**Proposal for a Neukom Interdisciplinary Working Group titled, "Coupled grassland and mammalian community dynamics over ecological and evolutionary timescales"**

**Co-organizers:**

Justin D. Yeakel, Santa Fe Institute

Nathaniel J. Dominy, Dartmouth College

**Abstract**: The emergence and expansion of grasslands during the late Cenozoic had a profound influence on mammalian evolution and community structure. The extent to which these habitat dynamics influenced mammalian evolution, or contributed to the structure of past and contemporary mammalian communities is unknown. Our Working Group aims to integrate paleontological and contemporary understandings of mammalian and grassland evolution and ecology, incorporating food web and community dynamics, foraging ecology, and the ecology and evolution of social groups - factors that operate on both ecological and evolutionary timescales. Our Working Group was conceived in two stages. Stage 1 at the Santa Fe Institute (SFI) was intended to facilitate introductions and cross-disciplinary interactions, the sharing of unpublished data and identification of data voids, the assignment of collaborative tasks, and the initiation of multiple projects aimed at investigating the central topic. Stage 2 at Dartmouth was conceived as a forum for sharing and integrating the outcomes of our work. Ultimately, our goal is to bundle papers in a journal that specializes on themed issues, such as *Interface Focus* or *Philosophical Transactions of the Royal Society B*.

**Outcome of Working Group Stage 1 at the Santa Fe Institute:** Our interdisciplinary working group convened at SFI from 29 September to 02 October 2015. During Working Group Stage 1 at SFI, we decided to focus on three distinct topics that will likely result in 5-6 research papers over the next 2-3 years. Our research topics span three key areas: 1) the dynamics of grassland/woodland transitions in systems with rich herbivore assemblages, 2) the influence of grasslands on community dynamics throughout the Cenozoic, and 3) the ecological and evolutionary effects of C3 vs. C4-photosynthetic grasses on mammalian communities, with a particular emphasis on the origin and radiation of the genus *Theropithecus*. *All of these project directives involve a heavy computational component, which will include high dimensional food web modeling, Bayesian estimation of species interactions, and both spatially explicit and implicit dynamic modeling of grassland/woodland transitions.*

**Overview of the present request:** Here we request support for a two-day follow-up meeting at Dartmouth in order to report on and discuss the collaborations that were initiated at SFI. The overarching goal of our working group is to investigate the consequences of grassland habitats on mammalian ecology and evolution in both species-specific and community contexts. The central questions that the project directives are designed to address include (but are not limited to):

* *How do savanna-woodland habitats impact the structure of communities?*
* *What is the interplay between spatial heterogeneity and consumer behaviors in grassland-woodland environments?*
* *How did the emergence of grassland ecosystems influence the evolutionary dynamics of different mammalian guilds?*
* *What ecological challenges did grasslands introduce to forest-adapted mammalian species, and how did this influence human evolution?*

To address these questions, we assembled prominent scholars from diverse disciplines (Table 1). For example, researchers who focus on eco-evolutionary dynamics, functional ecology, social dynamics, and paleontology of grassland-adapted mammalian groups including ungulates, baboons, and hominins; researchers who use quantitative tools (such as stable isotopes) to elucidate the origin, expansion, and ecological utilization of grassland plants by animals in both modern and paleontological contexts; researchers who study the interactions between vegetation and mammalian species in modern grassland ecosystems; and, researchers who focus on integrating interactions in larger community contexts to understand the structure and function of fossil and modern ecological networks over evolutionary timescales.

| Name | Department | Institution |
| --- | --- | --- |
| Thure Cerling | Geology & Geophysics | University of Utah |
| Andy Dobson | Ecology & Evolutionary Biology | Princeton University |
| Nathaniel Dominy | Anthropology | Dartmouth College |
| Jennifer Dunne |  | Santa Fe Institute |
| Stephen Frost | Anthropology | University of Oregon |
| John Fryxell | Integrative Biology | University of Guelph |
| Mirta Galesic |  | Santa Fe Institute |
| Jacquelyn Gill | Biology | University of Maine |
| Mathias Pires | Ecology | Universidade de São Paulo |
| Caroline Stromberg | Biology | University of Washington |
| Vivek Venkataraman | Biological Sciences | Dartmouth College |
| Justin Yeakel |  | Santa Fe Institute |

**Proposed meeting dates:** 23-24 May 2016

**Estimated Budget:**

1. Roundtrip travel for outside participants:

North America: $700 per participant x 9 participants = $6300

Brazil: $1300 per participant x 1 participant = $1300

2. Accommodation @ $125 per day x 3 days x 10 outside participants = $3750

3. Per diem @ $65 per day x 3 days x 10 outside participants = $1950

4. Coffee breaks @ $350 per day x 2 days = $700

GRAND TOTAL = $14,000

*Note on co-sponsorship: If the Neukom Institute can underwrite $7000, then I am confident that the Department of Anthropology can underwrite an additional $7000. We have the resources in our Goodman Fund and a recent gift from President Hanlon.*