Taft Research Support Cover Sheet

All Applications

- Project description (500-1000 words) & budget.
- Itemized Budget & Justification
- External funding history for the past 5 years
- A 2-page, recently updated curriculum vitae for researcher and other collaborators, if applicable

External Funding-Related

- Potential Grantors or Request for Proposals
- External grant proposal, if applicable
- Award letters, if applicable

Review Taft website for full application guidelines.

Date of Application: 1/14/13

Name, Department, and Rank: Dr. Kenneth Barnett Tankersley, Anthropology *Ken Tankersley*

Amount Requested: $3,300.00
$1,500: 3 accelerator mass spectrometry radiocarbon dating samples ($500/sample); $1,800: 30 geochemical analyses ($60/sample), which includes triplicate stable isotope analyses of soil organic matter and vertebrate bone and enamel collagen.

Title of Research Project: In Search of the First People of Trinidad and their Environment

Time Period: Trinidad and Tobago, March 11-24, 2013.

Probable Results of Award (such as external funding, publications, and presentations):

Other Funding Applied for or Received for this Research Project

Source	Amount	Status
Cost Sharing UC Department of Geology	$13,000.00	Approved

Is this a joint application? No.

If "Yes", complete the following section for all participating faculty:

Name	Department	Rank	Award Percentage

If applying for a Cost-Share grant, please indicate whether or not Cost-Share is required by grant giving organization and/or the budget items are necessary for the project but not covered by grant.

Amount Requested **$3,300**

$1,500: 3 accelerator mass spectrometry radiocarbon dating samples ($500/sample)

$1,800: 30 geochemical analyses ($60/sample), which includes stable isotope analyses of soil organic matter and vertebrate bone and enamel collagen

Cost sharing from Department of Geology, University of Cincinnati

$9,000: 15 optically stimulated luminescence dating samples ($600/sample)

$2,000: 50 X-ray diffraction analysis ($40/sample)

$2,000: 50 X-ray fluorescence spectrometry ($40/sample)

Taft Grants Received in the Last Five Years

1. Type and Dates: International Travel Grant 2012 Amount: $2,500.00 Project Title: Paper Presenter and Delegate, 34th International Congress of Geology, Brisbane. Resulting Publications and Presentations: 2012. Vernon Scarborough, Nicholas Dunning, David Lentz, Kenneth Tankersley, Liwy Grazioso, Christopher Carr, Eric Weaver, Brian Lane, Fred Valdez, Palma Buttles, and John Jones. Water and Sustainable Land Use in an Ancient Tropical City: Tikal, Guatemala. *PNAS* doi:10.1073/pnas.1202881109.

2. Type and Dates: Summer Research Fellowship 2009 Amount: $8,000.00. Project Title: Archaeological Significance of Late Holocene Reservoir Sediments in Shawnee Lookout Park, Hamilton County, Ohio. Resulting Publications and Presentations: 2010. Tankersley, K. B., and Marianne Balantyne, X- ray Power Diffraction Analysis of Late Holocene Reservoir Sediments. *Journal of Archaeological Science* 37:133-138. 2010. Tankersley, K. B., and Jeremy Koster . Sources of Stable Isotope Variation in Archaeological Dog Remains**.** *North American Archaeologist* 29:343-37. 2010. Tankersley, K. B. and A. L. Haines, Was Newtown a Fort Ancient Progenitor**?** *North American Archaeologist* 31:201-220.

3. Type and Dates: International Travel Grant 2008 Amount: 2,500.00 Project Title: Paper Presenter, Society for American Archaeology Annual Meeting, Vancouver. Resulting Publications and Presentations: 2011. Weeks, R. and K. B. Tankersley, Of Talking Leaves and Rocks that Teach: The Archaeology of Sequoya's Oldest Written Record. *Antiquity*

