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SOUTHERN METHODIST UNIVERSITY RADIOCARBON DATE LIST III

HERBERT HAAS
Institute for the Study of Earth and Man, Southern Methodist University
Dallas, Texas 75275

INTRODUCTION

The dates presented in this list were determined between June 1974 and October 1983. They relate to projects in North America and in Algeria. Dates with numbers prior to SMU-500 have generally no correction for fractionation. Following this initial series of dates an increasing number of $\delta^{13}C/^{12}C$ measurements were made by an outside laboratory, especially if the submitter requested a fractionation correction or if the sample was of carbonate or bone.

Our dating method is based on benzene synthesis and liquid scintillation counting. Equipment and procedures were previously described (Haynes & Haas, 1974; Haas & Haynes, 1975; Haas, 1979; Meeks, 1979; Devine & Haas, 1987).

The modern standards used in our laboratory are NBS Oxalic Acid I and II. These are converted to CO_2 with low temperature combustion in an oxygen atmosphere. The CO_2 yield is mostly between 99 and 100% of the theoretical carbon content. If an occasional lower yield falls below 97% the standard is discarded. An additional test is made on the pH of the water of combustion, which should be 3 or higher for a complete combustion. A pH of 1.5 or lower is an indication of an insufficient combustion yield which may be caused by the lack of an efficient platinum catalyst at the end of the combustion tube.

A fresh modern standard is made about every six weeks. This is necessary because of transfer losses between the different counting vials. Every vial used for sample counting is calibrated individually about every four weeks for counting efficiency and for background. The background standard is benzene synthesized in our system from anthracite of Pennsylvanian age. These background standards are made about every month. This also serves as a check on the cleanliness and reliability of our benzene synthesis system.

During the counter calibration several different modern and background standards are rotated in their use in order to detect any slight anomaly in a particular standard and to lower the risk that a very small and statistically hard-to-detect deviation by one of the standards might cause a bias on the counter calibration.

Reporting dates or ^{14}C results to the submitter of samples is done in two steps at our laboratory. Directly after counting, the results are calculated with recent calibration data of the counters. These calculations are reported as "temporary data." At about six month intervals calibration data of each vial used in the same counter are examined for trends observed on individual vials and for counter instability. Single or multiple linear regressions are used to determine the most probable background

and efficiency values for each day during which samples were counted. These new calibration values are then used to recalculate sample ages. The resulting second report is then sent to the submitter as the finalized date.

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Contributions to the content of this list were made by David Lubell (Algerian dates), Marvin Kay (Phillips Spring and Rodgers Shelter) and C V Haynes (Pomme de Terre River Valley, Missouri).

United States

Missouri

Phillips Spring series

Phillips Spring, an active artesian spring in the lower Pomme de Terre River Valley, Hickory Co (38° 3′ 45″ N, 93° 18′ 33″ W), was the subject of intensive archaeologic, geomorphologic, and palynologic investigations in the 1970s. Extensive excavations were conducted in 1977 and 1978 and were preceded in 1973, 1974, and 1976 by stratigraphic probes of the mainly Holocene (Rodgers) terrace deposits. The prime results of these efforts were: 1) ^{14}C dates of probable domesticated plants to the mid-Holocene (Table 1) with specific reference to Unit K2, the Squash and Gourd Zone; 2) delineation of the major Holocene alluvial cut-and-fill deposits and ^{14}C dates in the lower Pomme de Terre (Tables 1 & 2); and 3) the recovery of pollen from dated late Pleistocene and Holocene contexts (Tables 1 & 2). Synopses of these analyses are found in Chomko (1978), Chomko and Crawford (1978), Haynes (1985), Kay (1983), Kay (1986), Kay, King and Robinson (1980) and King (1980). Tables 1 & 2 provide, in sequence of depositional units, a chronologic overview of the project. The tables are followed by a listing of all dates with complete information on each sample. Transit datum depths (cm) throughout this date list are below a horizontal plane ca 60cm above the highest point on the excavation ground surface. A few early dates, derived from samples collected in 1974, are based on a different reference system, in which depths are given in cm below surface and the use of a different grid system is indicated by parentheses.

SMU-193. Phillips Spring **7480 ± 80**

Moss (160°N, 108° E), depth 170 to 180cm below surface, possibly from Unit C2. Coll July 1974.

TABLE 1
Radiocarbon assays for Phillips Spring (23HI216) archaeologic units

SMU Lab no.	Age BP ($t_{1/2}$ = 5568 yr)	Provenience	Datum depth (m)*	Depositional unit	Archaeologic component	Material	Comments
SMU-1213	5070 ± 150	512.5SE508.5	3.5–3.6	K2	Squash & gourd zone	Charcoal	Acceptable as date for cucurbits in 50 cm unit 512.5SE509.5 at same depth
-811	4970 ± 70	514SE506	3.25	K2	Squash & gourd zone	Uncarbonized twigs	Acceptable, from profile wall, Tr 7
-1214	4500 ± 100	512SE508.5	3.34–3.40	K2	Squash & gourd zone	Charcoal	Acceptable, assoc with cucurbits
-98	4310 ± 70			K2	Squash & gourd zone	Charcoal	Acceptable, from hearth in 1973 backhoe trench**
-102	4240 ± 80			K2	Squash & gourd zone	Charcoal	Acceptable, see SMU-98**
-483	4220 ± 60	510SE508	3.35	K2	Squash & gourd zone	Charcoal	Acceptable, assoc with cucurbits
-1167	4100 ± 250	512SE508	3.0–3.1	E	Sedalia #1	Charcoal	Acceptable
-1165	4100 ± 420	504SE508	3.2	E	Sedalia #1	Charcoal	Acceptable, feature has cucurbits
-423	4000 ± 100	502SE510	3.4	E	Sedalia #1	Charcoal	Acceptable
-1195	3760 ± 100	504SE510	3.2–3.3	E	Sedalia #1	Charcoal & uncharred wood	Reject, sample contaminated by aquatic moss
-1172	3240 ± 450	506SE510	3.2–3.3	E	Sedalia #1	Charcoal	Reject, lab problem with benzene
-556	3960 ± 70	511SE508.5	3.3–3.4	E	Sedalia #1	Charcoal	Acceptable, note Feature 1173 has cucurbits
-419	3940 ± 70	508SE508	3.28	E	Sedalia #1	Charcoal	Acceptable
-558	3920 ± 70	511.5SE508	3.3–3.4	E	Sedalia #1	Charcoal	Acceptable
-319	3930 ± 60	510SE508 ?	3.33	E	Sedalia #1	Charcoal	Acceptable
-1171	4010 ± 90	516SE504	3.5–3.54	E	Sedalia #1	Uncarbonized nut shells	Acceptable, from unit beneath Feature 1969; assoc with cucurbits
-1178	3850 ± 230	516SE504	3.1–3.2	E	Sedalia #3	Charcoal	Acceptable, assoc with cucurbits
-1179	3170 ± 90	516SE504	3.2–3.3	E	Sedalia #3	Charcoal	Reject, inverted stratigraphy
-559	3800 ± 180	500SE508	2.78–2.82	E	Sedalia #3	Charcoal	Acceptable

TABLE 1 (continued)

MU lab no.	Age BP ($t_{1/2}$ = 5568 yr)	Provenience	Datum depth (m)*	Depositional unit	Archaeologic component	Material	Comments
-820	3750 ± 50	506SE514	3.45	E	Sedalia #3	Uncarbonized plant fragments	Acceptable, from unit with pollen
-550	3650 ± 70	514SE508	2.8–2.9	E	Sedalia #4	Charcoal	Acceptable
-1112	3480 ± 50	512SE502	2.9–3.0	E	Sedalia #4	Charcoal	Acceptable
-818	3400 ± 50	508SE514	3.25	E	Sedalia #4	Uncarbonized nut shells	Acceptable, from unit with pollen
-331	3300 ± 50	508SE504	2.94	E	Sedalia #4	Charcoal	Acceptable
-235	3050 ± 60	504SE508	2.66	E	Sedalia #5	Charcoal	Acceptable
-238	2910 ± 50	515SE496	3.38–3.44	E	Sedalia #5	Uncarbonized wood	Acceptable
-1166	2860 ± 250	504SE504	2.8–2.9	E	Sedalia #5	Charcoal	Acceptable, but note age difference for underlying Feature 1858 assay (SMU-235) is insignificant
-1170	2450 ± 220	520SE506	2.6–2.7	E	Middle Woodland?	Charcoal	Acceptable
-236	2340 ± 80	508SE508 ?	2.58	E	Middle Woodland	Uncarbonized wood	Acceptable
-554	2250 ± 100	512SE512	2.8–2.9	E	Middle Woodland	Charcoal	Acceptable, charcoal is mainly oak
-1114	2210 ± 60	514SE510	2.75–2.85	E	Middle Woodland	Charcoal	Acceptable
-1113	2140 ± 60	512SE510	2.8–2.9	E	Middle Woodland	Charcoal	Acceptable
-537	2040 ± 60	514SE508	2.77–2.9	E	Middle Woodland	Charcoal	Acceptable
-234	1990 ± 50	515SE496	2.79	E	Middle Woodland	Charcoal	Acceptable
-538	1900 ± 80	518SE508	2.7–2.8	E	Middle Woodland	Charcoal	Acceptable
-327	1410 ± 50	515SE496	2.6–2.7	G ?	Late Woodland?	Uncarbonized wood	Acceptable
-237	270 ± 50			H	Historic	Charcoal	Acceptable

