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ILLINOIS STATE GEOLOGICAL SURVEY RADIOCARBON DATES VI

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All samples processed from February 1973 through January 1974 at the Illinois State Geological Survey Radiocarbon Dating Laboratory are reported here. The benzene liquid scintillation technique was used. Laboratory procedures used were the same as those previously reported by Coleman (1973, 1974).

All ages are calculated on the basis of a ^{14}C half-life of 5568 years, and the NBS oxalic acid standard is used as reference. Errors (1σ) reported account only for uncertainties in activity measurements of the sample, standard, and backgrounds. All age calculations have now been computerized with the assignment of modern and minimum ages based on the 4σ criteria as previously reported (Coleman, 1973). Activities for "modern" samples are given as % modern. No corrections have been made for isotopic fractionation or atmospheric ^{14}C fluctuations.

Requests for analyses were evaluated by a Radiocarbon Dating Committee consisting of J P Kempton, chairman, Charles Collinson, R E Bergstrom, J C Frye, and D D Coleman.

SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Illinois

ISGS-172. Peabody Coal Mine boring **>43,400**

Wood from Gallatin Co, center Sec 15, T 9S, R 9E, 2.4km N of Shawneetown, Illinois (37° 44′ 37″ N, 88° 12′ 15″ W). From 12m depth in boring for vent in mine. Coll 1972 by D F McCarthy; subm by T C Buschbach and H B Willman, Illinois State Geol Survey. *Comment* (HBW): site is in ancient Lake Saline, close to shoreline (Frye *et al*, 1972). Sediments encountered are older than those previously reported and may represent local preservation in protected position.

ISGS-179. Jules Section **15,020 ± 300**
13,070 BC

Humus from $<2\mu$ clay fraction of soil A horizon from Cass Co, SE¼ SE¼ NE¼ Sec 13, T 18N, R 11W, 13km E of Beardstown, Illinois (40° 01′ 00″ N, 90° 16′ 30″ W). From buried Jules Soil. Coll 1972 by L R Follmer and D W Moore; subm by L R Follmer, Illinois State Geol Survey. *Comment* (LRF): agrees well with date, 15,640 ± 580 (ISGS-137: R, 1974, v 16, p 110) on shell material from same horizon at Cottonwood School S Sec. Date helps confirm stratigraphic correlation with major glacial retreat during Woodfordian.

12,740 ± 210

ISGS-195. Cottonwood School South Section 10,790 BC

Humus from <4μ clay fraction of soil A horizon from Cass Co, NW¼ NW¼ SW¼ Sec 12, T 18N, R 11W, 11km E of Beardstown, Illinois (40° 01′ 30″ N, 90° 17′ 30″ W). From buried Jules Soil, 0.3m thick, 1.5m below surface. Coll 1972 by L R Follmer and D W Moore; subm by L R Follmer. *Comment* (LRF): disagrees with previous dates ISGS-179 and -137. Cause of discrepancy unknown.

40,000 ± 1100

ISGS-211. Emerald Pond Section 38,050 BC

Wood from Vermilion Co, SW¼ SW¼ SW¼ Sec 33, T 20N, R 12W, 8km W of Danville, Illinois (40° 08′ 45″ N, 87° 43′ 50″ W). From Glenburn Till Member of Wedron Formation, 1.8m below Batestown-Glenburn contact. Coll 1973 by W H Johnson and R P Goldthwait; subm by W H Johnson, Univ of Illinois. *Comment* (WHJ): agrees with previous date, 38,000 (ISGS-15: R, 1970, v 12, p 505); shows wood in Glenburn Till antedates Woodfordian and suggests that Glenburn Till is Altonian in age. Dates, 20,500 ± 210 (ISGS-83) and 20,800 ± 130 (ISGS-81: R, 1973, v 15, p 79) on wood coll 0.4km SE of Emerald Pond Sec and stratigraphically below till thought to correlate with the Glenburn suggested a Woodfordian age. Thus, either the correlation is incorrect or older wood has been incorporated in the Glenburn Till at the Emerald Pond Sec.

