RADIOCARBON DATES VI

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INTRODUCTION

This report is the sixth date list from the Dating Laboratory at the University of Helsinki. The reports I – V were published in 1979, 1983, 1989, 1996 and 1998. The list includes the samples from laboratory code number Hel-3502 to Hel-4000 dated in 1994-1997. The list also includes the first AMS dates from our laboratory (Hela-1 –). The pretreated and graphitized samples were measured at the AMS facilities in Uppsala. All dates in the list are based on the activity of the new oxalic standard and reported according to the recommendations made by Stuiver and Polach (1977). The dates are corrected for isotope fractionation in the sample.
The list is compiled according to laboratory number. Series of samples from the same site or context are, however, grouped together. At the end of the report an index according to the submitters' institute is included.

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IIJÄRVI SERIES, INARI

Coll. and subm. 1993 by M. Kotilainen.
General comment: See Mutusjärvi and Iijärvi Series, Inari, in Jungner and Sonninen (1998).

Hel-3502 Sample 68 — **850 ± 110**
x = 770 285, y = 531 10, z = 230 — **$\delta^{13}C$ = -26.7‰**
Charcoal, depth 0.69 m (the uppermost)

Hel-3503 Sample 68. — **1910 ± 120**
Charcoal, depth 0.85 cm (the lowermost) — **$\delta^{13}C$ = -27.1‰**

Hel-3504 Sample 73 — **1990 ± 100**
x = 769 855, y = 525 15, z = 210 — **$\delta^{13}C$ = -27.0‰**
Charcoal, depth 0.35 m

Hela-23 Sample 63 — **3820 ± 70**
x = 770 070, y = 523 70, z = 200 — **$\delta^{13}C$ = -26.3‰**
Charcoal, depth 0.30 m

Hela-24 Sample 68 — **1740 ± 75**
Charcoal, depth 0.76 m — **$\delta^{13}C$ = -25.6‰**

Hela-25 Sample 69/4 — **7650 ± 80**
x = 770 225, y = 528 60, z = 205 — **$\delta^{13}C$ = -26.5‰**
Charcoal, depth 1.28 m

Hela-26 Sample 72 — **4380 ± 100**
x = 770 000, y = 526 22, z = 200 — **$\delta^{13}C$ = -24.3‰**
Charcoal, depth 0.72 cm

ÅLAND CHURCHES SERIES, ÅLAND

Coll. and subm. 1993 and 1994 by Å. Ringbom.
General comment: See Åland Churches Series, Åland, in Jungner and Sonninen (1998).
Ref. Dreijer (1951, 1954), Ringbom and Remmer (2000).

Finström Church

Hel-3505 Fika Sample A — **710 ± 80**
$\delta^{13}C$ = -19.6‰
Comment (ÅR): West wall, bone, femur(?) slivers from a grave that according to M. Dreijer had been truncated by church foundations. Judging by its position, the bone is the same seen in Dreijer's photos and drawings. The fragmentary state is due to a boulder that was placed as filling after the 1951 dig.

Hel-3506 Fika Sample B **540 ± 100**
$\delta^{13}C$ = -18.8‰

Comment (ÅR): West wall, bone, fragment of humerus shaft that appears to be articulated with its scapula and in normal anatomic position with ribs and probably ulna. It was oriented parallel to the wall, with which it was in contact. The bone is seen in Dreijer's Photo (Dreijer 1951: plåt 1683). It could be from the same period as the truncated skeleton (sample A) or younger than the church wall. Less likely but nevertheless possible is that the samples A and B belong to the same skeleton.

Hel-3556 Fika 05 **250 ± 80**
$\delta^{13}C$ = -20.7‰

Comment (ÅR): Wooden sample, log with specially carved ending, lying separate and loose on top of the northern wall of the nave, originally corner construction from timbered building.

Hel-3557 Fika 08 **470 ± 70**
$\delta^{13}C$ = -23.2‰

Comment (ÅR): Wooden sample, the eastern rafter truss of the sacristy roof construction. From the south gable of the sacristy, in level with the northern wall of the nave. Visible from the nave, above vault level. Predating the vault of the nave.

Hel-3558 Fika 09 **470 ± 60**
$\delta^{13}C$ = -22.8‰

Comment (ÅR): Wooden sample, the right Queens post from the south gable of the sacristy, in level with the northern wall of the nave. Visible from the nave, above vault level, predating the vault of the nave.

Hel-3559 Fika 13 **470 ± 70**
$\delta^{13}C$ = -25.1‰

Comment (ÅR): Wooden sample, piece of wood walled in the northern wall of the nave, or in the south gable of the sacristy. Sample taken from the attic of the sacristy, close to the walled in opening to the nave.

Hel-3560 Fika 24 **480 ± 70**
$\delta^{13}C$ = -22.7‰

Comment (ÅR): Wooden sample, end of tassel, marked IIII, by the fourth roof truss from the west, along the south wall of the nave.

Saltvik Church

Hel-3507 Saka Sample C **520 ± 80**
$\delta^{13}C$ = -20.1‰

Comment (ÅR): Bone from skeleton by the northern wall of the nave. Right clavicle from articulated skeleton, not identical to the bisected skeleton observed by M. Dreijer in 1954, probably below it.

Hel-3508 Saka Sample D **630 ± 70**
$\delta^{13}C$ = -19.4‰

Comment (ÅR): Bone from skeleton by the northern wall of the nave. Right tibia from articulated skeleton, not identical to the bisected skeleton observed by Mr. Dreijer in 1954, probably below it.

Hel-3561 Saka 107 **520 ± 70**
$\delta^{13}C$ = -22.7‰

Comment (ÅR): Wooden sample from the attic of the nave, the northern wall, fragment of wooden scaffolding, low down against the northeast spandrel of the northern nave.

Hel-3562 Saka 108 **640 ± 70**
$\delta^{13}C$ =-22.7‰

Comment (ÅR): Wooden sample, from the attic of the nave, the northern wall. Fragment of wooden scaffolding, down against the spandrel between the first and second bay.

Hel-3563 Saka 111 **530 ± 70**
$\delta^{13}C$ = -23.3‰

Comment (ÅR): Wooden sample from a cut tie beam in the west gable, on the south side. Sample partly burnt into charcoal. Should predate the tower, since it stretches behind the tower wall.

Hel-3564 Saka 112 **480 ± 75**
$\delta^{13}C$ = -22.8‰

Comment (ÅR): Wooden sample from the exterior of the west gable of the nave. Fragment of wooden scaffolding, ca 20 cm below and 90 cm south of the opening to the attic of the nave.

Hel-3565 Saka 115 **510 ± 70**
$\delta^{13}C$ = -21.7‰

Comment (ÅR): Wooden sample from the tower, wooden scaffolding still in situ in the south wall of the tower chamber. Ca 30 cm below horizontal level.

STRÅKA SERIES, PÅRAS, KRONOBY

63°43'N, 23°03'E; 10 m a.s.l.
Coll. and subm. 1993 and 1996 by H. Vikström.

Hel-3509 Sample 1 **modern**
Wood, depth 0.80-0.90 m **$\delta^{13}C$ = -24.1‰**

Hel-3510 Sample 2 **150 ± 90**
Wood, depth 0.30 m **$\delta^{13}C$ = -25.3‰**

Hel-3914 Stråka 1 **300 ± 80**
Charcoal **$\delta^{13}C$ = -26.5‰**

Hel-3915 Stråka 2 — **70 ± 100**
Charcoal — **$\delta^{13}C$ = -25.5‰**

Hel-3511 KÄTKIKIELAS S3, UTSJOKI — **1750 ± 90**
$\delta^{13}C$ = -30.0‰

420 m a.s.l.
Coll. and subm. 1993 by J. Hietaranta.
Charcoal from a sand layer, depth 1.00 m

SKAIDEJAVRI SERIES, UTSJOKI

70°03'N, 27°52'E; 182 m a.s.l.
Coll. 1992 and subm. 1993 by H. Seppä.
Ref. Seppä (1996).

Hel-3512 Lake Skaidejavri 980-970 — **9660 ± 180**
Gyttja, depth 9.75 m — **$\delta^{13}C$ = -23.1‰**

Hel-3513 Lake Skaidejavri 955-945 — **7830 ± 140**
Gyttja, depth 9.50 m — **$\delta^{13}C$ = -27.9‰**

Hel-3514 Lake Skaidejavri 798-788 — **3280 ± 120**
Gyttja, depth 7.93 m — **$\delta^{13}C$ = -28.5‰**

Hel-3515 Lake Skaidejavri 715-705 — **2220 ± 110**
Gyttja, depth 7.10 m — **$\delta^{13}C$ = -29.8‰**

Hel-3516 Lake Skaidejavri 662-652 — **1380 ± 110**
Gyttja, depth 6.57 m — **$\delta^{13}C$ = -30.2‰**

RAUTUSELKÄ SERIES, INARI

69°34'N, 28°32'E; 136 m a.s.l.
Coll. 1992 and subm. 1993 by H. Seppä.
Ref. Seppä (1996).

Hel-3517 Lake Rautuselkä 585-575 — **9990 ± 140**
Gyttja, depth 5.80 m — **$\delta^{13}C$ = -23.5‰**

Hel-3518 Lake Rautuselkä 535-525 — **7300 ± 120**
Gyttja, depth 5.30 m — **$\delta^{13}C$ = -26.4‰**

Hel-3519 Lake Rautuselkä 510-500 — **6010 ± 120**
Gyttja, depth 5.05 m — **$\delta^{13}C$ = -25.8‰**

Hel-3520 Lake Rautuselkä 404-395 — **2030 ± 100**
Gyttja, depth 4.00 m — **$\delta^{13}C$ = -24.7‰**

STRYKMOSSEN SERIES, KIRKNIEMI

60°09'N, 23°57'E; 50 m a.s.l.
Coll. and subm. 1993 by A. Korhola.

Hel-3521 STRYK 500-510	**6120 ± 100**
Peat, depth 5.00-5.10 m	**$\delta^{13}C$ = -29.6‰**
Hel-3522 STRYK 510-520	**6170 ± 100**
Peat, depth 5.10-5.20 m	**$\delta^{13}C$ = -31.2‰**

LAMANSMOSSEN SERIES, KARJAA

60°01'N, 23°35'E; 20 m a.s.l.
Coll. and subm. 1993 by A. Korhola.
Ref. Korhola (1996).

Hel-3523 LA 1	**2600 ± 120**
Peat, depth 0.70-0.78 m	**$\delta^{13}C$ = -28.2‰**
Hel-3524 LA 2	**3090 ± 100**
Peat, depth 1.96-2.05 m	**$\delta^{13}C$ = -28.0‰**
Hel-3525 LA 3	**3120 ± 100**
Peat, depth 1.37-1.45 m	**$\delta^{13}C$ = -27.6‰**
Hel-3526 LA 4	**3710 ± 110**
Peat, depth 2.40-2.48 m	**$\delta^{13}C$ = -28.2‰**
Hel-3527 LA 5	**4220 ± 110**
Peat, depth 2.70-2.77 m	**$\delta^{13}C$ = -28.8‰**
Hel-3528 LA 6	**3550 ± 100**
Peat, depth 2.47-2.55 m	**$\delta^{13}C$ = -27.8‰**
Hel-3529 LA 7	**3890 ± 110**
Peat, depth 2.68-2.76 m	**$\delta^{13}C$ = -27.7‰**
Hel-3530 LA 8	**3080 ± 100**
Peat, depth 1.00-1.08 m	**$\delta^{13}C$ = -28.4‰**
Hel-3531 LB 1	**2790 ± 90**
Peat, depth 1.60-1.67 m	**$\delta^{13}C$ = -27.4‰**
Hel-3532 LB 2	**4070 ± 110**
Peat, depth 1.68-1.76 m	**$\delta^{13}C$ = -28.8‰**
Hel-3533 LB 3	**4180 ± 110**
Peat, depth 1.77-1.85 m	**$\delta^{13}C$ = -28.7‰**

Hel-3534 LB 4 — **3680 ± 100**
Peat, depth 1.25-1.35 m — **$\delta^{13}C$ = -28.6‰**

Hel-3535 LC 1 — **2210 ± 100**
Peat, depth 1.10-1.18 m — **$\delta^{13}C$ = -28.0‰**

Hel-3536 LC 2 — **2040 ± 100**
Peat, depth 1.70-1.78 m — **$\delta^{13}C$ = -27.0‰**

Hel-3537 LC 3 — **3140 ± 100**
Peat, depth 2.50-2.59 m — **$\delta^{13}C$ = -28.2‰**

Hel-3538 LC 4 — **5590 ± 110**
Peat, depth 1.64-1.72 m — **$\delta^{13}C$ = -29.3‰**

HOPSEIDET SERIES, NORWAY

70°50'N, 27°43'E; 225 m a.s.l.
Coll. 1993 and subm. 1994 and 1995 by H. Seppä.
Ref. Seppä (1996).

Hel-3539 Lake Hopseidet 785 — **4400 ± 110**
Gyttja, depth 7.85 m — **$\delta^{13}C$ = -26.2‰**

Hel-3540 Lake Hopseidet 835 — **6510 ± 100**
Gyttja, depth 8.35 m — **$\delta^{13}C$ = -25.0‰**

Hel-3541 Lake Hopseidet 900 — **9290 ± 140**
Gyttja, depth 9.00 m — **$\delta^{13}C$ = -24.8‰**

Hel-3542 Lake Hopseidet 916 — **10570 ± 110**
Gyttja, depth 9.16 m — **$\delta^{13}C$ = -24.0‰**

Hel-3644 Lake Hopseidet 746 — **2470± 100**
Gyttja, depth 7.46 m — **$\delta^{13}C$ = -27.9‰**

Hel-3543 HANGASKANGAS, PIKKARALA — **4130 ± 90**
$\delta^{13}C$ = +0.1‰

Coll. 1993 and subm. 1994 by S. Roman.
Shells of *Mytilus Edulis*
Ref. Eronen et al. (1995).

Hel-3544 KOTAMAA, SODANKYLÄ 62 **3880 ± 100**
$\delta^{13}C$ = -25.7‰

67°29'N, 26°39'E; 181 m a.s.l.
Coll. 1993 by T. Ylimaunu and subm. 1993 by M. Sarkkinen.
KM 27957:272, charcoal, depth 0.15-0.20 m
Comment (MS): Kotamaa is a Stone Age riverside dwelling place without accurate datable archaeological material (findings containing quartz and burnt bone). The sample was collected from a refuse pit (Pit No. 2) together with small quartz flakes and burnt bone (elk, bird, beaver? and deer?). The radiocarbon date is well acceptable and it dates the site to the end of the Stone Age.
Ref. In Edgren et al., eds. (1996).

POIKAMELLA SERIES, SODANKYLÄ 63

67°27'N, 26°36'E; 177-180 m a.s.l.
General comment (MS): Poikamella is a riverside dwelling place which on the basis of the archaeological material seems to have had dwellers from the Mesolithic to the Early Metal Age. The main phase is the Epineolithic/Early Metal Age. Excavation in 1993 by M. Sarkkinen and in 1994 by E. Raike.
Ref. In Edgren et al., eds. (1996).

Hel-3545 KM 27958:21 **6300 ± 100**
Coll. and subm. 1993 by M. Sarkkinen. **$\delta^{13}C$ = -26.1‰**
Charcoal, depth 0.55 m
Comment (MS): The sample is collected from dirty soil together with quartz scraper and flake when defining the limits of the site. The radiocarbon date suggests an earlier phase at the site.

Hel-3667 Sample 1/B **2650 ± 100**
Coll. 1994 and subm. 1995 by E. Raike. **$\delta^{13}C$ = -24.7‰**
Charcoal, depth 0.15 m

Hel-3668 Sample 2/C **5790 ± 110**
Coll. 1994 and subm 1995 by E. Raike. **$\delta^{13}C$ = -26.6‰**
Charcoal, depth 0.20 m

Hela-28 KM 28520:345 **2990 ± 60**
Coll. 1994 and subm. 1995 by E. Raike **$\delta^{13}C$ = -26.3‰**
Charred crust from ceramics, depth 0.15 m

AURALA SERIES, PUDASJÄRVI

65°23'N, 26°51'E; 110-115 m a.s.l.
Coll.1993 by M. Mäkivuoti and subm. 1993 by M. Torvinen.
General comment (MT): The finds of the site range from the Mesolithic Stone Age to the Late Iron Age. The oldest date is in accordance with the finds. The younger date as "too young" is in conflict with the archaeological finds.
Ref. In Edgren et al., eds. (1996).

Hel-3546 KM 27936:44 **840 ± 90**
Charcoal sample taken from pit house II. **$\delta^{13}C$ = -25.4‰**
depth 0.50 m

Hel-3547 KM 27936:42 **3880 ± 100**
Charcoa sample taken from pit house I. **$\delta^{13}C$ = -25.0‰**
depth 1.20 m

PAIKKALA SERIES, HÄMEENLINNA

60°31'N, 24°58'E; 85-90 m a.s.l.
Coll. and subm. 1993 by H. Asplund.
Ref. In Edgren et al., eds. (1996).

Hel-3548 KM 27786:14 A **230 ± 90**
Charcoal, depth 0.45 m **$\delta^{13}C$ = -23.9‰**

Hel-3549 KM 27786:14 B **450 ± 80**
Charcoal, depth 1.05 m **$\delta^{13}C$ = -25.6‰**

Hel-3550 KM 27786:14 C **1630 ± 90**
Charcoal, depth 0.45-0.55 m **$\delta^{13}C$ = -24.6‰**

RYÖKÄS SERIES, RÄHÄLÄ, LIETO

60°32'N, 22°27'E; 25 m a.s.l.
Coll. and subm. 1993 by E. Raike.
Ref. In Edgren et al., eds. (1996).

Hel-3551 Structure 5 **910 ± 110**
Charcoal, depth 0.50 m **$\delta^{13}C$ = -25.7‰**

Hel-3552 Structure 19 A, sector A **830 ± 90**
Charcoal, depth 0.50 m **$\delta^{13}C$ = -25.5‰**

Hel-3553 VANNIPUULA **8730 ± 100**
$\delta^{13}C$ = -27.6‰

61°34'N, 26° 02'E; 94 m a.s.l.
Coll. 1993 and subm. 1994 by M. Tikkanen.
Peat, depth 0.87-0.90 m
Comment (MT): The sample was collected from a core obtained from a peat layer submerged beneath the waters of the Vannipuula transgression. Mire formation began here by paludification of the mineral soil.
Ref. Tikkanen (1995).

SIRKKAJÄRVI SERIES, SIRKKAJÄRVI

60°51'N, 25°25'E; 132 m a.s.l.
Coll. 1991 by A. Korhola and M. Tikkanen, subm. 1994 by M. Tikkanen.
General comment (MT): The bulk samples were taken from the lowermost section of the sediment at the deepest point of the lake. The dates are in good agreement with the pollen stratigraphy, but younger than expected.
Ref. Korhola and Tikkanen (1996).

Hel-3554 Sirkkajärvi 1 — **8670 ± 140**
Gyttja, depth 8.43-8.53 m — **$\delta^{13}C$ = -27.9‰**

Hel-3555 Sirkkajärvi 2 — **8230 ± 120**
Gyttja, depth 8.23-8.33 m — **$\delta^{13}C$ = -29.1‰**

Hel-3556 – Hel-3560 See ÅLAND CHURCHES SERIES (Finström) Hel-3505

Hel-3561 – Hel-3565 See ÅLAND CHURCHES SERIES (Saltvik) Hel-3505

SAAMENMUSEO SERIES, INARI 13

68°54'N, 27°01'E
Coll.1993 and 1994 and subm. 1994 by S-L. Seppälä.
General comment: See Hel-2635 in Jungner and Sonninen (1996), Hel-2911 and Saamen museo 13 Series in Jungner and Sonninen (1998); see also Arponen and Hintikainen (1995).
Ref. In Edgren et al., eds. (1996).

Hel-3566 Sample 1/1993 380/390 B — **2610 ± 100**
127.65 m a.s.l. — **$\delta^{13}C$ = -26.3‰**
Charcoal, depth 0.80 m

Hel-3567 Sample 2/1993 382/390 B — **2610 ± 80**
127.28 m a.s.l. — **$\delta^{13}C$ = -26.4‰**
Charcoal, depth 0.40 m

Hel-3568 Sample 3/1993 302/416 C — **7330 ± 120**
124.58 m a.s.l. — **$\delta^{13}C$ = -25.9‰**
Charcoal

Hel-3580 Pit, stone setting — **7600 ± 90**
122.85 m a.s.l. — **$\delta^{13}C$ = -25.5‰**
Charcoal, depth 0.45 m

VUOPAJA SERIES, INARI 14

68°54'N, 27°01'E
Coll.1993 and subm. 1994 by S-L. Seppälä.
Ref. Arponen and Hintikainen (1995), In: Edgren et al., eds. (1996).

Hel-3569 Sample 4/1993 574/997 — **6850 ± 110**
123.20 m a.s.l. — **$\delta^{13}C$ = -27.3‰**
Charcoal, depth 0.35 m

Hel-3570 Sample 5/1993 582/994-995 — **7530 ± 150**
123.82 m a.s.l. — **$\delta^{13}C$ = -27.1‰**
Charcoal, depth 0.30 m

Hel-3571 Sample 6/1993 626/1004 — **6890 ± 110**
128.65 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.35 m

Hel-3572 TIKANTONTTI, HULKKIO, KAARINA — **1820 ± 100**
$\delta^{13}C$ = -23.8‰

60°25'N, 22°25'E; 24 m a.s.l.
Coll. and subm. 1993 by N. Strandberg.
Sample 576/312, charcoal, depth 0.38 m
Ref. In Edgren et al., eds. (1995, 1996).