* As defined in text
Haas & Haynes (1975)

TABLE 2
Non-archaeologic ^{14}C assays for Phillips Spring (23H1216)

Lab no.	Age BP ($t_{1/2}$ = 5568 yr)	Provenience	Datum depth (m)	Depositional unit	Material	Comments
SMU-813	25,050 ± 330	510.9SE511.2	6.5–6.6	A	Humate fraction	Acceptable, Monolith 3266 unit assoc with pollen
-518	8,570 ± 90				Carbonate sediment	Precipitate from spring water
-825	8,090 ± 90	513.4SE511.2	5.1–5.2	C2	Uncarbonized wood	Acceptable, Monolith 3264 unit assoc with pollen
-737	8,050 ± 90	Trench 7	6.25	C1	Uncarbonized wood	Acceptable
-727	7,980 ± 70	513.4SE511.2	4.7–4.8	C2	Uncarbonized wood	Acceptable, Monolith 3264 unit assoc with pollen
-78	7,870 ± 90	Trench 1		C2 ?	Uncarbonized wood	Acceptable, unit assoc with pollen; see Haynes & Haas (1974, p 373)
-735	7,750 ± 90	Trench 7	5.25	C1	Uncarbonized wood	Acceptable
-826	7,650 ± 190	510.9SE511.2	5.5-5.6	C1	Uncarbonized wood & plants	Acceptable, Monolith 3266 unit assoc with pollen
-736	7,620 ± 90	Trench 7	4.7	C1	Uncarbonized wood	Acceptable
-193	7,480 ± 80	515SE496	3.2–3.3	C2 ?	Moss	Acceptable, from pollen profile 74-2; see Haas & Haynes (1975, p 360)
-726	7,300 ± 80	513.4SE511.2	4.2–4.3	C2	Uncharred wood, seeds, & nuts	Acceptable, Monolith 3264 unit assoc with pollen
-812	7,200 ± 100	Trench 7	4.48	C1	Uncarbonized wood & plants	Acceptable
-557	7,090 ± 90	510SE508	3.92	C2	Uncarbonized wood	Acceptable
-819	6,900 ± 80	Trench 7	3.75	C2	Uncarbonized twigs	Acceptable, but lacks ^{13}C correction
-505	6,580 ± 180	510SE508	3.92	C2	Charcoal	Acceptable, see SMU-557 for assay from same sample
-824	6,280 ± 100	513.4SE511.2	3.4–3.5	K1	Mainly uncharred wood	Acceptable, Monolith3264 unit assoc with pollen
-815	5,400 ± 110	Trench 7	3.60	K1	Uncarbonized wood	Acceptable
-539	5,390 ± 90	Pollen profile 74-1		K1 ?	Uncharred moss & wood	Acceptable, unit assoc with pollen
-810	6,430 ± 80	Trench 7	3.40	C3	Uncarbonized wood	Acceptable

SMU-234. Phillips Spring 15-10 **1990 ± 50**

Charcoal (160° N, 108° E), depth 129cm below surface in peat assoc with pottery in Unit E (R 4-5). Coll Dec 1974 by J E King.

SMU-235. Phillips Spring 102-1 **3050 ± 60**

Charcoal (176° N, 116° E), depth 140 to 150cm below surface in Unit E (R 4-5). Light gray clay. Sample was flecks of charcoal scattered across level near top of horizon below rock Unit I. Coll July 1974 by S Chomko and W R Wood.

SMU-236. Phillips Spring 51-1 **2340 ± 80**

Wood (170° N, 116° E) depth 114.5cm below surface in Unit E (R 4-5) organic clay. Coll July 1974 by S Chomko and W R Wood.

SMU-237. Phillips Spring 114-1 **270 ± 50**

Charcoal from trench across spring, in silt Unit H, Feature 14. Flotation recovery from pit fill; may be recent pit assoc with disturbed horizon, S of spring. Coll 1974 by S Chomko and W R Wood.

SMU-238. Phillips Spring 22-1 **2910 ± 50**

Wood (160° N, 108° E) depth 188 to 194 cm below surface in Unit E (R 4-5). In peat, non-ceramic horizon; rests on peat clay contact. Coll July 1974 by S Chomko and W R Wood.

SMU-319. Phillips Spring 108-6 **3930 ± 60**

Charcoal from Feature 1173, Unit E, assoc with squash seeds. Coll by S Chomko and W R Wood.

SMU-327. Phillips Spring 13-10 **1410 ± 50**

Wood (160° N, 108° E) SE quad, 110 to 120cm below surface possibly Unit G (R 6) base of Unit 6, S of spring. Coll by S Chomko and W R Wood.

SMU-331. Phillips Spring 37-2 **3300 ± 50**

Charcoal (180° N, 114° E) from Feature 3 in Unit E (R 4-5); flotation sample. Coll by S Chomko and W R Wood.

SMU-419. Phillips Spring 175 **3940 ± 70**

Charcoal depth 170 to 190cm below surface in Unit E (R 4-5), Feature 1173. From trench excavated in 1976, hearth in occupational horizon. Coll July 1976 by M Kay and J King.

SMU-423. Phillips Spring 202 **4000 ± 100**

Charcoal from Trench 2, excavated in 1976, depth 3.40m. Lower end of hearth buried in occupational horizon Unit E, Feature 201. Coll July 1976 by M Kay.

SMU-483. Phillips Spring 1502 **4220 ± 60**

Charcoal from Sq 510 SE 508 (S half). Sample is well-defined cultural zone below rock-lined pit with Sedalia complex artifacts at depth 3.35m, Unit K2. Sample processed through field flotation. Coll July 1977 by M Kay and J Phillippe.

SMU-505. Phillips Spring 1640, 1st sample **6580 ± 180**

Charcoal from Sq 510 SE 508. Upper portion of rock-lined stream channel defined in field; Unit C2; depth 3.92m. Sample processed through field flotation; trisodium phosphate added to disperse clays. Coll July 1977 by J Phillippe. Second sample fraction of uncharred wood was dated as SMU-557.

SMU-518. Phillips Spring water **8570 ± 90**
$\delta^{13}C = -11.5‰$

Carbonate sediment. Precipitation procedure: water was allowed to rise to near surface by stopping pumps for 10 min, then pumping resumed and water was collected in three 25L and one 20L carboys. KOH (in pellet form), $SrCl_2$, and $FeSO_4$ were added to filled carboy. Dissolved CO_2 and HCO_3^- in water reacts to $SrCO_3$, which flocculates readily in presence of $FeSO_4$ and settles rapidly in neck of inverted carboy. Faucet attached to cap allowed draining of sediment into 0.5L bottles. In laboratory, sediment was transferred into hydrolysis system where it was acidified under vacuum. Released CO_2 was processed to benzene. Coll 1977 by H Haas.

SMU-537. Phillips Spring 393 **2040 ± 60**

Charcoal from Sq S514 SE 508, to 512 SE 508. Sample from 2nd level of pit, Feature 392 in Unit E (R 4-5). Sample was processed through field flotation and was presoaked with trisodium phosphate. Coll July 1977 by R Hake.

SMU-538. Phillips Spring 713 **1900 ± 80**

Charcoal from Sq 518 SE 508, 2nd level of pit Feature 408 in Unit E (R 4-5); depth 2.7 to 2.8m. Sample was processed through field flotation and was presoaked with trisodium phosphate. Coll July 1977 by J Phillippe.

SMU-539. Phillips Spring pollen profile **5390 ± 90**

Uncharred moss and wood fragments, 18.2g. Profile 1974-1, depth 65 to 75cm below surface in peat layer, ca 40cm thick, (probably Unit K1) above what are believed to be artifacts from Upper Sedalia components. Top of peat is below Woodland artifacts. Coll July 1974 by J King.

SMU-550. Phillips Spring 823 **3650 ± 70**

Charcoal from Sq 514 SE 508, first level of pit Feature 424 in Unit E (R 4-5), depth 2.8 to 2.9m on E end of pit above sand-lined floor. Sample

was processed through field flotation and was presoaked with trisodium phosphate. Coll July 1977 by J Behm.

