A.D. 1110

830 ± 60 and 850 ± 70.

Tx-730. Kleberg Point C	1960 ± 50
1950 ± 90 and 1970 ± 60.	10 B.C.
Tx-731. Kleberg Point D	1960 ± 60
1060 ± 90 and 1950 ± 80.	10 B.C.
Tx-735. Kleberg Point 2a	2220 ± 70
	270 B.C.
Tx-732. Kleberg Point F	2280 ± 90
	330 B.C.
Tx-734. Kleberg Point 1a	2280 ± 60
2200 ± 80 and 2350 ± 80.	330 B.C.
Tx-747. Kleberg Point 3a	2900 ± 90
	950 B.C.

General Comment: see comment for Kleberg Lagoon series, below.

Kleberg Lagoon series

Marl from bottom of lagoon at Kleberg Point (see Kleberg Point series, above). From base of closed-lagoon-algal mat sequence that began when sand spits closed lagoon from Baffin Bay. Sequence underlain by open-bay shelly mud and overlain by algal mat-evaporite sediments. Coll. 1968.

Tx-759. Kleberg Lagoon RBB 62	1100 ± 100
From 62 cm below bottom in core near center of lagoon.	A.D. 850
Tx-758. Kleberg Lagoon BB 100	2660 ± 270
From 100 cm below sediment-water interface in core S of center of lagoon.	710 B.C.

General Comment on Kleberg Point and Kleberg Lagoon series (E.W.B.): dates indicate a group of shelly spits grew from 2900 to 1440 B.P. (Tx-728 through 732, 734, 735, 747), forming Kleberg Lagoon and separating it from Baffin Bay; algal mats then flourished within lagoon. Four discrepancies exist: 1) Tx-729 out of order; unexplained but might be sampling error, 2) current active spit dates 960 B.P. (Tx-733); probably indicates old shells retained in active spit, 3) older spit (Tx-747) has older date than underlying marl (Tx-758); if age of spit is corrected for old shells incorporated in it, as in 2), above, discrepancy disappears, 4) coring has shown that algal mats began to flourish immediately after formation of spit dating 2280 B.P. (Tx-734), but at base of mat sequence is marl dating 1100 B.P. (Tx-759). No reason to believe there was no deposition during this 1100 yr interval. If old-shell correction is applied to age of this spit, as in 2), above, marl formation follows spit formation within ca. 200 yr.

C. Florida

Reef tract sand series, Florida keys

Carbonate sand (abraded fossil debris and mud pellets) from reef tract near Plantation and Upper Matecumbe Keys, Florida. Dated to study age of sands of outer Florida reef tract relative to age of sands near Florida Keys which show less evidence of early diagenesis. Coll. 1966 by P. Braithwaite; subm. by B. W. Boyer, Dept. of Geol. Sci., Univ. of Texas, Austin.

Tx-834. Plantation Key, 571**2260 ± 70****310 B.C.**

From surface of sediment; water depth ca. 6.1 m; 2.9 mi SE of Plantation Point, Plantation Key (24° 55' N Lat, 80° 33' W Long).

Tx-836. Plantation Key, 567**1890 ± 100****A.D. 60**

From top 2.5 cm of sediment; water depth ca. 4.6 m; 1.8 mi SE of Plantation Point, Plantation Key (24° 56' N Lat, 80° 33' W Long).

Tx-835. Upper Matecumbe, 514**1610 ± 90****A.D. 340**

From surface of sediment; water depth ca. 4.0 m; 1.3 mi SE of Islamorada, Upper Matecumbe Key (24° 55' N Lat, 80° 36' W Long). *General Comment* (B.W.B.): dates suggest back reef sands become older farther offshore from keys. Dates do not seem consistent with hypothesis that lithified pellets and diagenetically altered skeletal debris, which form large percentage of some samples, are relict Pleistocene material.

III. GEOLOGIC SAMPLES

FM 1144 caliche series, South Texas

Calcite caliche samples from cuts in top of hill on Farm Rd. 1144, 6 mi W of Karnes City, Texas (28° 52' 31" N Lat, 97° 59' 00" W Long). Present soils are silty clay loams of subhumid climate, developing from caliche, relict soil material formed under arid conditions from soft silty Catahoula Tuff bedrock. Caliche is of 2 types: firm massive caliche capping a rounded hill, and soil-joint fillings and horizontal tributary veins in bedrock slightly downhill. Coll. 1967 by Eargle, Ingerson, and Valastro; subm. by D. H. Eargle, Uranium Sec., Branch of Rocky Mt. Mineral Resources, U.S. Geol. Survey, Austin, Texas.

Tx-461. FM 1144, A: vein caliche**19,730 ± 430****17,780 B.C.**

Vein caliche, .6 to .9 m below surface.

Tx-462. FM 1144, B: caliche matrix**16,350 ± 280****14,400 B.C.**

Caliche matrix .6 to .9 m below surface.

Tx-634. FM 1144, #1: vein caliche**13,750 ± 230****11,800 B.C.**

Vein, .9 to 1.1 m below surface.

