

10-31-2020

Radiocarbon Analysis of Artifacts from Burns (8BR85) (1)

University of Central Florida Brevard County Archaeology

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ISO/IEC 17025:2005-Accredited Testing Laboratory

May 16, 2019

Dr. Sarah Barber
UCF
4000 Central Florida Blvd.
Orlando, FL 32816
United States

RE: Radiocarbon Dating Results

Dear Dr. Barber,

Enclosed are the radiocarbon dating results for two samples recently sent to us. As usual, the method of analysis is listed on the report with the results and calibration data is provided where applicable. The Conventional Radiocarbon Ages have all been corrected for total fractionation effects and where applicable, calibration was performed using 2013 calibration databases (cited on the graph pages).

The web directory containing the table of results and PDF download also contains pictures, a cvs spreadsheet download option and a quality assurance report containing expected vs. measured values for 3-5 working standards analyzed simultaneously with your samples.

Reported results are accredited to ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 standards and all chemistry was performed here in our laboratory and counted in our own accelerators here. Since Beta is not a teaching laboratory, only graduates trained to strict protocols of the ISO/IEC 17025:2005 Testing Accreditation PJLA #59423 program participated in the analyses.

As always Conventional Radiocarbon Ages and sigmas are rounded to the nearest 10 years per the conventions of the 1977 International Radiocarbon Conference. When counting statistics produce sigmas lower than +/- 30 years, a conservative +/- 30 BP is cited for the result. The reported $\delta^{13}C$ values were measured separately in an IRMS (isotope ratio mass spectrometer). They are NOT the AMS $\delta^{13}C$ which would include fractionation effects from natural, chemistry and AMS induced sources.

When interpreting the results, please consider any communications you may have had with us regarding the samples.

The cost of analysis was previously invoiced. As always, if you have any questions or would like to discuss the results, don't hesitate to contact us.

Sincerely,

Ronald E. Hatfield Director



REPORT OF RADIOCARBON DATING ANALYSES

Sarah Barber

Report Date: May 16, 2019

UCF

Material Received: April 29, 2019

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
		Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	

Beta - 524135

5536

80 +/- 30 BP

IRMS $\delta^{13}C$: -21.4 o/oo

IRMS $\delta^{15}N$: +5.1 o/oo

**(70.5%)
(24.9%)**

**1810 - 1926 cal AD
1690 - 1730 cal AD**

**(140 - 24 cal BP)
(260 - 220 cal BP)**

Submitter Material: Bone (Heated)
Pretreatment: (bone collagen) collagen extraction; with alkali
Analyzed Material: Bone collagen
Analysis Service: AMS-Standard delivery
Percent Modern Carbon: 99.01 +/- 0.37 pMC
Fraction Modern Carbon: 0.9901 +/- 0.0037
D14C: -9.91 +/- 3.70 o/oo
 $\Delta^{14}C$: -18.14 +/- 3.70 o/oo(1950:2,019.00)
Measured Radiocarbon Age: (without d13C correction): 20 +/- 30 BP
Calibration: BetaCal3.21: HPD method: INTCAL13
Carbon/Nitrogen: CN : 3.3 %C: 40.69 %N: 14.30

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the ^{14}C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. $d^{13}C$ values are on the material itself (not the AMS $d^{13}C$). $d^{13}C$ and $d^{15}N$ values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.



ISO/IEC 17025:2005-Accredited Testing Laboratory

REPORT OF RADIOCARBON DATING ANALYSES

Sarah Barber

Report Date: May 16, 2019

UCF

Material Received: April 29, 2019

Laboratory Number	Sample Code Number	Conventional Radiocarbon Age (BP) or Percent Modern Carbon (pMC) & Stable Isotopes	
		Calendar Calibrated Results: 95.4 % Probability High Probability Density Range Method (HPD)	

Beta - 524136

5555

910 +/- 30 BP

IRMS δ13C: -26.4 o/oo

**(94.0%)
(1.4%)**

**1033 - 1190 cal AD
1198 - 1204 cal AD**

**(917 - 760 cal BP)
(752 - 746 cal BP)**

Submitter Material: Charcoal
 Pretreatment: (charred material) acid/alkali/acid
 Analyzed Material: Charred material
 Analysis Service: AMS-Standard delivery
 Percent Modern Carbon: 89.29 +/- 0.33 pMC
 Fraction Modern Carbon: 0.8929 +/- 0.0033
 D14C: -107.10 +/- 3.33 o/oo
 Δ14C: -114.52 +/- 3.33 o/oo(1950:2,019.00)
 Measured Radiocarbon Age: (without d13C correction): 930 +/- 30 BP
 Calibration: BetaCal3.21: HPD method: INTCAL13

