

### BELFAST RADIOCARBON DATES III

A. G. SMITH, G. W. PEARSON, and J. R. PILCHER

Palaeoecology Laboratory, Queen's University,  
Belfast, Northern Ireland

#### INTRODUCTION

The dating equipment in the Palaeoecology Laboratory remains essentially as described in R., 1970, v. 12, p. 285-290, and the operating conditions as described in R., 1970, v. 12, p. 291-297. Small samples, however, have been counted at a filling pressure equivalent to 152 cm Hg at 20°C. Charcoal samples pretreated by nitration have been treated as described in R., 1970, v. 12, p. 285-290. Other charcoal samples have been pretreated using the following technique developed by P. Q. Dresser: samples are washed in 5% sodium hydroxide; this is followed by treatment in a solution composed of 8% potassium permanganate and 10% sulphuric acid, at 80°C for 20 mins, to remove residual rootlets and organic matter. Unless specifically stated, the samples have been collected by the authors and other members of the Laboratory: M. G. L. Baillie, P. Q. Dresser, Adelaide Goddard, and I. Goddard. Where a sample has been collected for a specific research project the collector's initials are given. Routine operation of the dating apparatus has been carried out by Mrs. Marilyn Carse and Mrs. Florence Qua to whom we are much indebted.

#### ACKNOWLEDGMENTS

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#### I. ARCHAEOLOGIC SAMPLES

##### **Armagh Hill Fort series, Co. Armagh**

Samples from excavation of Early Christian site at Castle Street, Armagh, Co. Armagh (54° 21' N Lat, 6° 39' W Long; Irish Grid Ref. H 874453). Site excavated by C. Warhurst and A. Harper for Ministry of Finance for Northern Ireland in 1968. Coll. 1968 by C. W. and A.H.; subm. by D. M. Waterman, Archaeol. Survey of Northern Ireland.

**1660 ± 80**

**UB-283. Armagh Hill Fort, Trench 3, 16      A.D. 290**

Twigs from bottom of ditch. Pretreatment by bleaching and charring.

**1845 ± 85**

**UB-284. Armagh Hill Fort, Trench 3, 13a      A.D. 105**

Charcoal from intermediate layer in ditch fill. Pretreatment by nitration.

**1430  $\pm$  85****UB-285. Armagh Hill Fort, Trench 2, Pit 3      A.D. 520**

Charred twigs from pit dug into filled ditch. Pretreatment by nitration.

*General Comment (C.W.):* UB-283 came from bottom of defensive ditch encircling hill in centre of Armagh city. There is documentary evidence for founding of city by St. Patrick (*Annals of Ulster*, A.D. 444; *Annals of the Four Masters*, A.D. 457). Date for UB-283 suggests possibility of pre-Christian settlement on hill. UB-284 and UB-285 were stratigraphically later, which suggests that UB-284 was from old wood. Date range fits finds from metal workshop which included clay molds dated by art styles, Warhurst and Harper (1970).

**3350  $\pm$  80****UB-43. Coney Island, F 158, Sample 4****1400 B.C.**

Carbonized wood from prehistoric settlement site on Coney I., SW Lough Neagh, 1 mi from shore, Co. Armagh (54° 31' N Lat, 6° 33' W Long; Irish Grid Ref. H 938642). Site excavated by P. V. Addyman, Univ. of Southampton in 1964. Coll. 1964 by A. G. Smith. Ref. Addyman, P. V. 1965. *Comment:* sample came from deposit containing Irish Bowl pottery. Date is somewhat younger than expected. Sample is part of large series to be dated.

**Pubble archaeological series, Co. Londonderry**

Samples are from peat-covered round barrow in Loughermore Td., 8 mi SW of Limavady, Co. Londonderry (54° 55' N Lat, 7° 7' W Long; Irish Grid Ref. C 585128; alt 600 ft O.D.). Site excavated 1968 by C. Warhurst.

Central mound, of turves and upcast, contained 2 soil horizons (UB-262 and UB-263) above pre-barrow land surface (UB-191) from which had been dug a central pit. Central mound was surrounded by a ditch (UB-193, basal deposit) and bank. Tail of bank was stratified into peat and is bracketed by UB-195 and UB-196. Fraction notation is as for geochemical samples (Sec. IV).

**3875  $\pm$  85****UB-191 E. Pubble, old ground surface 1****1925 B.C.**

Charcoal from old ground surface below central mound.

UB-191 C. (humic acid)      3560  $\pm$  60

*Comment:* date for Fraction E provides one lower bracket for monument; date for humic acid (Fraction C) probably provides a closer lower bracket than Fraction E, but possibility of downwash of humic acid cannot be excluded.

**3135  $\pm$  90****UB-193 A. Pubble, ditch****1185 B.C.**

Basal 5 cm of peat from ditch.

UB-193 C. (humic acid)      2970  $\pm$  85

UB-193 F. (fine particulate fraction)      3135  $\pm$  75

*Comment:* dates give an upper bracket for barrow. Using quoted errors dates are not significantly different. Consideration of Laboratory's dates on fractionated peats will form subject of future publication.

**3835  $\pm$  80**

**UB-195 F. Pubble, old ground surface 2** **1885 B.C.**

Fine particulate fraction from 5 cm of humus and peat sealed beneath S edge of barrow bank.

|                        |               |
|------------------------|---------------|
| UB-195 A. (whole peat) | 3220 $\pm$ 65 |
| UB-195 C. (humic acid) | 2850 $\pm$ 60 |

*Comment:* Fraction F provides 2nd lower bracket for monument and is closely comparable with UB-191 E. Fractions A and C present clear evidence of contamination by washed-down humic acid.

**2775  $\pm$  75**

**UB-196 F. Pubble, basal blanket peat** **825 B.C.**

Fine particulate fraction from basal 5 cm of peat covering S edge of bank above UB-195.

|                        |               |
|------------------------|---------------|
| UB-196 A. (whole peat) | 2745 $\pm$ 60 |
| UB-196 C. (humic acid) | 2625 $\pm$ 90 |

*Comment:* by comparison with UB-193, dates show time lag of several centuries between initiation of peat growth in ditch and over bank. Similarity of dates for fractions indicates no downwash of humic acid.

**535  $\pm$  80**

**UB-262 C. Pubble, upper buried soil (B)** **A.D. 1415**

Humic acid from buried soil (B) developed on upcast over original mound surface.

|                           |              |
|---------------------------|--------------|
| UB-262 F. (fine fraction) | 555 $\pm$ 80 |
|---------------------------|--------------|

*Comment:* no significant difference between fractions suggesting no movement of humic acid in body of barrow.

**950  $\pm$  75**

**UB-263. Pubble, lower buried soil (A)** **A.D. 1000**

Humic acid from buried soil (A), just below UB-262, developed on original mound surface. *Comment:* taken together with dates for UB-262 (this list) date suggests disturbance of barrow in medieval times. Soil humus may, however, be older than burial of soil and date does not measure disturbance of site precisely.

*General Comment:* monument must have been built after formation of deposits dated to 3875  $\pm$  85 (UB-191 E) and 3835  $\pm$  80 (UB-195 F), and possibly after 3560  $\pm$  60 (UB-191 C), and before 3135  $\pm$  90 (UB-193 A). Any of these possible brackets demonstrates that the barrow is of Bronze age rather than Iron age date.

**Ballynagilly Series I, Co. Tyrone**

Continuation of series reported in R., 1970, v. 12, p. 285-290, from site known as 'The Corbie' in Ballynagilly Td., Co. Tyrone (54° 42'

N Lat, 6° 51' W Long; Irish Grid Ref. H 743837) 5 mi NW of Cookstown. Series is from excavations carried out by A. M. ApSimon (Dept. Archaeol., Univ. of Southampton) for Ministry of Finance, Northern Ireland during 1966-69. Samples are from Neolithic and Earlier Bronze age occupations. Coll. 1969 by A. M. ApSimon unless otherwise stated.

