Radiocarbon dating archaeobotanical remains from Lydford

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Excavations by Peter Addyman between 1963 and 1965, on the site of a small Norman fort in Lydford (Devon), revealed, according to a summary published in *Medieval Archaeology*, the remains of five 'burnt-out timber granaries, probably mid-12th century' (Wilson and Hurst 1967, p.263). The evidence for the proposed mid-twelfth-century date was not detailed in this summary report, and the excavations have not yet been published at the time of writing. However, draft documents in the site archive, held at the English Heritage Temple Cloud store (Somerset), explain that Norman activity at the site is principally dated by 'pottery of 12th century type and a coin of the first issue of Stephen (1135–42)' (Addyman 1964, 2). The coin is the latest dateable artefact from the site as a whole, suggesting a *terminus ante quem* around the mid-twelfth century, but it does not appear that the coin was directly associated with the granaries, and therefore does not necessarily date their conflagration.

Within the granaries were 'extensive deposits of carbonised grain… [which] had survived due to an earthen bank having been constructed over the destroyed granary sealing part of it from post-destructional disturbance' (Green 1980, 1, citing Peter Addyman pers. comm.). Despite the 1967 summary report mentioning five granaries, the 1980 report by Frank Green on the charred plant remains describes (and illustrates) only four, labelled A, B, C and D. A grid of two-foot (c. 60 cm) squares was mapped onto the excavated area, with archaeobotanical samples identifiable by their grid square coordinates (e.g. J3).

This assemblage, originally analysed by Green, was revisited by the Feeding Anglo-Saxon England project (FeedSax) which aimed to investigate developments in early medieval farming using bioarchaeological evidence, including charred plant remains. FeedSax submitted charred cereal grains from four samples – one from each granary – to the Oxford Radiocarbon Accelerator Unit for radiocarbon dating, to assess how accurate the originally proposed mid-twelfth-century date might actually be. These grains of rye (*Secale cereale* L.) and oat (*Avena* L.) were selected from archive material held by Historic England at Fort Cumberland, and photographed at the University of Oxford by the author; the photographs are included in the project's photographic archive (McKerracher *et al.* in prep.).

The radiocarbon determinations obtained for these samples have been calibrated using IntCal20 (Reimer *et al.* 2020) and OxCal 4.4.2 (Bronk Ramsey 2009) as shown in the table below and figures at the end of this report.

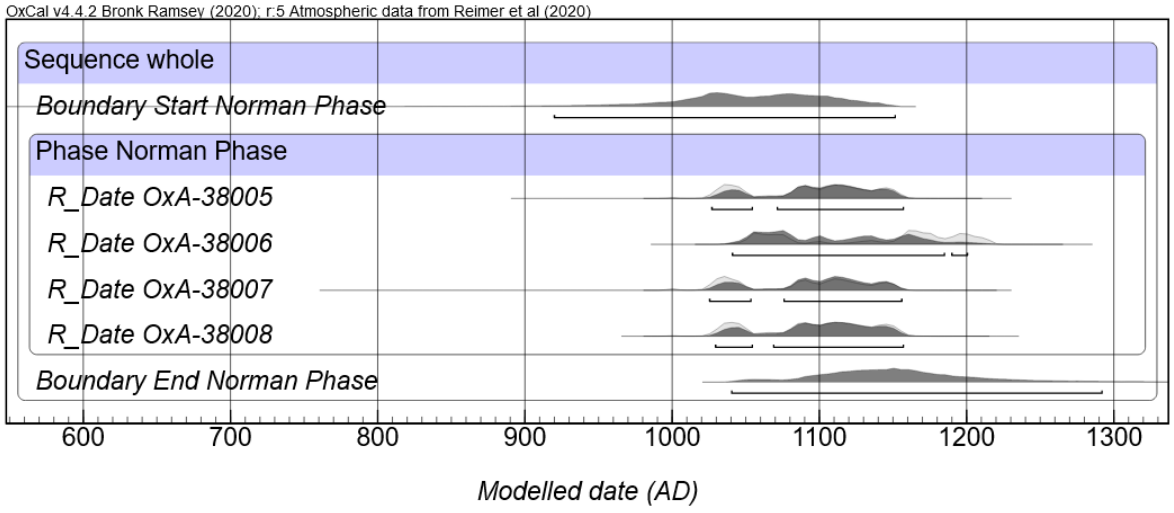
sample (granary)	grains	laboratory no.	age BP	calibrated dates AD (confidence)
J3 (A)	3 x oat	OxA-38005	968±23	1024–1054 @ 25.2% 1075–1157 @ 70.3%
Q10 (B)	3 x rye	OxA-38006	899±23	1045–1085 @ 29.5% 1121–1219 @ 63.4%
R11 (C)	3 x rye	OxA-38007	976±24	1021–1054 @ 30.1% 1075–1157 @ 65.3%
U15 (D)	2 x rye	OxA-38008	963±23	1062–1158 @ 73.7%

