Statement of Purpose

Mauricio Oliveira Carneiro

October 17, 2004

In order to further pursue a career in research in the combined fields of Computer Science, Mathematics and Molecular Biology, I intend to commence studies at Harvard University's Organismic and Evolutionary Biology PhD program.

After attending a technical high school in Computer Science, I graduated in Computer Engineering from the Catholic University of Rio de Janeiro (PUC-RIO) in 2003. Both my technical high school and my undergraduate courses were focused on computational intelligence and optimization. Nevertheless, I have also explored many other computer science fields taking courses and working with computer graphics, networks, computational theory, database and software engineering.

During my freshman year as an undergraduate student, I received the Best Mathematics Software award, from the Science Center at PUC-RIO which qualified me to take honors calculus courses. Later I represented my university for 3 years at the International Collegiate Programming Contest (ICPC), organized by the Association for Computing Machinery (ACM). The ICPC is the most important contest for undergraduates in the academic field of computer science

In 2002 I won the title of South American champion and was ranked 4th place of South America in 2001 (2nd of Brazil). Beyond the prizes, the championship granted me a trip to California for the world finals celebration along with the other 68 regional champions from around the world. At

the world finals, I was awarded the Upislon pi Epsilon (UPE) Programming Excellence Award. The UPE is a society that promotes academic excellence, at both the undergraduate and graduate levels, in the Computing and Information Disciplines.

Concurrent with my undergraduate training, I was also exposed to additional professional experiences. It is worth noting my participation in the development of the game "Taina", the first computer game developed in Brazil and released in 2000. I was also able to make use of several algorithms in computer intelligence and to work directly with game programming, computer graphics, physics simulation and network programming. As the Project Coordinator, I managed the interactions between programmers and artists (musicians and designers) and learned how to carry out a large project.

In my last 3 years as an undergraduate, I was awarded a scholarship from PUC-RIO to work as a junior researcher in the computer graphics research lab at the University (Tecgraf, PUC-RIO). During this period, I also worked as a Teaching Assistant in Data Structures (for 3 semesters), Interactive Computer Graphics and Advanced Algorithms, giving lectures and preparing/correcting assignments and exams.

In 2003 I was awarded a scholarship from the Brazilian Research Council to work as a Junior Researcher in Molecular Epidemiology under the guidance of Prof. Claudio Struchiner (Ph.D. from Harvard in Infectious Diseases) at FIOCRUZ, the leading scientific research institution in the country on health related problems. During this period, I have had the opportunity to explore the many fields that lie at the interface between computer and biological sciences.

I studied Bioinformatics and Population Dynamics based upon lectures from the Santa Fe Institute and also took courses in Biomathematics at a workshop co-organized by Drs. Martin Nowak and Karl Sigmund at the Pure and Applied Mathematics Institute of Rio de Janeiro (IMPA). Meanwhile,

I audited the undergraduate Biology classes at the Biophysics Institute of the Federal University of Rio de Janeiro. In this period, I gave a lecture on the Evolutionary Basis of Public Health and developed a research project on HIV Evolution. For this work, I was granted a full scholarship from the UCSD Medical School to present the results at the XI HIV Dynamics and Evolution Workshop, in Sweden - May 2004.

These experiences prompted me the interest in pursuing a formal training in Molecular Biology. I enrolled in the Master's of Science program in Molecular Biology at FIOCRUZ (with a full scholarship from the Brazilian Research Council) in order to acquire specific knowledge in molecular biology and to learn more about the biological processes at the molecular level, specially in the specific fields of Immunology, Ecology and Disease Evolution. I plan to graduate from the MSc program in Molecular Biology at the Oswaldo Cruz Research Institute (FIOCRUZ) in June 2005. My thesis is entitled "Computational Methods for the Evolutionary Dynamics of Transposable Elements" and is directly linked to the research I am doing in the laboratory with my advisor on the mechanisms to block the vectorial capabilities of Malaria vectors (Anopheles) through the use of transgenic mosquitoes.

In my phd I intend to address the unanswered questions around organismic and disease evolution in order to adequately describe the dynamics of their evolution. The analysis of these studies should be applied to many new interfacing fields of modern molecular biology with the more quantitative sciences. For example: development of dna vaccines.

The excellence of Harvard's Organismic and Evolutionary Biology PhD program best fits my intentions. I believe it is the best university to expand my horizons and put together the building blocks to become a senior level researcher for it's renowned quality in all these interfacing fields.