

## VIII Bijlagen

### Radiocarbon dates for flint mines

Richard Burleigh

The following list of radiocarbon dates for prehistoric flint mines in southern England and in Europe (TABLE 1) has been compiled mainly from dates published in the journal *Radiocarbon* but also includes a number of dates published by Sieveking *et al.* in the *Proceedings of the Prehistoric Society*, Volume 39 (1973) and some others (Appendix to the Table) which have not yet appeared in *Radiocarbon*. A brief explanation of how the dates were recovered from *Radiocarbon* is necessary in order to indicate possible shortcomings the list as a whole may have.

As there are now some 39,000 published radiocarbon dates a direct search through *Radiocarbon* for particular classes of dates would generally be impractical and manual needle-sorting of the 'Radiocarbon Dates' edge-punched cards<sup>1</sup> would be almost as difficult a task.

Fortunately, the information on these cards, which has been abstracted from *Radiocarbon*, Volumes 1-16 (1959-1974)<sup>2</sup>, is also now available in the form of a magnetic tape and can be retrieved by computer methods. In the present case an HP 2100A computer installed at the BM Research Laboratory was available for this purpose, the search program used being a standard part of the system software. However, to simplify the task still further the total list of some 125 radiocarbon laboratories either at one time or currently producing dates was first inspected and 59 of these laboratories were considered on criteria such as their geographic location or field of interest to be outside the scope of the search. Using the magnetic tape, the date lists of the remaining 66 laboratories were searched for archaeological dates for the European region between 3000-8000 bp<sup>3</sup>, the time limits chosen being deliberately wide, and a total of 2159 dates were retrieved from 52 of these laboratories. These dates (initially listed by the computer simply as laboratory numbers and volume and page references) had then to be visually checked against the original descriptive entries in the volumes of *Radiocarbon* and finally a total of 33 dates from seven laboratories proved to relate to flint mines. These are listed in detail in TABLE 1. Lastly, a direct search through the latest issue of *Radiocarbon* (Volume 17, 1975), which is not yet on magnetic tape, revealed no further flint mine dates.

Although not considered to be a very strong possibility various factors could strictly have combined to make this list of radiocarbon dates for flint mines incomplete. For example, not all radiocarbon dating laboratories publish their results in *Radiocarbon*. Again, the successful retrieval of a date depends on its having been correctly transferred in the first place from *Radiocarbon* via IBM punched cards to the magnetic tape. There is also the rather remote possibility that some laboratories not searched may have dated flint mines. Despite these reservations the list is considered most likely to contain all the published flint mine dates up to the end of *Radiocarbon*, Volume 17 (1975) and the approach used here is felt to be justified. However, it would still be misleading not to emphasize the interim character of the list. A large number of additional dates will be published shortly for Grime's Graves, Norfolk, England, following the fresh excavation work there between 1972-1975 and more dates should soon be avail-

able for continental sites. Because of a continuing interest in the subject of flint mine dating the author would be very grateful for any omissions or new dates brought to his attention.

Finally, it should be noted that the dates in TABLE 1 have been given in radiocarbon years based on the Libby half-life for carbon-14 of 5570 years, exactly as published in *Radiocarbon*. Following archaeological convention the dates are also expressed for convenience in years bc<sup>3</sup>. No attempt has been made to correct the dates individually for the now well-established secular carbon-14 variations although from the data of Damon *et al.* (1972) or Ralph *et al.* (1973)<sup>4</sup> it will be seen that in absolute terms dates falling in the 2nd and 3rd millennia bc may be too recent by up to a maximum of some 600 calendar years or more.

