

RADIOCARBON DATING IN THE SOVIET UNION¹

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This report covers the investigations of the Laboratory of Archeological Technology of the Institute of Archeology of the Academy of Sciences of the U.S.S.R. under the technical direction of Corresponding Academician I. Ye. Starik. This work was begun in 1956, but the bulk of the dates were obtained during 1959-61 by the ethyl-benzol technique. For a control, ethyl-benzol was synthesized from the annual rings of the heartwood of an 80-yr-old larch. Depending on the size of the sample submitted for analysis, from 15-70 ml of ethyl-benzol was used.

Archaeologic samples clearly dated from a Scythian kurgan in the Altai uplands were given radiocarbon analysis to check the C¹⁴ laboratory techniques. The following dates were obtained:

No.	Specimen	Submitted	Notes	Date ² (B.P.)
1	RUL-120	S. I. Rudenko	Beam from covering of Pazyryk Kurgan II, Altai	2350 ± 140 [400 B.C.]
2	RUL-151	S. I. Rudenko	Part of covering of Pazyryk Kurgan V, Altai	2440 ± 50 [490 B.C.]
3	RUL-132	S. I. Rudenko	Beam from covering of Tuekta Kurgan	2450 ± 120 [500 B.C.]
4	RUL-129	S. I. Rudenko	Birch trunk from grave-robber's shaft of Tuekta Kurgan	2450 ± 120 [500 B.C.]
5	RUL-130	S. I. Rudenko	Beam from covering of Katanda Kurgan	2420 ± 130 [470 B.C.]
6	RUL-293	M. P. Griaznov	Part of covering of Shibe Kurgan	2420 ± 100 [470 B.C.]

On the basis of archaeological evidence, the Scythian kurgans above belong to the VI-IV centuries B.C. (2550-2350 B.P.), dates which agree with those determined by C¹⁴ analysis. The coincidence of the ages of RUL-132 and RUL-129 indicates that the Tuekta Kurgan was plundered shortly after completion.

The choice of samples was related to other methodological laboratory problems, especially the establishment of the upper and lower limits of dating, the use of different organic substances for dating, etc. The earliest dates were obtained from Pleistocene and Holocene [Recent] geologic samples.

¹ Subm. by Henry Field and D. B. Shimkin, Harvard Univ.: extracted from p. 26-30 of S. I. Rudenko: *Novyye metody v arkheologicheskikh issledovaniyakh* (New Methods in Archeological Investigations), Institut Arkheologiyi, Akademiya Nauk SSSR, Moscow, 1963. The techniques used are described in p. 9-26, 32-56.

² B.P. = before present or absolute age before 1963. Brackets have been inserted to clarify the text. (D.B.S.)

No.	Specimen	Submitted	Notes	Date (B.P.)
7	RUL-185	V. N. Sukachev	Wood from interglacial deposits near Shurskol village, Yaroslavl' Oblast	>45,000
8	RUL-199	V. N. Sukachev	Wood from interglacial deposits near Chermoshnik village, Yaroslavl' Oblast	19,500 ± 300 [17,550 B.C.]
9	RUL-114	V. N. Sukachev	Wood from interglacial deposits near Levina Gora settlement, Yaroslavl' Oblast	17,200 ± 2500 [15,250 B.C.]
10	RUL-197	V. N. Sukachev	Wood from interglacial deposits near Tutayevo, Yaroslavl' Oblast	15,700 ± 300 [13,750 B.C.]
11	RUL-145	V. A. Yakimovich	Wood from cross-section of second terrace (Upper Pleistocene) above Belaya River, Bashkir ASSR	21,280 ± 550 [19,330 B.C.]
12	RUL-168	V. N. Sukachev	Wood from lower horizons of Holocene [Recent] deposit near Gryamyachevo, Kaluga Oblast	12,880 ± 200 [10,930 B.C.]
13	RUL-161	V. N. Sukachev	Wood from lower horizons of Holocene deposits near Zvenigorod, Moscow Oblast	15,080 ± 270 [13,130 B.C.]
14	RUL-205	V. N. Sukachev	Wood from Holocene deposits near Debolevskoye, Yaroslavl' Oblast	12,800 ± 900 [10,850 B.C.]

