

UNIVERSITY OF WISCONSIN RADIOCARBON DATES XIX

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Procedures and equipment have been described in previous date lists. Except as otherwise indicated, wood, charcoal and peat samples are pretreated with dilute NaOH–Na₄P₂O₇ and dilute H₃PO₄ before conversion to the counting gas methane; marls and lake cores are treated with acid only. Very calcareous materials are treated with HCl instead of H₃PO₄. Pretreatment of bone varies with the condition of the bone sample, solid bone with little deterioration is first cleaned manually and ultrasonically. The bone is treated with 8% HCl for 15 minutes, then dilute NaOH–Na₄P₂O₇ for 3 hours at room temperature, washed until neutral, and the collagen extracted by Longin's method (Longin, 1971). Charred bone is treated with dilute HCl, NaOH–Na₄P₂O₇, and then dilute HCl again.

The dates reported have been calculated using 5568 as the half-life of ¹⁴C. The standard deviation quoted includes only 1σ of the counting statistics of background, sample, and standard counts. Background methane is prepared from anthracite, standard methane from NBS oxalic acid. The activities of the dated samples for which δ¹³ values are listed have been corrected to correspond to a δ¹³C value of –25‰; the activity of the standard methane has been corrected to –19‰.

Sample descriptions are based on information supplied by those who submitted samples.

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I. ARCHAEOLOGIC SAMPLES

United States

Iowa

Wittrock site (130B4) series

Sample coll July 1980 from Wittrock site, component of Mill Creek culture of Iowa, O'Brien Co (43° 0' N, 95° 30' W). Floral analysis of site is underway as part of study of climatic changes in Iowa (Henning, 1968). Coll and subm by L A Zalucha, Univ Wisconsin-Madison. Acid treatment only.

* Margaret M Bender retired August 31, 1981.

WIS-1292. **800 ± 70**
 $\delta^{13}C = -22.7\text{‰}$

Assorted sp of wood charcoal and charred corn from Level 2, Feature 80-2, trash pit, 94 to 137cm below surface.

WIS-1293. **800 ± 70**
 $\delta^{13}C = -22.0\text{‰}$

Assorted sp of wood charcoal and charred corn from Level 2, Feature 80-2, trash pit, 79 to 107cm below surface.

Phipps site (13CK21) series

Test excavation at Phipps site conducted by L A Zalucha June 1981 to obtain soil samples from later levels of Mill Creek site (42° 45' N, 95° 30' W). Analysis of seeds and charcoal undertaken to test validity of current hypotheses concerning effects of climatic change on Mill Creek culture (Henning, 1968). Subm by L A Zalucha.

WIS-1274. **790 ± 70**
 $\delta^{13}C = -24.5\text{‰}$

Wood charcoal and charred corn from Level 3, lowest natural level, trash pit, Feature 81-2, 89 to 109cm below surface.

WIS-1273. **720 ± 70**
 $\delta^{13}C = -20.0\text{‰}$

Wood charcoal and charred corn from base of trash pit, Feature 81-1, 78.7 to 86.4cm below surface.

WIS-1220. Logansport site **3560 ± 80**
 $\delta^{13}C = -25.5\text{‰}$

Wood charcoal, ISU catalogue no. 7700 from Feature 7, cultural fill of large, rather shallow basin-shaped feature 1.7m below present surface. Sample dated to provide temporal information on most deeply buried horizon at site, cultural stratum below successive Woodland and Great Oasis occupational zones but one from which no specifically diagnostic artifactual material had been recovered (Gradwohl and Osborn, 1976, p 165). Coll July 1979 from site in Boone Co (42° 4' 30" N, 93° 57' 30" W); subm by D M Gradwohl, Iowa State Univ, Ames, Iowa.

Kentucky

Carlston Annis site (15Bt5) series

Charcoal samples from 1x1m pit (D14-2) excavated in shell midden in 10cm levels July and Aug 1980 under supervision of W H Marquardt, Univ South Carolina, and P J Watson, Washington Univ, from site in Butler Co (37° 17' 29" N, 86° 48' 17" W). Subm by D A Baerreis.

WIS-1301. **4760 ± 90**
 $\delta^{13}C = -26.2\text{‰}$

Sample from Level 13, 120 to 130cm deep. A radiocarbon date from Level 15 (UGa -3391) has been reported as 4670 ± 85 (Myers, 1981).

WIS-1302. **5350 ± 80**
 $\delta^{13}C = -25.6\text{‰}$

Sample from Level 19, 180 to 190cm deep. Radiocarbon date from Level 20 (UGa -3390) reported as 4350 ± 85 (Myers, 1981).

Tennessee

Snake Creek site (40HR35) series

Charcoal coll from site on W bank of Tennessee R, Hardin Co (35° 09' 45" N, 88° 31' 38") coll Jan 1978 and subm by D H Dye, Washington Univ, St Louis, Missouri.

WIS-1261. **1080 ± 100**
 $\delta^{13}C = -25.8\text{‰}$

Charred nut fragments (*Juglans*, *Carya*) and wood charcoal 60cm below surface in 1x2m test excavation of multi-component midden. In direct assoc were McKelvey series sherds (Futato, 1977; Webb and DeJarnette, 1942).