**UB-199. Ballynagilly, post-hole in Neolithic House F(L) 149** **5230 ± 125**  
**3280 B.C.**

Charcoal from post-hole in Neolithic house (ApSimon, 1969); assoc. with Neolithic pottery. Coll. 1967 by A.M.A. *Comment*: similar to date for material from walling of house (UB-201, 5165 ± 50, R., 1970, v. 12, p. 289) and some early Neolithic dates in this series.

**UB-200. Ballynagilly, Beaker Hearth-Pit F(M) 32** **3905 ± 120**  
**1955 B.C.**

Charcoal from hearth-pit in Beaker habitation area. Pit contained much pottery and fragmentary burnt bone. Evidence of burning *in situ*. Coll. 1967 by A. M. ApSimon.

**UB-301. Ballynagilly, Pit F(L) 134** **4910 ± 90**  
**2960 B.C.**

Charcoal from pit containing Neolithic artifacts. Coll. 1967 by A. M. ApSimon. *Comment*: result similar to that from Middle Neolithic hearth (UB-306, 4880 ± 110), this list.

**UB-304. Ballynagilly, Pit Complex F(L) 211** **5370 ± 85**  
**3420 B.C.**

Charcoal from Layer 5b of pit complex. No artifacts found in this layer but it was sealed by layer containing Neolithic artifacts.

**UB-305. Ballynagilly, Hearth F(L) 16** **5745 ± 90**  
**3795 B.C.**

Charcoal from hearth and ash-pit in Neolithic occupation area. Coll. 1967 by A. M. ApSimon.

**UB-306. Ballynagilly, Middle Neolithic Hearth F(M) 174** **4880 ± 110**  
**2930 B.C.**

Charcoal found in close assoc. with Middle Neolithic pottery, stratigraphically pre-Beaker.

**UB-307. Ballynagilly, Pit and Gully Complex F(M) 46** **5640 ± 90**  
**3690 B.C.**

Charcoal from pit containing Early Neolithic pottery in base of gully sealed by sterile sand and overlain by Beaker occupation material. Coll. 1967 by A. M. ApSimon.

**UB-309. Ballynagilly, Beaker Pit F(M) 17** **3850 ± 55**  
**1900 B.C.**

Charcoal from basal Layer F of pit 1.2 × 1.2 × 0.6 m deep containing Beaker pottery: some sherds closely assoc. with sample. Coll. 1968 and 1969 by A. M. ApSimon.

- 3455  $\pm$  60**
- UB-314. Ballynagilly, 'Plainware' Pit F(M) 317 1505 B.C.**  
Charcoal from shallow pit  $1.0 \times 0.8 \times 0.1$  m deep with one 'plainware' potsherd and flints.
- 3480  $\pm$  80**  
**1530 B.C.**
- UB-315. Ballynagilly, 'Plainware' Hearth F(M) 332**  
Charcoal from hearth ca.  $2 \times 1$  m with flints and 'plainware' sherds closely assoc.
- 3960  $\pm$  75**  
**2010 B.C.**
- UB-316. Ballynagilly, Beaker Hearth F(G) 5**  
Charcoal from hearth  $0.4 \times 0.3$  m  $\times$  5 cm deep in Area G of excavation containing compacted mass of charcoal enclosing sherds of Beaker pottery. Further excavation in this area is planned.
- 3525  $\pm$  75**  
**1575 B.C.**
- UB-355. Ballynagilly, 'Plainware' Occupation Spread F(M) 335**  
Charcoal from 2 m diam. continuous spread of 'plainware' sherds and charcoal. Probable focus of occupation.
- 3905  $\pm$  75**  
**1955 B.C.**
- UB-356. Ballynagilly, Burnt Area F(M) 334 and 333**  
Charcoal from burnt area with Beaker pottery.

*General Comment:* further samples will be dated after 1970 excavations. Dates obtained so far fall into 2 distinct groups. Those from Neolithic contexts fall before ca. 2700 B.C. and those from Earlier Bronze age contexts fall after ca. 2200 B.C. This is in line with pollen evidence for forest regeneration and lack of agriculture for the period between  $2590 \pm 65$  B.C. (UB-251) and  $2390 \pm 65$  B.C. (UB-250, R., 1970, v. 12, p. 295).

Dates for Neolithic house wall material (UB-201) and house post-hole (UB-199) are statistically indistinguishable from dates for early forest clearance shown by pollen analysis (UB-253, R., 1970, v. 12, p. 295) and for charcoal layers in surrounding bog (UB-18, this list and UB-15, R., 1970, v. 12, p. 289). Results strongly suggest that forest clearance at elm decline was carried out by builders of rectangular house. These dates cluster around mean of ca. 3250 B.C. and are closely comparable with other dates for Irish Early Neolithic material (McAulay and Watts, 1961). Dates for 3 Neolithic samples (UB-305, UB-307, and UB-197), however, are earlier than any other dated Neolithic material from Ireland. It may be noted that date for end of pre-landnam forest clearance at Ballyscullion (UB-116) is  $5525 \pm 60$ , this list. Single sample (UB-306) for Middle Neolithic falls in later part of forest clearance phase and may be compared with UB-252 ( $4850 \pm 70$ , R., 1970, v. 12, p. 295).

Samples from Beaker contexts fall ca. 1900 to 2000 B.C. and those from Irish Bowl and 'Plainware' (Early Bronze age) contexts fall ca. 1500 to 1600 B.C. Although individual samples from these 2 contexts

may not always be statistically distinct, the 2 groups of dates show a clear separation. Beaker occupation can be correlated with forest clearance indicated by increase of plantain pollen (UB-248,  $2005 \pm 55$  B.C., R., 1970, v. 12, p. 294, emended this list). Subsequent Earlier Bronze age occupation is presumably connected with charcoal layer and clearance of birch (UB-247,  $1670 \pm 60$  B.C., R., 1970, v. 12, p. 294).

*General Comment on Archaeologic Samples* (A.M.A.): dates are from 4 sites in area  $200 \times 200$  m. Early Neolithic pottery resembles Ballymarlagh style (Case, 1961, p. 176). Further study is necessary to determine whether the group of very early dates (UB-305, -307, -197) is reflected by differences in artifacts. Pot attributed to the Middle Neolithic (UB-306) resembles *Murlough* variety of Sandhills ware (Case, 1961, 1969) with features reminiscent of Carrowkeel ware. Bell Beaker dates are from 3 separate sites, each with differing pottery. This suggests contributions from European Bell and Wessex/Middle Rhine groups and Early Northern British Beaker tradition. Later pottery includes Irish Bowl (UB-198) and, from a separate site, 'plainware' dated by UB-314, -315, -316. Affinities of this plainware require further study.

**2725  $\pm$  55**

**UB-163. Beaghmore Diagram 4, 33 to 35 cm** **775 B.C.**

Humic acid from blanket peat from Beaghmore stone circle site ( $54^{\circ} 42'$  N Lat,  $6^{\circ} 56'$  W Long; Irish Grid Ref. H 685843) 9 mi NW of Cookstown, Co. Tyrone. Sample from base of ditch of Cairn 10. Coll. 1966 by Pilcher (1969). *Comment* (J.R.P.): together with UB-11 (R., 1970, v. 12, p. 292, emended this list) result provides date bracket for construction of cairn. Humic acid fraction extracted and dated as contamination by modern roots was suspected. Date may still be younger than earliest organic accumulation in ditch. Date bracket places construction in Middle or Later Bronze age.

**UB-320 E. Goodland Neolithic ritual site,** **4575  $\pm$  135**  
**Co. Antrim** **2625 B.C.**

Fine charcoal particles from Neolithic ritual site in Goodland Td., 5 mi E of Ballycastle, Co. Antrim ( $55^{\circ} 12'$  N Lat,  $6^{\circ} 7'$  W Long; Irish Grid Ref. D 200413; alt 750 ft O.D.). Samples separated in lab. by P. Q. Dresser from filling of pit containing Neolithic material. Pit was in till beneath blanket peat. Coll. 1964 by H. Case, Ashmolean Mus., Oxford, in consultation with A. G. Smith.