SMU-554. Phillips Spring 789 **2250 ± 100**

Charcoal (predominantly oak) from Sq 512 SE 512. Samples are respectively from 3rd and 4th 10cm levels of Pit 415 in Unit E (R 4-5). Sample was processed through field flotation and was presoaked with trisodium phosphate. Coll July 1977 by J Nylander.

SMU-556. Phillips Spring 1278 **3960 ± 70**

Charcoal Sq 511 SE 508.5, from 50sq cm block in Feature 1173, Unit E (R 4-5). Upper portion of rock-lined basin above "Squash Horizon" defined in field, depth 3.3 to 3.4m. Sample was field processed through flotation; trisodium phosphate added to disperse clays. Coll July 1977 by J Phillippe.

SMU-557. Phillips Spring 1640, 2nd sample **7090 ± 90**

Uncharred wood from Sq 510 SE 508; for first sample, see SMU-505. From top of stream channel fill in Unit C2 (R 2).

SMU-558. Phillips Spring 1453 **3920 ± 70**

Charcoal from Sq 511.5 SE 508, from 50cm block in Feature 117, Unit E (R 4-5). Sample is from rock-lined basin above "Squash Horizon" defined in field, depth 3.3 to 3.4m. Sample field processed through flotation; trisodium phosphate added to disperse clays. Coll July 1977 by J Phillippe.

SMU-559. Phillips Spring 1124 **3800 ± 180**

Charcoal from grid Sq 500 SE 508, 4m, Upper Sedalia complex component-sealed floor. Sample is lumped from several $50cm^2$ units and comprises all charcoal from Feature 1124, Unit E (R 4-5). Coll July 1977 by Field Crew.

SMU-726. Phillips Spring 3464 **7300 ± 80**

Uncharred wood and seeds of nut hulls, 61.5g from 513.4 SE 511.2, depth 4.2 to 4.3m, top of Unit C2 (R 2), channel fill, top of Holocene pollen profile; wood fragments include bark, bur oak acorns, twigs. Coll July 1978 by M Kay.

SMU-727. Phillips Spring 3469 **7980 ± 70**

Uncharred wood, 55.5g, piece of grape vine, piece of charred elm from 513.4 SE 511.2, depth 4.7 to 4.8m. Sample was near center of Unit C2 (R 2) channel fill. Base of Holocene pollen profile. Coll July 1979 by M Kay.

SMU-735. Phillips Spring 40MO78 **7750 ± 90**

Wood from Tr 7 (38° 03′ 45″ N, 93° 18′ 33″ W), depth 5.25m, Unit C1. Coll July 1978 by C V Haynes.

SMU-736. Phillips Spring 41MO78 **7620 ± 90**
$\delta^{13}C = -27.4‰$

Wood from Tr 7, depth 4.7m, Unit C1. Coll July 1978 by C V Haynes.

SMU-737. Phillips Spring 43MO78 **8050 ± 90**
$\delta^{13}C = -30.0‰$

Wood from Tr 7, depth 6.25m, Unit C1. Coll July 1978 by C V Haynes.

SMU-810. Phillips Spring 29MO78 **6430 ± 80**
$\delta^{13}C = -26.7‰$

Sticks, twigs from Tr 7, depth 3.4m, Unit C3, 3.6g coarse, 4.3g fine wood fragments after pretreatment. Coll July 1978 by C V Haynes.

SMU-811. Phillips Spring 31MO78 **4970 ± 70**
$\delta^{13}C = -27.2‰$

Twigs from Tr 7, depth 3.25m, Unit K2, 2.8g coarse, 2.6g fine wood fragments after pretreatment. Coll July 1978 by C V Haynes.

SMU-812. Phillips Springs 39MO78 **7200 ± 100**
$\delta^{13}C = -27.4‰$

Wood, plant fragments from Tr 7, depth 4.48m, Unit C1, 15.8g after pretreatment. Coll July 1978 by C V Haynes.

SMU-813. Phillips Spring 3484 **25,050 ± 330**

Humate fraction from 510.9 SE 511.2, depth 6.5 to 6.6m at top of recovered sec from Unit A; sample was sectioned for pollen, primary spectra was pine. Coll July 1978 by M Kay.

SMU-815. Phillips Spring 30MO78 **5400 ± 110**
$\delta^{13}C = -26.8‰$

Small pieces of wood from Tr 7, depth 3.6m, Unit K1, pretreated by C V Haynes.

SMU-818. Phillips Spring 36MO78 **3400 ± 50**
$\delta^{13}C = -29.2‰$

Walnut shells from Tr 7, from Feature 3492, Unit E, depth 3.25M. Coll July 1978 by C V Haynes.

SMU-819. Phillips Spring 28MO78 **6900 ± 80**

Sticks, twigs from Tr 7, Unit C2, depth 3.75m. Coll July 1978 by C V Haynes.

SMU-820. Phillips Spring 37MO78 **3750 ± 50**
$\delta^{13}C = -26.6‰$

Plant fragments in clay from Tr 7, Feature 3493, Unit E, depth 3.45m. Coll July 1978 by C V Haynes.

6280 ± 100

SMU-824. Phillips Spring 3455/56 $\delta^{13}C = -27.8‰$

Wood and plant fragments, mostly uncharred, 27.2g, from 513.4 SE 511.2, depth 3.4 to 3.5m, Unit K1 channel fill deposit. Matrix reduced with trisodium phosphate and sample coll through flotation. Coll 1978 by M Kay.

8090 ± 90

SMU-825. Phillips Spring 3473/74 $\delta^{13}C = -23.9‰$

Wood and plant fragments, 20.85g, from 513.4 SE 511.2, depth 5.1 to 5.2m, base of Unit C2 channel fill. Coll 1978 by M Kay.

SMU-826. Phillips Spring 3266 **7650 ± 190**

Uncharred wood and plant fragments, 6.15g, from 510.9 SE 511.2, depth 5.5 to 5.6m, base of Unit C1 overlying Unit A3 gravel. Matrix reduced with trisodium phosphate and sample coll through flotation. Coll July 1978 by M Kay.

SMU-1112. Phillips Spring 3428 **3480 ± 50**

Charcoal, 12.7g, from 512 SE 502, depth 2.9 to 3.0m from Feature 3428, Unit E; possible Sedalia Component 4. Coll summer 1978 by M Kay.

2140 ± 60

SMU-1113. Phillips Spring 416 $\delta^{13}C = -26.3‰$

Charcoal, 15.9g, from 512 SE 510, depth 2.8 to 2.9m from Feature 414, Unit E. Coll Dec 1977 by M Kay.

2210 ± 60

SMU-1114. Phillips Spring 936 $\delta^{13}C = -25.3‰$

Charcoal, 14.8g from 514 SE 510, depth 2.75 to 2.85m from Feature 935, Unit E. Coll Dec 1977 by M Kay.

SMU-1165. Phillips Spring 3309 **4100 ± 420**

Charcoal, 0.8g, from 504 SE 508, depth 3.2m, Unit E of Sedalia Component 1 in Feature 201. Coll summer 1978 by M Kay.

SMU-1166. Phillips Spring 2027 **2860 ± 250**

Charcoal, 2.5g, from 504 SE 504, depth 2.8 to 2.9m, from pit Feature 1931 Sedalia Component 4, Unit E. Coll 1978 by M Kay.

SMU-1167. Phillips Spring 2074 **4100 ± 250**

Charcoal, 2.5g, from 512 SE 508, depth 3.0 to 3.1m, from Feature 2074, Unit E Sedalia Component 3; prospective Component 3 small pit. Coll summer 1978 by M Kay.

SMU-1170. Phillips Spring 3047 **2450 ± 220**

Charcoal, 1.8g, from 520 SE 506, depth 2.6 to 2.7m, Unit E in Feature 3011 Woodland period. Coll summer 1978 by M Kay.

SMU-1171. Phillips Spring 3008 **4010 ± 90**

Uncarbonized nut shells, including hickory and walnut, from 516 SE 504, depth 3.5 to 3.54 from complex peat and sand levels beneath Feature 1969; sample from peat. Coll summer 1978 by M Kay.

SMU-1172. Phillips Spring 3366 **3240 ± 450**
$\delta^{13}C = -26.4‰$

Charcoal, 15.8g, from 506 SE 510, depth 3.2 to 3.3m, Unit E Sedalia Component 1 Feature 201. Coll summer 1978 by M Kay. *Comment:* lab problem with benzene; assay is rejected-inconsistent with SMU-423 and -1165.

SMU-1178. Phillips Spring 2095 **3850 ± 230**
$\delta^{13}C = -26.6‰$

Charcoal, 1.7g, from 516 SE 504, depth 3.1 to 3.2m, Feature 1969, Unit E Sedalia Component 3. Coll summer 1978 by M Kay.

