

VIENNA RADIUM INSTITUTE RADIOCARBON DATES VII

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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, 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.

The following list represents most samples of our work in the last year. Sample descriptions have been prepared in cooperation with submitters.

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SAMPLE DESCRIPTIONS

I. GEOLOGY, GLACIOLOGY, LIMNOLOGY AND FORESTRY

A. Austria

Freibach series, Kärnten

Remnants of wood and cones, deformed and dark colored, in sandy-muddy sediments of small dammed former lake, over-ridden by Freibach glacier and covered by moraine (van Husen, 1975). A palynologic profile was taken from each end of the 2 sedimentation basins separated by small alluvial cone. Samples coll at lower and upper end of profiles ca 3m high. Left border of R Freibach (46° 29' 18" N, 14° 26' 47" E) S of bridge Pt 812 (ÖK 1:25,000 Part 212/1 Zell Pfarre), Carinthia. Coll 1974 and subm by D van Husen, Inst Geol, TH Vienna.

General Comment (DvH): should help to clarify discrepancy between pollen analysis and age implied by VRI-393 (R, 1975, v 17, p 248).

	+1600
	33,400
	-2000
VRI-418. Profile N, base	31,400 BC
Cones and wood, lower end of Profile N.	
	+2000
	35,300
	-2600
VRI-419. Profile N, top	33,300 BC
Cones and wood, upper end of Profile N.	

- +1400
32,300
 -1700
30,300 BC
- VRI-420. Profile S, base**
 Wood, lower end of Profile S.
- +2600
37,900
 -3800
35,000 BC
- VRI-421. Profile S, top**
 Cones and wood, upper end of Profile S.
- VRI-398. Langenzersdorf, NÖ** <230
 Stem of tree 3/73 (willow?) lifted during excavation for lock Langenzersdorf (48° 20' N, 16° 20' E), Lower Austria, left bank of R Danube, km 1938, in area subject to flooding. Stem embedded *in situ* in upright position with humic silt and sand in the root-stock in lower part of gravel zone ca 10m thick on flysh socket. Coll 1973 and subm by J Fink, Geog Inst, Univ Vienna. *Comment* (JF): dates gravel accumulation in narrow passage of R Danube between Mt Kahlengebirge and Mt Bisamberg.
- 5480 ± 100**
3530 BC
- VRI-401. Badgastein 1, Salzburg**
 Root (*Pinus mugo*) 50cm below surface from bog of unknown thickness between 2 lakes Pochart (47° 05' N, 13° 02' 30" E), 7.5km SW Badgastein, Salzburg, alt 2040m. Coll 1973 and subm by G Mutschlechner, Innsbruck. *Comment* (GM): clue to age of bog.
- VRI-402. Badgastein 2, Salzburg** <220
 Charred wood from dump of old mine, ca 20cm below sward cover; 8km SW Badgastein (47° 02' 45" N, 13° 05' 30" E), Salzburg, alt 2160m. Coll 1973 and subm by G Mutschlechner. *Comment* (GM): decades ago K Zschocke coll fragments of vessels, supposedly Roman, near this location. Date is not helpful.
- 570 ± 80**
AD 1380
- VRI-346. Tennengebirge, Salzburg**
 Piece of resin on surface of peat-earth over limestone, Mt Tennengebirge, W part of edge (47° 33' N, 13° 13' E), alt ca 2200m, Salzburg. Coll by G Abel, subm by K Ehrenberg, Paläont Inst, Univ Vienna. No sample pretreatment. *Comment* (KE): dates period of wood growth on plateau of Mt Tennengebirge.
- 10,360 ± 390**
8410 BC
- VRI-410. Mariazell, Steiermark**
 Wood at -4.30m in boring core from bottom of L. Erlaufsee, 34m below water level, near Mariazell (47° 49' 35" N, 15° 05' 12" E), Styria. Coll 1974 and subm by M Bobek, Limnolog Inst, Österr Akad Wiss, Vienna. HCl pretreatment only. *Comment* (MB): dates organic base of lake. Shell sample.

VRI-411. Mariazell, Steiermark **7790 ± 120**
5840 BC

Peaty substance in zone of change from lake marl to peat 30 to 40cm above base of 3.2m thick bog, former part of lake Hechtensee (47° 46' 58" N, 15° 14' 02" E), near Mariazell, Styria. Coll 1973 and subm by M Bobek. *Comment* (MB): dates organic base of Hechtensee.

Ober-Etrach series, Steiermark

Samples from succession of lake, depth to base 5.35m, near Ober-Etrach (47° 12' N, 14° 00' 04" E), Styria. Coll 1973 and subm by E Schultze, Limnolog Inst, Österr Akad Wiss, Vienna. No humic acid extraction. *Comment* (ES): date palynologic events.