37,600 ± 1300

ISGS-238. Carpentersville Pit 35,650 BC

Wood from Kane Co, NW¼ NE¼ SW¼ Sec 2, T 42N, R 8E, 0.75km NW of Carpentersville, Illinois (42° 08′ 42.5″ N, 88° 16′ 12.5″ W). From cross-bedded sandy silt 0.75m above top of Tiskilwa Till Member of Wedron Formation. Coll 1973 by J C Cobb and G S Fraser; subm by J C Cobb, Illinois State Geol Survey. *Comment* (JCC): silt is in erosional contact with top of Tiskilwa Till. Wood fragment evidently reworked from Altonian-age Plano Silt Member and redeposited in fluvial sediments containing clay pebbles of Tiskilwa Till.

B. Lake Michigan and shore area

Illinois Beach State Park area series

715 ± 75

ISGS-168. IBSP-1 AD 1235

Peat from Lake Co, Illinois, SW¼ SW¼ SE¼ Sec 27, T 46N, R 12E, 1.6km SE of Zion, Illinois (42° 25′ 50″ N, 87° 48′ 58″ W). From 0.3m thick Grayslake Peat overlying silty sand rich in organic material and ca 2m below mixture of muck, lacustrine clays, and peat. Coll 1972 and subm by N C Hester, Illinois State Geol Survey.

1165 ± 75

ISGS-169. IBSP-2 AD 785

Peat from Lake Co, Illinois, SW¼ SE¼ NE¼ Sec 22, T 46N, R

12E, 1.6km ENE of Zion, Illinois (42° 27′ 05″ N, 87° 48′ 45″ W). From 15cm thick Grayslake Peat, underlying 2.4m sands, clays, and muck. Overlying medium to coarse sand with scattered gravel. Coll 1972 and subm by N C Hester.

ISGS-170. IBSP-3 **600 ± 75** **AD 1350**

Muck from Lake Co, Illinois, NW¼ NW¼ NW¼ Sec 2, T 46N, R 12E, 2.3km NE of Winthrop Harbor, Illinois (42° 29′ 30″ N, 87° 48′ 11″ W). From ca 0.5m thick Grayslake Peat underlying 0.6m aeolian sand and overlying medium to coarse sand with scattered gravel. Coll 1972 and subm by N C Hester.

ISGS-182. IBSP-4 **540 ± 75** **AD 1410**

Peat from Lake Co, Illinois, NW¼ SW¼ SE¼ Sec 27, T 46N, R 12E, 1.7km SE of Zion, Illinois (42° 27′ 05″N, 87° 48′ 50″ W). From peat layer underlying silts, overlain by active bog. Coll 1972 by N C Hester and G S Fraser; subm by N C Hester.

ISGS-184. IBSP-5a **>33,200**

Wood from Kenosha Co, Wisconsin, NW¼ SE¼ NE¼ Sec 19, T 1N, R 23E, 5km NNE of Winthrop Harbor, Illinois (42° 31′ 53″ N, 87° 49′ 05″ W). From 1.3m below surface in cross-bedded sand. Coll 1973 and subm by N C Hester. *Comment* (NCH): wood apparently eroded from much older deposit and was transported into area.

ISGS-185. IBSP-6 **6350 ± 140** **4400 BC**

Wood from Kenosha Co, Wisconsin, NW¼ SW¼ SW¼ Sec 17, T 1N, R 23E, 1.8km E of South Kenosha (42° 32′ 20″ N, 87° 48′ 45″ W). From ripple-bedded sand originating near shore. Coll 1973 by N C Hester and G S Fraser; subm by N C Hester.

ISGS-187. IBSP-7 **7370 ± 90** **5420 BC**

Peat from Kenosha Co, Wisconsin, NW¼ SW¼ SW¼ Sec 8, T 1N, R 23E, 4km SE of Kenosha, Wisconsin (42° 33′ 15″ N, 87° 48′ 45″ W). From large scale trough cross-bedded sands deposited by longshore currents directly overlying basal till and below ripple-bedded sands dated by ISGS-185. Coll 1973 by N C Hester and G S Fraser; subm by N C Hester.

ISGS-189. IBSP-8 **5315 ± 75** **3365 BC**

Wood from Kenosha Co, Wisconsin, NW¼ NW¼ SW¼ Sec 8, T 1N, R 23E, 3.7km SE of Kenosha (42° 33′ 30″ N, 87° 48′ 50″ W). From clay zone rich in organic material overlying till and underlying cross-bedded sand. Coll 1973 by N C Hester and G S Fraser; subm by N C Hester.

