

## GLIWICE RADIOCARBON DATES IV

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All samples described in this date list have been measured since July 1973 to Oct 1975 using carbon dioxide filled proportional counters. Most of samples have been dated with Counter No. 1 (L1) as in our previous list (Mościcki and Zastawny, 1976). Some samples were measured with Counter No. 3 (L3), with a total volume of 1.5l and background and NBS oxalic acid standard counting rate of respectively, 3.50 or 4.00 cpm and 10.05 or 20.40 cpm when filled to 1 or 2 atm pressure (Mościcki and Zastawny, 1977).

All dates reported here are conventional radiocarbon dates calculated using the Libby value for the half life of radiocarbon. For water samples the results of measurements are given as per cent of modern. Measurement errors are calculated from statistics of counts including one-sigma standard deviations of sample, modern and background counting rates and the uncertainty of gas pressure in the counter. No corrections for isotopic fractionation were made. Background carbon dioxide is prepared from anthracite coal, modern tree activity standard is prepared from NBS oxalic acid by wet oxidation. The  $\delta^{13}\text{C}$  value for carbon dioxide obtained from NBS oxalic acid standard is  $-19.41 \pm 0.08\%$  with respect to the PDB standard. Sample descriptions, comments and references to publications are based on information supplied by the persons who submitted the samples.

During 1975 and 1976 an improvement in measurement techniques was achieved through the application of a new method for counting gas purity control and continuous monitoring of counting efficiency. The method is based on calculating the ratio of the number of muon coincidence counts between proportional counter and guard counters to the number of muon coincidence counts between two independent sections of the guard counter. This ratio was proven to be a very sensitive tool for monitoring counting efficiency and allows for correction of counting efficiency when the filling gas has impurities (Pazdur *et al*, 1978).

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### SAMPLE DESCRIPTIONS

#### I. ARCHAEOLOGIC SAMPLES

#### Gd-259. Grzegorzewice No. 40

1960  $\pm$  140

Incompletely burned charcoal from Site 1, Furnace 40, Grzegorzewice, Opatów dist (50° 09' N, 21° 02' E). Furnace hole of bloomery type

filled with iron slags was excavated in undisturbed loess. Base of furnace hole, 45cm diam, was submerged into loess 35cm. Also found were remains of 104 furnaces of bloomery type. Coll and subm 1973 by K Bielenin, Archaeol Mus, Cracow. *Comment*: charcoal from Furnace 16, this site was dated in Berlin, Bln-1349,  $1810 \pm 60$  (K Bielenin, written commun, 1973). *Cf* other dates of similar objects from Poland: Gd-229,  $1920 \pm 150$  (R, 1976, v 18, p 56), Gd-263,  $1770 \pm 140$ ; Gd-298,  $1660 \pm 120$ , this list, see also Mościcki *et al* (1967) and Bielenin (1977).

### Swiecica series

Charcoal from Mound II in Święcica, Sandomierz dist ( $50^{\circ} 48' N$ ,  $21^{\circ} 40' E$ ). Coll 1973 and 1974 and subm 1974 by A Kempisty, Dept Prehist & Early Medieval Archaeol, Warsaw Univ.

**Gd-320. Swiecica 62/73** **1210  $\pm$  70**

Sample from one of accumulations of charcoal in central part of mound at depth 1.33 to 1.55m below surface. *Comment* (AK): agrees fairly well with archaeol estimate.

**Gd-323. Swiecica 823/74** **3695  $\pm$  90**

Sample representing colln of small lumps of charcoal spreaded in entire fill of Pit III, at depth 1.7 to 3.1m below surface, N part of mound. *Comment* (AK): Pit III is dated as belonging to Mierzanowice culture from Period I of Bronze age, ca 1700bc.

