

**UNIVERSITY OF WISCONSIN RADIOCARBON DATES XV**

MARGARET M BENDER, REID A BRYSON, and  
DAVID A BAERREIS

Center for Climatic Research  
1225 W Dayton Street  
University of Wisconsin, Madison

Procedures and equipment of the laboratory have been described in previous date lists. Except as otherwise indicated, wood, charcoal, and peat samples are pretreated with dilute NaOH and dilute  $H_3PO_4$  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  $H_3PO_4$ .

The dates reported have been calculated using 5568 as the half-life of  $^{14}C$ , with 1950 as the reference year. The standard deviation quoted includes only the  $1\sigma$  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  $\delta^{13}C$  values are listed have been corrected to correspond to a  $\delta^{13}C$  values of  $-25\text{‰}$ .

ACKNOWLEDGMENTS

This research is supported by the Office for Climate Dynamics, National and International Programs, National Science Foundation, Grant No. ATM74-23041-AO1. We thank the Chemistry Department for the use of the RMS 6-60 mass spectrometer. We also wish to thank Raymond Steventon, Arden Berge, and Crayton Yapp for technical assistance.

I. ARCHAEOLOGIC SAMPLES

*A. Iowa*

**Chan-ya-ta site (13BV1)**

Charcoal from Chan-ya-ta site, Mill Creek culture in Buena Vista Co, Iowa ( $42^\circ$ ,  $51'$  N,  $95^\circ$   $18'$  W), coll 1974 by J A Tiffany, Univ Iowa; subm by D A Baerreis. Dates from earlier excavation at site have been reported (R, 1975, v 17, p 125). Note correction of earlier site location.

**WIS-893. Chan-ya-ta site (13BV1)**  **$900 \pm 60$**   
 $\delta^{13}C = -25.6\text{‰}$

Sample 370A, Feature 9/ from floor of 1 of 2 small rectangular structures superimposed on each other in house depression.

**WIS-895. Chan-ya-ta site (13BV1)**  **$870 \pm 55$**   
 $\delta^{13}C = -25.1\text{‰}$

Sample 260A from floor of square structure in Feature 6/ house depression.

**WIS-898. Chan-ya-ta site (13BV1)  $735 \pm 95$**   
 $\delta^{13}C = -25.4\text{‰}$

Sample 360A, Feature 9/ from floor 1 of 2 small rectangular structures superimposed on each other in house depression. Sample was counted only once.

**WIS-897. Chan-ya-ta site (13BV1)  $820 \pm 60$**   
 $\delta^{13}C = -26.0\text{‰}$

Sample M-17, Feature 4/6, from hearth of E house superimposed by small diamond-shaped structure previously dated (WIS-671,-673,-685) between 890 to 995 BP.

**WIS-892. Bultman site (13BV2)  $770 \pm 55$**   
 $\delta^{13}C = -24.2\text{‰}$

Charcoal and charred bone from Bultman site in Buena Vista Co, Iowa (42° 54' N, 95° 16' W) coll 1974 by J A Tiffany and Dean Thompson, Luther College, Decorah; subm by D A Baerreis. Site is multi-component fortified Mill Creek culture site on floodplain of Little Sioux R. Site was tested previously by Orr (1963) in the 1930's. Sample from Sq A-1, Level 5, 63.5 to 91.4cm below surface.

#### **Glenwood series, State School site (13ML155)**

Charcoal from Nebraska aspect, Central Plains earthlodge on loess ridge 985m N of Horse Creek, Mills Co, Glenwood, Iowa (41° 02' 20" N, 95° 43' 46" W). Earthlodge is 100m N of village group, Glenwood series, dated earlier (R, 1976, v 18, p 127-128). Coll 1975 by J A Hotopp, Univ Iowa, Iowa City; subm by D A Baerreis. Wood id by Dwight Benseid, Ames, Iowa.

**WIS-877. State School site (13ML155)  $690 \pm 50$**   
 $\delta^{13}C = -26.6\text{‰}$

Sample 408-P5-8 (*Ostya* sp) from NE central support post of lodge, 43cm deep.