UB-320 C. (humic acid)  $1710 \pm 65$

UB-320 G. (rootlet material)  $885 \pm 80$

*Comment:* mean of charcoal determination falls near end of Middle Neolithic and beginning of Late Neolithic distinguished by Case (1961, 1969) and provides date for mature Sandhills Ware and for Goodland type of ritual site.

Samples from this site have been dated by the Lamont Lab. (R., 1961, v. 3, p. 172). Downwash of humic acid is shown by young age of Fraction C which is close to that for humic acid from basal peat determined by Lamont Lab., L-472 (humic acid). At least some rootlets (Fraction G) penetrating Neolithic pit deposits clearly much younger than pit and suggest possible cause of unacceptably young age previously determined by Lamont Lab. for charcoal from pit, L-472 A. Charcoal date conforms with that for base of peat at site obtained by Dublin Lab. (D-46,  $4150 \pm 200$ ; R., 1961, v. 3, p. 33), though both of these are much older than the Lamont determination for basal peat (L-472 B;  $1380 \pm 150$ ).

**UB-317. Kilmagoura bridge, Co. Cork, 725  $\pm$  70  
Republic of Ireland A.D. 1225**

Oak foundation timber of entrance to Kilmagoura moated site, Kilmagoura Td., 0.75 mi SW of Newtown, Co. Cork, Ireland ( $52^{\circ} 20'$  N Lat,  $8^{\circ} 47'$  W Long; Irish Grid Ref. R 467213). Coll. 1967 by R. E. Glasscock, Dept. of Geog., Univ. of Belfast. Ref. Glasscock, 1968. *Comments* (M.G.L.B.): sample of 10 annual rings beginning 20 yr from outside of 160 yr old tree. (R.E.G.): date agrees with late 13th to 14th century date already suggested from excavation evidence. Pretreatment by bleaching and charring.

**Mullaghbane Rath series, Co. Tyrone**

Fossil soil and charcoal from Mullaghbane Rath, 6 mi SW of Omagh, Co. Tyrone ( $54^{\circ} 33'$  N Lat,  $7^{\circ} 24'$  W Long; Irish Grid Ref. H 385661; alt 300 ft O.D.). Samples composed of old ground surface material containing charcoal from beneath highest part of bank (ca. 6 ft) of ringwork. Site excavated by A. Harper for Ministry of Finance for Northern Ireland. Coll. 1969 by P. Q. Dresser, A. G. Smith, and A. Harper, and pretreated by P. Q. Dresser.

**UB-268. Mullaghbane No. 1 825  $\pm$  85  
A.D. 1125**

Humic acid from upper 2 cm of fossil soil from beneath bank of rath. Charcoal dated as UB-391.

**UB-390. Mullaghbane No. 2 1715  $\pm$  100  
A.D. 235**

Humic acid from lower 4 cm of fossil soil from beneath bank of rath, contiguous with Mullaghbane No. 1. Charcoal dated as UB-391.

**UB-391. Mullaghbane No. 3 2915  $\pm$  115  
965 B.C.**

Charcoal from fossil soil from beneath bank of rath.

*General Comment:* result for UB-268 lies within limits for acceptable age of ringwork. Contiguous sample UB-390 is appreciably older and may indicate lack of large-scale contamination by downwash of humus, presumably due to great thickness of mineral overburden. Difference

between UB-268 and UB-390 suggests a lack of pre-structure ploughing and that UB-268 could indicate maximum age of building. Charcoal (UB-391) is clearly of prehistoric age and not related to ringwork.

## II. PALAEOECOLOGIC SAMPLES

### Ballyscullion series, Co. Antrim

Samples from monolith, from which detailed pollen diagram has been prepared by Mrs. A. Crowder (Queen's Univ., Kingston, Ontario), through large raised bog in Ballyscullion East Td., 8.5 mi SW of Ballymena, Co. Antrim (54° 58' N Lat, 6° 27' W Long; Irish Grid Ref. H 997955; alt 80 ft O.D.). Refs. Jessen (1949); Mitchell (1956). Coll. 1963 by A. G. Smith. All samples received acid pretreatment.

**3835 ± 80**  
**UB-109. Ballyscullion monolith, 204 to 208 cm 1885 B.C.**

*Sphagnum-Eriophorum* peat with *Calluna*. Sample from beginning of phase of intense agricultural activity, possibly of pastoralism, some time after 2nd elm decline, indicated by rise of grass and plantain pollen.

**3920 ± 85**  
**UB-110. Ballyscullion monolith, 236 to 238 cm 1970 B.C.**

*Sphagnum-Eriophorum* peat. Sample from level of recovery of elm after its 2nd decline.

**4200 ± 85**  
**UB-111. Ballyscullion monolith, 250 to 254 cm 2250 B.C.**

*Sphagnum-Eriophorum* peat. Sample from level of 2nd marked elm decline, and final pine decline.

**4570 ± 55**  
**UB-112. Ballyscullion monolith, 284 to 286 cm 2620 B.C.**

*Sphagnum-Eriophorum* peat. Sample from end of Stage 3 of landnam phase, where elm curve has fully recovered and where plantain pollen has disappeared. Heath curve begins to rise.

**4830 ± 60**  
**UB-294. Ballyscullion monolith, 290 to 294 cm 2880 B.C.**

*Sphagnum-Eriophorum* peat. Sample from middle of Stage 3 of landnam phase, where elm recovery has begun and plantain curve has just fallen. Includes maximum of hazel curve.

**4840 ± 60**  
**UB-113. Ballyscullion monolith, 298 to 300 cm 2890 B.C.**

*Sphagnum-Eriophorum* peat. Sample from beginning of Stage 3 of landnam phase, as defined by beginning of rise of hazel curve but includes maxima of grass and plantain pollen.

**4990 ± 55**  
**UB-114. Ballyscullion monolith, 304 to 308 cm 3040 B.C.**

*Sphagnum-Eriophorum* peat. Sample from beginning of Stage 2 of landnam phase where elm curve falls markedly and includes rise of

grass and plantain curves. Sample at Pollen Zone Boundary VIIa-VIIIb of Jessen (1949).

**UB-115. Ballyscullion monolith, 310 to 314 cm** **5130  $\pm$  60**  
**3180 B.C.**

*Sphagnum-Eriophorum* peat. Sample from beginning of Stage 1 of landnam phase where elm curve begins to decline, grass pollen increases and plantain pollen re-appears.

**UB-295. Ballyscullion monolith, 330 to 334 cm** **5250  $\pm$  85**  
**3300 B.C.**

*Sphagnum-Eriophorum* peat.

**UB-116. Ballyscullion monolith, 340 to 344 cm** **5530  $\pm$  60**  
**3580 B.C.**

*Sphagnum-Eriophorum* peat with *Calluna*. Sample from later part of pre-landnam clearance phase with maxima of grass and plantain pollen just above slight fall of oak curve.

**UB-296. Ballyscullion monolith, 354 to 356 cm** **5815  $\pm$  90**  
**3865 B.C.**

*Sphagnum-Eriophorum* peat with *Calluna*. Sample ca. 10 cm above decline of pine curve.

**UB-118. Ballyscullion monolith, 374 to 378 cm** **6000  $\pm$  85**  
**4050 B.C.**

*Sphagnum-(Eriophorum)* peat with *Calluna*.

**UB-119. Ballyscullion monolith, 398 to 400 cm** **6430  $\pm$  85**  
**4480 B.C.**

*Sphagnum-(Eriophorum)* peat with *Calluna*.

**UB-120. Ballyscullion monolith, 416 to 418 cm** **6950  $\pm$  85**  
**5000 B.C.**

Reedswamp peat. Sample from level of rise of alder curve at Boreal-Atlantic boundary (Pollen Zone Transition VI-VII of Jessen, 1949).

*General Comment:* samples selected primarily to date horizons of vegetational change, particularly those assoc. with early human activity. UB-116 (5530  $\pm$  60) dates later part of earliest forest clearance episode discovered so far in Ireland. Dates in same range were obtained for Neolithic material from Ballynagilly, Co. Tyrone (UB-197, R., 1970, v. 12, p. 289 and UB-305, UB-307, this list).

