

TARTU RADIOCARBON DATES III

J. M. PUNNING, A. LIIVA, and E. ILVES

Institute of Zoology and Botany, Academy of Sciences, Estonian SSR

In dating the samples reported here as well as in calculating their ages, the same equipment and method of processing and counting were used which were previously described in Tartu I and II.

TA-103. Akali

6255 $\pm$ 100
4305 B.C.

Arboreal coal from hearth of settlement Akali, 4 km S of village Praaga on right bank of Akali R., Tartu Dist., Estonian SSR. Putative age of sample: 3rd millennium B.C. or older. Coll. 1966 by K. Jaanits, subm. by L. Jaanits, Hist. Inst., Acad. Sci. of Estonian SSR.

TA-121. Byzovaya

18,320 $\pm$ 280
16,370 B.C.

Bones of mammoth (*Mammonteus primigenius* Blumenbach) found near settlement Byzovaya, Pechorskij Dist., Komi ASSR. Sample depth, 1.5 to 20 m. Probable age: Late Pleistocene (Ilves *et al.*, 1968). Coll. 1964 by V. I. Kanivtsa, subm. by I. E. Kuzmina, Zool. Inst. Acad. Sci. of SSSR.

TA-134. Naroch

10,100 $\pm$ 95
8150 B.C.

Wood remains from sec. on S bank of Lake Naroch, Myadel'skij Dist., Byelorussian SSR. In abrasion terrace outcrop: grayish-yellow sand (fill), 100 cm; sod-podzolic soil overlying sand with admixture of gravel, 70 cm, eolian and lacustrine sands, 400 cm, alluvial peat with interlayers of muddy sand, in places containing many wood fragments and intact tree trunks, 15 to 20 cm, lacustrine sand with sparse inclusions of gravel and shingle. Visible thickness 80 to 100 cm (Voznyachuk and Punning, 1967). Silicon implements attributed by V. B. Bud'ko and M. M. Chernyavskij to end of Late Paleolithic or Early Mesolithic were found near outcrop in sand. According to V. A. Kaleshishtch, sample contains pollen of pine up to 94%, birch 5%, spruce 0.5%, alder 0.5%, and willow 1%. Coll. 1966 and subm. by L. N. Voznyachuk, Byelorussian State Univ.

TA-135. Naroch

10,810 $\pm$ 100
8860 B.C.

Fragments of big tree trunk (according to H. Paaves, *Pinus silvestris*) from outcrop where sample TA-134 was collected. Submerged alluvial peat formed in late Alleröd or on border of Alleröd and Dryas intervals, also corroborated by paleocarpological, palynological, and archaeo-logical data.

TA-136. Peedu**39,180 ± 1960
37,230 B.C.**

Large wood fragments from inter-morainic stratum near town Elva on NW Otepää elev. in SE Estonia. Pollen analysis by E. Liivrand shows that when lake and swamp deposits accumulated alder (~ 50%) and fir (1 to 10%) pollen, spruce and pine also played important role in ancient vegetation; pollen grains of white beech and elm were also detected (Punning *et al.*, 1967). Palynologically, profile has some features similar to deposits at Karuküla (Serebryanny *et al.*, 1968).

TA-137. Loobu**13,970 ± 115
12,020 B.C.**

Bryales peat containing calcareous aleurite and subfossils on left bank of Loobu R., Rakvere Dist., Estonian SSR. Stratigraphy of outcrop from surface: well-decomposed peat, 110 cm; lime sapropelite containing plant remains and shells, 45 cm; Bryales peat with bluish-gray lime aleurite and subfossils, 9 cm; Bryales peat slightly muddy with subfossils, 9 cm; bluish-gray clay with plant remains in upper part, 177 cm; gray stratified clay. Sample depth, 160 to 169 cm. Pollen-analysis by R. Pirrus. Sample attributed to Pollen Zone IX (V. Post-Nilsson system). Coll. 1966 and subm. by R. Pirrus, Geol. Inst., Acad. Sci. of Estonian SSR.

TA-138. Loobu**14,725 ± 260
12,775 B.C.**

Bryales peat with lime aleurite and subfossils coll. at depth 170 to 178 cm. Sample is referred to Pollen Zone X (see TA-137). *Comment:* greater sample age is probably due to incorporation of carbonates from ancient limestone dissolved in water.

