Burton Dassett Southend

Part 2 Sections 8.22 and 8.23

Scientific Dating

8.22 **RADIOCARBON DATING OF SPELT WHEAT**

by Rupert Housley

8.23 **ARCHAEOMAGNETIC DATING OF HEARTHS**

by Paul Linford

The results of the excavations conducted at Burton Dassett Southend 1986-88, together with subsequent fieldwork (fieldwalking, and recording of the Chapel and Priest's House) are disseminated in two parts.

Part 1 is the printed volume *Burton Dassett Southend, Warwickshire: A Medieval Market Village* by Nicholas Palmer and Jonathan Parkhouse, Society-for Medieval Archaeology Monograph 44 (2022). The printed volume contains the following sections:

1. Introduction and background (aims and origin of the project, key issues, archaeological and historical contexts, fieldwork scope and methodology, summaries of earthwork survey and fieldwalking)
2. The archaeological sequence (summary of the structural evidence, ordered by phase)
3 Spatial organisation and the buildings at Southend
4 Daily life and economy at Southend
5 Conclusion
Bibliography

Part 2 consists of a series of digital files in .pdf and .xlsx format, available via the Archaeological Data Service at https://doi.org/10.5284/1083492. Whilst Part 1 is a free-standing narrative, Part 2 includes the detailed descriptions and specialist analyses underpinning the printed volume. It consists of the following sections:

6.1 Geology by John Crossling
6.2 Soils by Magdalen Snape
6.3 Earthwork survey by Nicholas Palmer
6.4 Excavation methods by Nicholas Palmer
6.5 Dovehouse Close fieldwalking 1987 & Chapel Ground fieldwalking 1991 by Nicholas Palmer
7. Fieldwork (detailed description of the structural evidence at individual context level, ordered by area/tenement and phase) by Nicholas Palmer
8.1 Medieval pottery by Stephanie Rátkai
8.2 Coins and jettons by Wilfred Seaby
8.3 Copper alloy objects by Alison R Goodall with contribution by Dr John Blair
8.4 Analyses of copper alloy objects by Dr Roger Brownsword and E E H Pitt
8.5 Pewter objects by Brian Spencer and Nicholas Palmer, with analyses of pewter spoons by Dr Roger Brownsword and E E H Pitt
8.6 Lead objects by Nicholas Palmer
8.7 Ironwork by Dr Ian H Goodall, with spurs by Blanche Ellis
8.8 Bone, jet, glass and miscellaneous by Iain Soden and Nicholas Palmer
8.9 Domestic stonework by Iain Soden, John Crossling and Nicholas Palmer
8.10 Architectural stonework by Iain Soden
8.11 Stone roofing material by Nicholas Palmer
8.12 Roof tiles and ceramic artefacts by Susan Lisk
8.13 Archaeometallurgical investigation of the smithy and other evidence by Dr J G McDonnell and Alison Mills
8.14 Coal by Dr A H V Smith
8.15 Human remains by Ann Stirland
8.16 Clay tobacco pipe by Nicholas Palmer
8.17 Flint by Dr L H Barfield
8.18 Late Bronze Age pottery by Alistair Barclay
8.19 Roman and Saxon pottery by Paul Booth
8.20 Faunal remains by Julie Hamilton
8.21 Plant economy by Lisa Moffett
8.22 Radiocarbon dating of spelt wheat by Rupert Housley
8.23 Archaeomagnetic dating of hearths by Paul Linford
9. Miscellaneous data tables

The bibliography, incorporating all the works cited in Part 1 and Part 2, is also available digitally.

8.22 RADIOCARBON DATING OF SPELT WHEAT *by Rupert Housley*

To establish whether the spelt wheat remains found across the site were genuinely medieval or residual Roman material, a sample was submitted to the Oxford University Radiocarbon Accelerator Unit for dating. It was hoped that the small sample size required for accelerator dating would allow a date to be obtained from glume bases, the most distinctive part of the plant.