780 ± 75

ISGS-206. South Port Park #2 AD 1170

Soil humus from Kenosha Co, Wisconsin, NE¼ NW¼ NW¼ Sec 17, T 1N, R 23E, 1km S of Kenosha (42° 33′ 00″ N, 87° 48′ 40″ W). From soil developed in beach sand ca 3m above present lake level and covered by recent dune sand. Coll 1973 by L R Follmer, N C Hester, and Curtis Larsen; subm by L R Follmer.

3130 ± 100

ISGS-217. Main Street core, 95 to 103cm depth 1180 BC

2980 ± 130

ISGS-218. Main Street core, 114 to 119cm depth 1030 BC

Organic silt and peat from Lake Co, Illinois, NE¼ SE¼ NW¼ Sec 10, T 46N, R 23E, immediately E of Winthrop Harbor, Illinois (42° 28′ 50″ N, 87° 49′ 00″ W). From Grayslake Peat in depression on sand plain. Coll 1973 by A M Jacobs and Curtis Larsen; subm by A M Jacobs, Illinois State Geol Survey.

2280 ± 130

ISGS-225. Camp Logan core, 100 to 105cm depth 330 BC

2275 ± 75

ISGS-224. Camp Logan core, 110 to 118cm depth 325 BC

Silt rich in organic material from Lake Co, Illinois, NE¼ NE¼ SE¼ Sec 15, R 46N, T 23E, 1km NE of Zion, Illinois (42° 27′ 50″ N, 87° 48′ 10″ W). From Grayslake Peat in depression on sand plain. Coll 1973 by A M Jacobs and Curtis Larsen; subm by A M Jacobs.

General Comment (GSF & AMJ): dates show progressively younger organic sediments s-ward, indicating age of beach ridge complex decreases in that direction (Hester and Fraser, 1973).

Lake Michigan bottom sediment series

Silt rich in organic material from cores in Lake Michigan Formation. Coll by J A Lineback and D L Gross; subm by D L Gross, Illinois State Geol Survey.

8075 ± 95

ISGS-208. Core 836-5B 6125 BC

From 19km SW of Benton Harbor, Michigan (42° 07′ 42″ N, 86° 43′ 30″ W). From Waukegan Member, interval 72 to 95cm below sediment/water interface. Coll 1971. *Comment* (DLG): from same core intervals as wood dated 910 ± 140 (ISGS-100: R, 1973, v 15, p 78), which is more reasonable for time of deposition. Cause of discrepancy unknown but may be result of older, detrital carbon, possibly from 13,000-yr-old till which forms shoreline in area.

11,110 ± 220

ISGS-226. Core 1002-3A 9160 BC

From 22km E of Waukegan, Illinois (42° 23′ 00″ N, 87° 34′ 54″ W). From Lake Forest Member, interval 90 to 100cm below sediment/

water interface. Coll 1973. *Comment* (DLG): indicates very low sedimentation rate along W side of S Lake Michigan. No major streams enter lake along this shore; hence sedimentation rates are lower than on E side of S lake basin.

ISGS-219. Core 1000-3C, 20 to 30cm interval **4070 ± 130**
2120 BC

ISGS-234. Core 1000-3C, 50 to 60cm interval **4400 ± 200**
2450 BC

ISGS-220. Core 1000-3C, 90 to 100cm interval **5140 ± 160**
3190 BC

From 25km NW of Benton Harbor, Michigan (42° 18′ 00″ N, 86° 42′ 00″ W). From Waukegan Member. Coll 1973. *Comment* (DLG): dates imply sedimentation rate for foreset beds of Waukegan Member of Lake Michigan Formation. On depth *vs* age plot, points approx straight line with slope of 61cm/1000 yr. In an earlier study, 7 dates from core in bottomset beds indicated sedimentation rate of 19cm/1000 yr (R, 1974, v 16, p 112). Although relative values of ages appear correct, absolute values are probably too old because plots do not intersect origin. Anomolously old ages may be caused by presence of older, detrital carbon.

C. New Mexico

Lake Alamagordo E Section series

Sec in De Baca Co, NE¼ SE¼ SE¼ Sec 36, T 5N, R 25E, 31km NW of Ft Sumner, New Mexico (34° 34′ 30″ N, 104° 18′ 30″ W). Coll by J C Frye and A B Leonard; subm by H D Glass, Illinois State Geol Survey.

