

GLIWICE (GDANSK) RADIOCARBON DATES III*

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The first natural ^{14}C measurements in Poland were made, using $\text{CO}_2 + \text{CS}_2$ GM counter as early as 1953 (Mościcki, 1953), but continuous operation was not possible until 1971. Following Poznań Toruń (Mościcki, 1958; 1961) and Gdańsk (Mościcki and Zastawny, 1962a), where the first long series of ^{14}C measurements were made (Mościcki *et al.*, 1967), an actively operating radiocarbon dating laboratory was installed at Gliwice in 1971.

Essentially, our equipment is the same used in Gdańsk (Mościcki and Zastawny, 1962b). The steel wall proportional counter ca 2.41 active volume, filled with 1 atm CO_2 , is used. Background and net 0.95 A_{ox} counting rates are, respectively, 10.43 and 15.09cpm.

All BP dates are based on 5570 yr for the ^{14}C half-life. No correction for isotopic fractionation was made. Age errors include only the statistical inaccuracy of the measurements within limits of $\pm 1\sigma$. 'Infinite' ages have been based on the 3σ criterion.

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SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

A. Baltic Coast

Cliff between Ustka and Orzechowski River series

Fen peat, ca 4km E of Ustka ($54^\circ 35' 53''$ N, $16^\circ 54' 11''$ E). Coll 1972 by A Marsz and K Topolski. Subm by AM, for INQUA conf of subcomm on shorelines of NW Europe.

Gd-122. Ustka-Rowy 4/72

510 \pm 80

AD 1440

Fen peat with some sand, from upper part of peat between cover sand and dune sands.

Gd-120. Ustka-Rowy 5/72

11,100 \pm 140

9150 BC

Fen peat with much sand, with *Betula nana*, *Selaginella selaginoides* *Salix* sp, from bottom part of peat on boulder clay covered by sand.

Fossil soil horizons near Ustka-Rowy series

Fossil soil 8km W of Rowy village ($54^\circ 40'$ N, $17^\circ 00'$ E). Coll April 1973 by B Noryskiewicz and R Bednarek. Subm by Z Prusinkiewicz, Inst Biol, Copernicus Univ, Toruń.

* The first two lists of this laboratory were published elsewhere; see references: Mościcki and Zastawny (1962a), Mościcki *et al.* (1966).

Gd-190. Debina I **7500 ± 330**
5550 BC
Depth 350cm.

Gd-191. Debina II **2980 ± 190**
1030 BC
Depth 270cm.

Gd-192. Debina III **1390 ± 110**
AD 560
Depth 230cm.

Gd-193. Debina IV **1230 ± 90**
AD 720
Depth 205cm.

General Comment (ZP): samples dated by pollen analysis (BN): Debina I: Late Glacial, Debina II: Atlantic, Debina III: Sub-Boreal, Debina IV: Sub-Atlantic.

Gardno-Leba Lowland series

Coll 1973 by Marsz and K Topolski. Subm by AM for INQUA conf, subcomm on shorelines of NW Europe, Poland, 1972.

Gd-137. Forest of Kluki Prof 22 **850 ± 100**
AD 1100
Fen wood-peat (*Betula pubescens*) with some sand, 1200m N of E part of Kluki village (54° 41' 35" N, 17° 20' 02" E). Peat under dune sands.

Gd-154. Czołpino Br 69 **860 ± 120**
AD 1090
Detrital gyttja, mixed with sand, 3350m E of Czołpino (54° 42.7' N, 17° 17.6' E) from depth 100 to 105cm overlying marine fauna.

B. Mazowiecka Plain

Kampino Forest series

Charcoal from dune, coll June 1971 by U Urbaniak-Biernacka; subm by J Rózycki, Warsaw Politech.

Gd-112. Górki **9200 ± 160**
7250 BC
Sample was from bottom of dune in eolian sand layer, 8cm thick, with charcoal detritus in Górki village, 16km from Nowy Dwór Mazowiecki (52° 21' N, 20° 32' E). *Comment (UU-B):* suggested age: Late Glacial.

Gd-195. Laski 1 **1080 ± 90**
AD 870
From fossil soil ca .5m thick in Laski village, 10km WNW of Warsaw (52° 17' N, 20° 50' E).

- Gd-202. Laski 2** **2160 ± 90**
210 BC
Charcoal dispersed in sand, same place as Laski 1.

