



Howard Hughes Medical Institute  
Research Laboratories

Jack W. Szostak, Ph.D.  
Investigator

Dec. 30, 2004

Biocomplexity Faculty Search  
c/o Theresa Dawson,  
Department of Physics  
Indiana University  
Swain West 117  
727 East 3rd Street  
Bloomington, IN 47405-7105

To: The Search Committee

I am writing in enthusiastic support of the application of Dr. Martin Hanczyc, who has applied for a position as Assistant Professor in your Department. Marty has been one of the most creative and adventurous postdocs I have ever had in my lab. I think he will be a great catch for any Department looking for a really smart, nice colleague who is almost sure to do the unexpected.

Marty joined my lab as a postdoctoral fellow about four years ago after completing his Ph.D. with Prof. Rob Dorit at Yale. Marty came very highly recommended, and he was clearly very productive as a graduate student. Martin's extremely creative and innovative thesis research was focused on the use of in vitro molecular evolution to address basic evolutionary issues such as the evolution of a host-parasite interactions and the reproducibility/uniqueness of evolutionary trajectories.

Marty has continued to work on very creative and distinctive projects during his time in my lab. Working closely with a graduate student, Shelly Fujikawa, Marty successfully carried through two important pieces of work. First, he and Shelly worked out a practical laboratory demonstration of what had been just a theoretical concept – a way that membrane vesicles could grow and divide indefinitely, with continuity of both membrane and contents from generation to generation. This was a wonderful accomplishment because it provided a proof-of-principle example of a process that must have been integral to the origin of life. This work also set the stage for a continuing research program on vesicle replication - a subject that now occupies almost a third of my lab. The work was also a testament to Marty's technical creativity, persistence, and careful interpretation of experimental results.

The second project arose from observations of surface effects on membrane growth. The key experiment was a clear demonstration that the clay mineral montmorillonite exerted a catalytic effect on the assembly of bilayer membranes from micelle precursors. This was a very

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surprising, even unprecedented observation, and it was in large part Marty's persistence in exploring this phenomenon (in the face of my initial skepticism) that ultimately led us to appreciate its significance as a means of bringing together the key components, nucleic acids and membranes, of the first cellular structures.

Martin Hanczyc is a very bright, creative, and articulate young scientist with great scientific potential. In the course of carrying out the work described above, he has demonstrated a willingness to learn and apply whatever methods are appropriate for solving a problem. Undeterred by lack of prior experience he learned how to apply dynamic light scattering and quantitative fluorescence methods to vesicle growth assays. He also learned a lot about fluorescence microscopy, so that he was able to generate the beautiful confocal images of RNA on clay inside vesicles. Since completing the above work, which was published in *Science*, Marty has embarked on a diverse array of follow up studies. He is exploring the effects of a wide range of mineral surfaces on membrane assembly, and is applying methods for the chemical synthesis of monodisperse silica particles to disentangling the effects of particle surface curvature vs. surface area on membrane assembly. Marty is now completing experiments for a paper on the mechanism of surface-enhanced membrane assembly.

Marty is also a very friendly and collaborative person. As I mentioned, much of his early vesicle work was done along with a grad student, Shelly Fujikawa. He has recently embarked on a collaborative study (with Shuguang Zhang of MIT) of membranes made from amphiphilic peptides. His areas of interest are so broad that this ability to work effectively in collaborative projects will be of great value in the future. Marty is also an engaging and effective speaker - he gave the first talk in the Harvard Astrobiology seminar series, which was very well received, and after a recent talk at a meeting in Crete was invited to speak in Japan. He is clearly ready to begin independent research, since he has many more ideas than he can develop on his own here. He is bound to end up exploring new, unexpected and probably highly interdisciplinary areas of science. I strongly support his application.

Sincerely,

A handwritten signature in black ink that reads "Jack W. Szostak". The signature is fluid and cursive, with a long horizontal line extending from the end of the name.

Jack W. Szostak  
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