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#### REFERENCES

- DAMON, P. E., LONG, A. and WALLICK, E. I., 1972, *Dendrochronologic calibration of the carbon-14 time scale* in T. A. Rafter and T. Grant-Taylor (Eds.), *Proceedings of the 8th International Conference on Radiocarbon Dating*, Volume 1: Wellington, Royal Society of New Zealand, pp. A29-43.  
RALPH, E. K., MICHAEL, H. N. and HAN, M. C., 1973, *Radiocarbon dates and reality: MASCA Newsletter* 9 (1), 1-20 (Philadelphia, University Museum).  
SIEVEKING, G. de G., LONGWORTH, I. H., HUGHES, M. J., CLARK, A. J. and MILLET, A., 1973, *A new survey of Grime's Graves, Norfolk: Proceedings of the Prehistoric Society* 39, 182-218.

<sup>1</sup> Supplied by Radiocarbon Dates, P.O. Box 22, Braintree, Massachusetts 02184, U.S.A.

<sup>2</sup> Before *Radiocarbon* was established some laboratories published lists in *Science* and these references are also included on the tape though none yielded flint mine dates.

<sup>3</sup> The recently advocated bp/bc notation (see, for example, *Antiquity* 46, p. 265) has been used in this paper to indicate radiocarbon years.

<sup>4</sup> These relationships for conversion of radiocarbon dates into dates in calendar years also take into account the more accurate value of 5730  $\pm$  40 years for the half-life of carbon-14.

#### Notes to the table

In an attempt to impose some order on the data and for ease of reference the dates have been arranged in approximately comparable groups, arbitrarily listed geographically from west to east. Within these divisions the dates are listed alphabetically by laboratory coding and then in numerical order. No archaeological, chronological or other formal classification is implied by this arrangement, nor has any interpretation been placed on the dates or their validity; the table is simply a compilation of results. All the more common methods of measuring radiocarbon dates (by gas- and liquid scintillation counting) are represented in the list. There is no evidence that any systematic age errors arise from the use of the different methods of measurement. Antler dates are based on chemically separated protein (collagen).

## Abbreviations

(a) Laboratories: A-, Arizona; B-, Bern; Bln-, Berlin; BM-, British Museum; GIN-, Geological Institute, Academy of Sciences, USSR; GrN-, Groningen; Hv-, Hannover; LE-, Institute of Archaeology, Leningrad; Lv-, Louvain; MC-, Monaco; Ny-, Nancy (see the comprehensive lists of laboratories in *Radiocarbon* for fuller details).

(b) Counting methods: A, acetylene; C, carbon dioxide; M, methane (all gas counting); L, benzene (liquid scintillation counting).

(c) References: PPS, *Proceedings of the Prehistoric Society*; R, *Radiocarbon*.

Richard Burleigh, 29th October, 1975

TABLE 1. RADIOCARBON DATES FOR FLINT MINES

(a.). Grime's Graves, Thetford, Norfolk, England (52°26' N, 0° 39' E)

Lab. No.	Sample material	Provenance	Method	bp	bc	Ref.
BM-87.	Charcoal	Shaft fill (Pit 15)	A	4270 ± 150	c. 2320	R. 3, p. 41
BM-88.	Antler	Shaft fill (Pit 15)	A	4050 ± 150	c. 2100	R. 3, p. 41
BM-93.	Antler	Shaft fill (Pit 10)	A	3870 ± 150	c. 1920	R. 5, p.106
BM-97.	Antler	Shaft fill (Pit 12)	A	4290 ± 150	c. 2340	R. 5, p.106
BM-99.	Antler	Shaft fill (Pit 14)	A	3980 ± 150	c. 2030	R. 5, p.106
BM-103.	Antler	Shaft fill (Pit 11)	A	3700 ± 150	c. 1750	R. 5, p.106
BM-109.	Antler	Shaft fill (Pit 8)	A	3290 ± 150	c. 1340	R. 5, p.106
BM-276.	Antler	Shaft fill (Pit 12)	C	3550 ± 150	c. 1600	R.11, p.286
BM-291.	Antler	Gallery (Greenwell Pit)	L	3810 ± 130	c. 1860	R.11, p.286
BM-377.	Antler	Shaft fill (Pit 12)	L	4250 ± 130	c. 2300	R.11, p.286
BM-775.	Charcoal	Gallery	L	3815 ± 60	c. 1865	PPS.39, p.201
BM-776.	Charcoal	Shaft fill (base)	L	3789 ± 60	c. 1839	PPS.39, p.201
BM-777.	Charcoal	Gallery	L	3764 ± 60	c. 1814	PPS.39, p.201
BM-778.	Charcoal	Shaft fill (upper part)	L	3781 ± 60	c. 1831	PPS.39, p.201