- 17,870 ± 350**
- Tx-635. FM 1144, #2: caliche matrix** **15,920 B.C.**
Massive caliche 1.1 m below surface, ca. 30.5 m from Tx-634.
- 18,190 ± 340**
- Tx-636. FM 1144, #3: caliche matrix** **16,240 B.C.**
Massive caliche 1.1 m below surface, ca. 35 m from Tx-634.
- 20,310 ± 430**
- Tx-637. FM 1144, #4: joint filling** **18,360 B.C.**
Joint filling .9 to 1.1 m below surface, near Tx-634.
- 16,920 ± 310**
- Tx-638. FM 1144, #5: vein caliche** **14,970 B.C.**
Vein, .9 to 1.1 m below surface, same place as Tx-634.
- General Comment* (D.H.E.): relative uniformity of dates from massive caliche matrix reflects its uniform structure and impervious nature. Greater variation in dates from veins and joint fillings indicates variable admixtures of CaCO₃ derived from calcareous bedrock. Dates refer to time of very dry climate of late Wisconsin, indicated by geologic evidence in SW U.S. and N Mexico.
- Lacustrine Samples, West Texas and Chihuahua*
- Samples coll. and subm. by C. C. Reeves, Jr., Dept. of Geosciences, Texas Tech Univ., Lubbock; comments by C.C.R., Jr.
- 32,550 ± 1600**
- Tx-639. Blackwater Draw HAL-1** **30,600 B.C.**
Carbonate rock from W side Blackwater Draw ca. 10 mi N of Amherst, Lamb Co., Texas (35° 10' N Lat, 102° 25' W Long), about halfway up from bottom of draw. Assoc. with ponding of Blackwater Draw. Coll. 1968. *Comment*: shows ponding during Terry Subpluvial and desiccation during Rich Lake Interpluvial.
- 25,460 ± 860**
- Tx-689. Mound Lake, W** **23,510 B.C.**
Lacustrine carbonate (dolomite) from deep erosional cut, W side playa of Mound Lake, Terry Co., Texas (33° 14' N Lat, 102° 05' W Long), immediately S of Cities Service brine pit. Dolomite is overlain by Tahoka clay, underlain by Rich Lake clay. See also Tx-270-273 (Radio-carbon, 1966, v. 8, p. 459), Tx-327 and 328 (*ibid.*, 1968, v. 10, p. 387), Tx-549-552 (*ibid.*, 1970, v. 12, p. 252). Coll. 1968. *Comment*: fixes maximum age for Tahoka Pluvial; dates Rich Lake dolomite.
- 16,810 ± 820**
- Tx-749. Rich Lake, Texas** **14,860 B.C.**
Shells from erosional cut at N end of Rich Lake, 7 mi NE of Brownfield, Terry Co., Texas (33° 18' N Lat, 102° 12' W Long). Apparently in Tahoka Clay sec. Coll. 1968. *Comment*: dates age of enclosing clay.

Tx-750. Loop 289-1 basin **15,640 ± 1730**
13,690 B.C.

Shells from clay zone near top of lacustrine sec., E side of Loop 289 basin, SW side of Lubbock, Texas (33° 35' N Lat, 101° 58' W Long). From lacustrine clay with mammoth bones. Coll. 1968. *Comment:* dates time of last filling of this type of basin.

Tx-640. Lake Palomas, Chihuahua, B **>37,000**

Carbonate rock from middle terrace of pluvial lake in Lake Palomas Basin, Chihuahua, Mexico, at La Mota Point (31° 20' N Lat, 107° 30' W Long). Terrace is Pleistocene, expected age: <10,000 yr old. Coll. 1967. *Comment:* carbonate is spring deposit over Pleistocene shore, source of carbonate being Paleozoic strata to the W. Cf. Tx-464, 27,150 ± 1060 (Radiocarbon, 1968, v. 10, p. 389) from high La Mota shoreline in same lake basin.

IV. PALEOBOTANICAL SAMPLES

Boriack Peat Bog series

Peat samples from 2 cores in Boriack Peat Bog, 6.7 mi SW of Lexington, Lee Co., central Texas, on N bank of Owens Branch, a tributary of Yegua Creek (30° 21' 48" N Lat, 97° 05' 92" W Long). Coll. 1969 by Bryant and Valastro; subm. by V. M. Bryant, Jr., Dept. Botany, Univ. of Texas, Austin.

Tx-837. Boriack Core I, 40 to 50 cm	3700 ± 90 1750 B.C.
Tx-838. Boriack Core I, 240 to 250 cm	9850 ± 160 7900 B.C.
Tx-839. Boriack Core I, 440 to 450 cm	13,810 ± 210 11,860 B.C.
Tx-840. Boriack Core I, 500 to 527 cm	15,460 ± 250 13,510 B.C.
Tx-841. Boriack Core II, 40 to 50 cm	3850 ± 80 1900 B.C.
Tx-842. Boriack Core II, 240 to 250 cm	10,010 ± 160 8060 B.C.
Tx-843. Boriack Core II, 440 to 450 cm	14,410 ± 220 12,460 B.C.

General Comment (V.M.B.): dates indicate following vegetational sequence for central Texas: before 14,000 B.P., temperate deciduous woodland with some conifers; 14,000 to 10,000 B.P., transition to parkland; after 10,000 B.P., loss of parkland elements, replacement by oak savannas; 7000 to 4500 B.P., hot and/or dry altithermal conditions; 4500 B.P. to present, increasing aridity. This record and that of Hershop Bog ca. 70 mi SSW of Boriack (Tx-837-843, this list) indicate trend toward less mesic conditions in central Texas during the past 10,000 yr.