The first sample submitted consisted of spelt glume bases from soil sample 679/1/2. This proved too small and was supplemented by more glume bases from a further eleven samples (91/1/1, 176/1/1, 263/1/1, 292/1/1, 301/1/1, 478/1/1, 489/1/1, 547/1/1, 599/1/1, 1327/5/1 and 1848/3/1). This produced the following result:

Lab no	*Sample ref*	*Measured delta C13*	*Radiocarbon Age (BP)*
OxA 2226	BD86 AA/1/1	-22.4‰	1530 ± 70

Using the calibration programme of C I O Groningen the following age ranges are obtained:

AD 445-595 (68% confidence level)
AD 395-650 (95% confidence level)

[Or Oxcal v4.2

68% confidence	429 (30.1%) 495, 508 (5.1%) 520, 527 (32.9%) 597
95% confidence	399-646]

This result shows the material to be residual from the late Roman/early Saxon period.

NB Bayliss *et al* (2013, 46-7) describe only the initial sample and ref (BD86 B 679/1/2) not its subsequent augmentation and new ref (BD86 AA/1/1).

8.23 ARCHAEOMAGNETIC DATING OF HEARTHS *by Paul Linford*

Directional magnetic dating relies on the variation in the direction of the geomagnetic vector with time (Aitken 1990). Substances that contain ferrimagnetic minerals become magnetised in the direction of the geomagnetic vector after being heated above a certain temperature, known as the blocking temperature. Hence structures made of such substances that were heated in antiquity can be dated by comparison of the direction of magnetisation they record with known historic directions of the geomagnetic vector. It should be noted that it is the date that the feature was last heated above its blocking temperature that is obtained and that the feature must have remained undisturbed since that time.

At Burton Dassett samples were collected for archaeomagnetic dating from six features (Linford 1990), all apparently hearths, using the disc method (Clark *et al* 1988) (Figure 5.16); orientation to true north was achieved using a gyro-theodolite. The samples were taken from the ironstone blocks that formed the surface of the features, several discs being fixed to each block. In addition, two samples were taken from a surface of stacked clay tiles forming part of Hearth 703. These samples were then sub-sampled at the laboratory. Laboratory measurements were made using a Molspin fluxgate spinner magnetometer (Molyneux 1971) and the directional measurements were calibrated using the British Master Curve (Clark *et al* 1988).

Two of the hearths, 818 (ph E3) and 819 (ph E6), appeared to have no stable thermoremanent direction, possibly because the material sampled had not been heated above its blocking temperature, and they could therefore not be dated. The mean thermoremanent directions and associated date ranges from the initial calibration for the other four features were:

Context	*Phase*	*N*	*Declination*	*Inclination*	*Alpha-95*	*Date range (cal AD)*
691	D26	9	9.147˚	62.167˚	1.769˚	1482 - 1517
703	D26	7	8.728˚	62.086˚	1.836˚	1480 - 1515
705	D25	10	3.794˚	57.534˚	1.425˚	1400 - 1446
707	D24	8	1.131˚	56.927˚	2.037˚	1387 - 1418

All the date ranges are quoted at the 68% confidence level. N indicates the number of samples from which the mean field direction was calculated and the alpha-95 statistic is a measure of the precision of the determination; it is analogous to the standard error of scalar quantities, hence the smaller the value the more precise the mean direction.

The thermoremanent directions measured in samples from Hearths 691 and 703 exhibited systematic deviations owing to the phenomenon of magnetic refraction (Aitken and Hawley 1971). Samples taken from the north and south edges of the stone blocks had steeper inclinations consistent with the refraction expected for vertical surfaces. Those samples from the core of the blocks had shallower inclinations as predicted for refraction at horizontal surfaces. Since the ironstone blocks sampled were about 150-200mm thick the edge samples mentioned were indeed near to vertical surfaces perpendicular to the horizontal

component of the earth's magnetic field. As the angular deviation caused by magnetic refraction is theoretically proportional to the overall strength of magnetisation, it is likely that this effect was noticeable owing to the high degree of magnetisation present in these two features.

In April 2017 the data was recalibrated at the request of the editor (JP) using the more up-to-date calibration curve (Arch_UK1). This gave revised date ranges as follows:

Context	*Phase*	*N*	*Declination*	*Inclination*	*Alpha-95*	*Date range at 95% confidence using ARCH_UK1 (cal AD)*
691	D26	9	9.147°	62.167°	1.769	1449-1539
703	D26	7	8.728°	62.086°	1.836°	1440-1539
705	D25	10	3.794°	57.534°	2.629°	1294-1327
707	D24	8	1.131°	56.927°	2.037°	No date post AD1000

It should be noted that in keeping with current best practice, these dates have been quoted at the 95% confidence level, so the date ranges would be expected to be wider.

