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Biocomplexity Faculty Search Committee,
c / o Prof. Rob de Ruyter van Steveninck,
Department of Physics,
Indiana University,
Swain Hall West 117,
Bloomington
IN, 47405-7105

Dear Search Committee,

I am writing at the request of Dr. Vladimir Shinkarev, who has applied for a faculty position in your department. I am happy to give my strongest support to Dr. Shinkarev's application. I have known Vlad for over a dozen years since he moved to Urbana, and I knew him by reputation before that as a result of his publications in the photosynthesis literature. Over the last four years we have collaborated quite extensively, and I feel well qualified to judge his ability, experience and personality. On all counts, he scores high.

Dr. Shinkarev works on biophysical and structural aspects of photosynthetic and respiratory systems, particularly the proton pumping electron transfer complexes and reaction centers associated with energy conversion. He came to UIUC from the A.N. Belozersky Institute for Molecular Biology and Bioorganic Chemistry, Moscow State University, one of the few internationally respected laboratories in this field in the former USSR. In addition to his many publications of a high quality in prestigious international journals during the last 25 years, he has also published a series of invited review articles in quite diverse areas, which provide a glimpse both of his range and reputation. Photosynthetic systems provide the unique advantage of rapid kinetic assay linked to photoactivation. Vlad has used photosynthetic systems to answer fundamental questions about the interface between structure and function, and the complementary information from both sides that reveal underlying molecular mechanisms of catalysis.

I had followed Vlad's research with great interest, since in many areas his work overlapped with my own. He moved to Urbana as a Research Associate in 1990, and is currently Visiting Associate Professor of Biochemistry, working independently in Colin Wraight's group. His early work here with Wraight was on the quinone reductase site of the bacterial photochemical reaction center and on oxygen evolution in photosystem II. He constructed or improved several items of apparatus, including one for measurement of rapid electrogenic processes coupled to photosynthetic electron transfer, using a design he help to develop when in the Russian laboratory, and a rapid scan spectrophotometer, and these made possible significant new technical approaches to the study of these reactions. During the past few years a substantial part of Vlad's effort has involved a

fruitful collaboration between Colin Wraight's lab and my own on the mechanism of the bc_1 complex. We demonstrated that the inhibition of reactions of the bc_1 complex by DCCD were not dependent on one residue previously identified as a binding site, and have investigated several aspects of the electrogenic function for which the structures have forced a reevaluation of current thinking. We also studied the interaction between the Rieske iron sulfur protein and ubiquinone bound at the Q_o -site through the change in E_m of the $[2Fe-2S]$ center induced by addition of myxothiazol, and have used this to propose a novel idea, - that the structure implies a spring-loading that favors the rapid release of products from intermediate states necessary for rapid turnover. These and other collaborative efforts have resulted in six publications, and have been a lot of fun.

One of Vlad's greatest strengths is in the functional modeling and theoretical analysis of complex electron transfer reaction pathways. Because of the experimental facility with which kinetics can be studied in photosynthetic systems, the detailed theoretical understanding of such systems has contributed substantially to our appreciation of electron transfer reactions in general, applicable in the wider context of respiration, ligand binding from the membrane phase, drug metabolism, pharmacological applications, etc. Vlad's major contributions are summarized in several reviews in which he was the senior author. These have included studies on the two-electron gate of bacterial reaction centers, a re-analysis of the reactions of the oxygen evolving complex of photosystem II, leading to a novel double cycle of reactions which accounts for several observations which were not well explained by previous hypotheses, and a review of the use of fluorescence in probing donor and acceptor side reactions in photosystem II.

Although his theoretical skills set him apart, Dr. Shinkarev is also a gifted experimentalist, with a low activation barrier to new techniques. He has been exploring a number of structural approaches for looking at the finer details of the structure-function interface in membrane proteins, including ATM and FTIR spectroscopy, and optical methods for measurement of particle size. Vlad Shinkarev has been PI or co-PI on several substantial grants (USDA and NIH). During the last few years, his NIH grant with Colin Wraight was renewed, which includes a substantial section on application of FTIR to study the structure-function interface in reaction centers and the bc_1 complex. He is a pleasant, energetic and enthusiastic man, speaks English well, and presents a well-organized seminar. He has helped in delivery of my course, Biological Energy Conversion (Biophysics 354), where he has presented several lectures when I have been unavailable. I feel sure that he will make a competent and popular teacher.

In conclusion, I strongly support Dr. Shinkarev's application for the position you advertised. His range of interest fits perfectly with the requirements of the position, and he would clearly warrant consideration at a more senior level than Assistant Professor. He is poised to extend his reputation in the experimental dissection and functional modeling of inter and intra-molecular interactions of membrane proteins to the structural side, and will continue to make substantial contributions to the advancement of the field.

Yours sincerely,



Antony R. Crofts
Professor of Biochemistry and, Biophysics