All the above data, excluding RUL-199, RUL-114 and RUL-197, are in general accord with geologic evidence.

The apparent juvenility of the wood samples from the interglacial deposits from the Chermoshnik, Levina Gora and Tutayevo Rayons must be explained by the pollution of the specimens from the remains of the root-system of younger plants or by fractionation of carbon isotopes during the process of decay. Errors in the estimation of the geologic age of the samples are not excluded.³

The most recent wood samples are RUL-303, RUL-108 and RUL-172.

³ It is also possible that these samples are interstadial within Würm rather than Riss-Würm interglacial. (D.B.S.)

No.	Sample	Submitted	Notes	Date (B.P.)
15	RUL-303	Chernigov Historical Mus.	Hollowed oak log boat from cliff above Dniester ⁴ River, Chernigov Rayon. Historically XII-XVIII centuries	300 ± 60 [A.D. 1650]
16	RUL-108	P. A. Rappaport	Charred wood from Kobyl'e gorodishche [fortified settlement], northwest USSR. Historically mid-XV century	660 ± 120 [A.D. 1290]
17	RUL-172	Vladivostok Regional Mus.	Part of wooden human figurine (idol) from Sergeevka tumulus, Primorskiy Kray, Far East. Archaeologic date missing	780 ± 65 [A.D. 1170]

Here attention must be called to the fact that C¹⁴ dating for samples less than 1000 yr old is not as reliable as by other methods.

Two samples (RUL-179 and RUL-138) came from the Arctic and Antarctic; both were found on marine terraces. The ages give some clues as to the rapidity of their uplift.

No.	Sample	Submitted	Notes	Date (B.P.)
18	RUL-179	V. D. Dibner	Fin (or flipper) from surface of 10-m terrace, southern coast, Zemlya Aleksandra, Franz Josef Archipelago	4250 ± 90 [2300 B.C.]
19	RUL-138	E. S. Korotkevich	Sea-elephant tissues from surface of 25-m terrace, Grierson Oasis, eastern Antarctica	1800 ± 130 [A.D. 150]

The average uplift of these terraces, 2.5 and 14.0 mm per annum respectively, agrees well with the data obtained by other investigators.

The results of age determination of most of the archaeological samples are given in the following table on p. 226. The data now available do not warrant general conclusions regarding their chronology relative to neighboring areas.

There are recent publications indicating that the value of 5568 yr for the half-life for C¹⁴ is evidently too low and should be increased to 5720-5780 yr. This new value for the half-life leads us to an increase in the age of radiocarbon dates. However, all these dates, including those given here, are calculated from $T_{C^{14}} = 5568$ yr.

⁴ Chernigov is on the Desna River. (H.F.)

