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October 28, 2005

Yves Brun
Systems Biology/Microbiology Faculty Search
Department of Biology
Indiana University
Jordan Hall 142,
1001 E 3rd Street
Bloomington, IN 47405-7005

Dear Search Committee:

It is my pleasure to recommend **Vincent VanBuren** for an Assistant Professor position in your department. I've known Vince since 1995 when he entered our graduate program in molecular biology. Vince's dissertation work in my laboratory applied computer and mathematical modeling to better understand mechanisms underlying microtubule assembly. These methods are well outside my area of expertise and therefore Vince received additional guidance from a long-time collaborator, Dr. David Odde, a Chemical Engineer at the University of Minnesota. While Dr. Odde provided some initial ideas and feedback, Vince developed almost all of the computational methods in his thesis with minimal input from myself or others. His thesis work has provided a unique contribution to the microtubule field and his 3 dimensional mechanical model of microtubule assembly is well ahead of anything anyone else has attempted.

Microtubules are self-assembling polymers of tubulin subunits. At steady-state the polymer remains dynamic and can switch between phases of growth and shortening. Microtubules are hollow cylinders made up of 13 chains of subunits and structural constraints likely play important roles in regulating the assembly/disassembly process. The assembly process is far from intuitive and well-suited to computer-based modeling. Vince's models address issues of energy minimization within the microtubule lattice, how conformational changes induce strain in the lattice and how transitions between growth and shortening occur at a molecular level. Vince devised methods to calculate bond energies within the microtubule lattice and the size of the stabilizing cap at the microtubule tip. He incorporated simple rules to approximate structural differences between growing and shortening microtubule ends and was able to simulate dynamic instability with a single parameter set. This first part of his thesis was published in PNAS. The second model developed in his thesis is a 3 dimensional mechanical model that takes into account the structure of the microtubule. A manuscript describing the results is now in press at Biophysical Journal (the slowness to publish this manuscript reflects the fact that the three authors are in three different locations). This latter model provides an explanation for the apparently paradoxical effects of taxol on microtubule assembly and rigidity.

Both of Vince's publications from his Ph.D. thesis demonstrate his creativity in applying computational methods to biological questions. In each paper he has taken existing data from the literature and applied that data in simple, yet clever, simulations to estimate rate constants or mechanical rigidity values. Vince's Biophysical Journal manuscript is due to appear in the November issue and will be accompanied by a "new and noteworthy" article by Schek and Hunt. Their summary describes both his papers and highlights his creative approaches.

In addition to his outstanding independent research, Vince was also an exemplary graduate student. He was supported by several highly competitive university fellowships including a Dean's Fellowship and the Aventis Fellowship. During his graduate student years Vince was asked to step in and teach a 400 level course (senior undergraduate and graduate level) in Human Genetics after the professor suddenly fell ill. That my colleagues would ask Vince to teach an upper level course in an emergency situation is a testament to the high regard everyone in the department had for his abilities and intellect. Student response to Vince's teaching was also highly favorable, demonstrating that he could master new material and teach it with very little time to prepare.

Vince has clearly demonstrated skills in applying computational algorithms to problems in molecular cell biology and has furthered his skills in bioinformatics and computational biology through his postdoctoral research. Vince is an extremely gifted individual and I believe that he has a bright future ahead of him. Finally, Vince is a pleasure to work with and a terrific person. Please feel free to contact me if you have any questions.

Sincerely,



Lynne Cassimeris, Ph.D.
Professor