VRI-412. 25 to 30 cm **11,010 ± 160**
9060 BC

Clayey gyttja 25 to 30cm above base. Gyttja was dissolved by NaOH, separated from clay, precipitated by HCl, and dated. *Comment* (ES): dates reforestation after extreme glaciation.

VRI-413. 60 to 75cm **10,230 ± 140**
8280 BC

Peat-gyttja 60 to 75cm above base. *Comment* (ES): dates climatic oscillation in late glacial.

VRI-414. 95 to 105cm **9200 ± 130**
7250 BC

Eriophorum peat 95 to 105cm above base. *Comment* (ES): dates 1st rise of *Picea abies*.

Baumkirchen series, Tirol

Wood from undisturbed banded silt, NW part of pit Baumkirchen (47° 18' 25" N, 11° 34' 19" E), N Tyrol. Coll near Finds 1 and 2 and subm by F Fliri, Geog Inst, Univ Innsbruck.

General Comment (FF): verification of dates from upper part of working (Fliri *et al*, 1972; Felber, 1971).

VRI-343. Find 25 **27,300 ± 1100**
25,350 BC

Wood from alt 678m, coll 1972. *Comment* (HF): admixture of dead methane due to small sample size.

VRI-394. Find 30 **28,100 ± 800**
26,150 BC

Twigs from *Hippophae rh* from alt 663m; coll 1973.

Obergurgl series, Tirol

Cyperaceous peat samples from different depths of bog Zirbenwaldmoor near Obergurgl (46° 51' 30" N, 11° 01' 14" E), Tyrol. Coll 1974

and subm by S Bortenschlager, Inst Bot Systematik Geobot, Univ Innsbruck. HCl pretreatment only.

General Comment (SB): samples date changes and oscillations in pollen diagram.

VRI-424. 90 to 100cm **2120 ± 80**
170 BC

Depth 90 to 100cm. *Comment (SB):* dates 1st human influence recognized by considerable NAP climax.

VRI-425. 120 to 130cm **5920 ± 100**
3970 BC

Depth 120 to 130cm. *Comment (SB):* dates considerable change.

VRI-426. 150 to 160cm **6920 ± 110**
4970 BC

Depth 150 to 160cm. *Comment (SB):* suggests correspondence of change with Frosnitz-Oscillation of Venediger area.

VRI-427. 210 to 220cm **7950 ± 120**
6000 BC

Depth 210 to 220cm. *Comment (SB):* dates slight change in profile.

VRI-428. 260 to 270cm **7960 ± 200**
6010 BC

Depth 260 to 270cm. *Comment (SB):* pollen curves of indicators of open vegetation end at this depth.

Lienz series I, Osttirol

Pine wood from different horizons of bog Bärenlacke above Schlaiten near Lienz (46° 51' 50" N, 12° 39' 10" E), E-Tyrol, alt 1550m. Coll 1972 and subm by F Kral, Inst Waldbau, Hochsch Bodenkultur, Vienna.

General Comment (FK) dates characteristic points of pollen profile and solves problems of forest history. Dates as expected.

VRI-360. Depth 44cm **350 ± 70**
AD 1600

Sample embedded in *Carex* peat.

VRI-361. Depth 65cm **800 ± 70**
AD 1150

Sample embedded in carr peat.

VRI-362. Depth 75cm **1410 ± 70**
AD 550

Sample embedded in carr peat.

Lienz series II, Osttirol

Samples from depth 54cm of nameless bog above Schlaiten near Lienz (46° 51' 40" N, 12° 39' E), E-Tyrol, alt 1600m. Coll 1972 and subm by F Kral.

General Comment (FK, HF): samples date characteristic points of pollen profile and solves problems in forest history. Discrepancy in dates is

paralleled in Schlatenkees series (R, 1971, v 13, p 130; Patzelt, 1973), which shows that wood deposited in bog can be older than embedding peat horizon.

VRI-363. Sample A **2700 ± 80**
750 BC

Pine wood in transition zone from *Carex* peat to carr peat.

VRI-364. Sample B **1740 ± 100**
AD 210

Stratigraphically autochthonous charcoal in nearly continuous layer spread over same peat transition zone in which Sample A was deposited.

B. Italy, Spain

Wolfsgruben series, Italy

Lacustrine deposit in quartz-porphyratic depression within relict pine woodland, Signater Kopf, Mt Ritten, Wolfsgruben (46° 31' N, 11° 25' 02" E), prov Bozen (Alto Adige), S Tyrol, Italy. Coll 1973 and subm by R Schmidt, Limnolog Inst, Österr Akad Wiss, Vienna.

General Comment (RS): dates palynologically recognized events.

VRI-382. 240 to 255cm **6200 ± 100**
4250 BC

Radizellen Sphagnum peat from depth 240 to 255cm. *Comment* (RS): dates immigration of *Abies alba* and *Fagus silvatica*.