V. ARCHAEOLOGIC SAMPLES

A. George C. Davis site, East Texas

Charcoal samples from George C. Davis site (41CE19), E side Neches R. valley 6 mi SW of Alto, Cherokee Co., Texas (31° 35' N Lat, 95° 10' W Long). Site is a mound and village site of Alto focus, early Caddoan; stylistic cross-dating suggests it may be earliest Caddo site known. Major excavations in 1939-41 (Newell and Krieger, 1949) limited to small portion of site (Mound A and vicinity), was source of previous dated samples, all from same house: C-153, 1553 ± 175 (Libby, 1955, p. 108); M-1186, 655 ± 75 (Radiocarbon, v. 5, 1963, p. 241); Tx-105, 1120 ± 90 (Radiocarbon, v. 6, 1964, p. 155). Present samples are from different portion of site (Mounds B and C and vicinity) but ceramics indicate same cultural affiliation. Coll. 1968-69 and subm. by D. A. Story, Dept. Anthropol., Univ. of Texas, Austin; comments by D.A.S. except as noted. In titles, "F" stands for "Feature."

Geo. Davis site, Feature 120 series

Feature 120 is small circular structure overlain by washed fill of Mound B; thought to be earliest structure excavated thus far under Mound B.

Tx-914A. Geo. Davis 52, F120, corn **790 ± 70**
A.D. 1160

Tx-914B. Geo. Davis 52, F120, wood **1060 ± 60**
A.D. 890

Tx-914 sample was from fill of Post Mold 2. Sorted under low magnification; Tx-114A believed to be mostly or entirely corn, Tx-914B wood. *Comment* (S.V., Jr.): discrepancy about as expected; our experience is that corn produces dates ca. 300 yr too recent.

Tx-925. Geo. Davis 69, F120 **1150 ± 70**
A.D. 800

Combined sample from fill of Post Molds 1 through 6.

General Comment: Tx-914B and Tx-925 in good agreement; house probably dates in 9th century. A.D.

Geo. Davis site, Feature 115 series

Feature 115 is subrectangular structure overlain by Mound B fill and washed Mound B fill.

Tx-920. Geo. Davis 60, F115, subfloor **1150 ± 70**
A.D. 800

Scattered charcoal from midden-stained soil underlying prepared floor.

Tx-923. Geo. Davis 67-71, F115 **1020 ± 100**
A.D. 930

From fill of Post Molds 1 and 2.

General Comment: dates agree within 1σ ; house probably dates in 9th or 10th century A.D. Midden, as expected, dates slightly earlier.

Geo. Davis site, Feature 108 series

Feature 108 is a subrectangular structure overlain by washed fill of Mound B.

900 ± 70

Tx-916. Geo. Davis 55, F108 **A.D. 1050**

Scattered charcoal from thin midden overlying prepared floor.

830 ± 70

Tx-915. Geo. Davis 54, F108 **A.D. 1120**

Scattered charcoal from midden just outside Feature 108 and same elevation as Tx-916.

General Comment on Tx-916, Tx-915: good agreement between samples; house probably dates in latter part of 11th century A.D.

Geo. Davis site, Feature 111 series

Feature 111 is large circular structure (probably ceremonial) underlying fill of Mound B.

870 ± 160

Tx-911. Geo. Davis 49, F111 **A.D. 1080**

From fill of Post Mold 20.

870 ± 70

Tx-912. Geo. Davis 50, F111 **A.D. 1080**

Charred horizontal beam in depression along exterior wall.

810 ± 70

Tx-918. Geo. Davis 57, F111 **A.D. 1140**

Charred horizontal beam in depression along exterior wall between Posts 17 and 21.

980 ± 70

Tx-917. Geo. Davis 56, F111 **A.D. 970**

From fill of several small wall posts in depression along exterior wall.

850 ± 100

Tx-905. Geo. Davis 28, F111, overburden **A.D. 1100**

Scattered charcoal from midden overlying prepared floor.

950 ± 70

Tx-921. Geo. Davis 65, F111, overburden **A.D. 1000**

Scattered charcoal from midden overlying prepared floor.

General Comment: dates in good agreement; house probably dates between A.D. 950 and A.D. 1100.

Geo. Davis site, Feature 112 series

Feature 112 is circular structure underlying Mound B fill; believed contemporary with other sub-Mound B structures except Feature 120.

Tx-919. Geo. Davis 58, F112 **1310 ± 80**
A.D. 640
From fill of Post Mold 10.

Tx-924. Geo. Davis 68, F112 **940 ± 70**
A.D. 1010
Combined sample from fill of Post Molds 1 through 11.

Tx-910. Geo. Davis 37, F112 **830 ± 70**
A.D. 1120
From fill in probable post trench (Feature 114).

General Comment: Tx-924 and Tx-910 agree within 1σ ; house probably dates between A.D. 950 and 1150. Tx-919 anomalous, presumably not relevant; no explanation for discrepancy.

Geo. Davis site, sub-Mound B midden series

Samples from cultural zone just below Mound B and washed Mound B fill.

Tx-674. Geo. Davis 4, sub-Mound B **1420 ± 100**
A.D. 530
From below Feature 108, Excav. Unit 3A, elev. 99.26 to 99.06 m.

Tx-675. Geo. Davis 10, sub-Mound B **1010 ± 80**
A.D. 940
Excav. Unit 3C, 99.36 to 99.16 m.

Tx-676. Geo. Davis 11, sub-Mound B **1120 ± 80**
A.D. 830
Excav. Unit 3B, 99.17 to 99.06 m.