(b). Worthing area, Sussex, England - Church Hill (BM-181; 50° 52' N, 0° 25' W), Harrow Hill (BM-182; 50° 53' N, 0° 28' W), Cissbury (BM-183 - BM-185; 50° 52' N, 0° 23' W), Blackpatch (BM-290; 50° 52' N, 0° 27' W)

BM-181.	Antler	Gallery	C	5340 ± 150	c. 3390	R.11, p.285
BM-182.	Antler	Gallery	C	4930 ± 150	c. 2980	R.11, p.285
BM-183.	Antler	Gallery	C	4720 ± 150	c. 2770	R.11, p.286
BM-184.	Antler	Gallery	C	4650 ± 150	c. 2700	R.11, p.286
BM-185.	Antler	Gallery	C	4730 ± 150	c. 2780	R.11, p.286
BM-290.	Antler	Gallery	L	5090 ± 130	c. 3140	R.11, p.286

(c). Easton Down, Salisbury, Wiltshire, England (51° 05' N, 1° 48' W)

BM-190.	Antler	Gallery	C	4480 ± 150	c. 2530	R.11, p.286
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(d). Spiennes (BM-289, GrN-4674) and Mesvin (Sans Pareil; BM-417, Lv-65, Lv-216), Mons, Hainaut, Belgium (50° 26' N, 3° 58' E)

BM-289.	Antler	Surface atelier	L	4230 ± 130	c. 2280	R.13, p.158
GrN-4674.	Charcoal	Hearth	C	5420 ± 75	c. 3470	R. 9, p.132
BM-417.	Antler	Shaft 1 (base)	L	5131 ± 123	c. 3181	R.13, p.158
Lv-65.	Charcoal	Shaft 1 (fill)	M	5220 ± 170	c. 3270	R. 6, p.165
Lv-216.	Charcoal	Shaft 1 (gallery)	M	5340 ± 150	c. 3390	R. 8, p.253

(e). Rijckholt, Limburg, Netherlands (50° 48' N, 5° 44' E)

GrN-4544.	Charcoal	Gallery between Shafts 3 and 4	C	5070 ± 60	c. 3120	R. 9, p.124
GrN-5549.	Charcoal	Shaft 23 (basal fill)	C	5000 ± 40	c. 3050	R.14, p. 83

(f). Kvarnby, Malmo, Scania, Sweden (55° 36' N, 12° 58' E)

BM-410.	Antler	—	L	4850 ± 115	c. 2900	R.13, p.184
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(g). Tusimice (approx 90 km N.W. Praha, 70 km N Plzen), Ohre valley, Severocesky region, Czechoslovakia (50° 23' N, 13° 21' E)

Bln-239.	Charcoal	Pit floor	A	4768 ± 100	c. 2818	R. 8, p. 38
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(h). Sumeg (20 km N. L. Balaton), Veszprem region, W. Hungary (47° N, 17° 20' E)

A-246.	Charcoal	Pit fill	C	4520 ± 160	c. 2570	R. 4, p.247
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(i) Krasnoye Selo, Volkovysk Raion, Grodno Oblast, Belorussian SSR (53° 08' N, 24° 25' E)

