[RADIOCARBON, VOL 29, NO. 3, 1987, P 389–396]

VIENNA RADIUM INSTITUTE RADIOCARBON DATES XVI

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Measurements have continued with the same proportional counter system, pretreatment procedure, methane preparation and measurement, and calculation, as described previously (R, 1970, v 12, no. 1, p 298–318). Uncertainties quoted are single standard deviations. No $^{13}C/^{12}C$ ratios were measured. Sample descriptions have been prepared in cooperation with submitters. Some dates have been calibrated using the correction tables of Klein *et al* (1982) and are reported as "cal" ages in the comment.

ACKNOWLEDGMENTS

I express my thanks to Ing L Stein for excellent work in sample preparation and for careful operation of the dating equipment.

GEOLOGIC, GEOGRAPHIC, AND BOTANIC SAMPLES

Austria

VRI-899. Wöllatal, Kärnten **12,080 ± 150**

Wood at −13m in fossil soil, −50cm thick, above strongly compressed ground moraine. Fossil soil is overlain by washed down coarse clastic material followed by younger moraine overlain again by redeposited coarse detritus. Sample from Wöllatal (46° 52′ 13″ N, 13° 04′ 21″ E), Kreuzeckgruppe, Carinthia, at 1210.8m asl. Coll 1983 by S Jacobs; subm by A Fritz, Naturwiss Verein f Kärnten, Klagenfurt. *Comment* (HF): date contradicts assumption of Würm interstadial. No NaOH pretreatment.

Nieselach series, Kärnten

Wood and slate coal (lignite) of seam in late Würm glacial succession, at ca −10m, from Nieselach (13° 30′ 30″ N, 46° 36′ 30″ E), Carinthia. Coll 1984 and subm by Dirk van Husen, Tech Univ Vienna.

General Comment (DvH): establishes sedimentation chronology and dates embedment of wood.

VRI-988. Nieselach 1 **30,400 ± 1300**

Slate coal.

VRI-987. Nieselach 2 **31,600 $^{+1800}_{-1500}$**

Root-wood embedded in slate coal seam.

VRI-989. Nieselach 3 **> 35,800**

Wood (root?) embedded in coarse sandy gravel overlying slate coal seam.

Schafberg area series, O Ö

Peat from dried out part of Halleswiessee (47° 46′ N, 13° 22′ E), Schafberg area, Upper Austria, at 781m asl. Coll 1984 by boring and subm by Roland Schmidt, Inst Limnol, Österr Akad Wiss, Gaisberg, Salzburg.

General Comment (RS): dates both drying out of lake and level oscillations (Schmidt, 1981). (HF): HCl pretreatment only.

VRI-906. 210–220 **1940 ± 110**

Radicella peat from depth 210 to 220cm.

VRI-907. 230–240 **2280 ± 70**

Radicella peat from depth 230 to 240cm.

Zellhof series, Salzburg

Samples from Zellhofer Moor bog (47° 59′ N, 13° 06′ E) near Zellhof, Salzburg. Coll 1983 by boring and subm by Roland Schmidt.

General Comment (RS): dates pollen diagram. (HF): HCl pretreatment only.

VRI-903. 450–455 **7240 ± 150**

Radicella peat at −450 to −455cm. *Comment* (RS): dates crossing of *Quercetrum mixtum* and *Corylus* curves.

VRI-904. 505–510 **8720 ± 120**

Detritus gyttja at −505 to −510cm. *Comment* (RS): dates *Corylus* increase.

VRI-905. 547–552 **12,020 ± 160**

Gyttja at −547 to −552cm. *Comment* (RS): dates beginning of organic sedimentation at Bölling/Oldest Dryas boundary. Age is too young, perhaps caused by unsuitable range of depth.

Tamsweg series, Salzburg

Peat from bogs near Tamsweg (47° 08′ N, 13° 48′ E), Salzburg. Coll 1984 and subm by Robert Krisai, Univ Salzburg.

General Comment (RK): dates beginning of peat growth. (HF): HCl pretreatment only.

VRI-974. Schwefelbrunnmoos **7920 ± 100**

Peat from Schwefelbrunnmoos bog (47° 07′ 25″ N, 13° 54′ 20″ E) at ca 3.6m depth.

VRI-975. Dürreneggsee **8760 ± 160**

Peat from W lake Dürrenbergsee bog (47° 10′ 25″ N, 13° 52′ 30″ E) at ca 7.6m depth.

VRI-976. Überlingmoos **9160 ± 160**

Peat from Überlingmoos bog (47° 10′ 25″ N, 13° 54′ 15″ E) at ca 6m depth.

