The University of Georgia

Center for Applied Isotope Studies

RADIOCARBON ANALYSIS REPORT

November 29, 2011

Hugo Miller
1215 Bryson Rd.
Columbus, OH 43224-2009

Dear Mr. Miller

Enclosed please find the results of carbon content analyses for the sample received by our laboratory on October 27, 2011.

UGAMS #	Sample ID	Material	C, %	N, %	^{14}C age, years BP	δ^{13}C, ‰
9891a	P-B-9	bioapatite	3.40	0.20	38250±160	-9.1
9891c	P-B-9	organics			22390±70	-21.7
9892	H-H-Int	bulk	2.95	0.06	n/a	n/a
9893a	H-H-Ext	bioapatite	2.95	0.00	37660±160	-4.9
9894c	B-Bis-1	collagen	5.73	1.41	160±25	-12.4

C and N content were analyzed on the bulk samples before any pretreatment.

The bone was cleaned and washed, using ultrasonic bath. After cleaning, the dried bone was gently crushed to small fragments. The crushed bone was treated with diluted 1N acetic acid to remove surface absorbed and secondary carbonates. Carbon dioxide from the secondary carbonates was collected and purified for analysis. The chemically cleaned sample was then reacted under vacuum with 1N HCl to dissolve the bone mineral and release carbon dioxide from bioapatite.
The charred bone sample was treated with 5% HCl at the temperature 80°C for 1 hour, then it was washed and with deionized water on the fiberglass filter and treated with diluted NaOH to remove possible contamination by humic acids. After that the sample was treated with diluted HCL again, washed with deionized water and dried at 60°C.
The cleaned sample was combusted at 900ºC in evacuated/sealed quartz ampoule in the present CuO.
The resulting carbon dioxide was cryogenically purified from the other reaction products and catalytically converted to graphite using the method of Vogel *et al*. (1984) Nuclear Instruments and Methods in Physics Research B5, 289-293. Graphite $^{14}C/^{13}C$ ratios were measured using the CAIS 0.5 MeV accelerator mass spectrometer. The sample ratios were compared to the ratio measured from the Oxalic Acid I (NBS SRM 4990). The sample $^{13}C/^{12}C$ ratios were measured separately using a stable isotope ratio mass spectrometer and expressed as $\delta^{13}C$ with respect to PDB, with an error of less than 0.1‰.

The quoted uncalibrated dates have been given in radiocarbon years before 1950 (years BP), using the ^{14}C half-life of 5568 years. The error is quoted as one standard deviation and reflects both statistical and experimental errors. The date has been corrected for isotope fractionation.

Sincerely,

Dr.Alexander Cherkinsky

Center for Applied Isotope Studies
University of Georgia

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acherkin@uga.edu

INVOICE

November 29, 2011

Results To:

Hugo Miller
1215 Bryson Rd.
Columbus, OH 43224-2009

Invoice To:

Invoice Nos.: 11529

Description of Work:

4 carbon and nitrogen content analyses	@ $20.00
3 radiocarbon (AMS) analysis of bone	@ $575.00
1 radiocarbon (AMS) analysis of charred bone	@ $525.00

Total Samples: 4
UGAMS 09891 through 9894.

Please Pay This Total Amount ……..US$2330.00
Make Check Payable To …….University of Georgia/CAIS

Remit Payment to …… Center for Applied Isotope Studies
C.A.I.S. Building
120 Riverbend Rd.
Athens, GA 30602-4702

Invoice Submitted by……Alexander Cherkinsky

Center for Applied Isotope Studies