HAASIINNIEMI SERIES, LIEKSA 25

63°07'N, 30°20'E; 100 m a.s.l.
Coll. and subm. 1993 by K. Katiskoski.
General comment (KK): These samples belong to a series of five samples taken from an excavation at the multi-period dwelling site of Haasiinniemi on the south-eastern shore of lake Pielinen. The previously dated samples represent a cultural horizon of an early stage of occupation (Mesolithic) approx. 101 m a.s.l. and some 7 m above the present water level of the lake (Hel-3308: 7390 ± 120 BP). The horizon was covered with a thick layer of sand (½ m) apparently caused by a transgressive water level, probably connected with the maximum of Pielinen and the outburst of the Uimaharju threshold. However, this dating is some 1000 years younger than expected. Another sample (Hel-3307: 6060 ± 120 BP) collected from a horizon at the bottom (ca. 99.5 m a.s.l.) of the terrace referred above with a disturbed hearth and an Early Combed Ceramic vessel (Ka I:1) is in accordance with the archaeological dating of this context. The third sample dated previously (Hel-3309: 1630 ± 110 BP) derives from a hearth located on the lowermost bank (ca. 96 m a.s.l.) of Pielinen (94 m a.s.l.). Of the two samples at hand the older one was taken from a hearth as well (Hel-3574: 5420 ±110 BP) at an altitude of ca. 99 m a.s.l. It refers to an early stage of typical Comb Ware with no direct archaeological evidence from that period. The other sample is from one of the pitfalls (No. 4) of the site complex (Hel-3573: 2520 ±100 BP).
Ref. In Edgren et al., eds. (1996).

Hel-3573 Sample 1 **2520 ± 100**
Charcoal, depth 0.35 m **$\delta^{13}C$ = -26.1‰**

Hel-3574 Sample 4 **5240 ± 110**
Charcoal, depth 0.50 m **$\delta^{13}C$ = -25.4‰**

KYYHKYLÄ SERIES, PORRASSALMI, MIKKELI

61°38'N, 27°17'E; 82 m a.s.l.
Coll. and subm. 1993 by H. Poutiainen.
Ref. In Edgren et al., eds. (1996).

Hel-3575 Sample 3, KM 28017:1943 **1070 ± 100**
Charcoal, depth 0.50 m **$\delta^{13}C$ = -25.0‰**

Hel-3576 Sample 4, KM 28017:1944 **910 ± 90**
Charcoal, depth 0.55 m **$\delta^{13}C$ = -24.8‰**

Hel-3577 BRAGENESET, SVALBARD **8340 ± 120**
$\delta^{13}C$ = +1.7‰

Coll. 1955 and subm. 1994 by J. Donner.
Shells of Astarte elliptica
Comment (JD): The shells dated belong to the Brageneset series of shells from the till of the advance of Vestfonna against Brageneset between AD 1861 and 1899. The shells are from the time when the ice margin had retreated from Brageneset after the last glaciation, and were incorporated into the till of the young end-moraine during the re-advance of the ice.
Ref. Donner and West (1995).

SEITLAX SERIES, PORVOO

14.20 m a.s.l.
Coll. and subm. 1994 by T. Jantunen.
General comment: See Hel-3347 in Jungner and Sonninen (1998).
Ref. Jantunen (1995).

Hel-3578 Sample A, 30210 **4080 ± 110**
Gyttja and peat, depth 0.60-0.70 m **$\delta^{13}C$ = -20.0‰**

Hel-3579 Sample C, 30210 **5160 ± 120**
Gyttja, depth 1.35-1.40 m **$\delta^{13}C$ = -20.9‰**

Hel-3580 See SAAMENMUSEO SERIES Hel-3566

VUOPAJA SERIES, INARI 13

68°54'N, 27°01'E
Coll. and subm. 1994 by S-L. Seppälä.
General comment: See Vuopaja Series in Jungner and Sonninen (1996); see also Arponen and Hintikainen (1995).
Ref. In Edgren et al., eds. (1996).

Hel-3581 Hearth 102/994 C — **5210 ± 140**
122.21 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.20 m

Hel-3582 Hearth 116/994 D — **7110 ± 140**
123.05 m a.s.l. — **$\delta^{13}C$ = -26.4‰**
Charcoal, depth 0.25 m

Hel-3583 Old podsol 116/998 — **4490 ± 90**
123.05 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.15 m

Hel-3584 Charcoal layer 120/998 — **7600 ± 90**
122.96 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.50 m

Hel-3585 Hearth 120/998 C — **7410 ± 100**
123.05 m a.s.l. — **$\delta^{13}C$ = -26.1‰**
Charcoal, depth 0.25 m

Hel-3586 KALASATAMA, LOKAN TEKOJÄRVI — **-240 ± 100**
$\delta^{13}C$ = -60.2‰

Coll. and subm. 1994 by H. Nykänen.
Methane gas

ENONTEKIÖ SERIES, ENONTEKIÖ

Coll. 1993 by P. Halinen and subm. 1994 by P. Halinen and C. Carpelan
General comment (PH): The dates of these dwelling sites are as expected with the exception of Hel-3588 which is younger than suggested by the finds.
Ref. In Edgren et al., eds. (1996).

Hel-3587 PH 1, Myllymaa 2, Enontekiö 210 — **5790 ± 120**
68°21'N, 23°29'E; 287.10 m a.s.l. — **$\delta^{13}C$ = -26.3‰**
Charcoal, depth 0.05-0.10 m

Hel-3588 PH 2, Pekkalanvaara, Enontekiö 114 — **3490 ± 100**
68°22'N, 23°40'E; 293.62 m a.s.l — **$\delta^{13}C$ = -26.3‰**
Charcoal, depth 0.08 m

Hel-3589 PH 3, Suonttajoki W 1, Enontekiö, 198 **6940 ± 120**
68°22'N, 23°32'E; 290 m a.s.l. **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.15-0.20 m

Hel-3590 PH 4, Suonttajoki W 3, Enontekiö 200 **4280 ± 90**
68°22'N, 23°31'E; 299.5 m a.s.l. **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.15-0.20 m

Hel-3591 PH 5, Majava SW, Enontekiö 202 **4210 ± 100**
68°22'N, 23°35'E; 288.5 m a.s.l. **$\delta^{13}C$ = -26.8‰**
Charcoal, depth 0.05-0.10 m

Hel-3592 PH 6, Aittamaa 2, Enontekiö 195 **3870 ± 120**
68°22'N, 23° 33'E; 290.25 m a.s.l. **$\delta^{13}C$ = -26.7‰**
Charcoal, depth 0.05-0.10 m

Hel-3593 PH 7, Majava, Enontekiö 201 **6570 ± 120**
68°22'N, 23°35'E; 291.5 m a.s.l. **$\delta^{13}C$ = -26.7‰**
Charcoal, depth 0.20-0.25 m

Hel-3594 PH 8, Myllymaa 2, Enontekiö 210 **6530 ± 140**
68°21'N, 23°29'E; 287.05 m **$\delta^{13}C$ = -26.5‰**
Charcoal, depth 0.20-0.25 m

LÄNSI-POHJASSUO SERIES, POSIO

66°14'N, 28°31'E; 390-415 m a.s.l.
Coll. and subm. 1994 by A. Huttunen.
General comment (AH): The purpose of dating bottom samples from the mire is to gain more information about the rate of lateral expansion of the mire upward the slope (from LPS 1 to LPS 25). At the latter point, the bottom of a charcoal layer in the upper part of the turf dates to 290 ± 80 BP (LPS 25 B). Age differences between the adjacent (distance 30 m) dated sites in Länsi-Pohjassuo were conspicuous, varying from 170 to 5020 calibrated years, 1840 years on the average. The rate of lateral expansion varied within broad limits (0.059-0.173 m/a) being, however, rather small. The accumulation rates were in better agreement, 0.134-0.417 mm/a. A possibility of multinucleus genesis exists, especially at LPS 13-16.

Hel-3595 LPS 1 **7840 ± 140**
Peat **$\delta^{13}C$ = -26.9‰**

Hel-3596 LPS 4 **8380 ± 150**
Peat **$\delta^{13}C$ = -27.6‰**

Hel-3597 LPS 7 **7510 ± 110**
Peat **$\delta^{13}C$ = -29.0‰**

Hel-3598 LPS 10 **5490 ± 100**
Peat **$\delta^{13}C$ = -28.2‰**

Hel-3599 LPS 13 Peat	**2110 ± 100** **$\delta^{13}C$ = -27.8‰**
Hel-3600 LPS 16 Peat	**1970 ± 90** **$\delta^{13}C$ = -29.1‰**
Hel-3601 LPS 19 Peat	**3630 ± 100** **$\delta^{13}C$ = -28.6‰**
Hel-3602 LPS 22 Peat	**4430 ± 120** **$\delta^{13}C$ = -28.0‰**
Hel-3603 LPS 25A Peat	**modern** **$\delta^{13}C$ = -26.7‰**
Hel-3604 LPS 25B Peat	**290 ± 80** **$\delta^{13}C$ = -26.5‰**

WESTERN DESERT SERIES, EGYPT

Coll. and subm. 1994-1997 by J. Donner.
General comment (JD): The samples of ostrich egg shell, mostly from playas in the Farafra Depression, date the early Holocene humid phase in the Western Desert of Egypt. Two dates of *Melania tuberculata* are too old because of the hard-water effect. Two samples of wood are about mid Holocene in age, whereas one sample of wood from a spring mound is modern. The sample of plant remains in calcrete dates a short-terms period of rains.
Ref. Donner et al (1999).

El-Farafra

Playa south of Qasr El-Farafra
26°59'N, 27°57'E

Hel-3607 Sample 3 Ostrich egg shell	**6480 ± 120** **$\delta^{13}C$ = -3.9‰**
Hel-3628 SF 1/3 (2 m below surface) Wood	**modern** **$\delta^{13}C$ = -24.4‰**
Hel-3629 SF 1/1 Gastropod shell, *Melania tuberculata*	**18310 ± 280** **$\delta^{13}C$ = -5.4‰**
Hel-3630 SF 1/2 Ostrich egg shell	**8220 ± 140** **$\delta^{13}C$ = -4.1‰**
Hel-3765 Farafra, Sample 13 Ostrich egg shell	**8970 ± 110** **$\delta^{13}C$ = -1.4‰**

Hel-3766 Farafra, Sample 12 Ostrich egg shell	**6390 ± 100** **$\delta^{13}C$ = -4.4‰**
Hel-3767 Farafra, Sample 9 Ostrich egg shell	**7320 ± 100** **$\delta^{13}C$ = -3.8‰**
Hel-3768 Farafra, Sample 15 Ostrich egg shell	**6880 ± 100** **$\delta^{13}C$ = -3.3‰**
Hel-3769 Farafra, Sample 8 Ostrich egg shell	**8310 ± 100** **$\delta^{13}C$ = -4.6‰**
Hel-3811 Farafra E 12 Gastropod shell, *Melania tuberculata*	**19700 ± 300** **$\delta^{13}C$ = -5.7‰**
Hel-4003 Farafra SF 1/Sample 5 Ostrich egg shell	**7840 ± 110** **$\delta^{13}C$ = -3.4‰**
Hel-4130 Sample 1 Ostrich egg shell	**9090 ± 110** **$\delta^{13}C$ = -5.6‰**
Hel-4131 Sample 5 Ostrich egg shell	**7500 ± 100** **$\delta^{13}C$ = -4.0‰**
Hel-4132 Sample 4 Ostrich egg shell	**6010 ± 100** **$\delta^{13}C$ = -4.6‰**

Mound of sediment N of Qasr El-Farafra
27°06'N, 27°59'E

Hel-3605 Sample 1 Wood from top of 4 m high mound	**4850 ± 100** **$\delta^{13}C$ = -25.2‰**
Hel-3606 Sample 2 Wood from same mound	**4260 ± 90** **$\delta^{13}C$ = -23.7‰**

Playa N of Qasr El-Farafra
27°11'N, 28°03'E

Hel-3631 NF 2/1 Ostrich egg shell	**8280 ± 140** **$\delta^{13}C$ = -4.5‰**
Hel-3812 Farafra E 13 Ostrich egg shell	**8440 ± 120** **$\delta^{13}C$ = -4.8‰**

Playa E of Qasr El-Farafra
27°03'N, 28°02'E

Hel-3813 Farafra E 15 Ostrich egg shell	**8650 ± 110** **$\delta^{13}C$ = -2.7‰**

Ain El-Raml, playa SW of Qasr El-Farafra
27°02'N, 27°57'E

Hel-4004 Ain El-Raml /Sample 2 — **9140 ± 110**
Ostrich egg shell — **$\delta^{13}C$ = -4.9‰**

Section at Guest House, Qasr El-Farafra
27°04'N, 27°58'E

Hela-30 Sample — **665 ± 60**
Plant remains in calcrete, depth 0.70 m — **$\delta^{13}C$ = -12.2‰**

Bahariya

Playa at El Heiz
28°02'N, 28°41'E

Hel-3632 Bahariya, El Heiz, Egypt — **7810 ± 130**
Ostrich egg shell — **$\delta^{13}C$ = -6.0‰**

Djara Cave area

Shallow stream channel
27°24'N, 29°38'E

Hel-4001 Egypt 1/96 — **8730 ± 110**
Ostrich egg shell — **$\delta^{13}C$ = -7.0‰**

Upstream in same channel

Hel-4002 Egypt 2/96 — **5450 ± 90**
Ostrich egg shell — **$\delta^{13}C$ = -6.2‰**

Djara Cave site
27°24'N, 29°38'E

Hel-4005 Djara Cave site/Sample 1 — **7410 ± 110**
Ostrich egg shell — **$\delta^{13}C$ = -4.2‰**

Hel-4006 Djara Cave site/Sample 3 — **7600 ± 100**
Ostrich egg shell — **$\delta^{13}C$ = -5.4‰**

Hel-4007 Djara Cave site/Sample 4 — **7630 ± 110**
Ostrich egg shell — **$\delta^{13}C$ = -5.8‰**

Small shallow playas

Hel-4008 Djara Playa C/Sample 6 — **9670 ± 110**
27°24'N, 29°39'E — **$\delta^{13}C$ = -6.4‰**
Ostrich egg shell

Hel-4009 Djara Playa F/Sample 7 **7900 ± 110**
27°25'N, 29°39'E $\delta^{13}C = -5.2‰$
Ostrich egg shell

SUOSILMU PROJECT

Coll. 1993-1996 by J. Turunen and subm. 1995-1996 by K. Tolonen.
Ref. Korhola et al. (1995), Tolonen and Turunen (1996), Clymo et al. (1998), Pitkänen et al. (1999), Turunen et al. (1999).

Ahvensalo Series, Ilomantsi

62°51'N, 30°53'E; 160 m a.s.l.

Hel-3608 LS1 **5280 ± 110**
Peat Pr-N-S-C, H5, depth 3.45-3.50 m $\delta^{13}C = -24.6‰$

Hel-3609 LS2 **5090 ± 100**
Peat Eq-L-C-S, H5, depth 3.30-3.35 m $\delta^{13}C = -27.0‰$

Patvinsuo Series I, Lieksa

Hel-3610 C500 **6140 ± 130**
63°05'N, 30°45'E; 150 m a.s.l. $\delta^{13}C = -28.4‰$
Peat C, H7, depth 0.70-0.75 m

Hel-3611 B600 **7020 ± 120**
63°06'N, 30°45'E; 155 m a.s.l. $\delta^{13}C = -29.4‰$
Peat L-ER-S, H8, depth 1.65-1.70 m

Hel-3612 D900 **9510 ± 180**
63°06'N, 30°38'E; 165 m a.s.l. $\delta^{13}C = -28.1‰$
Peat C-S-B, H3, depth 2.90-2.95 m

Hel-3613 W600A **7160 ± 100**
63°06'N, 30°40'E; 160 m a.s.l. $\delta^{13}C = -28.8‰$
Peat Er-S-C, H7, depth 1.90-1.95 m

Hel-3614 A0 **8130 ± 150**
63°04'N, 30°47'E; 150 m a.s.l. $\delta^{13}C = -29.5‰$
Peat Pr-Eq-B, H3, depth 2.95-3.00 m

Hel-3615 F400 **7430 ± 130**
63°07'N, 30°40'E; 161 m a.s.l. $\delta^{13}C = -28.3‰$
Peat L-C, H6, depth 2.65-2.70 m

Lakkasuo Series, Orivesi
61°47'N, 24°18'E

Hel-3739 A50 — **3990 ± 100**
155 m a.s.l. — **$\delta^{13}C$ = -28.7‰**
Peat L-Er-C-S, H6-7, depth 2.39-2.46 m

Hel-3740 A10 — **1580 ± 90**
156 m a.s.l. — **$\delta^{13}C$ = -28.7‰**
Peat L-S, H7-8, depth 0.61-0.65 m

Hel-3741 A8 — **660 ± 80**
156 m a.s.l. — **$\delta^{13}C$ = -28.3‰**
Peat L-S, H7-8, depth 0.32-0.37 m

Hel-3742 A14 — **1820 ± 90**
156 m a.s.l. — **$\delta^{13}C$ = -28.6‰**
Peat L-C-S, H8, depth 0.85-0.91 m

Hel-3743 A16 — **1790 ± 90**
156 m a.s.l. — **$\delta^{13}C$ = -28.3‰**
Peat L-S, H8-10, depth 0.90-0.97 m

Hel-3744 A19 — **2860 ± 120**
156 m a.s.l. — **$\delta^{13}C$ = -28.0‰**
Peat L-S, H8-9, depth 1.43-1.50 m

Hel-3745 A21 — **2680 ± 90**
155 m a.s.l. — **$\delta^{13}C$ = -28.9‰**
Peat L-Er-S, H8-9, depth 1.45-1.52 m

Hel-3746 A25 — **2840 ± 80**
155 m a.s.l. — **$\delta^{13}C$ = -28.8‰**
Peat L-S, H8-9, depth 1.82-1.89 m

Hel-3814 Lakka0 — **1450 ± 90**
152 m a.s.l. — **$\delta^{13}C$ = -29.5‰**
Peat Eq-L-C, H5, depth 0.35-0.40 m

Hel-3815 A100 — **3930 ± 70**
154 m a.s.l. — **$\delta^{13}C$ = -28.5‰**
Peat Eq-L-C-S, H8, depth 2.30-2.35 m

Hel-3816 A40 — **3570 ± 110**
155 m a.s.l. — **$\delta^{13}C$ = -28.6‰**
Peat Er-C-S, H7, depth 2.35-2.40 m

Hel-3817 Lakka16 — **8100 ± 130**
156 m a.s.l. — **$\delta^{13}C$ = -28.2‰**
Peat Er-S-C, H7, depth 1.45-1.50 m

Patvinsuo Series II, Lieksa

Hel-3791 Surkansuo 23 — **3380 ± 100**
Peat L-S, H8, depth 1.25-1.30 m — **$\delta^{13}C$ = -28.8‰**

Hel-3792 Surkansuo 24 — **4930 ± 110**
Peat L-S, H8, depth 1.55-1.60 m — **$\delta^{13}C$ = -28.2‰**

Hel-3793 Surkansuo 25 — **3110 ± 110**
Peat Er-S, H7, depth 0.95-1.00 m — **$\delta^{13}C$ = -28.7‰**

Hel-3794 Surkansuo 26 — **4510 ± 100**
Peat L-S, H9, depth 3.95-4.00 m — **$\delta^{13}C$ = -31.3‰**

Hel-3795 Surkansuo 27 — **7550 ± 110**
Peat L-Er-S, H7, depth 1.85-1.90 m — **$\delta^{13}C$ = -29.1‰**

Patvinsuo Series III, Lieksa

Hel-3800 B100 — **3120 ± 100**
153 m a.s.l. — **$\delta^{13}C$ = -28.9‰**
Peat L-Er-S, H8, depth 1.00-1.05 m

Hel-3801 B100 — **4970 ± 100**
153 m a.s.l. — **$\delta^{13}C$ = -29.2‰**
Peat L-Er-S, H8, depth 1.05-1.10 m

Hel-3802 B600 — **6450 ± 100**
153 m a.s.l. — **$\delta^{13}C$ = -28.8‰**
Peat L-Er-S, H8-9, depth 1.60-1.65 m

Hel-3803 C500 — **4060 ± 110**
150 m a.s.l. — **$\delta^{13}C$ = -29.8‰**
Peat C, H7-8, depth 0.80-0.85 m

Hel-3804 D100 — **4140 ± 100**
164 m a.s.l. — **$\delta^{13}C$ = -29.1‰**
Peat L-Er-S, H5-6, depth 0.95-1.00 m

Hel-3805 D100 — **4710 ± 110**
164 m a.s.l. — **$\delta^{13}C$ = -28.6‰**
Peat L-Er-S, H6, depth 1.00-1.04 m

Hel-3806 Lintu — **3730 ± 100**
151 m a.s.l. — **$\delta^{13}C$ = -29.7‰**
Peat C, H7-8, depth 0.65-0.70 m

Hel-3807 Lintu — **4810 ± 110**
151 m a.s.l. — **$\delta^{13}C$ = -29.5‰**
Peat C, H7-8, depth 0.70-0.75 m

Hel-3808 K+100 **3770 ± 80**
151 m a.s.l. **$\delta^{13}C$ = -28.4‰**
Peat Er-C-S, H9, depth 0.50-0.585

Hel-3809 K0 **4580 ± 110**
151 m a.s.l. **$\delta^{13}C$ = -29.1‰**
Peat Er-S, H8, depth 0.93-1.00 m

Hel-3810 C400 **3840 ± 90**
151 m a.s.l. **$\delta^{13}C$ = -29.9‰**
Peat C, H6, depth 0.45-0.515 m

Patvinsuo Series IV, Lieksa

Hel-3889 Pav **7530 ± 120**
158 m a.s.l. **$\delta^{13}C$ = -28.6‰**
Peat Er-S-C, H6-7, depth 1.85-1.90 m