Tx-677. Geo. Davis 12, sub-Mound B **1070 ± 70**
A.D. 880

General Comment: except for Tx-674, dates form good stratigraphic series. Tx-674 seems early, but lower part of sub-Mound B midden poorly sampled.

Tx-678. Geo. Davis 22, Excav. Unit 4 **1430 ± 160**
A.D. 520
From lower part of occupation zone in village remains S of Mound B. Large error quoted due to small sample size. *Comment:* date early, cannot be unequivocally taken as true age unless other similar dates are obtained. Assoc. ceramics are Alto focus.

Tx-913. Geo. Davis 51, Feature 119 **1150 ± 80**
A.D. 800

Scattered charcoal from introduced layer of greenish sand at bottom of shaft burial with elaborate offerings, Feature 119, in Mound C; thought to be earlier than Mound B. Assoc. of charcoal with burial not certain, but lack of other midden debris suggests charcoal was deliberate inclusion. *Comment:* if date does apply to burial, burial dates well before Mound B.

Geo. Davis site, Feature 110 series

Feature 110 is scattered series of post molds in Excavation Unit 6, representing at least one structure, near edge of terrace S of Mound B. Samples are from just below plow zone.

Tx-906A. Geo. Davis 29, F110, corn **710 ± 70**
A.D. 1240

Tx-906B. Geo. Davis 29, F110, wood **1130 ± 160**
A.D. 820

Tx-906 was from fill in lower part of Post Mold 1. Sorted under low magnification into corn sample and wood sample. *Comment* (S.V., Jr.): discrepancy between corn and wood is somewhat larger than expected from our experience. Tx-906B should be proper radiocarbon age of sample; large error due to small sample size.

Tx-926. Geo. Davis 70, F110 **1000 ± 60**
A.D. 950

From fill in lower part of Post Mold 1; should be same age as Tx-906B.

Tx-907. Geo. Davis 30, F110 **960 ± 70**
A.D. 990

From fill in lower part of Post Mold 2.

Tx-922. Geo. Davis 66, F110 **1070 ± 70**
A.D. 880

From fill in lower part of Post Mold 2. Sample was split and 2 parts prepared and counted separately: 1000 ± 70, 1140 ± 100.

Tx-908. Geo. Davis 31, F110 **1230 ± 100**
A.D. 720

From fill in lower part of Post Molds 7 and 17.

Tx-909. Geo. Davis 32, F110 **1170 ± 120**
A.D. 780

From fill in lower part of Post Mold 17.

General Comment: principal overlap of 1σ ranges is between A.D. 700 and 1000; dates suggest more than one structure is represented.

General Comment on Davis site dates: long span of occupation indicated. Village remains underlying Mound B and at terrace edge S of Mound B appear to date between A.D. 700 and 1200, with Mound B construction beginning ca. A.D. 1200. Features 108, 111, and 112 immediately under Mound B were probably constructed between A.D. 1000 and 1200. Feature 115 is slightly older, and Feature 120 is at least 100 or 200 yr earlier. Earliest sub-Mound B date, Tx-674, is from midden debris not assoc. with a structure and is out of stratigraphic sequence.

B. Other Texas sites

Tx-666. Tuck Carpenter site, Texas **360 ± 70**
A.D. 1590

Charred logs from Burial 10, Tuck Carpenter site (41CP5), 3 mi E of Pittsburg, Camp Co., NE Texas (32° 59' 41" N Lat, 94° 54' 53"

W Long). Site is a Titus focus (late prehistoric Caddoan) cemetery. Pottery styles suggest 2 time periods; if so, Burial 10 is of the later period. Sample was from near feet of individual. Coll. 1963 by R. L. Turner, Jr.; subm. by E. M. Davis. *Comment* (E.M.D.): 1st date from a classic Titus focus site; agrees with estimates of age (A.D. 1500-1700) from Whelan complex (early Titus focus): Tx-83, Tx-84 (Radiocarbon, 1964, v. 6, p. 156); Tx-199, Tx-202 (*ibid.*, 1965, v. 7, p. 309-310); Tx-238 through Tx-241 (*ibid.*, 1966, v. 8, p. 461-462). Time spans of complexes may be too small to distinguish on basis of C¹⁴ assays.

Sam Kaufman series, Northeastern Texas

Charcoal samples from House 3, Sam Kaufman site (X41RR1), right bank of Red R. 5.2 mi NW of State Hwy 37 bridge, in Red River Co., Texas (33° 54' N Lat, 95° 07' W Long). Assigned to Sanders focus, Gibson aspect Caddoan (Skinner *et al.*, 1969). Coll. 1968 and subm. by S. A. Skinner and R. K. Harris, Dept. Anthropol., Southern Methodist Univ., Dallas, Texas.

		870 ± 70
Tx-882.	Sam Kaufman 43	A.D. 1080
		1000 ± 70
Tx-883.	Sam Kaufman 44	A.D. 950
		910 ± 70
Tx-884.	Sam Kaufman 64	A.D. 1040
		900 ± 70
Tx-885.	Sam Kaufman 65	A.D. 1050

General Comment (S.A.S. and R.K.H.): dates indicate house was occupied in 11th century A.D., which is consistent with archaeological evidence.