### Nieborowa II series

Charcoal from campfire stands in Nieborowa, Chełm Lubelski dist ( $51^{\circ} 19' 43'' N$ ,  $23^{\circ} 29' 11'' E$ ). Cultural sites excavated in alluvial layer of sandy soil in denudational valley on slope of fluvioglacial hill Pagór Uhruski. The valley is covered with eolically transformed alluvial sands. Coll and subm 1973 by H Mackiewicz, Inst Hist Material Culture, Polish Acad Sci, Warsaw.

*General Comment* (HM): archaeol dating indicates latest period of Mesolithic age contemporary with fully developed Neolithic culture. Stands belong probably to decline of Atlantic and beginning of Sub-Boreal period.

**Gd-325. Nieborowa II/1/A** **2200  $\pm$  80**  
From campfire at depth 30 to 40cm.

**Gd-322. Nieborowa II/1/B** **2550  $\pm$  120**  
From campfire at depth 40 to 50cm.

**Gd-321. Nieborowa II/1/C** **980  $\pm$  100**  
From campfire at depth 60 to 80cm.

*General Comment*: *cf* other dates from Nieborowa I: Gd-140,  $2400 \pm 100$ ; Gd-144,  $5730 \pm 130$  (R, 1976, v 18, p 55).

**Gd-301. Pieczyska I 1210 ± 110**

Carbonized wood from elements of earth-wooden wall construction of early medieval settlement covered with layer of humus at margin of loess highland, Pieczyska I, Zawichost-Podgórze, Sandomierz dist (50° 48' 00" N, 21° 51' 30" E). Sample from 2nd horizon of wall remains at depth 50 to 55cm. Coll and subm 1974 by S Tabaczyński, Inst Hist Material Culture, Polish Acad Sci, Warsaw.

**Gd-300. Otałazka I 1790 ± 110**

Charcoal and pieces of partly burned wood from Hearth Area 4, Otałazka I, Mogielnica village, Grójec dist (51° 41' N, 20° 45' E). Cultural layer found between 2 peat layers at depth 180 to 190cm (Bender & Stupnicka, 1974; Oświt & Zurek, 1974; Dzieczkowski, 1974). Coll and subm 1973 by W Bender, Inst Hist Material Culture, Polish Acad Sci, Warsaw. *Comment* (WB): site is dated between 4th and 6th centuries AD.

**Dobrzeń Mały series**

Charcoal from iron-foundry settlement dating from period of Roman provincial cultural influences, ca 1.2km E of Dobrzeń Mały, Opole dist (50° 45' 00" N, 17° 52' 45" E), NE of prevalley of Odra R. Coll 1974 by K Bielenin and E Tomczak; subm 1974 by J Rozpędowski, Inst Hist Architecture Arts & Technology, Wrocław Tech Univ, Wrocław.

**Gd-263. Dobrzeń Mały ob 19 1770 ± 140**

From Stand B, ar 89, Structure 19. Sample from lower part of primitive smelting cupola furnace with loamy base covered with fine iron slags and remains of charcoal.

**Gd-298. Dobrzeń Mały ob 25 1660 ± 120**

From Stand B, ar 331, Structure 25. Sample taken from lower part of heating furnace ca 15m below its remaining roof part.

**Debczyno series**

Carbonized wood (*Quercus* sp) id by M Klichowska, from Site 3 in Dębczyno, Koszalin dist (53° 58' 15" N, 16° 00' 32" E). Subm 1974 by J Zak, Dept Archaeol, A Mickiewicz Univ, Poznań. Samples taken from fill of pit dwelling composed mainly of clay mixed with fossil humus. Pieces of charcoal from fireplace scattered over large area in lower part of habitation.

**Gd-318. Debczyno 32 1670 ± 140**

From pit dwelling 4. Coll 1971 by C Strzyzewski. *Comment* (JZ): cultural dating, 3rd to 4th centuries AD.

**Gd-319. Debczyno 300 2050 ± 130**

From pit dwelling No. 22. Coll 1974 by E Slaska. *Comment* (JZ): cultural dating, 4th to 5th centuries AD.