**WIS-878. State School site (13ML155)  $705 \pm 50$**   
 $\delta^{13}C = -26.3\text{‰}$

Sample 408-P18-19 (*Juglans nigra*) from wall post in NE corner of lodge, 39cm deep.

#### **Glenwood series, McGee site (13ML145)**

Charcoal coll June 1974 by J A Hotopp from earthlodge located on loess ridge 92m N of Brush Creek, tributary to Pony Creek, Glenwood, Mills Co, Iowa (41° 02' 44" N, 95° 46' 56" W). Earthlodge is somewhat isolated from village groups already dated, but ceramics place lodge in Nebraska aspect, Central Plains tradition. Samples id by Barbara Schulte, Ames, Iowa.

**WIS-894. McGee site (13ML145) 700 ± 55**

$$\delta^{13}C = -26.0\text{‰}$$

Sample 344-26 (*Populus deltoides*) from post in cache pit in NW corner of earthlodge.

**WIS-896. McGee site (13ML145) 770 ± 60**

$$\delta^{13}C = -27.4\text{‰}$$

Sample 344-24 (*Fraxinus americana*) from roof beam fragment in NW corner of earthlodge.

**WIS-900. McGee site (13ML145) 755 ± 55**

$$\delta^{13}C = -25.8\text{‰}$$

Sample 344-29 (*Ulmus americana*) from S central floor of lodge.

**Larsen site (13PM61)**

Charcoal from 4 subterranean refuse-storage pits on Larsen site, Perry Reservoir, Plymouth Co, Iowa (42° 36' 18" N, 96° 24' 21" W) excavated in summer of 1974 by Dale Henning, Univ Nebraska, Lincoln; subm by Dale Henning. Site contained reputed late Great Oasis-Mill Creek material.

**WIS-868. Larsen site (13PM61) 740 ± 60**

Catalog No. 573 from Feature 11, subterranean refuse-storage pit.

**WIS-870. Larsen site (13PM61) 730 ± 50**

$$\delta^{13}C = -25.8\text{‰}$$

Catalog Nos 728 and 726 from Feature 15.

**WIS-874. Larsen site (13PM61) 710 ± 55**

$$\delta^{13}C = -24.7\text{‰}$$

Catalog Nos 554 and 638 from Feature 10.

**WIS-875. Larsen site (13PM61) 730 ± 60**

$$\delta^{13}C = -25.4\text{‰}$$

Sample Nos 633 and 512 from Feature 2.

**WIS-876. Keystone site (13JK23) 1790 ± 60**

$$\delta^{13}C = -26.1\text{‰}$$

Charcoal from Levels 10, 11, 12 of Keystone rockshelter, Jackson Co, Iowa (42° 02' N, 90° 51' W). Coll October 1975 by D C Anderson, Univ Iowa; subm by D A Baerreis. Sample from transitional zone between Archaic and Woodland occupations, assoc with Archaic/Early Woodland artifacts.

**Darr-Es-Shalom site (13PK149)**

Charcoal from Darr-Es-Shalom site, Polk Co, Iowa (41° 44' 5" N, 93° 42' 16" W). Coll 1975 under direction of David Gradwohl, Iowa State Univ, Ames; subm by D A Baerreis. Samples represent 4 depositional units at Late Woodland site (Gradwohl & Osborn, 1973).

**WIS-879. Darr-Es-Shalom site (13PK149)** **840 ± 50**  
 $\delta^{13}C = -25.4\text{‰}$

Sample 58-A from Feature 58 in stratigraphic Unit 1.

**WIS-899. Darr-Es-Shalom site (13PK149)** **1575 ± 60**

Sample 55-A from Feature 55 assoc with depositional Unit 1.

**WIS-902. Darr-Es-Shalom site (13PK149)** **1605 ± 55**  
 $\delta^{13}C = -26.4\text{‰}$

Charcoal from Feature 12, acid treatment only.