Vaskrääma series

Submerged organogenous deposits 0.5 km W of Vaskrääma RR Sta., on beach of Pärnu Bay, SW Estonia. Stratigraphy of sec.: humified sand 0 to 25 cm; limonitic sand 25 to 55 cm, sand containing gravel 130 to 177 cm; clay. Upper part of organogenous layer submerged by Littorina deposits is composed of lagoon sapropels; lower part is made up of woody peat. In upper part of organogenous layer brackish water diatoms are found (*Campylodiscus clypeus* Ehr.). Pollen analysis by H. Kessel, Geol. Inst., Acad. Sci. of Estonian SSR. Coll. 1966 by J. M. Punning, subm. by H. Kajak, State Production Geol. Comm. of Estonian SSR, later referred to as Geol. Comm.

TA-139. Vaskrääma**6870 ± 110
4920 B.C.**

Depth of sample, 135 to 140 cm. Sample attributed to Pollen Zone VI (V. Post-Nilsson system).

- TA-140. Vaskrääma** **6975 ± 110**
5025 B.C.
Sample at depth 145 to 150 cm is referred to Pollen Zone VI (V. Post-Nilsson system). From this level downward brackish-water diatoms are found in sapropels.
- TA-141. Vaskrääma** **7580 ± 170**
5630 B.C.
Sample at depth 165 to 170 cm is attributed to Pollen Zone VII (V. Post-Nilsson system).
- TA-154. Kostenki XII** **20,900 ± 390**
18,950 B.C.
Bones of horse (*Equus caballus* L.) from Paleolithic settlement in Kostenki Dist. on right bank of Don R., S of town Voronezh. Sample depth, 2.0 to 2.5 m. Probable age: Late Paleolithic (Ilves *et al.*, 1968). Coll. 1964 by A. N. Rogalyeva, subm. by I. V. Kuzmina.
- TA-156. Arashu** **1060 ± 60**
A.D. 890
Wood remains from settlement on Lake Arashu, Cesis Dist., Latvian SSR, 7 km S of town Cesis. Depth, 75 cm. Coll. 1966 and subm. by J. F. Apals, Hist. Inst. Acad. Sci. of Latvian SSR.
- TA-157. Vigala** **7375 ± 170**
5425 B.C.
Brown reed peat from deposits of Littorina transgression near Vigala RR Sta., Rapla Dist., Estonian SSR. Thickness of organogenous layer, 35 cm. Underlying layer: clayey aleurite with plant remains: overlying layer: fine-grained-to-aleurite sand with plant remains. Sample depth, 165 to 175 cm. Coll. 1966 and subm. by H. Stumbur, Geol. Comm.
- TA-159. Rannapungerja** **910 ± 200**
A.D. 1040
Wood remains (oak) from bank of Rannapungerja R., Mustvee Dist., Estonian SSR. Depth, 300 cm. Sample underlies alluvial sands. Pollen analysis by R. Pirrus indicates Pollen Zone I b (V. Post-Nilsson system). Coll. 1966 and subm. by E. Rähni, Geol. Inst.
- TA-160. Smorgoni** **670 ± 50**
A.D. 1280
Well-preserved fragment of oak from quarry near Smorgoni Hydromechanized Gravel Plant, 130 km NW of Minsk, Byelorussian SSR, floodland of Viliya R. Many bones of mammals, (musk ox, bison, deer, etc.) were found in these quarries. Depth of oak trunks, 400 to 600 cm. Coll. 1966 and subm. by L. N. Voznyachuk.
- TA-161. Smorgoni** **1045 ± 60**
A.D. 905
Fumed oak from quarry near Smorgoni Hydromechanized Gravel Plant (see TA-160).

TA-162. Abava**9870 $\pm$ 200
7920 B.C.**

Wood remains from 1st riparian terrace of Abava R. near Sabile, Jelgava Dist., Latvian SSR. Stratigraphy of deposits from surface fine-grained, light-gray sand, 130 cm. Well-decomposed sedge and Bryales peat with wood remains 130 to 100 cm; fine-grained gray sand 160 to 180 cm; slightly decomposed Carex-Bryales peat with wood remains 180 to 275 cm; bluish-gray sandy loam with interlayers of moss 275 to 315 cm. Sample taken from upper peat layer and pollen-analyzed by V. Stelle. Putative age: Pre-Boreal or Boreal. Coll. 1966 and subm. by V. Stelle, Geol. Inst. of Latvian SSR.

TA-163. Abava**10,410 $\pm$ 90
8460 B.C.**

Wood remains from lower peat layer of riparian terrace of Abava R. (see TA-162). Probable age: Late Dryas. Coll. 1966 and subm. by V. Stelle.

TA-175. Sindi**9300 $\pm$ 75
7350 B.C.**

Humified peat from quarry wall near RR bridge at Sindi on right bank of Pärnu R., Pärnu Dist., Estonian SSR. Depth, 230 to 233 cm. Pollen analysis by H. Kessel, Geol. Inst., attributes sample to Pollen Zone IX (V. Post-Nilsson system). Coll. 1967 and subm. by H. Kajak.

