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October 26, 2005

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

Dear Dr. Brun:

I would like to be considered for your Biocomplexity/Biology faculty opening at the University of Indiana-Bloomington at the rank of Assistant Professor. I am excited about the opportunity to continue my research career and begin teaching as faculty. I feel I would bring a unique background of skills, experience, perspective, and motivation to Bloomington.

Currently, I am working as a Post-Doctoral Fellow in the Department of Microbiology at the University of Iowa, having completed my Ph.D. in Civil and Environmental Engineering in 2002. My graduate work focused on the conditions under which environmentally sensitive compounds would be degraded microbiologically, and my current post-doctoral work addresses molecular techniques used to study bacteria and growth of bacteria in biofilms. More specifically, my current project studies development of *Pseudomonas aeruginosa* biofilms and intercellular bacterial signaling within the biofilm. Overall, I have specialized in molecular and microbiological techniques that can be applied to investigate issues important to public health and environmental microbiology. I look forward to continuing such work as an Assistant Professor, to directing graduate researchers, and to developing collaborations within the department and with faculty in additional disciplines. I am interested in conducting fundamental scientific research on bacteria that affect human health and environmental systems.

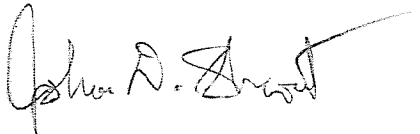
The route taken to my current position and research interests is unique and I believe this has allowed me to approach research from a useful perspective. I have experience in engineering consulting and this non-research work experience has led me to understand

more clearly the issues of industry and government and has helped me to become a better academician. In the laboratory I have been involved in both applied and fundamental scientific research and I am interested in conducting future investigation that bridges the need for practical applied solutions with the fundamental research techniques required to answer current and future complex multi-disciplinary questions that involve bacteria.

I am very enthused about bringing my talents to the classroom. I possess strong oral and written communication skills as well as the ability and patience to explain complex concepts. Moreover, I derive great satisfaction from helping others to learn and understand. I am confident that my background is well suited to teaching of topics that I have emphasized in my studies such as environmental microbiology and other courses that address the roles of bacteria. I would be most interested in developing and teaching courses that best utilize my talents to meet the needs of the department and to address environmental and public health concerns of the 21st century. I have been privileged to learn from many wonderful teachers who have fostered a love of learning in me, and I am hopeful that I will inspire my students similarly.

I appreciate this opportunity to apply for your faculty opening and thank you in advance for consideration of my credentials. Please do not hesitate to contact me by phone at (319) 621-1638 or by e-mail at joshua-shrout@uiowa.edu if you should require any additional information. I look forward to hearing from you.

Sincerely,

A handwritten signature in black ink, appearing to read "Joshua D. Shrout". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Joshua D. Shrout, Ph.D.

RESEARCH AND TEACHING GOALS

I am eager to advance my research career by transitioning into the roles of investigator and advisor. Given my preparation, I am well-equipped to direct examination of current and future public health and environmental research questions with vigor, aptitude, and proficiency. Trained in both engineering and microbiology, I am an expert in molecular methods, bacterial biofilms, and in the transformation of environmentally sensitive compounds by bacteria. I am also interested in the analysis and extrapolation of laboratory experiments using mathematical and computational techniques to increase relevance of scientific discovery. My graduate and post-doctoral research has focused on the microbiology, molecular biology, and biochemical transformations of bacteria that are important to the environment and public health. Having done research with multiple professors whose interests differed, I know the importance of including the skills and perspectives of varying disciplines to answer complex research questions. I have investigated a broad range of fundamental and applied research questions that involve bacteria and I feel comfortable coordinating multidisciplinary research. My graduate career primarily addressed bacterial biotransformation of chemical pollutants and my post-doctoral training has focused on the molecular methods associated with better understanding environmental bacteria combined with mathematical analysis to describe bacterial biofilm formation.

Biofilms are important in many natural and engineered systems and my current post-doctoral research focuses on the communication, growth, and physiology of bacteria growing in a biofilm state. Specifically, I have been studying *Pseudomonas aeruginosa*, a ubiquitous organism with both clinical and environmental relevance. The primary research objective of my project involves describing the growth and cell-signaling of *Pseudomonas aeruginosa* biofilms with a mathematical computational model. The impact of this research has the potential for clinical, ecological, and other practical applications. The personal significance of this work is that it has honed my skills in molecular biology, microbiology, and confocal laser microscopy. I will combine these skills with my strong environmental engineering background to lead cutting-edge research.

