

TRONDHEIM NATURAL RADIOCARBON MEASUREMENTS VII

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INTRODUCTION

Most dates in this list were obtained in the period 1970 to 1972. Treatment of samples and counting equipment have remained essentially the same as described previously (R, 1972, v 14, p 418-419).

Counting equipment and improvements are described in more detail by Gulliksen (1972). Our counters 2, 5 and 6 now have backgrounds/percent standard net counts of respectively .8cpm/19.3cpm, 1.1cpm/11.7cpm, and .55cpm/7.6cpm. Guard Counter GM3 (Nydal, 1965) shielding our Counter 2, has been continuously working for 3 years without refilling or purification of the propane counting gas (1.2atm). Gyttja samples are now dated by using the NaOH-soluble fraction whenever the quantity of sample material is sufficient.

Ages are calculated by applying the Libby value 5570 ± 30 years, for the ^{14}C half life, and using 95% of NBS oxalic acid activity as contemporary standard referring to AD 1950. Errors quoted ($\pm 1\sigma$) include counting uncertainties for sample, standard, and background. $\delta^{13}\text{C}$ values reported are relative to PDB, and corrections for deviations from 0 ‰ relative PDB are applied for shell samples.

ACKNOWLEDGMENTS

The authors wish to thank collectors and submitters of the samples for their collaboration in preparing the manuscript. $^{13}\text{C}/^{12}\text{C}$ ratios were measured by R Ryhage, Karolinska Inst, Stockholm. Further thanks to Elsa Riiser and Fred Skogseth for sample treatment. Financial support from The Norwegian Research Council for Science and the Humanities is fully acknowledged.

SAMPLE DESCRIPTIONS

I. GEOLOGIC SAMPLES

Norway

1. Interstadial and interglacial samples

Flåte series, Vaksdal

Marine shells from +40 to 45m in Flåte, Trengereid, Vaksdal (60° 26' N, 5° 35' E). T-1161 I and II from silt embedded in till, T-1162 from till. Coll and subm 1971 by Jan Mangerud, Dept Geol, Univ Bergen. *Comment* (JM): site is farthest inside the Younger Dryas end moraines in Hordaland where Alleröd dated sediments are found. Sediments over-riden by ice during Younger Dryas (Aarseth and Mangerud, 1974; Mangerud, 1973).

- T-1161 I. Flåte 1** **11,380 ± 140**
9430 BC
 $\delta^{13}C = +0.6\text{‰}$
Balanus balanus from depth 3m.
- T-1161 II. Flåte 2** **11,260 ± 200**
9310 BC
 $\delta^{13}C = +1.2\text{‰}$
Chlamys islandicus from depth 3m.
- T-1162. Flåte 3** **(a) 11,440 ± 140**
9490 BC
 $\delta^{13}C = +0.6\text{‰}$
(b) 11,560 ± 150
9610 BC
 $\delta^{13}C = +0.9\text{‰}$
 Outer (a) and inner (b) fraction of *Balanus balanus* from depth 4m.
- T-1021. Os** **11,280 ± 110**
9350 BC
 $\delta^{13}C = -1.0\text{‰}$
 Marine shells from +50m in Os, Hordaland (60° 11' N, 5° 29' E). From shelly sand at depth 3m, probably overridden by ice. Coll 1969 and subm 1970 by J Mangerud. *Comment* (JM): many species of marine shells found (Aarseth and Mangerud, 1974; Mangerud, 1973).
- (a) 11,990 ± 200**
10,040 BC
 $\delta^{13}C = +1.7\text{‰}$
(b) 11,880 ± 120
9930 BC
 $\delta^{13}C = +1.6\text{‰}$
T-1022. Hjellestad, Bergen
 Inner (b) and outer (a) fraction of marine shells (*Mya truncata*), from clay underlying till in Younger Dryas end moraines at Hjellestad, Bergen, Hordaland (60° 15' N, 5° 15' E). Coll at +10 to 20m, ca 2m below surface. Coll and subm 1970 by J Mangerud. *Comment* (JM): dates indicate site was deglaciated early in Alleröd. Ice advance during Younger Dryas reached site (Aarseth and Mangerud, 1974; Mangerud, 1973).
- T-1049. Herdla Moraine** **10,540 ± 130**
8590 BC
 Marine shells (*Mya truncata*) from seashore sec in Herdla Moraine, Herdla, Askøy, Hordaland (60° 34' N, 4° 87' E). Coll and subm 1970 by J Mangerud. *Comment* (JM): shells from below ice-front sediments. Indicates Herdla moraines are of Late Younger Dryas age (Aarseth and Mangerud, 1974; Mangerud, 1973).
- T-743/II. Hensmoen 2** **>47,000**
 Stump of *Spruce* from North Hen sandpit, Ringerike, Buskerud. Coll 1968 by L Kjemperud; subm 1969 by T Nygaard, Univ Oslo. Posi-

tion in pit approx as for stump coll 1966, dated to 48,000 \pm 4000 BP (T-743, R, 1970, v 12, p 215). *Lab comment*: dated to check T-743. Probably of same age, *ie*, activity found in T-743 might not be real. T-743/II calculated with a confidence limit of 2σ .

2. Postglacial samples

T-1160. Lekvenvann **7710 \pm 100**
5760 BC

Gyttja from Lekvenvann at +37m, Os, Hordaland (60° 10' N, 5° 27' E). Sample coll with 54mm piston sampler 6.80 to 6.85m below surface. In pollen diagram *Alnus* increases from 3% to ca 40% within .10m; sample from lower .05m of rise. Coll and subm 1971 by J Mangerud.

Engerdal series

Peat from Engerdal, Hedmark (61° 38' N, 11° 45' E) dating Holocene soil and vegetational development. Samples from pollen analyzed sec in traverse from valley floor at +550m to alpine region (+1040m). One sec, in sloping spring fen at +955m, is chosen as "type locality". Coll and subm 1970-1972 by Rolf Sørensen, Inst Geol, Norwegian Inst of Agric, As.

T-981. Holbekkjölen **3310 \pm 170**
1360 BC

From depth 1.40m, underlying main recurrence surface. Watershed fen at +815m, slightly ombrotrophic in parts. *Comment* (RS): spruce expansion overlying recurrence surface (Tallantire, 1972; Lundqvist, 1951; 1969).

T-1126. Snerta **6850 \pm 230**
4900 BC

Basal sediments from dead ice depression at depth 4.90m on margin of valley floor (+557m). *Comment* (RS): age is minimum for last ice remains in central E Norway.

T-1174. Römundfjell I **1660 \pm 80**
AD 290

From depth .45m, .05m above main recurrence surface, dating spruce expansion. Sloping spring fen at +955m in sub-alpine region, slightly above forest limit.

T-1175. Römundfjell II **5850 \pm 100**
3900 BC

From depth .75m at +955m, dating *Alnus* maximum (27% AP). *Comment* (RS): date agrees well with results from Jämtland (Lundqvist, 1969).

T-1317. Römundfjell III **3320 \pm 80**
1370 BC

From depth .55m, .05m below main recurrence surface. *Comment* (RS): a hiatus of ca 1800 yr is evident in this sec and same development seems likely for whole region, *cf* T-981, -1174.

T-1318. Römundfjell IV **8380 ± 140**
6430 BC

Basal organic sediment at depth .95m. *Comment* (RS): date agrees well with results from Jämtland (Lundqvist, 1969).

T-1176. Skjerbekkdalen I **1180 ± 70**
AD 770

From depth .35m, dating spruce expansion. Eroded spring fen in spruce forest at +870m. *Comment* (RS): surprisingly late spruce expansion in area where soil and local climate should be most favorable.

T-1316. Skjerbekkdalen II **2940 ± 170**
1990 BC

Basal organic sediment at depth .7m above thin podzolic layer at +870m.

Sauherad series

Marine mollusks from Sauherad, Telemark. Coll and subm 1972 by Dagfinn Trömborg, Telemark District Academy.

(a) **7810 ± 110**
5860 BC

$\delta^{13}C = +0.3\text{‰}$

(b) **7910 ± 120**
5960 BC

$\delta^{13}C = +0.3\text{‰}$

T-1249. Gvåla

Outer fraction (a) and inner fraction (b) from Gvåla (59° 24' N, 9° 18' E) at +35m, depth 1.2m.

(a) **7440 ± 110**
5490 BC

$\delta^{13}C = +1.3\text{‰}$

(b) **7620 ± 160**
5670 BC

$\delta^{13}C = +2.0\text{‰}$

T-1250. Gyvihaug

Outer fraction (a) and inner fraction (b) from Gyvihaug (59° 25' N, 9° 19' E) at +32m, depth 2m.