UB-115 (5130  $\pm$  60) dates beginning of landnam phase of classical type as distinguished at Fallahogy, Co. Londonderry (Smith and Willis, 1962) and dated by Cambridge Lab. (R., 1962, v. 4, p. 68). End of landnam phase is dated by UB-112 (4570  $\pm$  55). These dates, and consideration of deposition rate as a whole, suggest that total length of landnam phase was some 400 to 600 yr. Phase appears thus to have been more than a temporary clearance for agriculture as was originally supposed. This finding is in line with conclusions drawn for landnam phases at Beaghmore and Ballynagilly, Co. Tyrone (Pilcher, 1970). At level of UB-109 (3835  $\pm$  80) creation of pasture is indicated by pollen diagram

and date suggests that this may have been due to activities of Beaker peoples (see general comment on Ballynagilly Series I, this list).

### Ballynagilly Series II, Co. Tyrone

Continuation of series reported in Belfast I and II from palaeo-ecologic work assoc. with excavations of A. M. ApSimon at 'The Corbie', Ballynagilly Td., Co. Tyrone (54° 42' N Lat, 6° 51' W Long; Irish Grid Ref. H 743837). All samples received acid pretreatment. Coll. 1967 by J. R. Pilcher and A. G. Smith.

|   |                   |
|---|-------------------|
|   | <b>695 ± 80</b>   |
| <b>UB-242. Ballynagilly core, 40 to 44 cm</b>   | <b>A.D. 1255</b>  |
| Blanket peat with <i>Eriophorum</i> .   |                   |
|   | <b>2375 ± 80</b>  |
| <b>UB-244. Ballynagilly core, 120 to 124 cm</b>   | <b>425 B.C.</b>   |
| Blanket peat. Time of high plantain pollen values.  |                   |
|   | <b>7275 ± 95</b>  |
| <b>UB-257. Ballynagilly core, 310 to 314 cm</b>   | <b>5325 B.C.</b>  |
| Coarse detritus mud. Just after main rise of pine pollen curve and just before Zone VI/VIIa boundary.   |                   |
|   | <b>8095 ± 80</b>  |
| <b>UB-258. Ballynagilly core, 330 to 334 cm</b>   | <b>6145 B.C.</b>  |
| Coarse detritus mud. First rise of elm and oak curves marking Zone V/VI boundary.   |                   |
|   | <b>9595 ± 80</b>  |
| <b>UB-260. Ballynagilly core, 380 to 384 cm</b>   | <b>7645 B.C.</b>  |
| Fine detritus mud. Fall of juniper curve and rise of birch curve.   |                   |
|   | <b>9595 ± 125</b> |
| <b>UB-297. Ballynagilly core, 400 to 404 cm</b>   | <b>7645 B.C.</b>  |
| Sandy and muddy diatomite. Pollen very scarce, <i>Myriophyllum</i> pollen dominant, some <i>Rumex</i> and <i>Empetrum</i> pollen. Tree pollen forms < 10% of total. Pollen Zone III. <i>Comment</i> : date is indistinguishable from UB-260, 20 cm higher in profile. Contamination by younger humic acids is suspected, but organic content of samples was too small to permit extraction of particulate organic fraction. For comparable situation see UB-298, basal sample of Slieve Gallion series (this list). |                   |
|   | <b>5295 ± 90</b>  |
| <b>UB-18. Ballynagilly Monolith E, 29 to 31 cm</b>  | <b>3245 B.C.</b>  |
| Charcoal (hazel, id. by J.R.P.) from layer below iron pan in monolith from blanket peat between prehistoric occupation area and deep bog. <i>Comment</i> : date is conformable with those for Early Neolithic material from this site (e.g., UB-201, R., 1970, v. 12, p. 289). Overlying sand suggests soil erosion following forest clearance and burning. Date shows this to have been in Neolithic times.  |                   |
| <i>General Comment</i> : core samples expand previous dating of profile (R., 1970, v. 12, p. 291-297) and complete Post-glacial sequence from   |                   |

site. Date for Zone III is unexpectedly young and is discussed in connection with similar problem at Slieve Gallion (this list).

### Slieve Gallion Monolith series, Co. Tyrone

Samples from monolith from which pollen diagram has been prepared (J.R.P.), from bog between twin summits of Slieve Gallion (54° 45' N Lat, 6° 45' W Long; Irish Grid Ref. H 807896; alt 1400 ft O.D.), 6.5 mi N of Cookstown, Co. Tyrone. All samples received acid pre-treatment.

|   |                  |
|---|------------------|
| <b>UB-271.</b> Slieve Gallion monolith, 50 to 52 cm<br>Blanket peat.  | <b>2670 ± 80</b> |
|   | <b>720 B.C.</b>  |
| <b>UB-272.</b> Slieve Gallion monolith, 80 to 82 cm<br>Blanket peat.  | <b>3280 ± 75</b> |
|   | <b>1330 B.C.</b> |
| <b>UB-273.</b> Slieve Gallion monolith, 110 to 112 cm<br>Blanket peat.  | <b>3580 ± 60</b> |
|   | <b>1630 B.C.</b> |
| <b>UB-274.</b> Slieve Gallion monolith, 140 to 142 cm<br>Organic deposit transitional from woody reedswamp peat to blanket peat. Pine and elm pollen permanently reduced to low values. | <b>4165 ± 80</b> |
|   | <b>2215 B.C.</b> |
| <b>UB-275.</b> Slieve Gallion monolith, 170 to 172 cm<br>Woody reedswamp peat. Elm decline, 1st plantain pollen. Zone VIIa/VIIb transition <i>sensu</i> Jessen (1949).                  | <b>4895 ± 65</b> |
|   | <b>2945 B.C.</b> |
| <b>UB-276.</b> Slieve Gallion monolith, 200 to 202 cm<br>Woody reedswamp peat. Big increase in pollen of sedges and decrease in pollen of hazel.  | <b>5870 ± 65</b> |
|   | <b>3920 B.C.</b> |
| <b>UB-277.</b> Slieve Gallion monolith, 220 to 222 cm<br>Reedswamp peat. First appearance of alder pollen.  | <b>6735 ± 85</b> |
|   | <b>4785 B.C.</b> |
| <b>UB-278.</b> Slieve Gallion monolith, 235 to 237 cm<br>Reedswamp peat. First significant rise of pine pollen.   | <b>7400 ± 90</b> |
|   | <b>5450 B.C.</b> |
| <b>UB-279.</b> Slieve Gallion monolith, 250 to 252 cm<br>Reedswamp peat. First significant rise of oak pollen.  | <b>7880 ± 75</b> |
|   | <b>5930 B.C.</b> |
| <b>UB-280.</b> Slieve Gallion monolith, 265 to 267 cm<br>Reedswamp peat. Just before 1st appearance of oak and elm pollen. Approx. Zone V-VI boundary.                                  | <b>8760 ± 90</b> |
|   | <b>6810 B.C.</b> |

**UB-321. Slieve Gallion monolith, 278 to 280 cm** **9210  $\pm$  110**  
**7260 B.C.**

Particulate fraction of reedswamp peat (humic acid removed). *Comment:* sample taken to check on possible humic acid contamination at this level. Date is indistinguishable from sample immediately below, UB-281.

**UB-281. Slieve Gallion monolith, 280 to 282 cm** **9215  $\pm$  75**  
**7265 B.C.**

Reedswamp peat. Middle of juniper maximum. Zone IV.

**UB-298 D. Slieve Gallion monolith, 291 to 293 cm** **9660  $\pm$  105**  
**7710 B.C.**

Particulate fraction of reedswamp peat.

UB-298 C. (humic acid) 9505  $\pm$  100

*Comment:* sample taken to check on possible contamination by younger humic acids. Both fraction dates are older than underlying whole peat sample (UB-282) suggesting removal of some younger peat component during treatment, probably water soluble humic acids. Particulate fraction date could be older than humic acid date and some contamination by alkali-soluble humic acids is possible.