C. Great Poland Lowland

Warszawa-Berlin Pradolina series

Peat layer underlying S arm of parabolic dune, 2.5km E of Swietno village, 12km S of Wolsztyn (52° 00' 30" N, 16° 05' 50" E). Coll Aug 1972 by B Nowaczyk; subm by S Kozarski, Inst Geog, A Mickiewicz Univ, Poznań.

- Gd-119. Swietno 2/bn** **9120 ± 160**
7170 BC
Peat, depth 150cm.

- Gd-123. Swietno 1/BN** **10,400 ± 260**
8450 BC
Fossil plant fragments, depth 288cm.

- Gd-206. Krzekotów 3a** **28,200 ± 1250**
26,250 BC
Oak from Flood-Plain Bench Krzycki Rów (Dumanowski *et al.*, 1962) .8km from Krzekotów village, 7km NE of Głogów (51° 42' 48" N, 16° 09' 40" E). Sample from depth 19.20 to 19.35m. Coll June 1972 and subm by J Kucharewicz, Geol Enterprise, Wrocław.

- Gd-118. Borowiec 3/JA** **>31,200**
Wood pieces, 3.8km from Jarocin, E side of Lutynia valley 200m E of forester's lodge (51° 58' 35" N, 17° 33' 20" E). Upper terrace of Würm age in the Lutynia valley. Gray silt layer with wood pieces 20cm thick, covered with river sands and gravels at depth 12m from terrace surface. Coll March 1972 by J Jańczak, subm by S Kozarski.

- Gd-124. Raszewy 18/72/KR** **>30,300**
Wood, from edge of R Warta alley, 350m NE of E border of Raszewy village, 3km N of town of Zerków, 14km NE of Jarocin (52° 05' 08" N, 17° 37' 16" E). An old unexploited sand pit in upper Warta R terrace, at + 100m. Depth 4 to 4.3m. Coll April 1972 by K Rotnicki; subm by S Kozarski. *Comment* (KR): terrace is younger than Leszno (Brandenburg) phase of Baltic Glaciation.

- Gd-136. Laka Pyzdrska 22A/72 KR** **10,470 ± 180**
8520 BC
Sandy peat from Pyzdry Basin, 35km SE of Pyzdry town, 1km E of Pyzdry-Kalisz rd, 200m W of frontal part of parabolic dune (52° 08' 52" N, 17° 25' 00" E). Depth 175 to 185cm. Coll July 1972 by K Rotnicki; subm by S Kozarski.

D. Śląska Plain

- Gd-141. Marcinkowice** **2500 ± 150**
550 BC
Oak and ash wood from Skroda valley at Marcinkowice (51° 31' 30" N, 14° 49' 30" E). Wood is from peat overlain by river gravel 2m thick. Coll July 1968 by J Wróński; subm by L Sawicki, Inst Geol, Lower Silesia Dept, Wrocław.

- Gd-153. Dobromierz 1/72/S** **1260 ± 120**
AD 690
Peat interbedded with clay from left tributary of Strzegomska R, ca 5km of church at Dobromierz (50° 54' 30" N, 16° 14' 30" E). Coll April 1972 by H Teissere; subm by L Sawicki.

Nysa Klodzka Valley series

Trunks, lying 2 to 7m deep in river gravels, 8km WNW of Paczków (50° 28' N, 16° 58' E). Coll Aug 1971 by J Wroński; subm by L Sawicki.

- Gd-145. Paczków 1** **1450 ± 100**
AD 500
Oak wood. Fragment of trunk, diam 1.5m, length 9m.

- Gd-152. Paczków 2** **7300 ± 180**
5350 BC
Ash wood. Fragment of trunk, diam .8m, length 9m.

E. Sandomierska Valley

Flooded terrace plain of Wisloka River series

Coll 1972 by L Starker, Inst Geog Polish Acad Sci, Cracow.

- Gd-121. Kozlow** **1670 ± 80**
AD 280
Oak, surficial part of trunk 40cm thick, lying in sands with gravel, depth 7m, .5m deep in undercutting. From Kozłów, 6km NNE of Debica (50° 04' N, 21° 27' E). *Comment* (LS): estimated age of alluvia of riverbed facies: Atlantic.

