

VIENNA RADIUM INSTITUTE RADIOCARBON DATES IX

HEINZ FELBER

Institut für Radiumforschung und Kernphysik der Österr Akademie
der Wissenschaften, Vienna, Austria

Measurements have continued with the same proportional counter system, pretreatment procedure, methane preparation, measurement, and calculation, as described previously (R, 1970, v 12, p 298-318). Uncertainties quoted are single standard deviations originating from standard, sample, background counting rates and half-life. No $^{13}\text{C}/^{12}\text{C}$ ratios were measured.

Sample descriptions have been prepared in cooperation with submitters.

ACKNOWLEDGMENTS

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

SAMPLE DESCRIPTIONS

I. GEOLOGY, GLACIOLOGY AND BOTANY

A. Austria

VRI-569. Altenwörth, NÖ 7320 ± 110

Split oak stem, with root stock, 10m long, 60cm diam, fossil drift wood of R Danube, overlain by 4m gravel, left bank 1km downstream from dam of Sta Altenwörth (48° 23' N, 15° 52' E), Lower Austria. Coll 1976 and subm by Henriette Meissinger, Schiffahrtsmuseum Spitz/Donau, NÖ.

VRI-571. St Pölten, NÖ 3830 ± 90

Oak stem at 5 to 6m depth in gravel of R Traisen, pit Paderta, Viehofen near St Pölten (48° 13' N, 15° 38' E), Lower Austria. Coll 1976 and subm by Heinrich Fischer, Vienna.

VRI-516. Strobl, OÖ 5800 ± 110

Peat from depth 2.20 to 2.35cm of bog Moosalmmoor near Lake Schwarzensee (47° 46' N, 13° 29' 10" E), near Strobl, Upper Austria. Coll and subm by D van Husen, Geol Inst, TU Vienna. *Comment* (DvH): dates 1st increase of *Fagus-Abies* in pollen diagram.

Seefeld series, OÖ

Organic samples in boring cores coll from different depths near pump sta in Seefeld (47° 50' N, 13° 33' E), Lake Attersee, OÖ. Coll 1975 and subm by Helmut Flögl, Reinhaltungsverband Attersee, Schörfling, OÖ.

General Comment (HF): exploration of soil chronology suggested by landslide.

VRI-543. 930 to 960cm 2770 ± 80

Wood splinters and remnants of leaves from depth 930 to 960cm.

VRI-544. 740 to 930cm 2550 ± 120

Piece of branch in core between 740 to 930cm.

Mt Dachstein series, OÖ

Brown-moss-Dy of postglacial organic lacustrine deposition within doline: Lake Hirzkarsee, Mt Dachstein (47° 31' N, 13° 41' E), 1800m alt, Upper Austria. Coll 1977 and subm by Roland Schmidt, Limnolog Inst Österr Akad Wiss, Vienna.

General Comment (RS): dates postglacial climatic oscillation palynologically detected. No humic acids separation.

VRI-604. Hirzkarsee, 100 to 115cm 8210 ± 150

Sample from depth 100 to 115cm. *Comment* (RS): age unexpectedly high.

VRI-605. Hirzkarsee, 120 to 135cm 9380 ± 140

Sample from depth 120 to 135cm. *Comment* (RS): age unexpectedly high.

VRI-492. Totes Gebirge, Steiermark 31,200 ± 1100

Pollen, spores, and plant detritus 15 to 20cm below ground surface of Graf-Kesselstadt-Dom, Salzofenhöhle cave (47° 40' 45" N, 31° 35' 45" E), Totes Gebirge, Styria. Coll 1967, prepared and subm by Ilse Draxler, Geol BA, Vienna. *Comment* (ID): dates cave bear layer. Already known dates: GRO-761, 34,000 ± 3000, charcoal from cultural layer in entrance hall; GRO-N-4628, >44,500, bones from entrance hall.

VRI-508. Ödensee, Steiermark 10,160 ± 130

Peat from bog NNE lake Ödensee between Kame terrace and end moraine (47° 34' 08" N, 13° 49' 36" E), Styria. Coll 1974 from depth 405 to 415cm and subm by D van Husen. *Comment* (DvH): dates palynologically established climatic deterioration.

Mitterndorfer Becken series, Steiermark

Samples from different depths of bog between Kame terrace and end moraine ridge NE lake Ödensee (47° 33' 45" N, 13° 50' 20" E), Mitterndorfer Becken, Styria. Coll and subm by D van Husen.

General Comment (DvH): dates palynologically detected events. No humic acid separation (HF).

VRI-513. 395 to 405cm 6610 ± 110

Peat 395 to 405cm below surface. *Comment* (DvH): dates immigration of copper-beech.

VRI-514. 180 to 200cm 3180 ± 90

Peat 180 to 200cm below surface. *Comment* (DvH): dates beginning of *Carpinus* and culture pollen.