Hel-3890 Pav **7900 ± 120**
158 m a.s.l. **$\delta^{13}C$ = -28.9‰**
Peat Er-S-C, H6-7, depth 1.95-2.00 m

Hel-3891 D400 **7140 ± 110**
163 m a.s.l. **$\delta^{13}C$ = -29.2‰**
Peat C, H5, depth 1.40-1.45 m

Hel-3892 D400 **7960 ± 150**
163 m a.s.l. **$\delta^{13}C$ = -29.3‰**
Peat C, H5, depth 1.45-1.50 m

Hel-3893 D900 **8900 ± 150**
162 m a.s.l. **$\delta^{13}C$ = -27.6‰**
Peat C-S-B, H8, depth 2.85-2.90 m

Hel-3894 E200 **8980 ± 120**
168 m a.s.l. **$\delta^{13}C$ = -28.7‰**
Peat S-C, H4, depth 2.90-2.95 m

Hel-3895 E200 **8930 ± 160**
165 m a.s.l. **$\delta^{13}C$ = -27.5‰**
Peat S-C, H4, depth 2.95-3.00 m

Hel-3896 E400 **8350 ± 140**
166 m a.s.l. **$\delta^{13}C$ = -27.6‰**
Peat C-S, H7-8, depth 2.40-2.45 m

Hel-3897 E400 **8700 ± 160**
166 m a.s.l. **$\delta^{13}C$ = -27.9‰**
Peat C-S, H7-8, depth 2.45-2.50 m

Hel-3898 A0 — **9040 ± 100**
150 m a.s.l. — **$\delta^{13}C$ = -29.4‰**
Peat Pr-Eq-B, H3, depth 2.90-2.95 m

Hel-3899 F400 — **7650 ± 100**
160 m a.s.l. — **$\delta^{13}C$ = -29.7‰**
Peat L-C, H6-7, depth 2.60-2.65 m

Hel-3900 F800 — **9260 ± 180**
158 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Peat Eq-B, H3-4, depth 2.90-2.95 m

Hel-3901 F800 — **8730 ± 120**
158 m a.s.l. — **$\delta^{13}C$ = -28.6‰**
Peat Eq-B, H3-4, depth 2.95-3.00 m

Separate Suosilmu samples

Hel-3700 JT7, Oisavansuo, Muhos — **2860 ± 80**
70 m a.s.l. — **$\delta^{13}C$ = -29.3‰**
Peat Eq-B-C, H8, depth 1.55-1.60 m

Hel-3701 JT8, Siivilänniemenaapa, Simo — **6420 ± 110**
96 m a.s.l. — **$\delta^{13}C$ = -28.5‰**
Peat C-S, H4, depth 1.77-1.82 m

Hel-3702 JT9, Simo — **6290 ± 110**
130 m a.s.l. — **$\delta^{13}C$ = -27.6‰**
Peat Pr-L-B-C, H9, depth 0.87-0.92 m

Hel-3703 JT10, Korkeakorpi, Kemi — **1690 ± 70**
18 m a.s.l. — **$\delta^{13}C$ = -28.4‰**
Peat L-S, H8, depth 0.65-0.70 m

Hel-3704 JT11, Torviaapa, Kemi — **2110 ± 90**
25 m a.s.l. — **$\delta^{13}C$ = -28.5‰**
Peat L-Eq-Pr-C, H8, depth 0.90-0.95 m

Hel-3705 JT12, Riihisuo, Pieksämäki — **8150 ± 100**
123 m a.s.l. — **$\delta^{13}C$ = -28.7‰**
Peat S, H10, depth 1.70-1.75 m

Hel-3706 JT13, Juurikkasuo, Pieksämäki — **7010 ± 100**
120 m a.s.l. — **$\delta^{13}C$ = -27.6‰**
Peat Pr-Eq-B-S, H8, depth 1.65-1.70 m

Hel-3707 JT14, Vehvaansuo, Pieksämäki — **6790 ± 90**
106 m a.s.l. — **$\delta^{13}C$ = -29.3‰**
Peat L-C-S, H8, depth 1.65-1.70 m

Hel-3708 JT15, Paritsansuo, Joensuu **3425 ± 100**
81 m a.s.l. $\delta^{13}C = -23.0‰$
Peat L-Pr-S-C, H9, depth 1.30-1.35 m

Hel-3749 Annanlamminneva, Merikarvia **2260 ± 90**
24.30 m a.s.l. $\delta^{13}C = -27.8‰$
Peat L-B-C, H8, depth 2.25-2.30 m

Hel-3750 Kräsmosanneva, Merikarvia **1930 ± 100**
20.20 m a.s.l. $\delta^{13}C = -29.8‰$
Peat L-C, H5, depth 2.65-2.70 m

Hel-3751 Kräsmosanneva, Merikarvia **1590 ± 100**
20.70 m a.s.l. $\delta^{13}C = -27.8‰$
Peat L-Eq-B-C, H5, depth 1.90-1.95 m

Hel-3752 Hellunkeidas, Tuorila **2670 ± 90**
30 m a.s.l. Peat L-C-S, H9, depth 3.35-3.40 m $\delta^{13}C = -29.5‰$

Hel-3753 Lappoonneva, Merikarvia **630 ±100**
2.40 m a.s.l. $\delta^{13}C = -26.6‰$
Peat Pr-S, H3, depth 0.97-1.02 m

Hel-3754 Haukijärvenkeidas, Tuorila **4110 ± 130**
39.90 m a.s.l. $\delta^{13}C = -29.3‰$
Peat Pr-Eq-C, H8, depth 3.25-3.30 m

Hel-3755 Haukijärvenkeidas, Tuorila **3940 ± 120**
40 m a.s.l. $\delta^{13}C = -28.2‰$
Peat Pr-Eq-C, H4, depth 3.55-3.60 m

Hel-3756 Mäntyneva, Tuorila **4230 ± 110**
43.80 m a.s.l. $\delta^{13}C = -26.7‰$
Peat Pr-S-C, H6, depth 2.65-2.70 m

Hel-3757 Urstinneva, Tuorila **4010 ± 120**
41.5 m a.s.l. $\delta^{13}C = -28.0‰$
Peat L-C-S, H9, depth 3.65-3.70 m

Hel-3758 Urstinneva, Tuorila **3200 ± 90**
42.10 m a.s.l. $\delta^{13}C = -30.2‰$
Peat Eq-C-S, H9, depth 3.05-3.10 m

Hel-3759 Rösmosa, Riispyy **2480 ± 110**
25.90 m a.s.l. $\delta^{13}C = -25.8‰$
Peat Eq-Sch-S-C, H5, depth 3.25-3.30 m

Hel-3760 Koivumäenkeidas, Kuvaskangas **4330 ± 100**
46.60 m a.s.l. $\delta^{13}C = -29.9‰$
Peat L-Eq-S, H9, depth 4.03-4.08 m

Hel-3761 Pohjuskeidas, Kuvaskangas **4010 ± 90**
49.30 m a.s.l. $\delta^{13}C = -28.9‰$
Peat Eq-C, H9, depth 4.50-4.55 m

Hel-3762 Leppineva, Leppijärvi **4420 ± 100**
62.20 m a.s.l. $\delta^{13}C = -29.9‰$
Peat Pr-L-C, H8, depth 3.85-3.90 m

Hel-3763 Kirkkokeidas, Siikainen **3870 ± 100**
56 m a.s.l. $\delta^{13}C = -29.6‰$
Peat L-Eq-S-C, H8, depth 3.85-3.90 m

Hel-3764 Korvenneva, Riispyy **3490 ± 100**
37.10 m a.s.l. $\delta^{13}C = -27.5‰$
Peat Sch-S-C, H4, depth 4.05-4.10 m

Hel-3770 Heitonneva, Kuvaskangas **4560 ± 100**
46.5 m a.s.l. $\delta^{13}C = -27.3‰$
Peat Pr-C-S, H5, depth 5.05-5.10 m

Hel-3771 Ristikeidas, Sammi **5600 ± 90**
72.5 m a.s.l. $\delta^{13}C = -26.2‰$
Peat Er-S-C, H8, depth 3.90-3.95 m

Hel-3772 Muurainsuo, Luvia **920 ± 80**
6.60 m a.s.l. $\delta^{13}C = -28.1‰$
Peat Eq-N-C, H4, depth 1.60-1.65 m

Hel-3773 Inari II, Inari **5280 ± 100**
205 m a.s.l. $\delta^{13}C = -27.7‰$
Peat C-B, H4, depth 1.45-1.50 M

Hel-3774 Inari II, Inari **6310 ± 100**
205 m a.s.l. $\delta^{13}C = -27.9‰$
Peat Eq-C-B, H3, depth 2.45-2.50 m

Hel-3775 Inari II, Inari **7810 ± 110**
205 m a.s.l. $\delta^{13}C = -28.4‰$
Peat Eq-C-B, H3, depth 3.45-3.50 m

Hel-3776 Inari II, Inari **9140 ± 110**
205 m a.s.l. $\delta^{13}C = -26.7‰$
Peat Eq-C, H5, depth 4.45-4.50 m

Hel-3782 Vuotos 22la, Pelkosenniemi **1020 ± 90**
160 m a.s.l. $\delta^{13}C = -28.5‰$
Peat N-S, H6, depth 0.38-0.40 m

Hel-3783 Vuotos 22Ib, Pelkosenniemi **4530 ± 110**
160 m a.s.l. $\delta^{13}C = -28.5‰$
Peat L-Eq-B-C, H6, depth 1.55-1.60 m

Hel-3784 Vuotos 22A, Pelkosenniemi **3950 ± 110**
160 m a.s.l. $\delta^{13}C = -29.7‰$
Peat Eq-C, H7, depth 0.95-1.00 m

Hel-3785 Vuotos 22C, Pelkosenniemi **4380 ± 80**
160 m a.s.l. $\delta^{13}C = -29.1‰$
Peat C-S, H7, depth 0.85-0.90 m

Hel-3786 Vuotos 22D, Pelkosenniemi **5120 ± 110**
160 m a.s.l. $\delta^{13}C = -29.9‰$
Peat N-S-C, H6, depth 1.45-1.50 m

Hel-3787 Vuotos 22E, Pelkosenniemi **8810 ± 140**
160 m a.s.l. $\delta^{13}C = -27.5‰$
Peat Eq-C-B, H3, depth 2.75-2.80 m

Hel-3788 Vuotos 22F, Pelkosenniemi **7330 ± 110**
160 m a.s.l. $\delta^{13}C = -28.8‰$
Peat Eq-L-C-S, H5, depth 2.90-2.95 m

Hel-3789 Vuotos 22G, Pelkosenniemi **7960 ± 100**
160 m a.s.l. $\delta^{13}C = -29.6‰$
Peat L-B-C, H5, depth 2.50-2.55 m

Hel-3790 Vuotos 22J, Pelkosenniemi **3520 ± 110**
160 m a.s.l. $\delta^{13}C = -29.1‰$
Peat Eq-L-S-C, H5, depth 1.15-1.20 m

Hel-3818 Onki2, Utra **4510 ± 100**
83 m a.s.l. $\delta^{13}C = -28.1‰$
Peat Pr-C-B, H5, depth 1.35-1.40 m

Hel-3819 Vehva 1000+200, Pieksämäki **2230 ± 110**
107 m a.s.l. $\delta^{13}C = -28.6‰$
Peat Er-C-S, H9, depth 0.95-1.00 m

Hel-3820 Pässirova 16, Inari **5570 ± 140**
152 m a.s.l. $\delta^{13}C = -28.3‰$
Peat C, H6, depth 0.75-0.80 m

Hel-3821 Pässirova 16, Inari **6940 ± 120**
152 m a.s.l. $\delta^{13}C = -28.7‰$
Peat Eq-C, H7, depth 0.85-0.90 m

Hel-3822 Pässirova 17, Inari **5400 ± 110**
152 m a.s.l. $\delta^{13}C = -29.0‰$
Peat B-C, H4, depth 1.07-1.12 m

Hel-3823 Pässirova 17, Inari **5410 ± 80**
152 m a.s.l. $\delta^{13}C = -28.3‰$
Peat C, H5, depth 1.17-1.22 m

Hel-3842 Pässirova 18, Inari **4860 ± 100**
152 m a.s.l. $\delta^{13}C = -28.1‰$
Peat Eq-B-C, H4, depth 0.85-0.90 m

Hel-3843 Pässirova 18, Inari **5780 ± 110**
152 m a.s.l. $\delta^{13}C = -27.8‰$
Peat Eq-B-C, H4, depth 0.95-1.00 m

Hel-3844 Pässirova 19, Inari **5640 ± 110**
152 m a.s.l. $\delta^{13}C = -28.1‰$
Peat B-C, H5, depth 1.20-1.25 m

Hel-3845 Pässirova 19, Inari **7060 ± 110**
152 m a.s.l. $\delta^{13}C = -28.5‰$
Peat Pr-Eq-C, H6, depth 1.30-1.35 m

Hel-3846 Pässirova x3, Inari **5280 ± 100**
152 m a.s.l. $\delta^{13}C = -28.9‰$
Peat S-C, H7, depth 1.35-1.40 m

Hel-3847 Pässirova x3, Inari **7250 ± 120**
152 m a.s.l. $\delta^{13}C = -29.8‰$
Peat S-C, H7, depth 1.45-1.50 m

IFJORD SERIES, NORWAY

70°26'N, 27°38'E; 317 m a.s.l.
Coll. 1993 and subm. 1994 and 1995 by H. Seppä.
Ref. Seppä (1996).

Hel-3616 Lake Ifjord 700 **6400 ± 110**
Gyttja, depth 7.00 m $\delta^{13}C = -29.1‰$

Hel-3617 Lake Ifjord 760 **8290 ± 140**
Gyttja, depth 7.60 m $\delta^{13}C = -29.6‰$

Hel-3618 Lake Ifjord 780 **9360 ± 100**
Gyttja, depth 7.80 m $\delta^{13}C = -28.4‰$

Hel-3619 Lake Ifjord 845 **10600 ± 190**
Gyttja, depth 8.45 m $\delta^{13}C = -21.0‰$

Hel-3643 Lake Ifjord 634 **3440 ± 90**
70°55'N, 27°25'E, 317 m a.s.l. **$\delta^{13}C$ = -29.6‰**
Gyttja, depth 6.34 m

ABOA VETUS SERIES, TURKU

Coll. and subm. 1994 by K. Uotila.
Ref. Uotila (1998).

Hel-3620 Sample 7 **780 ± 70**
Charcoal **$\delta^{13}C$ = -23.3‰**

Hel-3621 Sample 8 **810 ± 70**
Charcoal and wood **$\delta^{13}C$ = -23.0‰**

Hel-3624 Sample 19 **470 ± 60**
Mortar **$\delta^{13}C$ = -16.2‰**

Hel-3625 Sample 32 **340 ± 60**
Mortar **$\delta^{13}C$ = -16.8‰**

Hel-3622 KIVIVAARA, ENONTEKIÖ **3820 ± 80**

68°25'N, 24°30'E **$\delta^{13}C$ = -23.1‰**
A wood sample coll. and subm. 1994 by T. Kurkela.
Comment (TK): Based on dendrochronology the sample should be either 1000 or 7000 years old.

KARELIAN ISTHMUS SERIES, RUSSIA

General comment (PU): These are the results of a limited dating program carried out as part of a study of the Bronze and Iron Ages in the former Finnish part of the Karelian Isthmus. The names given below are the traditional Finnish names; the current Russian names of the municipalities are given in parentheses.
Ref. Uino (1997).

Hel-3623 Naskalinmäki, Lapinlahti, **890 ± 70**
Sakkola (Ol'hovka) **$\delta^{13}C$ = -24.4‰**
60°38'N, 30°19'E; 40 m a.s.l.
Coll. 1921 by A. Europaeus and subm. 1994 by P. Uino.
KM 7901:26, charcoal, depth 0.60 m
Comment (PU): Sample taken from burial stone structure (low cairn or level ground cremation cemetery). The C-14 Age (calibrated to AD 1040-1240) is younger than the age assigned to the most of the artefacts (AD 700-900), which suggests the later activity at the site.

Hela-8 **Hovinsaari, Kalmistomäki, Räisälä (Mel'nikovo)** **2360 ± 70** **$\delta^{13}C$ = -26.1‰**
60°55'N, 29°46'E; 15 m a.s.l.
Coll. 1887-88 by Th. Schvindt and subm 1994 by P. Uino.
KM 2556, charred crust
Comment (PU): Samples of charred crust from ceramic vessels. Hela-8 represents Luukonsaari asbestos ware. Hela-9 and Hela-10 represent Iron Age type pottery. The archaeological datings agree with the results from radiocarbon dating.

Hela-9 **Hovinsaari, Tontinmäki, Räisälä (Mel'nikovo/Krotovo)** **1350 ± 65** **$\delta^{13}C$ = -25.3‰**
60°55'N, 30°02'E; 10-15 m a.s.l.
KM 2592:146, charred crust
Comment: See Hela-8.

Hela-10 **Unnunkoski, Räisälä (Mel'nikovo/Gori)** **1280 ± 65**
60°58'N, 29°50'E; 10-15 m a.s.l. **$\delta^{13}C$ = -28.8‰**
KM 2594, charred crust
Comment: See Hela-8.

Hela-11 **Suotniemi, Käkisalmi (Priozersk/Yarkoye)** **1490 ± 65**
61°02'N, 30°07'E; 15 m a.s.l. **$\delta^{13}C$ = -25.0‰**
Coll. 1991 by P. Uino and A. I. Saksa, subm 1994 by P. Uino.
Charred crust, depth 0.25-0.35 m
Comment (PU): Charred crust from Iron Age type pottery. The C-14 age indicates that there has been activity at the site already in the 6th-7th centuries AD. The neighboring Suotniemi cemetery is dated to the 12th-13th centuries.

Hela-13 **Käkisalmi Fortress (Priozersk)** **910 ± 75**
61°01'N, 30°08'E; 5-10 m a.s.l. **$\delta^{13}C$ = -23.6‰**
Coll. 1990 by P. Uino and A. I. Saksa, subm 1994 by P. Uino.
Seed, depth 1.80-2.00 m
Comment (PU): This C-14 age is younger than other radiocarbon dates from the Käkisalmi Fortress. The earliest archaeological finds from this site date to the 8th century AD.
Ref. Kankainen et al. (1995), Uino (1997).

Hel-3624 – Hel-3625 See ABOA VETUS SERIES Hel-3620

PASKOLAMPI SERIES, YLIKIIMINKI

65°05'N, 26°15'E; 82.80 m a.s.l.
Coll. 1994 and subm. 1995 by H. Hellsten.

Hel-3626 **Paskolampi 406-411 cm + I** **5520 ± 140**
Gyttja, depth 4.06-4.11 m **$\delta^{13}C$ = -33.1‰**

Hel-3627 Paskolampi 411-416 cm + I **5520 ± 130**
Gyttja, depth 4.11-4.16 m **$\delta^{13}C$ = -32.1‰**

Hel-3628 - Hel-3632 See WESTERN DESERT SERIES Hel-3607

LAKKASUO SERIES, ORIVESI

61°48'N, 24°19'E; 150 m a.s.l.
Coll. 1994 by S. Jauhiainen, V-M. Komulainen and E. Tuittila.,
subm. 1995 by J. Laine.
Ref. Laine and Minkkinen (1996), Minkkinen et al. (1999).

2L25 (I)

Hel-3633 **1590 ± 110**
Peat, depth 1.00-1.05 m **$\delta^{13}C$ = -27.7‰**

Hel-3635 **3520 ± 100**
Peat, depth 1.79-1.84 m **$\delta^{13}C$ = -29.8‰**

Hel-3636 **4180 ± 110**
Peat, depth 1.84-1.89 m **$\delta^{13}C$ = -29.0‰**

Hel-3637 **4760 ± 100**
Peat, depth 1.89-1.945 m (= bottom) **$\delta^{13}C$ = -29.8‰**

2L25 (II)

Hel-3645 **1720 ± 90**
Peat, depth 1.00-1.05 m **$\delta^{13}C$ = -27.6‰**

Hel-3646 **2690 ± 100**
Peat, depth 1.43-1.48 m **$\delta^{13}C$ = -28.4‰**

Hel-3647 **3830 ± 90**
Peat, depth 1.815-1.865 m **$\delta^{13}C$ = -29.4‰**

Hel-3648 **4150 ± 100**
Peat, depth 1.865-1.915 m **$\delta^{13}C$ = -29.2‰**

Hel-3649 **5530 ± 100**
Peat, depth 1.915-1.965 m **$\delta^{13}C$ = -29.9‰**

3L25 (I)

Hel-3650 **1460 ± 110**
Peat, depth 1.00-1.05 m **$\delta^{13}C$ = -27.8‰**

Hel-3651	**2400 ± 100**
Peat, depth 1.745-1.795 m	**$\delta^{13}C$ = -26.5‰**
Hel-3652	**3460 ± 100**
Peat, depth 2.417-2.467 m	**$\delta^{13}C$ = -27.2‰**
Hel-3653	**3410 ± 90**
Peat, depth 2.467-2.517 m	**$\delta^{13}C$ = -28.3‰**
Hel-3654	**4350 ± 100**
Peat, depth 2.517-2.617 m (= bottom)	**$\delta^{13}C$ = -28.8‰**

3L25 (II)

Hela-33	**1530 ± 55**
Peat, depth 1.00-1.05 m	**$\delta^{13}C$ = -28.1‰**
Hel-3656	**2310 ± 100**
Peat, depth 1.745-1.795 m	**$\delta^{13}C$ = -28.4‰**
Hel-3657	**3480 ± 100**
Peat, depth 2.450-2.50 m	**$\delta^{13}C$ = -27.8‰**
Hel-3658	**3580 ± 100**
Peat, depth 2.50-2.55 m	**$\delta^{13}C$ = -26.8‰**
Hel-3659	**4340 ± 100**
Peat, depth 2.55-2.625 m (= bottom)	**$\delta^{13}C$ = -28.5‰**

JOKINIEMI SERIES, VANTAA

60°17'N, 25°02'E; 23-25 m a.s.l.
Coll. 1993 and 1994 and subm. 1995 by K. Katiskoski.
General comment (KK): These samples were collected during the excavation in 1994 at the large dwelling site complex of Jokiniemi-Stenkulla-Maarinkunnas on the western bank of the river Keravanjoki in Vantaa. The complex is mainly dated to the Typical and Late Combed Ware stage (Ka II-III:1) of the Neolithic. Sample Hel-3634 (5040 ± 80 BP) is from a hearth with sherds of Corded Ware as well, but is to be connected with Combed Ware. Hela-31 (880 ± 50 BP) is from the cultural layer below the present field representing late prehistoric/early medieval activities. The third sample is from *Corylus avellana* nutshells and is in accordance with the archaeological dating of the site (Hela-32: 4885 ± 60 BP). The relation of dating between charcoal on one hand and nutshells on the other hand is equal with a few datings of charcoal and charred crust from ceramics on the eastern bank of the river, i.e. charcoal gives older dates than nutshells or charred crust etc. The datings also refer to later activities at the site (cf. Hel-2470 and Hel-2471: 760 ± 90 and 560 ± 120 BP in Jungner and Sonninen 1996).
Ref. In Edgren et al., eds. (1996).