**UB-282. Slieve Gallion monolith, 293 to 295 cm** **9405  $\pm$  80**  
**7455 B.C.**

Sandy reedswamp peat. Probable end of Pollen Zone III. *Comment:* on basis of results for fractionated Sample UB-298, this sample is probably contaminated by younger humic acids and does not give a reliable measure of the end of Pollen Zone III.

*General Comment:* Sample UB-298 indicates advisability of removing humic acids from early Post-glacial peats. Sample UB-321 shows that removal of humic acid from samples higher in profile would not have materially altered results. On basis of UB-298 D end of Late-glacial period, defined pollen-analytically, occurred near 9660  $\pm$  105.

**Pubble pollen series, Co. Londonderry**

Samples are from 2 peat monoliths from barrow described in Pubble archaeol. series (this list), in Loughmore Td., 8 mi SW of Limavady, Co. Londonderry (54° 55' N Lat, 7° 7' W Long; Irish Grid Ref. C 585128; alt 600 ft O.D.). Profile I is from N arc of ditch. Base of monolith is adjacent to Sample UB-193 (this list). Profile III is through tail of upcast from ditch close to UB-195 and UB-196 (this list). Coll. 1968. Pollen analyses from profiles made by I. Goddard.

**UB-325. Pubble Profile I, 144 to 148 cm** **2480  $\pm$  70**  
**530 B.C.**

Fine particulate fraction of blanket peat from 144 to 148 cm depth. Sample from level of beginning of decline of non-tree pollen immediately above level where tree pollen falls sharply from ca. 20% to ca. 10%, with pollen of cereals and weed species.

**2765 ± 70**  
**815 B.C.**

**UB-326. Pubble Profile I, 150 to 152 cm**

Fine particulate fraction of blanket peat from 150 to 152 cm depth. Sample from end of gradual decline of tree pollen from ca. 40% to ca. 20% and just below level of sharp fall to ca. 10% (see UB-325, above).

**1665 ± 80**  
**A.D. 285**

**UB-331. Pubble Profile III, 16 to 20 cm**

Fine particulate fraction of blanket peat from 16 to 20 cm above base. Sample at level of birch peak, decline of grasses and increase of heaths.

**2280 ± 70**  
**330 B.C.**

**UB-330. Pubble Profile III, 10 to 14 cm**

Fine particulate fraction of blanket peat from 10 to 14 cm above base. Sample from base of peat immediately above upcast from ditch. At level of sample oak curve is declining, alder curve is at a maximum, grass curve increases, and heath curve declines.

*General Comment* (A.G.S., I.G.): UB-326 and UB-325 from Profile I bracket pollen-analytically defined agricultural phase which thus appears to belong to latest part of Bronze age, and shows intensified utilization of area some time after construction of barrow. Date for UB-330 is some 500 yr younger than date for UB-196 F (this list). These 2 samples come from within 2 m of each other; both immediately overlie upcast but porosity of substratum differs.

**Carn a Chnuic series, Inverness, Scotland**

Samples of mor humus from pine forest and moorland in Abernethy and Kincardine parish, 8 mi S of Grantown-on-Spey, Moray, Inverness, Scotland. Coll. and pretreated 1968 by P. E. O'Sullivan, School of Biol. and Environmental Sciences, New Univ. of Ulster.

**105 ± 65**  
**A.D. 1845**

**UB-393. Carn a Chnuic, CAC-I, 13 cm**

Mor humus from 13 cm depth in soil below pine forest (57° 12' N Lat, 3° 36' W Long; Grid Ref. NJ (38) 137147; alt 1400 ft O.D.). Sample from H/F<sub>2</sub> layer interface. *Comment* (P.E.O'S.): pollen analyses indicate transition from open pine-birch woodland to closed pine forest at level of sample.

**1035 ± 70**  
**A.D. 915**

**UB-392. Carn a Chnuic, CAC-I, 22 to 23 cm**

Fine particulate fraction of mor humus from 22 to 23 cm depth in same profile as UB-393 (above). Sample from A<sub>1</sub>/H layer interface. Pollen analytically defined change in forest composition at level of sample. *Comment*: (P.E.O'S.): result should indicate minimum date for onset of podsolization at site.

**UB-395. Carn a Chnuic, CAC-III, base** **1340 ± 70**  
**A.D. 610**

Basal mor humus from *Calluna* moor (57° 12' N Lat, 3° 37' W Long; Grid Ref. NJ (38) 034142; alt 1300 ft O.D.). Sample from A<sub>1</sub>/H layer interface. *Comment* (P.E.O'S.): result should indicate minimum date for onset of podsolization at site.

**UB-394. Ryvoan Pass, Abernethy Forest, Inverness, Scotland, RVS(1), + 7 cm** **1425 ± 70**  
**A.D. 525**

Fine particulate fraction of charcoal-containing peat from *Calluna* moor in Abernethy and Kincardine parish, 10.5 mi S of Grantown-on-Spey, Inverness, Scotland (57° 10' N Lat, 3° 55' W Long; Grid Ref. NJ (38) 019109). Coll. and pretreated 1969 by P. E. O'Sullivan. *Comment* (P.E.O'S.): pollen analyses show change from pine-birch forest to open moorland at level of sample.

*Upland Blanket Peat Samples*

The following samples were taken in connection with research by Mrs. A. Goddard into the origins and vegetational changes associated with the initiation of blanket peat growth in NE Ireland. Percentages quoted in relation to pollen-analytical results are calculated on the basis of total pollen. Pretreatments carried out by A.G.

**Altnahinch blanket bog series, Co. Antrim**

Blanket peat samples from Altnahinch Td., 7.5 mi SW of Cushendall, Co. Antrim (55° 3' N Lat, 6° 15' W Long; Grid Ref. D 233125). Coll. 1969 by A.G.

**UB-349. Altnahinch blanket bog, 41 to 46 cm** **2370 ± 85**  
**420 B.C.**

Fine particulate fraction of very fibrous blanket peat from 41 to 46 cm depth. Heath pollen dominant. Sample is at level of fall of grass pollen and rise of sedge pollen, and just above a charcoal layer.

**UB-332 F. Altnahinch blanket bog, 51 to 57 cm** **2725 ± 85**  
**775 B.C.**

Fine particulate fraction of basal blanket peat. Sample from immediately above fall of total tree pollen from ca. 90% to ca. 30%.

UB-332 C. (humic acid) 2415 ± 70

**UB-333. Altnahinch blanket bog, 58 to 63 cm** **2745 ± 70**  
**795 B.C.**

Humic acid from mineral soil below blanket peat. Tree-pollen percentages very high, mostly oak and hazel with some alder.

**Lough Lark series, Co. Tyrone**

Peat and soil samples from blanket bog near Lough Lark in Meenarodda Td., 20 mi SE of Londonderry, Co. Tyrone (54° 46' N Lat, 7° 0' W Long; Irish Grid Ref. H 645926; alt 1080 ft O.D.). Coll. 1966 by J. R. Pilcher.

**UB-380. Lough Lark, 98 to 101 cm****3955 ± 75****2005 B.C.**

Fine particulate fraction of basal blanket peat. Sample at level of fall of total tree pollen from ca. 60% to ca. 30% where heath values rise sharply.

**UB-381. Lough Lark, 102 to 105 cm****3835 ± 70****1885 B.C.**

Humic acid from mineral soil below blanket peat. Tree pollen percentage high, mostly hazel.

**Breen bog (2) series, Co. Antrim**

Peat and soil samples from blanket bog in Breen Td., 7.5 mi NW of Cushendall, Co. Antrim (55° 8' N Lat, 6° 15' W Long; Irish Grid Ref. D 118326; alt 900 ft O.D.). Coll. 1969 by A. Goddard.

**UB-367 F. Breen bog (2), 50 to 55 cm****1485 ± 65****A.D. 465**

Fine particulate fraction of blanket peat from 50 to 55 cm depth. Base of true blanket peat with no mineral content. Sample from immediately above fall of total tree pollen from ca. 70% to ca. 30%.

UB-367 C. (humic acid) 1255 ± 65

**UB-368. Breen bog (2), 60 to 65 cm****2715 ± 140****865 B.C.**

Fine particulate fraction of peaty soil from 60 to 65 cm depth. Tree pollen ca. 70%. Sample includes peak of willow curve and is just below rise of birch curve.