ISGS-200. NMP-140 **29,470 ± 360**
27,520 BC

Pisolitic cap on 1m caliche within top of Ogallala Formation. Overlain by 1m of Pleistocene marl and caliche. Coll 1972.

ISGS-216. NMP-305 **20,490 ± 230**
18,540 BC

Caliche 10cm from top of sec. Within gradational zone between underlying marl and overlying caliche.

ISGS-221. NMP-306 **11,250 ± 150**
9300 BC

Platy caliche, overlying Pleistocene marl on Ogallala pisolitic caliche. Coll 1973.

Santa Rosa NW Section series

Sec in Guadalupe Co, NW cor Sec 36, T 9N, R 20E, 9.7km WNW of Santa Rosa, New Mexico (34° 58′ N, 104° 46′ W). Coll 1972 by J C Frye and A B Leonard; subm by H D Glass.

27,160 ± 540

ISGS-201. NMP-108 **25,210 BC**

Pisolitic caliche from top 10cm of 2.45m exposure of Ogallala Formation.

41,500 ± 1200

ISGS-203. NMP-109 **39,550 BC**

Massive caliche of Ogallala Formation from 1.5m below top of exposure.

Santa Rosa SE Section series

Sec in Guadalupe Co, SE¼ Sec 22, T 8N, R 22E, on E edge of Santa Rosa, New Mexico (34° 48′ N, 104° 32′ W). Coll by J C Frye and A B Leonard; subm by H D Glass.

32,160 ± 430

ISGS-205. NMP-145 **30,210 BC**

Pisolitic caliche 9cm from top of Ogallala Formation. Coll 1972.

33,680 ± 300

ISGS-240. NMP-308 **31,730 BC**

Massive caliche of Ogallala Formation, 1.5m below top of pisolitic caliche.

35,000 ± 850

ISGS-207. NMP-175 **33,050 BC**

Pisolitic caliche from Chaves Co, NE¼ SE¼ SE¼ Sec 8, T 9S, R 25E, 22km NE of Roswell, New Mexico (32° 30′ N, 104° 25′ W). From 9cm below top of Ogallala Formation. Coll 1972 by J C Frye and A B Leonard; subm by H D Glass.

30,880 ± 400

ISGS-212. NMP-125 **28,930 BC**

Caliche from De Baca Co, SW¼ NW¼ NW¼ Sec 20, T 3N, R 25E, 9.3km W of Ft Sumner, New Mexico (34° 28′ 30″ N, 104° 21′ W). From banded to massive caliche of Ogallala Formation, 15cm below surface, but stratigraphically 0.6 to 1.2m below top of pisolitic caliche. Coll 1972 by J C Frye and A B Leonard; subm by H D Glass.

27,400 ± 500

ISGS-213. Taiban Borrow Pit Section, NMP-159 **25,450 BC**

Caliche from Roosevelt Co, NE¼ SE¼ Sec 31, T 3N, R 30E, 16.3km E of Taiban, New Mexico (34° 11′ N, 103° 56′ W). From dense caliche at top of 5.2m exposure of Kansan deposit. Coll 1972 by J C Frye and A B Leonard; subm by H D Glass.

24,100 ± 300

ISGS-214. Santa Rosa W Section, NMP-301 **22,150 BC**

Caliche from Guadalupe Co, NW¼ Sec 10, T 8N, R 21E, on W edge of Santa Rosa, New Mexico (34° 58′ N, 104° 44′ W). From top 10cm of Pleistocene pond marl. Coll 1973 by J C Frye and A B Leonard; subm by H D Glass.

43,100 ± 1900

ISGS-227. Quay/Curry Co Line Section, NMP-370 41,150 BC

Caliche from Quay Co, SW¼ SE¼ SE¼ Sec 34, T 9N, R 36E, 14.5km N of Bellview, New Mexico (34° 56′ N, 103° 07′ W). From massive caliche of Ogallala Formation, 2.4m below top of pisolitic caliche. Coll 1973 by J C Frye and A B Leonard; subm by H D Glass.

Hagerman E Section series

Sec in Chaves Co, NE¼ Sec 18, T 14S, R27E, 5.6km ESE of Hagerman, New Mexico (33° 07′ N, 104° 15′ W). Coll 1973 by J C Frye and A B Leonard; subm by H D Glass.