Akershus series

Gyttja and shells from different parts of Akershus, dating Holocene sea-level changes. Shells from "Tapes" level and Aker substage shore level date shoreline-relation diagram for Oslo region. Sea-level curve for Ås-Ski area is based on shell, gyttja and wood dates. Coll and subm 1971 and 1972 by R Sørensen (Andrews, 1969; Danielsen, 1970; Hafsten, 1956; Undås, 1950).

T-1173. Bollerudmåsan **9180 ± 130**
7230 BC

Gyttja from depth 6.8m in Bollerudmåsan (59° 43' N, 10° 48' E). Large ombrotrophic bog dammed by end moraines in both ends at

+170m. *Comment* (RS): date younger than expected; might indicate a hiatus of late Pre-Boreal/Early Boreal age.

T-1319. Bråtenmyra **9590 ± 150**
7640 BC

From basal sediments at depth 1.25m in Bråtenmyra at +147m (59° 44' N, 10° 51' E). Sample is from light gray gyttja overlying brackish-marine clay, *Mytilus* shells .15m below gyttja/clay boundary. Coll 1972 by J M Östby.

(a) **2220 ± 80**
270 BC
 $\delta^{13}C = -0.3\text{‰}$

T-1377. Bunnefjorden **(b) 2430 ± 120**
480 BC
 $\delta^{13}C = +1.3\text{‰}$

Outer fraction (a) and inner fraction (b) of *Modiolus* shells from depth 3.75m in beach terrace at +5m at Bunnefjorden, Frogn (59° 43' N, 10° 43' E). Sample found with many *Scrobicularia* shells in dark, layered silt and fine sand below large mudflow. *Comment* (RS): shell bearing sediments considerably older than beach terrace. Dates approx age of mudflow, which must correspond to a sudden reduction of level of Lake Årungen, 1km upstream.

(a) **6730 ± 100**
4780 BC
 $\delta^{13}C = 0\text{‰}$

T-1378. Vestby **(b) 6770 ± 100**
4820 BC
 $\delta^{13}C = +0.3\text{‰}$

Outer fraction (a) and inner fraction (b) of shells from oyster-shell deposit at depth .60m with *Tapes decussatus*, and *Mytilus-Littorina* gravel in Vestby (59° 36' N, 10° 46' E) at +55m.

Slidreåsen series

Peat and gyttja from Vestre Slidre, Oppland. Coll 1971 by Kari Henningsmoen, Wencke Slomann, Helge Irgens Höeg; subm 1972 by H I Höeg, Inst Geol, Univ Oslo (Höeg, in press; Slomann, 1971).

T-1478. Gardberg .20 to .25m, peat **350 ± 110**
AD 1600

From bog 1.975m deep at Fardberg (61° 05' N, 9° 01' E) at +680m. Depth .20 to .25m. *Comment* (HIH): dates beginning of recent farming period in Slidreåsen.

T-1338. Gardberg .45 to .50m, gyttja **1690 ± 110**
AD 260
Comment (HIH): dates most intensive farming period.

- T-1339. Gardberg .70 to .75m, gyttja** **3440 ± 120**
1490 BC
Comment (HIH): dates 1st traces of a farming culture.
- T-1479. Tvenge .95 to 1.05m, peat** **1990 ± 80**
40 BC
Peat from bog 6.5m deep near Tvengehögd (61° 05' N, 9° 02' E) at +900m. *Comment* (HIH): dates beginning of *Picea*-curve; definite rise of *Picea* was later, ca AD 1000.
- T-1340. Tvenge 1.96 to 2.05m, peat** **3380 ± 120**
1430 BC
Comment (HIH): dates earliest farming culture in Slidreåsen. Decline in *Alnus* and QM, and rise in NAP, especially *Cyperaceae*.
- T-1480. Tvenge 2.95 to 3.05m, gyttja** **5330 ± 160**
3380 BC
Comment (HIH): dates decline in *Alnus* and rise in NAP.
- T-1481. Tvenge 3.95 to 4.05m, gyttja** **6880 ± 80**
4930 BC
Comment (HIH): dates *Ulmus* maximum.
- T-1482. Tvenge 5.48 to 5.58m, gyttja** **10,230 ± 260**
8390 BC
Comment (HIH): dates oldest organic deposits. Sample contained pollen from *Alnus* and QM, indicating that sample cannot be older than ca 7500 yr BP.
- T-1483. Slidre 0.95 to 1.05m, peat** **1540 ± 90**
AD 410
From bog 5.7m deep near Slidrestöl (61° 06' N, 9° 00' E) at +720m. *Comment* (HIH): dates forest clearing period in Slidreåsen, which starts a little earlier, at same time as beginning of continuous *Picea* curve. Definite rise of *Picea* came later, ca AD 1000.
- T-1484. Slidre 4.03 to 4.13m, gyttja** **9670 ± 570**
7720 BC
Comment (HIH): dates oldest organic deposits and immigration of *Ulmus* and *Alnus*. Pollen content indicates that sample cannot be older than ca 7500 yr BP.

Skaitidalen series

Peat and gyttja from Skaitidalen, Saltdal, Nordland. Coll 1970 and subm 1971 by H I Höeg (1972).

- T-1095. Myr I, .94 to 1.09m, peat** **4230 ± 170**
2280 BC
From bog 1.25m deep (66° 52' N, 15° 48' E) at +580m, depth .94 to 1.09m. *Comment* (HIH): dates oldest organic deposits. Deterioration of climate is seen in pollen diagram as a *Cyperaceae* peak between .88 and .77m.

- T-1096. Myr C, 2.05 to 2.15m, peat** **3510 ± 170**
1560 BC
From 4.20m deep bog at +640m (66° 54' N, 15° 50' E). *Comment* (HIH): dates decline of *Alnus*.
- T-1097. Myr C, 3.10 to 3.20m, gyttja** **4680 ± 180**
2730 BC
Comment (HIH): dates beginning of climatic deterioration corresponding to a *Cyperaceae* peak, and also a *Pinus* decline.
- T-1098. Myr C, 4.10 to 4.20m, gyttja** **7260 ± 160**
5310 BC
Comment (HIH): dates oldest sediments and rise of *Alnus*.
- T-1099. Myr F, 3.85 to 3.95m, gyttja** **11,440 ± 480**
9490 BC
From 3.95m deep bog (66° 49' N, 15° 50' E) at +550m. *Comment* (HIH): dates oldest sediments containing pollen from typical Pre-Boreal vegetation (*Betula nana*, *Hippophaë*, *Salix*, *Rumex*, *Saxifraga*, and *Caryophyllaceae*). Date too old, Alleröd not expected in this area.
- Breiavatnet series**
- Gyttja and shell from bottom mud in Lake Breiavatnet at +4.2m in city of Stavanger, Rogaland (58° 58' N, 5° 44' E). Series gives the age of Lake Breiavatnet (time of isolation from sea), and reveals human impact on vegetation during last 3000 yr. Coll 1971 and subm 1972 by Asbjörn Simonsen, Stavanger Mus (Simonsen, 1971).
- T-1163. Breiavatnet 1, 4.45 to 4.50m, gyttja** **650 ± 100**
AD 1300
From depth 4.45 to 4.50m below water surface. *Comment* (AS): dates a sharp decline in cereal pollen.
- T-1283. Breiavatnet 2, 4.80m, gyttja** **1190 ± 100**
AD 760
Comment (AS): dates low frequency of cereal pollen in Merovinger period, reflecting low agricultural activity.
- T-1164. Breiavatnet 3, 5.25 to 5.50m, gyttja** **1780 ± 290**
AD 170
Comment (AS): dates marked increase in cereal pollen, reflecting higher agricultural activity in Great Migration period.
- T-1341. Breiavatnet 4, 5.45m, gyttja** **2580 ± 100**
630 BC
- T-1165. Breiavatnet 5, 5.65m, gyttja** **3090 ± 160**
1140 BC
Comment (AS): dates transition layer of marine/brackish gyttja.
- T-1284 II. Breiavatnet 6, 6.75m, gyttja** **3150 ± 200**
1200 BC
Comment (AS): decline of oak pollen.

T-1284 I. Breiavatnet 6A, 6.75m, shell **2670 ± 110**
720 BC
 Shell fragments in gyttja of T-1284 II. $\delta^{13}C = +0.2\text{‰}$

T-1332. Breiavatnet 6A, 6.75m, shell **2670 ± 80**
720 BC
 $\delta^{13}C = +0.2\text{‰}$

Shells (*Ostrea edulis*) embedded in gyttja of T-1284 II. *Comment* (AS): shells might have been pressed down from younger layer by core sampler.