SMU-1179. Phillips Spring 3001 **3170 ± 90**
$\delta^{13}C = -27.0‰$

Charcoal, 3.0g, from 516 SE 504, depth 3.2 to 3.3m, Feature 1969, Unit E Sedalia Component 3; sample in Archaic rock concentration. Coll summer 1978 by M Kay.

SMU-1195. Phillips Spring 3410 and 3411 **3760 ± 100**
$\delta^{13}C = -26.6‰$

Charcoal and some uncarbonized wood, 5.0g, from 504 SE 510, depth 3.2 to 3.3m, Unit E Sedalia Component 1 Feature 201. Coll summer 1978 by M Kay. *Comment:* aquatic moss infiltrated feature after its abandonment. Sample is contaminated and assay is unacceptable.

SMU-1213. Phillips Spring 3190 **5070 ± 150**
$\delta^{13}C = -25.8‰$

Charcoal, 2.3g, from 512.5 SE 508.5, depth 3.5 to 3.6m, lower Unit K2. Coll summer 1978 by M Kay.

SMU-1214. Phillips Spring 3173 **4500 ± 100**
$\delta^{13}C = -26.2‰$

Charcoal, 7g, from 512 SE 508.5, depth 3.34 to 3.40, upper Unit K2. Coll summer 1978 by M Kay.

General Comment: significance of individual dates and of entire series from Phillips Spring is indicated in Tables 1 and 2 and is more fully discussed in references. Assays are generally from stratigraphically well-controlled natural depositional units and/or archaeologic features within and below Holo-

cene-age Rodgers alluvium. These and accompanying Rodgers Shelter date list represent most comprehensive alluvial dating program of individual archaeologic sites and Holocene deposits in lower Pomme de Terre River valley.

Rodgers Shelter series

Rodgers Shelter, a multilayered site of four main strata in Benton Co, Missouri (38° 5′ 30″ N, 93° 20′ 40″ W) is the premiere archaeologic site in the lower Pomme de Terre River valley. Thirty-two ^{14}C assays (Table 3) are available for charcoal samples from its depositional units, including 21 newly reported SMU assays; an additional 4 SMU assays are on non-human bone from the site.

The primary concern of the 1960s ^{14}C dating program was to bracket the ages of natural strata noted within the 9m deposit (Ahler, 1976, p 124, Fig 8.2). This, however, was only partly successful, as charcoal samples were of insufficient size to date the uppermost Statum 4. Excavations were renewed in 1974 and completed in 1976 (Kay, 1980). All four strata are now securely dated (Table 3). Excavations were in three areas of the site, the

TABLE 3
Rodgers Shelter radiocarbon dates on charcoal

Lab no.*	5568 BP half-life	Provenience	Datum depth (m)	Stratum
ISGS-48	10,530 ± 650	225NW95	8.53	1
M-2333	10,200 ± 330	225NW95	8.98	1
A-868A	8,100 ± 300	240NW110	3.81	1
GAK-1170	8,100 ± 140	250NW110	3.05	1
M-1900	8,030 ± 300	240NW105	4.52	1
SMU-461	7,960 ± 130	220NW405	4.57	1WT
GAK-1172	7,490 ± 170	245NW110	3.44	2
SMU-507	7,260 ± 290	265NW115	2.06	2
SMU-502	7,170 ± 160	265NW115	1.90	2
GAK-1171	7,010 ± 160	250NW115	3.20	2
ISGS-35	6,300 ± 590	265NW95	1.77	2
M-2281	5,200 ± 200	260NW70	1.37	3
SMU-459	5,130 ± 160	220NW405	3.66	2WT
M-2332	5,100 ± 400	260NW70	1.37	3
SMU-451	3,530 ± 80	243NW75	1.43	4
SMU-524	3,430 ± 50	265NW115	1.14	4
SMU-510	3,360 ± 70	265NW115	1.14	3
SMU-488	3,150 ± 60	243NW75	1.29	4
SMU-465	2,620 ± 140	220NW405	2.44	4WT
SMU-448	2,520 ± 60	265NW110	0.84	4
SMU-454	2,350 ± 80	243NW75	1.20	4
SMU-478	2,250 ± 70	243NW75	1.28	4
SMU-439	2,070 ± 70	265NW110	0.69	4
SMU-455	1,910 ± 100	220NW405	2.28	4WT
SMU-447	1,580 ± 70	265NW110	0.53	4
SMU-446	1,460 ± 60	265NW110	0.38	4
SMU-438	1,390 ± 70	265NW110	0.53	4
SMU-474	1,060 ± 100	220NW405	2.21	4WT
SMU-466	530 ± 70	243NW75	1.13	4
A-867	430 ± 100			4
SMU-467	200 ± 70	220NW405	1.98	4WT
SMU-456	200 ± 60	220NW405	2.05	4WT

* All SMU dates are from 1974, 1976 excavations; all other dates are from the 1960s excavations, none is $\delta^{13}C$ adjusted.

Shelter, a contiguous Main Excavation, and the West Terrace. All West Terrace assays stem from the 1976 excavations and are from the 22ONW405 provenience unit. Basal Stratum 4 dates for the Shelter and Main Excavation areas are reasonably consistent but differ from the West Terrace assays because of an erosional interval that affected sedimentation on the West Terrace. Table 3 is followed by descriptions of the samples.

SMU-438. Rodgers Shelter 10003 **1390 ± 70**

Charcoal from Sq 265 NW 110, depth 0.53m, St 4. Coll 1974 by K McGrath. Different sample from same depth was dated; see SMU-447.

SMU-439. Rodgers Shelter 10005 & 10006 **2070 ± 70**

Charcoal from Sq 265 NW 110, depth 0.69m, St 4. Coll 1974 by K McGrath.

SMU-446. Rodgers Shelter 10001 & 10002 **1460 ± 60**

Charcoal from Sq 265 NW 110, depth 0.38m St 4. Coll 1974 by K McGrath.

SMU-447. Rodgers Shelter 10004 **1580 ± 70**

Charcoal, nuts from Sq 265 NW 110, depth 0.53m, St 4. Coll 1974 by K McGrath.

SMU-448. Rodgers Shelter 10007 & 10008 **2520 ± 60**

Charcoal from Sq 265 NW 110, depth 0.84m, St 4. Coll 1975 by K McGrath.

SMU-451. Rodgers Shelter 11099 **3530 ± 80**

Charcoal, 2.6g, from Sq 243 NW 75, depth 1.29–1.52m. Sample should provide basal date for St 4 from main excavation area of Rodgers Shelter. Charcoal was hand-picked from flotation residue by F King and subsample was retained for charcoal identification. Coll July 1976 by M Kay.

SMU-454. Rodgers Shelter 11052 **2350 ± 80**

Charcoal, 11.8g, Sq 243 NW 75, depth 1.13 to 1.21m, upper St 4. Sample should date upper portion of St 4. Coll July 1976 by M Kay.

SMU-455. Rodgers Shelter 11047 **1910 ± 100**

Charcoal, 2.9g, Sq 220 NW 405, depth 2.21 to 2.28, base of St 4, W terrace. Coll July by M Kay.

SMU-456. Rodgers Shelter 11033 **200 ± 60**

Charcoal, 6.8g, Sq 220 NW 405, depth 1.98 to 2.06m, upper St 4, W terrace. Sample should provide closely correlated date for upper sediments from W terrace. Coll July 9, 1976 by M Kay.

SMU-459. Rodgers Shelter 11318, 11324, 11358 combined **5130 ± 160**

Charcoal, 2.1g, Sq 220 NW 405, depth 3.46 to 3.73m, base of St 2, W terrace. Sample should provide basal date for St 2, like unit from W terrace. Coll Aug 19, 1976 by M Kay.

SMU-461. Rodgers Shelter 11476 **7960 ± 130**

Charcoal, 6.6g, Sq 220 NW 405, depth 4.42 to 4.57m, burned tree stump truncated by gravels in upper part of St 1. Sample should provide upper date for St 1 on W terrace, possibly correlated with earliest occurrence of Rice Lobed and Graham Cave Notched points. Coll Sept 1976 by M Kay.

SMU-465. Rodgers Shelter 11049, 11053, 11068 combined **2620 ± 140**

Charcoal, 1.5g, Sq 220 NW 405, depth 2.29 to 2.51m, base of St 4 or top of St 3, from W terrace. Sample should provide upper date from St 3. Coll July 1976, by M Kay.

SMU-466. Rodgers Shelter 11046 **530 ± 70**

Charcoal, 7.1g, Sq 243 NW 75, depth 1.03 to 1.13m, top of St 4. Sample should provide upper date for Rodgers Shelter. Coll July 13, 1976 by M Kay.