Hel-3634 Sample **5040 ± 80**
Charcoal, depth 0.25 m **$\delta^{13}C$ = -25.3‰**

Hela-31 Juniper berry 94:1 **880 ± 50**
Charred, depth 0.35 m **$\delta^{13}C$ = -25.9‰**

Hela-32 KM 28382 **4885 ± 60**
Charred nutshell (*Corylus avellana)*, depth 0.40 m **$\delta^{13}C$ = -25.3‰**

Hel-3635 – Hel-3637 See LAKKASUO SERIES Hel-3633

TAHIRBAJ SERIES, TURKMENISTAN

Coll. and subm.1993 by M Cattani

Hel-3638 THR-1 A1 19 **2080 ± 110**
Charcoal **$\delta^{13}C$ = -12.2‰**

Hel-3639 THR-1 A3 36 **2560 ± 110**
Charcoal **$\delta^{13}C$ = -10.7‰**

Hel-3641 THR-1 A3 141 **2560 ± 90**
Charcoal **$\delta^{13}C$ = -20.5‰**

VÄLIKANGAS SERIES, KAAKKURI, OULU 22

64°57'N, 25°32'E; 16.5 m a.s.l.
Coll. 1988 by M. Mäkivuoti and subm. 1995 by M. Mäkivuoti and C. Carpelan (Early in the North Project).
General comment (MM): The charcoal samples are from burials in cairn No. 2: Hel-3640 from burial No. 2 (cremation) and Hel-3642 from burial No. 7 (cremation). The radiocarbon dates are in conflict with the archaeological dating. The artifacts from the burials date to the Roman Iron Age.

Hel-3640 KM 24597:46 **660 ± 90**
Charcoal, depth 0.45 m **$\delta^{13}C$ = -24.7‰**

Hel-3642 KM 24597:48 **150 ± 70**
Charcoal, depth 0.50 m **$\delta^{13}C$ = -25.7‰**

Hel-3641 See TAHIRBAJ SERIES Hel-3638

Hel-3642 See VÄLIKANGAS SERIES Hel-3640

Hel-3643 See IFJORD SERIES Hel-3616

Hel-3644 See HOPSEIDET SERIES Hel-3539

Hel-3645 – Hel-3654 See LAKKASUO SERIES Hel-3633

Hel-3655 KULTISALMI, RANUA 37 **5360 ± 90**
$\delta^{13}C$ = -25.3‰

66°05'N, 27°07'E; 177 m a.s.l.
Coll. 1991 by K. Katiskoski and subm 1995 by K. Katiskoski and C. Carpelan (Early in the North Project).
Sample 7, KM 25927, charcoal, depth 0.30 m
Comment (KK): The sample is a part of a series of seven samples, six of which have been dated earlier – see Kultisalmi Series in Jungner and Sonninen (1998); also In: Edgren et al., eds. (1995). They represent an extended chronology of the large dwelling site of Kultisalmi by the lake Simojärvi in Ranua, Northern Ostrobothnia. The earlier samples are dated to the Mesolithic (Hel-3182: 7320 ± 140 BP), the Early Metal Age (Hel-3081: 2600 ± 80 BP) and the Iron Age (Hel-3082-Hel-3084: 1760 ± 100; 1570 ± 90; 1650 ± 100 and Hel-3183: 1090 ± 110 BP). The sample at hand was collected from a hearth in the western part of the site with sherds of Early Neolithic Sär 1 pottery. The dating (5360 ± 90 BP) seems rather late compared with the dating of that pottery. There is, however, even typical Combed Ware Style 2 further east at the site. The sampled hearth was located in a lower stratum compared with an adjoining hearth-pit visible on the ground with the youngest date of the site.

Hel-3656 – Hel-3659 See LAKKASUO SERIES Hel-3633

IILOMPOLO SERIES, IIJÄRVI

Coll. and subm. 1995 by H. Hyvärinen.
General comment (HH): The dates indicate a slow rate of sedimentation from early to mid-Holocene times (from ca. 8000 to 4000 BP), and an accelerated rate during the last 4000 years. This trend, observed in several lake sediment cores from Lapland, is assumed to reflect a late Holocene rise in lake-level stands in Lapland, hence an increase in the climatic humidity.
Ref. Hyvärinen and Alhonen (1994), Mäkelä (1998), Eronen et al. (1999).

Hel-3660 Sample 1 **1070 ± 100**
Gyttja, depth 0.20-0.25 m **$\delta^{13}C$ = -24.1‰**

Hel-3661 Sample 2 **1980 ± 90**
Gyttja, depth 0.50-0.55 m **$\delta^{13}C$ = -24.2‰**

Hel-3662 Sample 3 **2690 ± 90**
Gyttja, depth 0.80-0.85 m **$\delta^{13}C$ = -24.6‰**

Hel-3663 Sample 4 **3450 ± 90**
Gyttja, depth 1.10-1.15 m **$\delta^{13}C$ = -24.1‰**

Hel-3664 Sample 5 **4900 ± 110**
Gyttja, depth 1.40-1.45 m **$\delta^{13}C$ = -24.5‰**

Hel-3665 Sample 6 **7890 ± 110**
Gyttja, depth 1.65-1.70 m **$\delta^{13}C$ = -24.3‰**

TERVANIEMI SERIES, TAIVALKOSKI 37

65°34'N, 29°00'E; 239-240 m a.s.l.
Coll. 1993 and 1994 and subm. 1995 by E. Raike and J. Saukkonen.
Ref. In Edgren et al., eds. (1996).

Hel-3666 Sample 1994/1 **6250 ± 100**
Charcoal, depth 0.20 m **$\delta^{13}C$ = -26.3‰**

Hel-3669 Sample 3 **7140 ± 110**
KM 28128:1375, charcoal, depth 0.30 m **$\delta^{13}C$ = -25.0‰**

Hel-3670 Sample 6 **2750 ± 80**
KM 28128:1375, charcoal, depth 0.40 m **$\delta^{13}C$ = -25.5‰**

Hela-27 **6015 ± 170**
Chewing resin, depth 0.10 m **$\delta^{13}C$ = -26.0‰**

Hel-3667 – Hel-3668 See POIKAMELLA SERIES Hel-3645

Hel-3669 – Hel-3670 See TERVANIEMI SERIES Hel-3666

KITULANSUO SERIES, RISTIINA

61°30'N, 27°22'E; 82 m a.s.l.
Coll. 1994-1995 and subm. 1995-1996 by M. Lavento.
Ref. In Edgren et al., eds. (1998).

Hel-3671 Sample No. 1 **550 ± 90**
Charcoal, depth 0.30 m **$\delta^{13}C$ = -26.1‰**

Hel-3672 Sample No. 2 **530 ± 80**
Charcoal, depth 0.30 m **$\delta^{13}C$ = -25.6‰**
Comment (ML): The purpose of both samples Hel-3671 and Hel-3672 was to date the fireplaces found at an Early Metal Age dwelling site. A great majority of the ceramics found during the excavation was of the Sarsa-Tomitsa Ware while a small number of ceramics belongs to the

Luukonsaari Ware. According to the finds, the C-14 dates should fall between 3500-1500 BP. Because the results show unexpectedly recent dates, it is possible that later fires (possibly natural forest fires) have occurred at the site. At the excavation some traces of lighthouse structures dating to the Historical Period were located, which might explain the datings.

Hel-3836 Sample No. 15 **2170 ± 90**
Charcoal, depth 0.30 m **$\delta^{13}C$ = -24.6‰**
Comment (ML): Metal Age dwelling site. The find context around the hearth was Sarsa-Tomitsa Ware. Compared with the AMS-date (Hela-104) of Sarsa-Tomitsa Ware at the site, this date is very late.

Hel-3837 Sample No. 23 **1530 ± 80**
Charcoal, depth 0.30 m. **$\delta^{13}C$ = -26.4‰**
Comment (ML): The sample was taken from an iron smelting furnace of Eastern type. The context seems clean and some sherds of Luukonsaari ceramics were collected from the furnace during the excavation. The sample is very large and also TL-samples have been taken.

Hela-104 KM 28960:586 **3220 ± 65**
Charcoal **$\delta^{13}C$ = -30.2‰**
Comment (ML): Charred crust from the surface of a sherd of Sarsa-Tomitsa Ware. The purpose of dating was to get more exact dates for the use of Sarsa-Tomitsa Ware in Finland. The date refers to the beginning of the period.

TÖÖLÖNLAHTI SERIES, HELSINKI

60°11'N, 24°57'E; 0.30-0.60 m a.s.l.
Coll. and subm. 1995 by M. Tikkanen.
General comment (MT): The dates are not in correspondence to the sedimentation stratigraphy due to the contamination of the upper samples with older sediments washed off the slopes in the course of land uplift and field clearance.
Ref. Tikkanen et al. (1996).

Hel-3673 Sample 1 **1780 ± 80**
Clay+gyttja, depth 1.45-1.55 m **$\delta^{13}C$ = -23.5‰**

Hel-3674 Sample 2 **1950 ± 100**
Clay+gyttja, depth 2.45-2.55 m **$\delta^{13}C$ = -19.6‰**

Hel-3675 Sample 3 **1650 ± 100**
Clay+gyttja, depth 3.40-3.55 m **$\delta^{13}C$ = -22.3‰**

SODANKYLÄ SERIES, SODANKYLÄ

Coll. 1994 and subm. 1995 by K. Katiskoski.
General comment (KK): These samples were collected from two site excavations due to the planned construction of the Kelukoski hydro power-station on the river Kitinen, just N of the village of Sodankylä in Lapland. The samples from the small dwelling site of Kelukoski E by the rapids of Kitinen were collected from the cultural layer. The first sample (Hel-3676: 4610 ± 100 BP) comes from excavation area 3 with mainly finds of quarts, quartzite and slate and a single rimsherd of Sär 2 asbestos ware. The Neolithic date of the sample was older than expected as compared with the Early Metal Age pottery and may represent an older occupation of the site. The other sample (Hel-3677: 4470 ± 80 BP) from a trial-pit with lithic finds and burnt bones refers to the same Neolithic occupation horizon. Taking into consideration the dates of the samples, the single sherd of Sär 2 Ware and the location of the site as well it seems probable that the site has been in frequent use during the Neolithic and the Early Metal Age, at least.
The site of the third sample (Hel-3678: 2510 ± 80 BP), Neulaniemi (Neulanniemi), is a small camp with a number of pits (pitfalls?) on an ancient riverbank? close to the confluence of the tributary river Sattasjoki with the river Kitinen, 11 km NNE of the village of Sodankylä. The sample was taken from the bottom layer of a pit 2 by 3 m across, already covered with sand in ancient times. The finds consist of quartz with tools (scrapers, knives and arrowheads). No pottery was found. Burnt bone of beaver, elk and deer was extensive. An older dating of the sample was expected even though there is no direct conflict with the finds of the site.
Ref. In Edgren et al., eds. (1996).

Hel-3676 Sample 1/Kelukoski **4610 ± 100**
67°27'N, 26°31'E; 181 m a.s.l. **$\delta^{13}C$ = -25.4‰**
Charcoal, depth 0.25 m

Hel-3677 Sample 2/Kelukoski **4470 ± 80**
67°27'N, 26°31'E; 182 m a.s.l. **$\delta^{13}C$ = -25.2‰**
Charcoal, 0.35-0.50 m

Hel-3678 Sample 3/Neulaniemi **2510 ± 80**
67°31'N, 26°37'E; 180 m a.s.l. **$\delta^{13}C$ = -25.2‰**
Charcoal, depth 0.10-0.15 m

KOTIJÄNKÄ SERIES, ROVANIEMI 469

66°28'N, 25°56'E; 84.70 m a.s.l.
Coll. 1991 and 1994 by H. Kotivuori and subm. 1994 and 1995 by H. Kotivuori and C. Carpelan (Early in the North Project).
General comment: See Sierijärvi 469 Series in Jungner and Sonninen (1998); also Kotivuori (1996). See Charred Crust Series (Hela-35 this volume).

Hel-3679 469 Sample 3 **2070 ± 90**
Charcoal, depth 0.15 m **$\delta^{13}C$ = -25.1‰**

Hel-3688 469 Sample 4 — **1950 ± 80**
Charcoal, depth 0.15 m — **$\delta^{13}C$ = -25.9‰**

Hel-3689 469 Sample 6 — **2230 ± 80**
Charcoal, depth 0.10-0.15 m — **$\delta^{13}C$ = -25.3‰**

Hela-14 KM 26780:81 — **2410 ± 75**
Charred crust from ceramics, depth 0.10-0.20 m — **$\delta^{13}C$ = -26.7‰**

Hela-15 KM 26780:88 — **2465 ± 75**
Charred crust from ceramics, depth 0.10-0.20 m — **$\delta^{13}C$ = -26.8‰**

Hela-16 KM 26780:255 — **2540 ± 80**
Charred crust from ceramics, depth 0.10-0.20 m — **$\delta^{13}C$ = -27.3‰**

KRASNOYARSK SERIES, RUSSIA

Coll. By F.Z. Glebov and subm. 1995 by H. Vasander.

Fomka Series

60°21'N, 90°31'E

Hel-3680 Fomka-1 — **2290 ± 100**
Peat, depth 2.40-2.50 m — **$\delta^{13}C$ = -27.2‰**

Hel-3681 Fomka-2 — **2620 ± 80**
Peat, depth 1.40-1.50 m — **$\delta^{13}C$ = -28.3‰**

Hel-3685 Fomka-3 — **3030 ± 100**
Peat, depth 3.40-3.50 m — **$\delta^{13}C$ = -25.5‰**

Hel-3686 Fomka-4 — **5980 ± 80**
Peat, depth 4.90-5.00 m — **$\delta^{13}C$ = -28.6‰**

Hel-3687 Fomka-5 — **7150 ± 120**
Peat, depth 5.90-6.00 m — **$\delta^{13}C$ = -28.4‰**

Hel-3696 Fomka-6 — **3860 ± 110**
Peat, depth 1.90-2.00 m — **$\delta^{13}C$ = -28.6‰**

Hel-3697 Fomka-7 — **2820 ± 110**
Peat, depth 2.90-3.00 m — **$\delta^{13}C$ = -26.9‰**

Hel-3698 Fomka-8 — **3920 ± 120**
Peat, depth 3.90-4.00 m — **$\delta^{13}C$ = -25.7‰**

Hel-3699 Fomka-9 — **5800 ± 110**
Peat, depth 5.40-5.50 m — **$\delta^{13}C$ = -28.0‰**

Hela-64 Fomka-10 — **6815 ± 105**
Peat, depth 6.30-6.40 m — **$\delta^{13}C$ = -24.6‰**

Hel-3736 River Khantayka c.Fomka — **4950 ± 100**
68°27'N, 89°05'E — **$\delta^{13}C$ = -27.7‰**
Peat, depth 3.10-3.30 m

Hel-3737 River Khantayka c Region — **430 ± 80**
68°27'N, 89°05'E — **$\delta^{13}C$ = -27.6‰**
Peat, depth 3.30-3.50 m

Kangatovo Series

63°41'N, 87°51'E

Hel-3721 Kangatovo-1 — **7870 ± 180**
Peat, depth 3.90-4.00 m — **$\delta^{13}C$ = -29.4‰**

Hel-3722 Kangatovo-2 — **6100 ± 110**
Peat, depth 3.60-3.70 m — **$\delta^{13}C$ = -29.2‰**

Hel-3723 Kangatovo-3 — **3700 ± 110**
Peat, depth 3.20-3.30 m — **$\delta^{13}C$ = -29.4‰**

Hel-3724 Kangatovo-4 — **3210 ± 100**
Peat, depth 2.80-2.90 m — **$\delta^{13}C$ = -26.4‰**

Hel-3725 Kangatovo-5 — **2780 ± 100**
Peat, depth 2.40-2.50 m — **$\delta^{13}C$ = -26.7‰**

Hel-3726 Kangatovo-6 — **2610 ± 100**
Peat, depth 2.00-2.10 m — **$\delta^{13}C$ = -26.8‰**

Hel-3727 Kangatovo-7 — **2170 ± 120**
Peat, depth 1.60-1.70 m — **$\delta^{13}C$ = -26.5‰**

Hel-3728 Kangatovo-8 — **1360 ± 100**
Peat, depth 1.20-1.30 m — **$\delta^{13}C$ = -27.5‰**

Hel-3729 Kangatovo-9 — **7280 ± 130**
Peat, depth 3.80-3.90 m — **$\delta^{13}C$ = -28.7‰**

Hel-3730 Kangatovo-10 — **4160 ± 100**
Peat, depth 3.40-3.50 m — **$\delta^{13}C$ = -29.0‰**

Hel-3731 Kangatovo-11 — **3280 ± 100**
Peat, depth 3.00-3.10 m — **$\delta^{13}C$ = -29.0‰**

Hel-3732 Kangatovo-12 — **2770 ± 100**
Peat, depth 2.60-2.70 m — **$\delta^{13}C$ = -26.6‰**

Hel-3733 Kangatovo-13 **2770 ± 110**
Peat, depth 2.20-2.30 m **$\delta^{13}C$ = -26.9‰**

Hel-3734 Kangatovo-14 **2010 ± 100**
Peat, depth 1.80-1.90 m **$\delta^{13}C$ = -26.7‰**

Hel-3735 Kangatovo-15 **1440 ± 100**
Peat, depth 1.40-1.50 m **$\delta^{13}C$ = -27.2‰**

KIIANMAA SERIES, KEMINMAA 23

65°43'N, 24°45'E; 33.35 m a.s.l.
Coll. 1993 by J. Okkonen and subm. 1995 by J. Okkonen and C. Carpelan (Early in the North Project).
General comment: See Hel-3236 in Jungner and Sonninen (1998). See also Charred Crust Series (Hela-35 this volume)
Ref. In Edgren et al., eds. (1996).

Hel-3682 KM 27700:4 **2370 ± 80**
Charcoal, depth 0.18 m **$\delta^{13}C$ = -25.2‰**
Comment (JO): Charcoal from a small soot pit located close to a cooking pit. An Iron Age date was accepted.

Hela-50 KM 28368:21 **2695 ± 115**
Subm. 1995 by C. Carpelan **$\delta^{13}C$ = -19.3‰**
Charred crust from ceramics
Comment (JO): Sär 2 Ware from the same context.

KUUSELANKANGAS SERIES I, YLI-II

65°21'N, 25°55'E; 60 m a.s.l.
Coll. 1994 by M. Makkonen and subm. 1995 by P. Koivunen and C. Carpelan (Early in the North Project).
General comment (MT): The results are in accordance with the archaeological results: the Late Stone Age (Kierikki Ware period). – See Kuuselankangas Series II (Hela-74 this volume). See also Charred Crust Series (Hela-35 this volume).

Hel-3683 Sample 1, 3B **4440 ± 110**
Charcoal **$\delta^{13}C$ = -25.3‰**

Hel-3684 Sample 2, 5A **4590 ± 120**
Charcoal **$\delta^{13}C$ = -25.7‰**

Hela-51 Sample II, KKK-94 **4800 ± 115**
Charred crust from ceramics **$\delta^{13}C$ = -23.4‰**

Hela-52 Sample III/152/30/8 **4420 ± 90**
Charred crust from ceramics **$\delta^{13}C$ = -23.2‰**

Hel-3685 – Hel-3687 See KRASNOYARSK SERIES (Fomka) Hel-3680

Hel-3688 – Hel-3689 See KOTIJÄNKÄ SERIES Hel-3679

RIITAKANRANTA SERIES, ROVANIEMI 474

66°27'N, 25°59'E; 90 m a.s.l.
Coll. 1990 and 1991 by H. Kotivuori and subm. 1995 by H. Kotivuori and C. Carpelan (Early in the North Project).
General comment: See Sierijärvi 474 A Series in Jungner and Sonninen (1998); see also Kotivuori (1996).

Hel-3690 474a Sample 7 **2080 ± 100**
Charcoal, depth 0.10-0.15 m **$\delta^{13}C$ = -25.7‰**

Hel-3691 474a Sample 8 **1650 ± 110**
Charcoal, depth 0.15 m **$\delta^{13}C$ = -25.9‰**

ISO LEHMÄLAMPI 1 SERIES, VIHTI

60°21'N, 24°26'E; 91.70 m a.s.l.
Coll. and subm. 1995 by K. Sarmaja-Korjonen.
General comment (K S-K): There were two layers of aquatic mosses in the lower section of the core. The core was collected from the deepest part of the lake where the depth of water was 8.1 m. This series dates the lower and upper boundaries of the moss layers. The ages are well in accordance with the pollen chronology and forest development in southern Finland.
Ref. Sarmaja-Korjonen (1998), Sarmaja-Korjonen and Alhonen (1999).