VRI-515. Base 11,500 ± 180

Gyttja and peat from base. *Comment* (DvH): dates beginning of peat growth coinciding with slope of *Pinus* max.

Stubaital series, Tirol

Peat from different horizons of Buntess Moor bog (46° 59' 27" N, 11° 08' 45" E), Fernauferner glacier, 2285m alt, Stubai Valley, Tyrol. Coll 1976 and subm by Gernot Patzelt, Geog Inst, Univ Innsbruck.

General Comment (GP): dates glacier oscillations.

VRI-456. 82 to 84cm 620 ± 80

Peat, depth 82 to 84cm, from undermost 2cm of peat band 11cm thick overlying loam sediment. *Comment* (GP): dates end of glacial max. Unknown origin of unacceptable young age.

VRI-457. 73 to 75cm 1270 ± 70

Peat, depth 73 to 75cm, from uppermost 2cm of same layer as VRI-456. *Comment* (GP): dates beginning of glacier max.

VRI-458. 45 to 47cm 450 ± 70

Peat, depth 45 to 47cm, from uppermost 2cm of 8cm thick peat layer. *Comment* (GP): dates beginning of glacier max.

VRI-459. 34 to 35cm 530 ± 70

Peat, depth 34 to 35cm, from 1 to 2cm thick peat layer in loamy washed in sediments. *Comment* (GP): dates end of same (VRI-458) glacier max.

VRI-460. 17 to 19cm <220

Peat, depth 17 to 19cm, from peat layer 2cm thick in loamy washed in sediments.

VRI-526. 72 to 76cm 1200 ± 150

Peat, depth 72 to 76cm, same horizon as VRI-457. *Comment* (GP): verifies VRI-457.

VRI-527. 103 to 108cm 1940 ± 150

Peat, depth 103 to 108cm, from uppermost 4cm of peat layer, 9 to 11cm thick, covered by washed in loamy sediment. *Comment* (GP): completes series VRI-11: 1890 ± 120 and VRI-15: 2280 ± 110 (R, 1970, v 12, p 303) sandwiching VRI-527.

Sölden series, Tirol

Cyperaceae peat from Wildmoos bog (46° 57' 00" N, 11° 01' 06" E) near Sölden, Tyrol. Coll 1975 and subm by Sigmar Bortenschlager, Botan Inst, Univ Innsbruck.

General Comment (SB): dates palynologically detected events. No humic acids separation.

VRI-461. 200 to 207cm 5750 ± 110

Peat from depth 200 to 207cm. *Comment* (SB): pollen profile indicates human influence.

VRI-462. 245 to 252cm 6240 ± 110

Peat from depth 245 to 252cm. *Comment* (SB): pollen profile indicates 1st human influence with distinct signs of woodland clearing.

VRI-463. 565 to 752cm 8780 ± 120

Peat from depth 565 to 752cm. *Comment* (SB): dates beginning of fir curve.

Obergurgl series, Tirol

Samples from base of undisturbed bog 200 to 215cm thick, over ground moraine. Bog near Schönwieshütte shelter (46° 50' 45" N, 11° 00' 18" E), 2260m alt, near Obergurgl, Ötz Valley, Tyrol. Coll 1976 and subm by Gernot Patzelt.

General Comment (GP): samples completing Schönwies series VRI-230 (R, 1972, v 14, p 501), VRI-296-299 (R, 1974, v 16, p 279), date beginning of vegetational development in surroundings of bog and give min age for ice retreat.

VRI-528. Schönwies 6 9300 ± 300

Wood remnants.

VRI-529. Schönwies 7 9590 ± 260

Peat surrounding VRI-528.

*B. Europe, Asia***Sarntheim I series, Italy**

Cyperaceae peat from bogs outside of outermost end moraines of Egesen phase, Mt Villanders-Berg near Sarntheim, Italy. Coll by boring 1976 and subm by Sigmar Bortenschlager, Botan Inst, Univ Innsbruck.

General Comment (SB): dates palynologically detected events. No humic acids separation.

VRI-538. Rinderplatz 1 11,790 ± 170

Peat in contact with base gravel at depth 545 to 550cm from Rinderplatz bog (46° 38' 41" N, 11° 29' 40" E). *Comment* (SB): dates beginning of organic sedimentation and gives min age for ice retreat in this area. Age too low.

VRI-540. Rinderplatz 2 10,030 ± 170

Peat at depth 505 to 510cm from Rinderplatz bog. *Comment* (SB): dates final reforestation in this area.

VRI-541. Rinderplatz 3 8480 ± 110

Peat at depth 410 to 415cm from Rinderplatz bog. *Comment* (SB): dates decrease of *Pinus* and increase of *Picea* curve.