SMU-467. Rodgers Shelter 11032 **200 ± 70**

Charcoal, 7.4g, Sq 220 NW 405, depth 1.91 to 1.98m, top of St 4 from W terrace. Sample should provide upper date for W terrace, and hopefully will closely correlate with dates from sample 11046. Coll July 9, 1976 by M Kay.

SMU-474. Rodgers Shelter 11039 **1060 ± 100**

Charcoal, Sq 220 NW 405, depth 2.13 to 2.21m, near top of St 4 from W terrace. Coll 1976 by M Kay.

SMU-478. Rodgers Shelter 11054 **2250 ± 70**

Charcoal, 9.7g, Sq 243 NW 75, depth 1.20 to 1.28m, lower portion of St 4. Sample was hand-picked from flotation residues that were pre-soaked with trisodium phosphate. Coll July 1976 by M Kay. *Comment* (HH): sample consisted of organic materials coll over 2.3m^2 area. St 4 has total thickness of ca 50cm at this excavation square. Date is in fair agreement with SMU-454.

SMU-488. Rodgers Shelter 11089 **3150 ± 60**

Charcoal, 9.8g, Sq 243 NW 75, depth 1.28 to 1.29m, lower part of St 4. Sample was hand-picked from flotation residues that were pre-soaked with trisodium phosphate. Coll July 1976 by M Kay.

SMU-502. Rodgers Shelter 10022 **7170 ± 160**

Charcoal, 1.7g, 1974 excavation, Sq 265 NW 115 (Sq C), depth 1.90m, near top of St 2. Coll June 1974 by K McGrath.

SMU-507. Rodgers Shelter 10023 **7260 ± 290**

Charcoal, 1.4g, 1974 excavation Sq 265 NW 115, depth 2.06m, near top of St 2. Coll June 1974 by K McGrath.

SMU-510. Rodgers Shelter 10015 **3360 ± 70**

Charcoal, 6.4g, 1974 excavation Sq 265 NW 115, depth 1.14m, top of St 3, below black soil. Coll by K McGrath.

SMU-524. Rodgers Shelter 10015 **3430 ± 50**

Charcoal, 20.9g, 1974 excavation Sq 265 NW 115, depth 1.14m, base of St 4 beneath overhang. Coll by K McGrath.

Rodgers Shelter bone series

The following four bone samples were coll and subm by C V Haynes to analyze ^{14}C content of secondary carbonate deposited inside bone structure. Samples were hydrolized in 50% acetic acid.

SMU-533. Rodgers Shelter, bone scrap **105.4 ± 2.9% modern**

St 4, Level 4, 0.84m.

SMU-530. Rodgers Shelter, bone scrap **96.6 ± 2.0% modern**

St 2, Levels 11 and 12, 1.9 to 2.06m.

SMU-532. Rodgers Shelter, bone scrap **118.0 ± 2.1% modern**

St 2, Level 16.

SMU-526. Rodgers Shelter, bone scrap **121.2 ± 1.7% modern**

St 1, Level 18.

General Comment: test indicates penetration of nuclear-age carbon to at least 0.6m depth and rise of groundwater level by at least 6m above normal (Haynes, 1985).

Trolinger Spring series

Trolinger Spring dates were discussed in Haynes *et al* (1983). Five samples were coll and pretreated by C V Haynes July and Aug, 1978.

SMU-931. Missouri 5M078 **32,270 ± 920**
$\delta^{13}C = -28.3‰$

Peat residue, 10.49g, (48°03′59″N, 93°20′42″W), 7″ below well collar DD, above 4MO78. Standard pretreatment with multiple acid-base cycles to reduce humate content.

SMU-932. Missouri 6MO78 **32,950 ± 1040**
$\delta^{13}C = -28.2‰$

Peat residue, 12.37g, 1″ above well collar DD, above 5MO78.

SMU-933. Missouri 7MO78 **38,200 ± 1680**
$\delta^{13}C = -28.0‰$

Peat residue, 16.75g, 12″ below well collar DD. Standard pretreatment with multiple acid-base cycles to reduce humate content.

38,880 ± 3750

SMU-934. Missouri 8MO78 $\delta^{13}C = -28.3‰$

Peat residue, 5.9g. Standard pretreatment with multiple acid-base cycles to reduce humate content.

38,020 ± 2850

SMU-935. Missouri 9MO78 $\delta^{13}C = -28.3‰$

Peat residue, 4.37g. Standard pretreatment with multiple acid-base cycles to reduce humate content.

General Comment: results indicate that Trolinger Spring Fm (Haynes, 1985) is ≧30,000 BP.

Rodgers Shelter Formation series

The following samples were coll 1977 by C V Haynes in Trench 76D, opposite Rodgers Shelter. A full report on these samples, as well as on those from Trench 78, which are also reported here, is given in Haynes (1985).

SMU-429. Pomme de Terre 1MO76 **3560 ± 90**

Charcoal from Tr 76D, Unit R4. Coll April 1977.

SMU-430. Pomme de Terre 5MO76 **1750 ± 90**

Charcoal from Tr 76D, Unit R5. Coll Aug 1976.

SMU-431. Pomme de Terre 2MO76 **230 ± 40**

Wood stick from Tr 76D, Unit P2. Coll April 1977.

SMU-485. Pomme de Terre 3MO76 **330 ± 50**

Leafmat (lower) from Tr 76D, Unit P2. Coll Aug 1976.

SMU-499. Pomme de Terre 3MO76 **140 ± 90**

Leafmat (lower) from Tr 76D, Unit P2. Coll Aug 1976.

SMU-500. Pomme de Terre 4MO76 **190 ± 40**

Leafmat (upper) from Tr 76D, Unit P2. Coll Aug 1976.

SMU-506. Pomme de Terre 6MO76 **2360 ± 70**

Charcoal from Tr 76D, Unit R5. Coll Aug 1976 by C V Haynes.

SMU-508. Pomme de Terre 7MO76 **280 ± 50**

Wood from Tr 76D, Unit P2. Coll Aug 1976 by C V Haynes.

8050 ± 100

SMU-814. Missouri 57MO78 $\delta^{13}C = -26.8‰$

Charcoal from Tr 78B.

5150 ± 330

SMU-816. Missouri 58MO78 $\delta^{13}C = -26.6‰$

Charcoal from Tr 78B, pretreated by C V Haynes.

SMU-823. Missouri 23MO78 **3630 ± 70**

Charcoal from Tr 78B, Unit R4.

SMU-817. Missouri 59MO78 **520 ± 330**

Charcoal from Tr 78C.

General Comment: results help to confirm and date six-fold subdivision of Rodgers Shelter Fm (Haynes, 1985).

Texas

Cooper Lake series

The Cooper Dam and Lake Project was established to provide flood control and water retention along 25.6km of the South Sulphur River. When built, the lake will cover ca 13,760ha of flood plain and Pleistocene terraces on either side of the Sulphur River. Prior to construction an inventory and extensive evaluation of the cultural resources were made. These dates are part of this study; detailed reports were previously pub (Butler, Hyatt & Mosca, 1974; Doehner & Larson, 1975; Doehner, Peter & Skinner, 1978). Samples were from 33° 18′ N, 95° 40′ W unless otherwise indicated.

SMU-310. **870 ± 50**

Charcoal from Sq 112, 30 to 35cm depth. Coll June 1975 by K Doehner.

SMU-316. **950 ± 60**

Charcoal from Feature 112A. Coll July 1975 by J Saunders. *Comment* (HH): obviously large quantity of silt and soil and separate pieces of charcoal coll with shovel.

SMU-325. **950 ± 50**

Charcoal from Feature 97A, 41cm depth, beneath ash pit.

SMU-328. **850 ± 60**

Charcoal from Feature 112A, 49cm depth. Coll July 1975 by K Doehner.

SMU-335. **1360 ± 140**

Charcoal from Sq 52, 40 to 45cm depth. Coll Oct 1975 by P Stark.

SMU-338. **1070 ± 60**

Charcoal from Sq 109, 42.5cm depth, 24cm S of N wall in W wall. Coll 1975 by J Garber.

SMU-339. **1410 ± 120**

Charcoal from Sq 155, 61cm depth. Coll June 1975 by J Morris.

SMU-341. **860 ± 60**

Charcoal from Sq 127, 35 to 40cm depth, NW corner. Coll June 1975 by B Rader.

SMU-346. **1090 ± 100**

Charcoal (33° 20′ N, 95° 50′ W) from Sq 113, 54 to 56cm depth. Coll by K Doehner.

SMU-349. **1320 ± 190**

Charcoal from 30 to 35cm below surface.

SMU-359. **115.9 ± 0.9% modern**

Charcoal from 5 to 10cm below surface (33° 20′ N, 95° 50′ W).

SMU-363. **270 ± 60**

Charcoal from Sq 46, 10 to 15cm, below surface (33° 20′ N, 95° 40′ W). *Comment* (KD): possible contamination.