**Krusza Zamkowa series**

Charcoal from Krusza Zamkowa, Inowrocław dist (52° 45' N, 18° 12' E). Subm by A Cofta Broniewska, Dept Archaeol, A Mickiewicz Univ, Poznań.

**Gd-309. Krusza Zamkowa, Site 13 5140 ± 140**

From Grave III in passage graves cemetery belonging to Globular Amphora culture. Coll 1974 by U Narozna.

**Gd-317. Krusza Zamkowa, Site 3 1990 ± 100**

From Pit 5 in big settlement of Przeworska Culture. Coll 1973 by A Szulczyński.

**Gd-324. Koscieliec Kujawski KK448 5240 ± 160**

Charcoal from Site 16 at Kościelec Kujawski, Inowrocław dist (52° 46' N, 18° 04' E). Coll 1974 by L Czerniak and subm by A Cofta Broniewska. *Comment* (ACB): date consistent with archaeol estimate.

**Gd-336. Lacko L1 2580 ± 130**

Charcoal from Site 6 at Łacko, Inowrocław (52° 49' N, 18° 06' E). Fragments of sherd (TRB culture). Coll 1973 by L Domańska, subm 1974 by A Cofta Broniewska.

**Gd-345. Krepnica K-1-I/74 5180 ± 160**

Charcoal from dune on terrace of Bóbr R, ca 1/2km NW of Krępnica village, Bolesławiec dist (51° 20' N, 15° 34' E). Site consists of 3 contemporaneous hearths surrounded with stones, found at depth .45m inside pit dwelling belonging to fishing and hunting population, assoc with carbonized bird bones, broken stone and flint tools. Coll and subm 1974 by Z Bagniewski, Dept Archaeol, Wrocław Univ. *Comment* (ZB): typology of assoc material indicates end of Atlantic period.

**Gd-337. Pobiel P-10-I/71 7550 ± 190**

Charcoal from cultural layer on terrace of Orla R, at depth .84m under organic layer of primary oak ca 1km S of Pobiel village (51° 33' N, 16° 45' E). Pollen analysis by P Szczypek, Inst Geog, Wrocław Univ, indicates Atlantic period. *Comment* (ZB): based on assoc material this site probably belongs to Komornicka culture from beginning of Atlantic period.

## II. GEOLOGIC SAMPLES

## A. Poland

## 1. Mazury Lakeland

**Gd-225. Nowe Miasto Lubawskie 470 ± 150**

Charcoal from sandy soil layer at depth 1 to 1.3m on left side of Drwęca R at Nowe Miasto Lubawskie, voi Olsztyn (53° 24' N, 19° 35' E). Coll 1972 by A. Olszewski and subm 1973 by Z Churska, Inst Geog, M Kopernik Univ, Toruń (Churska, 1969)

**Gd-224. Fletnowo II** **10,200 ± 270**

Peat from base of post-lacustrine depression at Fletnowo, Swiecie dist, voi Bydgoszcz (53° 32' N, 18° 39' E). Sample from depth 8.57 to 8.63m, basal layer of peat covered with upper peat layer and gyttja. Coll 1973 by K Więckowski and subm by L Roszko, Inst Geog, M Kopernik Univ, Toruń. *Comment* (LR): pollen analysis of bottom layer by B Noryśkiewicz indicates end of younger Dryas (Roszko, 1968).

2. *Great Poland Lowland***Mirkow 1 series**

Holocene deposits in floodplain of Prosna R consisting of muds, 0 to 1.5m, sandy-organic muds, 1.5 to 2.1m, with trunks and wood fragments, and various-grained sands, below 2.1m, at Mirków, Wieruszów dist (51° 18' N, 18° 09' E). Coll 1973 by K Rotnicki and subm by S Kozarski, A Mickiewicz Univ, Inst Geog, Poznań. Samples dated for Holocene conf in 1974. Pollen analysis of organic layer dates Atlantic period (Kozarski & Rotnicki, 1977).

