

## KRAKOW RADIOCARBON MEASUREMENTS I

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The Krakow Radiocarbon Laboratory is part of the Environmental Physics Department headed by T Florkowski and belongs to the Institute of Physics and Nuclear Techniques, The Academy of Mining and Metallurgy. A  $^3\text{H}$  and  $^{14}\text{C}$  laboratory was built primarily for the assessment of natural radioactivity in groundwater. In 1982,  $^{14}\text{C}$  preparation facilities were extended to include a combustion system for organic samples. The  $^{14}\text{C}$  measurement method is liquid scintillation counting on synthesized benzene in an LSC spectrometer TRI-CARB model 3320 (Packard International).

Usually 15 to 20g of raw organic material, after removal of visible contaminants, is chemically pretreated, applying 4% HCL, 80°C, overnight, 4% NaOH, 80°C, overnight, 4% HCL, 80°C, several hours, each step separated by rinsing with distilled water. Samples are dried for several hours at ca 110°C and combusted in a pressurized vessel in pure oxygen (Grabczak *et al*, 1983). Separation of  $\text{CO}_2$  from  $\text{O}_2$  and other contaminants (mainly  $\text{H}_2\text{O}$ ) is carried out in two liquid nitrogen cooled traps and two traps kept at a temperature of  $-70^\circ\text{C}$ , respectively. Desiccated  $\text{CO}_2$  is converted to benzene in the laboratory-produced benzene synthesis line applying the well-known procedure of transforming  $\text{CO}_2$  to  $\text{Li}_2\text{C}_2$  and acetylene. The final trimerization takes place on a commercially produced catalyst KC-Perlkator D1 (Kali-Chemie AG, Germany). Ca 2g of  $\text{C}_6\text{H}_6$  weighted into a "laboratory-made" teflon-copper vial (Kuc & Rózański, 1979) and mixed with 50 $\mu\text{l}$  toluene solution of 100:1 PPO and POPOP is counted for 1500–2000 minutes, sequentially at 100-minute intervals (50 $\mu\text{l}$  of the scintillation cocktail contains 2.5mg PPO). Standard and background are counted in each batch of 4 to 6 samples. The measurement chamber is refrigerated at  $+6^\circ\text{C}$ .

Radiocarbon dates are calculated based on 95% activity of NBS oxalic acid as modern standard and the Libby half-life ( $5568 \pm 30$ ) and reported with  $1\sigma$  counting error including variations in the sample, standard, and background. Standard activity is normalized to  $\delta^{13}\text{C} = -19\text{‰}$  PDB, according to Craig (1961). Determination of  $\delta^{13}\text{C}$  for each sample is routinely done on Micromass 602 C (V G Micromass Ltd).

Results presented below were obtained in 1986 and 1987 as part of a project of dating fossil wood (black oak) found in the Vistula valley alluvial fossil.

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## GEOLOGIC SAMPLES

*Poland***Branice & Grabie series**

Fossil wood (black oak) excavated in gravel pits Branice and Grabie (20° 08' E, 50° 02' N) in the Vistula River valley. The trunks, which were dark-brown to gray-brown when dried, had neither outer bark nor sapwood and had no roots and branches. Samples coll 1986–1987 from ca 1m above trunk base. Each sample was subject to dendrochronologic measurements.

**KR-18. CD-1A/Branice** **1070 ± 120**  
 $\delta^{13}\text{C} = -25.6\text{‰}$

Old gravel pit no. 3d, 189m asl, sandy-gravel-alluvial deposits, 5m above Miocene clay. Average trunk diameter was 69cm, 1m above roots; 130 rings were preserved; dates 10 youngest rings.

**KR-22. CD-2A/Branice** **1060 ± 80**  
 $\delta^{13}\text{C} = -23.9\text{‰}$

Located very close to KR-18 in same formation. Average trunk diameter was 63cm, 1m above roots; 142 rings were preserved; dates 10 youngest rings.

**KR-35. B-4z/Branice** **1380 ± 90**  
 $\delta^{13}\text{C} = -24.3\text{‰}$

Gravel pit no. 2d, 188m asl, sandy-gravel-alluvial deposits, 6m above Miocene clay. Average trunk diameter was 125cm, 1m above roots; 279 rings were preserved; dates 10 youngest rings.

**KR-34. B-4r/Branice** **1690 ± 80**  
 $\delta^{13}\text{C} = -25.2\text{‰}$

Same as KR-35, dates 10 oldest rings.

**KR-39. B-10z/Branice** **2020 ± 90**  
 $\delta^{13}\text{C} = -23.7\text{‰}$

Gravel pit no. 3d, 187m asl, sandy-gravel-alluvial deposits, 3m above Miocene clay. Average trunk diameter was 82cm, 1m above roots; 190 rings were preserved; dates 10 youngest rings.

**KR-38. B-10r/Branice** **2050 ± 80**  
 $\delta^{13}\text{C} = -25.3\text{‰}$

Same as KR-39; dates 10 oldest rings.

**KR-29. G-IIIz/Grabie**  $3120 \pm 100$   
 $\delta^{13}C = -24.4\text{‰}$

Close to Branice, ca 2km to S, opposite bank of Vistula River, 197 to 198m asl, sandy-gravel-alluvial deposits, 2m above Miocene clay. Average trunk diameter was 75cm, 1m above roots; 129 rings were preserved; dates 10 youngest rings.

**KR-28. G-IIIr/Grabie**  $3060 \pm 80$   
 $\delta^{13}C = -26.1\text{‰}$

Same as KR-29, dates 10 oldest rings.

**KR-31. G-IVz/Grabie**  $3020 \pm 100$   
 $\delta^{13}C = -24.4\text{‰}$

Located very close to KR-28, -29 in same formation. Average trunk diameter was 80cm, 1m above roots; 139 rings were preserved; dates 10 youngest rings.

**KR-30. G-IVr/Grabie**  $3050 \pm 80$   
 $\delta^{13}C = -25.0\text{‰}$

Same as KR-31, dates 10 oldest rings.

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