WIS-1260. **2110 ± 80**
 $\delta^{13}C = -26.2\text{‰}$

Charred nut fragments (*Carya*, *Juglans*) 140cm below surface. In direct assoc were Longbranch series sherds (Futato, 1977; Oakley and Futato, 1975). Ceramic analysis indicates that sample is from Early Woodland Colbert component.

Wisconsin

Jones site (47RO203) series

Charcoal coll Nov 1977 from site in Rock Co (42° 45' N, 89° 07' W). Coll by William Green; subm by Constance Arzigian, Univ Wisconsin-Madison.

WIS-1228. **480 ± 60**
 $\delta^{13}C = -26.6\text{‰}$

Charcoal, including some oak, from Feature 11, Sq E3a-3, shallow pit containing burned bone and numerous cord-roughened Madison-ware sherds.

WIS-1289. **<200**
 $\delta^{13}C = -26.9\text{‰}$

Charcoal, including some oak, from Feature 15, possible hearth, 7cm below surface of unplowed field. Feature contained Madison-ware pottery.

Bluff Siding site (47 Bf 45) series

Charcoal from site in Buffalo Co (44° 04' 15" N, 91° 36' 30" W) coll July 1979 by J T Penman, State Hist Soc Wisconsin. Samples are first dated Late Woodland samples from Wisconsin site adjacent to Mississippi R (Penman, 1981). Subm by J T Penman.

WIS-1206. **780 ± 70**
 $\delta^{13}C = -26.4\text{‰}$

Sample from Feature 9, 30 to 40cm below surface.

WIS-1208. **1570 ± 60**
 $\delta^{13}C = -27.7\text{‰}$
Sample from Feature 1, Level 5, 40 to 50cm below surface.

WIS-1251. **980 ± 70**
 $\delta^{13}C = -26.5\text{‰}$
Charcoal (*Quercus* sp) from Feature 6, 30cm below surface.

Plum Creek Bridge site (47 Pe 38) series

Charcoal coll from site in Pepin Co (92° 07' 31" N, 44° 34' 0" W) July 1981 by B W Ford, Jr. Site is Late Woodland, containing Madison triangular projectile points and Clam River Corded Stamped ceramics. Site is S-most Clam River site excavated at present time. Subm by J T Penman.

WIS-1299. **340 ± 70**
 $\delta^{13}C = -26.2\text{‰}$
Charcoal from Sq 2-176-D, Level 2.

WIS-1296. **970 ± 70**
 $\delta^{13}C = -27.0\text{‰}$
Charcoal from Sq 2-132, Level 4. Acid treatment only.

Pedretti III site (47Cr127) series

Charcoal coll July 1978 from site in Crawford Co (42° 06' 26" N, 91° 08' 36" W). Coll and subm by J B Stoltman, Univ Wisconsin-Madison.

WIS-1250. **1330 ± 70**
 $\delta^{13}C = -26.2\text{‰}$
Charcoal from Feature 2 in Levels 4 and 5, Sq 5 (N254/W235) 30 to 50cm deep. Besides two Levsen Stamped variety dentate sherds, Feature 2 contained linear stamped rim which presumably postdates Millville Phase. Date presumably applies to an immediately post-Millville (Lane Farm?) component.

WIS-1249. **1460 ± 60**
 $\delta^{13}C = -26.4\text{‰}$
Charcoal from Levels 11, 12, and 13, sandy, shell-rich levels below 90cm silty alluvium. Of 46 identifiable sherds, 42 are Linn Ware types, 1 Havanna Ware and 3 are unid. Date applies to Millville Phase.

WIS-1290. **1490 ± 30**
 $\delta^{13}C = -26.2\text{‰}$
Charcoal from Level 3b (26 to 30cm deep) in Square 6 assoc with two dentate Levsen Stamped variety sherds of Millville Phase.

WIS-1291. Clam Shell Point (47 Cr 187) **1960 ± 30**
 $\delta^{13}C = -27.1\text{‰}$
Charcoal (*Morus rubra*) id by L A Zalucha, from site in Crawford Co (43° 05' 05" N, 91° 09' 25" W). Sample from lowest levels yielding ceramics in Test Pit 2. Corded and pinch-decorated sherds suggest Early Woodland stage cultural affiliation. Coll and subm by J B Stoltman.

Outlet site (47 Da 3) series

Samples excavated 1949 by D A Baerreis from site in Dane Co (43° 02' 58" N, 89° 21' 53" W). Burial 3 of Mound 5 consisted of reburial of bones of several individuals. Bones were both charred and uncharred in close proximity in central portion of mound. Assoc of large quartzite blade of Hopewell style suggests Middle Woodland affiliation. Subm by D A Baerreis.

WIS-1213. **1960 ± 80**
 $\delta^{13}C = -19.7\text{‰}$

Collagen extracted from human bones by Longin's method (Longin, 1971).

WIS-1217. **1540 ± 70**
 $\delta^{13}C = -18.7\text{‰}$

Charred human bone.