Eigerøy series

Charcoal (*Alnus*) and peat from 1m deep bog at +5m in Gjedlestadvige, Eigersund, Rogaland (58° 25' N, 5° 59' E). Bog situated close to several dwelling sites from Mesolithic and later periods; series dates vegetational development in area. Two layers of charcoal reflect forest clearing. Coll 1971 and subm 1972 by A Simonsen (1972).

T-1285. Eigerøy 1, .17 to .20m, charcoal **2120 ± 100**
170 BC

From depth .17 to .20m. *Comment* (AS): dates last and final forest clearing in area, not coinciding with traditional Sub-Boreal/Sub-Atlantic transition.

T-1167. Eigerøy 2, .23 to .31m, charcoal **3340 ± 80**
1390 BC

Comment (AS): dates 1st, incomplete forest clearing.

T-1286. Eigerøy 3, .75 to .80m, peat **5810 ± 160**
3860 BC

Upper part of peat under marine sand.

Hardangervidda peat development series

Peat and wood from the mountainous Hardangervidda area in S Norway. Series date peat development in area, also used in pollen analytic and archaeological studies. All samples are cut out of open profiles. Coll and subm 1970 to 1972 by Dagfinn Moe, Arthur Fasteland, and F E Wielgolaski, The Hardangervidda project for interdisciplinary cultural research. *Comment* (DM): dates correlate well with expected ages (Moe, 1973a, b).

T-1080. Halnelaegeret 1 **4860 ± 90**
2910 BC

Peat from depth .80m in Eidfjord, Hordaland (60° 25' N, 7° 42' E), at +1140m.

T-999. Halnelaegeret 2 **3510 ± 90**
1560 BC

Peat from depth 1.4m.

- T-1079. Stigstuv 1** **5090 ± 180**
3140 BC
Wood (*Salix*) from depth .50m in Eidfjord, Hordaland (60° 19' N, 7° 37' E), at +1310m.
- T-1140. Stigstuv 2** **8000 ± 130**
6050 BC
Peat from depth .74 to .75m.
- T-1141. Stigstuv 3** **5150 ± 90**
3200 BC
Peat from depth .51 to .52m.
- T-1081. Ustetind 1** **5870 ± 150**
3920 BC
Peat from depth .60m in Hol, Buskerud (60° 29' N, 8° 07' E), at +1310m.
- T-1554. Ustetind 2** **1400 ± 80**
AD 550
Peat from depth .15 to .16m.
- T-1195. Vetle Fjellsetmyr 1** **4870 ± 90**
2920 BC
Peat from depth .95 to .97m in Hol, Buskerud (60° 28' N, 8° 10' E), at +1135m.
- T-1196. Vetle Fjellsetmyr 2** **7790 ± 210**
5840 BC
Peat from depth 1.55 to 1.57m.

II. ARCHAEOLOGIC SAMPLES

Norway

1. Settlement sites

Hardangervidda Stone age series

Charcoal and bone from several sites in different parts of the Hardangervidda mountain plateau in S Norway intended to give an absolute chronology for different stages of man's exploitation of area in pre-metal time. Coll 1970 to 1972 by Svein Indrelid and S Bang Andersen; subm 1970 to 1972 by S Indrelid, Univ Bergen (Indrelid, 1973).

- T-1000. Hein 85** **7450 ± 350**
5500 BC
Charcoal from depth .12m at Heintjern, Buskerud (60° 22' N, 7° 55' E) at +1112m. From hearth of Stone age site with thin cultural layer. Artifacts made of quartz. Few tools. *Comment* (SI): character of raw material and chipping technique indicate Mesolithic age, but do not exclude other periods.

T-1289. Hein 76 **7020 ± 140**
5070 BC

Charcoal from depth .08 to .10m at Övre Hein, Buskerud (60° 22' N, 7° 52' E) at +1113m. *Comment* (SI): finds are of same character as those from T-1000.

T-1003. Hein 33/1 **5920 ± 200**
3970 BC

Charcoal from depth .55 to .58m at Halnefjorden, Buskerud (60° 22' N, 7° 44' E) at +1132m. *Comment* (SI): site Hein 33 was stratified, and it was archaeologically possible to distinguish at least 2 phases of settlement, an older pre-slate phase (Levels IV and V) and a younger slate phase (Levels I and II). In both phases were found points of single edged, oblique edged, and tanged types. Date of T-1003 (Level V) indicates that tanged points were used in this area in late Mesolithic time, before slate phase.

T-1005. Hein 33/2 **5150 ± 130**
3200 BC

Charcoal from depth .20m, Level III (transition pre-slate/slate). Small tanged points, oblique, and single edged points abundant, a few slate points were found. Bones of trout (*Salmo trutta*).

T-1001. Hein 33/3 **5020 ± 100**
3070 BC

Charcoal from depth .35 to .40m, Level III. *Comment* (SI): dates (T-1005, -1001) indicate that tanged points were used in this area at the transition between Mesolithic and Younger Stone age. This is earlier than type appearance in the "Pit-ware-culture" in S Scandinavia.

T-1076. Hein 33/4 **4920 ± 90**
2970 BC

Elk bone (*Alces alces*) from depth .45m, Level IV. Trout bones (*Salmo trutta*) also found. *Comment* (SI): date agrees with T-1001 and T-1005. Level IV revealed no slate; it was probably introduced later. Dates indicate that tanged-point tradition existed unbroken from Mesolithic time to Younger Stone age in mt areas of S Norway.

T-1004. Hein 33/5 **4240 ± 130**
2290 BC

Charcoal from depth .15m in fire pit. *Comment* (SI): dates youngest settlement phase.

T-1002. Hein 33/6 **4190 ± 110**
2240 BC

Charcoal from cultural layer in outer part of site, depth .45m.

T-1398. Nordmannslågen 724 **7420 ± 330**
5470 BC

Charcoal from depth .20m in fire pit in small site at +1250m near lake Nordmannslågen, Ullensvang, Hordaland (60° 12' N, 7° 27' E).

Comment (SI): quartz artifacts and very few tools were found, as in sites Hein 85 and 76. Finds look very homogeneous and dates agree well.

T-1234. Nordmannslågen 512/1 **5800 ± 600**
3850 BC

Charcoal from deepest part of cultural layer in site at +1245m at Sandhaug near lake Nordmannslågen, Ullensvang, Hordaland (60° 11' N, 7° 29' E). Depth .35m. *Comment* (SI): date agrees well with oldest levels of Hein 33, where artifacts of same character were found.

T-1233. Nordmannslågen 512/2 **2070 ± 140**
120 BC

Charcoal from top layers, depth .10m. *Comment* (SI): date too young, as artifacts of Mesolithic character were found at depth .01 to .02m. Discrepancy might be explained by frost stirring.

T-1230. Nordmannslågen 550/1 **3250 ± 150**
1300 BC

Charcoal from depth .15m in fireplace in center of 1 of 2 circular housegrounds at +1255m at Sandhaug. All artifacts made of flint, quartz, and quartzite.

T-1231. Nordmannslågen 550/2 **2790 ± 240**
840 BC

Charcoal from depth .08 to .10m in fire pit outside housegrounds.

T-1229. Nordmannslågen 550/3 **2420 ± 140**
470 BC

Charcoal from depth .06 to .08m in fireplace in center of the youngest looking houseground. *Comment* (SI): dates from Loc 550 indicate that stone was used as raw material in Bronze age period in this area; agrees with dates from rock shelters and caves with similar artifacts, indicating late stone technology in mt areas of S Norway.

T-1236. Nordmannslågen 547 **3010 ± 160**
1060 BC

Charcoal from depth .10m in fireplace in center of another circular houseground at +1255m at Sandhaug. *Comment* (SI): date agrees with dates from Loc 550.

T-1394. Skryken 1113 **5730 ± 240**
3780 BC

From charcoal concentration .20m below surface at +1158m at Skryken, Nore og Uvdal, Buskerud (60° 15' N, 8° 04' E). *Comment* (SI): artifacts of Mesolithic character, few tools. Microblades are frequent.

T-1397. Tøddølvatn 1100 **5250 ± 100**
3300 BC

Charcoal from depth .30m in hearth in cultural layer at +1105m at Tøddølvatn, Nore og Uvdal, Buskerud (60° 19' N, 8° 17' E). *Comment* (SI): site not dateable by artifacts.

T-1449. Veivatn 618/1 **4290 ± 170**
2340 BC

Charcoal from depth .15 to .18m in hearth in artifact-bearing cultural layer of Stone age site at +1178m at Veivatn, Ullensvang, Hordaland (60° 15' N, 6° 55' E Long).