SMU-396. **920 ± 40**

Charcoal (33° 17′ 18″ N, 95° 46′ 01″ W) from test pit 21, Feature 21-A. Coll Aug 1976 by N Morris.

SMU-398. **200 ± 80**

Charcoal test pit 14, 45 to 50cm below surface. Coll July 1976 by I McGregor.

SMU-401. **1060 ± 70**

Charcoal (33° 18′ 15″ N, 95° 43′ 49'' W) from test pit 10, 45 to 50cm below surface. Coll July 1976 by I McGregor.

SMU-402. **165 ± 70**

Charcoal (33° 17′ 25″ N, 95° 39′ 01″ W) from test pit 3, 15 to 20cm below surface. Coll July 1976 by I McGregor.

SMU-404. **660 ± 70**

Charcoal (33° 17′ 18″ N, 95° 46′ 01″ W) from test pit 30, 30 to 40cm below surface. Coll Aug 1976 by M Goode.

SMU-417. **160 ± 45**

Charcoal from test pit 31, Feature 31-A.

SMU-471. **280 ± 70**

Charcoal from test pit 19, W wall pedestal, 20 to 30cm below surface. Coll Aug 1976.

SMU-476. **1300 ± 150**

Charcoal from test pit 15 (stained area) 44cm below surface. Coll Aug 1976 by K Doehner.

SMU-477. **1060 ± 120**

Charcoal (33° 18′ 51″ N, 95° 42′ 26″ W) from test pit 7, 20 to 25cm below surface. Coll Aug 1976 by D Kellogg.

Aquilla Reservoir Project series

Aquilla Reservoir is located at Hill Co, Texas (31° 53′ 30″ N, 97° 12′ 15″ W). For progress report, see Skinner *et al* (1978).

SMU-498. X41HI40 Sample 1 **620 ± 80**

Charcoal from Unit 9E, 30 to 40cm depth; large charcoal lumps from clay matrix dispersed throughout unit, not from one hearth. Coll Aug 1977 by K Banks.

SMU-479. X41HI41 Sample 3 **1400 ± 60**

Mussel shell from top of paleosol in cultural layer ca 20cm from present bank face. Coll Aug 18, 1977 by G Rutenberg.

SMU-528. X41HI40 Sample 2 **720 ± 100**

Charcoal from Unit 9E, 40 to 50cm depth; large charcoal lumps from clay matrix dispersed throughout unit. Coll Aug 11, 1977 by K Banks.

SMU-535. X41HI40 Sample 3 **850 ± 60**

Charcoal from Unit 9E, 50 to 60 cm depth; large charcoal lumps from clay matrix dispersed throughout unit. Coll Aug 11, 1977 by K Banks.

SMU-540. X41HI141 Sample 4 **2200 ± 50**

C-horizon soil from cut bank profile 5cm above paleosol. Coll Aug 24, 1977 by K Banks.

SMU-568. X41HI141 Sample 2 **2300 ± 60**

Paleosol from cut bank profile 5cm above base of paleosol cultural layer according to D Pheasant, at base of 3A1 above 2150 datum. Coll Aug 18, 1977 by K Banks.

SMU-633. X41HI141 Sample 1 **1910 ± 45**

Paleosol from cut bank profile 5cm below top of paleosol cultural layer according to D Pheasant, in top of 3A1 below 1790 datum. Coll Aug 1977 by K Banks.

Hog Creek Basin series

Site is at Edward's Plateau (31° 45′ N, 97° 47′ W).

SMU-272. X41BQ19 Charcoal **990 ± 130**

Sample from Five Goat site, 20 to 25cm depth. Coll Oct 1975 by H Mosca.

SMU-280. X41CR1 Charcoal and burned wood **560 ± 45**

Apparently basal layer of cultural deposit. Sample was originally 2 samples coll from same lens of charcoal/ash stain. Coll Oct 1975 by R Larson.

SMU-324. X41CV2-TP1-13 Charcoal **1180 ± 60**

Sample from "Pick A Slab" Rockshelter (31° 38′ 52″ N, 94° 38′ 16″ W)

Hog Creek drainage. From test pit 1, SE quad, 130cm below present ground surface. Coll from ash lens just above disintegrated limestone bedrock of rockshelter. Coll Oct 1975 by R Larson.

Elcor Burial Cave series

Seven human skulls were recovered from small sinkhole cave in west Texas in 1975. These skulls represent secondary burial of undetermined age. ^{14}C dating of two skulls and anthropometric study of entire sample suggest that skulls belong to prehistoric Indians physically similar to those of Trans-Pecos, ca AD 900-1100. Two skulls were subm for dating (Skinner, Haas & Wilson, 1980). Burial cave is in S end of Rustler Hills near E division line of strata change, Gypsum Plain, ca 72km of Van Horn, Culberson Co (31° 41′ N, 140° 15′ W).

880 ± 50
SMU-342. Skull 5 $\delta^{13}C = -7.6‰$

Human skull, apatite fraction. *Comment* (HH): bones seemed relatively thin walled and broke at sutures.

1230 ± 70
SMU-374. Skull 5 $\delta^{13}C = -12.3‰$

Human skull, collagen fraction.

950 ± 50
SMU-387. Skull 1 $\delta^{13}C = -6.6‰$

Human skull, apatite fraction.

960 ± 60
SMU-434. Skull 1 $\delta^{13}C = -13.0‰$

Human skull, collagen fraction.

Rex Rodgers site series

Rex Rodgers site is in Tule Canyon, Brisco Co (34° 32′ 45″ N, 101° 26′ 15″ W), Paleo-Indian bison kill and butchering area (Speer, 1978).

9330 ± 80
SMU-274. Bison bone, scrap bone apatite $\delta^{13}C = -4.2‰$

Lake Lavon series

Enlargement project for this artificial lake in Collin Co. On N end of lake is Sister Grove Creek site (33° 8′ 52″ N, 96° 28′ 47″ W), human burial in round pit, Feature 15. Charcoal from fire in pit, antedating burial, was dated 790 ± 90 (Tx-2040). Sample consisted of ca 450g arm and leg bones. Coll and subm July 1974 by M J Lynott (1975, p 33).

1020 ± 170
SMU-233. Bone apatite $\delta^{13}C = -13.5‰$

Hydrolized with HCL. Discarded initial 2L of CO_2, dated final CO_2, 3.4L.

880 ± 40

SMU-239. $\delta^{13}C = -22.5‰$

Collagen fraction, 58.5g yielding 4.9L CO_2.

Oklahoma

Big Hawk Shelter series

Big Hawk Shelter and Cut Finger Cave are two sites in Hominy Creek Valley ca 35km NW of Tulsa, in area of proposed Skiatook Lake.

Big Hawk Shelter (36° 23′ N, 96° 16′ W) was formed by chemical weathering of limestone fm underlying more resistant sandstone fm. Excavation exposed aeolian deposit containing four lithologic layers. Excavation was carried out in 0.25m quadrants in 10cm levels, measured from surface. Artifactual and radiometric evidence indicates prehistoric occupations from AD 200 to 1500, including Plains Woodland and Plains Village. Samples were coll Feb 1976, and subm July 1976 by D O Henry (1978a,b). Depths are reported in cm.

SMU-356.	**Charcoal, Level 3, 20-30cm**	**700 ± 60**
SMU-371.	**Charcoal, Level 4, 30-40cm**	**880 ± 60**
SMU-344.	**Charcoal, Level 5, 40-50cm**	**800 ± 60**
SMU-372.	**Charcoal, Level 6, 50-60cm**	**840 ± 60**
SMU-379.	**Charcoal, Level 8, 70-80cm**	**660 ± 60**
SMU-380.	**Charcoal, Level 9, 80-90cm**	**390 ± 100**
SMU-381.	**Charcoal, Level 10, 90-100cm**	**390 ± 60**

Cut Finger Cave series

Cut Finger Cave is ca 25m E of Big Hawk Shelter; cave was formed at contact of limestone and overlying sandstone strata. Excavation revealed 3 stratigraphic layers within cave. Top Layers A and B post-date prehistoric occupation of cave and seal cultural horizon of Layer C. Two dates are from this layer (Henry, 1978b).

SMU-336. Charcoal, Level 2, 30-40cm **740 ± 50**

Sample from hearth (Feature 1).

SMU-382. Charcoal, Level 4, 50-60cm **850 ± 50**

Cedar Creek Shelter series

Cedar Creek Shelter (36° 83′ N, 96° 8′ W) is rock overhang at base of 14m sandstone escarpment along Cedar Creek ca 1km upstream from confluence with Hominy Creek. Excavation revealed three layers (Henry, 1978b).

SMU-495. Charred nuts, Layer B **970 ± 40**

Level 3, 60 to 70cm.