VRI-408. 465 to 470cm **8500 ± 140**
6550 BC

Dy from depth 465 to 470cm. *Comment* (RS): dates 1st climatic deterioration.

VRI-403. Hierro, Canarias, Spain **5910 ± 110**
3960 BC

Carbonized pine-wood (root?) excavated from horizon of volcanic ash 1m below recent soil. Numerous small remains of pine-wood coal in same horizon suggest that wood was burnt by deposition of hot ash. Pit near San Andres (27° 45' N, 14° 15' E), I Hierro; Canarias, Spain; alt 1000m. Coll 1973 and subm by H Franz, Inst Bodenforschung, Hochsch Bodenkultur, Vienna. *Comment* (HF): dates youngest volcanic activity at I Hierro.

C. Asia

VRI-390. Kathmandu, Nepal **14,050 ± 250**
13,100 BC

Humic sand horizon ca 10cm thick between banded sand layers ca 10.5m below surface. Kathmandu, airport terrace (22° 40' N, 85° 33' E), Nepal. Coll 1972 by H Franz, subm by F Kral. *Comment* (FK): chronologic classification of pollen-analytically tested humus horizons.

VRI-373. Wadi Hanifah, Saudi Arabia **Modern**

Roots in sand of accumulation terrace in Wadi Hanifah (24° 30' N, 46° 45' E), Saudi Arabia. Coll and subm by J Zötl, Inst Min Tech Geol, TH Graz. Only HCl pretreatment. *Comment* (JZ): terrace free of plants. Submitter expected dating of terrace.

8290 ± 120**VRI-405. Al Hassa, Saudi Arabia****6340 BC**

Peat-coal with sand 50 to 100cm below recent surface in area of oasis of Al Hassa (25° 30' N, 49° 37' E), Saudi Arabia. Coll and subm by J Zötl. *Comment* (JZ): dates former bogs presumably present in this oasis during periods of high precipitation.

3990 ± 90**VRI-406. Persian Gulf, Saudi Arabia****2040 BC**

Shells in sandstone from surface of solidified shell bank, presently at sea level, Persian Gulf (26° 30' N, 50° 03' E), E coast of Saudi Arabia. Coll 1973 and subm by J Zötl. Sample leached with HCl before dating. *Comment* (JZ): dates formation of recent breakers terrace lying below sea level at that time.

2 ± 0.4%**VRI-442. Wadi Shabah, Saudi Arabia****modern**

Crusts of calcareous sinter on boulders in conglomerate layer of fluvial terrace ca 50 to 70cm below surface, Wadi Shabah (26° 15' N, 41° 50' E), Saudi Arabia. Coll and subm 1974 by J Zötl. *Comment* (JZ): dates accumulation terrace. An assumed recent activity of 85% modern (Münnich & Vogel, 1959; Geyh & Schillat, 1966) gives model age of 28,900 ± 1300; upper age limit 30,200 ± 1300 is obtained with 100% modern.

As Sulb series, Saudi Arabia

Stalactite embedded in duricrust (calcareous, solidified reddish sediment resembling sandstone) from roof of cave Dahl Abu Marwa near As Sulb (26° 30' N, 47° 30' E), Shumman Plateau, Saudi Arabia. Coll 1974 and subm by J Zötl.

General Comment (JZ): helps in study of paleo-climate and morphogenesis of Shumman Plateau.

VRI-450. Stalactite**<1% modern**

Piece of stalactite, 20mm thick, chiseled out of duricrust. *Comment* (HF): recent activity 85% modern, usually assumed (Franke and Geyh, 1969) gives >37,000 yr.

VRI-451. Duricrust**1.6 ± 0.3% modern**

Comment (HF): with recent activity, 85% modern, age of duricrust sinter component is 32,020 $\begin{matrix} +1920 \\ -1550 \end{matrix}$ if no additional fossil carbonates are present. Otherwise, this is upper limit.

II. ARCHAEOLOGIC SAMPLES

VRI-443. Villach, Kärnten **3560 ± 120**
1610 BC

Charcoal residue in ceramic vessel from prehistoric culture of Trentino and Südtirol, Italy. Coll 1974 by M Gietler, in Butz-Höhle cave, Mt Graschlitzen (46° 35' N, 13° 15' E), 701m asl, Villach, Warmbad, Carinthia, and subm by H Dolenz, Mus Stadt Villach. Sample was embedded in Rotlehm below collapsed roof of cave (Dolenz, 1961). *Comment* (HD): expected date: Bronze age.

Misling series, OÖ

Remains of wood lifted from bottom of lake Attersee, 20m from shore at depth -2 to -3m, Sta Misling II (47° 49' 35" N, 31° 10' 10" E), Gde Unterach/Attersee, OÖ. Coll 1973 and subm by H Offenberger, Bundesdenkmalamt, Vienna.

