

Consortium on Law and Values in Health, Environment & the Life Sciences

2015-16 Student Proposal Cover Page

Applicant Information

Applicant name:	Marissa Milstein	Email:	mils0025@umn.edu
Project title:	A mixed-methods study of bushmeat hunting and zoonotic disease risk among indigenous Waiwai in the Konashen Community Owned Conservation Area, Guyana		
Department:	Veterinary Population Medicine	College:	College of Veterinary Medicine
Degree program:	DVM	Faculty advisor name & email:	Dominic Travis (datravis@umn.edu) Tiffany Wolf (wolfx305@umn.edu)
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How did you hear about this funding opportunity?
 Consortium e-mail
 The Brief
 Advisor
 Dept. email/newsletter
 Consortium website
 Other

Funding

Total amount of funding requested: **\$ 6,975**

Executive summary (maximum 200 words)

While bushmeat hunting is a key component of the traditional subsistence strategies of many Amazonian indigenous groups, it is also a potential source of zoonotic disease. Although numerous studies have documented the emergence of zoonoses from hunting in Africa and Asia, relatively little research has focused on infectious diseases from bushmeat within the Neotropics. In addition, few researchers have used ethnographic methods to understand the influence of sociocultural factors on human-animal pathogen exchange. The goal of this study is to combine methods from veterinary medicine and anthropology to understand the importance of bushmeat hunting for the subsistence of indigenous Waiwai in Guyana, and identify and mitigate the risk of zoonotic disease transmission via bushmeat. I will use ethnographic interviews and participant observation to assess the economic and cultural importance of hunting to the Waiwai and document harvesting methods that may place them at risk for disease. I will also collect fecal and tissue samples from necropsied animals for parasitological and histopathological analyses. This research will provide invaluable data on wildlife diseases that will increase our understanding of the factors affecting disease transmission from bushmeat hunting across the tropical world and enhance our capacity to manage disease risk in human populations.

Approvals

Check all appropriate approvals required for your proposal. Approvals must be obtained prior to receipt of funding. If you have applied for approval but have not yet received it, indicate that below.

IRB	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	X Application pending	IRB approval was received for pilot research and is currently being renewed
Other	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> NA	X Application pending	Specify: Permits are required from CDC and USDA for export of tissue samples. These were obtained for pilot research and are currently being renewed

Checklist—for reviewer use

- X The proposal is 1000 words or less excluding budget, biographies, references and citations.
- X The proposal includes a work plan with a specific timeline using months or quarters to identify work to be done and completion dates.
- X The proposal includes a 1-2 paragraph biography of the applicant and all co-investigators.
- X The budget form is complete including the funds sought for this project, other pending applications for this project, and the amount/source of matching or other funds.
- X The applicant's faculty advisor is copied on the application email. Professional students w/o advisors check NA.
- X All necessary approvals are pending or received.

A mixed-methods study of bushmeat hunting and zoonotic disease risk among indigenous Waiwai in the Konashen Community Owned Conservation Area, Guyana

Introduction

I propose to study zoonotic disease risk and bushmeat hunting as part of an interdisciplinary research project on the resource use and health of indigenous Waiwai in the Konashen Community Owned Conservation Area (KCOCA), Guyana. While bushmeat hunting is a key component of the traditional subsistence strategies of many Amazonian indigenous groups, it is also a major source of zoonotic disease (Wolfe et al. 2005, Ohl-Schacherer et al. 2007, Friant et al. 2015). Wildlife populations can act as important disease reservoirs and the close contact between humans and wildlife that occurs during the hunting, butchery, and consumption of bushmeat provides a particularly high risk of pathogen exchange (Wolfe et al. 2007, Harper et al. 2013). However, indigenous reserves, where indigenous groups seek to preserve cultural identity and traditional subsistence strategies while simultaneously conserving biodiversity, now make up over 20% of Amazonia (Peres and Nascimento 2006). As hunting is important for food security and cultural identity in most of these areas, it is critically important that researchers work with indigenous groups to identify and mitigate the risk of zoonotic disease transmission from bushmeat consumption. Unfortunately, although numerous studies have documented that hunting is a major source of disease risk in Africa and Asia, relatively little research has focused on infectious diseases from bushmeat within the Neotropics (Wolfe et al. 2005). In addition, despite the recent emergence of several zoonotic diseases with global importance in Amazonia, including Zika and chikungunya viruses, our understanding of Amazonian wildlife diseases remains limited (Cooper and Nunn 2013). Further, few researchers have used ethnographic methods to understand the influence of cultural factors like identity, food taboos, and gender roles on human-animal pathogen exchange (Friant et al. 2015).