VRI-985. Lofer, Salzburg **10,340 ± 190**

Wood, B72/84, in undisturbed ground moraine underlying "Loferer Bergsturz" landslide from cut at left side of R Saalach (47° 36′ N, 12° 42′ E), NNE Lofer, Salzburg. Coll 1984 by Johanna Brückl, subm by Josef-Michael Schramm, Univ Salzburg. *Comment* (J-M S): yields max age of landslide. (HF): HCl pretreatment only.

Schwemm series, Tirol

Lacustrine sediments of former lake (47° 39′ 30″ N, 12° 18′ E), Schwemm, Tyrol. Coll 1984 and subm by K Oeggl, Bot Inst, Univ Innsbruck.

General Comment (KO): absolute dating of pollen-analytically determined events. (HF): HCl pretreatment only.

VRI-846. Schwemm B5/768 **10,370 ± 80**

Gyttja on clay at −758 to −768cm. *Comment* (KO): dates first organic sedimentation.

VRI-847. Schwemm B5/740 **8650 ± 130**

Gyttja immediately above lake marl at −730 to −740cm. *Comment* (KO): dates second organic sedimentation.

VRI-848. Schwemm B5/650 **6450 ± 90**

Gyttja at −640 to −650cm. *Comment* (KO): dates first appearance of cereal pollen.

VRI-849. Schwemm B5/490 **5240 ± 90**

Gyttja at −485 to −490cm. *Comment* (KO): dates first appearance of *Abies.*

VRI-850. Schwemm B5/395 **3990 ± 80**

Gyttja at −390 to −395cm. *Comment* (KO): dates first appearance of *Fagus.*

VRI-851. Schwemm B5/130 **1090 ± 60**

Sphagnum-Radicella peat at −125 to −130cm. *Comment* (KO): dates human influence.

St Jakob i Def series, Osttirol

Soil samples from different profiles at Oberhauser Zirbenwald; St Jakob im Defereggen (46° 57′ N, 12° 13′ E), 186cm asl, East-Tyrol. Coll 1983 by Hubert Kammerlander; subm by Friedrich Kral, Univ Bodenkultur, Vienna.

General Comment (HK, HF): dates for pollen diagram. Humic acid fraction was dated to eliminate contamination by younger rootlets.

VRI-912. OZI-1/12–15 **270 ± 60**

Sandy raw humus at −12 to −15cm, profile 1. *Comment* (HK): dates

raw humus following extended human influence. Presently oldest trees aged 200 a.

VRI-913. OZI-1A/20–25 **Modern**

Sand with humus at −20 to −25cm, profile 1A. *Comment* (HK): should date natural wood regeneration after extended human influence.

VRI-978. Wattens, Tirol **7470 ± 120**

Charcoal from charcoal layer ca 1m below surface embedded in loam sediment of R Inn at Wattens (47° 17′ 46″ N, 11° 36′ 00″ E) Tyrol, at 552m asl. Coll 1984 and subm by Gernot Patzelt, Univ Innsbruck. *Comment* (GP, HF): assoc with VRI-882 (R, v 27, no. 3, 1985) dated at 9730 ± 120, coll −4m below this sample, dating interval of 2260 ± 170 yr for this deposition.

Obergurgl series, Tirol

Peat with sand of small bog at "Kleinalbl," Gurgler Alm, near former end of tongue of Gurgler Ferner Glacier, Obergurgl (46° 50′ 22″ N, 11° 00′ 11″ E), Tyrol, at 2160m asl. Coll 1984 and subm by Gernot Patzelt.

General Comment (GP): absolute dating of bog development (HF): HCl pretreatment only.

VRI-979. Gurgler Ferner 1 **3920 ± 80**

Peat at −108 to −110cm above coarse stony solifluction material. *Comment* (GP): dates end of solifluction period.

VRI-980. Gurgler Ferner 2 **4270 ± 80**

Peat at −135 to −138cm below stony solifluction material. *Comment* (GP): together with VRI-979, limits solifluction period related to postglacial climate oscillation.

VRI-981. Gurgler Ferner 3 **4850 ± 90**

Peat at −157 to −160cm, base. *Comment* (GP): dates beginning of bog development and min age for ice retreat in this area.

Kaunertal series, Tirol

Wood (*Pinus cembra*) formerly buried under moraine material, now visible at different levels on inner slope of AD 1850 moraine; from margin of Gepatschferner Glacier (46° 52′ 33″ N, 10° 45′ 06″ E), Kaunertal, Ötztaler Alpen, Tyrol. Coll 1984 and subm by Gernot Patzelt.