**Gd-241. Mirkow 1/155** **7730 ± 190**

Fossil plant fragments from top layer of sandy mud at depth 1.55m.

**Gd-234. Mirkow 1/185** **7760 ± 220**

Wood, individual trunk from depth 1.85m.

**Gd-233. Mirkow 1/205** **9380 ± 210**

Wood, individual trunk from depth 2.05m.

**Gd-232. Mirkow 1/290** **9770 ± 250**

Wood, individual trunks found under organic layer at depth 2.9m.

**Mirkow 2 series**

Wood from two organic layers separated with stratified silty sands with rich admixture of wood fragments in fossil river channel at Mirków, Wieruszów dist (51° 18' N, 18° 09' E). Coll 1973 by K Tobolski and subm by S Kozarski (Kozarski & Rotnicki, 1977).

**Gd-235. Mirkow 2/280** **4920 ± 170**

Wood from depth 2.8m.

**Gd-236. Mirkow 2/210** **3120 ± 160**

Wood from depth 2.1m.

**Gd-293. Jaskowo** **9650 ± 240**

Coarse-detrital gyttja from continuous layer of deposits in filling fossil meander channel on Warta R floodplain; depth 2.74 to 2.80m, at

Jaszkowo, Srem dist (52° 10' N, 16° 57' E). Coll 1974 by B Nowaczyk and subm by S Kozarski.

### **Kraski series**

Charcoal in single pieces from organic layer separating 2 series of dune sands in parabolic dune on terrace of Warsaw-Berlin ice-marginal valley at Kraski village, Łęczyca dist (52° 02' N, 18° 54' E). Coll 1974 by K Krajewski and subm 1974 by A Dylikowa, Inst Geog, Łódź Univ (Dylikowa, 1967; 1969; Wasylikowa, 1964).

**Gd-294. Kraski 1** **10,530 ± 585**

From N part of dune bank, depth 4m. *Comment:* sample diluted with inactive CO<sub>2</sub> for counting.

**Gd-295. Kraski 2** **3050 ± 130**

From S part of dune bank, depth 1.6m.

**Gd-304. Borki Lipkowskie 1** **10,500 ± 250**

Charcoal from dune at Borki Lipkowskie, dist Poddębice (51° 51' N, 18° 54' E). Single pieces of charcoal found at depth 5m in organic layer separating 2 series of dune sands. Coll 1973 by K Krajewski and subm 1974 by A Dylikowa.

### *3. Mazowiecka Plain*

#### **Wolumen series**

Peat, coll and subm 1974 by W Morawski, Inst Geol, Warsaw (Morawski, 1975; 1976).

**Gd-308. Wolumen T-I** **>30,000**

Peat from bed in post-lacustrine depression at Wawrzyszew, Warsaw (52° 17' 00" N, 20° 56' 15" E). Depth 2.4 to 2.6m. *Comment:* date based on 3σ criterion.

**Gd-343. Wolumen T-II** **720 ± 120**

Peat from highest layer of organic deposits in lake bowl at Warsaw (52° 17' 20" N, 20° 56' 00" E). Depth 1.90 to 2m.

**Gd-246. Czarnow** **9860 ± 440**

Charcoal from fossil soil layer at depth ca 3.5m in dune at Czarnów village, Piaseczno dist, ca 20km SSE of Warsaw (52° 04' N, 21° 06' E). Coll 1973 by K Urbaniak Biernacka, subm by J Rózycki, Fac Geod Cart, Warsaw Tech Univ. *Comment:* sample diluted with inactive CO<sub>2</sub> for counting.

**Gd-245. Ciesle Stare** **3410 ± 150**

Carbonized wood from depth 2.8m in flood terrace of Mołtawa R valley at Ciesle Stare village, Płock dist (52° 27' 54" N, 20° 59' 30" E). Coll 1973 by J Kotarbiński, subm by J Rózycki.