Price Daniel series, Southeastern Texas

Human bone fragments from Price Daniel site (41LB3), E side Trinity R. flood plain, 2 mi N of Liberty, Texas (30° 05' 30" N Lat, 90° 47' 30" W Long). In immediate vicinity of bones were sandy-paste potsherds, fired clay lumps, 2 probable Neo-American arrowpoints, one partial dart point. Subm. by C. D. Tunnell and J. M. Malone, State Archaeologist's office, Austin, Texas. Dating was done on carbonate in bone apatite, following Haynes (1968).

		4080 ± 430
Tx-887.	Price Daniel 29-30	2130 B.C.
	From Test 1, Levels 1 and 2. Coll. 1967 by Jensen and Tunnell.	
		4500 ± 160
Tx-896.	Price Daniel 2	2550 B.C.

From Area 1, Levels 3 and 4. Same excavation area as Tx-887 (above) and almost certainly same burial. Coll. 1969 by J. M. Malone. *General Comment* (J.M.M., E.M.D., S.V., Jr.): from what little is now known, pottery first appears after A.D. 1 in this region (Ambler, 1967, p.

78-79); thus these dates are at least 2000 yr older than expected. No burial pit visible, so that primary assoc. of bones with potsherds now seems questionable.

Spanish Moss series, Southeastern Texas

Rangia shell samples from near E edge of cut on N face of Spanish Moss site (41GV10), shell midden on S side Clear Lake ca. 3000 ft W of mouth of Robinson's Creek at SW edge of Houston, Texas (29° 32' N Lat, 95° 06' W Long). Site has sandy paste pottery of general Goose Creek type, also some sherd-tempered pottery. Coll. 1968 by T. R. Hester and J. E. Corbin; subm. by E. M. Davis.

740 ± 70

Tx-690. Spanish Moss, upper **A.D. 1210**

From near surface of midden. Sandy-paste pottery and some sherd-tempered pottery.

2450 ± 70

Tx-691. Spanish Moss, lower **500 B.C.**

From bottom of midden. Sandy-paste pottery; no sherd-tempered pottery.

General Comment (T.R.H., J.E.C.): dated sample pairs of charcoal and *Rangia* from nearby Wallisville Reservoir (Radiocarbon, 1970, v. 12, p. 263) indicate *Rangia* gives ages 200-300 yr older than charcoal in this environment, although sometimes disparity is less. Two Wallisville charcoal dates (Tx-400, 1990 ± 90; Tx-401, 1780 ± 100; *ibid.*, p. 265) indicate earliest pottery there is ca. A.D. 100. Present date Tx-691 suggests pottery appeared in this area a few centuries earlier.

Kyle site, Series 2: snail shells

Snail shells from Kyle rock shelter (41H11), E edge of Brazos R. valley SE of Blum, Hill Co., Texas (32° 02' N Lat, 97° 25' W Long). Site was stratified; Austin focus lower, Foyah focus higher (Jelks, 1962). For previous dates from site see Radiocarbon, 1964, v. 6, p. 149. Present series dates by M. A. Tamers and F. J. Pearson, Jr., 1963-64 at this lab, but not reported until now; dated to study validity of C¹⁴ dates on terrestrial snail shells (Tamers, 1970). Coll. 1959-60 and subm. by E. B. Jelks, Texas Archaeol. Salvage Project, Univ. of Texas, Austin.

1140 ± 130

Tx-742. Kyle 71, shell **A.D. 810**

Stratum 5; late to middle Toyah focus.

1980 ± 80

Tx-743. Kyle 104, shell **30 B.C.**

Stratum 4; Austin-Toyah focus transition.

1350 ± 110

Tx-744. Kyle 163, shell **A.D. 600**

Upper Stratum 1; middle Austin focus.

- Tx-745. Kyle 147, shell** **1680 ± 140**
A.D. 270
Middle Stratum 1; early Austin focus.
- Tx-746. Kyle 159, shell** **1550 ± 140**
A.D. 400
Lower Stratum 1; very early Austin focus.
General Comment (E.M.D.): dates are unrealistically old (except perhaps Tx-746) but in varying amounts. Significance of variation is discussed by Tamers (1970).
- Smith Shelter, Series 3: snail shells**
Snail shell samples from Smith rock shelter (41TV42) on Onion Creek S of Austin, Texas (30° 12' N Lat, 97° 43' W Long). Site is stratified, with 11 layers; deepest is Transitional Archaic, most recent is Toyah focus (Suhm, 1957). Present series dated by M. A. Tamers and F. J. Pearson, Jr., 1963-64 at this lab, but not reported until now; dated to study validity of C¹⁴ dates on terrestrial snail shells (Tamers, 1970). Coll. 1954-55 and subm. by D. A. Story, Dept. Anthropol., Univ. of Texas, Austin.
- Tx-736. Smith 2, shell** **1390 ± 150**
A.D. 560
Sq. N1-N2; B-C; 0 to 15 cm below surface; mixed layers X and XI, Toyah focus with some European materials.
- Tx-737. Smith 33, shell** **1150 ± 110**
A.D. 800
Sq. 0-N1; C-D; 106 to 122 cm below surface, mixed layers III and IV, Austin focus.
- Tx-738. Smith 36, shell** **1400 ± 80**
A.D. 550
Sq. 0-S1; D-E; 229 to 244 cm below surface. Layer I, Transitional Archaic.
- Tx-739. Smith 19, shell** **1730 ± 70**
A.D. 220
Sq. 0-S1; D-C; 152 to 168 cm below surface. Layer II; little cultural material but should be either Transitional Archaic or early Austin focus.
- Tx-740. Smith B, shell** **1260 ± 70**
A.D. 690
Sq. S1-S2; C-D; 91 to 106 cm below surface. Layer II, Austin focus.
- Tx-741. Smith C, shell** **1090 ± 90**
A.D. 860
Sq. S1-S2; C-D; 46 to 61 cm below surface. Layer IX, Austin focus.
General Comment (D.A.S.): these and other shell dates from site (Radio-carbon, 1970, v. 12, p. 271) are so inconsistent with stratigraphic sequence and with charcoal dates (*ibid.*, 1964, v. 6, p. 145-146) that they are of no archaeological significance.