General Comment (GP): together with sample Gepatschferner 2, Hv-11412, dated at 2205 ± 55, at 2285m asl, series fixes chronology of moraine development. (HF): HCl pretreatment only.

VRI-982. Gepatschferner 3 **2020 ± 70**

Wood at 2255m asl. *Comment* (GP): dates glacial advance.

VRI-983. Gepatschferner 5 **1660 ± 70**

Wood at 2260m asl. *Comment* (GP): dates glacial advance.

Europe

VRI-915. Stuttgart, FRG **119 ± 0.8% modern**

Copal of unknown origin identified by dealer as "real natural amber," from colln of Staatl Mus Nat Sci, Stuttgart, FRG. Subm by Dieter Schlee, Mus Naturkunde Stuttgart. *Comment* (DS): color and lacquer coating removed. (HF): no pretreatment. Clearly discernible nuclear weapons influence.

VRI-852. Kasbegi, USSR **240 ± 60**

Cyperaceae-*Radicella* peat of floating horizon, 40cm thick, in wide valley flooded and cut by nameless rivulet with repeatedly changed bed near Kasbegi (42° 40′ N, 44° 50′ E), Caucasus, USSR. Coll 1984 by K Oeggl. *Comment* (KO): dates floating horizon.

Other Countries

VRI-954. Algeria **2.11 ± 0.3% modern**

Calcareous quartz sand encrustation in Algerian Sahara. Coll at surface by Eckhard Klenkler, Ettenheim, FRG. *Comment* (HF): homogeneity of sample suggests continuous growth phase. Tentatively assumed recent concentration, 85% modern (Münnich & Vogel, 1959; Geyh & Schillat, 1966) yields model age, 29,700 ± 1200. Recent concentration, 100% modern yields max age, 31,000 ± 1200.

VRI-999. Moa, Tanzania **115 ± 0.8% modern**

Copal, identified by dealer as Tanzania amber from Pliocene, coll at Moa, Tanzania. Subm by Dieter Schlee. *Comment* (DS): color and lacquer ground off. (HF): no pretreatment. Clearly discernible nuclear weapons influence indicates very young age of resin.

Dominican Republic series, Central America

Amber-copal of unknown site, Dominican Republic, from colln of Staatl Mus Naturkunde, Stuttgart; subm by Dieter Schlee.

General Comment (DS): classified as intermediate between copal and amber. Authenticity is expected by dating. (HF): no pretreatment.

VRI-916. **$31{,}500\ ^{+\ 1700}_{-\ 1400}$**

Non-adhesive copal, intermediate between typical fresh copal and typical amber. *Comment* (DS): date proves sample to be copal.

VRI-998. **> 35,000**

"Young amber," according to dealer; no further specification. *Comment* (DS): date does not refute sample classification of amber several million yr old.

Thimi series, Nepal

Samples from clay pit near Thimi (27° 39′ 44″ N, 85° 23′ 27″ E), Kathmandu Valley, Nepal, coll 1984 and subm by Gernot Patzelt.

General Comment (GP): Kathmandu Valley filled with lake sediments recently exposed in terrace by river cutting. Dates provide time frame of last lake development. (HF): no pretreatment.

VRI-1001. Thimi 1 **> 31,000**

Gyttja from 1m layer in lake sediment, ca −180 to −185cm below terrace surface, at 1323m asl.

VRI-1002. Thimi 2 **> 35,000**

Wood and plant detritus in layer 19m below terrace surface, ca 17m below Thimi 1, at 1306m asl.

VRI-917. New Zealand **119 ± 0.7% modern**

Copal identified by dealer as "amber from New Zealand," from colln of Staatl Mus Nat Sci, Stuttgart; subm by Dieter Schlee. *Comment* (HF): clearly discernible nuclear weapons influence.

ARCHAEOLOGIC AND HISTORIC SAMPLES

Austria

VRI-1003. Globasnitz, Kärnten **1520 ± 60**

Charred wood from floor in kitchen of pilgrims' house, near early Christian church complex, above coarsely leveled rock surface; from Hemmaberg excavation (46° 33′ 08″ N, 16° 40′ E), Globasnitz, Carinthia. Coll 1981 at −0.7m and subm by Franz Glaser, Landesmus f Kärnten, Klagenfurt. *Comment* (FG): pilgrims' house is Late Antique, older than early Christian church at Hemmaberg. Age range cannot be delimited by ceramic fragments. Date fits expectation. (HF): cal AD 400 ± 610.