I plan to continue investigation of bacterial biofilms as faculty and am aware that obtaining external funding is a key prerequisite for conducting meaningful research that leads to peer-reviewed publications and for supporting graduate students. I have an understanding of the funding process from first-hand experience as I have authored and assisted in the preparation of proposals and served as a Co-Project Investigator on a project that funded half my initial post-doctoral research and salary ("Treatability and Demonstration Project for Phytoremediation and Rhizodegradation of Perchlorate in Groundwater at the Longhorn Army Ammunition Plant, Karnack, Texas"). As there appear to be many questions regarding bacterial biofilms that are important to environmental and public health scenarios, I will initially focus my efforts to gain funding for this type of research. The underlying theme of my current interest involves the formation of and genetic expression within bacterial biofilms. Many public health scenarios appear to be influenced by bacteria present in a biofilm growth state, yet little is actually known about the prevalence and impact of such bacteria. Within this framework lay several fundamental research questions about growth of biofilm bacteria like *P. aeruginosa* that I wish to address. Study of these questions using *P. aeruginosa* is particularly effective because its relevance to many scenarios sequence of the genome is known (which allows for easier

manipulation to understand molecular processes). Questions involving bacterial biofilm formation their genetic expression have great importance for clinical (e.g., surgically implanted devices), public health (e.g., water distribution systems), and remediation (e.g., *in situ* soil zones) applications. Several funding agencies have shown interest in biofilm-related research. I anticipate writing the following proposals to answer the respective requests-for-proposal (or similar, to meet specified deadlines): “Microbial biofilm formation in public drinking water distribution systems” to answer NIH/NIGMS RFP PA-03-047—Research on Microbial Biofilms and “Genetic expression of biofilms growing on natural geochemical surfaces” to answer NSF RFP 05-600—Microbial Observatories and Microbial Interactions and Processes. I will also submit unsolicited proposals to federal, state, and private agencies proposing fundamental scientific investigation of microorganisms that form biofilms. I will coordinate research of additional questions involving impact of biofilm bacteria upon engineered systems or relevant environmental settings by collaborating with experts from different disciplines. Overall, my long-term research objective is to study environmentally significant bacteria and further develop methods that allow detection, characterization, and classification of bacteria. I feel there is a clear connection between development of molecular techniques for fundamental research and application of these techniques to environmental engineering concerns such as drinking water supply. I look forward to the opportunity to collaborate with fellow faculty members on multi-faceted research projects drawing upon the strengths of the department to conduct meaningful and successful environmental research.

In addition to continuing research, I am excited to begin teaching students in a classroom setting. I am confident that I will be an effective teacher, attentive to and considerate of students’ individual needs and interests, while providing a rigorous challenge to all students. My own experience as a student has shaped the vision I have of myself as an instructor. The teachers who utilized a variety of styles are the ones from whom I learned the most and whom I most admire, and I hope to inspire my students as those teachers inspired me. Equally important are the teachers whose courses I did not enjoy. These memories will challenge me to reach my students in a positive way. I see myself as an instructor with two overarching goals as I teach: to make the material relevant to the students and to make effective communicators of future scientists. Student-centered instruction, I believe, is the key to achieving these goals. To make an impact, learning should be interesting and fun. Technology can be a powerful tool toward that end, and I plan to employ tools like PowerPoint® and the World-Wide-Web in the classroom. When students buy into the idea that the content of the course matters to them personally, their motivation to learn comes from within. The objective of higher education is, in large part, to foster a self-driven desire for continual learning. Ironically, scientists have the stigma of being poor communicators, yet success in science and engineering is achieved only when ideas are presented to and understood by others. Clearly, successful expression of concepts and ideas is vital in engineering. Toward the goal of improving communication skills, both written and oral assignments will be given. Small groups will be utilized to emphasize cooperation, communication, and peer teaching/learning. In addition, I will challenge students by writing exam questions that force them to apply and connect what they have learned, not just regurgitate facts. My background is well suited to teaching of topics that I have emphasized in my studies and research, such as environmental microbiology and chemistry. I would be interested in teaching the Microbial Physiology and Biochemistry class listed in the course

catalog or developing a complementary course that utilizes my expertise in microbiology and chemistry to the benefit of the department.

I am eager to continue work in academia, and I am interested in sharing my passion for my work with others. My own communication skills are strong and have been tested in a variety of situations. I have presented to small groups as well as larger audiences, and I have experience speaking in front of undergraduates, my peers and mentors, and participants at internationally attended conferences. I am sensitive to the make-up of my audience and am comfortable adjusting the way in which I present to make the delivery meaningful for those who are listening. With continued effort, I know that my ability to communicate and my facility for scientific investigation will make me a successful researcher and teacher.

REFERENCES

References from the following individuals have been arranged to be sent separately:

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