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# Artificial Immune Systems

Third International Conference, ICARIS 2004  
Catania, Sicily, Italy, September 13-16, 2004  
Proceedings



Springer

Volume Editors

Giuseppe Nicosia  
Vincenzo Cutello  
University of Catania  
Department of Mathematics and Computer Science  
V.le A. Doria 6, 95125 Catania, Italy  
E-mail: {nicosia;cutello}@dmi.unict.it

Peter J. Bentley  
University College London  
Department of Computer Science  
Gower Street, WC1E 6BT, London, UK  
E-mail: P.Bentley@cs.ucl.ac.uk

Jon Timmis  
University of Kent  
Computing Laboratory  
CT2 7NF Canterbury, Kent, UK  
E-mail: j.timmis@kent.ac.uk

Library of Congress Control Number: 2004111519

CR Subject Classification (1998): F.1, I.2, F.2, H.2.8, H.3

ISSN 0302-9743

ISBN 3-540-23097-1 Springer Berlin Heidelberg New York

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springeronline.com

© Springer-Verlag Berlin Heidelberg 2004  
Printed in Germany

Typesetting: Camera-ready by author, data conversion by PTP-Berlin, Protago-TeX-Production GmbH  
Printed on acid-free paper SPIN: 11320210 06/3142 5 4 3 2 1 0

# Preface

Artificial Immune Systems have come of age. They are no longer an obscure computer science technique, worked on by a couple of farsighted research groups. Today, researchers across the globe are working on new computer algorithms inspired by the workings of the immune system. This vigorous field of research investigates how immunobiology can assist our technology, and along the way is beginning to help biologists understand their unique problems.

AIS is now old enough to understand its roots, its context in the research community, and its exciting future. It has grown too big to be confined to special sessions in evolutionary computation conferences. AIS researchers are now forming their own community and identity. The International Conference on Artificial Immune Systems is proud to be the premiere conference in the area. As its organizers, we were honored to have such a variety of innovative and original scientific papers presented this year.

ICARIS 2004 was the third international conference dedicated entirely to the field of Artificial Immune Systems (AIS). It was held in Catania, on the beautiful island of Sicily, Italy, during September 13–16, 2004. While hosting the conference, the city of Catania gave the participants the opportunity to enjoy the richness of its historical and cultural atmosphere and the beauty of its natural resources, the sea, and the Etna volcano.

In comparison to the previous two AIS conferences, at ICARIS 2004 we added some new and exciting features. First, there was a tutorial day, a new track where leading scientists presented the background and the future directions of the Artificial Immune Systems discipline. In particular, four extended tutorials were presented:

- the first was an introduction to Artificial Immune Systems by Dr. J. Timmis;
- the second tutorial, delivered by Dr. Filippo Castiglione, faced the immune system and related pathologies using *in silico* methodologies;
- the third tutorial, by Prof. R. Callard, described the modelling of the immune system;
- the last tutorial, offered by Dr. Leandro de Castro, illustrated the emerging engineering applications of Artificial Immune Systems.

There was also a plenary lecture, delivered by Prof. Alan S. Perelson, on the current state of the art of computational and theoretical immunology.

Moreover, the organizing committee devoted a special session to the topic “Immunoinformatics”, run by Dr. Darren Flower. Immunoinformatics is a new discipline that aims to apply computer science techniques to molecules of the immune system and to use bioinformatics tools for a better understanding of the immune functions.

We had more submissions than ever this year, and because our acceptance rate is based purely on quality, we were able to accept only 59% of the submitted

papers. More details: 58 papers were submitted, and each one was independently reviewed by at least three members of the program committee in a blind review process. So, in these proceedings you will find the extended abstract of the plenary lecture and 34 papers written by leading scientists in the field, from 21 different countries on 4 continents, describing an impressive array of ideas, technologies and applications for AIS.

We couldn't have organized this conference without these researchers, so we thank them all for coming. We also couldn't have organized ICARIS without the excellent work of all of the program committee members, our publicity chair, Simon Garrett, our conference secretary, Jenny Oatley, and, as local organizer, Mario Pavone.

We would like to express our appreciation to the plenary lecturer who accepted our invitation, to the tutorial speakers, and to all authors who submitted research papers to ICARIS 2004.

September 2004

Giuseppe Nicosia, Vincenzo Cutello  
Peter J. Bentley, and Jon Timmis

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Darren Flower	Edward Jenner Institute for Vaccine Research, UK
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## **Tutorial Speakers**

Jon Timmis	University of Kent, UK
Filippo Castiglione	Consiglio Nazionale delle Ricerche, Italy
Robin Callard	Institute of Child Health, London, UK
Leandro de Castro	Catholic University of Santos (Unisantos), Brazil

## **Keynote Speaker**

Alan S. Perelson	Los Alamos National Laboratory, USA
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