26,190 ± 220

ISGS-228. NMP-377 24,240 BC

Caliche from top of platy zone capping Kansan terrace on E side of Pecos R.

31,700 ± 570

ISGS-232. NMP-378 29,750 BC

Caliche from massive zone, 1m below top of platy caliche capping Kansan terrace.

32,600 ± 400

ISGS-239. Santa Rosa E Section, NMP-316 30,650 BC

Caliche cemented sand from Guadalupe Co, NE¼ Sec 4, T 8N, R 22E, on E edge of Santa Rosa, New Mexico (34° 57′ N, 104° 35′ W). From Ogallala Formation, 3.1m below top of pisolitic caliche. Coll 1973 by J C Frye and A B Leonard; subm by H D Glass.

General Comment: caliche dates have been shown by Frye *et al* (1974) to substantiate clay-mineral data, which indicates that capping layer of Ogallala Formation has been significantly modified by dissolution and reprecipitation in late Pleistocene and probably Holocene time. Ages are only apparent and do not represent actual time of caliche deposition.

13,550 ± 170

ISGS-222. Lake Avalon Dam Section 11,600 BC

Unionid shell fragments from Eddy Co, NE¼ Sec 14, T 21s, R 26E, 10km NNW of Carlsbad, New Mexico (32° 30′ N, 104° 15′ W). From lowest terrace of Pecos R, below Lake Avalon Dam. Coll 1973 by J C Frye and A B Leonard; subm by J C Frye, Illinois State Geol Survey. *Comment* (JCF): dates molluscan fauna of lowest part of terrace complex just above Pecos R floodplain of lower Pecos Valley.

6420 ± 110

ISGS-223. Highway 31 Section 4470 BC

Unionid shell fragments from Eddy Co, S central Sec 11, T 23S, R 28E, 4km NE of Loving, New Mexico (32° 16′ N, 104° 02′ W). From second terrace of Pecos R Valley in S New Mexico. Coll 1973 by J C Frye and A B Leonard; subm by J C Frye. *Comment* (JCF): dates upper part of gravelly terrace above floodplain of Pecos R.

D. Other localities

ISGS-173. Lower Moreau terrace **9180 ± 210 / 7230 BC**

Alluvium rich in organic material from Cole Co, Missouri, NE¼ SW¼ NW¼ Sec 28, T 44N, R11W, 7.2km SE of Jefferson City, Missouri (38° 32′ 10″ N, 92° 08′ 38″ W). From base of lower terrace along lower Moreau R, 15cm above gravel layer, 6.6m below surface. Coll 1972 by R Ward and W H Allen, Jr; subm by W H Allen, Jr, Missouri Geol Survey, Rolla. *Comment* (WHA): represents near-maximum age for deposition of material on lower terrace. Coarseness of material at base indicates lower terrace unit was cut into former floodplain and then built up more slowly. Terrace is still being aggraded during floods.

ISGS-174. Lincoln Farm Section **3675 ± 85 / 1725 BC**

Wood and disseminated carbon in alluvial silt from Cole Co, Missouri, SW¼ SW¼ SE¼ Sec 30, T 44N, R 12W, 6.4km S of Jefferson City (38° 31′ 30″ N, 92° 10′ 35″ W). From silt inset into lower terrace along Lower Moreau R, ca 5m below surface. Coll 1972 by R Ward and W H Allen, Jr; subm by W H Allen, Jr. *Comment* (WHA): material deposited in abandoned sloughs and assoc with chert gravels indicates a major change in stream channel, occurring at numerous points along Lower Moreau R between 4000 and 3500 BP. Sloughs have now been filled and appear as normal dissected elements of lower terrace, except where exposed in vertical cuts of present-day channel.

ISGS-180. Sullivan Country Core #3 **16,540 ± 110 / 14,590 BC**

Organic material in $<2\mu$ clay fraction from Sullivan Co, Indiana, SW¼ SE¼ NE¼ Sec 13, T 9N, R 10W, 3.2km N of Scott City, Indiana (39° 14′ 06″ N, 87° 27′ 50″ W). From IIA_{1b} horizon of paleosol in 15cm sandy loess zone overlying 18cm pedisediment and underlying 125cm of loess. Coll 1973 and subm by A P Canepa, Indiana Univ, Bloomington. *Comment* (APC): dated material overlain by 125cm of Peoria Loess (15,000 to 22,000 BP). It is unlikely that the Peoria Loess, generally 150 to 170cm thick in the area, was deposited in 1500 yr, therefore dated material is probably contaminated.

