

13 December 2004

Dear **Professor Rob de Ruyter van Steveninck**,

Re: Dr. Gareth Witten for your junior faculty position

Gareth and I met at the Santa Fe Institute (SFI) in September, 2002. I had received a Minnesota Bush Foundation Medical Fellowship to study complexity science and its application to pediatric obesity. With Gareth, I attended a SFI hosted workshop in ecology and metabolism organized by Geoff West and the annual Ulam Lecture series.

We discovered a common interest in energy regulation and complimentary skills and experience. I had clinical experience with obese patients and their families from developing an interdisciplinary clinic in the Twin Cities. I was interested in computer simulations as an experiential learning tool. Gareth had mathematical modeling skills and previous experience with energy balance in cattle. We formulated key features and interactions for a pediatric obesity model that could serve as the core of a lifestyle simulator.

We continued to collaborate on this problem by email when Gareth returned to South Africa. Subsequently, he came to Minneapolis, July 2003, to present our efforts to my decision science research group at the University of Minnesota.

We continue to work on the obesity problem at several levels. On a larger scale we have modeled individual energy regulation as the complimentary interaction of homeostatic and homeorrhetic mechanisms. Energy balance, like the dynamics of cardiorespiratory fitness has both central and peripheral regulatory mechanisms. The peripheral mechanisms especially exhibit properties of complex adaptive systems, integrating multiple flows into emergent levels.

On the smaller scale of muscle metabolism, we are currently modeling how obesity creates a phase transition from oscillating carbohydrate and fat metabolism to metabolic inflexibility (Kelley, D. Ann. N.Y. Acad. Sci. 967:135-145,2002). We are both interested in how to model complex phenomena, like obesity, across scales or levels of description.

Gareth is a confident, capable, compassionate young scholar and collaborator. Growing up in South Africa certainly challenged his access to opportunities and created a burning desire not to just succeed but excel. How else do you explain his athletic, academic, and even operatic accomplishments? Yes, he has sung with the Santa Fe Opera company. Gareth has great depth of character. He also has the sensitivity to diversity to lead those who do not have his vision - he is an exceptional person.

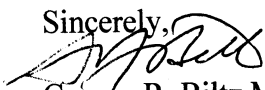
Gareth was an International Fellow at the Santa Fe Institute and Los Alamos National Laboratories and is still collaborating with Alan Perelson and Jim Crutchfield at these institutions. He also has strong links with French researchers in complex systems modeling. He has recently been nominated for the most prestigious young scientist award in South Africa and has presented a summer lecture series (with Professor George Ellis, who recently won the 2004 Templeton Prize) called "Complexity in Our Interconnected World" that covered the limits of science and tools such as networks and the essence of the modeling approach to solving these problems.

His diverse interest in modeling applications provides a broad base of experience for future projects. Following Ashby's Law of Requisite Variety- only variety can absorb variety- Gareth has experience with problems requiring a variety of modeling methods: differential equations, networks, and differential inclusions. The breadth of his current experience provides the foundation for the depth of future insights and accomplishments. The paradoxical goals of breadth and depth are bridged by the best medical clinicians and the best medical modelers. Gareth is building that bridge.

In our current project, we are modeling healthy muscle metabolic oscillation as a set of hyperbolic (nonlinear) interactions that maintain energy availability with variable macronutrient composition. Changing total energy demands shifts between hyperbolic curves. We are trying to understand the metabolic phase transition from healthy oscillation in macro-nutrient composition to unhealthy inflexibility in lipid oxidation. We will also simulate the effects of exercise on improving macronutrient flows and the potential reversibility of the unhealthy phase transition. The data for this project come from the work of Caprio, Kelley and Bergman, and Kahn. We hope to present this model at the Pediatric Work Physiology Meeting XXIII in Switzerland, next September.

Gareth has the character and the credentials to join the Biocomplexity Initiative at Indiana University, Bloomington. He only needs the opportunity. He will be an excellent contribution to Indiana University and the Biocomplexity Initiative. He is resourceful, respectful of collaborators and ready for your caliber of research in mathematical biology. He is already familiar with other complexity scientists in the United States and should make an easy transition from Cape Town to Bloomington, Indiana.

Sincerely,



George R. Biltz MD

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