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MOST RADIOCARBON DATES I

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The Laboratory of Applied Nuclear Physics of the Brown Coal Research Institute in Most started the radiocarbon dating of archaeologic samples in 1972. Dates presented in this list were obtained from 1973 to 1974.

Samples of compact wood to be dated were filed to remove surface layers and then were treated in 3N hydrochloric acid for 48 hours, after which they were carbonized in an iron retort at 560°C for 2 hours. Badly preserved wood, charred wood, charred grain, and charcoal were mechanically cleaned and treated for 24 hours in 3N hydrochloric acid and for 24 hours longer in 2% sodium hydroxide. The samples were then washed in distilled water, acidified by hydrochloric acid to pH $\leqq$ 4, and carbonized. Charcoal obtained in this way was filled into a steel reaction vessel together with an excess of metalic lithium and heated slowly up to 800°C, similar to the procedure described by Tamers (1969). The prepared lithium carbide was decomposed by dead water with phosphoric acid and the liberated acetylene was catalytically trimerized into the benzene, after Noakes *et al* (1963). The pearl-type catalyst NEU, product of Kali-Chemie Co, was used (Pietig and Scharpenseel, 1966). The prepared benzene was very pure, according to gas-chromatographic analysis it contained only 0.04% unknown nonaromatic hydrocarbon and 0.08% water. All the benzene prepared from each sample was transferred into a nylon vial without being diluted. PBD and the POPOP were added, 8mg and 0.1mg per lg of benzene, respectively. Reference samples were prepared by quantitative wet oxidation of the U S NBS oxalic acid standard of modern carbon, followed by reaction of the released carbon dioxide with metalic lithium (Barker, 1953) at 650°C and then in the same way as the samples of unknown age. Background samples were prepared from north-bohemian brown coal by means of the same method as archaeologic charcoal samples.

Samples were counted in an Intertechnique liquid scintillation counter Model SL-30. Counting efficiency is ca 64%, using the part of spectrum above the end-point of tritium. Background is from 9 to 13cpm, according to the mass of the sample benzene. The net count rate, corresponding to 95% of NBS oxalic acid standard, is 8.03 $\pm$ 0.03 cpm/g carbon. Each measured set contained 1 or 2 reference samples, from 3 to 5 background samples of different masses, and several samples of unknown age.

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Ages were calculated according to the formula:

$$\tau = 18\,503 \lg d \frac{0.95\, m_S\, (R-B_R)}{m_R\, (S-B_S)}$$

where m_S and m_R are, respectively, masses of the benzene in the unknown sample and in the reference sample in grams, calculated as arithmetic averages of the values, observed before and after the counting. S and R are average count rates of the unknown sample with background, after elimination of wrong values, based on the 3 sigma rule, and B_S and B_R are background rates corresponding to masses m_S and m_R. B_S and B_R were calculated (Veselý *et al*, 1973) or graphically interpolated from results of background counts. The formula is adequate for benzene sample mass between 3 and 17g.

All listed dates are based on the Libby half-life value of 5570 yr and referred to 1950. The dates are not corrected for ^{13}C. The reported mean errors are calculated by the formula:

$$\sigma = 8036 \left[\left(\frac{\sigma S-B_S}{S-B_S} \right)^2 + \left(\frac{\sigma R-B_R}{R-B_R} \right)^2 + \left(\frac{\sigma m_S}{m_S} \right)^2 + \left(\frac{\sigma m_R}{m_R} \right)^2 \right]^{0.5}$$

where $\sigma S-B_S$, $\sigma R-B_R$, ... , are theoretical standard statistical deviations of the values $S-B_S$, $R-B_R$, ...

The laboratory received samples with no information, and carried out measurements without knowing even the approximate age of samples.

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SAMPLE DESCRIPTIONS

2835 ± 110
885 BC

MOC-20. Počerady, Pit 1

Charcoal from a piriform pit at Počerady, dist Louny, containing no datable archaeol finds. Nearby features could be dated to the La Tène period, 2nd half of 1st millennium BC. Excavated by E Neustupný in 1966. *Comment:* considerably contaminated. Date corresponding to Late Bronze age, absent at the site.

1500 ± 70
AD 450

MOC-26. Rusovce

Charred grain strewn over last habitation layer of the Roman camp Gerulata, Rusovce, Bratislava dist. Excavated in 1967 by J Dekan. *Comment:* should be 5th century AD. Date agrees with archaeol estimate.

1560 ± 80
AD 390

MOC-27. Kadaň, Pit 12

Charcoal from Pit 12, Jezerka at Kadan, Chomutov dist. Site revealed finds mostly from Hallstatt D and Early La Tène periods, 6th to

5th centuries BC. Pit 12 was originally believed to be of this age. Coll 1968 by V Kruta. *Comment:* considerably contaminated and attacked by mildew. Date sharply disagreed with archaeol expectation. Finds from Pit 12 were reinspected and found to contain sherds from possibly the 5th century AD. This is corroborated by P-1915: 1560 ± 50 (R, 1975, v 17, p 199) for another part of the same sample, and by a thermoluminiscence date AD 400. obtained on a sherd from Pit 12 by J Kvasnička (pers commun).

MOC-44. Most, No. 240 **680 ± 70** **AD 1270**

Charred grain from a destroyed oven in the yard of House No. 240 in Most, Most dist. Archaeol age was believed to be 13th century AD. Coll 1972 by J Klápště. *Comment*: date agrees with archaeol estimate.