Introduction: Trinidad provides a unique opportunity to examine the migration of the first humans into the Caribbean and the history and dynamics of human mediated landscape and paleoenvironmental change at the margins of Amazonia. Trinidad is particularly significant because it contains Banwari Trace, the oldest archaeological site in the West Indies (Boomert 2000; Wilson 2007). Excavations in 1969 and 1970 produced human remains dated to ~6,000 years before present (BP) and large quantities of faunal remains, most of which have never been analyzed in detail (Harris 1973; Boomert and Harris 1988). A sediment core from a wetland in the Oropuche drainage several kilometers from the site shows dramatic impacts on vegetation resulting from initial human settlement (Casile, et al. 2008; Dunning and Farrell 2010; Jones 2010; Jones et al. 2010). However, an extensive survey of the Banwari Trace area seeking other early human remains and to reconstruct associated past environments has not yet been undertaken (Boomert and Harris 1988). An early occupation of the area is expected given the site's proximity to Taima Taima, a 13,000 year old site in nearby Venezuela. We therefore propose a multi-proxy interdisciplinary investigation of Banwari Trace and the surrounding Oropuche and Coora River drainage basins to provide crucial new insights into the dynamic interaction between human colonization, environmental change, landscape evolution, and species extinction.

Significance: This study will be the first of its kind undertaken in the region and will provide a broad array of multi-proxy paleoenvironmental data for Trinidad. Environmental change, including sea-level rise and climate oscillations, affected human settlement on Trinidad and elsewhere in the West Indies (e.g., Beets, et al. 2006; Ramcharan 2004; Ramcharan and MacAndrews 2006). Likewise, humans clearly had significant impacts on island environments. Nevertheless, these processes and their interaction have not yet been articulated for Trinidad. I plan to address this deficit in knowledge. Trinidad has also experienced a tremendous amount of anthropogenic environmental change in Colonial and post-Colonial times (Watts 1987), and pre-Colonial landscapes are typically masked by these more recent impacts. My work will help disentangle these prehistoric and historic landscapes.

My research will help illuminate the nature of early human occupation and paleoenvironmental change in Trinidad. A comprehensive analysis of the archaeology, paleontology (macro and micro), sedimentology, geomorphology and pedology of Banwari Trace and the surrounding Oropuche and Coora River drainage basins will provide us with critical data for reconstructing past regional environments. In particular, we propose to document a detailed geochronological record using Accelerator Mass Spectrometry (AMS) radiocarbon, Optically Stimulated Luminescence (OSL), and Terrestrial Cosmogenic Nuclide (TCN) dating of landscape development, vegetation, and faunal community composition since the last Ice Age. I will document this record by conducting geochemical analyses on bones and teeth, sediments, and shells from cores excavated from the Banwari Trace site itself and from across terraces and floodplains in the vicinity of the site.

Hypotheses: Data collected in the field and laboratory will be used to test the following hypotheses:
1) Human migration into Trinidad was earlier than previously documented. We anticipate finding evidence for human presence at Banwari Trace and nearby sites that significantly pre-date the current date at Banwari (~6,000 BP).
2) Humans directly triggered environment change soon after their arrival in Trinidad. We anticipate documenting simultaneous shifts in regional vegetation, faunal composition, and sedimentology that reflect anthropogenic impacts earlier than ~6,000 years ago.

Methods: I will identify strata which (i) contain evidence of human occupation and/or landscape modification, (ii) contain faunal and plant remains, and (iii) record times of paleoclimatic and paleoenvironmental transitions. My fieldwork will include the extraction of at least 20 solid-sediment cores and three excavation units to document and date strata containing artifacts, floral, and faunal remains, and multi-proxy analyses of the sediments and faunal and floral remains recovered. All sediments excavated and extracted will be screened through a 1⁄4-inch screen and subjected to flotation

analysis to recover fossil micro-mammal and plant remains for potential radiocarbon dating and stable isotope analysis.

Stratigraphic units, paleosols, and geomorphic surfaces exposed in excavations will be correlated with those identified in the solid sediment cores using soil color, particle size, magnetic susceptibility, X-ray diffractometry (XRD), and X-ray fluoresence (XRF) spectrometry. Coring and excavation sites will be selected on beach ridge, floodplain, and terrace landforms to characterize the depositional history of the area and to recover materials suitable for dating. These locations will be mapped with a Trimble GeoHX GPS. Particle size analysis and magnetic susceptibility will be conducted in the Ohio Valley archaeology laboratory, Department of Anthropology, University of Cincinnati. XRD and XRF will be conducted in the X-ray laboratory of the Department of Geology, University of Cincinnati.