T-1396. Veivatn 618/2 **4080 ± 140**
2130 BC

Charcoal from depth .10m in hearth.

T-1395. Veivatn 634 **4200 ± 170**
2250 BC

Charcoal from depth .10 to .12m in hearth of Stone age site at +1180m at Veivatn.

Laerdal series

Charcoal from site with clearly defined Stone age technique at +1315m in Kjöleskarvet S, near lake Store Öljusjö, Laerdal, Sogn og Fjordane (60° 58' N, 8° 04' E). Artifacts made of quartzite. Coll and subm 1971 by Arne Johansen, Hist Mus, Univ Bergen. *Comment (AJ)*: dates give surprisingly low age for site with Mesolithic stone working technique (Johansen, 1969; Vorren, 1973).

T-1186. Kjöleskarvet 1 **2450 ± 160**
500 BC

From charcoal layer at depth .15 to .18m. Circular layer of brittle-burnt stones at depth .10 to .15m; many artifacts in top layer.

T-1243. Kjöleskarvet 2 **3520 ± 300**
1570 BC

From depth .15m, beneath stone layer of exactly same type.

Storbåthallaren series

Charcoal and shell from cave at +7.5m with kitchen midden deposits at Storbåthallaren, Moskenes, Nordland (68° 05' N, 13° 25' E). Thick layers of shell and fish bones, mostly from big cod (skrei), but also from many species of mammals and birds. Bone and slate artifacts showing hunting and fishing economy. Two Younger Stone age phases, separated by last Tapes transgression. Coll and subm 1970 and 1971 by Astrid Utne, Tromsø Mus, Univ Tromsø (Utne, 1971a, b).

T-1200. Storbåthallaren 1 **2060 ± 80**
110 BC

Charcoal from depth .18m.

T-1013. Storbåthallaren 2 **2330 ± 110**
380 BC

Charcoal from depth .25m. *Comment (AU)*: latest phase of Younger Stone age settlement, agrees with archaeol dating.

T-1198. Storbåthallaren 3 **4740 ± 140**
2790 BC

Charcoal from depth .30m.

T-1017. Storbåthallaren 4	4910 ± 80 2960 BC
Mollusks from depth .40m to .50m.	
T-1014. Storbåthallaren 5	5250 ± 80 3300 BC
Charcoal from depth .50m.	
T-1016. Storbåthallaren 6	2460 ± 70 510 BC
Charcoal from depth .55m. <i>Comment</i> (AU): date too young, but further excavation showed stratigraphy was disturbed.	
T-1018. Storbåthallaren 7	5080 ± 90 3130 BC
Mollusks from depth .60 to .70m.	
T-1015. Storbåthallaren 8	4000 ± 800 2050 BC
Coal from depth .70m. <i>Lab comment</i> : sample extremely undersized, 8% sample gas (.1gC). Date might be too young.	

Devdisvatn series

Charcoal and charred bones from fireplace and shallow pits assoc with Mesolithic/Younger Stone age artifacts at +412m at lake Devdisvatn, Målselv, Troms (69° 47' N, 19° 40' E). Coll 1970 and subm 1972 by Knut Helskog, Tromsø Mus, Univ Tromsø. *Comment* (KH): bone dates both considerably younger than indicated by cultural inventory. T-1343 corresponds with archaeol date.

T-1342. Devdisvatn 1	1020 ± 180 AD 930
Charred bone from depth .05 to .10m in pit.	
T-1453. Devdisvatn 2	1800 ± 220 AD 150
Charred bone from depth .05 to .07m in pit.	
T-1343. Devdisvatn 3	6570 ± 150 4620 BC
Charcoal from depth .10 to .15m in fireplace.	

Stegaros series, Hardangervidda

Charcoal from cultural layers assoc with rock shelters in Stegaros, Tinn, Telemark (60° 05' N, 8° 17' E). Stegaros, at lake Mår on Hardangervidda, is site with 2 rock shelters, several housegrounds, and pits with charcoal and heated stones. Coll 1972 by Lil Gustafson and Svein Indrelid; subm 1972 by Lil Gustafson, Univ Oldsaksamling, Oslo. *Comment* (LG): rock shelters were used in Late Neolithic, Bronze age, Iron age, and occasionally later.

T-1445. Stegaros 1058/1 **3810 ± 90**
1860 BC

From depth .68m in cultural layer .70 to .80m thick in rock shelter, Loc 1058. Fragmented animal bones and heated stones; all artifacts in lower parts were of flint and quartzite, eg, flat-chopped arrowheads.

T-1452. Stegaros 1058/2 **600 ± 120**
AD 1350

From depth .30m in fireplace in rock shelter. Flint and quartzite.

T-1450. Stegaros 1006/1 **2980 ± 170**
1030 BC

From depth .60m in refuse heap outside rock shelter Loc 1006. Artifacts of stone and iron: flat-chopped tools of flint and quartzite, nails, fish hooks and other iron items, as well as fragmented animal bones and heated stones.

T-1451. Stegaros 1006/2 **600 ± 120**
AD 1350

From fireplace in base of cultural layer .20m thick inside rock shelter. *Comment* (LG): fireplace belongs to late settlement, stratigraphy shows that oldest cultural accumulations were discarded. Artifacts, mostly iron nails and strike-a-lights of flint, do not contradict date.

Gjerland series

Charcoal from 4 out of nearly 50 fireplaces assoc with 2 rare house-grounds on a terrace at +300m in Gjerland, Förde, Sogn og Fjordane (61° 25' N, 6° 25' E). Coll 1971 and 1972; subm 1972 and 1973 by Björn Myhre, Hist Mus, Univ Bergen. *Comment* (BM): archaeol material very scanty and difficult to date. Structures were supposedly from Early Iron age, probably Migration period; agreeing with dates (Myhre, 1973a).

T-1334. Gjerland 1 **1790 ± 110**
AD 160

From depth .25m inside House I.

T-1404. Gjerland 2 **1650 ± 70**
AD 300

From depth .20m in another fireplace in House I.

T-1459. Gjerland 3 **1670 ± 80**
AD 280

From depth .25m in House II.

T-1335. Gjerland 4 **1580 ± 150**
AD 370

From depth .50m in fireplace outside the housegrounds.

Boat house series, Stend

Charcoal from fireplaces and wood from walls of boat house from Early Iron age at +3m in Stend, Bergen, Hordaland (60° 15' N, 5° 20' E). Coll and subm 1970 to 1972 by B Myhre. *Comment* (BM): house was ca

32m × 5m, dated archaeologically by earliest pottery to 1600 BP. Walls might be older than oldest artifacts (Myhre, 1973b).

T-1067. Stend 1	1730 ± 160
From end wall, depth .50m.	AD 220
T-1241. Stend 2	1810 ± 60
From end wall, depth .50m.	AD 140
T-1336. Stend 3	1790 ± 110
From W side wall, depth .50m.	AD 160
T-1337. Stend 4	1520 ± 70
From depth .50m in fireplace at entrance.	AD 320
T-1242. Stend 5	1680 ± 60
From depth .75m in fireplace.	AD 270

Lonelega rock shelter series

Charcoal from cultural layers in the rock shelter Lonelega I at +835m at Lake Lonevatn, Forsand, Rogaland (59° 10' N, 6° 55' E). Dates different stages of visits or settlements during Later Bronze age, Pre-Roman Iron age, and Medieval age. Two 1st stages are represented by different types of flat-chopped arrowheads and potsherds. Finds from Stone age and Migration period in other layers. Coll 1972 by Birgitta Broberg; subm 1972 by Egil Mikkelsen, Univ Oldsaksamling, Oslo.

T-1426. Lonelega I/1	590 ± 200
From fireplace in Layer 3.	AD 1360
T-1428. Lonelega I/2	2320 ± 150
From Layer 6.	370 BC
T-1427. Lonelega I/3	2780 ± 110
From Layers 7 and 8.	830 BC

Risøya series, Sund

Charcoal from 1 excavated houseground of 8, situated around a shallow bay facing E on treeless, uninhabited Risøya I., outside Toft in Sund, Hordaland (60° 10' N, 5° E). Four cooking pits inside houseground, with central fireplace. Finds are mainly iron fishing hooks and knives, soapstone sinkers, cooking pots, and whetstones. Coll and subm 1972 by Bente Magnus Myhre, Hist Mus, Univ Bergen. *Comment* (BMM): habitation assumed to be seasonal fishing communities during Late Iron age, confirmed by dates. T-1406 slightly too old, might be caused by use of driftwood.