MOC-52. Rvenice **2655 ± 50** **705 BC**

Rotted wood from a massive beam used for construction of burial chamber at Rvenice, Louny dist. Grave belonged to "princely" class of the Bylany culture (Hallstatt C period, 7th century BC archaeol chronology). Coll 1961 by D Koutecký. *Comment*: date, especially if calibrated, suggests older age, 9th century BC, than expected archaeol. This is surprising but agrees with other dates obtained in Philadelphia for Hallstatt B2 and D periods: P-1907: 2730 ± 60 Hallstatt B2, P-1913: 2630 ± 60 and P-1914: 2550 ± 50 Hallstatt D (R, 1975, v 17, p 198).

Mohelnice series

An extensive Neolithic site was partly destroyed by a sandpit at Mohelnice, N Moravia, from 1971 to 1973. It lay near the upper course of the Morava R, whose water-table could be reached by wells several m deep. The wells contained much organic material suitable for radiocarbon dating.

MOC-69. Mohelnice CCLV **4800 ± 70** **2850 BC**

Wet wood from Eneolithic well CCLV at Mohelnice, Šumperk dist. Pottery from feature probably belongs to an early phase of the TRB culture. Coll 1971 by R Tichý. *Comment*: agrees well with expected archaeol age. Groningen measurement of the same sample is 4985 ± 40: GrN-6604.

MOC-70+91. Mohelnice CCLIV **6220 ± 80** **4270 BC**

Wet wood from Neolithic well CCLIV at Mohelnice, Šumperk dist. Pottery fragments from well belong to a somewhat developed earliest phase of Linear Pottery culture. Coll 1971 by R Tichý. *Comment*: as sample MOC-70 did not contain sufficient amt of carbon, only 2.6g benzene yield, it was mixed in benzene form with sample MOC-91, from the same piece of wood. Both samples were measured together. Resulting

date agrees well with archaeol expectation and with a Groningen measurement of another sample from same well, GrN-6610: 6240 ± 65 BP.

6330 ± 140

MOC-91. Mohelnice CCLIV **4380 BC**

Description as MOC-70+91. *Comment*: separate count is less accurate than MOC-70+91, because of smaller mass.

3340 ± 50

MOC-71. Mohelnice CCLVI **1390 BC**

Wet wood from a prehistoric well, feature CCLVI, at Mohelnice, Šumperk dist. Wood was presumably shaped by means of a metalic tool and is therefore believed to be of Bronze age date. Coll 1972 by R Tichý. *Comment*: date indicates Middle Bronze age. Another sample from the same well was measured in Groningen, giving 3875 BP (pers commun).

General Comment: as everything inside the wells was perfectly conserved there was some doubt as to their antiquity; prehistoric pottery could have been deposited secondarily. Radiocarbon dates showed that the wells did belong to the Neolithic, Eneolithic, and Bronze ages, despite their modern appearance. Wells from those periods are to be expected in other sites with similar geol conditions. They are of paramount archaeol interest in view of the fact that they contain well preserved artifacts of organic materials and wooden beams.

Meclov series

Meclov-Březí is an extensive site in W Bohemia. Excavations led by E Čujanová revealed finds from beginning of Middle Bronze age, ca 1900 BC calibrated radiocarbon chronology. The pottery, however, is badly preserved, weathered surface, and comes mostly from a shallow cultural layer (Čujanová, 1967).

1890 ± 70

MOC-88. Meclov, Hut 1 **AD 60**

Charcoal from a fireplace in Hut 1. *Comment*: radiocarbon age is ca 2000 yr later than expected archaeol. *Cf General Comment,* below.

1525 ± 70

MOC-89. Meclov, Pit 32 **AD 425**

Charcoal from a hearth in Pit 32. *Comment*: same sample as MOC-98 and LJ-2501: 1537 ± 50 (pers commun). Ca 2300 yr later than expected archaeol. *Cf General Comment,* below.

1410 ± 80

MOC-98. Meclov, Pit 32 **AD 540**

Charcoal from a hearth in Pit 32. *Comment*: same sample as MOC-89.

2280 ± 60

MOC-90. Meclov, Pit 36 **330 BC**

Charcoal from a fireplace in Pit 36. *Comment*: same sample as MOC-97. Ca 1600 yr later than expected. *Cf General Comment,* below.

MOC-97. Meclov, Pit 36 **2300 ± 70**
350 BC

Charcoal from a fireplace in Pit 36. *Comment*: same sample as MOC-90.

General Comment: other samples from Meclov were measured by H Suess in La Jolla and thermoluminiscence, preliminary results, was measured by J Kvasnička (pers commun). The evidence may be summarized as follows:

Feature	La Jolla	Most	Thermoluminiscence dates BP
Pit 36		2300±70:MOC-97 2280±60:MOC-90	3867±390
Hut 1		1890±70:MOC-88	1410±170
Pit 32	1537±50:LJ-2501	1525±70:MOC-89 1410±80:MOC-98	
Hut 3	1537±50:LJ-2499		
Pit 1959			1500±220

The only non-archeol evidence for Middle Bronze age occupation is the thermoluminiscence date for Pit 36. Radiocarbon samples from the same feature, however, indicate 5th century BC, which is the Early La-Tène period in archaeol classification. Thermoluminiscence date for Hut 1 also differs from the corresponding radiocarbon age. La Jolla and Most agree perfectly on a group of dates, both radiocarbon and thermoluminiscence, for Pit 32, Hut 3, and Pit 1959: an occupation is definite ca AD 400. Traditional archaeol methods discovered only 1 occupation while radiocarbon and thermoluminiscence dating clearly shows at least 3.

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