The goal of the proposed study is to use a mixed-methods approach that combines methods from veterinary medicine and anthropology to understand the importance of bushmeat hunting for Waiwai subsistence, and identify and mitigate the risk of zoonotic disease transmission via bushmeat. The primary research questions are: 1) what diseases with zoonotic potential are present in the wildlife of the KCOCA, 2) how important is bushmeat to the food security and cultural identity of the Waiwai, and, 3) how might the harvesting of bushmeat put Waiwai individuals at risk for acquiring zoonotic diseases? In addition, this research will serve as a foundation for the establishment of a community-based surveillance program to monitor potential emerging zoonotic disease.

Field Site and Methodology

The KCOCA is an extremely remote 625,000ha indigenous reserve populated by approximately 250 Waiwai forager-horticulturalists. The Waiwai practice a traditional Amazonian subsistence strategy of swidden cassava horticulture supplemented with hunted meat and fish. My research will be an integral part of an interdisciplinary project on human-wildlife interactions in the KCOCA run by anthropologist Christopher Shaffer at Grand Valley State University. This project seeks to describe the shared ecologies and social lives of the Waiwai and the symbiotic animals of the KCOCA in order to promote long-term, community-based

conservation. In June-July 2015, I conducted a pilot study at the site to field test necropsy procedures, conduct preliminary interviews, and assess the feasibility of the proposed project. The quality of tissue samples obtained during this work was sufficient to show proof of concept for high resolution analysis of disease loads in the wildlife of the KCOCA.

To address my research questions, I will combine ethnography with histopathological and parasitological analysis of necropsied animals. To assess the economic and cultural importance of hunting to the Waiwai and harvesting methods that may place them at risk for disease transmission, I will conduct semi-structured interviews with hunters and other individuals that consume bushmeat on topics like hunting and butchery methods, injuries associated with handling animal carcasses, and perceptions of zoonotic risk. In addition, I will administer in-depth unstructured and life history interviews with key informants to understand the relationship of hunted animals to Waiwai identity and belief systems. I will also employ participant observation during hunts, food preparation, and butchery to better understand zoonotic disease risk factors. I will conduct necropsies on each animal killed by Waiwai hunters during the study period. Necropsies will only be conducted on animals killed during the course of normal Waiwai hunting and no animals will be killed for this research. All necropsies will be conducted using full biosafety protocols, including the wearing of personal protective equipment. During each necropsy, the following samples will be collected: liver, spleen, kidney, heart, lung, brain, lymph nodes, and feces. Samples will be stored in RNAlater. Fecal samples will be analyzed for parasite diversity at the Gillespie Lab (Emory University) and tissue samples will be analyzed at the Terio Lab (University of Illinois) to assess general health; suspicious findings will be submitted for further molecular analyses to identify diseases with zoonotic potential. I will also train Waiwai assistants in field necropsy methods using a protocol developed at Gombe National Park, Tanzania. Waiwai trainees will learn how to conduct a physical examination of hunted animals and identify gross pathologies.

Study Impact

This study will be one of the first in Amazonia to quantitatively and qualitatively examine human-wildlife pathogen exchange. Despite their importance to global health, our knowledge of Neotropical wildlife pathogens is limited (Gillespie et al. 2008, Cooper and Nunn 2013). The data from this study will provide invaluable information on wildlife diseases that will increase our capacity to manage disease risk in human populations and inform us about the cultural context in which the human-animal pathogen interface has taken place for millennia. In addition, the insights obtained from this research will increase our understanding of the factors affecting disease transmission from bushmeat hunting across the tropical world and improve the ability for policy makers to implement successful conservation strategies. Finally, the training and capacity building provided during this research will serve as a foundation for a hunter-based disease surveillance program that will allow the Waiwai to monitor the health of hunted animals and limit the potential for zoonotic disease emergence, and will serve as a model for community-based management of disease risk across Amazonia.

Timeline

Month	Activity
July - August	Field work in the KCOCA, Guyana: Collection of ethnographic data, collection of fecal and tissue samples during necropsies and transport to the U.S., training of Waiwai hunters
September - December	Analysis of ethnographic data, Analysis of fecal samples at Emory University and analysis of tissue samples at the University of Illinois
January - March	Complete 1 st draft of manuscript for submission to Journal of the American Veterinary Medical Association and a manuscript for submission to Ecohealth
April - May	Finalize and submit manuscripts, complete and submit narrative and financial report for Consortium

Biography

Marissa Milstein is a second year DVM candidate at the University of Minnesota, College of Veterinary Medicine. Prior to beginning her veterinary education, Marissa spent five years studying nonhuman primates in both wild and captive settings. She served as a primate field researcher at the Lomas Barbudal Biological Reserve in Guanacaste, Costa Rica from August 2006 – August 2007 where she studied capuchin monkey behavior. She worked from September 2007 – August 2010 as a researcher at the Lester E. Fisher Center for the Study and Conservation of Apes at the Lincoln Park Zoo, Chicago, IL. Of her many projects, she was involved with in-situ research at Gombe National Park, Tanzania focused on chimpanzee health surveillance by using observational methods and data collected by trained field primatologists.