VRI-537. Malschötscher Hotter 8670 ± 130

Peat at depth 240 to 247cm from Malschötscher Hotter bog (46° 39' 58" N, 11° 27' 30" E). *Comment* (SB): dates beginning of organic sedimentation and gives min age for ice retreat in this area. Age >10,000 BP is expected.

Sarnthein 2 series, Italy

Cyperaceae peat from Dura-Bog (46° 48' 25" N, 11° 27' 35" E), Mt Villanders-Berg near Sarnthein, Italy. Coll by boring 1976 and subm by Sigmar Bortenschlager.

General Comment (SB): dates palynologically detected events. No humic acids separation.

VRI-550. 185 to 190cm 5450 ± 110

Peat at depth 185 to 190cm. *Comment* (SB): dates *Picea* max following herbaceous pollen max.

VRI-551. 90 to 95cm 2050 ± 70

Peat at depth 90 to 95cm. *Comment* (SB): dates renewed increase of *Pinus* and 1st signs of culture.

VRI-552. 50 to 55cm 1220 ± 80

Peat at depth 50 to 55cm. *Comment* (SB): dates *Pinus* max, rise of herbaceous curve, and increase of cereals and *Plantago*.

VRI-554. Natz, Italy 12,700 ± 200

Clay with gyttja from base of Sommersüss bog, depth 425 to 435cm, near Natz (46° 45' 39" N, 11° 40' 42" E), Italy. Coll by boring 1977 and subm by Hannes Müller and Alois Seiwald, Botan Inst, Univ Innsbruck. *Comment* (HM): dates beginning of organic sedimentation.

Canary Islands series, Spain

Charcoal from aboriginal fire places at different alts above recent sea level, near Parador (27° 45' N, 18° E), Hierro I., Canary Is., Spain. Coll 1976 and subm by Herbert Franz, Univ Bodenkultur, Vienna.

General Comment (HF): dates upper limit for last sea level max indicated by marine sediments and lava rubble reaching 2m above fireplaces.

VRI-564. Hierro I 990 ± 110
9.5m alt.**VRI-565. Hierro II 1390 ± 90**
10m alt.**VRI-566. Hierro III 1220 ± 90**
10.8m alt.**VRI-567. Hierro V 980 ± 70**
Ca 11m alt, ca 100m N samples I and II.

Rawcun series, Afghanistan

Samples from vicinity of Rawcun (36° 59' 20" N, 73° 14' 20" E), 3230m alt, Wakhan Valley, Afghanistan. Coll 1975 and subm by Gernot Patzelt.

General Comment (HF): no humic acid separation.

VRI-524. Rawcun 1 3600 ± 80

Wood at base of lacustrine sediment deposited by Wakhan Valley R, temporarily dammed up by alluvial cone from steep side valley. *Comment* (GP): dates beginning of last lake damming.

VRI-525. Rawcun 5 1350 ± 60

Charcoal in burning horizon 5 to 10cm thick above 90cm sediment from dammed up lake and overlain by 50 to 70cm fine sand from artificial irrigation followed by recent soil. *Comment* (GP): gives min age for end of last lake damming and max age for beginning of artificial irrigation (agriculture?).

VRI-545. Kathmandu, Nepal 26,700 ± 800

Lignited wood from light gray loam horizon in steep profile wall on R Nakhu Khola S Kathmandu (26° 52' N, 85° 19' E), Nepal. Coll 1975 and subm by Herbert Franz. *Comment* (HF): dates sediments of former lake in Kathmandu basin.

VRI-506. Wadi Dawasir, Saudi Arabia 3 ± 0.3% modern

Calcareous crust on noncalcareous gravel 60cm below surface of fluvial terrace erosion of Wadi Dawasir (20° 40' N, 44° 30' E), Saudi Arabia. Coll 1975 and subm by Josef Zötl, Hydrogeol, TU Graz. *Comment* (JZ): dates fluvial terrace: 26,900 ± 900 BP is calculated with recent value 85% modern (Münnich & Vogel, 1959; Geyh & Schillat, 1966), max age 28,200 ± 900 BP with 100% modern.

VRI-572. Jeddah, Saudi Arabia 17,100 ± 300

Fossil reef corals 5km E of present Red Sea shoreline N Jeddah (21° 48' N, 39° 06' E), Saudi Arabia, following foot of N flank of SW-NE striking Quaternary basalt flow, small ridge rising ca 10m above coastal plain recently. Typical example of relief inversion by marine abrasion. Coll 1976 and subm by Josef Zötl. *Comment* (JZ): dates high sea level phase corresponding with coral growth.

VRI-573. Harrat al Kishb, Saudi Arabia 7.3 ± 0.3% modern

Carbonate weathering of young basalt tongue was dissolved, transported and precipitated in a recently dry basin at SE margin of Harrat al Kishb (22° 40' N, 41° 34' E), Saudi Arabia. Coll 1976 and subm by Josef Zötl. *Comment* (JZ): dates humid climate phase necessary for carbonate dissolution. Age 19,700 ± 400 follows with recent activity 85% modern (Geyh & Schillat, 1966; Münnich & Vogel, 1959).