Hel-3692 IL 1 **8100 ± 120**
Gyttja, depth 2.11-2.18 m **$\delta^{13}C$ = -28.6‰**

Hel-3693 IL 2 **7930 ± 90**
Gyttja, depth 1.90-1.97 m **$\delta^{13}C$ = -29.3‰**

Hel-3694 IL 3 **7300 ± 120**
Gyttja, depth 1.68-1.75 m **$\delta^{13}C$ = -31.2‰**

Hel-3695 IL 4 **7260 ± 140**
Gyttja, depth 1.55-1.62 m **$\delta^{13}C$ = -32.1‰**

Hel-3696 – Hel-3699 See KRASNOYARSK SERIES (Fomka) Hel-3680

Hel-3700 – Hel-3708 See SUOSILMU PROJECT (Separate samples) Hel-3608

VEHKO SERIES, KOTKA

60°38'N, 26°47'E; 35 m a.s.l.
Coll. 1993 by K. Tolonen and K. Weckström, subm. 1995 by K. Weckström.
Ref. Weckström (1996).
Comment (KW): The samples Hel-3715 and Hel-3718 are younger than expected, suggesting a very high accumulation rate of ~0.5/1.3 cm/year. One reason for this could be the transportation of present carbon via roots of, for example, *Ericaceae,* which were abundant at the site.

Hel-3709 Vehko I — **3640 ± 100**
Peat, depth 2.41-2.44 m — **$\delta^{13}C$ = -29.8‰**

Hel-3710 Vehko II — **980 ± 90**
Peat, depth 1.45-1.49 m — **$\delta^{13}C$ = -27.2‰**

Hel-3715 Vehko III — **220 ± 90**
Peat, depth 0.95-1.00 m — **$\delta^{13}C$ = -25.8‰**

Hel-3718 Vehko IV — **40 ± 90**
Peat, depth 0.50-0.55 m — **$\delta^{13}C$ = -24.9‰**

BACTRIA SERIES, UZBEKISTAN

Subm. by F. Hiebert.

Hel-3711 Sample 1, Djarkutan Citadel — **3690 ± 90**
Charcoal — **$\delta^{13}C$ = -25.9‰**

Hel-3712 Sample 2, Djarkutan Klom — **3450 ± 80**
Charcoal — **$\delta^{13}C$ = -23.6‰**

Hel-3713 Sample 3, Djarkutan Citadel — **3710 ± 90**
Charcoal — **$\delta^{13}C$ = -23.5‰**

Hel-3714 Sample 4, Djarkutan Citadel — **3670 ± 120**
Charcoal — **$\delta^{13}C$ = -24.0‰**

Hel-3716 Sample 5, Sapalli depe — **3590 ± 90**
Charcoal — **$\delta^{13}C$ = -25.1‰**

Hel-3717 Sample 6, Talashkan depe — **2330 ± 80**
Charcoal — **$\delta^{13}C$ = -25.3‰**

Hel-3715 See VEHKO SERIES Hel-3709

Hel-3716 – Hel-3717 See BACTRIA SERIES Hel-3711

Hel-3718 See VEHKO SERIES Hel-3709

RUOKOLAMMINSUO SERIES, VIROLAHTI

60°36'N, 27°30'E; 20 m a.s.l.
Coll. and subm. 1995 by A, Miettinen and H. Hyvärinen.
Ref. Miettinen (2002).

Hel-3719 Ruo 1 **5700 ± 110**
Gyttja, depth 1.67-1.74 m **$\delta^{13}C$ = -25.8‰**

Hel-3720 Ruo 2 **7520 ± 110**
Gyttja, depth 1.92-1.98 m **$\delta^{13}C$ = -26.1‰**

Hela-61 Ruo 3 **5035 ± 115**
Water plant, depth 1.77 m **$\delta^{13}C$ = -27.6‰**

Hela-62 Ruo 4 **4425 ± 100**
Wood, depth 1.57 m **$\delta^{13}C$ = -28.7‰**

Hel-3721 – Hel-3735 See KRASNOYARSK SERIES (Kangatovo) Hel-3680

Hel-3736 – Hel-3737 See KRASNOYARSK SERIES (Fomka) Hel-3680

Hel-3738 SIRKKA 3, SIRKKAJÄRVI **9310 ± 160**
$\delta^{13}C$ = -24.5‰

60°51'N, 25°25°E; 131.90 m a.s.l.
Coll. and subm. 1995 by A. Korhola and M. Tikkanen.
Clay and gyttja, depth 8.82-8.85 m

Hel-3739 – Hel-3746 See SUOSILMU PROJECT (Lakkasuo) Hel-3608

IRON PRODUCTION SITE SERIES

Coll. and subm 1995 (Hel-3747 – Hel-3778) and 1996 (Hel-3872 – Hel-3875) by E. Suominen.
General comment (ES): Charcoal from heaps of charcoal at iron production sites.

Hel-3747 Rempsunsuo, Hyrynsalmi **340 ± 90**
64°33'N, 28°49'E; 205 m a.s.l. **$\delta^{13}C$ = -25.2‰**
Charcoal, depth 0.05-0.15 m

Hel-3748 Likosuo, Hyrynsalmi **90 ± 70**
64°45'N, 28°23'E; 166 m a.s.l. $\delta^{13}C = -26.3‰$
Charcoal, depth 0.05-0.15 m

Hel-3777 Multipuro, Hyrynsalmi **90 ± 90**
64°44'N, 28°21'E; 186 m a.s.l. $\delta^{13}C = -26.1‰$
Charcoal, depth 0.05-0.10 m
Comment (ES): According to local tradition this iron production site dates to the end of the 18th or beginning of the 19th century.

Hel-3778 Autioniemi E, Kuhmo **160 ± 70**
64°04'N, 29°10'E; 165 m a.s.l. $\delta^{13}C = -26.7‰$
Charcoal, depth 0.02-0.10 m

Hel-3872 Rautaruukinaho, Suomussalmi **380 ± 90**
64°41'N, 29°15'E; 237 m a.s.l. $\delta^{13}C = -25.9‰$
Charcoal, depth 0.02-0.10 m

Hel-3873 Naamankajärvi SE, Suomussalmi **340 ± 80**
65°04'N, 28°17'E; 185 m a.s.l. $\delta^{13}C = -25.9‰$
Charcoal, depth 0.05-0.10 m

Hel-3874 Akkosuo, Hyrynsalmi **350 ± 90**
64°35'N, 28°59'E; 190 m a.s.l. $\delta^{13}C = -26.3‰$
Charcoal, depth 0.05-0.10 m

Hel-3875 Honkamäki, Hyrynsalmi **300 ± 80**
64°35'N, 28°46'E; 215 m a.s.l. $\delta^{13}C = -25.3‰$
Charcoal, depth 0.05-0.15 m

Hel-3951 Hyttisuo, Hyrynsalmi **120 ± 80**
64°44'N, 28°14'E; 202 m a.s.l. $\delta^{13}C = -24.3‰$
Coll. 1991 and subm. 1996 by E. Suominen.
Comment (ES): Charred wood from outer structure of a shaft furnace at an iron production site, depth 0.70 m.

Hel-3749 – Hel-3764 See SUOSILMU PROJECT (Separate samples) Hel-3608

Hel-3765 – Hel-3769 See WESTERN DESERT SERIES Hel-3607

Hel-3770 – Hel-3776 See SUOSILMI PROJECT (Separate samples) Hel-3608

Hel-3777 – Hel-3778 See IRON PRODUCTION SITE SERIES Hel-3747

Hel-3779 KIVIJÄRVI, ÄETSÄ **330 ± 70**
$\delta^{13}C$ = -23.1‰

Coll. 1995 by L. Tomanterä, subm. 1995 by T. Heikkurinen-Montell.
KM 28867, wood of ski
Comment: A museum piece.

VTT PROJECT K5SU00146

Subm. 1995-1996 by E. Suokas and T. Jakobsson.

Hel-3780 TUPA 1 **780 ± 80**
Peat **$\delta^{13}C$ = -25.0‰**

Hel-3781 TUPA 2 **1280 ± 80**
Peat **$\delta^{13}C$ = -26.3‰**

Hel-3888 TUPA 5/1 **1110 ± 30**
Cottongrass **$\delta^{13}C$ = -25.**

Hel-3916 TUPA 5/1 **modern**
Cottongrass **$\delta^{13}C$ = -24.**

Hel-3930 B5L **1180 ± 70**
Cottongrass **$\delta^{13}C$ = -24**

Hel-3782 – Hel-3795 See SUOSILMU PROJECT (Separate samples) Hel-3608

ROGOVAYA RIVER SERIES, RUSSIA

67°16'N, 62°09'E (Rog 2)
67°15'N, 62°05'E (Rog 3)
Coll. and subm. 1995 by P. Oksanen.
Ref. Alekseeva et al. (1998), Oksanen et al. (1998).

Hel-3796 ROG 2 **3120 ± 100**
Peat, depth 0.50-0.55 m **$\delta^{13}C$ = -28.5‰**

Hel-3797 ROG 2 **2240 ± 90**
Peat, depth 0.20-0.25 m **$\delta^{13}C$ = -23.6‰**

Hel-3798 ROG 3 **1920 ± 100**
Peat, depth 0.20-0.25 m **$\delta^{13}C$ = -27.8‰**

Hel-3799 ROG 3 **2860 ± 90**
Peat, depth 0.45-0.50 m **$\delta^{13}C$ = -28.4‰**

Hel-3800 – Hel-3810 See SUOSILMU PROJECT (Patvinsuo III) Hel-3608

Hel-3811 – Hel-3813 See WESTERN DESERT SERIES Hel-3607

Hel-3814 – Hel-3823 See SUOSILMU PROJECT (Lakkasuo) Hel-3608

OULU COOKING PIT SERIES

Subm. by T. Ylimaunu and C. Carpelan (Early in the North Project).
General comment (CC): Charcoal samples from cooking pits at seven different sites excavated by the University of Oulu, Dept. of Archaeology.
Ref. Alakärppä et al. (1997a), Alakärppä et al. (1997b), Ylimaunu (1999), in: Moisanen and Hamari, eds. (2000).

Hel-3824 **Korkiamaa, Keminmaa** **2000 ± 80**
Charcoal $\delta^{13}C = -25.0‰$

Hel-3825 **Rovavaara, Keminmaa** **2550 ± 100**
Charcoal $\delta^{13}C = -25.1‰$

Hel-3826 **Aaltokangas, Kortejärvenkangas, Kemi/Simo** **1610 ± 80**
Charcoal $\delta^{13}C = -25.6‰$

Hel-3827 **Länkimaa, Kemi** **1080 ± 80**
Charcoal $\delta^{13}C = -24.8‰$

Hel-3832 **Mäntymaa, Tornio** **1610 ± 80**
Charcoal $\delta^{13}C = -26.0‰$

Hel-3833 **Hangaskangas SW, Ii** **2400 ± 90**
Charcoal $\delta^{13}C = -25.1‰$

Hel-3834 **Petäjäniemi, Pudasjärvi** **2260 ± 100**
Charcoal $\delta^{13}C = -24.8‰$

Hel-3828 **HOSSANUMMI, MUURLA** **5250 ± 110**
$\delta^{13}C = -25.8‰$

60°22'N, 23°17'E; 48.82 m a.s.l.
Coll. 1995 and subm. 1996 by N. Strandberg.
Charcoal, depth 0.65 m
Ref. In Edgren et al., eds. (1998).

VASIKKANIEMI SERIES, KUHMO

64°04'N, 29°01'E
Coll. 1995 and subm. 1996 by T. Karjalainen.
General comment (TK): The samples are from a dwelling site with layers and contexts from the Mesolithic to the Iron Age and Historical Time.
Ref. In Edgren et al., eds. 1998

Hel-3829 SW 1+2 **1040 ± 90**
161.55 m a.s.l. **$\delta^{13}C$ = -26.2‰**
Charcoal, depth 0.30 m
Comment (TK): The sample is from a fireplace in contact with finds of the Early Metal Age/Historical Time like Textile Ceramics and glass beads.

Hel-3831 SW 13+14 **6080 ± 100**
160.95 m a.s.l. **$\delta^{13}C$ = -25.1‰**
Charcoal, depth 0.40 m
Comment (TK): The sample is from a big fireplace in contact with artefacts of quartz. A primitive stone axe from the Mesolithic was found nearby.

Hela-90 Sample 5 **6210 ± 125**
161.46 m a.s.l. **$\delta^{13}C$ = -26.6‰**
Charcoal, depth 0.30 m

Hela-93 Samples 3+4 **7380 ± 95**
161.46 m a.s.l. **$\delta^{13}C$ = -27.2‰**
Charcoal, depth 0.45 m

Hel-3830 KAUVONKANGAS, KANKAANJÄNKÄ, TERVOLA

3890 ± 90
$\delta^{13}C$ = -26.4‰

66°02'N, 24°51'E; 52.02 m a.s.l.
Coll. and subm. 1995 by H. Kotivuori and M. Torvinen.
Charcoal, sample is taken from pit house 6, depth 0.45 m
Comment (MT): The result is in accordance with the archaeological results: The Late Stone Age (Pöljä asbestos ceramic period).
Ref. In Edgren et al., eds. (1998).

HEL-3831 See VASIKKANIEMI SERIES Hel-3829

Hel-3832 – Hel-3834 See OULU COOKING PIT SERIES Hel-3824

TERVAKANGAS SERIES, RAAHE

64°35'N, 24°27'E
Coll. 1990-1993 by E. Jarva and subm. 1995-1996 by E. Jarva and C. Carpelan (Early in the North Project).
General comment: See Charred Crust Series (Hela-35 this volume).
Ref. Jarva (1999).

Hel-3835 KM 27913:120 **modern**
Charcoal $\delta^{13}C = -27.8‰$
Comment (CC): Charcoal from "a cooking pit" within the cemetery.

Hela-88 KM 26060 11/1 **1920 ± 75**
Charred crust from ceramics $\delta^{13}C = -24.9‰$

Hela-89 KM 26060 13/3 **1940 ± 75**
Charred crust from ceramics $\delta^{13}C = -24.4‰$

Hel-3836 – Hel-3837 See KITULANSUO SERIES Hel-3671

VÄTSÄRI SERIES, HIRVASLOMPOLO

69°28'N, 29°11'E; 210 m a.s.l.
Coll. and subm by H. Hyvärinen.
General comment (HH): The date for the moss lens at 1.50-1.55 m depth (Hel-3841) is clearly anomalous, and it suggested that the moss lens is not an original feature of the stratigraphy, but a coring artefact.
Ref. Mäkelä and Hyvärinen (2000).

Hel-3838 4 / V2 **1450 ± 90**
Gyttja, depth 0.20-0.30 m $\delta^{13}C = -28.1‰$

Hel-3839 3 / V2 **3700 ± 110**
Gyttja, depth 0.60-0.70 m $\delta^{13}C = -29.4‰$

Hel-3840 2 / V2 **6720 ± 100**
Gyttja, depth 1.05-1.15 m $\delta^{13}C = -32.1‰$

Hel-3841 1 / V2 **6240 ± 120**
Lens of Bryales moss, depth 1.50-1.55 m $\delta^{13}C = -32.7‰$

Hel-3968 2 B **7940 ± 110**
Depth 1.25-1.35 m $\delta^{13}C = -29.7‰$

Hel-3842 - Hel-3847 See SUOSILMU PROJECT (Separate samples) Hel-3608

LOWLANDS SERIES, HUDSON BAY, CANADA

Coll. 1992 and 1993 and subm. 1996 by P. Kuhry.

Hel-3848 Sample 1 S49A — **2210 ± 80**
57°23'N, 94°11'W; 100 m a.s.l. — **$\delta^{13}C$ = -27.5‰**
Peat, depth 1.21-1.30 m

Hel-3849 Sample 2A S50A — **1980 ± 90**
57°50'N, 94°12'W; 85 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Peat, depth, 1.06-1.14 m

Hel-3850 Sample 3 S50C — **4280 ± 110**
57°50'N, 94°12'W; 85 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
Peat, depth, 1.08-1.10 m

Hel-3851 Sample 5 S53 — **460 ± 90**
59°55'N, 104°13'W; 120 m a.s.l. — **$\delta^{13}C$ = -26.0‰**
Peat, depth, 0.41-0.42 m

UNITED ARAB EMIRATES SERIES

Coll. 1995 and subm. 1996 by J. Donner.
Comment (JD): The shells are from the flat coastal sabkha surface, 10 km ESE of Sila in northern UAE, with shell gravel about +2 m a.s.l. dating the Holocene high stand of sea level.

Hel-3852 UAE 1 Mactra — **5050 ± 110**
Marine shells — **$\delta^{13}C$ = +3.1‰**

Hel-3853 UAE 2 Conus — **5190 ± 100**
Marine shells — **$\delta^{13}C$ = +2.7‰**

Hel-3854 AMPANIHY, MADAGASCAR — **2430 ± 100**
$\delta^{13}C$ = -22.3‰

22°20'S, 44°43'E; 660 m a.s.l.
Coll. 1995 and subm. 1996 by J. Jernvall.
Sample 6, bone, depth 1.00-2.00 m
Comment (JJ): The Ampanihy site is near village Ampoza consisting of several subfossil sites exposed by eroding stream banks. This SW region of Madagascar is now dominated by grasslands but the subfossil fauna is largely made of extinct hippopotamus, crocodile and turtle remains with occasional giant lemur and *Aepyornis* (elephant bird) bones. Ampanihy fauna and sedimentology appear largely similar to Ampoza locality (dates Hela-156-158) but is older in age. People reached late the island of Madagascar and their arrival coincides with the disappearance of the Malagasy megafauna. Ampanihy and Ampoza sites appear to temporally bracket the estimated earliest arrival of humans to Madagascar. Thus these dates show that the Ampoza and Ampanihy sites can be used to examine the role of humans in the extinctions of Malagasy megafauna.

Hel-3855 KOURUJÄRVI, NABBA, KARLEBY **290 ± 90**
$\delta^{13}C$ = -24.1‰

22°20'N, 44°43'E
Charcoal coll. 1994 by M. Passoja and subm. 1996 by R. Sandström.

RIISINVÄLISUO SERIES, POSIO

66°13'N, 28°33'E; 423 m a.s.l.
Coll. 1993 and subm. 1996 by A. Huttunen.

Hel-3856 RVS 1 **3350 ± 120**
Peat, depth 0.29-0.36 m **$\delta^{13}C$ = -26.5‰**
Comment (AH): Sharp increase in *Picea, Calluna* and *Ericaceae*; with clearly increased *Sphagnum, Rubus chamaemorus* and *Selaginella.*

Hel-3857 RVS 2 **4910 ± 130**
Peat, depth 0.60-0.65 m **$\delta^{13}C$ = -28.0‰**
Comment (AH): Appearance of *Picea* in pollen, with slightly increased *Calluna* and *Ericaceae.*

KONILAMMENSUO SERIES

61°48'N, 24°17'E; 155 m a.s.l.
Coll. 1995 by S. Jauhiainen, V-M. Komulainen and J. Meronen, subm. 1996 by S. Jauhiainen.

Hel-3858 Sample 1 **3220 ± 100**
Peat, depth 0.45-0.50 m **$\delta^{13}C$ = -29.1‰**

Hel-3859 Sample 2 **4170 ± 110**
Peat, depth 0.95-1.00 m **$\delta^{13}C$ = -29.0‰**

Hel-3860 Sample 3 **5030 ± 100**
Peat, depth 1.45-1.50 m **$\delta^{13}C$ = -29.3‰**

Hel-3861 Sample 4 **6430 ± 100**
Peat, depth 1.95-2.00 m **$\delta^{13}C$ = -29.3‰**

Hel-3862 Sample 5 **8130 ± 160**
Peat, depth 2.25-2.30 m (=bottom) **$\delta^{13}C$ = -28.7‰**

VIHERIÄSENNEVA SERIES

61°51'N, 21°14'E; 160 m a.s.l.
Coll. 1995 by S. Jauhiainen, V-M. Komulainen and J. Meronen, subm. 1996 by S. Jauhiainen.

Hel-3863 Sample 1 — **680 ± 90**
Peat, depth 0.45-0.50 m — **$\delta^{13}C$ = -22.8‰**

Hel-3864 Sample 2 — **1470 ± 100**
Peat, depth 0.95-1.00 m — **$\delta^{13}C$ = -22.2‰**

Hel-3865 Sample 3 — **3480 ± 120**
Peat, depth 1.45-1.50 m — **$\delta^{13}C$ = -25.8‰**

Hel-3866 Sample 4 — **4330 ± 130**
Peat, depth 2.00-2.05 m — **$\delta^{13}C$ = -25.7‰**

Hel-3867 Sample 5 — **6070 ± 110**
Peat, depth 2.95-3.00 m — **$\delta^{13}C$ = -27.3‰**

Hel-3868 Sample 6 — **4730 ± 120**
Peat, depth 2.50-2.55 m — **$\delta^{13}C$ = -26.8‰**

Hel-3869 Sample 7 — **7280 ± 130**
Peat, depth 3.45-3.50 m — **$\delta^{13}C$ = -26.7‰**

Hel-3870 Sample 8 — **8490 ± 130**
Peat, depth 3.95-4.00 m — **$\delta^{13}C$ = -26.6‰**

Hel-3871 Sample 9 — **9110 ± 120**
Peat, depth 4.25-4.30 m — **$\delta^{13}C$ = -27.1‰**

Hel-3904 Sample 1 — **4220 ± 120**
Peat, depth 1.95-2.00 m — **$\delta^{13}C$ = -25.1‰**

Hel-3905 Sample 2 — **4640 ± 110**
Peat, depth 2.45-2.50 m — **$\delta^{13}C$ = -27.2‰**

Hel-3872 – Hel-3875 See IRON PRODUCTION SITE SERIES Hel-3747

KIRJAVALAMPI SERIES, RIEKKALANSAARI, SORTAVALA

Coll. and subm. 1996 by K. Tolonen.