T-1405. Risöya 1 **1150 ± 90**
AD 800
From depth .10m in top layer of cooking pit near W wall.

T-1461. Risöya 2 **1370 ± 160**
AD 580
Charred branch from depth .30m in cooking pit.

T-1460. Risöya 3 **1230 ± 60**
AD 720
Remnants of burnt plank from wall or floor, from depth .40m partly under W foundation wall.

T-1406. Risöya 4 **1630 ± 110**
AD 320
From depth .40m in bottom layer of fireplace.

Lille Gautelis series, Ankenes

Charcoal from different fireplaces in site at +856m in Lille Gautelis, Ankenes, Nordland (68° 01' N, 17° 50' E). Coll 1971 and subm 1972 by Knut Helskog, Tromsø Mus, Univ Tromsø. *Comment* (KH): archaeological dating based on artifacts in site is very difficult.

T-1252. L Gautelis 1 **580 ± 120**
AD 1370
From depth .05 to .08m.

T-1253. L Gautelis 2 **480 ± 110**
AD 1470
From depth .04 to .08m.

T-1344. L Gautelis 3 **6130 ± 170**
4180 BC
From depth .04 to .08m outside fireplace dated by T-1253.

T-1345. L Gautelis 4 **320 ± 130**
AD 1630
From depth .04 to .10m.

2. Cemeteries and burial mounds

Gunnarstorp series, Östfold

Charcoal from Early Iron age cemetery with >150 flat graves covered by a flat stone or various kinds of stone pavements at +35m in Gunnarstorp, Skjeberg, Östfold (59° 12' N, 11° 8' E). Coll 1955 to 1959 by Univ Oldsaksamling, Oslo; subm 1971 and 1972 by Trond Löken, Univ Oldsaksamling.

T-1212. Grave 31 **2070 ± 80**
120 BC

From depth .20 to .60m in pit fire covered with flat stone, containing burnt bones and potsherds. Cremation grave marked on surface with round stone pavement, diam 6m.

- 2230 ± 80**
280 BC
- T-1213. Grave 159**
From depth .35m in pit fire covered with a stone. Cremation grave asymmetrically surrounded by circular row of stones, diam 2.25m. In center small stone pavement connected to stone circle by 2 radial rows of stones.
- 270 ± 70**
AD 1680
- T-1292. Grave 37**
From .10m thick charcoal layer at depth .10m from center of stone circle, diam 8m, including 11 standing stones connected with stone pavement. *Comment* (TL): sample obviously recent compared to stone circle.
- 2050 ± 70**
100 BC
- T-1293. Grave 3**
From charcoal layer at depth .50m at base of round grave mound, of gravel and stones and surrounded by a kerb. Potsherds and burnt bones were in layer.
- 380 ± 60**
AD 1570
- T-1294. Grave 40**
From charcoal layer at depth .10 to .20m with a few burnt bones, covered by irregular stone pavement. *Comment* (TL): date does not agree with supposed age.
- 2970 ± 70**
1020 BC
- T-1295. Grave 70**
From depth .35m in pit with burnt stones, fragments of iron and potsherds, covered with 2 flat stones and surrounded by triangular stone pavement with kerb. *Comment* (TL): date older than expected.
- 2350 ± 80**
400 BC
- T-1296. Grave 54**
From depth .20 to .50m in pit with burnt bones, covered by flat stone.
- 2230 ± 80**
280 BC
- T-1297. Grave 52**
From pit with bronze needle and burnt bones, covered with flat stone and surrounded by elliptical stone pavement with a kerb.
- 2230 ± 60**
280 BC
- T-1440. Grave 52**
From another pit inside same pavement.
- 1020 ± 70**
AD 930
- T-1439. Grave 41**
From pit containing soil mixed with charcoal, covered with irregular stone pavement, diam 3m. *Comment* (TL): pavement probably recent compared to cemetery.

T-1441. Grave 75 **330 ± 100**
AD 1620

From heap of potsherds mixed with burnt bones and small quantities of charcoal in stone cist, covered with an irregular kerb, diam 1.40m. *Comment* (TL): charcoal must be recent compared to potsherds and bones.

St Clemens church series, Oslo

Human bone and wood from oldest graves in 2 cemeteries at +10m, from excavation of St Clemens church, Gamlebyen, Oslo (59° 54' N, 10° 46' E). Probably oldest Christian cemeteries in Norway known; supposedly from early 12th century. Coll and subm 1971 by The Central Office Hist Monuments, Archaeol Sec, Oslo. *Comment* (COHM): dates slightly older than expected. T-1327 and -1328 are from oldest graves.

T-1156. St Clemens church, 133T **890 ± 150**
AD 1060
Stick of wood from depth 1.9m.

T-1210. St Clemens church, 136B **990 ± 70**
AD 960
Human bones from depth 2m.

T-1325. St Clemens church, 136T **1040 ± 110**
AD 910
Plank from coffin containing skeleton dated by T-1210.

T-1326. St Clemens church, 137B **1020 ± 100**
AD 930
Human bones from depth 2m.

T-1327. St Clemens church, 145B **930 ± 100**
AD 1020
Human bones from depth 2.1m.

T-1328. St Clemens church, 146B **920 ± 90**
AD 1030
Human bones from depth 2.2m.

Lille Sölensjöen series

Charcoal from concentrations in burial cairns at +700m at lake Lille Sölensjöen, Övre Rendal, Hedmark (62° 02' N, 11° 37' E). Coll and subm 1971 to 1973 by Arne Skjölsvold, Univ Oldsaksamling, Oslo. *Comment* (AS): part of study on Iron age settlements in mt regions in SE Norway. Dates T-1178 and -1179 too old; probably use of old fire wood.

T-1178. Lille Sölensjöen I **4080 ± 170**
3090 BC
From depth .30m.

T-1179. Lille Sölensjöen II **2430 ± 60**
480 BC
From depth .20m.

1580 ± 80
AD 370

T-1430. Lille Sölensjöen, Grav V
From charcoal concentration assoc with plane-iron and mounting of sword scabbard.

2470 ± 80
520 BC

T-1041. Bringsjord, Lyngdal

Charcoal from concentration at depth .50m in burial mound at +30m in Bringsjord, Lyngdal, Vest-Agder (48° 10' N, 7° 05' E). Potsherds and burnt bones underlying charcoal layer; flat piece of bronze also found in mound. Coll and subm 1970 by Trond Löken, Univ Oldsaksamling, Oslo. *Comment* (TL): date older than expected, finds do not contradict date.

Steinhaug series, Saerheim

Charcoal from pits underneath outer parts of a Bronze age mound at +70m in Saerheim, Klepp, Rogaland (58° 46' N, 5° 17' E). Samples from middle of 5 different pits, .50m deep, filled with charcoal and earth. Coll 1970 by Reidar Bertelsen, Stavanger Mus; subm 1971 by Oddmund Möllerop, Stavanger Mus, Stavanger. *Comment* (OM): outer part of mound younger than lower central, probably contemporary with a secondary burial in Roman period (Bertelsen, 1970).

2340 ± 70
390 BC

T-991. Saerheim 1

2460 ± 70
510 BC

T-992. Saerheim 2

2470 ± 80
520 BC

T-1201. Saerheim 3

2610 ± 80
660 BC

T-1314. Saerheim 4

2380 ± 110
430 BC

T-1315. Saerheim 5

Sörheim series, Etne

Charcoal from different barrows and graves in big cemetery at +50m in Sörheim, Etne, Hordaland (59° 40' N, 6° E). Coll 1969 by Svein Indrelid and Anne Zachariassen, Hist Mus, Univ Bergen; subm 1971 by Björn Myhre (1972).

2940 ± 130
990 BC

T-1278. Barrow 5/18

From charcoal layer at base of big barrow, depth 1m. *Comment* (BM): date as expected, correlates well with previous dates from Bronze age barrow at other end of cemetery (R, 1972, v 14, p 444).

3750 ± 90
1800 BC

T-1280. Fireplace 5/18

From fireplace at depth 1.30m below layer of earth underlying char-

coal layer dated by T-1278. *Comment* (BM): Late Stone age or Early Bronze age is reasonable.

T-1279. Grave 5/13 **1230 ± 70**
AD 720

From grave pit at base of barrow. *Comment* (BM): date correlates well with type of grave and poor grave goods from pit.

T-1065. Gjerstad **1780 ± 80**
AD 170

Charcoal from a cremation grave at depth 3m in center of big barrow at +100m in Gjerstad, Voss, Hordaland (60° 40' N, 6° 20' E). Coll 1968 by Bente Magnus Myhre; subm 1970 by Björn Myhre. *Comment* (BM): date too old, archaeol date AD 400 yr.