Loeve series, Laneport Reservoir

Charcoal samples from Loeve site (41WM133), 3.9 mi SE of Granger, Williamson Co., Texas, on left bank of San Gabriel R. (30° 39' N Lat, 97° 24' W Long). Site, buried in flood plain deposit, represents early part of local sequence—short-term camps immediately beside river channel. Samples are from Unit II, clay, and underlying Unit III, basal gravels. No cultural assoc. except for hearths and flint flakes. Coll. 1968 and subm. by F. W. Eddy, Texas Archaeol. Salvage Project, Balcones Research Center, Univ. of Texas, Austin.

Tx-802. Loeve 37 **7000 ± 160**
5050 B.C.

From Fire Hearth 3 in Unit II, just above contact with Unit III. Sample was divided and 2 parts prepared and counted separately: 6810 ± 160 and 7190 ± 80.

Tx-805. Loeve 30 **6900 ± 110**
4950 B.C.

From Fire Hearth 2 in Unit III.

General Comment (F.W.E.): site evidently in use ca. 5000 B.C., thus during local Archaic stage.

Dobias-Vitek series, Laneport Reservoir

Charcoal samples from Dobias-Vitek site (41WM118), 4.2 mi SE of Granger, Texas, on left side San Gabriel R. (30° 30' N Lat, 97° 00' W Long). Site, in Catalpa soil in top of Recent-age flood-plain deposit, represents later part of local sequence—seasonal camps located back from main drainage. Neo-American and Transitional Archaic artifacts found throughout 3.8 ft thick alluvial soil. Coll. 1968-1969 and subm. by F. W. Eddy.

Tx-804. Dobias-Vitek 6 **1350 ± 70**
A.D. 600

From Fire Hearth 1, Test Pit 1, 0.2 m below surface of plowed field. Four sand-tempered sherds found in same dug level as hearth. Should date end of Transitional Archaic stage.

Tx-806. Dobias-Vitek 57 **770 ± 70**
A.D. 1180

From Fire Hearth 3, Test Pit 4, 0.3 to 0.6 m below undisturbed surface. Perdiz arrowpoint and bone-tempered potsherd immediately overlay hearth. Should date middle of Neo-American stage at site.

General Comment (F.W.E.): dates not inconsistent with archaeological chronology as now known. More such dates will help us understand relationship between local fluvial history and cultural events.

Tx-688. Agarita site, Texas **700 ± 160**
A.D. 1250

Charcoal from Feature 4, Unit 16, Area B, Agarita site (41CK30), at confluence of Salt Creek and Colorado R., 6.8 mi W of Robert Lee, Coke Co., Texas, in Robert Lee Reservoir basin (31° 55' N Lat, 100°

37' W Long). Site has 2 living surfaces, both with Neo-American components; sample is from more recent surface, which had side-notched and unnotched arrowpoints. Combination of point forms suggests earlier time than ca. A.D. 1500 ascribed to sites 100 mi N of here with side-notched points and Rio Grande Glaze V pottery (Parson, 1967). *Comment* (H.J.S.): date supports archaeological estimate.

190 ± 80**Tx-679. Pavo site, Texas****A.D. 1760**

Charcoal assoc. with ash pit, Feature 5, at Pavo site (41CK129) on low bluff at N edge of Colorado R. flood plain, 6 mi NW of Robert Lee, Coke Co., Texas, in Robert Lee Reservoir basin (31° 50' N Lat, 100° 30' W Long). Assoc. with "cloud blower" pipe, presumably of SW origin. Coll. 1968 and subm. by H. J. Shafer. *Comment* (H.J.S.): date agrees well with Kidder's (1932, p. 169-182) dating of similar pipes at Pecos, A.D. 1500 to 1838.

La Jita series, Texas

Charcoal samples from La Jita site (41UV21), E side Sabinal R., in La Jita Girl Scout Camp, 3 mi S of Utopia in extreme NE corner of Uvalde Co., Texas (29° 34' N Lat, 99° 31' W Long). Site is 3 burned rock middens and cultural debris in surrounding terrace fill. Principal occupation Middle Archaic (Montell and especially Pedernales dart points); below is Early Archaic with corner-notched (Martindale-like) dart points; above is Late Archaic (Ensor, Frio dart points) and Neo-American (Edwards, Scallorn, Perdiz arrow points) with pottery. Coll. 1967 and subm. by T. R. Hester, Dept. Anthropol., Univ. of Texas, Austin, via E. M. Davis. Samples listed in presumed chronologic order, recent to older, based on type assoc.

660 ± 70**Tx-687. La Jita 49****A.D. 1290**

N15/E35, Level 2. Neo-American: Scallorn and other side-notched arrow points; bipoined knife.