**UB-369. Breen bog (2), 69 to 74 cm****3425 ± 90****1475 B.C.**

Fine particulate fraction of woody peat with high mineral content, from 69 to 74 cm depth. Just above phase of high alder pollen values and at rise of birch, hazel, and grasses. Tree pollen curve begins slow decline from ca. 90%. First consistent appearance of plantain pollen.

**UB-370. Breen bog (2), 79 to 84 cm****3770 ± 95****1820 B.C.**

Humic acid from mineral soil just below base of organic deposits, at 79 to 84 cm depth. High tree pollen percentages, mostly alder and hazel with some birch. Sample is just below sharp rise of alder from ca. 40% to ca. 80% and at end of gradual pine decline.

**UB-403. Ballypatrick Forest, 179 to 182 cm****2915 ± 75****965 B.C.**

Fine particulate fraction of blanket peat from 179 to 182 cm depth. Sample from near base of blanket peat which overlies reedswamp peat on slopes of Carneighaneigh Mt., 5.5 mi SE of Ballycastle, Co. Antrim (55° 9' 30" N Lat, 6° 7' 35" W Long; Irish Grid Ref. D 193364). Sample immediately above fall of total tree pollen. Fine charcoal fragments present. See also UB-265 (R., 1970, v. 12, p. 296, emended this list).

**Glens Bridge series, Co. Antrim**

Peat and soil samples from blanket peat in Altarichard Td., 8 mi W of Cushendall, Co. Antrim (55° 7' N Lat, 6° 16' W Long; Irish Grid Ref. D 106299; alt 760 ft O.D.). Coll. 1967 by A. Goddard.

**1035 ± 75****UB-373. Glens Bridge, 64 to 68 cm****A.D. 915**

Fine particulate fraction of blanket peat from 64 to 68 cm depth. Sample is at level of fall of tree pollen, particularly hazel, and rise of sedges and grasses; plantain curve rises sharply.

**1895 ± 70****UB-374. Glens Bridge, 117 to 123 cm****A.D. 55**

Fine particulate fraction of blanket peat from 117 to 123 cm depth. Sample at maximum of plantain curve and rise of grass and *Sphagnum* curves just above decline of hazel, the major tree species present.

**2440 ± 100****UB-375. Glens Bridge, 171 to 175 cm****490 B.C.**

Fine particulate fraction of blanket peat from 171 to 175 cm depth. Sample at rise of heath pollen from ca. 15% to ca. 60% of total pollen, and fall of tree pollen.

**3610 ± 75****UB-376 F. Glens Bridge, 199 to 203 cm****1660 B.C.**

Fine particulate fraction of basal blanket peat from 199 to 203 cm depth. Drop in tree pollen from ca. 90% to ca. 40% and end of alder peak; immediately above end of pine and elm curves.

UB-376 C. (humic acid) 3345 ± 70

*General Comment* (A.G. and A.G.S.): UB-376 F dates transition from locally dense scrub to open conditions, and initiation of blanket peat (see general comment on upland peat samples). At level of UB-374 pollen evidence suggests clearance of hazel scrub for pasture, and, subsequently, regeneration of scrub. Date shows clearance to have taken place in Iron age. Promontory forts in N Antrim thought to belong to this period. Renewed scrub clearance for pasture is indicated by pollen evidence at level of UB-373. Date implies that clearance may have been in response to Viking settlement as envisaged by Mitchell (1956, p. 247).

**Loughaveema series, Co. Antrim**

Peat and soil samples from blanket bog in Ballyvenagh Td., 5.5 mi NNW of Cushendall, Co. Antrim (55° 9' N Lat, 6° 7' W Long; Irish Grid Ref. D 205363; alt 740 ft O.D.). Coll. 1969 by A. Goddard. One sample of this series previously dated, UB-264 (172-175 cm, 2780 ± 95, R., 1970, v. 12, p. 296, emended this list).

**2430 ± 70****UB-335. Loughaveema, 146 to 148 cm****480 B.C.**

Blanket peat from 146 to 148 cm depth. Sample at end of willow

peak, fall of grasses, rise of heaths, sedges and *Sphagnum*. Acid pre-treatment.

**UB-365. Loughaveema, 160 to 166 cm** **2360 ± 45**  
**410 B.C.**

Humic acid fraction of woody peat from 160 to 166 cm depth. Sample at beginning of willow peak.

**UB-334. Loughaveema, 189 to 193 cm** **3075 ± 70**  
**1125 B.C.**

Humic acid from mineral soil above iron pan at 189 to 193 cm depth. Sample falls during slow decline of tree pollen (mainly hazel) from ca. 35% to ca. 20% and rise of heath pollen. Grass and plantain pollen abundant.

*General Comment* (A.G. and A.G.S.): pollen evidence at level of UB-334 indicates site was pasture land. Date suggests this existed in Bronze age and is compatible with proximity to Bronze age cairn (UB-264, R., 1970, v. 12, p. 296, emended this list) though actual age may be slightly older since material dated was humic acid (see general comment on upland peat series). UB-365 and UB-335 bracket peak of willow pollen and, even though different peat fractions were dated, fact that dates are indistinguishable suggests that willow phase was short.

**UB-347. Beaghs Forest, 42 to 44 cm** **2520 ± 70**  
**570 B.C.**

Humic acid from base of blanket peat at 42 to 44 cm depth in blanket bog in Beaghs Td., 5 mi SW of Cushendall, Co Antrim (55° 4' N Lat, 6° 11' W Long; Irish Grid Ref. D 158248; alt 1050 ft O.D.). *Comment:* abundance of grasses and plantains suggests site was pasture land. Date shows this was in existence in Bronze age.

#### **Loughermore blanket bog series, Co. Londonderry**

Samples of peat and soil from blanket bog in Loughermore Td., 9 mi ESE of Londonderry (54° 55' N Lat, 7° 7' W Long; Irish Grid Ref. C 585128). Site is close to Barrow from which Pubble series samples derive (this list). Coll. 1968 by C. Warhurst and sub-sampled 1969 by A. Goddard.

**UB-350. Loughermore, 18 to 22 cm** **1940 ± 70**  
**A.D. 10**

Fine particulate fraction of blanket peat from 18 to 22 cm above base of peat. Sample at rise of heath pollen and fall of tree pollen.

**UB-337 F. Loughermore, 0 to 5 cm** **2900 ± 70**  
**950 B.C.**

Fine particulate fraction of blanket peat from 0 to 5 cm above base of peat. Sample immediately above fall of oak curve from ca. 30% to ca. 5%, fall of hazel and rise of heath curves. *Comment:* pollen evidence implies oak-hazel scrub present on site until level immediately below sample. Result suggests this scrub disappeared in later part of Bronze age.

UB-337 C. (humic acid) 2640  $\pm$  70**3705  $\pm$  65****UB-346. Beaghs sand quarry, 155 to 158 cm 1755 B.C.**

Fine particulate fraction of basal, charcoal-containing, layer of blanket peat at sand quarry in Beaghs Td., 5 mi W of Cushendall, Co. Antrim (55° 5' N Lat, 6° 11' W Long; Irish Grid Ref. D 157274; alt 910 ft O.D.). Coll. 1969 by A. Goddard. Sample at fall of tree pollen (mostly hazel and birch) from ca. 90% to ca. 30% and rise of heaths, sedges and plantains. *Comment:* pollen evidence indicates hazel scrub disappeared from site at level of sample: date suggests this was in early part of Bronze age. See also Beaghs sand pit series in Pt. IV of this list.

**Gruig Top series, Co. Antrim**

Peat and soil samples from blanket peat in Timpan Td., 4 mi. NW of Cushendall, Co. Antrim (55° 6' N Lat, 6° 8' W Long; Irish Grid Ref. D 306198; alt 900 ft O.D.). Coll. 1968 by A. Goddard.

**UB-406. Gruig Top, 69 to 75 cm 3055  $\pm$  95**  
**1105 B.C.**

Fine particulate fraction of blanket peat from 69 to 75 cm depth. Sample from beginning of rise of sedge pollen.