Charcoal pit series

Charcoal from small pits with charcoal, stones, and few or no remains of burnt bones, a phenomenon often observed in Iron age cemeteries. The fact that the pits often are found in the bottom of barrows, seems incidental. They nearly always are older than barrows, probably representing a very extreme kind of burial rite in Early Iron age. Coll 1966 to 1971 and subm 1970 to 1972 by Oddmund Farbregd, DKNVS Mus, Univ Trondheim (Farbregd, 1971, 1972a, b).

T-987. Kvello, Pit A **2020 ± 90**
70 BC

From pit in bottom of barrow at +160m in Kvello, Verdal, Nord-Trøndelag (63° 46' N, 11° 41' E). Cist burial in center of barrow (25m wide × 3m high) dated at AD 350 to 450.

T-1120. Kvello, Pit B **1950 ± 80**
0 BC

From pit .50m from Pit A, same level.

T-1121. Kvello, Pit C **1720 ± 100**
AD 230

From pit .80m from Pit B, same level. *Comment* (OF): dates confirm pits are older than cist burial.

T-1122. Kvello, Trench **1680 ± 70**
AD 270

From trench in bottom of same barrow. Trench is part of circle with central stone cist, marking periphery of a small primary barrow. *Comment* (OF): trench probably contemporary with cist burial; date not conclusive.

T-1125. Vie, pit under long barrow **2120 ± 80**
170 BC

Sample from oval pit at base of barrow 20m long at +ca 100m in Vie, Grong, Nord-Trøndelag (64° 29' N, 12° 10' E). *Comment* (OF): date confirms pit is older than barrow.

T-1123. Figga, pit in boat grave **1470 ± 80**
AD 480

From pit at base of round barrow, ca 11m wide at +10m in Figga, Steinkjer, Nord-Trøndelag (64° 01' N, 11° 29' E), containing boat burial of late Viking period. *Comment* (OF): pit is clearly older than barrow.

T-1124. Vang, Barrow 587, pit **1430 ± 90**
AD 520

From pit at base of round barrow, 5m wide at +575m in Vang, Oppdal, Sør-Trøndelag (62° 36' N, 9° 39' E). No burnt bones, iron arrow head typical of Merovingian period on top of pit. *Comment* (OF): pit assumed to represent burial over which barrow was built; date agrees.

T-1287. Hollingen, pit **2320 ± 70**
370 BC

From pit at ca +40m just outside stone cist from Migration period in Hollingen, Aukra, Møre og Romsdal (62° 47' N, 6° 58' E). *Comment* (OF): pit clearly older than cist burial.

T-988. Å, Barrow 8, pit **1670 ± 70**
AD 280

From pit at base of Viking period barrow at +15m in Å, Snillfjord, Sør-Trøndelag (63° 24' N, 9° 30' E).

T-990. Å, separate pit **1860 ± 90**
AD 90

From pit 6m outside barrow covering pit dated by T-988. *Comment* (OF): both pits clearly older than barrow.

Å cemetery series

Charcoal samples related to primary and secondary stages of grave monument at +15m in Å, Snillfjord, Sør-Trøndelag (63° 24' N, 9° 30' E). Coll 1970 and subm 1970 and 1972 by O Farbregd (1971, 1972a, b).

T-989. Å, Barrow 8, stone cist **3370 ± 170**
1420 BC

Pieces of charcoal scattered in original surface under stone cist centrally situated in cairn 6m wide. In secondary stage of use covered by larger earth mound. *Comment* (OF): date is *post quem*, probably direct, *ie*, cist can be Bronze or Early Iron age.

T-1288. Å, Barrow 8, trench **1240 ± 70**
AD 710

From charcoal concentration at base of trench around barrow. *Comment* (OF): sample most probably contemporary with trench and barrow; date confirms secondary use of monument in Viking period.

Lappish Iron age series, Finnmark

Birch-bark from graves in rock-strewn slopes used as burial sites. Most samples from Mortensnes, Nesseby, Finnmark (70° 07' N, 29° 20' E).

Also charcoal and bone from house site at Mortensnes including several housegrounds belonging to same cultural tradition. Coll 1967 to 1970 and subm 1968 to 1970 by Else Johansen Kleppe, Hist Mus, Bergen. T-674 coll 1967, T-673 and -674 subm 1968 by Knut Odner, Hist Mus, Bergen. *Comment* (EJK): series indicate that Lappish Iron age lasted from approx AD 1 to AD 1700 (Solberg, 1909; Johansen and Odner, 1968).

T-871. Mortensnes 1, Grave 39 **680 ± 60**
AD 1270

Birch-bark, mostly decorated, from flagstone coffin in Mortensnes burial site. Other finds: 6 quartzite scrapers, 2 flakes, 1 pumice stone with flat polished surface, and skeletal remains. Depth .5m.

T-872. Mortensnes 2, Grave 145 **300 ± 50**
AD 1650

Birch-bark from partly opened and collapsed flagstone coffin. Other finds: 3 bronze needles, 1 pearl, 2 spindle whirls, 3 quartzite flakes, 2 pumice stones with flat polished surfaces and skeletal remains. Depth ca .7m.

T-874. Mortensnes 3, Grave 97 **1000 ± 70**
AD 950

Birch-bark from flagstone coffin, previously unopened. Other finds: quartzite scrapers and flakes, skeletal remains. Depth .5m.

T-933. Mortensnes 4, Grave 10 **1460 ± 90**
AD 490

Birch-bark from previously opened flagstone coffin. No other finds. Depth ca .6m.

T-934. Mortensnes 5, Grave 65 **250 ± 90**
AD 1700

Birch-bark from previously opened flagstone coffin. Other finds: 3 pumice stones. Depth .5m.

T-935. Mortensnes 6, Grave 113 **300 ± 90**
AD 1650

Birch-bark from previously unopened but collapsed coffin. Depth ca .2m. Other finds: quartzite scrapers and flakes and 1 skeleton.

T-673. Mortensnes 7, House 26, Sec A **600 ± 70**
AD 1350

Charcoal from depth ca .25m in fireplace, Houseground 26, Sec A.

T-870. Mortensnes 8, House 26, Sec A **≤ 100**

Bones of domestic animals from depth ca .15m in cultural layer with other animal bones and artifacts, some recent. No stratification observed.

T-675. Mortensnes 9, Sec A **2420 ± 120**
470 BC

Charcoal from depth ca .15m in concentration of stones in Sec A.

- T-674. Mortensnes 10, House 10, Sec B** **2150 ± 150**
200 BC
Charcoal from layer at depth ca .25m, under fireplace.
- T-873. Kariel, Grave I** **2010 ± 100**
60 BC
Birch-bark from previously unopened flagstone coffin in Kariel, Vadsö, Finnmark (70° 06' N, 29° 23' E). Most bark was decorated; skeletal remains also found. Depth .4m.
- T-1053. Skalnes grave** **200 ± 70**
AD 1750
Birch-bark from unopened flagstone coffin in Skalnes, Vadsö, Finnmark (70° 13' N, 30° 29' E). Other finds: bronze pendant, penannular bronze brooch, and skeletal remains. Depth .5m. *Comment* (EJK): date younger than burial. Archaeol date, based on well dated imported wares: AD 1000 to AD 1100.
3. *Bog iron industries*
- Mösstrand series, Telemark**
- Charcoal from iron extraction sites in mt community Mösstrand, Vinje, Telemark (59° 50' N, 8° 10' E). Dateable objects are few, series establishes chronology for sites and furnace types, ranging from AD 500 to 1350. Sites differ widely in character and size. Skarbjåen samples coll 1970 by Anne S Alsvik, T-1182 and -1183 in 1971 by Per Kr Horn, all others by Irmelin Martens 1961 to 1972; subm 1970 to 1972 by I Martens, Univ Oldsaksamling, Oslo (Martens, 1972).
- T-1068. Skarbjåen 30/52 no. 3/1** **1200 ± 80**
AD 750
From original surface under slag heap assoc with house site at +975m (Loc 3) in Skarbjåen.
- T-1069. Skarbjåen 30/52 no. 3/2** **975 ± 80**
AD 975
From slag groove at E side of bottom flagstone of furnace.
- T-1073. Skarbjåen 30/52 no. 7/1** **970 ± 80**
AD 980
From original surface under separate slag heap (Loc 7).
- T-1074. Skarbjåen 30/52 no. 7/2** **780 ± 110**
AD 1170
From S slag groove, close to the furnace in Loc 7.
- T-1072. Homvassbekken 30/52 no. 5/1** **920 ± 70**
AD 1030
From original surface under slag heap assoc with house site and 2 furnaces (Loc 5), at +950m at Homvassbekken.