Chronometric model

The close similarity of all four results means that greater resolution is unlikely to be obtained by chronometric modelling. Nonetheless, for completeness, the following CQL2 code was run in OxCal 4.4.2 to produce a Bayesian statistical model, based on the plausible assumption that all four samples represent a single phase of burning.

```
Plot() {
 Sequence("whole") {
  Boundary("Start Norman Phase");
  Phase("Norman Phase") {
   R_Date("OxA-38005", 968, 23);
   R_Date("OxA-38006", 899, 23);
   R_Date("OxA-38007", 976, 23);
   R_Date("OxA-38008", 963, 23);
  };
  Boundary("End Norman Phase");
 };
};
```

Name Show all Show structure	Unmodelled (BC/AD)			Modelled (BC/AD)			Indices A_{model}=86.3 $A_{overall}$=87.6					Select All Visible	Page break
	from	to	%	from	to	%	A_{comb}	A	L	P	C		
▼ Sequence whole												☑ 2	☐
Boundary Start Norman Phase				920	1151	95.4					95.2	☑ 3	☐
▼ Phase Norman Phase												☑ 4	☐
R_Date OxA-38005	1024	1157	95.4	1027	1157	95.4		100.5			99.4	☑ 5	☐
R_Date OxA-38006	1045	1219	95.4	1041	1200	95.4		77.4			99.2	☑ 6	☐
R_Date OxA-38007	1021	1158	95.4	1025	1156	95.4		97.1			99.5	☑ 7	☐
R_Date OxA-38008	1026	1158	95.4	1029	1157	95.4		101.7			99.6	☑ 8	☐
Boundary End Norman Phase				1040	1292	95.4					96.4	☑ 9	☐



Conclusion

These results confirm the likelihood that, provided all four granary deposits do indeed represent a single conflagration, the episode of burning took place between the mid-eleventh and mid-twelfth centuries, with a date in the first half of the twelfth century perhaps most likely.