Results are ISO/IEC-17025:2005 accredited. No sub-contracting or student labor was used in the analyses. All work was done at Beta in 4 in-house NEC accelerator mass spectrometers and 4 Thermo IRMSs. The "Conventional Radiocarbon Age" was calculated using the Libby half-life (5568 years), is corrected for total isotopic fraction and was used for calendar calibration where applicable. The Age is rounded to the nearest 10 years and is reported as radiocarbon years before present (BP), "present" = AD 1950. Results greater than the modern reference are reported as percent modern carbon (pMC). The modern reference standard was 95% the 14C signature of NIST SRM-4990C (oxalic acid). Quoted errors are 1 sigma counting statistics. Calculated sigmas less than 30 BP on the Conventional Radiocarbon Age are conservatively rounded up to 30. d13C values are on the material itself (not the AMS d13C). d13C and d15N values are relative to VPDB-1. References for calendar calibrations are cited at the bottom of calibration graph pages.

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: $\delta^{13}\text{C} = -21.4$ o/oo)

Laboratory number **Beta-524135**

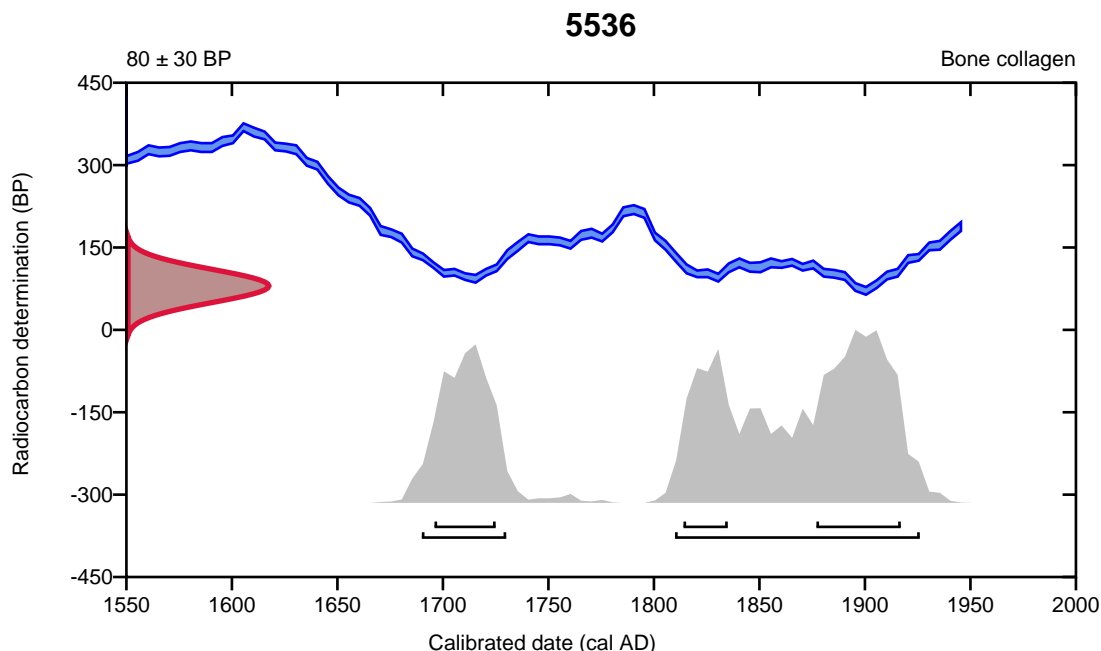
Conventional radiocarbon age **80 ± 30 BP**

95.4% probability

(70.5%)	1810 - 1926 cal AD	(140 - 24 cal BP)
(24.9%)	1690 - 1730 cal AD	(260 - 220 cal BP)

68.2% probability

(32.6%)	1877 - 1917 cal AD	(73 - 33 cal BP)
(20.9%)	1696 - 1725 cal AD	(254 - 225 cal BP)
(14.7%)	1814 - 1835 cal AD	(136 - 115 cal BP)



Database used
INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, *Radiocarbon*55(4).