I will investigate the paleoclimatology, paleogeography, paleoenvironment, and paleoecology of the Oropuche Lagoon region of southwestern Trinidad using palynology, stable isotope analysis of sediments and mammal remains, XRD, XRF, and descriptive analyses of the sediments. I will assess the geochronology of Trinidad's Quaternary strata and their archaeological, faunal, and floral content using OSL, TCN, and AMS radiocarbon dating. Uncertainties are inherent in all dating methods (see e.g. Owen et al., 2007). Multiple dating techniques will provide a means to cross check dates and evaluate these uncertainties (for more detailed methodology see Owen et al., 2011). OSL and TCN dating will be conducted OSL and TCN laboratories of the Department of Geology, University of Cincinnati. AMS radiocarbon dating will be conducted at Beta Analytic, Miami, Florida.

The clay mineral content of the sediments will be analyzed using XRD and XRF to provide important paleoenvironmental and paleoclimatic proxies (Dunning and Farrell 2010; Tankersley and Balyntine 2010). Mineral and trace element composition of cored sediments obtained by XRD and XRF will be also used to help define units and formations. Combined, these data will be used to create a detailed stratigraphic framework, identify the geographic extent of stratigraphic units, identify paleosols and distinguish geomorphic surfaces.

Stable carbon ($\delta^{13}C$) isotope values will be obtained for soils and stable carbon ($\delta^{13}C$), nitrogen ($\delta^{15}N$), and oxygen ($\delta^{18}O$) isotope values will be obtained from snail shells and bone collagen and tooth enamel carbonate from vertebrates preserved in cores and excavations. Carbon isotope values in animal tissues and soils reflect vegetation with differing photosynthetic pathways, such as C3 shrubs and herbs vs. C4 grasses (e.g. Kohn and Cerling 2002). They can also be used to distinguish feeding in open country versus forest with a dense canopy (Kohn 2010; Cerling et al. 2011; Crowley et al. 2012). Oxygen isotope values can help reconstruct temperature, relative humidity and seasonality (Bocherens et al. 1995; Kohn and Cerling 2002). Nitrogen isotope values reflect trophic level. Animals consuming more meat have higher $\delta^{15}N$ values (e.g., Ambrose 1991; Bocherens et al. 1995). Nitrogen is also affected by abiotic factors such as temperature and relative humidity (Handley et al. 1999; Swap et al. 2004). As a result, animals and plants from dry, hot localities have higher $\delta^{15}N$ values than animals living in cooler, moist localities, regardless of diet (Ambrose 1991; Crowley et al. 2011). Using the temporal framework I will develop using AMS ^{14}C dates, I will apply this suite of stable isotopes to investigate Late Quaternary environmental changes, including major changes in habitat and community composition (e.g., shift from C4 to C3 dominance) as well as more subtle transitions in vegetation cover in southwestern Trinidad. I will prepare the stable isotope samples in the Ohio Valley archaeology laboratory, Department of Anthropology, and they will be run on a elemental analyzer-isotopic ratio mass spectrometer (EA- IRMS) in the Department of Geology, University of Cincinnati.

Significance of the Data Collection to My Research: The intellectual merit of this project to my research lies in its ability to: (1) provide valuable new insight into the dynamic interaction between

climate and environmental change at a local scale; (2) track changes in the abundance of animal and plant species through time; and (3) utilize a broad suite of analyses coupled with focused sedimentological cores and archaeological excavations to assess the relative importance of climatic and environmental change on human migration and colonization. This project will be the first time such a comprehensive approach has been employed at Trinidad, making it a significant scholarly contribution in the humanities.

Results of the Award: This study will generate an unprecedented suite of archaeological, chronological, and geochemical proxies including a suite of OSL and AMS radiocarbon ages, stable isotope data, and XRD and XRF analyses. Combined, these data will provide crucial insights into the paleoenvironment of Trinidad. Results from this research will fill an important gap in our knowledge regarding chronostratigraphy as it relates to human migration and colonization within the context of climatic and environmental variability. The results of this research will be submitted to peer-reviewed professional journals for publication and presented at national and international professional meetings.