RADIOCARBON DATING OF ARCHAEOLOGIC SAMPLES

No.	Lab. No.	Recorder	Details on Sample	Archaeologic Date	C ¹⁴ Date (B.P.)
20	RUL-280	V. A. Ranov	Birch and tereken (<i>Eurotia ceratoides</i>) charcoal from large hearth, Osh Khon, E. Pamirs	Mesolithic	9530 ± 130 [7580 B.C.]
21	RUL-1	A. P. Oklandnikov	Saxaul (<i>Anabasis</i> sp.) charcoal from Stratum IV, Dzhebel Cave, Turkmen SSR	Neolithic	6030 ± 240 [4080 B.C.]
22	RUL-2	V. M. Masson	Charcoal from early agricultural settlement, Kara-Tepe, Turkmen SSR	End of IV to first half of III millennium B.C.	4700 ± 220 [2750 B.C.]
23	RUL-174	V. M. Masson	Charcoal from early agricultural settlement, Dashlydzh:Tepe, Turkmen SSR	End of V to first half of IV millennium B.C.	4710 ± 80 [2760 B.C.]
24	RUL-257	V. M. Masson	Charcoal from early agricultural settlement, Geoksyur I, Geoksyur Oasis, Turkmen SSR	Middle of IV millennium B.C.	3750 ± 90 [1800 B.C.]
25	RUL-241	V. M. Masson	Charcoal from early agricultural settlement, Geoksyur II, Geoksyur Oasis, Turkmen SSR	Middle of IV millennium B.C.	Contemporary
26	RUL-251	V. M. Masson	Charcoal from early agricultural settlement, Geoksyur III, Geoksyur Oasis, Turkmen SSR	First half of IV millennium B.C.	3700 ± 120 [1750 B.C.]
27	RUL-261	V. M. Masson	Charcoal from early agricultural settlement, Geoksyur IV, Geoksyur Oasis, Turkmen SSR	Middle of IV millennium B.C.	3750 ± 80 [1800 B.C.]
28	RUL-159	V. M. Masson	Charcoal from early agricultural settlement, Tilk'in-Tepe, Turkmen SSR	Middle of IV millennium B.C.	6590 ± 110 [4640 B.C.]
29	RUL-3	A. A. Yessen	Charcoal from settlement, Uzerlik-Tepe, Azerbaidzhan SSR	Bronze	3300 ± 260 [1350 B.C.]
30	RUL-157	State Mus. of Georgia	Carbonized bread grains from lower level of settlement, Kvatskhela, Georgian SSR	Neolithic	4760 ± 90 [2810 B.C.]
31	RUL-163	O. A. Abilulayev	Charcoal from lower horizons of settlement, Kyul'-Tapa, Nakhichevan ASSR	Neolithic	4880 ± 90 [2930 B.C.]

RADIOCARBON DATING OF ARCHAEOLOGIC SAMPLES (Continued)

No.	Lab. No.	Recorder	Details on Sample	Archaeologic Date	C ¹⁴ Date (B.P.)
32	RUL-305	A. A. Yessen	Wood from covering of basic interment, Kurgan No. 3, Uch-Tepe, Azerbaïdzhān SSR	Between III and II millennium B.C.	4500 ± 120 [2550 B.C.]
33	RUL-258	E. I. Krupnov	Charred wooden supports from earliest horizon of settlement, Serzhen-Yurt, Chechen-Ingush ASSR	Late Eneolithic	3480 ± 110 [1530 B.C.]
34	RUL-265	E. I. Krupnov	Charcoal from food storage pits and from cultural horizon of settlement, Serzhen-Yurt, Chechen-Ingush ASSR	Late Eneolithic	3140 ± 95 [1190 B.C.]
35	RUL-278	State Mus. of Georgia	Timber from "hut" (<i>sruba</i>) [covering interment] of kurgan, Samgori, Georgian SSR	Early Bronze ^a	3080 ± 85 ^a [1130 B.C.]
36	RUL-182	Yu. A. Zadneprovskiy	Charcoal from cultural horizon of gorodishche, Shurabashat II, Kirghiz SSR	I millennium B.C.	2670 ± 80 [720 B.C.]
37	RUL-127	Yu. A. Zadneprovskiy	Charcoal from cultural horizon of settlement, Dal'verzin, Uzbek SSR	Bronze	2720 ± 120 [770 B.C.]
38	RUL-323	Yu. A. Zadneprovskiy	Charcoal from lower horizon of settlement, Dal'verzin, Uzbek SSR	Bronze	3050 ± 120 [1100 B.C.]
39	RUL-312	S. P. Tolstov	Burned parts of walls and roof beams of House No. 8 of settlement, Yakke-Persan No. 2, Khorezm	IX-VIII centuries B.C.	2200 ± 75 [250 B.C.]
40	RUL-296	Inst. of History, Archeol. and Ethnography, Uzbek SSR	[Khwarazmi], Kara-Kalpak ASSR Charcoal from settlement, Kzyl-Kir, Uzbek SSR	"Classical" [Hellenistic to Parthian]	1330 ± 120 [A.D. 620]
41	RUL-298	B. A. Litvinskiy	Charcoal from Kurgan No. 3 of cemetery, Khargush I, Pamirs, Tadzhik SSR	Archaeologic date missing	1360 ± 85 [A.D. 590]
42	RUL-213	V. C. Sorokin	Wattle from settlement, Tasty-Butak, Kazakh SSR	Bronze, Andronovo Culture	3190 ± 80 [1240 B.C.]
43	RUL-276	K. V. Salnikov	Charcoal from walls and floor of settlement, Bohrykino village, Urals	Bronze, Andronovo Culture	3420 ± 65 [1470 B.C.]