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL13)

(Variables: $\delta^{13}\text{C} = -26.4$ o/oo)

Laboratory number **Beta-524136**

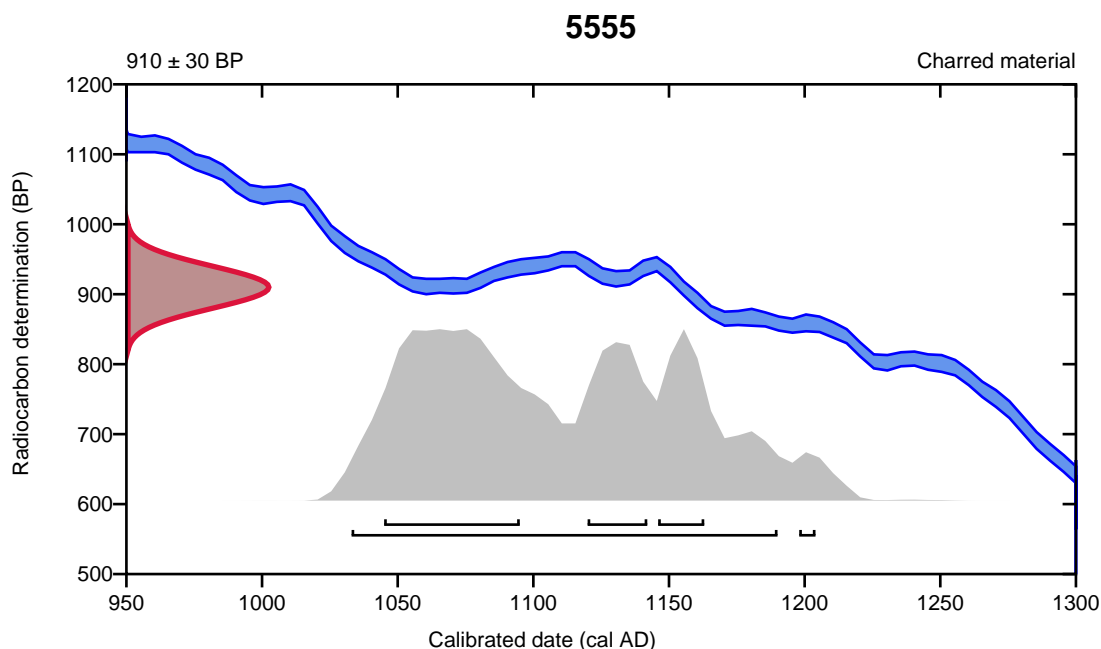
Conventional radiocarbon age **910 ± 30 BP**

95.4% probability

(94%)	1033 - 1190 cal AD	(917 - 760 cal BP)
(1.4%)	1198 - 1204 cal AD	(752 - 746 cal BP)

68.2% probability

(39.7%)	1045 - 1095 cal AD	(905 - 855 cal BP)
(16.1%)	1120 - 1142 cal AD	(830 - 808 cal BP)
(12.4%)	1146 - 1163 cal AD	(804 - 787 cal BP)



Database used
INTCAL13

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51(1), 337-360.

References to Database INTCAL13

Reimer, et.al., 2013, *Radiocarbon*55(4).



Quality Assurance Report

This report provides the results of reference materials used to validate radiocarbon analyses prior to reporting. Known-value reference materials were analyzed quasi-simultaneously with the unknowns. Results are reported as expected values vs measured values. Reported values are calculated relative to NIST SRM-4990B and corrected for isotopic fractionation. Results are reported using the direct analytical measure percent modern carbon (pMC) with one relative standard deviation. Agreement between expected and measured values is taken as being within 2 sigma agreement (error x 2) to account for total laboratory error.

Report Date: May 16, 2019
Submitter: Dr. Sarah Barber

QA MEASUREMENTS

Reference 1

Expected Value: 0.42 +/- 0.04
Measured Value: 0.43 +/- 0.03 pMC
Agreement: Accepted

Reference 2

Expected Value: 129.41 +/- 0.06 pMC
Measured Value: 129.42 +/- 0.37 pMC
Agreement: Accepted

Reference 3

Expected Value: 41.14 +/- 0.10 pMC
Measured Value: 40.95 +/- 0.15 pMC
Agreement: Accepted

COMMENT: All measurements passed acceptance tests.

Validation:


Digital signature on file

Date: May 16, 2019