**WIS-904. Darr-Es-Shalom site (13PK149)** **1605 ± 60**  
 $\delta^{13}C = -26.6\text{‰}$

Charcoal from depositional Unit 1, Feature 8, small basin-shaped feature which contained charcoal, clam shells, bone, and ash.

**WIS-905. Darr-Es-Shalom site (13PK149)** **2820 ± 65**  
 $\delta^{13}C = -23.1\text{‰}$

Sample 1130 from 2nd level of depositional Unit III, acid treatment only.

**WIS-880. Darr-Es-Shalom site (13PK149)** **3045 ± 65**  
 $\delta^{13}C = -25.7\text{‰}$

Sample 68-A from Feature 68 assoc with lowest depositional unit on site.

**WIS-901. Darr-Es-Shalom site (13PK149)** **3095 ± 65**  
 $\delta^{13}C = -25.4\text{‰}$

Sample 1335 from Unit IV, deepest unit of site.

**WIS-906. River Bend site (13BN123)** **940 ± 60**  
 $\delta^{13}C = -25.6\text{‰}$

Charcoal from River Bend site in Saylorville Reservoir, Boone Co, Iowa (42° 2' 18" N, 93° 55' 26" W). Coll August 1974 under direction of D M Gradwohl; subm by D A Baerreis. Cultural horizon from which this charcoal was removed also produced grit-tempered cord marked, rocker stamped, dentate stamped and other pieces indicative of Middle Woodland occupation (Gradwohl & Osborn, 1973; 1976).

#### **Sewer site (13CK405)**

Excavations at Cherokee Sewer site, Cherokee Co, Iowa (42° 43' 21" N, 95° 34' 24" W) in 1976 under direction of Richard Shutler, Jr, Univ Iowa, Iowa City. Charcoal samples subm by D A Baerreis.

**WIS-889. Sewer site (13CK405)** **6080 ± 70**  
 $\delta^{13}C = -25.7\text{‰}$

Charcoal, Sample 45, from Horizon IA, Sq TT I-II, 13cm above and intruded into I from silt and sands.

**WIS-891. Sewer site (13CK405) 7145 ± 75**

$$\delta^{13}C = -25.2\text{‰}$$

Sample 24 from Unit b of Horizon II, Trench I, Sq 55; may be from hearth.

**WIS-882. Sewer site (13CK405) 7340 ± 75**

$$\delta^{13}C = -24.5\text{‰}$$

Sample from Sq 39, Horizon II, Trench I, top of Soil C.

**WIS-886. Sewer site (13CK405) 7600 ± 80**

$$\delta^{13}C = -25.0\text{‰}$$

Charcoal and mud from Horizon II, Trench II, Sq I, Surface C, Feature 2.

**WIS-888. Sewer site (13CK405) 7490 ± 80**

Charcoal and mud from Horizon II, Trench II, acid treatment only.

**WIS-890. Sewer site (13CK405) 7770 ± 80**

$$\delta^{13}C = -23.4\text{‰}$$

Sample 52 from E wall of IIIb, between Horizon II and III.

*B. Missouri***Cannon Reservoir series, Cannon Reservoir site (23RA136, 23RA224, and 23RA302A)**

Charcoal from Cannon Reservoir, Ralls Co, Missouri (39° 31' N, 91° 37' 35" W; 39° 33' 38" N, 91° 35' 57" W; and 39° 30' 44" N, 91° 38' 59" W) excavated under direction of D R Henning in August 1975. Subm by D A Baerreis.

**WIS-850. Cannon Reservoir site (23RA224) 1150 ± 70**

$$\delta^{13}C = -24.5\text{‰}$$

Catalog No. 151 from Feature 18, basin-shaped pit. Feature contained reconstructable pottery vessel and some faunal remains.

**WIS-858. Cannon Reservoir site (23RA136) 1055 ± 50**

Catalog No. 271 from Feature 11, Woodland basin-shaped pit which contained chert debitage.

**WIS-859. Cannon Reservoir site (23RA224) 1060 ± 60**

$$\delta^{13}C = -25.4\text{‰}$$

Catalog No. 114 from Feature 9, steep-sided pit containing complete reconstructable pottery vessel and large amount of chert debitage. Occupation assigned to Middle-Late Woodland cultural period. Acid treatment only.