SMU-497. Charcoal and charred nuts, Layer C **1600 ± 40**

Level 5, 80 to 90cm.

SMU-519. Charcoal and charred nuts, Layer C **1540 ± 70**

Level 7, 100 to 110cm. *Comment:* this date and SMU-497 overlap within 1σ and may be viewed as equivalent in age.

SMU-405. Ft Sill Parade Ground site **390 ± 80**

Charcoal from Level 5, 20 to 25cm, Test Sq 3 (34° 40′ 15.7″ N, 98° 23′ 15.1″ W). Charcoal removed from light brown compact clayey silt containing abundant artifactual and organic cultural material. Charcoal lumps coll in field with trowels; excess matrix and some roots removed by hand in lab. Coll Jan 1977 by Mus Great Plains. Subm by R Ferring (Hall, 1978).

New Mexico

Los Esteros series

Los Esteros Archaeol Proj, Guadalupe Co (35° 02′ 13″ N, 104° 40′ 33″ W) was inventory and evaluation for Los Esteros Dam and Reservoir, on Pecos River seven miles upstream from Santa Rosa. Sites evaluated with ^{14}C dates included overhanging cliff shelter (Old Coyote Shelter), small rock shelter (Helter Shelter), 2 Tipi Ring sites (Catfish Falls site, Site 29 GU 236), and hearth site (Spillway site). Regional and local archaeology, artifact analyses, etc are discussed in Levine and Mobley (1976), Unine and Mobley (1976) and Mobley (1978). Subm Nov 1975 by C Mobley.

SMU-294. 29GU20-420 **1890 ± 40**

Charcoal from Old Coyote Feature 2, base Unit C39, Strata III E. Sample was within 1.2m of ground surface under drip line of rock shelter. Coll July 1975 by C Mobley.

SMU-301. 29GU20-162 **820 ± 60**

Charcoal from Old Coyote, Feature 1, Unit A40, Strata III A. Sample was from back of rock shelter within 50cm of ground surface near packrat nest. Coll July 1975 by C Mobley.

SMU-306. 29GU20-348 **850 ± 80**

Charcoal from Old Coyote, Feature 2, top, Unit C39, Strata III A. Sample was within 50cm of ground surface, under drip line of rock shelter. Coll July 1975 by C Mobley.

SMU-312. 29GU229-97 **880 ± 60**

Charcoal from open site, hearth G, Unit 1G, Level 1. Sample was within 0.40m of ground surface. Coll June 1975 by I Russo.

SMU-318. 29GU210-33 **790 ± 60**

Charcoal from Helter Shelter, Unit E, Strata II within rock shelter. Coll June 1975 by F Levine.

SMU-320. 29GU229-338 **810 ± 70**

Charcoal from open site, hearth 3I14, Unit 3I14, Level 1 within 0.40m of ground surface.

SMU-322. 29GU236-122 **5 ± 50**

Charcoal from bulldozed Tipi Ring, Unit 2B1, Strata II. Rather shallow (within 0.40m) but material was coll from under large rock. Expected date within last 700 yr but could be 1890 cowboy campfire. Coll Aug 1975 by C Mobley.

SMU-420. 29GU23-21A-1-254/240 **300 ± 60**

Charcoal from Catfish Falls site, Ring 21, Radius A, Level 1/2. Carbon was composed of two samples from same feature. Coll March 1977 by C Mobley and M Grady.

Last Chance Canyon Packrat Midden series

Site is in Guadalupe Mts, Eddy Co (32° 16′ N, 104° 39′ W).

SMU-406. LC6A **1550 ± 60**

Dung (*Neotoma*) from limestone cave which is separate from LC1 and LC2 but close to LC6A, well-separated unit overlying LC6B. Age estimate of sample was <8000 yr and probably <4000 yr ago, based on plant microfossil content. Coll June 1976 by T R Van Devender.

SMU-409. LC1 **10,010 ± 160**

Twigs and seeds (*Juniperus*) 6.3g, from packrat midden in limestone cave. Age estimate was 8000 yr or older based on earlier midden assemblages with ^{14}C dates. Coll June 1976 by T R Van Devender.

SMU-418. LC2 **90 ± 60**

Leaves (*Dasylirion*) 3.6g, from same small shelter as LC1. Age estimate was probably <2000 yr based on plant macrofossils in midden. Coll June 1976 by T R Van Devender.

SMU-425. LC9A **3940 ± 100**

Dung (*Neotoma*) from limestone cave. Age estimate was <8000 yr, based on earlier midden assemblages with ^{14}C dates. Coll June 1976 by T R Van Devender.

SMU-437. LC6B **850 ± 90**

Leaf fragments (*Agave lechuguilla*) 3.1g, from limestone cave; probably < 4000 yr. Coll June 1976 by T R Van Devender.

SMU-458. LC10 **3870 ± 80**

Dung (*Neotoma*) 13.45g, from limestone cave. Age estimate was <4000 yr. Coll June 1976 by T R Van Devender.

Seven Rivers Quadrant series

SMU-375. Hearth **1950 ± 60**

Charcoal flecks in burned soil at 3200 elev (32° 34′ 15″ N, 104° 23′ 4″ W). Level 9 arbitrary elev 1000.20. Projectile points from occupation area believed assoc with hearth considered to date to Archaic period. Estimated age: pre-AD 900.

Eddy County series

Site is W side of Pecos River (32° 34′ N, 104° 24′ W). Samples subm Sept 1975 by J G Gallagher.

SMU-283. X29ED6-284-10B-1 **750 ± 40**

Charcoal from Sq 284, 45 to 50cm depth, from center of ring midden; expected to date AD 1100. Coll June 1975 by K Vagstad.

SMU-286. X29ED34-2233-15-1 **1310 ± 60**

Charcoal from Sq 2233, 70 to 75cm depth, from burned rock mound; expected to date ca AD 900. Coll July 1975 by J Horoze.

SMU-299. X29ED34-2233-9-1 **1400 ± 80**

Charcoal from Sq 2233, 40 to 45cm depth, from burned rock mound; from same site as SMU-286. Coll June 1975 by J Horoze.

SMU-304. X28ED274-10A-2 **610 ± 40**

Charcoal from Sq 274, 50cm depth, near possible hearth on floor of ring midden. Coll by J Gallagher.

SMU-311. X29ED13-1661-0-1 **1280 ± 100**

Charcoal mixed with sandy soil from Sq 1661, surface material. Another sample from this site coll from trench cut in face of arroyo subm to Univ Texas, Austin ^{14}C lab Aug 1975. Coll July 1975 by P Urban.

SMU-394. X29ED4-0-1-13 **1840 ± 80**

Charcoal from burned rock mound, E face back hoe trench, 25 to 35cm depth within burned rock layer. Sample dry-screened and picked out of heavily stained soil. Coll June 1976 by J Gallagher.

SMU-388. X29ED6-2891-17A **1860 ± 50**

Charcoal from hearth. Coll July 1976 by M Connor.

SMU-449. Rocky Arroyo #3 Packrat Midden **230 ± 80**

Twigs (*Juniperus*) 7.5g, from Rocky Arroyo NW of Carlsbad, Eddy Co. Age estimate of sample was <8000 yr based on plant fossils.

Algeria

Dates in these series result from interdisciplinary research project in Telidjene Basin, S of Cheria, E Algeria. Field research was conducted from 1972 to 1979 under David Lubell, Univ Alberta to investigate man-land relationships during early Holocene to better understand introduction of food-producing economies into NW Africa. Comprehensive refs are given below.

ARCHAEOLOGIC SAMPLES

Kef Zoura series

This northfacing rockshelter (7° 40′ 38″ E, 35° 2′ 26″ N) is listed as Site no. 201 in catalogue compiled by Grebenart (1976, p 80), ca 30m × 5m with at least 2m of deposit. Two industries are represented: Typical Capsian in earlier deposits, exposed primarily in 1 m^2 test trench T/20-5, and Upper Capsian in later deposits. Faunal assemblages assoc with these industries are distinct, suggesting that lithic assemblages may represent tool kits designed, in part, for different uses. At this site, as well as Ain Misteheyia, Site 12 and other Capsian sites, there is evidence for technologic change and introduction of primary pressure flaking at ca 8000 BP. For fuller discussion, see Lubell (1984) and Lubell, Sheppard and Jackes (1984). All depths are in cm below datum (see also I-9835 through -9838, unpub).

SMU-704. T/20-5, hearth, 250cm **8580 ± 150**

Charcoal. Typical Capsian.

SMU-712. T/20-5, 270-280cm **9390 ± 130**

Charcoal. Typical Capsian.

SMU-1081. E20D, 135cm **7150 ± 200**
$\delta^{13}C = -25.4‰$

Charcoal from below SMU-1099 (below), Upper Capsian.

