**SFI WORKSHOP & WORKING GROUP PROPOSAL**

Please complete this form and return to [sfiscience@santafe.edu](mailto:sfiscience@santafe.edu) for consideration by the Chair of Faculty (Working Groups) or by the Science Steering Committee (Workshops).

Working Groups are more informal, typically have <12 participants, and generally meet in the Collins Conference Room and/or at SFI Tesuque. Working Group proposals should be submitted at least 1-2 months prior to meeting dates.

Workshops have more formal agendas, typically have 20-40 participants, and meet in the Noyce Conference room. Workshop ideas should be discussed with the Chair of Faculty (COF) and proposals should be submitted at least 6-8 months in advance of desired meeting dates to allow time for SSC evaluation and potential revision and re-evaluation by the SSC.

You can consult with the Events Manager, Bruce Bertram ([bertram@santafe.edu](mailto:bertram@santafe.edu)) about potential meeting dates and room availability prior to submitting your proposal.

* 1. **Title of Meeting**: **The eco-evolutionary interplay between grasslands and mammalian communities**
  2. **Type of Meeting** (Working Group or Workshop): Working Group

* 1. **Organizer(s) & Affiliations**: Justin D. Yeakel (SFI); Nathaniel Dominy (Dartmouth)
  2. **Dates of Event** (actual meeting days): July? August? September?
  3. **Meeting Room Preference**: Collins or Noyce Conference Room
  4. **Budget:** Attach a completed budget spreadsheet. Contact the COF with questions.
  5. **Summary of Budget & Funding Sources**:

Total budget amount: $18356

Amount requested from SFI science: $15000

Amount/identity of other funding sources: JD Yeakel Discretionary Fund; Dartmouth (for 2nd WG)

Amount to be raised: $3356

* 1. **Description:** Include a short summary paragraph about the meeting for the SFI website. Then, give a more detailed description of the proposed meeting (typically 1-4 pages).

**Short 1-Paragraph Meeting Summary**

The emergence and expansion of grassland habitats in the late Cenozoic has had a profound influence on mammalian evolution and community structure. To what extent these habitat dynamics influenced mammalian evolution, or contribute to the structure of both past and contemporary mammalian communities is unknown. This Working Group aims to integrate both 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 - all of which having elements that operate on both ecological and evolutionary timescales. Over the course of the Working Group, we will identify key questions to be addressed concerning the interplay of grassland habitats and mammalian community and species dynamics, and formulate a series of papers on these topics that will be submitted as a special issue to a journal such as *Journal of the Royal Society Interface Focus*. The Working Group will be followed up by a second meeting hosted and funded by Dartmouth College, permitting further collaboration and finalization of working paper topics.

**1-4 Page Description of Meeting**

*Include a description of the meeting topic, the rationale for holding the meeting at SFI, potential outcomes, and participants. Please indicate which participants have been contacted, and which are initially confirmed. Consult with the Chair of Faculty if you have any questions and to get feedback on Workshop proposals, which should be more detailed than Working Group proposals.*

The eco-evolutionary interplay between grasslands and mammalian communities

**Background** The emergence and expansion of grassland habitats in the late Cenozoic has had a profound influence on mammalian evolution and community structure. Although the evolutionary origins of C3 grasses are placed firmly in the Mesozoic, it was not until the early-mid Miocene that many forested habitats evolved into either heterogeneous grassland-woodland mosaics, or grass-dominated savannas. A second phase in grassland evolution occurred with the emergence and spread of C4 grasses (which differ from C3 grasses in that they concentrate CO2 within their cells), which tend to be dry-adapted with fast turn-over and slow decomposition rates, promoting fire to the exclusion of woody vegetation. These evolutionary events directly followed the height of mammalian diversification, and are thought to have since played an important role in the evolutionary and ecological constraints driving many mammalian communities.

Grassland expansion in a previously forested environment changes the fitness landscape over which the success or failure to survive and reproduce is determined. Open or patchy grassland-woodland environments introduce a relatively homogeneous yet low quality nutritional resource that reduces the uncertainty of acquisition (e.g. as compared to the temporally and spatially heterogeneous masting events in forests), yet places severe demands on consumption and digestion. Moreover, grasslands are open environments, easing the difficulties of travel, yet reducing cover, which introduces substantial predation risks. These combined features of grasslands have often been cited as a primary driver of mammalian body size evolution, stimulating the formation of large social groups, and playing a central role in human evolution. It is also known that the evolution of grassland-adapted mammals has had a reciprocal impact on the establishment and maintenance of grasslands themselves. To what extent these habitat dynamics influenced mammalian evolution, or contribute to the structure of both past and contemporary mammalian communities is unknown.

**Aims** This Working Group aims to investigate the consequences of grassland habitats on mammalian ecology and evolution in both species-specific and community contexts. Among the questions this Working Group aims 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 will bring together researchers who focus on the eco-evolutionary dynamics, functional ecology, and paleontology of grassland-adapted mammalian groups including ungulates (spp.), baboons, and hominins; researchers using 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 interactions between vegetation and mammalian species in modern grassland ecosystems; and researchers focused on integrating such interactions in larger community contexts to understand the structure and functioning of both paleo and modern ecological networks over evolutionary time.

**Why SFI?** The aims of this Working Group integrate both paleontological and contemporary understandings of mammalian and grassland ecology, incorporating diverse concepts such as food web and community dynamics, foraging ecology, and the ecology and evolution of social groups - all of which operating on both ecological and evolutionary timescales. We therefore aim to bring together a diverse group of ecologists, evolutionary biologists, and paleontologists with expertise in these disparate fields, who would not generally interact. Our goal is to produce 5-8 working papers that will address different aspects of the eco-evolutionary interplay between grasslands and mammalian communities for a special issue of - for example - *Journal of the Royal Society Interface Focus*, *Philosophical Transactions of the Royal Society*, or perhaps *Oecologia*, *Frontiers in Ecology and the Environment*, or a similarly-ranked journal. The first meeting of the Working Group will aim to focus on the most relevant and tractable questions, and to initiate smaller-group projects that will embody the set of papers to be tackled. We will follow-up this Working Group with a second meeting at Dartmouth College to continue collaborate projects, and finalize details of publication.

| Name | University | Focus |
| --- | --- | --- |
| Nathaniel Dominy\* | Dartmouth | Dietary ecology / functional morphology / evolution |
| Vivek Venkataraman | Dartmouth | Dietary ecology / evolution |
| Renee Bobe | George Wash. Univ. | Paleoecology |
| Nina Jablonski | Penn. State Univ. | Paleoecology / functional morphology |
| Felisa Smith | Univ. New Mexico | Body size / large scale evolutionary dynamics |
| Thure Cerling | Utah State Univ. | Stable isotopes / paleoclimate / African paleoecology |
| John Fryxell | Univ. Guelph | Consumer resource interactions / Savanna dynamics |
| Marcus de Aguiar | Campinas Univ. | Evolutionary, speciation dynamics |
| Mathias Pires | Univ. Sao Paulo | Paleo food webs |
| Andy Dobson | Princeton | African food webs / Parasite ecology |
| *——————————* | *—————————* | *———————————————————————* |
| *Justin Yeakel\** | *SFI* | *Food webs / interaction dynamics / paleoecology* |
| *Jen Dunne* | *SFI* | *Food webs / Paleoecology* |
| *Mirta Galesic* | *SFI* | *Group evolution / Hunter gatherers* |
| *Marcus Hamilton* | *SFI* | *Archaeology / Body size scaling* |

**People** (\*Organizers)