## 4. Kraków-Częstochowa Highland

**Siewierz series**

Charcoal from fossil soil levels in dune near Siewierz, Czarna Przemsza R valley (50° 29' N, 19° 13' E). Coll and subm 1974 by P Szczypek, Inst Geog, Silesian Univ, Sosnowiec.

**Gd-339. Siewierz 2** **4100 ± 150**

From younger level, depth .5 to 2.5m.

**Gd-341. Siewierz 1** **9420 ± 500**

From older level, depth 3m. *Comment:* sample diluted with inactive CO<sub>2</sub> for counting.

*B. Spitsbergen***Spitsbergen 1973 series**

Moss and peat samples coll 1973 by Polish Spitsbergen Expedition for study of intensity of slope processes and sequences of glacial extension and retreat during Holocene. Sample Gd-264 coll and subm 1973 by S Baranowski, Geog Inst, Wrocław Univ. Other samples coll and subm 1973 by K Pękala, Inst Earth Sci, M Skłodowska Univ, Lublin.

**Gd-264. Spitsbergen 51/1973** **760 ± 145**

Moss from Spitsbergen, Norway (77° 04' 40" N, 15° 13' 00" E). Fossil vegetation in clusters lying on older ground moraine of Weren-skiold Glacier Forefield under thin, 5 to 10cm, cover of younger ground moraine.

**Gd-278. Spitsbergen 104/1973** **930 ± 135**

Peat, fossil vegetation in form of compact cover on nunatak (weathered rock shelf) from Spitsbergen, Norway (77° 02' 45" N, 15° 25' 30" E). Peat layer on weathered sandy-loam soil covered with .5m rubble. *Comment (KP):* not long before terrain was covered with glacial ice.

**Gd-279. Spitsbergen 79/1973** **920 ± 140**

Fossil vegetation, compact cover on flat surface and slope of nunatak, partly covered with rubble, from Spitsbergen, Norway (77° 01' 45" N, 15° 26' 16" E).

**Gd-280. Spitsbergen 126/1973** **<425**

Peat, fossil vegetation, compact cover on N slope of nunatak, covered with 1.2m layer rubble, from Spitsbergen, Norway (77° 01' 45" N, 15° 26' 16" E). *Comment:* date based on 3σ criterion.

## III. GEOCHEMICAL SAMPLES

The purpose of this study was to trace origins of water from intrusions in deep coal mines of Rybnik coal region. First series of measurements was reported in our previous list (Mościcki & Zastawny, 1976; Mościcki,

1977). Present list summarizes results obtained since 1973 to 1975. All samples were coll by lab staff. The results of measurements are presented as per cent of modern  $0.95A_{ox}$  activity. No corrections for  $^{13}C/^{12}C$  were made. Samples denoted with asterisk (\*) were counted after dilution of sample  $CO_2$  with inactive gas. Unless stated explicitly sampling localities are essentially the same as in previous list.

#### A. Deep water samples

##### Shaft RJ-1 series (cont'd)

Zone of great tectonic disturbances, depth 400m. Three separate water outflows were distinguished: Outflow A—large dispersed water outflow from ceiling ca 10m from end of gallery, fresh water. Outflow B—mineralized water, moderate outflow from side wall of gallery, ca 10m from sampling point A. Outflow C—fresh water, greatly dispersed outflow from ceiling, ca 80m from sampling point B. Results pub in previous list were obtained for sampling point A, but some water samples were probably coll as mixtures of water from sampling points A and B.

Lab no.	Location	Colln date day/mo/yr	% of $0.95A_{ox}$ NBS
Gd-251	A	14/03/74	$1.3 \pm 0.8$
Gd-261	A	24/05/74	$1.3 \pm 0.8$
Gd-305	A	23/11/74	$2.0 \pm 0.8$
Gd-270	B	24/05/74	$1.0 \pm 0.8$
Gd-306	B	23/11/74	$0.0 \pm 0.6$
Gd-269	C	24/05/74	$0.5 \pm 0.8$
Gd-307	C	23/11/74	$2.0 \pm 0.8$

##### Shaft RVI-1 series (cont'd)

Water leakage from ceiling of cutting leading to coal bed. Depth 400m, ca 2km from sampling point RJ-1.