VRI-908. See am Mondsee, O Ö **7180 ± 100**

Wood in lake marl below Neolithic cultural layer at Sta See am Mondsee (47° 33′ N, 13° 27′ E), Upper Austria, at 481m asl. Coll 1983 at depth 77 to 83cm by Johann Offenberger; subm by Roland Schmidt. *Comment* (RS): dates chronologic boundaries of stratigraphic gap between Neolithic cultural layer and Atlanticum (Offenberger *et al*, 1981). (HF): HCl pretreatment only.

VRI-955. Dachstein, O Ö **3080 ± 70**

Charcoal and ceramic fragments at −20cm, E part of Mt Dachstein plateau near Lackenofen (47° 28′ N, 13° 42′ E), at 2000m asl. Coll 1984 by Franz Mandl; subm by Fritz-Eckart Barth, Naturhist Mus, Vienna. *Comment* (FM): date confirms expectation (Mandl, 1984). (HF): cal 1545 to 1125 BC.

VRI-984. Auffang, O Ö **310 ± 70**

Wood from fill (loamy soil and bricks) at archaeol site at Auffang (48° 12′ 17″ N, 13° 13′ 13″ E) near Schalchen, Upper Austria, at depth 1.8 to 1.9m. Coll 1984 and subm by Christine Schwanzar, O Ö Landesmus,

Linz. *Comment* (ChS): dates fill. (HF): cal AD 1425–1660. HCl pretreament only.

VRI-892. Trieben, Steiermark **4990 ± 90**

Charcoal from excavation Grünanger LG/no. 16, Cutl, LF21E, Trieben (47° 29′ 35″ N, 14° 26′ 48″ E), Styria, at −20cm. Coll 1980 by Clemens Eibner and Hubert Presslinger; subm by H Presslinger, Montanuniv Leoben. *Comment* (HP): ceramic finds do not yield chronologic assoc. Dates Neolithic settlement.

Bärndorf series, Steiermark

Charcoal and wood from excavations at Bärndorf near Rottenmann (47° 31′ 38″ N, 14° 11′ 35″ E), Styria. Coll 1983 by Clemens Eibner and Hubert Presslinger.

General Comment (HP): this area has been mined from primitive times to present; without ^{14}C dating, chronology is impossible.

VRI-893. Prenterwinkel no. 1 **400 ± 60**

Charcoal (47° 31′ 31″ N, 14° 25′ 55″ E), 20cm behind slope of dump opened by road construction.

VRI-894. Prenterwinkel no. 2 **370 ± 60**

Charcoal in same stratum as VRI-893.

VRI-895. Pretscherer no. 39 **180 ± 60**

Wood (47° 31′ 26″ N, 14° 26′ 39″ E), −70cm, from well-preserved wood structure.

VRI-927. Pretscherer no. 92 **280 ± 60**

Wood from cut of dump, basal layer, 15.6m run, planum, −3.20 to −3.30m.

VRI-928. Pretscherer no. 93 **210 ± 60**

Wood from cut of dump, basal layer, 15m run, planum, −3.20 to −3.30m.

VRI-929. Pretscherer no. 94 **260 ± 80**

Wood from cut of dump, basal layer, 13m run, planum, −3.20 to −3.30m.

VRI-931. Kaiserköpperl no. 36 **1390 ± 60**

Charcoal (47° 31′ 05″ N, 14° 26′ 14″ E) cut 1, planum, −20cm. Excavation of miners' settlement; occupied from end of Neolithic to Celtic period.

VRI-932. Kaiserköpperl no. 51 **870 ± 60**

Charcoal, cut 2, 2 to 4m run, −65cm. Same occupation as VRI-931.

VRI-933. Kaiserköpperl no. 59 **2350 ± 70**

Charcoal, cut 2, 1.20m run, −80cm. Same occupation as VRI-931.

Admont series, Steiermark

Charcoal from excavations at Mt Dürrenschöberl near Aigen bei Admont (47° 34′ 10″ N, 14° 21′ 49″ E), Styria. Coll 1983 by Clemens Eibner and Hubert Presslinger; subm by Hubert Presslinger.

General Comment (HP): excavations of iron smelting site yielded ceramics of several epochs.

VRI-934. Dürrenschöberl no. 51 **2280 ± 70**

Charcoal in furnace area, cut 2.

VRI-935. Dürrenschöberl no. 21 **640 ± 60**

Charcoal from basal layer with ceramic fragments, cut 2, depth 80cm.

VRI-977. Lech am Arlberg, Vorarlberg **350 ± 60**

Wood from beam in wall of Roman church at Lech am Arlberg (47° 13′ N, 10° 09′ E), Vorarlberg. Coll 1984; subm by Josef Fastl, Vienna. *Comment* (JF): dates subsequently installed beam. (HF): cal AD 1420–1650. HCl pretreatment only.

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