II. ARCHAEOLOGIC SAMPLES

*A. Austria***VRI-580. Böhheimkirchen, NÖ 3150 ± 80**

Bones in Pit 107, Böhheimkirchen excavation (48° 12' N, 15° 45' E) near St Pölten, Lower Austria. Coll 1974 and subm by J W Neugebauer, Inst Ur-Frühgesch, Univ Vienna. *Comment* (JWN): absolute dating of archaeol classified material. Verifies VRI-496 (R, v 21, no. 1, p 118). Correction for de Vries effect (Suess, 1970) gives 1500 BC. Collagen extracted by method of R Longin (1971).

Hallstatt series, OÖ

Wood samples coll above, in, and below prehistoric path layer (Trampelschicht) at Place 05 of Kaiser-Josef-adit, Hallstatt salt mine (47° 34' N, 48° 57' 26" E), Upper Austria. Coll 1975 and subm by F E Barth, Naturhist Mus, Vienna.

General Comment (FEB): clue to development of Trampelschicht.

VRI-558. Sample 1 2990 ± 100

Twigs above Trampelschicht. *Comment* (FEB): age unexpectedly high.

VRI-559. Sample 2 2690 ± 100

Wood from Trampelschicht.

VRI-560. Sample 3 2570 ± 90

Wood below Trampelschicht.

VRI-568. Antlangkirchen, OÖ 330 ± 80

Wooden pump-tube, oak, discovered in bog near Antlangkirchen (48° 22' N, 13° 42' E), Schärading dist, Upper Austria. Coll 1956 and subm by Josef Reitingner, OÖ Landesmus, Linz. *Comment* (JR): fixes find chronologically. De Vries correction (Suess, 1970) gives AD 1480 to 1600.

*B. Europe, Asia, Africa***Ptukh series, Afghanistan**

Samples from village Ptukh (37° 01' 20" N, 73° 23' 30" E), 3500 alt, and surroundings, Wakhan Valley, Afghanistan. Coll 1975 and subm by Gernot Patzelt.

General Comment (GP): 1st chronologic exploration in this area. No humic acid separation.

VRI-523. Ptukh 1 1880 ± 70

Clayey peat, base sample from -100 to -95cm of peat profile 102cm deep (37° 00' 30" N, 73° 22' 10" E), 3300m alt, near Ptukh. *Comment* (GP): dates beginning of peat growth and with pollen analyses, gives insight into history of climate, vegetation, settlement, and agriculture.

VRI-518. Ptukh 2 **530 ± 70**

Charcoal, wood, and grass remains, filling material between stones of decayed irrigation channel "Old Waal" near Ptukh below silty sediments of irrigation water. *Comment* (GP): dates erection of irrigation system and supposed beginning of settlement in this area.

VRI-519. Ptukh 3 **<300**

Stalks and roots of aquatic plants in silty sediment of destroyed artificial irrigation system "Old Waal" near Ptukh. *Comment* (GP): dates end of artificial irrigation system and settlement.

VRI-521. Ptukh 4 **<260**

Plant remains in loam mortar of stone base of House Ruin 4 M in Ptukh. *Comment* (GP): dates house bldg.

VRI-520. Ptukh 5 **<260**

Like VRI-521, Ruin 1 M.

VRI-595. Luqsor, Egypt **Modern**

Remains of hair and skin of horse —1m below dry sand and stone in necropolis of Theben, Luqsor, Qurna (25° 40' N, 33° 00' E), Asasif, Egypt. Coll 1970, subm by Manfred Bietak, Österr Archäol Inst, Cairo branch. *Comment* (MB): dating for osteologic comparison. Preservation and location close to recent way may point to recent age. No pretreatment.

Correction

VRI-418-421, R, 1976, v 18, p 240, 241: Signs of statistical uncertainties should be exchanged.

REFERENCES

- Geyh, M A and Schillat, B, 1966, Messungen der Kohlenstoffisotopenhäufigkeit von Kalksinterproben aus der Längenfelder Höhle: Aufschluss, v 17, p 315-323.
 Longin, R, 1971, New method of collagen extraction for radiocarbon dating: Nature, v 230, p 241-242.
 Münnich, K O, and Vogel, J, 1959, C-14-Altersbestimmungen von Süßwasser-Kalkablagerungen: Naturwiss, v 46, p 168-169.
 Suess, H E, 1970, Bristlecone-pine calibration of the radiocarbon time-scale 5200 BC to the present, in Olsson, I U, (ed), Radiocarbon variations and absolute chronology: Stockholm, Almqvist and Wiksell.