Venezuela series

From Estdo Falcon, Venezuela. Coll and subm by M P Weiss, N Illinois Univ, De Kalb.

ISGS-186. Lagoon on Cayo Sal, #1 **2690 ± 75 / 740 BC**

Saline peat from ca 1km NE of Chichiriviche, Venezuela (10° 56′ 30″ N, 68° 15′ 30″ W). From peat 11cm thick, 93cm below Cayo Sal Salina. Coll 1972.

2980 ± 120

ISGS-188. Lagoon on Cayo Sal, #2 **1030 BC**

Peat from ca 1km NE of Chichiriviche, Venezuela (10° 56′ 40″ N, 68° 15′ 45″ W). From saline peat 50cm below Cayo Sal Salina. Coll 1973. *General Comment* (MPW): dates represent last time vegetation grew in lagoon prior to hypersaline conditions.

100.98 ± .51%

ISGS-194A. Cayo Peraza Beach **Modern**

98.63 ± .46%

ISGS-194B. Cayo Peraza Beach **Modern**

Calcareous beach rock from ca 1km E of Chichiriviche, Venezuela (10° 56′ N, 68° 15′ W). Halimeda-molluscan sand cemented by aragonite from 4th-most-recent beachrock of Cayo Peraza. *Comment*: 2 fractions of CO_2 coll for dating. First fraction A probably contained most of the carbon in the aragonite cement. Fraction B probably is predominately from the clastics.

II. ARCHAEOLOGIC SAMPLES

A. Illinois

Loy Site series

Carbonized wood from Greene Co, SE¼ SE¼ SE¼ Sec 9 and N½ NE¼ NE¼ Sec 16, T 9N, R 10W, 12km S of Greenfield, Illinois (39° 14′ 00″ N, 90° 12′ 02″ W). Coll 1971 and subm by K B Farnsworth, Univ Michigan.

1970 ± 75

ISGS-171. No 4-31c **20 BC**

From base of sandstone-lined pit hearth, 0.6m below ground surface, assoc with 11 Havana-Hopewell series and 2 Middle Woodland type indeterminate sherds and one lamellar flake blade.

2010 ± 85

ISGS-181. No 6-72b **60 BC**

From mass of charcoal near base of basin-shaped refuse pit, Feature 72, 36cm below surface. Sherds recovered from pit were 53 Havana-Hopewell series and 4 Middle Woodland type indeterminate. One Snyders style and 2 Norton projectile points, and 2 lamellar flake blades were also recovered.

General Comment (KBF): previous Middle Woodland period samples from lower Illinois Valley region were dated between ca 100 BC and AD 450. In light of hypothesis for move of late Middle Woodland settlement from Illinois Valley trench into larger tributaries like Macoupin Valley, where Loy site is located (Farnsworth, 1973), dates ca AD 100 to 300 were expected.

975 ± 75

ISGS-175. Collins Site, Feature 41 **AD 975**

Wood charcoal from Vermilion Co, SW¼ NW¼ SE¼ Sec 8, T 20N, R 12W, 9.7km NW of Danville, Illinois (40° 12′ 30″ N, 87° 44′ 30″ W).

From refuse of burned Late Woodland house set in basin. Grit-tempered pottery with simple and collared rims in lower part of fill. Coll 1972 by Matt Walter; subm by J G Douglas, Univ Illinois. *Comment* (JGD): 2 other dates from site were 930 ± 140 (ISGS-112) and 853 ± 75 (ISGS-113: R, 1974, v 16, p 114). Three dates provide reasonable range for occupation of Collins site, although artifacts within house are interpreted to postdate AD 1050.

Indian Springs Mound series

Charred wood from Vermilion Co, NE¼ NW¼ SE¼ Sec 8, T 20N, R 12W, 9.7km NW of Danville, Illinois (40° 12′ 30″ N, 87° 44′ 30″ W). Outer rings of charred cedar logs, which were part of Late Woodland crematory structure built on bluff adjacent to pre-existing earthen mound, fired with 5 bundle burials on central scaffold, covered with loess cap. Coll 1972 and subm by J G Douglas.