Marissa received a Master's Degree in anthropology from Washington University in St. Louis in 2012. Part of her Master's research involved a three month study of chimpanzee tool use in Republic of Congo. During this research, she took part in a long-term parasitological surveillance program and participated in an Ebola monitoring program conducted by Wildlife Conservation Society veterinarians to train in-country field researchers on how to test for Ebola when encountering ape carcasses. She also worked extensively with local Bayaka indigenous people. These field experiences propelled her to apply to veterinary school and study zoonotic disease transmission between humans and nonhuman primates. Marissa's work as an anthropologist and field primatologist has made her interested in both the biology of zoonotic disease transmission and the cultural context in which disease emerges and propagates between human and wildlife communities. Her research seeks to understand disease as a dynamic entity, modified by both its biology and the animals, people and environment around it, and she hopes to use the proposed study as a foundation for a DVM-PhD.

References

- Cooper N, Nunn CL. 2013. Identifying future zoonotic disease threats: Where are the gaps in our understanding of primate infectious diseases? *Evolution, Medicine, and Public Health* 1:27-36.
- Friant S, Paige SB, Goldberg TL 2015. Drivers of bushmeat hunting and perceptions of zoonoses in Nigerian hunting communities. *PLOS Neglected Tropical Diseases*
DOI:10.1371/journal.pntd.0003792.
- Gillespie T, Nunn C, Leendertz F. 2008. Integrative approaches to the study of primate infectious disease: implications for biodiversity conservation and global health. *Yearbook of Physical Anthropology* 51:53–69.
- Harper KN, Zuckerman MK, Turner BL, Armelagos GJ. 2013. Primates, pathogens, and evolution: a context for understanding emerging disease. In: Brinkworth JF, Pechenkina K, editors. *Primates, pathogens, and evolution*. New York, Springer. p 389-409.
- Ohl-Schacherer J, Shepard GH, Kaplan H, Peres CA, Levi T, Yu DW. 2007. The Sustainability of Subsistence Hunting by Matsigenka Native Communities in Manu National Park, Peru. *Conservation Biology* 21:1174-1185.
- Peres CA, Nascimento HS. 2006. Impact of game hunting by the Kayapó of southeastern Amazonia: implications for wildlife conservation in Amazonian indigenous reserves. *Biodiversity and Conservation* 15:2627-2653.
- Wolfe ND, Daszak P, Kilpatrick AM, Burke DS. 2005. Bushmeat hunting deforestation, and prediction of zoonotic disease emergence. *Emerging Infectious Disease* 11:1822–1827.
- Wolfe ND, Dunavan CP, Diamond J. 2007. Origins of major human infectious diseases. *Nature* 447:279–283.

Budget for Student Proposals

Project Title:

A mixed-methods study of bushmeat hunting and zoonotic disease risk among indigenous Waiwai in the Konashen Community Owned Conservation Area, Guyana

Instructions: Provide justification along with costs.			Requested funding	Matching/other funding	
Category	Description & justification	Amount	Amount	Source	
1	Your stipend	Stipend for one field assistant at the rate of \$20 per day as determined by the Waiwai Village Council ¹	\$0	\$800	Primate Conservation Inc. (application submitted)
2	Speaker honoraria	___ speakers x \$ _____ honorarium			
3	Supplies & Services	Analysis of fecal samples at the Gillespie Lab (Emory University) will cost (\$2500) for 50 fecal samples (includes classical analysis, DNA extraction, and PCR/Gel electrophoresis). Histopathological analysis of tissue samples from 10 individuals will cost (\$3,000)	\$3,700	\$1,800	Primate Conservation Inc. (application submitted)
4	Equipment	1500ml of RNAlater for storage of fecal and tissue samples	\$1,050		
5	Travel	Roundtrip airfare to Georgetown, Guyana (\$1000), July 1, 2016 - August 20, 2016 for field research, roundtrip travel from Georgetown to the KCOCA study site (\$2000) ² , village research fees (\$500) ³ , per diem meals (\$15 per day for 50 days), accomodation at study site (\$5 per day for 45 days), accomodation in Georgetown (\$50 per day for 5 days)	\$2,225	\$2,500	Judd Fellowship (application submitted)
		Subtotal research expenses (2-6)	\$6,975	\$5,100	
		TOTAL BUDGET	\$6,975	\$5,100	

Budget Guidelines

1. A Waiwai field assistant will assist in data collection, serve as a forest guide and boat captain, and will take a leading role in training other Waiwai in necropsy methods
2. Due to the remoteness of the study site, the cost of getting from Georgetown (the capital city of Guyana) to the KCOCA, is approximately \$2000. This includes a hired 4X4 with driver and motorized boat, including gasoline
3. The Waiwai Village Council requires that all individuals conducting research in the KCOCA pay a \$500 fee