WIS-1243. **1360 ± 70**
 $\delta^{13}C = -19.2\text{‰}$

Charred human bone.

II. GEOLOGIC SAMPLES

*United States**Alaska***Squirrel River Lake site series**

Core sampled April 1979 by L Parrish and P Anderson, Brown Univ, Providence, Rhode Island, from unnamed perched lake bordering Squirrel R in Kobuk R drainage of NW Alaska (67° 06' N, 100° 23' W). Subm by P Anderson.

WIS-1166. **20,300 ± 380**
 $\delta^{13}C = -27.7\text{‰}$

Silty clay 325 to 245cm below mud-water interface.

WIS-1163. **22,700 ± 390**
 $\delta^{13}C = -28.1\text{‰}$

Silty gyttja 275 to 295cm below mud-water interface. (One 3-day count.)

WIS-1164. **17,360 ± 200**
 $\delta^{13}C = -30.1\text{‰}$

Silty clay 200 to 220cm below mud-water interface. Sample dates presence of *Artemisia*-rich tundra assoc with late glacial environments of Alaska and Canada. (One 3-day count.)

WIS-1197. **14,420 ± 230**
 $\delta^{13}C = -31.4\text{‰}$

Silty gyttja 100 to 130cm below mud-water interface. Level marks rise of *Betula* pollen and indicates appearance of shrub tundra in Kobuk valley, important as indication of warmer climatic conditions.

WIS-1193. **5200 ± 70**
 $\delta^{13}C = -33.8\text{‰}$

Gyttja 45 to 65cm below mud-water interface. This level marks increase in *Picea* pollen and should date appearance of spruce gallery in Kobuk R region which is of potential significance in postulated climatic events and occupations of Kobuk Valley by N Archaic cultures.

Kiliovilik Creek Lake series

Core obtained April 1979 by P Anderson, P Colinvaux, and L Parrish from unnamed lake drained by Kiliovilik Creek (68° 13' N, 158° 20' W). Kiliovilik Creek Lake is first lake in Selawik R drainage to be cored for pollen analysis. Subm by P Anderson.

WIS-1154. **3570 ± 70**
 $\delta^{13}C = -30.5\text{‰}$

Gyttja 73 to 93cm below mud-water interface.

WIS-1188. **3580 ± 70**
 $\delta^{13}C = -31.6\text{‰}$

Gyttja 145 to 155cm and wood fragment 159 to 160cm below mud-water interface. Dates decline of alder pollen.

Kaiyak Lake series

Core obtained April 1979 from lake in NW Alaska, Noatak R drainage (68° 7' N, 16° 25' W). Coll by L Parrish, J Walker, and P Anderson; subm by P Anderson. Depths are below mud-water interface.

WIS-1215. **3140 ± 80**

Gyttja 15 to 25cm depth. Dates decline in alder pollen percentages, perhaps marking end of time when conditions were warmer than at present at site. Counted in one counter only.

WIS-1218. **7960 ± 90**
 $\delta^{13}C = -25.8\text{‰}$

Gyttja 58 to 80cm depth.

WIS-1216. **14,300 ± 140**
 $\delta^{13}C = -30.9\text{‰}$

Gyttja 128 to 148cm depth. Dates initiation of shrub tundra in middle Noatak R.

WIS-1219. **21,700 ± 330**

Silty gyttja 340 to 365cm depth. Dates late glacial peak in grass pollen. Sample counted in one counter only.

WIS-1222. **>36,000**
 $\delta^{13}C = -29.3\text{‰}$

Silty gyttja 500 to 523cm depth. Dates decline in grass pollen frequencies.

WIS-1223. **>36,000**
 $\delta^{13}C = -28.9\text{‰}$

Silty gyttja 675 to 700cm depth, bottom of core. Sample activity not distinguishable from background.

*Connecticut***Lantern Hill Pond series**

Core coll Sept 1980 from Lantern Hill Pond, New London Co (41° 27' 30" N, 71° 57' W) by K McGown *et al*, Brown Univ, Providence, Rhode Island. Subm by Thompson Webb, III, Brown Univ.

WIS-1277. **11,160 ± 110**
 $\delta^{13}C = -33.8\text{‰}$
 Gyttja 927 to 932cm, bottom of core.

WIS-1283. **10,200 ± 100**
 $\delta^{13}C = -31.9\text{‰}$
 Gyttja 806 to 813cm deep. Dates change from spruce to oak and pine forest.

WIS-1247. **2340 ± 80**
 $\delta^{13}C = -29.9\text{‰}$
 Gyttja 208 to 212cm deep.

*Iowa***Holtz Bog series**

Core 1979-A coll July 1979 from center of Holtz Bog, Muscatine Co (41° 26' N, 90° 55' W) by J K Huber and R G Baker. Core obtained to provide environmental evidence for nearby archaeol sites. This will be first pollen record in this area of Mississippi Valley. Subm by J K Huber, R G Baker, and J A Tiffany, Univ Iowa, City.