**WIS-860. Cannon Reservoir site (23RA136) 1185 ± 60**

$$\delta^{13}C = -25.5\text{‰}$$

Catalog No. 336 from Feature 17, Woodland basin-shaped pit, stratigraphically superimposed over portion of Feature 11 and is therefore of more recent occupation.

**WIS-861. Cannon Reservoir site (23RA136) 4110 ± 85**  
 $\delta^{13}C = -25.0\text{‰}$

Catalog No. 268 from Feature 12, Archaic basin-shaped pit which contained relatively large amount of hematite/red ocher and manos with red stains suggesting pigment processing area. Only one long count on sample.

**WIS-862. Cannon Reservoir site (23RA302A) 900 ± 50**  
 $\delta^{13}C = -26.4\text{‰}$

Catalog No. 137 from Feature 2, vertical sided pit with expanded base.

**Cannon Reservoir series, Rose Shinn site (23MN222)**

Charcoal from Rose Shinn site, Monroe Co, Missouri (39° 31' N, 91° 46' 15" W) coll 1976 under direction of D R Henning. Subm by D A Baerreis.

**WIS-907. Rose Shinn site (23MN222) 845 ± 55**  
 $\delta^{13}C = -25.0\text{‰}$

Catalog No. 31 from Feature 1, possible fire pit directly beneath plow zone.

**WIS-910. Rose Shinn site (23MN222) 300 ± 50**  
 $\delta^{13}C = -26.7\text{‰}$

Catalog No. 27 from large area of charred wood ca 20cm below surface.

*C. Montana*

**Hagen site (24DW1)**

Charcoal from Hagen site (Mulloy, 1942) Dawson Co, Montana (47° 03' 00" N, 104° 45' 35" W). Excavated 1933-1940 by O T Lewis. Subm by W R Wood, Univ Missouri. Hagen is late prehistoric, putative Crow site, previously undated. Ceramic assemblage is most closely related to that of Mandan-Hidatsa Knife River phase (AD 1675-1780); dates therefore appear to be too early.

**WIS-863. Hagen site (24DW1) 490 ± 55**  
 Outer 10 rings of charred log (*Juniperus* cf *scapulorum*).

**WIS-864. Hagen site (24DW1) 780 ± 55**  
 Charred log (*Juniperus* cf *scapulorum*).

**WIS-865. Hagen site (24DW1) 775 ± 55**  
 Charred log (*Juniperus* cf *scapulorum*).

**WIS-914. Whiskey Hill site (24DW1001) 1555 ± 60**  
 $\delta^{13}C = -24.8\text{‰}$

Charcoal and burned bone from Whiskey Hill site, Dawson Co, Montana (47° 32' N, 104° 43' W) coll 1973 by A M Johnson, Denver,

Colorado; subm by D A Baerreis. Whiskey Hill is single component site containing both Besant projectile points and Woodland pottery.

#### *D. Wisconsin*

##### **Diamond Bluff site (47PI2)**

Charcoal from Diamond Bluff site, Pierce Co, Wisconsin (44° 38' N, 92° 36' W) was excavated by Univ Wisconsin-Milwaukee Summer Field School in Archaeol during summer of 1974 under direction of R A Alex, Archaeol Research Center, Ft. Meade, South Dakota, subm by D A Baerreis.

**WIS-841. Diamond Bluff site (47PI2) 910 ± 55**

Charcoal from 50 to 60cm deep, from Feature 1, large bell-shaped cache/refuse pit.

**WIS-842. Diamond Bluff site (47PI2) 890 ± 55**

Charcoal from Feature 1, 70 to 80cm deep.

**WIS-846. Diamond Bluff site (47PI2) 955 ± 55**

Sample from Feature 42, straight-walled cache/refuse pit from floor of pit house, 80 to 90cm deep.

**WIS-849. Diamond Bluff site (47PI2) 790 ± 55**

Sample from Feature 42, 100 to 110cm deep.