ISGS-176. Feature 1, RC-4 **1045 ± 75** **AD 905**

From unnumbered log chunk under E end of Log 23B.

ISGS-191. Feature 1, RC-6 **960 ± 75** **AD 990**

From unexposed underside of Log 9.

ISGS-193. Feature 1, RC-7 **950 ± 90** **AD 1000**

From unexposed underside of Log 6.

ISGS-196. Feature 1, RC-9 **890 ± 85** **AD 1060**

From unexposed underside of Log 169.

General Comment (JGD): dates are maximum for crematory. Comparison with ISGS-112, -113, and -175 confirms contemporaneity of Indian Springs Mound with Late Woodland Collins site. Slightly older age for ISGS-176 may be because chunk was more completely combusted and therefore date is on heartwood rather than sapwood.

ISGS-177. Pulcher site **1075 ± 80** **AD 875**

Acorns from St Clair Co, SE¼ SE¼ NW¼ Sec 32, T 1N, R 10W, 2.4km S of Dupo, Illinois (38° 29′ 40″ N, 90° 14′ 00″ W). From refuse pit at depth 70 to 80cm below surface. Coll 1972 by P A Dickinson; subm by G A Freimuth, Univ Illinois. *Comment* (GAF): date helps establish chronologic position of Pulcher site by other than ceramic comparisons.

ISGS-178. Cedar Creek Reservoir **2005 ± 80** **55 BC**

Wood charcoal from Jackson Co, SE¼ NW¼ SE¼ Sec 26, T 10S, R 2W, 11km SW of Carbondale, Illinois (37° 37′ 12″ N, 89° 17′ 35″ W). From 76cm below surface at base of rock-lined roasting pit 69cm deep.

Coll 1972 by Barry Konneker; subm by M J McNerney, S Illinois Univ Mus, Carbondale. *Comment* (MJM): although no ceramics were directly assoc with charcoal, site produced only Crab Orchard fabric impressed ceramics.

1115 ± 75

ISGS-183. Grammar site **AD 835**

Charcoal from Jackson Co, SE¼ NE¼ NE¼ Sec 12, T 10S, R 2W, 6.4km SW of Carbondale, Illinois (37° 40′ 09″ N, 89° 16′ 07″ W). From charcoal stain 9cm thick, 42cm below surface. Coll 1972 by William Cremin; subm by M J McNerney. *Comment* (MJM): ceramics assoc with sample are Late Woodland and conform to type Raymond cord-marked (Maxwell, 1951).

Koster Site series

Carbonized wood from Greene Co, SW¼ NW¼ SE¼ Sec 21, T 9N, R 13W, 8km NE of Hardin, Illinois (39° 12′ 30″ N, 90° 33′ 00″ W). Coll 1972 by R B McMillan; subm by R B McMillan, Illinois State Mus, Springfield, and J A Brown, Northwestern Univ, Evanston, Illinois.

4880 ± 250

ISGS-202. KO-503 **2930 BC**

From 5 to 10cm below top of Horizon 6.

5175 ± 85

ISGS-197. KO-508 **3225 BC**

From main stratum of Horizon 6.

5250 ± 250

ISGS-198. KO-509 **3300 BC**

From small hearth *in situ* in top of Horizon 6. Stratigraphically equivalent to ISGS-197.

5070 ± 90

ISGS-199. KO-510 **3120 BC**

From small hearth *in situ* in upper 10 cm of Horizon 6. Stratigraphically equivalent to ISGS-197 and -198.

5140 ± 75

ISGS-235. KO-521 **3190 BC**

From near center of Horizon 6. Stratigraphically equivalent to ISGS-197, -198, and -199 in main portion of Horizon 6.

5305 ± 75

ISGS-237. KO-541 **3355 BC**

From large feature (possibly Archaic house) near base of Horizon 6. *Comment* (JAB): sample belongs to either main stratum of Horizon 6 or underlying lower stratum. Date is consistent with this intermediate stratigraphic position.

5440 ± 100
ISGS-233. KO-531 **3490 BC**

From large feature (possibly Archaic house) near base of main portion of Horizon 6.

5720 ± 75
ISGS-209. KO-520 **3770 BC**

From pit originating from basal unit of Horizon 6. *Comment* (JAB): dates lower stratum of Horizon 6, which is stratigraphically distinct from main stratum of Horizon 6.