WIS-1198. **520 ± 70**
 $\delta^{13}C = -29.4\text{‰}$
 Silty, fine-grained peat 26 to 36cm below surface.

WIS-1199. **1330 ± 80**
 $\delta^{13}C = -27.4\text{‰}$
 Sandy, fine-grained peat 179 to 199cm below surface.

*Massachusetts***Tom Swamp series**

Core coll Nov 1979 from Tom Swamp, Harvard Forest, Worcester Co (42° 31' N, 72° 13' W). For pollen diagram of Tom Swamp, see Davis (1958). This core will be used to date earlier pollen diagram. Coll by C Lenk, N Miller, R Bradshaw, and G Thompson; subm by T Webb.

WIS-1210. **12,830 ± 120**
 $\delta^{13}C = -28.0\text{‰}$
 Clay with organic content, 955 to 965cm deep, base of spruce zone.

WIS-1214. **11,580 ± 110**
 $\delta^{13}C = -29.5\text{‰}$
 Organic gyttja 866 to 874cm deep, "mid-spruce" zone.

WIS-1212. **10,080 ± 100**
 $\delta^{13}C = -30.5\text{‰}$

Organic gyttja 767.5 to 772.5cm deep, top of spruce zone.

WIS-1211. **9280 ± 100**

Organic gyttja 667 to 673cm deep.

WIS-1221. Hawley Bog Pond site **12,450 ± 130**
 $\delta^{13}C = -32.5\text{‰}$

Algal gyttja 730 to 740cm below water surface, water depth 1m. Core coll from Hawley Bog Pond in Franklin Co (42° 34' N, 72° 53' W) Feb 1979 and subm by W A Patterson, III, Univ Massachusetts, Amherst. Other dates from site have been reported earlier (R, 1981, v 23, p 154-155). Sample dates max abundance of *Picea* pollen during A zone at Hawley Bog.

Duck Pond series

Core, 4.5m, coll June 1980 from Duck Pond, Barnstable Co (41° 50' N, 70° 0' W) and subm by M Winkler, Univ Wisconsin-Madison. Depths recorded include initial 18.2m water. Dates on earlier coring at site have been reported (R, 1981, v 23, p 153-154).

WIS-1298. **11,710 ± 120**
 $\delta^{13}C = -29.5\text{‰}$

Lake sediment 2208 to 2213cm below lake surface. *Nyssa-Picea* assemblage in pollen samples may indicate time when ice sheet receded.

WIS-1297. **10,260 ± 100**
 $\delta^{13}C = -29.5\text{‰}$

Gyttja from 2176 to 2181cm of core. Pollen shows transition from spruce and diploxylon pine to white pine, oak, and beech.

WIS-1271. **9000 ± 110**
 $\delta^{13}C = -28.3\text{‰}$

Lake sediment 2144 to 2149cm deep. Pollen diagram at this level shows change in diploxylon pine types indicating change in temperature regime.

WIS-1270. **4650 ± 70**

Gyttja 1955 to 1960cm deep. Pollen diagram at this level shows decrease in hemlock, oak, and elm, and increase in beech, hickory, and grass herbs.

WIS-1300. **1280 ± 70**
 $\delta^{13}C = -29.7\text{‰}$

Jelly-like gyttja 1870 to 1875cm deep. At this level in pollen diagram white pine decreases and hemlock and birch increase.

Michigan

Cub Lake series

Core coll March 1980 from Cub Lake, Kalkaska Co (44° 42' N, 84° 57' W) by R E Bailey and J B Rasmussen, Central Michigan Univ,

Mount Pleasant, Michigan. Sample depths from mud-water interface. Subm by R E Bailey.

WIS-1280.**9220 ± 100** $\delta^{13}C = -31.6\text{‰}$

Black algal gyttja 417.5 to 426.5cm deep. Post-dates spruce-pine transition in pollen record.

WIS-1279.**5030 ± 80** $\delta^{13}C = -31.3\text{‰}$

Organic lake sediments 319.5 to 328.5cm deep. Sample corresponds to middle of "pine period" of postglacial times, may correspond to appearance of *Pinus strobus* in N Michigan.

WIS-1284.**3440 ± 80**

Algal gyttja 198.5 to 207.5cm deep. Level corresponds to establishment of *Tsuga* in pollen rain and decline of *Pinus* below 50%.

WIS-1295.**2160 ± 80** $\delta^{13}C = -23.9\text{‰}$

Algal gyttja 116.5 to 130.5cm deep.

WIS-1285.**1780 ± 80** $\delta^{13}C = -24.6\text{‰}$

Organic sediments from 28 to 38cm deep, level immediately below land clearance. Acid treatment only.

*Minnesota***Little Trout Lake series**

Core coll Oct 1979 from Little Trout Lake, Voyageurs National Park, St Louis Co (48° 24' N, 92° 31' W). Coll and subm by A M Swain, Univ Wisconsin-Madison.

WIS-1229.**800 ± 80** $\delta^{13}C = -28.3\text{‰}$

Lake sediment, 87.5 to 94.5cm deep, bottom of core.

WIS-1269.**280 ± 80**

Lake sediment 14 to 31cm deep. Acid treatment only.