Acknowledgements

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References

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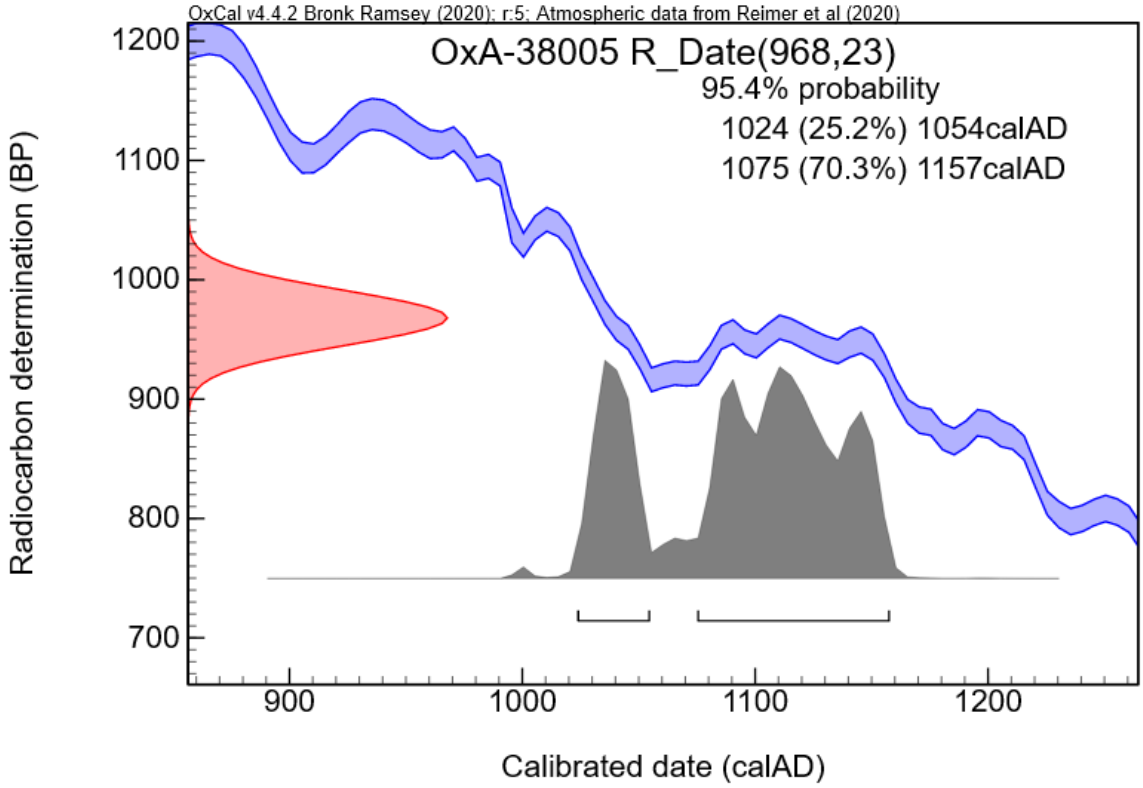
Green, F.J. (1980). *Lydford, Devon: Grain Deposits from the 12th century Granary*. AML Reports (Old Series) 3108.

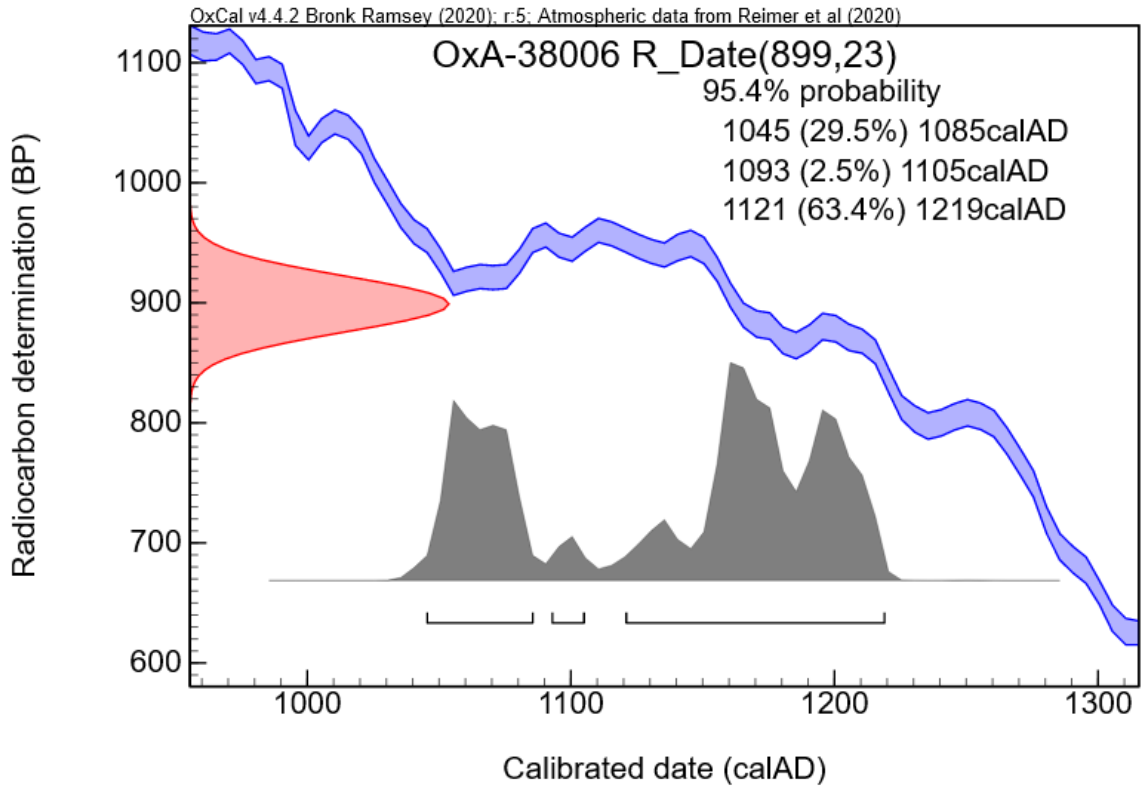
McKerracher, M., Bogaard, A., Bronk Ramsey, C., Charles, M., Forster, E., Hamerow, H., Holmes, M., Hodgson, J., Neil, S., Roushannafas, T., Stroud, E. and Thomas, R. (in prep.). 'Feeding Anglo-Saxon England (FeedSax): the Haystack bioarchaeological database and digital archives', *Internet Archaeology*.