General Comment: dates different parts of Neolithic lake dwelling sta.

VRI-355. Misling II/1 **4390 ± 90**
2440 BC

VRI-356. Misling II/2 **4710 ± 90**
2760 BC

VRI-357. Misling II/3 **4610 ± 90**
2660 BC

VRI-358. Misling II/4 **4450 ± 90**
2500 BC

VRI-328. Mühlbach, Salzburg **3450 ± 80**
1500 BC

Wooden bar from point 4635m, 140m below surface in so-called adit Keltenstollen of old part of copper mine; fallen in Keltenstollen, later cut by driving adit Arthurstollen, Mühlbach am Hochkönig (47° 23' N, 13° 07' E), Pongau, Salzburg. Coll 1972 by C Eibner, subm by R Pittioni, Inst Ur Frühgesch, Univ Vienna. *Comment* (CE): verifies prehistoric age supposed by Kyrle (1916) but doubted by Zschoke and Preuschen (1932).

VRI-400. Kindberg, Steiermark **230 ± 70**
AD 1716

Wood from under side of roof with paintings depicting Old Testament scenes in small garden house of landowner, A Fürst, Kindberg (47° 30' N, 15° 27' E), Styria. Coll and subm by H Stolla, solicitor, Kindberg. *Comment* (HS): garden house could be mortuary of former medieval Jewish cemetery. De Vries-corrected age is ambiguous: AD 1520 or AD 1650. AD 1520 goes with conception.

VRI-434. Kühtai, Tirol

<210

Wood (*Pinus*) from row boat covered with 15mm mud, lying at -26m on ground of lake Vorderer Finstertaler See, surroundings of Kühtai (47° 12' N, 11° 02' E), Tyrol, alt 2237m. Coll 1973 and subm by N Schulz, Zoolog Inst, Univ Innsbruck. *Comment* (NS): date contradicts assumption of medieval fishing boat.

VRI-342. Wien

<210

Wood (*Pinus* sp) from wooden pipeline of old water supply line, 1.5m below surface, Vienna 16, Ottakringerstraße, corner Deinhardgasse (48° 13' N, 16° 20' E). Coll 1971 and subm by H Bednar, Inst Holzforschung, Hochsch Bodenkultur, Vienna. *Comment* (HB): tree-ring lower age limit is AD 1722 (Bednar, 1973).

REFERENCES

- Bednar, H, 1973, Die Datierung von alten Holzwasserleitungen durch die Jahresringanalyse: Österr Wasserwirtschaft, 25 Jg, p 182-185.
- Dolenz, H, 1961, Urnenfelderzeitliche und Melaunerkeramik aus Warmbad Villach, Carinthia: Mitt Geschichtsverein, Kärnten, 151 Jg, p 383.
- Felber, H, 1971, Altersbestimmungen nach der Radiokohlenstoff methode an Fossilfunden aus dem Bänderton von Baumkirchen (Inntal, Tirol): Gletscherkde Glazialgeol Zeitschr, v 7, p 25-29.
- Fliri, F *et al*, 1972, Weitere Ergebnisse der Forschung am Bänderton von Baumkirchen (Inntal, Nordtirol): Gletscherkde Glazialgeol Zeitschr, v 8, p 203-213.
- Franke, H W and Geyh, M A, 1969, Zur C-14-Datierung des Würm-II/III-Interstadials mit Hilfe von Radiokohlenstoffmessungen an Höhlensinter und Schlußfolgerungen für die Wasseraltersbestimmung: Eiszeitalter u Gegenwart, v 20, p 72-75.
- Geyh, M and Schillat B, 1966, Messungen der Kohlenstoffisotopenhäufigkeit von Kalksinterproben aus der Langenfelder Höhle: Aufschluß, v 17, p 315-323.
- van Husen, D, 1975, Quatärgeologische Untersuchungen in den östlichen Karawanken: Geol Gesell Wien Mitt, v 66, in press.
- Kyrle, G, 1916, Der prähistorische Bergbaubetrieb in den Salzburger Alpen, Beitrag I in Urgeschichte des Kronlandes Salzburg: Österr Kunsttopographie, Wien, v 17, p 17-27.
- Münnich, K O and Vogel, J, 1959, C-14-Altersbestimmung von Süßwasser-Kalkablagerungen: Naturwiss 46 Jg, p 168-169.
- Patzelt, G, 1973, Die postglazialen Gletscher- und Klimaschwankungen in der Venedigergruppe (Hohe Tauern, Ostalpen): Z Geomorph N F, suppl v 16, p 25-72.
- Zschoke, K and Preuschen, E, 1932, Das urzeitliche Bergbauggebiet von Mühlbach-Bischofshofen: Mat z Urgeschichte Österreichs, Wien, v 6, p 14-17.