**UB-364 F. Gruig Top, 79 to 84 cm 3335  $\pm$  70**  
**1385 B.C.**

Fine particulate fraction of basal, charcoal-containing, layer of blanket peat from 79 to 84 cm depth. Sample at end of decline of tree pollen (see UB-339, below) and rise of heath pollen.

UB-364 C. (humic acid) 3260  $\pm$  70**3375  $\pm$  75**

**UB-339. Gruig Top, 85 to 88 cm 1425 B.C.**

Humic acid fraction of mineral material from 85 to 88 cm depth, just below blanket peat. Sample at beginning of fall of tree pollen, mainly hazel, from ca. 85% to ca. 45% at level of UB-364 (above), peak of birch pollen.

*General Comment:* results for UB-364 and UB-339 show little or no discontinuity between mineral and organic deposits. Pollen evidence indicates transition from scrub to heath between levels of UB-364 and UB-339. Dates show transition took place in middle of Bronze age.

**Crocknamoyle series, Co. Antrim**

Peat samples from Drumfresky Td., 4 mi NW of Cushendall, Co. Antrim (55° 7' N Lat, 6° 9' W Long; Irish Grid Ref. D 313188; alt 750 ft O.D.). Coll. 1968 by A. Goddard.

**UB-404. Crocknamoyle, 84 to 89 cm 2715  $\pm$  85**  
**765 B.C.**

Fine particulate fraction of blanket peat from 84 to 89 cm depth. Sample at level of peaks of grass, sedge, and plantain pollen curves, at end of temporary decline of tree pollen by ca. 25%.

**UB-405. Crocknamoyle, 105 to 112 cm****2815  $\pm$  90****865 B.C.**

Fine particulate fraction of blanket peat from 105 to 112 cm depth. Sample from level of minimum of tree pollen (mainly hazel).

*General Comment* (A.G. and A.G.S.): site is close to present-day hazel scrub. Samples are from levels where recession of scrub is suggested by pollen evidence. Dates indicate rapid peat accumulation rate close to base of bog and that hazel scrub is of long standing, originating at least as early as Bronze age.

*General Comment on Upland Peat Samples:* samples selected for dating basal peat are from purely organic layers, generally containing fine charcoal fragments, immediately above mineral soil. In most cases total tree pollen percentage falls markedly at level of sample. Dates of basal peats appear to fall into 2 groups. First group (UB-346, UB-376, UB-364, and UB-380) fall in a few centuries either side of 1700 B.C. UB-265, 1730  $\pm$  95 B.C. (R., 1970, v. 12, p. 296, emended this list), for basal *Phragmites* peat in same area, seems also to belong to this group. Second group (UB-332, UB-347, and UB-337), together with UB-264 (R., 1970, v. 12, p. 296, emended this list) fall in a few centuries either side of 750 B.C.

In 4 cases both humic acid (C) and fine particulate (F) fractions of blanket peat samples were dated. Taking the means, the humic acid dates are some 100 to 300 yr younger than the fine particulate fraction dates. The determinations are:

|           |               |
|-----------|---------------|
| UB-332 F. | 2725 $\pm$ 85 |
| UB-332 C. | 2415 $\pm$ 70 |
| UB-337 F. | 2900 $\pm$ 70 |
| UB-337 C. | 2640 $\pm$ 70 |
| UB-364 F. | 3335 $\pm$ 70 |
| UB-364 C. | 3260 $\pm$ 70 |
| UB-367 F. | 1485 $\pm$ 65 |
| UB-367 C. | 1255 $\pm$ 65 |

*General Comment on Palaeoecologic Samples relevant to dating of Irish Pollen Zone Boundaries:* certain determinations are relevant to dating of pollen zone boundaries. Pollen Zone Boundary V-VI, previously dated in Ireland only by Q-367 (Roddans Port, Co. Down), 7140  $\pm$  150 B.C. (R., 1964, v. 6, p. 119), is dated by UB-280 (Slieve Gallion, Co. Tyrone), 6810  $\pm$  90 B.C. and UB-258 (Ballynagilly, Co. Tyrone), 6145  $\pm$  80 B.C.

The Boreal-Atlantic transition (Pollen Zone VI-VII boundary) is dated by UB-120 (Ballyscullion, Co. Antrim), 5000  $\pm$  85 B.C., UB-221 A (Sluggan, Co. Antrim), 4810  $\pm$  90 B.C., and UB-277 (Slieve Gallion, Co. Tyrone), 4785  $\pm$  85 B.C. These may be compared with UB-96 (Beaghmore, Co. Tyrone), 5050  $\pm$  90 (R., 1970, v. 12, p. 294). Other determinations for this zone boundary in Ireland are:

Woodgrange, Co. Down (LJ-904) 5700  $\pm$  400 B.C. (R., 1965, v. 7, p. 83)

|                                  |   |
|----------------------------------|---|
| Ringneill Quay, Co. Down (Q-632) | 5395 $\pm$ 150 B.C.                         |
|                                  | 5550 $\pm$ 150 B.C. (R., 1962, v. 4, p. 58) |
| Redbog, Co. Louth (D-2)          | 4450 $\pm$ 200 B.C. (R., 1961, v. 3, p. 27) |

Pollen Zone Boundary VIIa-VIIb at Ballyscullion, Co. Antrim, is dated by UB-114, 3040  $\pm$  55 B.C. which comes from point where elm decline is under way. Elm decline begins at this site approx. at level of UB-115, 3180  $\pm$  60 B.C. These results may be compared with dates for the elm decline at Co. Tyrone sites, Beaghmore (UB-99), 3335  $\pm$  75 B.C. (R., 1970, v. 12, p. 293, emended this list) and Ballynagilly (UB-253) 3195  $\pm$  70 B.C. (R., 1970, v. 12, p. 295). Other radiocarbon dates for this zone boundary in Ireland are:

|                                    |   |
|------------------------------------|---|
| Fallahogy, Co. Londonderry (Q-555) | 3385 $\pm$ 120 B.C. (R., 1962, v. 4,        |
|                                    | 3170 $\pm$ 120 B.C. p. 67-8)                |
| (Q-653)                            | 3325 $\pm$ 120 B.C.                         |
|                                    | 3250 $\pm$ 120 B.C.                         |
| Redbog, Co. Louth (D-3)            | 3220 $\pm$ 190 B.C. (R., 1961, v. 3, p. 28) |
| Lomcloon, Co. Sligo (D-12)         | 3210 $\pm$ 190 B.C. (R., 1961, v. 3, p. 28) |
| Treanscrabbagh, Co. Sligo (D-13)   | 3020 $\pm$ 190 B.C. (R., 1961, v. 3, p. 29) |

The pine decline used by Jessen (1949) as one criterion for the definition of his Zone Boundary VII-VIII (Sub-Boreal-Sub-Atlantic) has previously been dated to 2390  $\pm$  65 (UB-250, Ballynagilly, Co. Tyrone) and between 1930  $\pm$  65 and 2575  $\pm$  55 B.C. (UB-91, UB-92, Beaghmore, Co. Tyrone). New determinations in this list are:

- (a) From long pollen diagrams through deep peats:—
 

|                                     |                    |
|-------------------------------------|--------------------|
| Ballyscullion, Co. Antrim (UB-111)  | 2250 $\pm$ 85 B.C. |
| Slieve Gallion, Co. Tyrone (UB-274) | 2215 $\pm$ 80 B.C. |
- (b) From base of blanket peats:—
 

|   |                    |
|---|--------------------|
| Lough Lark, Co. Tyrone (UB-380)         | 2005 $\pm$ 75 B.C. |
| (sample immediately below pine decline) |                    |
| Breen bog (2), Co. Antrim (UB-370)      | 1820 $\pm$ 95 B.C. |
| Ballypatrick, Co. Antrim (UB-265)       | 1730 $\pm$ 95 B.C. |
| (sample immediately below pine decline) |                    |
| Glens Bridge, Co. Antrim (UB-376F)      | 1660 $\pm$ 75 B.C. |
| (sample immediately above pine decline) |                    |
| Altnahinch, Co. Antrim (UB-333)         | 795 $\pm$ 70 B.C.  |

With the exception of UB-333 (for which the sample was humic acid from a mineral soil) these dates fall in few centuries either side of 2000 B.C. Range of dates might be taken as confirming Mitchell's opinion (Mitchell, 1956) that zone boundary is not synchronous. Dates from deep peats, however, appear to show some consistency. Jessen suggested zone boundary fell at ca. 500 B.C. These determinations show it to be much older.