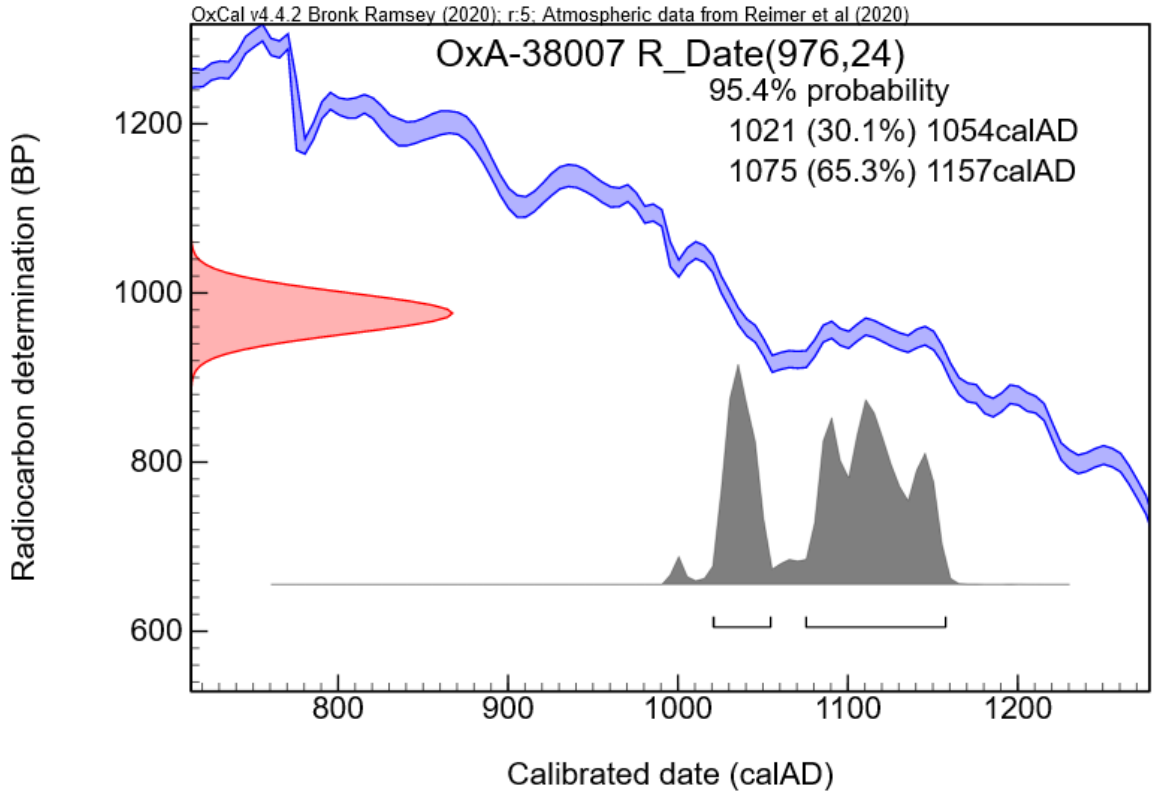
Reimer, P., Austin, W., Bard, E., Bayliss, A., Blackwell, P., Bronk Ramsey, C., . . . Talamo, S. (2020). 'The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP)', *Radiocarbon* 62(4), pp.725–757. doi:10.1017/RDC.2020.41