**WIS-845. Diamond Bluff site 755 ± 55**

Sample from Feature 42, 110 to 120cm deep.

## II. GEOLOGIC SAMPLES

### *A. Massachusetts*

**WIS-796. North Pond site 9620 ± 95**

Sediment cores were taken from North Pond, Berkshire Co, Massachusetts (42° 39' 03" N, 73° 03' 12" W) by means of modified Livingstone sampler. Samples coll Nov 1973 by T L Crisman and D R Whitehead, Indiana Univ, Bloomington, Indiana; subm by D R Whitehead. Sample dated was olive gyttja 3.27 to 3.37m deep.

### *B. Michigan*

Pollen records of 3 lakes which lie along transect across forest-type ecotone in NW portion of Michigan's lower peninsula have been studied for late-Holocene climatic changes. Marion Lake, Charlevoix Co (45° 14' N, 85° 15' W), Northern Hardwoods region, is most N., Lake 27, Antrim Co (45° 04' N, 84° 47' W), is near boundary between N hardwoods and pine dominated forests to SE, and Jones Lake, Crawford Co (44° 46' N, 84° 36' W), most S, is inside pine forest area. Chronology of late-Holocene changes will be established by 3 radiocarbon dates on each 2m core. Samples coll with Livingstone core June 1975 by J C Bernabo,

Brown Univ, Providence, Rhode Island; subm by Thompson Webb, III, Brown Univ.

**WIS-884. Marion Lake** **645 ± 55**  
 $\delta^{13}C = -31.8\text{‰}$

Lake sediment, 18 to 28cm sec of core, underlying *Ambrosia* rise. Dated to check for possible ancient carbonate contamination.

**WIS-883. Marion Lake** **1070 ± 60**  
 $\delta^{13}C = -32.0\text{‰}$

54 to 64cm of core, just below major rise in N hardwoods types (*Tsuga*, *Fagus*, *Acer*).

**WIS-872. Marion Lake** **3295 ± 60**  
 Bottom of core at 202 to 207cm.

**WIS-881. Lake 27** **945 ± 60**  
 $\delta^{13}C = -21.4\text{‰}$

Lake sediment at 5 to 22cm, immediately below *Ambrosia* rise.

**WIS-873. Lake 27** **1505 ± 55**  
 $\delta^{13}C = -22.6\text{‰}$

Gyttja at 42 to 60cm in core, just below rise in Northern hardwoods type.

**WIS-869. Lake 27** **4140 ± 110**  
 Bottom of core, 170 to 176cm.

**WIS-887. Jones Lake** **1150 ± 60**  
 $\delta^{13}C = -31.8\text{‰}$

Lake sediment at 8 to 18cm, underlying *Ambrosia* rise.

**WIS-885. Jones Lake** **1465 ± 60**  
 $\delta^{13}C = -33.3\text{‰}$

Lake sediment at 48 to 56cm in core. Increase in pine (largely *Pinus strobus*) pollen, roughly correlated with increases in N hardwoods types at Marion Lake and pine at Lake 27.

**WIS-871. Jones Lake** **2155 ± 60**  
 Bottom of core at 142 to 149cm.

#### *C. Nevada*

#### **Walker Lake site**

Several lake cores were obtained in October 1975 from Walker Lake, Mineral Co, Nevada (38° 38' N, 118° 43' W, 38° 45' N, 118° 45' W, 38° 41' N, 118° 44' W). Lake sediments were mainly detrital clay with sulfides and CaCO<sub>3</sub> present: lengthy acid treatment was necessary. Coll by R Spencer and J Hainline; subm by L V Benson, Desert Research Inst, Reno, Nevada.