810 ± 50**Tx-684. La Jita 176****A.D. 1140**

N25/E40, Level 3. Mixed Neo-American and Archaic: Sabinal arrow points (local type similar to Scallorn), Pedernales points triangular thinned biface. Sample split and 2 parts prepared and counted separately: 800 ± 60, 810 ± 90.

710 ± 70**Tx-664. La Jita 86****A.D. 1240**

Test Pit 6, Level 1. Neo-American and Archaic: Perdiz, Ensor-like, Marshall-like points. From thin deposit near edge of site; occupations probably mixed.

910 ± 80**Tx-665. La Jita 29****A.D. 1040**

N10/E40, Level 2. Mixed early Neo-American and Late Archaic: Montell, Edwards, arrow point fragments.

- Tx-681. La Jita 137** **990 ± 60**
A.D. 960
 N15/E35, Level 3. Mixed early Neo-American and Late Archaic.
 Frio dart points, Edwards points and arrow point fragments.
- Tx-685. La Jita 72** **1100 ± 70**
A.D. 850
 N20/W50, Level 3. Mixed early Neo-American and Late Archaic:
 Edwards and Pedernales types.
- Tx-686. La Jita 147** **1460 ± 80**
A.D. 490
 N60/E40, Level 2. Late Middle Archaic: Frio point.
- Tx-692. La Jita 32** **1850 ± 180**
A.D. 100
 N10/E40, Level 4. Late Archaic or Late Middle Archaic: Montell,
 Pedernales, Marshall-like point.
- Tx-682. La Jita 55** **920 ± 70**
A.D. 1030
 N15/E35, Level 4. Middle Archaic: Pedernales points.
- Tx-683. La Jita 160** **650 ± 50**
A.D. 1300
 N20/E35, Level 2. Middle Archaic: Pedernales point and other dart
 point fragments. Sample split; 2 parts prepared and counted separately:
 600 ± 80, 690 ± 70.

General Comments (T.R.H.): these are 1st dates from SW edge of Edwards Plateau. In general, Neo-American occupations agree in age with those of central Texas (Jelks, 1962, p. 98) though Scallorn points may have lasted much longer here. Edwards seems to be earliest arrow point type, dating from 10th century; Sabinal local type may appear later. Late Archaic dates indicate that period ended ca. A.D. 1000, much later than in either Amistad Reservoir to W or central Texas to NE. Dates on Montell specimens here are much later than those in Amistad Reservoir where they are from 2100 to 2800 B.P. (see comments with Tx-570; Radiocarbon, 1970, v. 12, p. 270). Best date for Pedernales type may be Tx-692; other much later dates, especially Tx-682 and Tx-683, were from rather mixed upper levels containing random Pedernales specimens. Dates of pottery at site not pin-pointed, but Tx-644 is most applicable. (E.M.D.): dates in general are so recent that one suspects some mixture of material.

Parker Midden #1 series, Texas

Charcoal samples assoc. with central slab-lined cooking pit at Parker Midden #1 (41CX30), ring midden on plateau at head of Simson Creek, 5 mi NE of Pecos R. near Iraan, in NW Crockett Co., Texas (31° 00' N Lat, 101° 48' W Long). Small unifacial scrapers directly assoc. with

cooking pit. Ensor point was in burned rock area on S side of midden, presumably same age as cooking pit or later. Coll. 1968 by A. W. Sommer and J. W. Greer; subm. by E. M. Davis.

Tx-645. Parker Midden #1, 3 **1160 ± 70**
A.D. 790
40 to 50 cm below surface, Sqs. K, K-1-E, J, J-1-W.

Tx-646. Parker Midden #1, 4 **1050 ± 70**
A.D. 900
50 to 60 cm below surface, Sqs. K, K-1-E, K-1-W.

Tx-647. Parker Midden #1, 5 **970 ± 70**
A.D. 980
Sqs. K, K-1-E, K-1-W, J, J-1-E, J-1-W, in and adjacent to pit. *Comment* (E.M.D., J.W.G.): date of site appears to be between A.D. 800 and 1000; agrees with estimate by Greer (1968) of probable age of such features.

Arenosa Shelter, Series 3

Charcoal from Arenosa Shelter (41VV99), right bank of Pecos R., 1 mi upstream from confluence with Rio Grande (29° 42' N Lat, 101° 22' W Long). For previous series from this site see Radiocarbon, 1967, v. 9, p. 444-445, and 1970, v. 12, p. 268. Coll. 1968 and subm. by D. S. Dibble, Texas Archaeol. Salvage Project, Balcones Research Center, Univ. of Texas, Austin.

Tx-696. Arenosa 653, Stratum 9 **2230 ± 80**
280 B.C.

From matrix of upper 1/3 of Stratum 9; dates earlier part of Ensor and Frio point occurrence at site.

Tx-701. Arenosa 659, Stratum 21 **3220 ± 70**
1270 B.C.

From all levels of Stratum 21; point assoc. principally Langtry, Val Verde, and "Shumla-like" (large barbed form with some morphologic and stratigraphic differences from classic Shumla at this site).

Tx-773. Arenosa 655, Stratum 30L **4670 ± 70**
2720 B.C.

From lower 1/2 of Stratum 30L; earliest occurrence of Pandale points.

General Comment (D.S.D.): dates are close to expectations in terms of previous dates from site. This series and previous dates indicate relatively rapid accumulation of cultural debris and overbank alluvial deposits through late Early Archaic and Middle and Late Archaic periods.

C. Louisiana and New Mexico

Tx-680. Poverty Point, Louisiana **3000 ± 90**
1050 B.C.