Lab. No.	Sample material	Provenance	Method	bp	bc	Note
GIN-148.	Charcoal	Shaft 13	L	4310 ± 45	c. 2360	R.10, p.437
GIN-164.	Charcoal	Shaft 3, 11, 18	L	5050 ± 25	c. 3100	R.10, p.437
LE-636.	Charcoal	Shaft 2, 3, 12	L	3190 ± 60	c. 1240	R.12, p.132
LE-637.	Charcoal	Shaft 15, 21, 56	L	5300 ± 300	c. 3350	R.12, p.132
LE-680.	Charcoal	Shaft 12	L	3370 ± 50	c. 1420	R.12, p.132
LE-799.	Charcoal	Shaft 125	L	3590 ± 150	c. 1640	R.14, p.336

(j.) St. Mihiel, Meuse, France (48°54' N, 5° 33' E)

Ny-285.	Charcoal	Hearth	L	4170 ± 70	c. 2220	R.16, p. 122
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TABLE 1. RADIOCARBON DATES FOR FLINT MINES - APPENDIX: UNPUBLISHED DATES (See Note 1)

(a). Grime's Graves, Thetford, Norfolk, England (52°26' N, 0° 39' E)

Lab. No.	Sample material	Provenance	Method	bp	bc	Note
BM-943.	Antler	Pit floor (cf. BM-776)*	L	4104 ± 55	c. 2154	2
BM-944.	Antler	Gallery (cf. BM-777)*	L	4153 ± 64	c. 2203	2
BM-945.	Antler	Gallery (cf. BM-775)*	L	4034 ± 88	c. 2084	* 2

\*BM-775 - BM-777 are listed in the main part of TABLE 1, above.

(b). St. Mihiel, Meuse, France (48° 54' N, 5° 33' E)

MC-573.	Charcoal	Hearth	C	4060 ± 50	c. 2110	3
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(c). Rijckholt, Limburg, Netherlands (50° 48' N, 5° 44' E)

GrN-5962.	Charcoal	Shaft 9 (basal fill)	C	5090 ± 40	c. 3140	4
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(d). Sangen (GrN-6782) and Geböske (GrN-6783), Valkenburg, Limburg, Netherlands (50° 51' N, 5° 50' E)

GrN-6782.	Antler	Quarry	C	4340 ± 60	c. 2390	5
GrN-6783.	Antler	Surface site,	C	4190 ± 45	c. 2240	5

(e). Löwenburg (25 km S.W. Basel), Pleigne, Canton of Bern, Switzerland (47° 26' N, 7° 19' E)

B-2050.	Charcoal	In waste (depth 1.75 m)	C	5020 ± 100	c. 3070	6
B-2057.	Charcoal	In waste	C	4940 ± 240	c. 2990	6
B-2601.	Charcoal	Excavation wall	C	5210 ± 100	c. 3260	6

(f). Tata-Kálvariadomb (30 km N.W. Budapest), Komárom region, Hungary (47° 17' N, 18° 22' E)

Hv-1770.	—	—	A	3810 ± 65	c. 1860	7
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(g). Saspow, Olkusz district, Cracow, Poland (50° 14' N, 19° 46' E)

BM-1128.	Charcoal	Shaft 6 (upper fill)	L	5046 ± 102	c. 3096	—
GrN-7052C.	Charcoal	Shaft 4	C	5325 ± 90	c. 3375	8

Notes

1. The dates listed in this appendix have not yet appeared in *Radiocarbon*, the primary source for compilation of the main part of the table.
2. British Museum natural radiocarbon measurements VIII, *Radiocarbon* 18 (1), in press.
3. Information supplied by Mme. C. Guillaume, Direction des Antiquités Préhistoriques de Lorraine
4. Information supplied by Ing. F. Engelen, Netherl. Geolog. Ass., Sittard, Netherlands.
5. Information supplied by Dr W. G. Mook, Natuurkundig Laboratorium der Rijks Universiteit, Groningen, Netherlands.
6. Information supplied by Dr E. Schmid, Laboratorium für Urgeschicht, Universität Basel, Basel, Switzerland.
7. Information supplied by Miss E. Bácskay, Központi Földtani Hivatal, Budapest, Hungary.
8. Information supplied by Mr J. Lech, Instytut Historii Kultury Materialnej, Warszawa, Poland.