TA-176. Sindi**9575 $\pm$ 115
7625 B.C.**

Wood remains from layer of humified clayey sand taken from quarry wall near RR bridge at Sindi (see TA-175). Depth, 315 to 325 cm. Layer contains deer bones and remains of fish skeletons. Sample is referred to Pollen Zone IX (V. Post-Nilsson system). Coll. 1967 and subm. by H. Kajak.

TA-177. Raunis**13,250 $\pm$ 160
11,300 B.C.**

Remains of Sphagnum and green mosses from exposure near Cesis-Veselava Rd., 100 m below road bridge on right bank of Raunis R., Latvian SSR. Stratigraphy of exposure: soil 0 to 30 cm; sandy stratum with lenses of loam, 30 to 200 cm; dark brown moraine with prevailing loamy substance; rubbly fraction with carbonaceous rocks predominating, 200 to 230 cm; stratified organic remains, 230 to 285 cm; moraine. Strata where sample was taken at depth 260 to 275 cm is composed of aleurite with well-preserved remains of Sphagnum and green mosses. Dating of these plant remains at Vernadski Inst. of Geochem. and Analytic Chem. yielded age $13,390 \pm 500$ yr. (Mo-296, Vinogradov, *et al.*, 1963.) Coll. 1967 and subm. by J. M. Punning, Geol. Comm.

TA-180A. Sinialliku **865 ± 50**
A.D. 1085

Charcoal from ancient stronghold at Sinialliku 0.5 km SE of Sinialliku RR Sta., Viljandi Dist., Estonian SSR. Sample at depth 130 cm from soil containing charcoal. Probable age: end of 12th or beginning of 13th century. Coll. 1967 and subm. by J. Selirand, Hist. Inst., Acad. Sci. of Estonian SSR.

TA-180B. Sinialliku **860 ± 50**
A.D. 1090

Same sample as TA-180A, but counting material was synthesized by using vanadium-oxide as catalyst.

TA-181. Kärla **7085 ± 80**
5135 B.C.

Reed peat underlying Littorina deposits at locality Kärla, Is. Saaremaa, Estonian SSR. Thickness of organogenous layer, 36 cm. Depth (with reference to organogenous layer), 0 to 3 cm. Pollen analysis by H. Kessel attributes sample to Pollen Zone VII (V. Post-Nilsson system). Coll. 1967 by J. M. Punning, subm. by G. Elterman, Geol. Comm.

TA-182. Kärla **7820 ± 80**
5870 B.C.

Wood peat at locality Kärla (See TA-181). Depth, with reference to organogenous layer, 30 to 33 cm. Pollen analysis indicates Pollen Zone VII (V. Post-Nilsson system). Coll. 1967 by J. M. Punning, subm. by G. Elterman.

TA-183. Seliste **5950 ± 60**
4000 B.C.

Well-decomposed muddy peat underlying Littorina deposits, Pärnu Dist., Estonian SSR. Depth of organogenous deposits, 265 to 317 cm. Sample at depth 3 to 8 cm (with reference to organogenous layer). Coll. 1967 and subm. by H. Kajak.

REFERENCES

- Date lists:
 Tartu I Liiva, Ilves, and Punning, 1966
 Tartu II Punning, Ilves, and Liiva, 1968
 Ilves, E., Punning, J. M., and Liiva, A., 1968, Dating of bone samples by the radiocarbon method: Proc. of Acad. Sci., Estonian SSR, in press.
 Punning, J. M., Ilves, E., and Liiva, A., 1968, Tartu radiocarbon dates II, Radiocarbon, v. 10, no. 1, p. 124-130.
 Punning, J. M., Raukas, A. V., and Serebryanny, L. R., 1967, Geochronology of the latest glaciation of the Russian Plain in the light of modern radiocarbon datings of lake and bog fossil deposits of the Baltic Region: Materialy II simposiuma po istorii ozyer severo-zapada SSR Minsk.
 Vinogradov, A. P., Devirts, A.L., Dobkina, E. I., and Markova, N. G., 1963, Determination of absolute age by C¹⁴: Soobshcheniya 4, Geokhimiya, no. 9.
 Voznyachuk, L. N. and Punning, J. M., 1967, Find of Alleröd deposits on the banks of Lake Naroch and some peculiarities of the history of the Late and Post-Pleistocene: Materialy II simposiuma po istorii ozyer severo-zapada SSR, Minsk.
 Serebryanny, L., Raukas, A., and Punning, J. M., Fragments of the natural history of the Russian Plain during the Late Pleistocene with special reference to radiocarbon datings of fossil organic matter from the Baltic Region: Publ. House "Baltica," Vilnius, in press.