This volume contains the contributions of the keynote speakers to the BIOMAT 2005 symposium, as well as a collection of selected papers by pioneering researchers. It provides a comprehensive review of the mathematical modeling of cancer development, Alzheimer disease, malaria and aneurysm development. Models for the immune system and epidemiological issues are analyzed and reviewed. Protein structure prediction by optimization and combinatorial techniques (Steiner trees) are explored. Bioinformatics issues, regulation of gene expression, evolution, development, DNA and array modeling, small world networks are covered in this cutting edge volume.

BIOMAT 2005

Proceedings of the International Symposium on Mathematical and Computational Biology

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Proceedings of the International Symposium on Mathematical and Computational Biology

BIOMAT 2005

edited by Rubem P Mondaini • Rui Dilão

Preface

The BIOMAT 2005 International Symposium on Mathematical and Computational Biology, together with the Fifth Brazilian Symposium on Mathematical and Computational Biology, was held in the city of Petrópolis, state of Rio de Janeiro, Brazil, from the 3rd to the 8th December 2005. The atmosphere of the symposium was informal and the approach interdisciplinary, with the contribution of the expertise of fifteen keynote speakers from different fields and backgrounds.

In the proceedings of BIOMAT 2005, there are state of the art research papers in the mathematical modelling of cancer development, malaria and aneurysm development, among others. Models for the immune system and for epidemiological issues are also analyzed and reviewed. Protein structure prediction by optimization and combinatorial techniques (Steiner trees) are explored. Bioinformatics questions, regulation of gene expression, evolution, development, DNA and array modelling, small world networks are other examples of topics covered in the BIOMAT 2005 symposium.

The diversity of topics and the combination of original with review approaches make BIOMAT Symposia important events for graduate students and researchers.

This Symposium would never have taken place without the generous contribution of all the sponsoring agencies. Our first thanks go to the Brazilian agencies CAPES and FINEP and their Board of Trustees. We deeply thank the support of CENPES-PETROBRAS, the Research Centre of the Brazilian Oil Company and the world leader of research in deep sea waters, and the support to the Fogarty International Centre, Harvard Medical School, USA, through the grant number #1 D43 TW7015-01.

We particularly thank the directors and representatives of these institutions: Dr. Geova Parente from CAPES; Dr. Henrique A. C. Santos, Dr. Gina Vasquez and Miss Raquel Prata from CENPES-PETROBRAS; Dr. Lucila Ohno-Machado, Dr. Eduardo P. Marques, Prof. Eduardo Massad and Dr. Heimar Marin from the Harvard Medical School.

We would also like to thank Prof. M. A. Raupp, Director of the National Laboratory of Scientific Computing (LNCC), at Petrópolis, for his invitation to host the BIOMAT Symposium at the LNCC. We are indebted to the members of the local Organizing Committee, Dr. Maurício V. Kritz, Dr. Luiz Bevilacqua and Dr. Marcelo T. Santos for their collaboration and effort in the local organization of the conference and the support of its social program. We also thank the partial support of FCT (Fundação para

a Ciência e a Tecnologia, Portugal) for the edition of these proceedings.

Finally, on behalf of the Scientific Program Committee and the Editorial Board of the BIOMAT Consortium, we thank all the participants and authors of BIOMAT 2005 for keeping the tradition of the BIOMAT Symposia.

Rubem P. Mondaini and Rui Dilão

Rio de Janeiro, December 2005

Editorial Board of the BIOMAT Consortium

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