Pogonia Bog Pond series

Cores, 5cm diam, coll from Pogonia Bog Pond—Core I, March 1974; Core II, March 1975—in Morris T Baker Park Reserve, Hennepin Co (45° 02' N, 93° 38' W). Pond is in Owatonna Moraine complex of E-central Minnesota, now occupied by deciduous forest (the Big Woods). Cores were analyzed for pollen by P Swain (ms); dates will be used to estimate pollen influx through Holocene. Depths measured from water surface, water depth 250cm, depth to glacial drift 1945cm.

WIS-1259.**11,190 ± 110**

Woody plant detritus including twigs, mycorrhizae, and needles of *Picea* and *Larix*, 1875 to 1880cm sec of Core II. Plant detritus immediately overlies glacial till. Marks melting of buried ice to form lake basin.

WIS-1257. **10,530 ± 110**
 $\delta^{13}C = -35.8\text{‰}$

Silty algal copropel, non-calcareous, 1790 to 1800cm sec of Core II. Decrease in spruce and increase of birch and pine pollen marks disappearance of spruce forest in early Holocene.

WIS-1258. **6450 ± 70**

Algal copropel, silty, calcareous, irregularly banded with marly copropel from 1565 to 1575cm sec of Core I. Peak of ragweed and other herb pollen is thought to indicate max development of prairie in region.

WIS-1253. **3820 ± 80**
 $\delta^{13}C = -33.4\text{‰}$

Moderately calcareous algal copropel with plant detritus, especially leaves of *Ceratophyllum* from 1300 to 1310cm sec of Core I. Increase in oak pollen and decrease in herb pollen thought to mark development of oak forest on local slopes protected from fire.

WIS-1252. **2750 ± 80**
 $\delta^{13}C = -25.5\text{‰}$

Non-calcareous algal copropel with coarse plant detritus, especially leaves of *Ceratophyllum* from 930 to 940cm sec of Core I. Increase in grass pollen thought to mark local spread of *Zizania* in basin.

WIS-1254. **460 ± 70**
 $\delta^{13}C = -33.4\text{‰}$

Non-calcareous algal copropel with *Drepanocladus* moss and plant detritus from 395 to 405cm in Core I. Increase in pollen of ironwood, elm, basswood, and sugar maple and decrease in pollen of oak at this level thought to mark development of mesic forest in area.

WIS-1268. **300 ± 70**

Non-calcareous algal copropel with coarse plant detritus from 310 to 319cm in core II combined with 290 to 299cm in Core I, correlated by pollen analysis which shows increase from 5 to 15% *Ambrosia* pollen in this interval.

Pogonia Bog series

Core, 10cm diam, coll Nov 1973 from Pogonia Bog near SW limits of *Larix* and of *Sphagnum* bogs in Minnesota in Morris T Baker Park Reserve, Hennepin Co (45° 02' N, 93° 38' W). Coll and subm by Patricia Swain, Univ Minnesota, Minneapolis. Pollen analysis by P Swain (ms) to determine age and sequence of development of bog.

WIS-1255. **180 ± 80**
 $\delta^{13}C = -29.7\text{‰}$

Sedge peat with *Drepanocladus*-type moss, 47 to 50cm sec of Core A, base of peat with lake sediment beneath. Dates inception of sedge mat in basin of Pogonia Bog Pond. Postdates increase in pollen of ironwood, elm, basswood, and sugar maple which marks development of mesic

forest on surrounding uplands, level dated by PBP I 395-405 (WIS-1254) above.

WIS-1256.**<100** $\delta^{13}C = -28.4\%$

Sedge peat with *Drepanocladus*-type moss, 34 to 36cm in Core A. Increase in pollen and other indicators of agriculture marks forest clearance and settlement that occurred here AD 1850 to 1860.

Cruiser Lake

Core coll Oct 1979 from Cruiser Lake, Voyageurs National Park, St Louis Co (48° 30' N, 92° 48' W). Coll and subm by A M Swain.

WIS-1226.**2610 ± 80** $\delta^{13}C = -31.8\%$

Gyttja 68.7 to 75.2cm deep, bottom of core.

WIS-1230.**1650 ± 80** $\delta^{13}C = -29.2\%$

Gyttja 32 to 39cm deep. Dates beginning of rise in spruce pollen, increase in red/jack pine and fir, decrease in alder.

WIS-1267.**500 ± 70**

Gyttja 8 to 18cm deep, just below *Ambrosia* rise.

Little Bass Lake series

Core A taken with Livingstone piston sampler, 5cm diam, from Little Bass Lake, Itasca Co (47° 17' N, 93° 36' W). Coll Dec 1977 by H E Wright *et al*; subm by E J Cushing, Univ Minnesota, Minneapolis. Lake is in mixed coniferous-deciduous forest of N central Minnesota on sandy outwash deposited by St Louis sub-lobe of Des Moines lobe. Pollen diagram from core has been completed by P C Swain and dates will be used to estimate pollen influx through Holocene. Depths measured from water surface, water depth 1282cm. All samples were calcareous.