- Gd-131. Brzeznicza B/2** **+2900**
29,400
-2100
27,450 BC
Clayey peat, lying on clays and covered by fluvial gravels and sands from depth 4.35 to 4.40m below surface. From Brzeznicza, 7km NE of Debica (50° 04' N, 21° 28' E). *Comment* (LS): expected age of alluvia of oxbow lake facies: end of interstadial period.

Gd-130. Debica B/2**10,100 ± 260****8150 BC**

Cyperacae peat, partly decomposed, clayey, from core at depth 8.71 to 8.74m. From Debica, W of Kolejowa St (50° 03' N, 21° 25' E). *Comment* (LS): Late Glacial.

*F. Western Bieszczady***Gd-165. Zakole****3140 ± 120****1190 BC**

Fen-wood peat from Zakole on San R, distr Ustrzyki Dolne (49° 12' N, 22° 44' E). Raised bog, core in center. Sample covers bottom of organic sediment at depth 3.25 to 3.15m overlying contact with mineral bed. Coll April 1972 and subm by M Rolska-Jasiewicz, Bot Inst Polish Acad Sci, Cracow. *Comment* (MR-J): estimated age: beginning of Sub-Boreal period.

II. ARCHAEOLOGIC SAMPLES

*A. North Poland***Braniewo series**

Charcoal from cultural layers underlying pure sand ca 1m thick from Grabina, 2.5km from Frombork, sandy hill at right shore of Bauda R (59° 21' 33" N, 19° 43' 50" E). Excavation on NW slope of the hill. Stand 1, Area 6, Quarter a; Area 14, Quarter b. Coll Aug 1972 and subm by M Maczkowska, Masurian Mus, Olsztyn.

Gd-150. Grabino III**2930 ± 95****980 BC**

Layer III, depth 1.10 to 1.25m from surface.

Gd-151. Grabino V**4830 ± 120****2880 BC**

Layer V, depth 1.30 to 1.50m from surface.

Woryty series

Charcoal from stone hearth at Olsztyn distr, from sand hill by Woryty village (53° 41' N, 20° 13' E). Coll June 1971 and subm by J Dabrowski, Inst Material Culture Hist, Polish Acad Sci, Warsaw.

Gd-135. Woryty 1-34**1700 ± 100****AD 250**

Object 38, depth 38 to 60cm.

Gd-134. Koryty 2-77**2100 ± 90****150 BC**

Object 77, depth 60 to 115cm.

General Comment (JD): settlement of Mazury-Warmia group of Lusatian culture. Late Bronze age.

*B. Central Poland***Holy Cross Mt series**

Charcoal from NE foothills of Holy Cross Mt ca (51° 14' N, 21° 07'

E). Coll and subm by R Schild, Inst Material Culture Hist, Polish Acad Sci, Warsaw.

Gd-133. Polany Kolonie II **3500 ± 90**
1550 BC

From base of last phase of filling of newly discovered flint mine shaft at Polany Kolonie, distr Szydłowiec. Depth 60 to 70cm. Coll in 1971. *Comment (RS)*: sediment consists of cultural debris with numerous limestone rubble and slabs in rendzina matrix. Cultural material, charcoal, rubble, and slabs are derived from mining dumps originally surrounding shafts of Late Neolithic or Early Bronze age. Since presence of more recent rendzina humus is established, dates are only minimum. Most probably slightly postdates flint mine.

Gd-134. Rydno IV **2300 ± 200**
350 BC

Pinus silvestris from fireplace on floor of Masovian final Paleolithic pit house at Rydno (Grzybowa Góra), Starachowice distr. Coll 1957. *Comments*: CO₂ obtained from sample amounted to 35% of standard filling and 65% of 'dead' CO₂ was added. (RS): date much younger than expected. Compare dates at Całowanie from generally similar assemblages GrN-5409: 8505 ± 90 BC, and GrN-5254: 7985 ± 110 BC.

Nieborowa series

Charcoal from campfire in Mesolithic flint assemblage, in top of alluvial sands. The uppermost, thin layer was reworked by wind processes. The campfire is C layer of soil. From Chełm Lubelski distr (51° 19' 43" N, 23° 29' 11" E). Coll 1965 to 1966 by H Mackiewicz. Subm by R Schild.

Gd-144. Nieborowa I/2 p 1 **5730 ± 130**
3780 BC
Depth 60 to 95cm.