## III. TIMBER SAMPLES

Samples from timbers collected from Irish sites for dendrochronologic studies.

**685 ± 80**

**UB-267. Mill Lough No. 203, Co. Fermanagh A.D. 1265**

Morticed oak beam from crannog (lake dwelling) in Mill Lough, Loughgare Td., Co. Fermanagh (54° 13' 30" N Lat, 7° 17' W Long; Irish Grid Ref. H 467313). Coll. 1968 by M. G. L. Baillie. Sample was 10 annual rings taken 25 yr from outside of 97-yr-old tree. Pretreatment by bleaching and charring. Remains of structure summarily excavated by R. Warner (Ulster Mus., Belfast) in 1968. *Comment* (R.W.): structure, which is typical 'Fermanagh Crannog', produced 'crannog-ware' pottery, ascribed by most authors to Medieval period, and leather shoes of this period. Result tends to confirm Medieval date of 'crannog-ware'.

**4395 ± 80**

**UB-293. Ballynagilly bog oak, Co. Tyrone 2445 B.C.**

Bog oak from 175 m W of Neolithic habitation site in Ballynagilly Td., 5 mi NW of Cookstown, Co. Tyrone (54° 42' N Lat, 6° 51' W Long; Irish Grid Ref. H 743837). See Ballynagilly Series I and II, this list, for other samples from this site. Sample was 10 annual rings taken 60 yr from outside of 270-yr-old tree found in shallow blanket peat. Coll. 1969 by M. G. L. Baillie.

**1025 ± 60**

**UB-287. Blackwater bog oak No. 303 A.D. 925**

Sample from bog oak found during river deepening at Verners Bridge, River Blackwater, Co. Tyrone (54° 29' 30" N Lat, 6° 38' W Long; Irish Grid Ref. H 883615). Sample of 10 annual rings 170 yr from outside of 260-yr-old tree. Coll. 1968 by M. G. L. Baillie.

**4490 ± 60**

**UB-286. Derrykerran bog oak No. 128 2540 B.C.**

Sample from bog oak found during motorway construction at Derrykerran Td., Co. Armagh, 1 mi W of point where motorway crosses R. Bann (54° 28' N Lat, 6° 27' W Long; Irish Grid Ref. J 006588). Sample of 10 annual rings taken 80 yr from outside of 220-yr-old tree. Coll. 1968 by M. G. L. Baillie.

## IV. GEOCHEMICAL SAMPLES

Samples in this section form part of a continued program for investigation of reliability of various peat types and fractions for dating. Fraction pretreatment and nomenclature follows that in R., 1970, v. 12, p. 296, Sec. III. In addition, a fine particulate fraction was prepared from material in Fraction D < 250  $\mu$ ; this is called Fraction F.

**Beaghs sandpit series, Co. Antrim**

Samples from W side of sand quarry at Beaghs Td., 2 mi W of Cushendall, Co. Antrim (55° 5' N Lat, 6° 11' W Long; Irish Grid Ref.

D 156276). Samples taken to date blanket peat and iron pan formation. Coll. 1969 by P. Q. Dresser.

**UB-270 A. Beaghs sandpit, No. 1**

**4140  $\pm$  55**

**2190 B.C.**

Unfractionated basal 2 cm layer of blanket peat from N of Sample

5. Fractions dated:

|           |                        |               |
|-----------|------------------------|---------------|
| UB-270 B. | (water soluble matter) | 3600 $\pm$ 55 |
| UB-270 C. | (humic acid)           | 4110 $\pm$ 55 |
| UB-270 D. | (residue)              | 4255 $\pm$ 60 |
| UB-270 F. | (fine particulate)     | 4355 $\pm$ 60 |

**4905  $\pm$  85**

**UB-291. Beaghs sandpit, No. 5**

**2955 B.C.**

Peripheral portion of prostrate pine trunk in basal layer of peat.

*Comment* (P.Q.D.): sample thought to provide lower limit for date of iron pan formation, due to manner in which pan formed around pine roots.

*General Comment* (P.Q.D.): UB-270 B is significantly younger, and UB-270 F significantly older, than whole peat, Fraction A, using 2  $\sigma$  limits.

**Sluggan series, Co. Antrim**

Series continued from R., 1970, v. 12, p. 296. Peat samples from Sluggan bog, Magheralane Td., 1.5 mi NE of Randalstown, Co. Antrim (54° 46' N Lat, 6° 18' W Long; Irish Grid Ref. J 009921). Samples obtained by excavation at a part of bog 5.2 m deep. Coll. 1968 by P. Q. Dresser.

**UB-210 A. Sluggan, No. 1, 42 to 47 cm**

**985  $\pm$  45**

**A.D. 965**

Fresh, light-brown *Sphagnum imbricatum* peat, with some *Eriophorum*.

**UB-211 A. Sluggan, No. 2, 47 to 52 cm**

**1225  $\pm$  65**

**A.D. 725**

Dark-brown well-humified *Sphagnum imbricatum* peat with *Eriophorum* and *Calluna*.

**UB-221 A. Sluggan, No. 12, 295 to 300 cm**

**6760  $\pm$  90**

**4810 B.C.**

Highly humified moss peat with pine and birch twigs and rootlets.

*Comment*: sample from Pollen Zone Boundary VI-VII (Boreal-Atlantic).

**UB-223 A. Sluggan, No. 14, 365 to 370 cm**

**8195  $\pm$  65**

**6245 B.C.**

Fine reedswamp peat with seeds of *Menyanthes* and wood. Other dated fractions:

|           |                        |               |
|-----------|------------------------|---------------|
| UB-223 B. | (water soluble matter) | 7975 $\pm$ 70 |
| UB-223 D. | (residue)              | 8360 $\pm$ 60 |

*Comment:* Fraction D is significantly older than whole peat (Fraction A) using 2  $\sigma$  limits.

## CORRECTION TO DATES IN BELFAST II

Owing to a previously undetected change in standard count-rate caused by accidental dilution, a small correction has to be applied to the following dates pub. in R., 1970, v. 12, p. 291-297.

| Sample no.               | Name                               | Corrected date |
|--------------------------|------------------------------------|----------------|
| UB-240                   | Annaghmare Cairn, Chamber 2        | 1600 $\pm$ 50  |
| UB-241                   | Annaghmare Cairn, forecourt        | 4395 $\pm$ 55  |
| UB-266                   | Teeshan, No. 9                     | 1970 $\pm$ 80  |
| UB-94                    | Beaghmore Series I, 308 to 312 cm  | 6050 $\pm$ 60  |
| UB-97                    | Beaghmore Series I, 278 to 280 cm  | 4640 $\pm$ 55  |
| UB-99                    | Beaghmore Series I, 286 to 288 cm  | 5285 $\pm$ 70  |
| UB-11                    | Beaghmore Stone Circles, Cairn 10  | 3485 $\pm$ 55  |
| UB-261 A                 | Beaghmore, basal blanket peat      | 2230 $\pm$ 60  |
| UB-261 B, 1765 $\pm$ 50. | UB-261 C, 1920 $\pm$ 60. UB-261 D, | 2275 $\pm$ 65  |
| UB-248                   | Ballynagilly core, 204 to 207 cm   | 3955 $\pm$ 55  |
| UB-255                   | Ballynagilly core, 270 to 273 cm   | 5920 $\pm$ 60  |
| UB-264                   | Loughaveema, 170 to 173 cm         | 2780 $\pm$ 95  |
| UB-265                   | Ballypatrick Forest, 203 to 206 cm | 3680 $\pm$ 95  |

These changes do not affect the conclusions derived from the dates.

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