WIS-1237.**10,660 ± 110** $\delta^{13}C = -32.2\%$

Silty algal copropel from 1790 to 1795cm sec of Core A. This level marks decrease in pollen of *Picea* and increase in *Pinus*.

WIS-1235.**7780 ± 90** $\delta^{13}C = -27.5\%$

Algal copropel from 1660 to 1670cm sec of core. Level marks decrease in pine pollen and increase in oak and herbs.

WIS-1234.**5530 ± 90** $\delta^{13}C = -31.4\%$

Algal copropel from 1590 to 1595cm sec of core. Level marks decrease in pollen of *Ostrya* and *Quercus* and increase in *Pinus*.

WIS-1231. **3960 ± 70**
 $\delta^{13}C = -32.7\%$

Algal copropel from 1520 to 1525cm sec of core. At 1520cm in core, pollen assemblage shifts from higher values of herb and oak pollen to higher proportions of birch and pine, especially white pine.

WIS-1232. **1890 ± 70**
 $\delta^{13}C = -32.2\%$

Algal copropel, calcareous, from 1375 to 1385cm sec of core. Pollen assemblage between 1282 and 1520cm in core dominated by pollen of *Pinus strobus* and *Betula* and is thought to have derived from regional vegetation similar to present.

Oklahoma

WIS-1189. Cherokee Co, Oklahoma site **1340 ± 80**

Quercus sp coll Oct 1979 by Michael Winter and W C Johnson, Univ Kansas, Lawrence, Kansas, 4.4m below surface from site in Cherokee Co (36° 07' N, 94° 48' W). Alluvial dates from SW Wisconsin indicate river changes occurred at times of climatic variation (Johnson, 1978). Goal is to determine whether dates of river change in S Great Plains are synchronous with those in Wisconsin (Johnson, 1979) and, therefore, whether climatic variation had regional effect on course of river.

Rhode Island

WIS-1233. Narragansett South site **1880 ± 80**
 $\delta^{13}C = -17.5\%$

Dark brown herbaceous peat, basal sample from E bank Pettaquamscutt R, Narragansett, Washington Co (41° 27' 05" N, 71° 27' 00" W). Coll Feb 1980 by Sheldon Nelson *et al*; subm by Sheldon Nelson, Brown Univ, Providence, Rhode Island. Sample dates initial organic sediment accumulation at site, antedates *Ambrosia* rise, and is coincident with *Tubuliflorae* max. Depth 219 to 229cm.

WIS-1248. Narragansett North site **570 ± 70**
 $\delta^{13}C = -18.2\%$

Dark brown herbaceous peat, 110 to 120cm deep, from E bank of Pettaquamscutt R, Narragansett, Washington Co (41° 21' 30" N, 71° 27' 25" W). Coll Feb 1980 by S Nelson *et al*; subm by S Nelson. Dates transition from freshwater to saltmarsh peat. Sample coincident with rise in Gramineae and Cyperaceae pollen and decline in pollen of major tree types.

South Dakota

Medicine Lake series

Core 80A, 5cm diam, 2240cm deep, coll Feb 1980 from Medicine Lake, Codington Co (44° 59' N, 97° 21' W). Sample dates to be used to determine sedimentation rates (Watts and Bright, 1968; Van Zant, 1979).

Acid treatment only. Depths are from water surface, sediment was 946cm deep. Coll and subm by N J Radle, Univ Minnesota, Minneapolis.

WIS-1225. **12,610 ± 120**
 $\delta^{13}C = -23.3\text{‰}$

Highly calcareous laminated silty gyttja at base of core, 2210 to 2217cm deep. Glacial silt immediately below.

WIS-1227. **10,940 ± 140**

Small bits of wood from litter layer at base of core, 2210 to 2217cm deep. Needles and seeds of *Picea* also present.

WIS-1246. **8750 ± 100**
 $\delta^{13}C = -27.6\text{‰}$

Lake sediment, 1952 to 1956cm deep, immediately below 10cm layer of gypsum crystals.

WIS-1245. **5050 ± 80**
 $\delta^{13}C = -25.1\text{‰}$

Lake sediment, 1644 to 1652cm below water surface.

WIS-1242. **2700 ± 70**
 $\delta^{13}C = -24.8\text{‰}$

Calcareous silty gyttja 1352 to 1356cm deep.

WIS-1244. **1130 ± 70**
 $\delta^{13}C = -22.1\text{‰}$

Calcareous silty gyttja 1040 to 1044cm deep.

Wisconsin

WIS-1224. Miller site, Brush Creek **5790 ± 90**
 $\delta^{13}C = -28.6\text{‰}$

Wood sample 280cm deep from one example of group of alluvial fan deposits with well-developed paleosols at mouths of several small tributaries in Brush Creek valley (McDowell, ms). Dates period of high sediment yields from tributaries and hillslopes assoc with shift to cooler and more moist climate after mid-Holocene warm/dry climate. Coll Nov 1978 by P McDowell from Miller farm, Monroe Co (43° 44' N, 90° 39' W). Subm by J C Knox, Univ Wisconsin-Madison.