Hel-3876 RIE 1 — **790 ± 90**
Gyttja, depth 0.34-0.38 m — **$\delta^{13}C$ = -31.8‰**

Hel-3877 RIE 2 — **1960 ± 100**
Gyttja, depth 0.74-0.78 m — **$\delta^{13}C$ = -30.4‰**

Hel-3878 RIE 3 — **3050 ± 110**
Gyttja, depth 1.29-1.33 m — **$\delta^{13}C$ = -30.2‰**

KUUPPALANLAMPI SERIES, KUUPPALA, KURKIJOKI

Coll. and subm. 1996 by K. Tolonen.

Hel-3879 Sample 1 — **1820 ± 90**
Gyttja, depth 0.67-0.71 m — **$\delta^{13}C$ = -32.6‰**

Hel-3880 Sample 2 — **4020 ± 100**
Gyttja, depth 1.27-1.31 m — **$\delta^{13}C$ = -33.0‰**

Hel-3881 Sample 3 — **6510 ± 100**
Gyttja, depth 1.92-1.96 m — **$\delta^{13}C$ = -34.2‰**

Hel-3882 Sample 4 — **7910 ± 130**
Gyttja, depth 2.32-2.36 m — **$\delta^{13}C$ = -34.0‰**

Hel-3883 Sample 5 — **8650 ± 120**
Gyttja, depth 2.47-2.51 m — **$\delta^{13}C$ = -34.1‰**

Hel-3884 Sample 6 — **8870 ± 100**
Gyttja, depth 2.62-2.66 m — **$\delta^{13}C$ = -33.5‰**

Hel-3885 RISTILAMPI, JUVA — **700 ± 80**
$\delta^{13}C$ = -24.3‰

Coll. and subm. 1996 by T. Jussila.
Charcoal, depth 0.25-0.30 m
Comment (TJ): The purpose of this sample is to date a quartz mine. There is a structure (an artificial terrace) underneath and charcoal on the bottom. The date is as expected.
Ref. In Edgren et al., eds. (1998)

Hel-3886 PERHONLAMPI — **4780 ± 100**
$\delta^{13}C$ = -32.5‰

63°32'N, 26°46'E; 101,70 m a.s.l.
Coll. 1995 and subm. 1996 by M. Tikkanen.
Gyttja, depth 4.97-5.07 m
Comment (MT): The date suggests that the mineral-rich streak in the sediment was most probably formed by rapid drop in the water level, when the Vuoksi outlet channel was created.
Ref. Virkanen and Tikkanen (1998).

Hel-3887 KUUSISTO 29/96 **620 ± 80**
$\delta^{13}C$ = -28.6‰

Coll. and subm. 1996 by A. Suna and K. Uotila.
Birch-bark
Comment (KU): In 1996 a birch-bark sample was taken from the log framework of tower C^1. During the excavation it was assumed that the bark was in direct association with the log framework and the construction of the wall.
Ref. Uotila (1998).

Hel-3888 See VTT PROJECT K5SU00146 Hel-3780

Hel-3889 – Hel-3901 See SUOSILMU PROJECT (Patvinsuo IV) Hel-3608

KRUUNUVUORENLAMPI SERIES, HELSINKI

60°11'N, 25°01'E; 8 m a.s.l.
Coll. 1996 by M. Tikkanen and H. Seppä, subm. 1996 by M. Tikkanen.
General comment (MT): The upper date is slightly older than the lower, but it is assumed that the date 2400 ± 100 is a relatively precise date for the isolation of the lake.
Ref. Seppä and Tikkanen (1998).

Hel-3902 Kruunuvuorenlampi I **2400 ± 100**
Gyttja, depth 2.78-2.84 m **$\delta^{13}C$ = -28.9‰**

Hel-3903 Kruunuvuorenlampi II **2420 ± 100**
Gyttja, depth 2.60-2.65 m **$\delta^{13}C$ = -28.4‰**

Hel-3904 – Hel-3905 See VIHERIÄISENNEVA SERIES Hel-3863

SAARASJÄRVI SERIES, VIROLAHTI

60°36'N, 27°30'E; 19.5 m a.s.l.
Coll. 1995 and subm. 1996 by A. Miettinen and H. Hyvärinen.
Ref. Miettinen and Hyvärinen (1997).

Hel-3906 Saa 1 **5940 ± 100**
Gyttja, depth 2.40-2.50 m **$\delta^{13}C$ = -29.7‰**

Hel-3907 Saa 2 **7630 ± 110**
Gyttja, depth 4.30-4.40 m **$\delta^{13}C$ = -29.1‰**

Hel-3908 LUOSSAKOADNELJAVRI, UTSJOKI **2270 ± 80**
$\delta^{13}C$ = -23.7‰

x = 77515, y = 34750; 110 m a.s.l.
Coll. and subm. 1996 by P. Zetterberg.
FIL5925, subfossil pine wood (*Pinus sylvestris L.*)
depth: bottom of lake, 0.80 m from the surface of the water
Comment (PZ): Important control sample confirming previous C-14 dating (Hel-834) of subfossil pine samples belonging to a group of trees dating to the latest end of 5000-year long floating pine tree-ring chronology from Finnish Lapland.
Ref. Zetterberg (1997, 1998).

MULTAVIERU SERIES, POLVIJÄRVI

62°55'N, 29°21'E; 100-101 m a.s.l.
Coll. and subm. 1996 by M. Lavento.
General comment (ML): Polvijärvi, Multavieru is a multi-period dwelling site, where habitation has begun during the Late Mesolithic Period. The following samples date different periods of habitation at the site. Hel-3909 dates the last habitation period to ca. 1750 AD, when bog iron and tar was produced at the site. Hel-3910 indicates more or less the use of Luukonsaari and Sirnihta Ware at the site. The Sample Hel-3911 was taken from the lowest excavation layer where Combed Ware of Styles 1 and 2 was found. In excavation area 1 it is possible to detect stratigraphy with the help of a statistical analysis.
Ref. In Edgren et al., eds. (1998).

Hel-3909 Sample 2 **380 ± 80**
Charcoal, depth 0.15 m **$\delta^{13}C$ = -24.4‰**

Hel-3910 Sample 12 **1480 ± 80**
Charcoal, depth 0.30 m **$\delta^{13}C$ = -25.7‰**

Hel-3911 Sample 13 **5550 ± 120**
Charcoal, depth 0.35 m **$\delta^{13}C$ = -25.2‰**

ROVANIEMI SERIES, ROVANIEMI

Coll. 1996 by C. Carpelan, H. Kotivuori, M. Lavento and M. Torvinen and subm. 1996 by C. Carpelan (Early in the North Project).
General comment (CC): Samples from two sediment columns taken at two different mires close to prehistoric sites. The purpose was to study human impact on the environment.

Hel-3912 Sample 1 = 4A+4B+4C, Sierijärvi **3800 ± 110**
66°28'N, 25°48'E **$\delta^{13}C$ = -28.4‰**
Peat

Hel-3913 Sample 2 = 5A+5B+5C, Kolpene **4390 ± 110**
66°27'N, 25°55'E **$\delta^{13}C$ = -29.3‰**
Peat

Hel-3914 – Hel-3915 See STRÅKA GÅRDSGRUPP SERIES Hel-3509

Hel-3916 See VTT PROJECT K5SU00146 Hel-3780

PURKAJASUO SERIES, YLI-II

65°23'N, 25°54'E; 50.05-50.10 m a.s.l.
Coll. 1996 by T. Ylimaunu and H-P. Schulz and subm. 1996 by H-P. Schulz.
General comment (H-P S): Hel-3917 and Hel-3918 are rests of wooden fish weirs covered by about 1 m river sediments; Hela 136 is burnt organic material from Pöljä Ware collected at a dwelling site. – See Hel-2740 in Jungner and Sonninen (1996).
Ref. In Edgren et al., eds. (1998).

Hel-3917 P 1271 — **4340 ± 100**
Wood, depth 1.15 m — **$\delta^{13}C$ = -27.9‰**

Hel-3918 P 1503 — **4460 ± 100**
Wood, depth 1.20 m — **$\delta^{13}C$ = -27.7‰**

Hela-136 Sample 3/1027/2091/2 — **4475 ± 60**
65°23'N, 25°59'E; 53 m a.s.l — **$\delta^{13}C$ = -28.8‰**
Charred crust, depth 0.20 m

SKI, RUNNER AND PADDLE SERIES

Subm. 1996 by M. Torvinen and C. Carpelan (Early in the North Project).

Hel-3919 Periläkangas, Enontekiö 272 — **1080 ± 70**
68°24'N, 23°45'E; 290 m a.s.l. — **$\delta^{13}C$ = -23.5‰**
KM 29775, wood
Comment (MT): Runner from a little lake

Hel-3920 Syväjärvi Uijajoki, Enontekiö 111 — **1150 ± 90**
68°37'N, 22°33'E; 420 m a.s.l. — **$\delta^{13}C$ = -24.5‰**
KMKT 5063, wood
Comment (MT): Runner from a mire ("below turf").

Hel-3921 Syväkangas, Kemi — **540 ± 90**
65°44'N, 24°37'E; 2.5 – 5 m a.s.l. — **$\delta^{13}C$ = -26.3‰**
KMTK 5391, wood, depth 1.75 m
Comment (MT): Paddle from a water main ditch.

Hel-3922 Kallioneva, Pattijoki 10 — **3800 ± 100**
64°40'N, 24°46'E; 45 m a.s.l. — **$\delta^{13}C$ = -26.2‰**
KM 11927, wood, depth 1.50 m
Comment (MT): Ski from bed between layers of sand and clay dated by pollen analysis to 1600-1900 BC.

Hel-3923 Tervajänkkä, Kemijärvi 278 **990 ± 90**
66°53'N, 27°26'E; 163 m a.s.l. **$\delta^{13}C$ = -25.8‰**
LLM 554, wood
Comment (MT): Ski from a moor ditch. The date is in agreement with the archaeological date to the Viking Age based on ornamental decoration.

Hel-3925 Pasmajärvi, Enontekiö 113 **2960 ± 80**
68°22' N, 24°47' E; 300 m a.s.l. **$\delta^{13}C$ = -25.5‰**
KMKT 8153, wood from runner

Hel-3926 Karvakkoaapa, Kemijärvi 312 **1180 ± 80**
66°45'N, 27°19'E; 161 m a.s.l. **$\delta^{13}C$ = -22.0‰**
KMKT 8225:2, wood from runner

Hel-3927 Maantieuoma, Sodankylä **1190 ± 80**
67°70'N, 25°42'E **$\delta^{13}C$ = -22.6‰**
KMKT 7534:1, wood from runner

Hel-3928 Könölä, Tornio **2540 ± 90**
65°59'N, 24°29'E **$\delta^{13}C$ = -26.1‰**
KMKT 7826, wood from runner

Hel-3929 Niittysuo, Kuusamo **2040 ± 90**
65°54'N, 29°15'E **$\delta^{13}C$ = -25.5‰**
KMKT 7989:3, wood from runner

Hela-130 Oksa, Muhos 65 **3275 ± 75**
64°51' N, 26°08' E; 65-70 m a.s.l. **$\delta^{13}C$ = -24.3‰**
KMKT 8226, wood from ski

Hela-131 Hietala, Tervola 120 **690 ± 55**
66°15'N, 24°54'E; 75 m a.s.l. **$\delta^{13}C$ = -25.8‰**
KM 24265, wood from paddle

Hela-132 Nuulasenlehto, Sodankylä 114 **1215 ± 55**
67°25'N, 26°26'E; 210 m a.s.l. **$\delta^{13}C$ = -24.8‰**
KM 19441, wood from ski

Hel-3924 NUOLIHARJU W, HYRYNSALMI **8960 ± 120**
$\delta^{13}C$ = -25.1‰

64°48'N, 28°28'E; 195 m a.s.l.
Coll. 1994 by M. Korteniemi and E. Suominen, subm 1996 by E. Suominen and C. Carpelan (Early in the North Project).
KM 28672:6, charcoal, depth 1.50 m
Comment (ES): Charcoal from the bottom of a possible trapping pit.
Ref. Korteniemi and Suominen (1998).

Hel-3925 – Hel-3929 See SKI, RUNNER AND PADDLE SERIES Hel-3919

Hel-3930 See VTT PROJECT K5SU00146 Hel-3780

VALKJÄRVI SERIES, VIROLAHTI

60°36'N, 27°30'E; 26.60 m a.s.l.
Coll. and subm. 1996 by A. Miettinen and H. Hyvärinen.

Hel-3931 Valk 1 **7890 ± 110**
Gyttja, depth 1.00-1.05 m **$\delta^{13}C$ = -30.1‰**

Hel-3932 Valk 2 **5960 ± 100**
Gyttja, depth 0.80-0.85 m **$\delta^{13}C$ = -30.1‰**

LUISTARI SERIES, EURA

61°06'N, 22°09'E; 38 m a.s.l.
Coll. (see below) and subm. 1996 by P-L. Lehtosalo-Hilander.
General comment (P-L L-H): The dates cover the use of the area excellently, and as a whole the results correspond to the picture obtained from the finds of artefacts. – See Hel-131 in Jungner (1979) and Luistari Series in Jungner and Sonninen (1983). Ref. Lehtosalo-Hilander (1999, 2000).

Hel-3933 18000:3811 **1330 ± 80**
Charcoal, depth 0.50 m, coll. 1971 **$\delta^{13}C$ = -24.4‰**

Hel-3934 18000:2373 **1330 ± 80**
Charcoal, depth 0.50-0.60 m, coll. 1970 **$\delta^{13}C$ = -24.9‰**

Hel-3935 18000:3199 **1360 ± 80**
Charcoal, depth 0.50 m, coll. 1971 **$\delta^{13}C$ = -24.3‰**

Hel-3936 27177:151B **1200 ± 80**
Charcoal, depth 1.00 m, coll. 1992 **$\delta^{13}C$ = -26.0‰**

Hel-3937 25480:621H **920 ± 80**
Charcoal, depth 1.00 m, coll. 1990 **$\delta^{13}C$ = -25.1‰**

Hel-3938 23183:707 **1100 ± 80**
Charcoal, depth 0.90-0.95 m, coll. 1986 **$\delta^{13}C$ = -25.2‰**

Hel-3939 18000:4616 **1020 ± 80**
Charcoal, depth 0.40-0.45 m, coll. 1972 **$\delta^{13}C$ = -25.3‰**

Hel-3952 25480:148 **190 ± 100**
Charcoal, depth 1.00 m, coll. 1990 **$\delta^{13}C$ = -21.5‰**

Hel-3953 23607:522N **2800 ± 80**
Charcoal, depth 0.45-0.50 m, coll. 1987 **$\delta^{13}C$ = -25.1‰**

Hel-3954 23607:522J **2420 ± 100**
Charcoal, depth 0.75 m, coll. 1987 **$\delta^{13}C$ = -25.1‰**

Hel-3955 27177:151F **2630 ± 90**
Charcoal, depth 0.90 m, coll. 1992 **$\delta^{13}C$ = -24.9‰**

Hel-3956 24388:525S **1490 ± 80**
Charcoal, depth 0.60 m, coll. 1988 **$\delta^{13}C$ = -26.1‰**

Hel-3957 27177:151G **2740 ± 90**
Charcoal, depth 1.00 m, coll. 1992 **$\delta^{13}C$ = -25.1‰**

Hela-133 13/24388:525C **2985 ± 75**
Charcoal, depth abt. 0.40 m, coll. 1988 **$\delta^{13}C$ = -25.4‰**

Hel-3940 REINDEER ANTLER, PARKANO **470 ± 70**
$\delta^{13}C$ = -19.3‰

Coll. and subm. 1996 by P. Ukkonen.
Sample No. 6545, bone
Comment (PU): The sample, a reindeer antler from Parkano, is part of a series of subfossil antlers of the wild reindeers from southern and central Finland. The antler was found in 1910 by forester, baron G. Wrede near Watajalampi in Parkano close to Kuru (Schulman 1910). It was given by Hj. Schulman to the collections of the Zoological Museum in Helsinki. The date is well in accordance with the information found in literature about the distribution of the wild forest reindeer in Finland during Historic Time.
Ref. Schulman (1910), Rankama and Ukkonen (2001).

SEYAHA SERIES, EASTERN YAMAL PENINSULA, WESTERN SIBERIA

Coll. and subm. 1996 by Y. and A. Vasil'chuk.
Ref. Vasil'chuk et al. (1998, 1999, 2000, 2001).

Hel-3941 363-YuV/1 **1370 ± 90**
Peat **$\delta^{13}C$ = -29.0‰**

Hel-3942 363-YuV/55 **11620 ± 150**
Peat **$\delta^{13}C$ = -28.5‰**

Hel-3943 363-YuV/112 **27890 ± 990**
Peat **$\delta^{13}C$ = -25.3‰**

Hel-3944 363-YuV/133 **8740 ± 130**
Wood **$\delta^{13}C$ = -27.8‰**

Hel-3945 **363-YuV/147** **7850 ± 150**
Peat **$\delta^{13}C$ = -29.4‰**

Hel-3946 **363-YuV/152** **8220 ± 140**
Peat **$\delta^{13}C$ = -28.3‰**
Hel-3947 **363-YuV/154** **8180 ± 140**
Peat **$\delta^{13}C$ = -28.6‰**

Hel-3948 **363-YuV/180** **8490 ± 130**
Peat **$\delta^{13}C$ = -29.1‰**

Hel-3949 **363-YuV/186** **8600 ± 140**
Peat **$\delta^{13}C$ = -29.1‰**

Hel-3950 **363-YuV/208** **36800 ± 3300**
Peat **$\delta^{13}C$ = -27.7‰**

Hel-3951 See IRON PRODUCTION SITE SERIES Hel-3747

Hel-3952 – Hel-3957 See LUISTARI SERIES Hel-3933

LAPURI WRECK SERIES, VIROLAHTI

60°28'N, 27°35'E
Coll. 1993 by S. Tikkanen (Hel-3958) and M. Hölttä (Hel-3959 and Hela-134), subm. 1996 by M. Fast.
General comment (MF): The wreck of a boat lies at 6 meters depth in the strait between the island of Lapuri and the mainland (the former island of Siikasaari).A clay vessel that was found in 1976 close to the wreck has been dated to approximately 1300 AD.

Hel-3958 **990 ± 90**
Wood **$\delta^{13}C$ = -27.4‰**
Comment (MF): The peace of wood is from a rib (KAARI K 11-10) of the boat.

Hel-3959 **750 ± 110**
Fiber **$\delta^{13}C$ = -24.1‰**
Comment (MF): The fiber is from the caulking of the boat.

Hela-134 **780 ± 70**
Textile **$\delta^{13}C$ = -24.0‰**
Comment (MF): A piece of woollen cloth (01393:019) was found between the planks of the boat.

Hel-3960 TONTTILA, VEHKALAHTI 39 **700 ± 80**
$\delta^{13}C$ = -25.0‰

60°39'N, 27°12'E; 28 m a.s.l.
Coll. and subm. 1996 by P. Uino.
Charcoal, depth, 0.30-0.40 m
Comment (PU): Mesolithic date expected (quartz artefacts, altitude a.s.l.). The sample is from a fireplace and the C-14 age indicates that there has been activity at the site also in the Medieval Period.

STENKULLA SERIES, VANTAA

60°18'N, 25°04'E; 25-26 m a.s.l.
Coll. and subm. 1996 by K. Katiskoski.
General comment (KK): These samples were collected from the left bank of the large dwelling site complex by the river Keravanjoki (cf. samples Hel-3634 and Hela-31-32) during an exceptionally large rescue excavation in 1996. They all derive from charcoal of hearths and all except Hel-3964 are in accordance with the archaeological dating of the site rich of finds mainly from the typical Late Comb Ceramic period (Ka II-III:1).
Ref. In Edgren et al., eds. (1998).

Hel-3961 Sample 1 **5020 ± 110**
Charcoal, depth 0.20-0.30 m **$\delta^{13}C$ = -25.2‰**

Hel-3962 Sample 2 **5000 ± 120**
Charcoal, depth 0.20-0.30 m **$\delta^{13}C$ = -24.9‰**

Hel-3963 Sample 3 **4970 ± 90**
Charcoal, depth 0.20-0.30 m **$\delta^{13}C$ = -25.0‰**

Hel-3964 Sample 4 **910 ± 90**
Charcoal, depth 0.05-0.10 m **$\delta^{13}C$ = -24.9‰**

Hel-3965 Sample 5 **4980 ± 100**
Charcoal, depth 0.10-0.20 m **$\delta^{13}C$ = -25.6‰**

PÖRRINMÖKKI SERIES, RÄÄKKYLÄ

62°11'N, 29°54'E; 80-82 m a.s.l.
Coll. and subm. 1996 by P. Pesonen.
General comment (PP): The samples are taken from a Stone Age settlement site. The dating of the hearth is in good agreement with the archaeological material (Typical Comb Ware). The dating of the hunting pit shows Mesolithic activity in the area. Hela-150 and Hela-151 are of birch tar used as repair material on the surface of Typical Comb Ware vessels. The dates are in good agreement with the archaeological dating of the site.
Ref. In Edgren et al. eds. (1998), Pesonen (1999).