Lab no.	Colln date day/mo/yr	% of $0.95A_{ox}$ NBS
Gd-252	14/03/74	$21.0 \pm 0.9$
Gd-260	24/05/74	$24.0 \pm 0.9$
Gd-356	12/06/75	$18.0 \pm 1.4$

##### Shaft RR-1 series (cont'd)

Two newly formed water outflows of ca 100m in testing gallery leading to fault region, depth 430m. Coll 16/11/74. *Comment:* results based on  $3\sigma$  criterion.



**Gd-302. RR-1A** <1.8% of 0.95A<sub>ox</sub> NBS

**Gd-303. RR-1B** <2.2% of 0.95A<sub>ox</sub> NBS

**Shaft CC-1 series (cont'd)**

Water outflow from wall of the gallery traversing sandy crevice near fault region, depth 390m. Coll 4/04/74.

**Gd-255.** 0.7 ± 0.8% of 0.95A<sub>ox</sub> NBS

**Shaft AJ-1 series (cont'd)**

Water leakage from wall of shaft, depth ca 160m, sample coll 4/04/74.

**Gd-254.** 30.4 ± 1.0% of 0.95A<sub>ox</sub> NBS

**Shaft AZ-1 series (cont'd)**

Series of water outflows from wall of shaft crossing water-bearing gypsum bed. Samples taken from 3 levels: Outflow C—at depth ca 20m, fresh water. Outflow B—at depth ca 43m, water containing sulphuric compounds. Outflow A—at depth ca 57m, fresh water with admixture (ca 30%) of sulphuric water from leakage at depth ca 50m.

Lab no.	Location	Colln date day/mo/yr	% of 0.95A <sub>ox</sub> NBS
Gd-331	A	29/01/75	13.6 ± 0.8
Gd-256	B	4/04/74	32.3 ± 1.0
Gd-274	B	31/05/74	33.7 ± 1.3
Gd-332	B	29/01/75	30.9 ± 1.0
Gd-353	B	14/05/75	31.5 ± 6.1*)
Gd-271	C	31/05/74	59.2 ± 1.3
Gd-333	C	29/01/75	48.2 ± 1.7
Gd-354	C	14/05/75	42.1 ± 0.8

*B. Ground water samples*

**Niedobczyce Niewiadom draw well series**

Draw well in Niedobczyce Niewiadom village, ca 3km SW of Rybnik, depth ca 30m.

Lab no.	Colln date day/mo/yr	% of 0.95A <sub>ox</sub> NBS
Gd-262	25/04/74	60.6 ± 1.3
Gd-297	15/10/74	56.0 ± 1.2
Gd-334	7/03/75	61.0 ± 1.4
Gd-351	23/04/75	56.2 ± 2.3*)
Gd-352	11/06/75	53.4 ± 2.5*)

**Zawada draw well series**

Draw wells in Zawada village, ca 2.5km SSW of Pszów.

Lab no.	Location	Colln date day/mo/yr	% of 0.95A <sub>ox</sub> NBS
Gd-272	Draw well 1643	31/05/74	75.6 ± 1.5
Gd-346	Draw well NN	29/01/75	90.1 ± 6.3*)

**Zawada spring series**

Meadows springs, water containing sulphuric compounds, at Zawada village, ca 2.5km SSW of Pszów.

Lab no.	Colln date day/mo/yr	% of 0.95A <sub>ox</sub> NBS
Gd-329	29/01/75	31.3 ± 1.0
Gd-349	14/05/75	40.9 ± 0.9

**Gd-350. Jejkowice draw well 100.7 ± 1.1% of 0.95A<sub>ox</sub> NBS**

Draw well, at Jejkowice village, ca 2.5km NWW of Rybnik, depth ca 15m. Coll 7/03/75.

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