Hugo Arndt site series

Wood samples coll Oct 1980 from site on Kickapoo R, Monroe Co (43° 47' N, 90° 33' W) by J C Knox. Samples dated as part of study of Holocene fluvial activity in upper Kickapoo R system (Knox, McDowell, and Johnson, 1981).

WIS-1281. **7080 ± 90**

Wood 255cm below bank top. Date confirms early Holocene age of fluvial terrace widespread in upper Kickapoo R system and that fluvial sedimentology of early Holocene deposits have finer textures than Holocene fluvial deposits younger than ca 6000 radiocarbon years at same sites. Date also shows that channel incision assoc with WIS-1282 occurred between ca 7100 and 3900 BP.

WIS-1282. 3850 ± 80

Wood 2.1m deep. Dates represent min age for abandonment of river channel active during late middle Holocene time. Sample date documents that middle to late middle Holocene river channels degraded beds 0.5 to 1.0m below elev of early Holocene channel beds. Degradation was accomplished in rather coarse resistant gravels and implies that large floods may have been assoc with degradation.

WIS-1294. Long Lake 7550 ± 90
 $\delta^{13}C = -29.2\text{‰}$

Silty clay, 593 to 600cm sec of core at transition from organic matter to sand in lake sediments below 3.4m water. Coll March 1980 from Long Lake, Bayfield Co (46° 40' N, 91° 3' W) and subm by A M Swain. Sand below sample shows spruce pollen and sediment and may date warming of climate as indicated by vegetation change from spruce to pine and mixed hardwood pollen.

WIS-1265. Waubesa Mound 7500 ± 80
 $\delta^{13}C = -29.9\text{‰}$

Sedge peat, 191 to 197cm depth, coll Oct 1980 with Hiller corer from peat mound in Waubesa Wetlands, Dane Co (43° 00' N, 89° 20' W) by M Winkler and T Kratz, Univ Wisconsin-Madison. Sample from sec overlying transition from silty clay to peat. Subm by M Winkler.

WIS-1286. Powell site 5450 ± 80
 $\delta^{13}C = -26.3\text{‰}$

Wood, 256cm deep, at gravel-silt interface coll from site on Brush Creek tributary, Kickapoo R system, Monroe Co (43° 44' N, 90° 36' W). Coll Oct 1980 and subm by J C Knox. Sample dates paleochannel system, widespread in upper Kickapoo R drainage system of SW Wisconsin which is presumed to have been adjusted to magnitudes and frequencies of floods typical of late Holocene (Knox, McDowell, and Johnson, 1981).

WIS-1287. McCoy site 5360 ± 80
 $\delta^{13}C = -27.4\text{‰}$

Wood, 2.6m deep, from Monroe Co on Kickapoo R, right stream bank in meander bend (43° 45' N, 90° 35' W). Coll Oct 1980 and subm by J C Knox. Sample dates segment of paleochannel system presumed to have been active during time of relatively rapid change from dryness to increased moisture.

Pine River site series

Samples obtained from excavations at Janney site in Richland Co from drainage ditch tributary to Fancy Creek, Pine R system (43° 24' N, 90° 24' W). Coll Aug 1979 and subm by J C Knox. Spruce stump excavated from site, 180 to 190cm deep, was dated as 9520 ± 95 (WIS-1023, R, 1980, v 22, p 122-123).

WIS-1190. 9690 ± 100

Wood fragments 120 to 125cm deep from transition zone between base of woody peat and top of woody zone which includes *in situ* spruce

stumps. Sample dates transition from dominance of tree growth on flood plain to shrub and sedge environment because of increasing warmth and dryness.

WIS-1191. **9120 ± 90**

Woody peat 102 to 107cm deep. Sample from uppermost portion of woody peat zone which underlies black silt thought to represent valley alluviation assoc with warm/dry Atlantic episode.

WIS-1192. **3180 ± 80**

Brown peat 45 to 55cm deep. Sample represents early stages of peat growth in late Holocene.

Brander Bog site series

Core sampled from Brander Bog, Stockton I. Apostle Islands National Lakeshore, Ashland Co (46° 57' N, 98° 32.5' W). Coll Aug 1980 and subm by A M Swain.

WIS-1263. **7230 ± 90**
 $\delta^{13}C = -30.2\text{‰}$

Peaty gyttja 223 to 232cm below surface of bog. Sample overlies transition to coarse sand and underlies transition to bog peat. Date should indicate beginning of wetland formation at site.

WIS-1264. **6770 ± 100**

Alkali soluble fraction of 223 to 232cm sample.

WIS-1262. **1590 ± 80**
 $\delta^{13}C = -30.3\text{‰}$

Fibrous peat with twigs 110 to 115cm below bog surface. Sample represents increase in hemlock and birch, decrease in white pine in pollen diagram.

WIS-1266. **1680 ± 90**
 $\delta^{13}C = -28.7\text{‰}$

Alkali soluble fraction of 110 to 115cm sample.