Gd-140. Nieborowa I/4 p 2 **2400 ± 100**
450 BC

Depth 30 to 60cm. *Comment (RS)*: archaeol site is probably from Boreal period. There is also some Neolithic and Early Bronze material at the site, situated in a denudational-erosional valley, incised into a hill 'Pagór Uhrski'. The hill is built of glacio-fluvial material of Middle Polish Glaciation. The valley was formed during regression phase of maximum of Last Glacial. Alluvial sands in the valley were set in the Holocene.

C. South Poland

Kielniki series

Charcoal from crematory burial ground, Site 1, ca 1.5km from Olsztyn village (50° 45' N, 19° 19' E), E side at foot of limestone rocks, 40m S from limestone quarry 'Kielniki' (Szydłowski, 1962). Coll Oct 1958 and subm by J Szydłowski, Upper Silesia Mus, Bytom.

Gd-162. Kielniki B.22/1575:59 **920 ± 120**
AD 1030

Pinus silvestris L from Quarter III, S part. Depth 40 to 50cm.

Gd-161. Kielniki B.22/1339:59 **1400 ± 130**
AD 550

Pinus silvestris L from Centre 7, below cultural layer, depth 50 to 70cm.

Gd-229. Lysa Góra S9 P9 **1920 ± 150**
AD 30

Charcoal from iron works, Site 9, Furnace 9, E slope of Lysa Góra Mt (50° 09' N, 21° 06' E), Kielce distr. Furnace hole excavated in undisturbed loess, filled with iron ore slag. At base of furnace in fine-grained slag were remains of incompletely burned charcoal. Furnace hole was overlain by a layer of brown soil ca 20cm thick. Slope of mt covered by coniferous and deciduous forest. Coll 7/7/73 and subm by K Bielenin, Archaeol Mus, Cracow. *Comment* (KB): Lysa Góra iron works were found in 1969. They are preserved as 11 holes filled with slag set in lower parts of furnaces. Similar objects in other sites permit to suppose iron works of Lysa Góra were used in the early Middle ages. Botanical study of sample was made by I Gluza. The following species of plants were found in the charcoal: *Tilia* sp, *Fagus silvatica* L, and *Populus* sp or *Salix* sp.

Gd-164. Nowa Huta—M62 J416 **5150 ± 180**
3200 BC

Carbonized cereal grains from pit on a N hill slope, Cracow, Nowa Huta (50° 04' N, 20° 04' E). Pit 416 was embedded in loess bedrock. Cereal grains formed a layer at base of pit and were overlain by brown soil 30 to 35cm thick. Coll June 1973 by M Godławska, subm by I Gluza, Archaeol Mus, Cracow. *Comment* (IG): carbonized plant material was coll from 2 places: S situated higher and N 10cm lower. Sample subm for dating comes from N part and contains some admixture fruit and seeds of weeds (*Bromus* sp, *Polygonum* sp). Based on archaeol context, sample age was defined by MG as Neolithic, middle phase of Lengyel culture.

Gd-163. Kraków-Planty P 5 **910 ± 120**
AD 1040

Carbonized oak from pale in Cracow park, Okół-Skarpa site, Tr III, area 17.45 to 18.20m (50° 03' N, 19° 56' E). Pale 5 was below an earth scarp at depth 230cm (top) below present surface, 50cm above sandy substratum. Coll June 1973 and subm by T Radwańska, Archaeol Mus, Cracow. *Comment* (TR): Pale 5 was part of palisade consisting of a row of vertical pales and probably occasionally planks. The parts of palisade visible when found were carbonized. On the inner (W) side, the palisade was bordered by clay with sand and coal fragments. Pale 5 was part of palisade protecting settlement from the E. Age based on stratigraphy: VI-XIII century.

III. WATER SAMPLES

A. Legnica—Głogów Copper Basin

Lab no.	Sample description	Coll date	Depth (m)	Activity (% of 0.95A _{ox} NBS)
Gd-43	Shallow water spring Stream at Lubin Legnicki	6/12/64	0-1	89.4 ± 1.0
Gd-42	Tap water in Polkowice	6/11/64	30	73.6 ± 1.4
Gd-68/69	Borehole A, drilled 9 mos before sampling Borehole B	5/19/65	90	4.0 ± 0.6
Gd-85	Recent boring	5/23/66	80	55.2 ± 3.0
Gd-86	After 7 hr bailing	5/23/66	80	53.0 ± 2.5
Gd-87	Ca 1 mo after boring Borehole C	6/19/66	80	34.5 ± 2.5
Gd-88	Recent boring	12/21/66	88-93	57.3 ± 3.0
Gd-91	Ca 3 mos after boring	3/29/67	88-93	22.8 ± 2.0
Gd-90	Borehole D, recent boring	12/21/66	100	53.1 ± 2.5
Gd-70	Shaft I	5/21/65	350	0.9 ± 0.7
Gd-84	Shaft III	5/24/66	610	5.5 ± 1.5