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Dunning, N., and Farrell, P., 2010. Physical Geography, Soils, and Holocene Sediments in the West Indies. Paper presented at a NSF Project Seminar at the School for Advanced Research on the Human Experience, Santa Fe, New Mexico

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January 13, 2013

To: Travel Research Support Grants Review Committee, C. P. Taft Research Center
Re: Kenneth Tankersley's application for Research Support funds

Dear Colleagues:

I write in support of Dr. Kenneth Tankersley's application for Research Support funds for his exploratory geoarchaeological project in Trinidad. Dr. Tankersley is a Quaternary research scientist, and this project is a new venture that explores the geological consequences of human colonization of an island landscape and its subsequent environmental impacts. It is my understanding that Dr. Tankersley will use the research results from this Taft-supported project to submit manuscripts to refereed journals and to develop a National Science Foundation proposal for further work. In view of the latter implication of this project, I think it is important to note that Dr. Tankersley's proposal aligns closely with the Taft Center's and the college's emphasis on increasing the rate of externally funding proposals submitted by Taft faculty. For all these reasons, I strongly recommend that Dr. Tankersley's proposal be fully funded.

Sincerely,
Alan P. Sullivan
Professor and Head

KENNETH BARNETT TANKERSLEY

CURRENT POSITION
Assistant Professor

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EDUCATION:
Post-doctorate. (1989-1993) Quaternary Research Program, Illinois State Museum.
Ph.D. (1982-1989) Anthropology. Indiana University
M.A. (1980-1982) Anthropology. University of Cincinnati
B.S. (1973-1978) Education (Geology). University of Cincinnati

RECENT PUBLICATIONS:
2012. Vernon Scarborough, Nicholas Dunning, David Lentz, Kenneth Tankersley, Liwy Grazioso, Christopher Carr, Eric Weaver, Brian Lane, Fred Valdez, Palma Buttles, and John Jones. Water and Sustainable Land Use in an Ancient Tropical City: Tikal, Guatemala. *PNAS* doi:10.1073/pnas.1202881109.
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FILMS:
2012. *How Space Changed History.* History Channel.
2009. *Universe.* History Channel.
2009. *How the Earth Was Made*. History Channel.
2009. *The Archaeology of Shawnee Lookout*, CET Public Broadcasting System Television.
2008. *Catastrophe*. Discovery Channel.
2008. *Ancient Asteroids*. National Geographic Television.
2007. *A Global Warning*. History Channel.
2007. *Behringer-Crawford Museum*. CERHAS, University of Cincinnati.
2007. *Where the River Bends*. KET Public Broadcasting System Television.
2006. *The Big Freeze*. National Geographic Television. 2004. *Stone Age American Explorers*. NOVA.
2004. *Land of Lost Monsters*. Animal Planet.
2003. *Monsters We Met*. Nature (Winner, Royal Television Craft and Design Award, Jackson Hole Wildlife Film Festival, Best Animation Award).
2002. *What Killed the Mega Beasts?* Discovery Channel.
1992. *Mysteries Underground*. National Geographic Society Feature Film.
1991. *Native Rights: Plundered or Preserved*. Public Broadcasting System Television, St. Louis.

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Travel Authorization Form

Name of Traveler/Group:	Dr. Kenneth Barnett Tankersley
Job Title:	Assistant Professor
College/Department:	A&S/Anthropology
Telephone:	513-556-5784
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E-mail:	tankerkh@uc.

Traveler is: ☒ Faculty ☐ Staff ☐ Student

☐ Group (attach a list of all travelers)

☐ Non-employee *(specify)*

Purpose of travel: Research

Travel is: ☐ Domestic ☒ International

Travel Dates: March 11, 2013 to March 24, 2013

to

to

Destination(s): Trinidad & Tobago

For internal use by unit:

Indicate any dates within travel period that are for personal travel:

Submitted by:

Traveler's Signature* or Authorized Signature for Group

* *When using a personally-owned vehicle for travel, this signature certifies the traveler has a valid U.S. or Canadian driver's license and the required insurance coverage.*

Approved by:

ALAN P. SULLIVAN

Type/Print Name

Supervisor* Signature

10/29/12

Date

- *If requesting any pre-payment, send a copy of this completed, dated and approved Travel Authorization Form to Accounts Payable along with the Funds Reservation Form prior to the trip.*
- *Following the trip, attach this completed, dated and approved Travel Authorization Form to the Travel Expense Report.*
- *The traveler should retain a copy of the signed Travel Authorization Form and make it available upon request from Internal Audit.*
- *For non-employee or student travel, the authorization should be approved by the unit head of the organization funding the travel.*