Stockton Bog site series

Core coll from Stockton Bog, Stockton I., Apostle Islands National Lakeshore, Ashland Co (46° 55' N, 90° 35' W). Coll Sept 1979 and subm by A Swain. Samples date pollen changes in pollen diagram of core.

WIS-1241. **5820 ± 80**
 $\delta^{13}C = -29.2\text{‰}$

Sand and peat with leaves and seeds from 896 to 900cm depth, bottom of core. Dates formation of tombolo on which bog developed.

WIS-1240. **5450 ± 80**
 $\delta^{13}C = -27.3\text{‰}$

Sandy peat and chunks of wood from 726 to 732cm depth, level at which pollen changes from all pine to all deciduous pollen other than pine.

WIS-1239. **4030 ± 80**
 $\delta^{13}C = -27.8\%$

Peat and gyttja from 395 to 400cm deep. Sample represents transition from lake to bog, precedes large sphagnum increase in pollen diagram.

WIS-1238. **2130 ± 70**
 $\delta^{13}C = -28.2\%$

Fibrous peat 175 to 180cm deep, level at which pollen diagram shows increase in white pine and hemlock.

WIS-1236. **270 ± 70**
 $\delta^{13}C = -28.0\%$

Fibrous peat 100 to 106cm deep. At this level, pollen diagram shows increase in white pine and sphagnum, decrease in birch, hemlock max.

Kelly's Hollow site series

Core coll Oct 1979 from small wet hollow within woodland basin in Taylor Co (45° 18' N, 90° 21' W). Pollen record of site reflects vegetational history of nearby woodland stand. Coll by K Heide and R Bradshaw; subm by K Heide, Brown Univ, Providence, Rhode Island. Dates on core coll 1978 were reported earlier (R, 1981, v 23, p 158).

WIS-1207. **6580 ± 90**
 $\delta^{13}C = -29.8\%$

Herb peat 421 to 426cm below surface. Dates occurrence of high percentage of *Acer saccharum*, *Ostrya/Carpinus* type, Cyperaceae and degraded pollen within *Pinus strobus* zone.

WIS-1209. **2920 ± 80**
 $\delta^{13}C = -29.5\%$

Wood-herb peat 119 to 124cm below surface. Dates initiation of *Tsuga* pollen sedimentation at site.

Bermuda

WIS-1288. Port Royal Bay **9590 ± 100**
 $\delta^{13}C = -30.0\%$

Tropical peat including fern leaf fragments, sedge roots, *Myrica*-type leaf fragments and algal remains 26m below mean low water in Port Royal Bay (32° 16' N, 63° 51' W). Sample 3.7m below peat and pond mud, indicates former sea level (Neumann, 1972). Coll Sept 1980 by D Meischner; subm by Stanley Ashmore, Univ Maryland.

Peru

WIS-1204. Lake Huataycoche **12,800 ± 130**
 $\delta^{13}C = -27.4\%$

Aquatic moss in marly silt, very calcareous, from base of lake sediment off sedge mat on E side of lake, beyond limits of local glaciation (10° 47' S, 76° 35' W), Junin prov, Oyon map sheet, Peru. Sample 373 to 383cm below lake surface. Date is min for retreat of ice sheet that covered W cordillera during late Pleistocene. Coll and subm by H E Wright, Univ Minnesota.

Lake Huatacocha series

Samples coll July 1978 from Lake Huatacocha area, Junin prov, Oyon map sheet, Peru (10° 47' S, 76° 35' W). Coll and subm by H E Wright. Earlier dates from Huatacocha Delta Site 2 and Upper Fan B have been reported (R, 1980, v 22, p 128). Previously reported latitude was in error.

WIS-1203. **13,540 ± 130**
 $\delta^{13}C = -19.8\%$

Moss layers 260 to 268cm below mud surface at base of lake sediments from S end of lake. Dates inception of Lake Huatacocha which postdates main cordilleran glaciation.

WIS-1202. Huatacocha Upper Fan B **760 ± 70**
 $\delta^{13}C = -26.1\%$

Peat from base of 2 adjacent sediment cores, 201 to 204cm depth, from small drained lake behind moraine. Dates final withdrawal of ice from drainage basin which allowed peat to grow over lake bed. Sample from same core as WIS-1070 (R, 1980, v 22, p 128) which was also sampled from below fan surface.

WIS-1205. Huatacocha Delta 1B **2150 ± 80**
 $\delta^{13}C = -26.0\%$

Peat 78 to 84cm deep from core of Delta 1B, formed of outwash from recent glacial advance. Peat dates from time when glacier withdrew and outwash silts were no longer actively deposited on delta.

WIS-1201. Huatacocha Delta 1B **290 ± 70**
 $\delta^{13}C = -25.5\%$

Peat 169 to 175cm deep from core of Delta 1B.

WIS-1200. Pistag Delta site **430 ± 70**
 $\delta^{13}C = -25.0\%$

Peat 170 to 175cm deep from delta formed of outwash from small Pistag Glacier. Sample dates end of glacial outwash in delta. Coll July 1978 from E side of Lake Pistag, Junin prov, Oyon map sheet (10° 47' S, 76° 35' W) and subm by H E Wright.

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