Hel-3966 Sample 2/Hearth 3 **4880 ± 100**
Charcoal $\delta^{13}C = -24.4‰$

Hel-3967 Sample 6/Hunting pit **6960 ± 150**
Charcoal, depth 1.00 m $\delta^{13}C = -25.2‰$

Hela-150 Sample 7 **4915 ± 65**
Birch tar $\delta^{13}C = -28.3‰$

Hela-151 Sample 8 **4880 ± 65**
Birch tar $\delta^{13}C = -27.6‰$

Hel-3968 See VÄTSÄRI SERIES Hel-3838

AITAJÄRVI SERIES, KAAMANEN

69°08'N, 27°14'E; 160 m a.s.l.
Coll. 1994 by H. Hyvärinen and E. Mäkelä, subm. 1996 by H. Hyvärinen.
Ref. Eronen et al. (1999).

Hel-3969 Sample 5/AJ **1390 ± 100**
Gyttja, depth 0.30-0.40 m $\delta^{13}C = -23.7‰$

Hel-3970 Sample 4/AJ **3030 ± 100**
Gyttja, depth 0.65-0.70 m $\delta^{13}C = -23.0‰$

Hel-3971 Sample 3/AJ **4690 ± 120**
Gyttja, depth 1.05-1.10 m $\delta^{13}C = -25.3‰$

Hel-3972 Sample 2/AJ **7580 ± 120**
Gyttja, depth 1.40-1.45 m $\delta^{13}C = -25.3‰$

Hel-3973 Sample 1/AJ **9090 ± 110**
Gyttja, depth 1.75-1.80 m $\delta^{13}C = -24.5‰$

LAAVUSSUO SERIES, OUTOKUMPU

62°42'N, 29°06'E; 90 m a.s.l.
Coll. and subm. 1996 by T. Karjalainen.
General comment (TK): The samples of wooden structures and birch bark (probably roof cover) of a Neolithic house with only Pöljä Ware found inside and elsewhere at the site. Hela-153 is chewing resin from the house.

Hel-3974 Sample 5 **4070 ± 110**
Birch bark, 5th level $\delta^{13}C = -26.3‰$

Hel-3975 Sample 15 **4420 ± 100**
Charcoal, depth 0.30 m $\delta^{13}C = -25.9‰$

Hel-3976 Sample 6 **4090 ± 100**
Charcoal, 5th level $\delta^{13}C = -25.5‰$

Hel-3977 Sample 12 **4170 ± 100**
Birch bark, 7th level $\delta^{13}C = -27.0‰$

Hela-153 Sample 16 **4010 ± 60**
Chewing resin $\delta^{13}C = -27.2‰$
Comment (TK): The sample is chewing resin from a Neolithic Stone Age house with only Pöljä type ceramic at the site. See also samples Hel-3974 – Hel-3977 which have been taken from wooden structures of the same house. The roof of the house was probably of birch bark.
Ref. In Edgren et al., eds. (1998).

KONTOLANRAHKA SERIES, PÖYTYÄ

60°47'N, 22°47'E
Coll. and subm. 1996 by A. Korhola.

Hel-3978 Kontolanrahka A7 **870 ± 80**
Peat, depth 0.90-1.00 m $\delta^{13}C = -25.6‰$

Hel-3979 Kontolanrahka A7 **2240 ± 80**
Peat, depth 1.90-2.00 m $\delta^{13}C = -25.6‰$

Hel-3980 Kontolanrahka A7 **2970 ± 100**
Peat, depth 2.90-3.00 m $\delta^{13}C = -25.5‰$

Hel-3981 Kontolanrahka A7 **3630 ± 110**
Peat, depth 3.90-4.00 m $\delta^{13}C = -25.0‰$

Hel-3982 Kontolanrahka A7 **4480 ± 90**
Peat, depth 4.90-5.00 m $\delta^{13}C = -25.3‰$

Hel-3983 Kontolanrahka A7 **5710 ± 130**
Peat, depth 5.90-6.00 m $\delta^{13}C = -25.6‰$

Hel-3984 Kontolanrahka A7 **6080 ± 100**
Peat, depth 6.50-6.60 m $\delta^{13}C = -27.2‰$

Hel-3985 Kontolanrahka A1 **modern**
Peat, depth 0.55-0.60 m $\delta^{13}C = -26.0‰$

Hel-3986 Kontolanrahka A **modern**
Peat, depth 1.75-1.80 m $\delta^{13}C = -25.2‰$

Hel-3987 Kontolanrahka A1 **240 ± 80**
Peat, depth 0.90-0.95 m **$\delta^{13}C$ = -27.2‰**

Hel-3988 Kontolanrahka A1 **2360 ± 90**
Peat, depth 1.05-1.10 m **$\delta^{13}C$ = -27.5‰**

Hel-3989 Kontolanrahka A1 **3510 ± 90**
Peat, depth 1.10-1.20 m **$\delta^{13}C$ = -27.1‰**

Hel-3990 Kontolanrahka A2 **5300 ± 100**
Peat, depth 3.00-3.10 m **$\delta^{13}C$ = -27.1‰**

Hel-3991 Kontolanrahka A2 **4650 ± 100**
Peat, depth 2.50-2.60 m **$\delta^{13}C$ = -27.2‰**

Hel-3992 Kontolanrahka A2 **4090 ± 100**
Peat, depth 2.00-2.10 m **$\delta^{13}C$ = -27.0‰**

Hel-3993 Kontolanrahka A2 **3510 ± 100**
Peat, depth 1.50-1.60 m **$\delta^{13}C$ = -25.9‰**

Hel-3994 Kontolanrahka A2 **2920 ± 100**
Peat, depth 1.00-1.10 m **$\delta^{13}C$ = -25.9‰**

Hel-3995 Kontolanrahka A2 50-60 **1780 ± 100**
Peat, depth 0.50-0.60 m **$\delta^{13}C$ = -25.9‰**

Hel-3996 TUPAVAARA 2, INARI 496 **1070 ± 90**
$\delta^{13}C$ = -26.6‰

69°00'N, 25°46'E; 190 m a.s.l.
Coll.1995 by P. Halinen and subm. 1996 by P. Hamari.
Sample 1, charcoal, depth 0.05 m
Comment (PH): Charcoal from a rectangular stone setting. The dating is well in agreement with expected and previous datings.

Hel-3997 NÄKKÄLÄJÄRVI W2, ENONTEKIÖ 263 **1010 ± 80**
$\delta^{13}C$ = -26.4‰

68°36'N, 23°35'E; 275 m a.s.l.
Coll. 1994 by P. Halinen and subm. 1996 by P. Hamari.
Sample 6, charcoal, depth 0.05 m
Comment (PH): Charcoal from a rectangular stone setting, probably a fireplace. The dating is well in agreement with expected and previous datings.

Hel-3998 FRIGGEBORG, KARJAA **990 ± 90**
$\delta^{13}C$ = -22.8‰

A wood sample coll. and subm. 1997 by L. Nyberg.

KANGAS 2 SERIES, KAUSTINEN

63°34'N, 23°41'E
Coll.1996 and subm. 1997 by P. Halinen.
General comment (PH): The dates of these samples from red ochre graves and the nearby dwelling site are as expected.
Ref. In Edgren et al., eds. (1998).

Hel-3999 Sample 1 (8th level)	**4910 ± 100**
Charcoal, depth 0.35-0.40 m	**$\delta^{13}C$ = -26.2‰**
Hel-4000 Sample 2 (6th level)	**5090 ± 100**
Charcoal, depth 0.30 m	**$\delta^{13}C$ = -24.7‰**
Hela-161 Sample 3 (Grave 2)	**5115 ± 85**
Charcoal, depth 0.95 m	**$\delta^{13}C$ = -22.5‰**

Hel-4001 – Hel-4009 See WESTERN DESERT SERIES Hel-3607

Hel-4130 – Hel-4132 See WESTERN DESERT SERIES Hel-3607

AMS DATES

KUUKKELIKUMPU SERIES, LOKKA HYDROELECTRIC RESERVOIR

67°50'N, 26°50'E
Methane emissions collected from the water reservoir in 1994.
Subm. by P. Martikainen.
Ref. Huttunen et al. (2002).

Hela-1a	**Kuukkelikumpu I**	**-85 ± 150** **$\delta^{13}C$ = -63.8‰**
Hela-1b	**Kuukkelikumpu I**	**340 ± 110** **$\delta^{13}C$ = -63.8‰**
Hela-2a	**Kuukkelikumpu II**	**-350 ± 90** **$\delta^{13}C$ = -63.7‰**
Hela-2b	**Kuukkelikumpu II**	**-330 ± 100** **$\delta^{13}C$ = -63.7‰**
Hela-3	**Vuollusvaara**	**660 ± 90** **$\delta^{13}C$ = -67.0‰**
Hela-4	**Lotakonsuo**	**1140 ± 105** **$\delta^{13}C$ = -71.1‰**
Hela-7	**Kalasatama**	**130 ± 100** **$\delta^{13}C$ = -60.1‰**

SALMISUO PEAT GAS SERIES, ILOMANTSI

62°47'N, 30°56'E; 145 m a.s.l.
Coll. and subm. 1994 by J. Alm.
Peat gas (carbon from mainly CH_4 and CO_2), depth 0-0.50 m
General comment (JA): The samples were obtained by stamping the peat surface and trapping the gas bubbles thereby released from the surface layers into a water-filled flask through an inverted funnel. Gas was in part obtained from deeper peat layers when the sampling was done by stamping the bottom of water-filled ditches. The concentration of methane varied between 4-16% CH_4 of the sample gas, being lower in the lawn surface and higher in the ditch bottom samples. According to the results, CH_4-C in the bubble gas was older than CO_2-C. As the samples were combined prior to dating, no distinction can be made between the ages of lawn and ditch gas.

Hela-5a **Salmisuo** **-535 ± 300**
Peat gas, CH_4 **$\delta^{13}C$ = -69.5‰**
Comment (JA): Gas bubbles released from peat surface layers.

Hela-5b Salmisuo **-900 ± 140**
Peat gas, CH_4 **$\delta^{13}C = -70.3‰$**
Comment (JA): Gas bubbles released from peat surface layers.

Hela-6 Salmisuo **-1070 ± 60**
Peat gas, CO_2 **$\delta^{13}C = -2.9‰$**
Comment (JA): Gas bubbles released from peat surface layers.

Hela-8 – Hela 11 See KARELIAN ISTHMUS SERIES Hel-3623

Hela-12 RETTIG 1992, TURKU **420 ± 60**
$\delta^{13}C = -24.0‰$
Coll. and subm 1994 by T. Lempiäinen.
Charcoal

Hela-13 See KARELIAN ISTHMUS SERIES Hel-3623

Hela-14 – Hela-16 See KOTIJÄNKÄ SERIES Hel-3679

NEITILÄ 4 SERIES, LUUSUA, KEMIJÄRVI

66°27'N, 27°22'E; 145 m a.s.l.
Subm. 1994 by C. Carpelan.
General comment (CC): Samples of charred crust adhering to ceramics, see Charred Crust Series (Hela-35 this volume).

Hela-17 KM 16553:180 **1910 ± 95**
Charred crust **$\delta^{13}C = -24.2‰$**

Hela-18 KM 16553:125 **2075 ± 55**
Charred crust **$\delta^{13}C = -25.5‰$**

Hela-19 KM 16553:198,603 **2080 ± 60**
Charred crust **$\delta^{13}C = -24.9‰$**

Hela-20 KM 16553:1332 **3035 ± 80**
Charred crust **$\delta^{13}C = -26.1‰$**

Hela-21 KM 16553:1248 **3320 ± 75**
Charred crust **$\delta^{13}C = -26.9‰$**

Hela-22 KM 16553:1287 **2540 ± 100**
Charred crust **$\delta^{13}C = -27.3‰$**

Hela-34 KM 16553:912 **5800 ± 90**
Charred crust $\delta^{13}C = -25.1‰$
Ref. Torvinen (2000).

Hela-36 KM 16553:292 **1990 ± 65**
Charred crust $\delta^{13}C = -23.8‰$

Hela-43 Sample 2/KM 16145:573 **2885 ± 100**
Charred crust $\delta^{13}C = -25.0‰$

Hela-44 Sample 3/KM 16145:81 **2400 ± 115**
Charred crust $\delta^{13}C = -25.0‰$

Hela-23 – Hela-26 See IIJÄRVI SERIES Hel-3502

Hela-27 See TERVANIEMI SERIES Hel-3666

Hela-28 See POIKAMELLA SERIES Hel-3545

Hela-29 LAPINNIEMI, RUOVESI **1090 ± 60**
$\delta^{13}C = -26.2‰$

61°55'N, 24°03'E; 100 m a.s.l.
Coll. 1995 by T. Heikkurinen-Montell and L. Tomanterä, subm. 1995 by T. Heikkurinen-Montell.
KM 28415, charred crust, depth 0.20 m
Comment (T H-M): Charred crust from a copper kettle discovered at a site with 5 cairns. 3 cairns were investigated and proved to be stoves. A copper kettle was found next to one investigated cairn. Probably, the cairns and the kettle are not connected chronologically. The cairns are piled on a Stone Age dwelling site
Ref. In Edgren et al., eds. (1996).

Hela-30 See WESTERN DESERT SERIES Hel-3607.

Hela-31 – Hela-32 See JOKINIEMI SERIES Hel-3634

Hela-33 See LAKKASUO SERIES Hel-3633

Hela-34 See NEITILÄ 4 SERIES Hela-1

CHARRED CRUST SERIES

Ceramics coll. by various persons at different occasions. Charred crust adhering to ceramics sampled and subm. 1995-1996 by M. Torvinen and C. Carpelan (Early in the North Project).
General comment (CC): Samples of charred crust adhering to the surface of ceramics. In all, 66 crust samples were submitted to dating by the Early in the North Project. Of these 39 are listed under this heading while 27 are listed by site context (see Kiimamaa Series, Kotijänkä Series, Kuuselankangas Series I, Neitilä 4 Series, Nimisjärvi Series, Tervakangas Series, Törmävaara Series, Vepsänkangas Series). According to the focus of the Project, the aim was to sample each ceramic type found in the provinces of Oulu and Lapland. The sampled types include Combed Ware Style 1.1 (6 samples), Combed Ware Style Sär 1 (8 samples), Combed Ware Style 2 (4 samples), Kierikki Ware (5 samples), Pöljä/Jysmä Ware (4 samples), L-Ware (6 samples), Impressed Ware (1 sample), A-Ware (11 samples), K-Ware (16 samples), Luukonsaari Ware (1 sample), Sär 2 in general (2 samples) and Morby Ware (1 sample), in all 66 samples.

Hela-35 Niemelä, Utsjoki 10 **2020 ± 70**
69°54'N, 27°05'E; 70 m a.s.l. **$\delta^{13}C$ = -23.6‰**
KM 13289:2, charred crust

Hela-37 Jatulinsaari, Kemijärvi 38 **3210 ± 70**
66°17'N, 27°50'E; 151 m a.s.l. **$\delta^{13}C$ = -25.4‰**
KM 15492:16, charred crust
Comment: See Jatulinsaari Series in Jungner (1979); see also Siiriäinen (1978).

Hela-38 Rönkönraivio, Inari 507 **5830 ± 85**
68°36'N, 27°24'E; 121 m a.s.l. **$\delta^{13}C$ = -28.2‰**
KM 24931, charred crust
Ref. Torvinen (2000).

Hela-39 Juikenttä, Sodankylä 14 **2560 ± 75**
68°04'N, 27°24'E; 245 m a.s.l. **$\delta^{13}C$ = -24.4‰**
KMSU 5577:151, charred crust
Comment: See also Hela-72 (this volume). – St-2719 and Hel-332 in Jungner (1979) represent attempts to date the organic substance found in the wall of the same vessel; cf. Linder (1966).

Hela-40 Turpeenniemi 5 (Ylitalo/Toivola), Rovaniemi 135 **5520 ± 185**
$\delta^{13}C$ = -20.3‰
66°25'N, 25°32'E; 79-82 m a.s.l.
KM 14278:1435, charred crust
Ref. Torvinen (2000).

Hela-41 Anttila 1, Kemijärvi 69 **2630 ± 65**
66°22'N, 27°17'E; 76 m a.s.l. **$\delta^{13}C$ = -25.7‰**
KM 14344:83, charred crust

Hela-42 Latokangas, Ylikiiminki 28 **5790 ± 105**
65°04'N, 26°11'E; 76 m a.s.l. $\delta^{13}C = -25.7‰$
KM 25731:385, charred crust
Comment: See also Hela-146 (this volume) and Latokangas Series in Jungner and Sonninen (1996, 1998).
Ref. Torvinen (2000)

Hela-45 Autio, Suomussalmi 192 **1780 ± 125**
64°48'N, 29°10'E; 100 m a.s.l. $\delta^{13}C = -27.8‰$
KM 20817:1, charred crust

Hela-57 Jokkavaara, Rovaniemi 340 **5070 ± 80**
66°27'N, 26°03'E; 82-87 m a.s.l. $\delta^{13}C = -25.9‰$
KM 21012:34, charred crust
Comment: See Jokkavaara Series in Jungner and Sonninen (1989, 1998).
Ref. Torvinen (2000).

Hela-72 Juikenttä, Sodankylä 14 **2560 ± 120**
68°04'N, 27°24'E; 245 m a.s.l. $\delta^{13}C = -24.2‰$
KMSU 5577:136, charred crust
Comment: See also Hela-39 (this volume). - St-2723 and Hel-331 in Jungner (1979) represent attempts to date the organic substance found in the wall of the same vessel; cf. Linder (1966).

Hela-77 Proksinkenttä, Enontekiö 76 **3470 ± 90**
68°23'N, 23°40'E; 288 m a.s.l. $\delta^{13}C = -27.5‰$
KM 22841:106, 100, charred crust
Comment: See Proksinkenttä Series in Jungner and Sonninen (1996).

Hela-79 Tainiaro, Simo 40 **5920 ± 100**
65°52'N, 25°34'E; 77 m a.s.l. $\delta^{13}C = -28.6‰$
KM 22398:349, charred crust
Comment: See also Hela-80 (this volume) and Tainiaro Series in Jungner and Sonninen (1996, 1998).

Hela-80 Tainiaro, Simo 40 **5940 ± 100**
65°52'N, 25°34'E; 77 m a.s.l. $\delta^{13}C = -27.6‰$
KM 22398:342, charred crust
Comment: See Hela-79 (this volume).

Hela-81 Jokonga, Kola Peninsula **2040 ± 90**
67°58'N, 39°49'E $\delta^{13}C = -22.9‰$
KM 6772:2, charred crust
Comment: See site description in Itkonen (1918).

Hela-82 Niittyjänkkä, Inari 683 **2960 ± 90**
68°37'N, 27°30'E; 125 m a.s.l. $\delta^{13}C = -25.2‰$
KM 26240:2, charred crust

Hela-83 Juuniemi, Kemijärvi 74 **3570 ± 90**
66°22'N, 27°20'E; 130 m a.s.l. $\delta^{13}C = -28.6‰$
KM 14345:20, charred crust

Hela-91 Alpua, Vihanti 85 **2635 ± 75**
64°25'N, 25°15'E $\delta^{13}C = -24.6‰$
KM 11239, charred crust

Hela-92 Nimisjoki Kaitanen, Vaala **2795 ± 80**
61°30'N, 26°48'E; 123-125 m a.s.l. $\delta^{13}C = -25.1‰$
KM 4080:9, charred crust

Hela-96 Pahkakoski, Yli-Ii 14 **5770 ± 80**
65°21'N, 26°02'E; 80 m a.s.l. $\delta^{13}C = -28.4‰$
KM 14984:221, charred crust
Comment: See also Hela-98 and Hela-99 (this volume).

Hela-97 Sotasari, Suomussalmi 44 **2575 ± 100**
64°42'N, 29°34'E; 189 m a.s.l. $\delta^{13}C = (-25.0)‰$
KM 14841:31, charred crust

Hela-98 Pahkakoski, Yli-Ii 14 **5615 ± 95**
65°21'N, 26°02'E; 80 m a.s.l. $\delta^{13}C = -27.9‰$
KM 14984:310, charred crust
Comment: See Hela-96 (this volume).

Hela-99 Pahkakoski, Yli-Ii 14 **5745 ± 130**
65°21'N, 26°02'E; 80 m a.s.l. $\delta^{13}C = -26.2‰$
KM 14984:352+245, charred crust
Comment: See Hela-96 (this volume).

Hela-100 Joenniemi, Suomussalmi 117 **4285 ± 80**
65°02'N, 29°04'E; 199 m a.s.l. $\delta^{13}C = -27.7‰$
KM 24506:159, charred crust
Comment: See also Hela-102, Hela-103 and Hela-143 (this volume) and Hel-1532 and Hel-2570 in Jungner and Sonninen (1989, 1996).

Hela-101 Somostenperä, Kuusamo 25 **4115 ± 75**
65°58'N, 29°11'E; 256 m a.s.l. $\delta^{13}C = -23.9‰$
KM 16734:9, charred crust

Hela-102 Joenniemi, Suomussalmi 117 **4555 ± 80**
65°02'N, 29°04'E; 199 m a.s.l. $\delta^{13}C = -29.8‰$
KM 23701:488, charred crust
Comment: See Hela-100 (this volume).

Hela-103 Joenniemi, Suomussalmi 117 **2470 ± 85**
65°02'N, 29°04'E; 199 m a.s.l. $\delta^{13}C = -26.8‰$
KM 20375:3, 23701:537, charred crust
Comment: See Hela-100 (this volume).

Hela-137 Tormuansärkkä, Suomussalmi 53 **1910 ± 80**
65°17'N, 29°28'E; 201 m a.s.l. **$\delta^{13}C$ = -24.4‰**
KM 18322:822, charred crust
Comment: See also Hel-188 in Jungner (1979).

Hela-138 Kalmosärkkä, Suomussalmi 25 **4485 ± 100**
65°12'N, 29°26'E; 199 m a.s.l. **$\delta^{13}C$ = -29.0‰**
KM 14829:106, charred crust
Comment: See also Hela-139 and Hela-142 (this volume).