^a A strikingly anomalous date, perhaps an error for Early Iron Age. (D.B.S.)

RADIOCARBON DATING OF ARCHAEOLOGIC SAMPLES (Continued)

No.	Lab. No.	Recorder	Details on Sample	Archaeologic Date	C ¹⁴ Date (B.P.)
44	RUL-105	S. I. Kaposhina	Charcoal from habitation, Kobya-kovskoye gorodishche, Rostov Oblast	Bronze	2850 ± 110 [1900 B.C.]
45	RUL-136	A. N. Melentyev	Part of [interment] covering [within] kurgan, Gireyeva-Mogila, Rostov Oblast	III-II millennia B.C.	3870 ± 130 [1920 B.C.]
46	RUL-247	S. S. Chernikov	Charcoal from [interment] covering [within] kurgan, Chilikta, Kazakh SSR	VII-VI centuries B.C.	2300 ± 90 [350 B.C.]
47	RUL-314	Chersonesus Regional Mus.	Charred bread grains from gorodishche, Tarpanchi, Crimea	II-I centuries B.C.	1480 ± 55 [A.D. 470]
48	RUL-246	E. A. Simonovitch	Charred wood from gorodishche, Kolochin I, Byelorussian SSR	Middle of I millennium A.D.	920 ± 100 [A.D. 1030]
49	RUL-227	K. V. Sahnikov	Wood from grave covering, Tsaryev Kurgan, Urals	Bronze	1620 ± 120 [A.D. 330]
50	RUL-187	N. N. Dikov	Charcoal from upper part of tumulus No. 15, Ust'-Belaya cemetery, Anadyr Basin	Neolithic	2860 ± 95 [1910 B.C.]
51	RUL-287	A. P. Okladnikov	Charcoal from semi-subterranean house, Kurkunikha, Primorskiy Krai [Maritime Territory], Far East	Middle of I millennium A.D.	1560 ± 60 [A.D. 390]
52	RUL-307	To Yü Ho	Charcoal from habitation No. 15 of settlement, Bomyugosok, KNDR [North Korea]	II-I millennia B.C.	2430 ± 120 [480 B.C.]
53	RUL-141	A. P. Okladnikov	Birchbark from Vorobyeyo burial, Baikal area	Archaeologic date missing	2840 ± 95 [890 B.C.]
54	RUL-165	A. P. Okladnikov	Charcoal from excavations, Semi-pyatnaya Valley, Primorskiy Krai	Early Iron	3010 ± 80 [1060 B.C.]
55	RUL-177	A. P. Okladnikov	Burned wooden parts of house, Kirovskoye, Primorskiy Krai	Bronze	4150 ± 60 [2200 B.C.]
56	RUL-193	A. P. Okladnikov	Charcoal from habitation, Pkhusun Bay, Primorskiy Krai	End of Neolithic to Early Bronze	4250 ± 60 [2300 B.C.]