(Editor's note) It will be noted that whilst the mid-points of the recalibrated date ranges for contexts 691 and 703 remain in the last decade of the fifteenth century, the archaeomagnetic date for context 705 is now significantly earlier than that previously calculated (and at variance with the general stratigraphic sequence for the site, which places the context in the mid-15th century). Context 707 cannot now be dated archaeomagnetically.

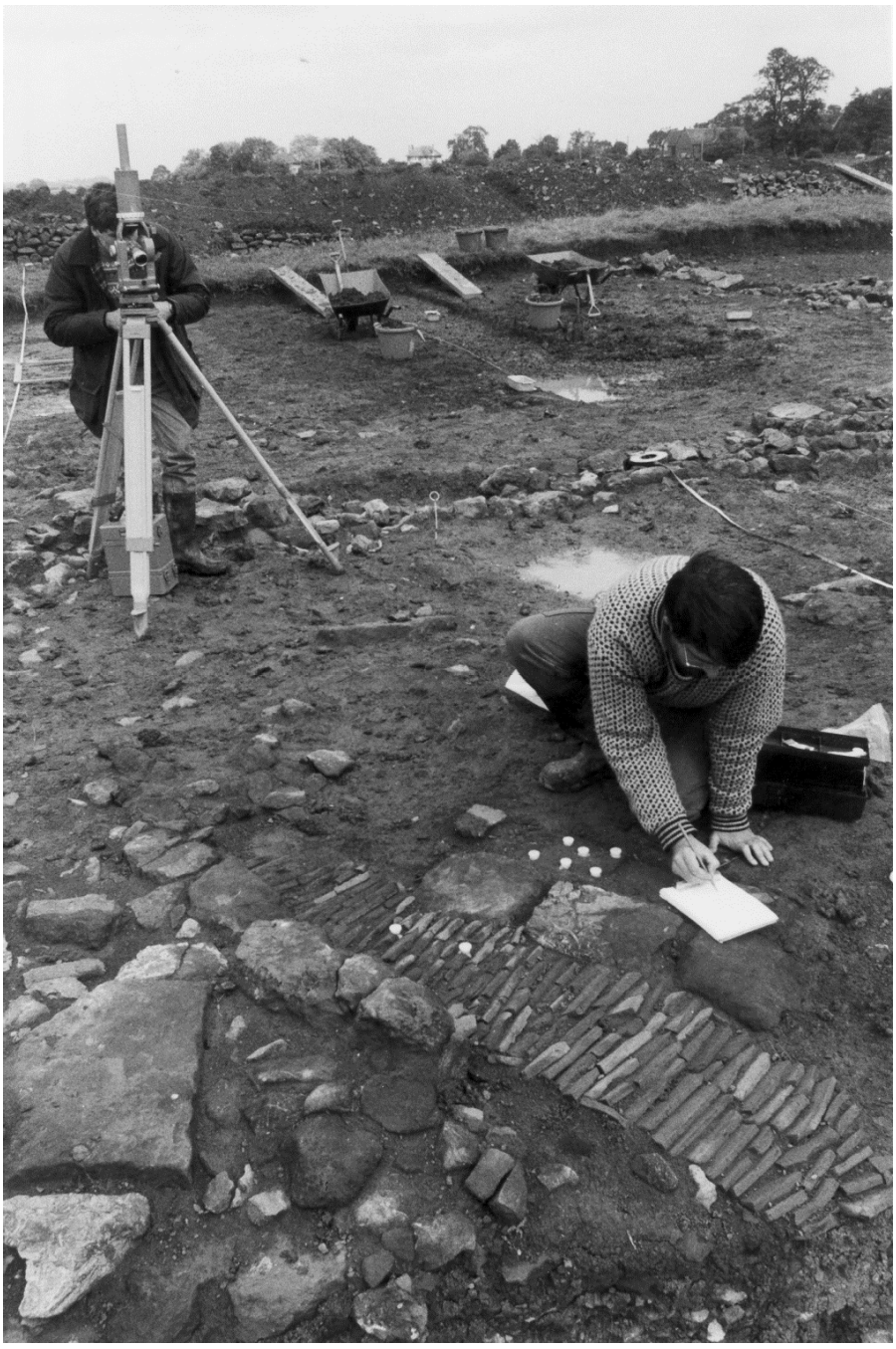

Figure 8.23.1
Magnetic dating of hearth 703 (Area D)