7630 ± 210
ISGS-210. KO-530. **5680 BC**

From Horizon sub-8. *Comment* (JAB): 2 previously determined dates on Horizon 8 were 6265 ± 180 (GX2401) and 7730 ± 190 (GX2402).

7910 ± 100
ISGS-229. KO-535 **5960 BC**

From upper stratigraphic unit of Horizon 9.

8430 ± 90
ISGS-230. KO-553 **6480 BC**

From top 5cm of Horizon 11.

8480 ± 110
ISGS-236. KO-546 **6530 BC**

From mid-portion of Horizon 11.

8430 ± 100
ISGS-231. KO-552 **6480 BC**

From bottom 5cm of Horizon 11. *Comment* (JAB): 2 previously determined dates of 7155 ± 220 (GX2102) and 7005 ± 360 (GX2103) do not agree with chronology established here.

General Comment (JAB): dates are remarkably consistent with each other and with site stratigraphy. Chronology established by this series is also consistent with archaeologic time markers from each horizon.

B. Other localities

Loma Alta site series

Wood charcoal from near Loma Alta, Ecuador, ca 24km upstream from mouth of Valdivia R. Coll 1972 by Presley Norton; subm by D W Lathrap, Univ Illinois.

3765 ± 85
ISGS-190. LA-8 **1815 BC**

From excavation Unit J-III in thin yellow clay buried by 2.1m cultural refuse of Valdivia culture. *Comment* (DWL): yellow clay lines

bottom of gully eroded through Valdivia II-III midden, subsequent to early Valdivia occupation. Gully was refilled with refuse of much later Valdivia VI reoccupation of Loma Alta hill. Only cultural material in fill is Valdivia VI. Date is ca 100 yr later than dates from cairns in Unit J-III.

ISGS-192. LA-7 **4590 ± 120**
2640 BC

From excavation Unit J-III, covered with 2.2m Valdivia II-III midden. Assoc with stone Cairn #8, at base of cultural deposit and containing earliest pottery so far id in Ecuador. *Comment* (DWL): date slightly later than other dates from cairns in J-III: ISGS-142: 5000 ± 190; ISGS-146: 4750 ± 120 (R, 1974, v 16, p 115); I-7075: 4920 ± 120; I-7076: 5010 ± 120. Further stylistic analysis of pottery in 16 cairns excavated in J-III may disclose minor chronologic variations among various cairns, but at present it is more reasonable to assume all 5 dates refer to same range of cultural events. Distinctive group of ceramics from cairns at Loma Alta site can be dated quite securely in 4750 to 4950 BP range. Dates are reasonable, as cairn pottery is demonstratably earlier, on stylistic grounds, than Valdivia pottery so far described from Valdivia site.

ISGS-204A. Brynjulfson Cave #1 **>27,000**

ISGS-204B. Brynjulfson Cave #1 **34,600 ± 2100**
32,650 BC

Collagen fraction of bone from Boone Co, Missouri, SW¼ NE¼ SW¼ Sec 16, T 47N, R 12W, 19km S of Columbia, Missouri (38° 51′ 07″ N, 92° 16′ 50″ W). Bone (*Platygonus compressus*) coll randomly throughout 1.5m cave fill for ca 12m. Coll 1962 by M G Mehl; subm by P W Parmalee, Illinois State Mus, Springfield. *Comment*: previous dates on collagen from bones of mixed species from Brynjulfson Cave #1 ranged from 9940 ± 760 (ISGS-70: R, 1973, v 15, p 84) to 21,150 ± 430 (ISGS-166D: R, 1974, v 16, p 116).

ISGS-215. Puna 004 **3995 ± 75**
2045 BC

Charcoal from Provincia de Jujuy, Argentina, 170km NW of Jujuy City, Argentina (23° 10′ 00″ S, 65° 50′ 30″ W). From remains of Indian fire. Coll 1973 and subm by Jorge Fernández, Mina Aguilar, Prov Jujuy, Argentina. *Comment* (JF): from Holocene sediments filling basin of Guatayok. Accompanied by grinding tools and lithic materials different from those characteristic of preceramic period of Argentine NW (industries of Saladillo, Ayampitin, etc). Artifacts are typologically related to those from Rio Colorado Basin and Pinto Basin site, Nevada, USA, *ie*, Pinto and Silver Lake type points. Culturally they correspond to context of superior hunters, established at a later date in the area.

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