Burned cane from shallow pit below midden exposed in caving W bank of Bayou Macon, N Sec., Ridge 2, Poverty Point site (41CW2;

Ford and Webb, 1956), ca. 7 mi E of Epps, W Carrol Parish, Louisiana (34° 38' N Lat, 91° 24' W Long). Represents early occupation by Poverty Point people in this part of site, before construction of geometric ridges. Coll. 1968 by M. Hillman; subm. by C. M. Webb, 1560 Line Ave., Shreveport, La. *Comment* (E.M.D.): date agrees within 1σ with M-403, 2850 \pm 250 (Crane and Griffin, 1958); L-195, 2860 \pm 90 (Broecker *et al.*, 1956); O-66, 3150 \pm 120 (Brannon *et al.*, 1957); and is close to several others from site (Ford and Webb, 1956, p. 121-122). However, Webb (1968, p. 318) suggests site may have been established considerably before this time. Present sample is of cane, raising question of possible fractionation, which might make date erroneously young by as much as 2 centuries (Bender, 1968).

2930 \pm 60**Tx-886. Yucca Cave, New Mexico****980 B.C.**

Wooden stick from crossed arrangement of sticks partly under large breakdown rock at Yucca Cave (Site C-27), large collapse sink in convex slope of Capitan Escarpment, 1/2 mi SW of mouth of Yucca Canyon, Carlsbad Caverns Natl. Monument, New Mexico (30° 05' 44" N Lat, 104° 35' 27" W Long). Sticks had been partly crushed by breakdown rock, on top of which is stalagmite 80 cm high and 15 cm average diam. No cultural assoc. Coll. 1969 by E. R. Anderson; subm. by P. F. van Cleave, Acting Supt., Carlsbad Caverns Natl. Monument, New Mexico. *Comment* (E.M.D.): date is maximum for fall of breakdown rock, and time of human use of cave.

*D. Mexico***La Calsada series, Nuevo Leon**

Charcoal samples from La Calsada site (NL103), overlooking Río Pílon valley, Ejido de Casillas, Municipio de Rayones, Nuevo Leon, Mexico (ca. 25° 00' N Lat, 100° 05' W Long). Site has 5 principal stratigraphic units: Unit 1-2 (highest) with arrow points and double-side-notched dart points; Unit 3 with earliest side-notched points, broad oval and triangular (Tortugas) dart points; Unit 4, stemmed dart points; Unit 5, Lerma and double-stemmed points; Unit 6, diamond-shaped and small leaf-shaped points. Each unit excavated in 10 cm levels numbered from top downward within unit. Samples coll. on screen. Coll. 1965 by C. R. Nance; subm. by Nance and J. F. Epstein, Dept. Anthropol., Univ. of Texas, Austin. Samples listed in order of increasing depth; in titles, "U" is unit, "L" is level.

Tx-707. La Calsada C-5: U1-2, L2 **580 \pm 60**
A.D. 1370

Tx-706. La Calsada C-4: U1-2, L3 **1050 \pm 80**
A.D. 900

Tx-709. La Calsada C-11: U3, L8 **4400 \pm 90**
2450 B.C.

Tx-710.	La Calsada C-12: U3, L9	5400 ± 100 3450 B.C.
Tx-708.	La Calsada C-10: U3, L9	4310 ± 90 2360 B.C.
Tx-764.	La Calsada C-18: U4, L3	4790 ± 90 2840 B.C.
Tx-768.	La Calsada C-20: U4, L2	5940 ± 160 3990 B.C.
Tx-767.	La Calsada C-19: U4, L4	6520 ± 150 4570 B.C.
Tx-711.	La Calsada C-13: U4, L1	5710 ± 120 3760 B.C.
Tx-765.	La Calsada C-14: U4, L2	4460 ± 120 2510 B.C.
Tx-769.	La Calsada C-24: U5, L2	7040 ± 180 5090 B.C.
Tx-766.	La Calsada C-23: U5, L2	7990 ± 130 6040 B.C.
Tx-354.	La Calsada C-3: U5, L2	7920 ± 190 5970 B.C.
Tx-770.	La Calsada C-27: U5, L5	9310 ± 160 7360 B.C.
Tx-771.	La Calsada C-28: U5, L7	8610 ± 100 6660 B.C.
Tx-353.	La Calsada C-2: U5, L7	9270 ± 150 7320 B.C.
Tx-352.	La Calsada C-1: U6, L2	9940 ± 150 7990 B.C.
Tx-772.	La Calsada C-30: U6, L2	9670 ± 70 7720 B.C.
Tx-875.	La Calsada C32-33: U6, L5	10,640 ± 210 8690 B.C.
Tx-895.	La Calsada C-43: U6, L12-13	9550 ± 130 7600 B.C.

General Comment (C.R.N.): dates provide good series, although some mixing within units is evident, and Unit 3 and 4 dates overlap. Estimated times of units are: Unit 1-2, A.D. 900 to historic; Unit 3, 2500 B.C. to after 1200 B.C. (by comparison with Cueva de la Zona de Derrumbes

where earliest Tortugas points are post-1200 B.C.; see Tx-147, Radiocarbon, 1965, v. 7, p. 312); Unit 4, 4000 B.C. to 2500 B.C.; Unit 5, 7500 B.C. to after 5000 B.C.; Unit 6, before 8700 B.C. to 7500 B.C.

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