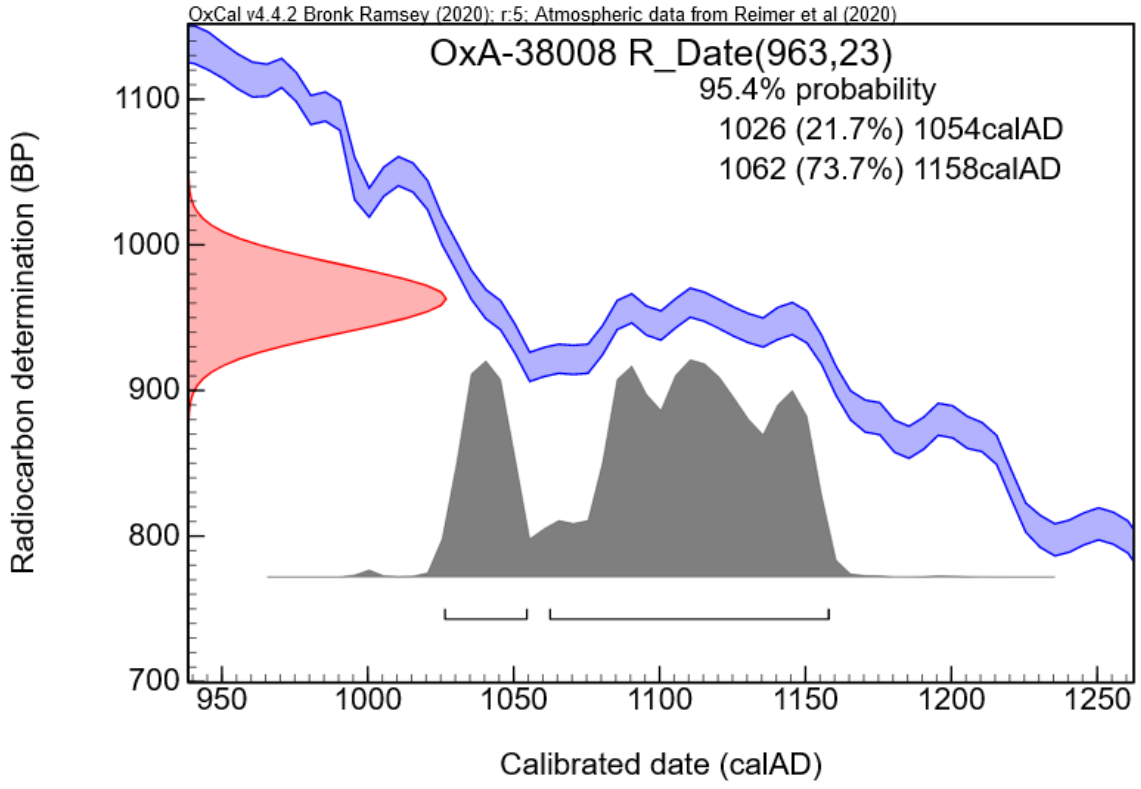
Wilson, D.M. and Hurst, D.G. (1967). 'Medieval Britain in 1966', *Medieval Archaeology* 11, pp.262–319.

Calibration of radiocarbon determinations






OxCal v4.4.2 Bronk Ramsey (2020); r:5; Atmospheric data from Reimer et al (2020)
OxA-38007 R_Date(976,24)
95.4% probability
1021 (30.1%) 1054calAD
1075 (65.3%) 1157calAD
Radiocarbon determination (BP)
1200
1000
800
600
800
900
1000
1100
1200
Calibrated date (calAD)


OxCal v4.4.2 Bronk Ramsey (2020); r:5; Atmospheric data from Reimer et al (2020)
OxA-38008 R_Date(963,23)
95.4% probability
1026 (21.7%) 1054calAD
1062 (73.7%) 1158calAD
Radiocarbon determination (BP)
1100
1000
900
800
700
950
1000
1050
1100
1150
1200
1250
Calibrated date (calAD)