STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305–2117

James Holland Jones
Stanford University
Department of Anthropological Sciences
Building 360
Stanford, CA 94305–2117
650-723-4824

February 9, 2007

Applicant: **Sadie J. Ryan**
Recommender: **James Holland Jones**

Admissions Committee
DIMACS/SACEMA
US-Africa Advanced Studies Institute on Mathematical Modeling of Infectious Diseases in Africa

To the Admissions Committee,

I am writing this letter in support of Sadie J. Ryan's application to attend the DIMACS/SACEMA US-Africa Advanced Studies Institute on Mathematical Modeling of Infectious Diseases in Africa in June of 2007. Sadie has been working with me as a post-doc since December 2006 when she began an NSF fellowship in bioinformatics held jointly between Stanford and McGill Universities.

Sadie's interests lie in modeling the human-wildlife disease interface. Toward this end she is pursuing a number of potential field collaborations on the subject of zoonotic spillover throughout Sub-Saharan Africa. These include: (1) An ongoing interest in the multi-way spillover of *Mycobacterium bovis* infection between wildlife, cattle, and humans in South Africa. This is a potentially enormous problem given the high prevalence of immunocompromised people in many parts of South Africa due to the HIV/AIDS epidemic. (2) A project on community structure changes (particularly the loss of the top predator guild) in Ghana and its impact on zoonotic spillover as mediated by baboons (*Papio* spp.). (3) The dynamics of multi-host epidemics among the primates of Kibale Forest, Uganda.

Since arriving at Stanford, Sadie has enrolled in a course on Java programming. A major goal of her bioinformatics fellowship is to develop spatially-explicit agent-based models of human-wildlife-disease interactions to support the empirical projects discussed above. This training will complement her already outstanding skills in GIS, database management, data mining, and applied data analysis. Computer simulation is a powerful tool. However, I believe that it is fundamental for science that simulation be accompanied by rigorous mathematical and statistical analysis. Without such analysis, the generalizability (and hence scientific value) of complex simulations is of dubious quality. While Sadie has certainly been exposed to such modes of analysis both as an undergraduate at Princeton and as a Ph.D. student in Wayne Getz's lab at Berkeley, I believe that she has entered a critical stage in her development where the necessity of such analytical skills has become apparent to her. The DIMACS/SACEMA workshop would help immerse her in mathematical epidemiology and teach her vital skills precisely at the time when she needs to use them. I understand it is unusual to admit a post-doc for the workshop, but I believe the payoff for investment in Sadie is large. She has a very high elasticity right now.

I have committed to mentor Sadie through the next phase of her professional development. I am able to contribute expertise on human and nonhuman primate ecology, modern statistical methodology, formal demography, social networks, and infectious disease epidemiology. In addition to my substantive and methodological expertise, one of the best contributions I can make to Sadie's development is access to my own social network of collaborators and mentors. I currently hold an NIH mentored research scientist career award (K01) to develop models for understanding the interactions between demographic change,

social structure, and infectious processes in heterogeneous human populations. The co-mentors for this K01 grant are Shripad Tuljapurkar (Biological Sciences, Stanford) and Kenneth Wachter (Demography, Berkeley). My background is in primate ecology and life history theory, having done my Ph.D. in biological anthropology at Harvard with Richard Wrangham, Peter Ellison, and David Haig. Following my Ph.D. I took an interdisciplinary NRSA post-doctoral fellowship at the University of Washington where I had simultaneous appointments at the Center for AIDS & STD, the Center for Statistics and the Social Sciences, and the Center for Studies in Demography and Ecology (the UW population center). At UW and under the mentorship of Martina Morris, Mark Handcock, and King Holmes, I developed expertise in social networks, infectious disease epidemiology, and modern statistical inference. Handcock continues to serve as an advisor for my K01 grant and we maintain an active collaboration.

At Stanford, Sadie has ample opportunities to amplify the skills she will learn at the DIMACS/SACEMA workshop. Professor Tuljapurkar and I share lab meetings in which we discuss a variety of topics in mathematical demography, biodemography, theoretical ecology and life history theory. We also run an NIH-funded series of workshops on mathematical demography and biodemography. Sadie will certainly participate in future workshops as long as she is affiliated with me. Through my ongoing collaborations with Gary Schoolnik in the Department of Microbiology and Immunology at Stanford Medical Center and Peter Small of the Gates Foundation, Sadie will have access to state-of-the-art research in the molecular epidemiology of TB. This expertise will be invaluable for her work on BTB in South Africa. In fact, we have submitted a pilot proposal to the Freeman Spogli Institute for International Studies at Stanford to do a molecular epidemiological study of villagers abutting national parks in South Africa where BTB exists in high prevalence.

My own work has evolved independently in the direction of Sadie's interests and I can therefore provide further guidance as she develops more skills. I am the co-PI on a large grant proposal to study the impact of land conversion on human welfare in Indonesian Borneo. A major health consequence of land conversion for forest people is the changing epidemiological environment and there are enormous questions of how changing arthropod and small mammal communities are going to affect the infectious disease burden in cleared areas. Sadie will have ample opportunities to apply her newly learned modeling skills to questions in Borneo as well as Africa.

In conclusion, I urge you to admit Sadie Ryan to the DIMACS/SACEMA US-Africa Advanced Studies Institute on Mathematical Modeling of Infectious Diseases in Africa. Sadie has already proved herself to be a researcher of enormous potential and the payoff to further investment in her skills in mathematical epidemiology at this point could be tremendous. At Stanford and McGill, Sadie possesses an excellent environment for mentorship and professional development and I expect great things of her in the next two years. I support her application categorically and without hesitation. Please feel free to contact me if you have further questions.

Yours Sincerely,

James Holland Jones