- T-1071. Homvassbekken 30/52 no. 5/2** **910 ± 70**
AD 1040
Coll near W rim of Furnace I, covered with earth mixed with charcoal and slag.
- T-1070. Homvassbekken 30/52 no. 5/3** **880 ± 70**
AD 1070
Coll under a big lump of slag, clotted in bottom of Furnace II.
- T-1109. Mogen** **720 ± 80**
AD 1230
From original surface layer close to furnace assoc with house site at +920m in Mogen. *Comment* (IM): a few objects of Viking or Medieval age were found; date agrees well.
- T-1110. Varland 33/49 no. 4** **1200 ± 80**
AD 750
Coll just outside furnace at +915m in Varland.
- T-1111. Martinvika 30/52 no. 6** **1190 ± 150**
AD 760
From small pit assoc with slag heap and furnace at +950m near Martinvika. *Comment* (IM): furnace is very similar to 33/49 no. 4 (T-1110).
- T-1443. Martinvika 30/52 no. 1** **970 ± 70**
AD 980
From original surface under slag heap assoc with house site at +950m in Martinvika. *Comment* (IM): site dated previously to 960 ± 60 BP (T-698, R 1970, v 12, p 235).
- T-1181. Erlandsgard 32/56 no. 2/1** **1090 ± 70**
AD 860
From original surface underneath large slag heap assoc with 3 furnaces (Loc 2) at +925m in Erlandsgard.
- T-1320. Erlandsgard 32/56 no. 2/2** **1480 ± 70**
AD 470
From original surface under slag heap. *Comment* (IM): date too old, T-1180 and -1181 from same site both give Viking period.
- T-1180. Erlandsgard 32/56 no. 2/3** **960 ± 90**
AD 990
From Furnace I.
- T-1183. Erlandsgard 32/56 no. 3/1** **920 ± 80**
AD 1030
From original surface under large slag heap assoc with 4 furnaces (Loc 3).
- T-1182. Erlandsgard 32/56 no. 3/2** **980 ± 110**
AD 970
From Furnace IV. *Comment* (IM): the few objects dated to Viking age/early Medieval, agree with dates from site.

- T-1184. Erlandsgard 32/56 no. 5** **1280 ± 70**
AD 670
From original surface under slag heap (Loc 5).
- T-1321. Erlandsgard 32/56 no. 6/1** **1390 ± 80**
AD 560
From original surface under slag heap (Loc 6).
- T-1185. Erlandsgard 32/56 no. 6/2** **1410 ± 150**
AD 540
From charcoal mixed soil in furnace.
- T-1444. Erlandsgard 32/57 no. 1** **1260 ± 80**
AD 690
From original surface under slag heap assoc with house site at +925m in Erlandsgard.

4. *Hunting constructions and localities*

Reindeer drive series, Hardangervidda

Charcoal and reindeer bone from lake-side sites characterized by remnants of stone huts in mt area Hardangervidda. Drift fences consisting of stone cairns are usually found on opposite side of lakes. Hunting method well documented in ethnographic literature: reindeers chased by beaters, diverted into lake by fences, here to be killed by hunters in boat. Coll 1971 and 1972, subm 1972 and 1973 by Otto Blehr and Rolf W Lie, The Hardangervidda project for interdisciplinary cultural research, Bergen. *Comment (OB)*: series dates use of reindeer drive since Late Stone age until Black Death, and regional differences in exploitation of wild reindeer in area by local communities (Blehr, 1973; Negaard, 1911; Böe, 1942).

- T-1303. Langevatn 1** **1890 ± 110**
AD 60
Charcoal from depth .30m in fireplace (cooking pit) in distinct remains of stone hut at +1124m at Lake Langevatn, Ullensvang, Hordaland (60° 28' N, 7° 34' E). Pit is probably 1 of at least 20 such pits SW of hut.
- T-1228. Langevatn 2** **1740 ± 110**
AD 210
Charcoal from depth .08m, 3m outside hut remains.
- T-1251. Langevatn 3a** **1430 ± 130**
AD 520
Bone from depth .05 to .10m in bone heap outside stone hut remains.
- T-1304. Langevatn 5** **1600 ± 110**
AD 350
Bone from depth .20m in bone heap.
- T-1423. Sumtangen 1** **600 ± 100**
AD 1350
Bone from depth .10 to .15m in bone heap outside remains of stone

hut at +1192m at lake Finnsbergvatn, Ullensvang, Hordaland (60° 29' N, 7° 37' E). Denoted "East hut" by Negaard (1911).

T-1424. Sumtangen 2 **740 ± 80**
AD 1210

Bone from bottom layer in bone heap, depth .50m.

T-1466. Sumtangen 5 **700 ± 100**
AD 1250

Bone from cultural layer at depth .10 to .15m outside entrance of another stone hut ("West hut", Negaard, 1911).

T-1514. Sumtangen 10 **860 ± 70**
AD 1090

Charcoal from bottom layer dated by T-1424.

T-1515. Dragöy 2 **1030 ± 70**
AD 920

Charcoal from depth .05 to .10m in remains of stone hut at +1180m at Lake Dragöyfjorden, Ullensvang, Hordaland (60° 27' N, 7° 41' E).

T-1306. Dragöy 4 **840 ± 130**
AD 1110

Charcoal from depth .10m in remains of another stone hut. Burnt bones and stones also found.

T-1302. Dragöy 5 **970 ± 110**
AD 980

Charcoal from depth .25m in remains of 3rd stone hut. Burnt bones and potsherds.

T-1462. Kraekkja 1a **780 ± 80**
AD 1170

Bone from depth .20m in bone heap outside remains of stone hut at +1153m at Lake Storekraekkja, Hol, Buskerud (60° 26' N, 7° 44' E).

T-1391. Kraekkja 2 **1020 ± 110**
AD 930

Charcoal from cultural layer .01 to .02m thick at depth .05m in remains of stone hut at +1151m. Burnt bones.

T-1513. Kraekkja 4 **720 ± 70**
AD 1230

Bone from depth .45m in bone heap outside entrance of stone hut remains at +1153m ("Hut C", Negaard, 1911).

T-1421. Kraekkja 5 **740 ± 150**
AD 1210

Bone from depth .20m in bone heap.

T-1463. Kraekkja 6 **810 ± 80**
AD 1140

Bone from cultural layer .30m thick at depth .20 to .30m outside supposed entrance of stone hut remains at +1151m ("Hut A", Negaard, 1911).

680 ± 100
AD 1270

T-1422. Kraekkja 7

Bone from depth .30 to .40m in bone heap outside entrance to S-most remains of stone hut in site at +1153m, denoted "Southern locality" by Negaard (1911).

590 ± 100
AD 1360

T-1465. Kraekkja 8

Bone from depth .05 to .15m in bone heap.

Reindeer individual hunting series, Hardangervidda

When local communities surrounding Hardangervidda were resettled after Black Death ca AD 1350, reindeer drive was no longer feasible; method replaced by individual trapping and hunting. Small and rather insignificant huts were built. Coll 1971 and 1972 and subm 1972 and 1973 by Ö Blehr. *Comment* (OB): dates from look-out huts, *ie*, huts situated to give hunter a good view of animal migration route. Younger than expected. This type of hut might reflect introduction of hunting with guns in area (Blehr, 1972).

270 ± 70
AD 1680

T-1392. Dragöynuten 1

Charcoal from cultural layer .01m thick at depth .07m in remains of look-out hut at +1210m at Dragöynuten, Hol, Buskerud (60° 27' N, 7° 42' E).

280 ± 70
AD 1670

T-1305. Olavsbuvatn 2

Charcoal from depth .10m in fireplace in remains of look-out hut at +1200m on top of small hill near lake Olavsbuvatn, Ullensvang, Hordaland (60° 26' N, 7° 37' E).

470 ± 70
AD 1480

T-1308. Dalbore 1

Charcoal from cultural layer at depth .10m outside entrance to remains of hut at +1150m in Kjeldo, Ullensvang, Hordaland (60° 26' N, 7° 34' E).

Pit fall series, Rondane

Series dates use of 2 different types of pit falls for trapping reindeer in mt area Rondane; one oval shaped type with wooden walls, the other rectangular with stone walls. Coll 1967 to 1972 by Edv K Barth and Arne Skjölsvold; subm 1971 and 1972 by E K Barth, Norsk Skogbruksmus, Elverum.

920 ± 70
AD 1030

T-1454. Grimsdalen

Charred wood remains of pole from wall of oval pit fall at +930m in Grimsdalen, Dovre, Oppland (62° 05' N, 11° 21' E). Depth ca .25m below basal surface of pit.