Hela-139 Kalmosärkkä, Suomussalmi 25 **4370 ± 90**
65°12'N, 29°26'E; 199 m a.s.l. **$\delta^{13}C$ = -27.2‰**
KM 14829:103, 116, charred crust
Comment: See Hela-138 (this volume).

Hela-140 Nuolisärkkä, Suomussalmi 26 **3680 ± 95**
65°12'N, 29°25'E; 199 m a.s.l. **$\delta^{13}C$ = -27.8‰**
KM 19538:11, charred crust

Hela-141 Sylväjänniemi 1, Kuhmo 29 **1925 ± 55**
64°08'N, 29°01'E; 162.50-165 m a.s.l. **$\delta^{13}C$ = -27.9‰**
KM 20903:177-188, charred crust
Comment: See also Hel-1601 in Jungner and Sonninen (1989).

Hela-142 Kalmosärkkä, Suomussalmi 25 **3135 ± 70**
65°12'N, 29°26'E; 199 m a.s.l. **$\delta^{13}C$ = -29.0‰**
KM 14504:286, charred crust
Comment: See Hela-138 (this volume).

Hela-143 Joenniemi, Suomussalmi 117 **4170 ± 85**
65°02'N, 29°04'E; 199 m a.s.l. **$\delta^{13}C$ = -29.5‰**
KM 24506:102, 140, charred crust
Comment: See Hela-100 (this volume).

Hela-144 Mikonsärkkä, Suomussalmi 56 **2600 ± 80**
65°12'N, 29°25'E; 199 m a.s.l. **$\delta^{13}C$ = -30.6‰**
KM 19879:23, charred crust
Comment: See Suomussalmi Series in Jungner and Sonninen (1998).

Hela-145 Kukkosaari, Suomussalmi 114 **4390 ± 100**
64°54'N, 28°57'E; 199 m a.s.l. **$\delta^{13}C$ = -32.6‰**
KM 25423:1, charred crust
Comment: Also Su-1030.

Hela-146 Latokangas, Ylikiiminki 28 **5795 ± 90**
65°04'N, 26°11'E; 76 m a.s.l. **$\delta^{13}C$ = -27.0‰**
KM 25731:698, charred crust
Comment: See Hela-42 (this volume).
Ref. Torvinen (2000).

Hela-147 Kumpuniemi (Kärräniemi), Rovaniemi 73 **4450 ± 105**
66°27'N, 25°38'E; 74 m a.s.l. **$\delta^{13}C$ = -29.3‰**
Sample 15222:543, charred crust

Hela-148 Pyhänniska, Utajärvi 78 **6140 ± 105**
64°48'N, 26°15'E; 75 m a.s.l. **$\delta^{13}C$ = -27.5‰**
KM 11762:37, charred crust
Ref. Torvinen (2000).

Hela-149 Roinila, Utajärvi 85 **5975 ± 105**
64°46'N, 26°19'E; 75 m a.s.l. **$\delta^{13}C$ = -25.6‰**
KM 13600:3, charred crust

Hela-36 See NEITILÄ 4 SERIES Hela-17

Hela-37 – Hela-42 See CHARRED CRUST SERIES Hela-35

Hela-43 – Hela-44 See NEITILÄ 4 SERIES Hela-17

Hela-45 See CHARRED CRUST SERIES Hela-35

NIMISJÄRVI SERIES, SÄRÄISNIEMI

64°31'N, 26°47'E; 123-125 m a.s.l.
Subm. 1995 by C. Carpelan.
General comment (CC): Samples of charred crust adhering to ceramics. See Charred Crust Series (Hela-35 this volume).

Hela-46 Sample 5, KM 4080:63 **2520 ± 125**
Charred crust **$\delta^{13}C$ = -25.2‰**

Hela-47 Sample 6, KM 21997:1 **2715 ± 130**
Charred crust **$\delta^{13}C$ = -25.8‰**

Hela-48 Sample 7, KM 4080:35 **no result**
Charred crust

Hela-49 Sample 8, KM 4080:42 **2145 ± 115**
Charred crust **$\delta^{13}C$ = -24.3‰**

Hela-50 See KIIMAMAA SERIES Hel-3682

Hela-51 – Hela-52 See KUUSELANKANGAS SERIES I Hel-3683

ISO LEHMÄLAMPI 2 SERIES, VIHTI

60°21'N, 24°36'E
Coll. and subm. 1995 by K. Sarmaja-Korjonen.
General comment (K S-K): Four AMS dates of bulk sediment above the upper layer of aquatic mosses described in Iso Lehmälampi 1 Series, but from another core. The ages are younger than expected on the basis of the conventional radiocarbon dates in Iso Lehmälampi 1 Series. The depths of the dated samples do not refer to the entire core but a 30 cm section subsampled for high-resolution analysis.

Hela-53 **6420 ± 85**
Gyttja, depth 0.016 m **$\delta^{13}C$ = -29.4‰**

Hela-54 **5650 ± 85**
Gyttja, depth 0.108 m **$\delta^{13}C$ = -29.4‰**

Hela-55 **5720 ± 90**
Gyttja, depth 0.182 m **$\delta^{13}C$ = -29.4‰**

Hela-56 **5340 ± 70**
Gyttja, depth 0.264 m **$\delta^{13}C$ = -30.4‰**

Hela-57 See CHARRED CRUST SERIES Hela-35

SAARASJÄRVI SERIES, VIROLAHTI

60°36'N, 27°30'E; 19.5 m a.s.l.
Coll. and subm. 1995 by A. Miettinen and H. Hyvärinen.
Ref. Miettinen and Hyvärinen (1997).

Hela-58 Saa 3 **6225 ± 110**
Wood, depth 3.41 m **$\delta^{13}C$ = -28.3‰**

Hela-59 Saa 4 **6890 ± 390**
Wood, depth 3.60 m **$\delta^{13}C$ = -25.0‰**

Hela-60 Saa 5 **8015 ± 135**
Wood, depth 5.72 m **$\delta^{13}C$ = -30.1‰**

Hela-61 – Hela-62 See RUOKOLAMMINSUO SERIES Hel-3719

Hela-63 HASSIS, KARLEBY **2010 ± 100**
$\delta^{13}C$ = -24.3‰

A wood sample taken from a bow found in a peat bog.
Coll. 1995 by E. Hagström.

Hela-64 See FOMKA SERIES Hel-3680

Hela-65 KUZOMEN 2 **1000 ± 140**
$\delta^{13}C$ = -19.1‰

66°18'N, 36°46'E
A sample of hair coll. 1982 by O. Ovsyannikov and subm. 1995 by C. Carpelan.
Comment (CC): See Ovsyannikov (1984) for description.

UST-PUJA SERIES

61°43'N, 42°32'E
Coll. 1976 by V. A. Nazarenko and subm. 1995 by C. Carpelan.
Comment (CC): See Nazarenko (1984) for description.

Hela-66 24985/33A **780 ± 100**
Hair **$\delta^{13}C$ = -21.5‰**

Hela-67 24985/33B **950 ± 150**
Textile **$\delta^{13}C$ = -25.2‰**

KORVINSUO SERIES, ILOMANTSI

62°46'N, 30°56'E; 147 m a.s.l.
Coll. 1994 and subm.1995 by K. Tolonen.
Comment: Tracing the bomb peak to correlate surface peat cores.
Ref. Jungner et al. (1995), Sonninen (2000).

Hela-68 **-3330 ± 85**
Peat, depth 0.34 m **$\delta^{13}C$ = -26.7‰**

Hela-69 **-920 ± 70**
Peat, depth 0.38 m **$\delta^{13}C$ = -26.4‰**

Hela-70 **-3645 ± 65**
Peat , depth 0.32 m **$\delta^{13}C$ = -26.5‰**

Hela-71 KUIVAJÄRVI 244 **6840 ± 190**
$\delta^{13}C$ = -27.3‰

66°21'N, 29°37'E
Coll. and subm.1995 by K. Sarmaja-Korjonen.
Bark, depth 2.44 m
Comment (K S-K): AMS date made of a piece of bark found in the calcareous sediment from Ylimmäinen Kuivajärvi Lake, core A. When compared with the pollen chronology the age fits well in the picture of forest development in the Kuusamo area, NE Finland.
Ref. Korjonen (1995), Sarmaja-Korjonen and Hyvärinen (1999).

Hela-72 See CHARRED CRUST SERIES Hela-35

Hela-73 BEAVER'S SKULL, PILKANMAA, PYHÄJÄRVI **320 ± 110**
$\delta^{13}C$ = -21.2‰

Coll. 1995 by K. Ekroos and subm. 1995 by K. Mikkola.
Bone, depth 0.30 m

KUUSELANKANGAS SERIES II, YLI-II

65°22'N, 25°56'E; 60 m a.s.l.
Coll. and subm. 1995 by K. Katiskoski.
General comment (KK): These samples from the dwelling site of Kuuselankangas with numerous pit houses were taken from resins found in house 12 (Hela-74) and 13 (Hela-76) and the cultural layer of the trial-trench 5 (Hela-75). They are well synchronic with each other. The site was situated in the ancient estuary of the river Iijoki during the phase of occupation in the Neolithic period of typical Combed Ware Style 2 and Kierikki Ware. The samples were mainly taken from the eastern part of the site with Combed Ware and the dates are in accordance with the archaeological dating. – See also Kuuselankangas Series I (this volume).
Ref. In Edgren et al., eds. (1998).

Hela-74 KM 28943 A **4770 ± 100**
Charcoal, depth 0.20 m **$\delta^{13}C$ = -27.7‰**

Hela-75 KM 28943 B **4840 ± 110**
Charcoal, depth 0.15 m **$\delta^{13}C$ = -27.0‰**

Hela-76 KM 28943 C **4820 ± 100**
Charcoal, depth 0.20 m **$\delta^{13}C$ = -27.0‰**

Hela-77 See CHARRED CRUST SERIES Hela-35

TÖRMÄVAARA SERIES, TERVOLA

66°07'N, 24°42'E; 55-68 m a.s.l.
Sampled and subm. 1995 by E-L. Schulz and C. Carpelan (Early in the North Project).
General comment (CC): Samples of charred crust from ceramics. See Charred Crust Series (Hela-35 this volume).

Hela-78 KM 21599:453 **5160 ± 100**
Charred crust **$\delta^{13}C$ = -25.6‰**

Hela-105 KM 22070:1067 **4940 ± 75**
Charred crust **$\delta^{13}C$ = -24.0‰**

Hela-106 KM 22070:1257 **4840 ± 140**
Charred crust $\delta^{13}C = -26.2‰$

Hela-107 KM 22481:2236 **4945 ± 70**
Charred crust $\delta^{13}C = -23.7‰$

Hela-79 – Hela-83 See CHARRED CRUST SERIES Hela-35

Hela-84 LAKE AHVENJÄRVI, NORTH KARELIA, FINLAND **2385 ± 95**
$\delta^{13}C = -28.2‰$

62°52'N, 30°57'E; 152 m a.s.l.
Coll. 1994 and subm. 1995 by E. Grönlund and A. Pitkänen.
Unidentified plant fragments, depth 18.00 m

LAKE PÖNTTÖLAMPI SERIES, NORTH KARELIA, FINLAND

63°10'N, 30°58'E, 173 m a.s.l.
Coll. 1994 and subm. 1995 by E. Grönlund and A. Pitkänen.
General comment (AP): The lake is surrounded by a bog and it is possible that the older plant material originates from the peat.
Ref. Pitkänen and Huttunen (1999).

Hela-85 Sample 1 **3580 ± 105**
Fragments of a birch leaf, depth 12.00 m $\delta^{13}C = -24.4‰$
Comment (AP): The radiocarbon date is "too old". Varve counts date the sediment at this level between AD 1534-1600. In North Karelia historical records (Könönen and Kirkinen, 1969) and pollen evidence (Grönlund,1995) suggest expansion of slash- and burn cultivation from the 16th century onwards. Pollen (rye pollen, decline of spruce) and charcoal evidence suggesting beginning of continuous extensive slash-and-burn cultivation from the top of this sample at about AD 1600, are in agreement with the data proposed by Könönen and Kirkinen (1969) as well as Grönlund (1995).

Hela-86 Sample 2 **1020 ± 75**
A birch stick, depth 0.39-0.40 m $\delta^{13}C = -26.8‰$
Comment (AP): Varve counts date the sediment at this level between AD 704-750.

Hela-87 KIELKALLIO, JUVA **370 ± 75**
$\delta^{13}C = -28.6‰$

Coll. and subm. 1995 by T. Jussila.
Charcoal from a trapping pit, depth 0.50 m
Comment (TJ): The dating is as expected.

Hela-88 – Hela-89 See TERVAKANGAS SERIES Hel-3835

Hela-90 See VASIKKANIEMI SERIES Hel-3829

Hela-91 – Hela-92 See CHARRED CRUST SERIES Hela-35

Hela-93 See VASIKKANIEMI SERIES Hel-3829

Hela-94 SIKVABBEN, KRISTIINANKAUPUNKI **4290 ± 70**
$\delta^{13}C$ = -18.3‰

62°18'N, 20°12'E; 20-25 m below sea level
KM 28756, antler or bone
Subm. By P. Hamari.
Comment (PH): The sample was taken from a notched harpoon made of bone, found in a fisherman's net outside Kristiinankaupunki.

Hela-95 4/S50A **5400 ± 80**
$\delta^{13}C$ = -27.6‰

57°50'N, 94°12'W; 85 m a.s.l.
Coll. 1992 and subm. 1996 by P. Kuhry.
Wood, depth1.84-1.90 m

Hela-96 – Hela-103 See CHARRED CRUST SERIES Hela-35

Hela-104 See KITULANSUO SERIES Hel-3671

Hela-105 – Hela-107 See TÖRMÄVAARA SERIES Hela-78

Hela-108 BEAVER'S SKULL, VIHANTI **2670 ± 75**
$\delta^{13}C$ = -23.2‰

Coll. 1950 by H. Hautala and subm.1996 by K. Mikkola.
Bone

Hela-109 TUUKKALA, MIKKELI **625 ± 65**
$\delta^{13}C$ = -27.5‰

61°30'N, 27°16'E; 90-95 m a.s.l.
Coll. 1886 by M. Tuderus and subm by P. Hamari 1996.
KM 2481:288, rye
Comment (PH): Rye seed from inhumation grave No. 36 from the Tuukkala cemetery in Mikkeli, found together with a bunch of bronze spiral decorations.

Hela-110 TIEMASSAARI, RANTASALMI **375 ± 80**
$\delta^{13}C = -24.1‰$

Coll. and subm. 1996 by T. Jussila.
Juniper seed
Comment (TJ): The sample consists of seeds from the ancient organic surface layer covered by sand shovelled up when the pitfall was dug. The dating is as expected.

BIRCH TAR SERIES

Coll. and subm. 1996 by P. Pesonen.
General comment (PP): The samples were taken from the birch tar used as repair material on the surface of Typical Comb Ware vessels. The datings are regularly 100-200 years younger than the charcoal datings from the sites of Typical Comb Ware.
Ref. Pesonen (1999).

Hela-111 Kärkkäinen, Lapinlahti **4820 ± 70**
63°22'N, 27°25'E $\delta^{13}C = -28.3‰$
KM 8603:7, birch tar

Hela-112 Pääskylahti, Savonlinna **4875 ± 70**
61°51'N, 28°57'E $\delta^{13}C = -28.0‰$
KM 8787:108, birch tar

Hela-113 Madeneva, Pihtipudas **4810 ± 70**
KM 16422:28, birch tar $\delta^{13}C = -27.2‰$

Hela-114 Voutilainen, Leppävirta **4730 ± 70**
62°26'N, 28°05'E $\delta^{13}C = -28.5‰$
KM 13886:234, birch tar

Hela-115 Niskasuo, Kymi **4700 ± 75**
60°35'N, 26°48'E $\delta^{13}C = -26.5‰$
KM 17075:250, birch tar

Hela-116 Sätös, Outokumpu **4990 ± 70**
62°43'N, 29°06'E $\delta^{13}C = -27.4‰$
KM 18225:308, birch tar

Hela-117 Vaateranta, Taipalsaari **5035 ± 70**
61°07'N, 28°06'E $\delta^{13}C = -27.0‰$
KM 19239:651, birch tar

Hela-118 Kukkarkoski, Lieto **5060 ± 65**
60°34'N, 22°28'E $\delta^{13}C = -27.7‰$
KM 19727:89, birch tar

Hela-119 Naarajärvi, Pieksämäki **4920 ± 60**
62°16'N, 27°03' $\delta^{13}C = -28.4‰$
KM 21519:412, birch tar

Hela-120 Neulaportti, Ristiina **4885 ± 60**
61°28'N, 27°25'E $\delta^{13}C = -27.0‰$
KM 22117:32, birch tar

Hela-121 Peuha, Korpilahti **4910 ± 60**
61°53N, 25°44'E $\delta^{13}C = -28.5‰$
KM 22900:260, birch tar

Hela-122 Pirittävaara, Rovaniemi **5015 ± 60**
66°31'N, 25°45'E $\delta^{13}C = -27.6‰$
KM 25334:210, birch tar

Hela-123 Pörrinmökki, Rääkkylä **4975 ± 60**
62°11'N, 29°55'E $\delta^{13}C = -26.6‰$
KM 28013:9374, birch tar

SOKLI SERIES

67°48'N, 29°20'E; 11.35-15.20 m a.s.l.
Coll. and subm. 1996 by K. Helmens.
Ref. Helmens et al. (2000).

Hela-124 14C 902-1 **8270 ± 95**
Wood, depth 2.63-2.53 m $\delta^{13}C = -27.4‰$

Hela-125 14C 900-4 **42450 ± 3570**
Wood, depth 5.00 m $\delta^{13}C = -26.4‰$

Hela-126 14C 900-2 **>42000**
Wood, depth 8.70-8.61 m $\delta^{13}C = -26.4‰$

Hela-127 SAARELA-1, RAHIKKALA, ELIMÄKI, **130 ± 55**
$\delta^{13}C = -26.2‰$

60°45'N, 26°32'E; 43 m a.s.l.
Coll. and subm. 1996 by H. Ahokas.
Charcoal, depth 0.15 m
Comment (HA): Determination of another charcoal sample (Saarela-2), about 55 m away) gave an age of about 1910 years and a third sample (Kuoppamäki-1, about 320 m away) an age of about 675 years. The samples indicate a long use of open fires or slash-and-burn cultivation or occurrence of forest fires at the site. This is to explain the occurrence of the rare fire-dependent *Geranium bohemicum* species in 1971 (specimen H 183926 in Helsinki, collected by HA) about 25 m away from the sampling site of Saarela-1.

VEPSÄNKANGAS SERIES, YLIKIIMINKI 46

64°59'N, 26°14'E; 79.20 m a.s.l.
Coll. by V. Marttila (M. Mäkivuoti) and subm. 1996 by M. Torvinen and C. Carpelan (Early in the North Project).
Depth 0.10-0.50 m
General comment (MT): The dwelling site belongs to the Säräisniemi 1 -period. The dates are in agreement with archaeological and dates from other Säräisniemi 1 dwelling sites. See Charred Crust Series (Hela-35 this volume).
Ref. Koivisto (1998), Torvinen (2000).

Hela-128 **KM 24714:4** **5995 ± 65**
charred crust from ceramics $\delta^{13}C = -22.2‰$

Hela-129 **KM 24714,12** **6020 ± 80**
resin $\delta^{13}C = -27.2‰$

Hela-130 – Hela-132 See SKI, RUNNER AND PADDLE SERIES Hel-3919

Hela-133 See LUISTARI SERIES Hel-3933

Hela-134 See LAPURI WRECK SERIES Hel-3958

HIUKKASAARI SERIES, VAMMALA (TYRVÄÄ)

58 m a.s.l.
Coll. 1979-1980 by M. Pärssinen, K. Korkeakoski, E. Salminen and J. Niemelä, subm. 1996-1998 by J. Luoto.
General comment (JL): These samples belong to a series collected for dating from different parts of Hiukkasaari (H-island) hillfort. They throw light on different settlement periods of the hillfort.

Hela-135 **TYA 161:238** **2290 ± 60**
charred crust from the inner surface of a pot sherd $\delta^{13}C = -29.4‰$
Comment (JL): The Dating is in accordance with the traditional dating of Luukonsaari-ceramics.

Hela-261 **TYA 178:363** **3700 ± 65**
charred crust from the inner surface of a pot sherd $\delta^{13}C = -25.2‰$
Comment (JL): The Dating is in accordance with the traditional dating of Ki-group ceramics.

Hela-136 See PURKAJASUO SERIES Hel-3917

Hela-137 – Hela-149 See CHARRED CRUST SERIES Hela-35

Hela-150 – Hela-151 See PÖRRINMÖKKI SERIES Hel-3966

Hela-152 SARVISUO, KITEE **5005 ± 70**
$\delta^{13}C$ = -27.9‰

62°11'N, 29°56'E; 83 m a.s.l.
Coll. and subm. 1996 by P. Pesonen.
Sample No. 3, ceramics, birch tar
Comment (PP): The sample was taken from the birch tar used as repair material on the surface of Typical Comb Ware vessels. The date is in good agreement with the archaeological dating of the site.
Ref. In Edgren et al., eds. (1998), Pesonen (1999).

Hela-153 See LAAVUSSUO SERIES Hel-3974

Hela-154 HALOSENTÖRMÄ, MUHOS **3420 ± 105**
$\delta^{13}C$ = -27.6‰

64°53'N, 25°17'E; 35 m a.s.l.
Sampled by A. Kehusmaa and subm. by C. Carpelan (Eraly in the North Project).
KM 17646:163, resin
Comment (CC): Piece of chewing resin. The date is in good agreement with the archaeological and shore line dating of the site.

Hela-161 See KANGAS 2 SERIES Hel-3999

Hela-261 See HIUKKASAARI SERIES Hela-135

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