**WIS-851. Walker Lake site** **Modern**  
 0 to 10cm depth of Core B.



<b>WIS-844. Walker Lake site</b>	<b>450 ± 50</b>
50 to 70cm depth of Core B.	$\delta^{13}C = -27.0\text{‰}$
<b>WIS-847. Walker Lake site</b>	<b>1020 ± 60</b>
120 to 140 cm depth of Core B.	$\delta^{13}C = -27.4\text{‰}$
<b>WIS-854. Walker Lake site</b>	<b>645 ± 55</b>
30 to 50cm depth of Core D.	$\delta^{13}C = -30.0\text{‰}$
<b>WIS-853. Walker Lake site</b>	<b>985 ± 55</b>
80 to 100cm depth of Core D.	$\delta^{13}C = -27.2\text{‰}$
<b>WIS-856. Walker Lake site</b>	<b>Modern</b>
0 to 10cm depth of Core E.	
<b>WIS-843. Walker Lake site</b>	<b>305 ± 50</b>
20 to 70cm depth of Core E.	
<b>WIS-838. Walker Lake site</b>	<b>315 ± 55</b>
70 to 90cm depth of Core E.	
<b>WIS-839. Walker Lake site</b>	<b>595 ± 55</b>
110 to 130cm depth of Core E.	
<b>WIS-840. Walker Lake site</b>	<b>840 ± 55</b>
150 to 170cm depth of Core E.	

*D. Pennsylvania*

**WIS-903. Criders Pond** **15,210 ± 150**

680 to 750cm sec of lake sediment core coll 1971 by W A Watts, Univ Minnesota, from Criders Pond, N of Phillamon Run, 3.2km E of Scotland, Franklin Co, Pennsylvania (39° 57.5' N, 77° 32.6' W). Depth indicated is below water surface. Dates on upper depths of core reported earlier (R, 1977, v 19, p 133). Subm by A M Swain, Univ Wisconsin-Madison.

*E. Rhode Island***Mashapaug and Pasacaco sites**

Pollen records from Mashapaug and Pasacaco ponds, Washington Co, Rhode Island (41° 47' N, 71° 26' W, and 41° 31' N, 71° 27' W, respectively) are being studied in detail to examine changing land use patterns from Woodland culture times to present. Radiocarbon dates will be used to establish when prehistoric forest disturbances and cultivation began in S New England. Coll April 1976 by J C Bernabo; subm by Thompson Webb, III.

**WIS-866. Mashapaug Pond 3820 ± 55**

Lake sediment, bottom of Livingstone core at 202 to 209cm. Date will be used to determine presettlement sedimentation rates.

**WIS-867. Pasacaco Pond 1355 ± 60**

Lake sediment, bottom of Livingstone core at 186 to 194cm. Date will be used to establish presettlement sedimentation rate and determine time when prehistoric human related forest disturbances took place. Correction of this date for assumed carbon isotope fractionation of this sample, analogous to fractionation of WIS-908 and -909, yields date of  $1280 \pm 60$ .

**WIS-909. Pasacaco Pond 825 ± 55**

$$\delta^{13}C = -31.0\text{‰}$$

Lake sediment, 136 to 144cm sec of core.

**WIS-908. Pasacaco Pond 625 ± 55**

$$\delta^{13}C = -30.1\text{‰}$$

Lake sediment, base of historic herb pollen rise, 82 to 88cm sec of core.

*F. Wisconsin***Kellner's Lake site**

Core from S central portion of Kellner's Lake, Manitowoc Co, Wisconsin (44° 14' N, 87° 51' W) taken in 1.5m water with 5.1cm diam Livingstone piston sampler. Core consisted of 11.8m of organic sediments which rested on sand and gravel. Coll Nov 1975 and subm by R Goodwin and L J Maher, Jr, Univ Wisconsin-Madison. Lake lies on red drift of interlobate moraine between Green Bay and Lake Michigan glacial lobes.

**WIS-857. Kellner's Lake site 13,970 ± 135**

Lowest organic sediment, 1135 to 1145cm below lake bottom in core.

**WIS-855. Kellner's Lake site 10,220 ± 95**

Organic lake sediment 990 to 1002.5cm below lake bottom, core interval at which spruce pollen percentages decrease and pine pollen percentages increase.