General Comment: this study was intended to 1) compare the activity of shallow water from L-G Copper Basin with contemporary samples from Europe, 2) to check accuracy of sampling method and measurement, 3) to determine amount of water leaking into borehole during drilling and rate of disappearance from the borehole, 4) to establish water sources in shafts (Jureczko *et al.*, 1974).

B. Rybnik Coal Region

Site is ca 50° 00' to 50° 10' N, 18° 35' E. Results of measurements are given in % activity of 0.95A_{ox} NBS.

Gd-222. Draw well—Niedobczyce 95.0 ± 5.0%

Draw well in Niedobczyce village (50° 03' 40" N, 18° 30' 00" E). Depth 10m. Coll July 73.

Shaft AZ-1 series

Water outflow from wall of shaft crossing a water-bearing gypsum bed. Samples were mixture of water from 3 separated outflows. Depth 50m.

Sample	Coll date	% of 0.95A _{ox} NBS
Gd-169	2/3/73	49.0 ± 5.0
Gd-213	5/17/73	40.2 ± 1.0

Shaft AJ-1 series

Water leakage from wall, depth 160m.

Sample	Coll date	% of 0.95A _{ox} NBS
Gd-132	6/30/72	41.0 ± 1.0
Gd-168	2/3/72	33.3 ± 3.7
Gd-200	5/17/73	31.6 ± 3.0

Shaft CC-1 series

Outflow from wall of gallery traversing a sandy crevice near fault. Depth 390m.

Sample	Coll date	% of 0.95A _{ox} NBS
Gd-199	3/15/73	12.6 ± 2.0*
Gd-242	11/14/73	1.8 ± 0.7

* CO₂ from sample diluted with inactive CO₂.

Shaft RJ-1 series

Zone of great tectonic disturbances, great dispersed water outflow, depth 400m.

Sample	Coll date	% of 0.95A _{ox} NBS
Gd-99	1/25/72	0.2 ± 0.5
Gd-111	3/28/72	2.8 ± 0.7
Gd-155	1/22/73	2.9 ± 0.6
Gd-207	5/22/73	1.4 ± 0.8
Gd-223	8/10/73	3.4 ± 0.7
Gd-237	10/24/73	2.8 ± 0.8
Gd-244	12/12/73	2.4 ± 0.9

Shaft R VI-1 series

Water leakage from ceiling of cutting leading to coal bed. Gallery ca 10m above sampling place is actually deluged. Depth 400m, ca 2km from Shaft RJ.

Sample	Coll date	% of 0.95A _{ox} NBS
Gd-100	1/27/72	30.5 ± 0.6
Gd-117	4/14/72	23.8 ± 0.5
Gd-148	10/12/72	26.7 ± 0.5
Gd-156	1/22/73	20.3 ± 3.0
Gd-196	3/5/73	24.4 ± 1.6
Gd-205	5/25/73	11.1 ± 1.3
Gd-238	10/24/73	15.0 ± 0.8
Gd-249	12/12/73	18.6 ± 0.9

Gd-218. Shaft RR-1 **1.4 ± 0.5%**

Outflow in the testing gallery leading to fault region. Depth 430m. Coll July 1973.

General Comment: extracting levels of mines exploiting coal beds in S part of Upper Silesia coal field lay at depths from 200 to 600m. The pit shafts penetrate layers of Quaternary deposits, Tertiary sediments (from tens to several hundred m thick) and Upper Carboniferous formations. Between Carboniferous and Tertiary sediments, (mostly clays) a water-bearing layer of fine sands extends from a few to several dozen m. The carboniferous sediments show serious tectonic activity marked by numerous faults, displacements of strata and folds. In the region of tectonic disturbances, water from the water-bearing Tertiary sands can penetrate to deeper parts of carboniferous. This study was made to determine connections of inflow of water in mines with surface water, Jureczko *et al* (1974).

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