T-1420. Lille Ula **360 ± 90**
AD 1590

Charred wood remains from wall of oval pit fall at +1020m in Lille Ula, Sel, Oppland (61° 51' N, 9° 40' E). Depth .50m below basal surface.

T-1123. Vulua, stone hut **420 ± 100**
AD 1530

Charcoal from depth .25m in fireplace inside remains of stone hut at +1080m in Vuludalen, Fron, Oppland (61° 49' N, 10° 02' E). *Comment* (EKB): remains near series of 68 oval-shaped pit falls.

T-1311. Vulua/Hornflågån **810 ± 70**
AD 1140

Humus from distinct layer .02m thick at depth .35m below basal surface at +1300m in Hornflågådalen, Fron, Oppland (61° 49' N, 9° 57' E), from rectangular stone-walled pit fall. *Comment* (EKB): hypothesis: last remains from covering frame work on top of pit.

T-1219. Gravhö **350 ± 80**
AD 1600

Wood from a solid, longitudinal pole at base of rectangular, stone-walled pit fall at +1300m in Gravhö, Dovre, Oppland (62° 03' N, 9° 37' E). Depth .15m below basal surface. *Comment* (EKB): hypothesis: pole preventing animals to climb up from pit.

T-1218. Randen **450 ± 70**
AD 1500

Part of solid, longitudinal pole at base of rectangular, stone walled pit fall at +1360m in Randen, Sel, Oppland (61° 52' N, 9° 43' E). Depth .19m below basal surface.

T-1217. Langglupdalen **1900 ± 400**
AD 50

Small pieces of wood at base of rectangular, stone walled pit fall at +1430m in Langglupdalen, Folldal, Hedmark (61° 56' N, 9° 51' E). Sample lying on large horizontal flagstone as fundament in bottom; assumed to be remains of covering frame work on top of pit. Depth .08m below basal surface of pit. *Comment* (EKB): oldest known date of pit falls of this type (R, 1972, v 14, p 447).

T-1127. Gravhö, stone hut **310 ± 70**
AD 1640

Charcoal from depth .15m in fireplace inside remains of stone hut at +1200m in Gravhö, Dovre, Oppland (62° 02' N, 9° 38' E). *Comment* (EKB): remains 500m from stone wall 19m long, built for trapping reindeer.

T-1419. Eldådalen wolf pit **420 ± 140**
AD 1530

Wood from wolf pit with timber walls from bog at +800m at N Messeltseter in Eldådalen, Stor-Elvdal, Hedmark (61° 28' N, 10° 48' E).

Depth .60m. Coll 1972 by Tore Fossum, Norsk Skogbruksmus, Elverum; subm 1972 by E K Barth and T Fossum.

5. *Miscellaneous archaeological samples*

Brennmoen series

Charcoal from excavated house on site now uninhabited at ca +100m in Brennmoen, Skistad, Overhalla, Nord-Trøndelag (64° 25' N, 12° 10' E). Coll and subm 1970 by Kristen R Möllenus, DKNVS Mus, Univ Trondheim.

	910 ± 100
T-967. Brennmoen II	AD 1040
From lower charcoal layer.	
	910 ± 70
T-968. Brennmoen III	AD 1040
From middle charcoal layer.	
	1040 ± 80
T-1077. Brennmoen IV	AD 910
From upper charcoal layer.	

Nape series, Fyresdal

Charcoal from farm with 2 house sites at +520m in W Nape, Fyresdal, Telemark (59° 10' N, 8° 10' E). Coll 1969 by Trygve Fett; subm 1970 by Irmelin Martens, Univ Oldsaksamling, Oslo. *Comment* (IM): no dateable objects, House II supposedly Medieval, confirmed by dates (Martens, 1973).

	560 ± 60
T-1012. House site II/1	AD 1390
From between flagstones in fireplace in Rm III.	
	760 ± 110
T-1011. House site II/2	AD 1190
From small pit dug into floor.	

Hunn series, Borge

Charcoal from 3 stone circles ("domarringar") in Hunn, Borge, Östfold (59° 11' N, 11° 3' E). Subm 1971 by Heid Gjøstein Resi, Univ Oldsaksamling, Oslo.

	680 ± 160
T-1101. Hunn 1	AD 1270
From concentration near Stone 1 in stone circle at +35m. Coll 1952 by Elizabeth Skjelsvik, Univ Oldsaksamling, Oslo.	
	2350 ± 120
T-1102. Hunn 2	400 BC
From pit containing charcoal and fragments of burnt bones between 2 standing stones (5 and 6) in stone circle at +35m. Coll 1952 by E Skjelsvik.	

T-1103. Hunn 3 **510 ± 70**
AD 1440

From part of stone-packing between standing stones in stone circle at +37m. Coll 1951 by E Skjelsvik.

T-1104. Hunn 4 **2250 ± 150**
300 BC

From concentration within remains of stone circle at +33m. Coll 1951 by Joan Jennings, Univ Oldsaksamling, Oslo.

T-1166. Hunn 5 **2700 ± 160**
750 BC

From depth .95m near base of grave mound at +43m; in layer containing charcoal, burnt bones (*homo sapiens*, *bos taurus*, *ovis/capra*), and a pair of bronze tweezers. Coll 1971 by H G Resi. *Comment* (HGR): date agrees well with assumed age of bronze tweezers from same layer.

T-1066. Hufthamar **870 ± 110**
AD 1080

Wood from 1 of aligned wooden poles in bog at +30m in Hufthamar, Austevoll, Hordaland (60° 10' N, 5° 10' E). Depth .50m. Coll 1971 by Kristian Jansen, Hist Mus, Bergen; subm 1971 by Björn Myhre. *Comment* (BM): 1st archaeol excavation of standing wooden poles in bogs, observed in different parts of W Norway. Medieval period probably indicates a practical function, eg, part of a fence.

Mindets tomt series, Oslo

Wooden sticks from fences or walls, covered by layers of debris. Found by excavation of townsite "Mindets tomt" at +10m in Gamlebyen, the oldest part of Oslo (59° 54' N, 10° 46' E). Coll and subm 1971 by The Central Office Hist Monuments, Archaeol Sec, Oslo.

T-1329. Mindets tomt, No. 1 **1040 ± 110**
AD 910

From depth ca 4m; construction belonging to one of oldest buildings in area.

T-1330. Mindets tomt, No. 5 **910 ± 90**
AD 1040

From depth ca 4m in sand layers.

T-1376. Mindets tomt, No. 2 **910 ± 100**
AD 1040

From construction belonging to one of oldest buildings in area.

Isegran ships series

Wood from 2 of 3 ships apparently sunk intentionally to block sailing channel in R Glomma at +2 to +3m in Isegran, Fredrikstad, Östfold (59° 10' N, 10° 50' E). Coll 1971 by Svein Molaug, Norsk Sjøfartsmus, Oslo; subm 1971 by Univ Oldsaksamling, Oslo. *Comment* (SM): in shipbuilding terms, ships may be as young as dated; but it is difficult

to associate the sinking with known historic events at such a late date (Molaug, 1972).

- T-1148. Isegran I** **320 ± 100**
AD 1630
Wood (treenails).
- T-1149. Isegran II** **210 ± 100**
AD 1740
Wood (treenails).
- T-1349. Verne Kloster boat** **730 ± 100**
AD 1220
Caulking of animal hair from wreck of ship or boat from depth .5m in drainage ditch at ca +1.5m, Verne Kloster, Rygge, Östfold (59° 20' N, 10° 40' E). Coll 1972 by A E Christensen Jr, Univ Oldsaksamling, Oslo; subm 1972 by Univ Oldsaksamling. *Comment* (AEC): date fits within limits suggested on evidence of shipbuilding technique.
- T-1429. Moen log-boat** **740 ± 110**
AD 1210
Wood (*Pinus*) from monoxyl found at depth .5m near an old brook during drainage work in Moen, Solum, Telemark (59° 10' N, 9° 20' E). Coll 1972 by A E Christensen, Jr; subm 1973 by Univ Oldsaksamling, Oslo. *Comment* (AEC): monoxyls cannot be dated on archaeol criteria.
- T-1348. Hellesö boat** **290 ± 100**
AD 1660
Wood (treenail) from partly submerged wreck of boat close to shore in Hellesö, Bamle, Telemark (58° 50' N, 9° 30' E). Coll 1972 by A E Christensen Jr; subm 1972 by Univ Oldsaksamling, Oslo. *Comment* (AEC): wreck not dateable on shipbuilding criteria.

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