**WIS-848. Cold Spring Valley Creek site 1820 ± 60**

$$\delta^{13}C = -28.4\text{‰}$$

Sample from log (*Quercus* sp) at base of bank of Cold Spring Valley Creek, Monroe Co, Wisconsin (43° 52' N, 90° 28' W). Coll 1976 by W C Johnson; subm by W C Johnson and J C Knox, Univ Wisconsin-Madison. Log was short distance from one retrieved earlier and dated at  $1920 \pm 60$ , WIS-747 (R, 1976, v 18, p 136).

*G. Northwest Territories***Long Lake site**

Two sedge peat monoliths from NW corner Long Lake, 2km SE of SE end of Dubawnt Lake, Dist Keewatin, Northwest Territories (62° 38'

N, 101° 14' W). Peat bank monolith 98cm thick, surrounds small drained pond; floor monolith 20cm thick from pond floor. Coll July 1975 and subm by P A Kay, Univ Utah, Salt Lake City.

**WIS-818. Long Lake site 5550 ± 75**

Basal 2cm of bank monolith, overlay permafrost sand and pebbles. Pollen suggests forest-tundra vegetation.

**WIS-852. Long Lake site 3745 ± 60**

$$\delta^{13}C = -29.4\text{‰}$$

36 to 38cm of bank monolith. Pollen indicates sharp reduction in sedge growth, rapid change from Boreal to Arctic vegetation. Date approx paleosols at Dubawnt Lake, WIS-12 (Bender *et al*, 1965) and WIS-52 (Bender *et al*, 1966) and widespread southward displacement of forest (Sorenson *et al*, 1971; Nichols, 1975).

**WIS-815. Long Lake site 2980 ± 65**

Level 2 to 4cm of floor monolith. Pond drained shortly afterwards.

**WIS-821. Long Lake site 5830 ± 75**

Basal 2cm of floor monolith, overlay permafrost sand and pebbles. Dates commencement of peat accumulation comparable to Ennadai Lake (Nichols, 1967). Pollen stratigraphy of floor monolith analogous to that of corresponding time in bank monolith.

#### REFERENCES

- Bender, M M, Bryson, R A, and Baerreis, D A, 1965, University of Wisconsin radiocarbon dates I: Radiocarbon, v 7, p 399-407.
- 1966, University of Wisconsin radiocarbon dates II: Radiocarbon, v 8, p 522-533.
- 1975, University of Wisconsin radiocarbon dates XII: Radiocarbon, v 17, p 121-134.
- 1976, University of Wisconsin radiocarbon dates XIII: Radiocarbon, v 18, p 125-139.
- 1977, University of Wisconsin radiocarbon dates XIV: Radiocarbon, v 19, p 127-137.
- Gradwohl, D M and Osborn, N M, 1973, Site seeking in Saylorville: an intensive archaeological site survey, reconnaissance units 1 & 3, Saylorville Reservoir, Iowa: Research rept, Iowa State Univ Archaeol Lab, Ames, Iowa, p 40, 55-56.
- 1976, Continued site seeking in Saylorville: an archaeological site survey of reconnaissance Units 12 through 19, Saylorville Reservoir, Iowa: Research rept, Iowa State Univ Archaeol Lab, p 210.
- Mulloy, W T, 1942, The Hagen site, a prehistoric village on the Lower Yellowstone: Univ Montana Pub in Soc Sci, no. 1.
- Nichols, Harvey, 1967, Pollen diagrams from sub-arctic central Canada: Science, v 155, p 1665-1668.
- 1975, Palynological and paleoclimatic study of the late Quaternary displacement of the boreal forest-tundra ecotone in Keewatin and Mackenzie, NWT: Univ Colorado, Boulder, Inst Arctic and Alpine Research, Occasional Paper 15.
- Orr, Ellison, 1963, Iowa archaeological reports 1934-1939 (10 vols) with an evaluation and index by Marshall McKusick: Archives of Archaeol, no. 20, 1702 p.
- Sorenson, C J, Knox, J C, Larsen, J A, and Bryson, R A, 1971, Paleosols and the forest border in Keewatin, NWT: Quaternary Research, v 1, p. 468-473.