SMU-1082. F20B, 82-104cm **7750 ± 50**
$\delta^{13}C = -8.6‰$

Helix melanostoma from pit containing almost only shells, within Upper Capsian levels. Date is too old; should be younger than SMU-1081 and -1084, and same age as SMU-1099. Sample suggests land snail shell may not provide accurate dates. For discussion relating to land snail dating, see Evin *et al* (1980) and Goodfriend and Hood (1983).

SMU-1084. F20D, 114-118.5cm **6620 ± 110**
$\delta^{13}C = -24.1‰$

Charcoal, Upper Capsian.

SMU-1095. G20C, 110-122cm **7590 ± 60**
$\delta^{13}C = -23.7‰$

Charcoal, Upper Capsian. Probably just above transition from Typical to Upper Capsian. See SMU-1121 (below).

7210 ± 340

SMU-1096. E20A, 123cm $\delta^{13}C = -22.7‰$

Charcoal, Upper Capsian. Very small sample.

6750 ± 70

SMU-1098. Humates $\delta^{13}C = -23.7‰$

Humates extracted from charcoal of SMU-1099. Presence of uncarbonized plant materials was considered suspicious but sample appears to be reliable.

6520 ± 170

SMU-1099. E20D, 120cm $\delta^{13}C = -25.2‰$

Charcoal. Sq E20 contains two distinctive deposits, one apparent stone-lined pit containing loose unbroken shells (*H melanostoma*) (*cf* SMU-1082, above), and one outside it. Sample comes from within rocks forming one edge, and should, therefore, be same age as SMU-1082.

9100 ± 130

SMU-1108. T/20-5, 260-270cm $\delta^{13}C = -8.3‰$

Terrestrial gastropod shell (mostly *H melanostoma*). Date is for comparison with SMU-704 and -712, over- and underlying sample, respectively. Typical Capsian assoc industry. Although this shell carbonate age does fall between bracketing charcoal dates, it may be several hundred years too old, given usual differences between shell and charcoal dates in this list (*cf* SMU-1082, -1084, -1119, -1141).

7350 ± 50

SMU-1120. G21A, 85-88cm $\delta^{13}C = -24.5‰$

Charcoal, Upper Capsian.

SMU-1121. G20C, 138cm **8390 ± 170**

Charcoal. Probably Typical Capsian, but assemblage from this level a bit small for accurate designation.

6770 ± 90

SMU-1154. E20D, 133cm $\delta^{13}C = -25.6‰$

Charcoal, Upper Capsian.

Ain Berriche series

Also known as Site 12, this open-air Capsian site is 10km N of Ain Beida in E Algeria (39° 88′ N, 5° 59′ E). It was excavated in 1930 by Logan Mus Expedition under Alonzo Pond, Beloit Coll, Beloit, Wisconsin. These dates are on samples coll 1930, by P Sheppard and stored at Logan Mus. Trench A was excavated in 60cm levels, I (top) to V (base). Samples date introduction of pressure flaking in lithic manufacture between Levels IV and III, and accord with dates from Ain Misteheyia, Kef Zoura D, and Medjez II.

7330 ± 390

SMU-1132. Site 12, Tr A, Level III $\delta^{13}C = -23.8‰$

Charcoal. Shellac contamination.

SMU-1135. Site 12, Tr A, Level IV **7780 ± 250**

Charcoal.

GEOLOGIC AND PALYNOLOGIC SAMPLES

Oum el-Khaled series

This extensive marsh occurs along Wadi Mezeraa (35° 6′ N, 7° 37.5′ E) just upstream from narrow gorge that acts as local base level (perhaps neotectonically active) along stream's course. There is open water at center of marsh throughout dry season. Core was coll Dec 1979 for pollen studies by J C Ritchie and D Lubell. Other deposits of Wadi Mezeraa were dated in terraces ca 6km upstream from this marsh; see SMU-655, -738, -1119, -1141, below, and I-7693, -9833, -9834 (unpub). Full pub of core data is forthcoming (Ritchie, ms).

SMU-1123. 136-146cm **4100 ± 80**

This date falls just prior to boundary between Zones 1 and 2. Zone 1 is dominated by *Pinus* and *Quercus* and most probably represents woodland similar to modern sclerophyl Mediterranean forests of NW Africa. Region today is too dry to support such forests.

SMU-1124. 169.5-179.5cm **5050 ± 100**

Sample marks base of core (not base of sediment in marsh), and base of Zone 1.

Wadi Mezeraa series

A prominent meander of this Wadi (35° 8′ 49″ N, 7° 40′ 34″ E) is bordered by two terrace levels representing two cut-and-fill cycles. Two prehistoric hearths (SMU-655 and -738) occur near base of higher (older) terrace. Despite absence of diagnostic artifacts, hearths probably represent pre-Capsian occupation of region which has yet to be fully investigated or understood. Sites of this age are known somewhat to W around Bou Saada (Amara, 1977; Heddouche, 1977) where they are attributed to Iberomaurusian industry. Snails (SMU-1119) and charcoal (SMU-1141) were dated from single horizon near top of lower (younger) terrace.

SMU-655. Hearth A **11,590 ± 100**

Charcoal. Coll July 1978 by D Lubell, A Miller.

SMU-738. Hearth B **11,870 ± 290**

Charcoal. Coll July 1978 by D Lubell, A Miller.

2260 ± 30

SMU-1119. Section A, Unit 6 $\delta^{13}C = -8.6‰$

Helix Melanostoma and *Otala* of Sample AL-80-35C. These appear to be

fluvially deposited, not archaeologic. *Comment:* result is average of two counting runs on same sample. Another sample from same horizon (I-9833) was previously dated at 2270 ± 80 BP, not corrected for $^{13}C/^{12}C$. If usual correction is applied, two dates agree very well. See also SMU-1141 for charcoal from same level. Coll July 21, 1980 by W R Farrand.

1450 ± 90

SMU-1141. Section A, Unit 6 $\delta^{13}C = -24.5‰$

Charcoal fragments from same bed, Sample AL-80-35B, as snails dated in SMU-1119. Another part of same sample was dated as Beta-2734 = 1350 ± 70 BP. Coll July 21, 1980 by W R Farrand. *Comment* (WRF): since charcoal and shells were coll from same horizon, dates (SMU, Beta, and Isotopes) indicate discrepancies between charcoal and shell carbonate ages. *Cf* also SMU-1082 and -1084, above, and two dates from Wadi Redif (in this area) where snails were dated 7690 ± 120 BP (I-7692, not corrected for $\delta^{13}C$, and charcoal dated 7340 ± 115 BP (I-7694)).

Wadi Regada series

Wadi Regada in N-central part of Telidjene basin (35° 7′ N, 7° 42.5′ E) cuts through several older alluvial deposits. This charcoal comes from hearth-like feature (without artifacts) within red paleosol exposed in wadi bank. Paleosol and hearth occur ca 270cm above wadi floor and are overlain by ca 240cm of younger alluvium that antedates present wadi incision. Coll June 30, 1980 by W R Farrand.

3160 ± 180

SMU-1142. Field sample AL-80-35A $\delta^{13}C = -22.0‰$

Comment (WRF): age is younger than expected because red soil is believed to occur on surface of "late Pleistocene pediment." Possibly, hearth is intrusive into soil. Another fragment of same sample was dated to 2590 ± 90 (Beta-2733).

Wadi Telidjene series

Snails (mostly *Helicella sitifensis*) were coll from cut bank of Wadi Telidjene (35° 4.6′ N, 7° 42.7′ E) ca 7.75km SW of Telidjene village. Snails occur in layer of gleyed, marshy sediments underlying main "late Pleisotcene Pediment" within Telidjene basin. Coll July 13, 1978 by A Miller, D Lubell, W R Farrand.

9230 ± 80

SMU-711. Snail shells (*Helix melanostoma*) $\delta^{13}C = -9.5‰$

Comment: age is reasonable for late Pleistocene/early Holocene filling of basin. Deposits are probably equivalent to lower part of Wadi Regada sec; see SMU-1142, above.

Wadi Oussif series

Wadi Oussif is major tributary in S-central part of Telidjene basin (35° 4.6′ N, 7° 44.7′ E) cutting through alluvial deposits underlying "late Pleisto-

cene pediment"; see also SMU-711 and -1142. Snails were coll July 1978 by A Miller from very dark gray, organic-rich sediments. Miller compared deposit to Unit II at Ain Misteheyia in E part of basin (Lubell *et al,* 1975).

SMU-688. Snails shells (*Helix melanostoma*) **6950 ± 60** $\delta^{13}C = -9.4‰$

Comment (WRF): sample is presumably younger, upper part of same deposit of SMU-711 and is early Holocene.

General Comment: additional refs on this project are: (Heddouche, 1977; Lubell, 1977; Lubell *et al,* 1975; Lubell & Gautier, in press; Lubell *et al,*1976).

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