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Membrane Computing

10th International Workshop, WMC 2009
Curtea de Arges, Romania, August 24-27, 2009
Revised Selected and Invited Papers

Springer

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Preface

This volume contains a selection of papers presented at the 10th Workshop on Membrane Computing, WMC 2009, which took place in Curtea de Argeş, Romania, during August 24–27, 2009.

The first three Workshops on Membrane Computing were organized in Curtea de Argeş, Romania – they took place in August 2000 (with the proceedings published in *Lecture Notes in Computer Science*, volume 2235), in August 2001 (with a selection of papers published as a special issue of *Fundamenta Informaticae*, volume 49, numbers 1–3, 2002), and in August 2002 (with the proceedings published in *Lecture Notes in Computer Science*, volume 2597). The next six workshops were organized in Tarragona, Spain (in July 2003), in Milan, Italy (in June 2004), in Vienna, Austria (in July 2005), in Leiden, The Netherlands (in July 2006), in Thessaloniki, Greece (in June 2007), and in Edinburgh, UK (in July 2008), with the proceedings published as volumes 2933, 3365, 3850, 4361, 4860, and 5391, respectively, of Springer's *Lecture Notes in Computer Science*.

The workshop changed its name in 2010, and the series will continue as the Conference on Membrane Computing, with the next edition, CMC11, to be held in Jena, Germany.

The tenth edition of WMC took place in Hotel Posada in Curtea de Argeş (`http://www.posada.ro/`) and it was organized by the National College "Vlaicu Vodă" of Curtea de Argeş, the University of Piteşti, Romania, and the Institute of Mathematics of the Romanian Academy, Bucharest, under the auspices of the European Molecular Computing Consortium (EMCC) and IEEE Computational Intelligence Society Emergent Technologies Technical Committee Molecular Computing Task Force, with the financial and organizational support of the Council of Argeş County and Seville University.

Being an anniversary edition of the workshop, ten researchers with fundamental contributions to membrane computing were invited to deliver talks covering important directions of research in this area. These invited speakers were: Erzsébet Csuhaj-Varjú, Budapest, Hungary; Rudolf Freund, Vienna, Austria; Pierluigi Frisco, Edinburgh, UK; Marian Gheorghe, Sheffield, UK; Oscar H. Ibarra, Santa Barbara, USA; Vincenzo Manca, Verona, Italy; Solomon Marcus, Bucharest, Romania; Giancarlo Mauri, Milan, Italy; Mario J. Pérez-Jiménez, Seville, Spain; Grzegorz Rozenberg, Leiden, The Netherlands.

Full papers associated with the invited talks or only extended abstract are included in the present volume.

The volume also contains 22 papers, most of them significantly rewritten according to the discussions held during WMC 2009. Each paper had three or four referee reports. The Program Committee consisted of Matteo Cavaliere (Trento, Italy), Erzsébet Csuhaj-Varjú (Budapest, Hungary), Rudolf Freund (Vienna, Austria), Pierluigi Frisco (Edinburgh, UK), Marian Gheorghe (Sheffield, UK), Thomas Hinze (Jena, Germany), Oscar H. Ibarra (Santa Barbara, USA),

Florentin Ipate (Piteşti, Romania), Shankara Narayanan Krishna (Mumbai, India), Vincenzo Manca (Verona, Italy), Giancarlo Mauri (Milan, Italy), Radu Nicolescu (Auckland, New Zealand), Linqiang Pan (Wuhan, China), Gheorghe Păun (Bucharest, Romania, and Seville, Spain) – Chair, Mario J. Pérez-Jiménez (Seville, Spain), and Claudio Zandron (Milan, Italy).

The program of WMC 2009 also included seven papers which were submitted after the deadline; they were allocated only 10 minutes for the presentation (and are not included in this volume). A pre-workshop proceedings volume, containing all papers, was available during the workshop.

During the workshop several prizes were awarded, some of them related to the 10th anniversary of the workshop (e.g., the youngest participant, the person who participated in most editions of WMC, the author of the largest number of papers in membrane computing, the author of the first PhD thesis in membrane computing, and so on), as well as the *best paper* award.

This award was shared by two papers:

1. Andrea Valsecchi, Antonio E. Porreca, Alberto Leporati, Giancarlo Mauri, Claudio Zandron: "An Efficient Simulation of Polynomial-Space Turing Machines by P Systems with Active Membranes"
2. Petr Sosik, Andrei Păun, Alfonso A. Rodriguez-Patón, David Pérez: "On the Power of Computing with Proteins on Membranes"

The Organizing Committee consisted of Gheorghe Păun – Chair, Costel Gheorghe – Co-chair, Gheorghe Barbu – Co-chair, Paul Radovici, Ştefana Florea, Ileana Popescu, Nicolae Lazăr, Marius Hirzoiu, Ştefana Dumitrache, Raluca Judeţ, Ana-Mariana Margarita, Vlad Bărbulescu, and Radu-Daniel Gheorghe.

Details about membrane computing can be found at: http://ppage.psystems.eu and its mirror page http://bmc.hust.edu.cn/ psystems. The workshop website, designed by Mihai Ionescu, is available at the address http://wmc10.psystems.eu/.

The workshop was sponsored by the Council of Argeş County, Piteşti, Romania, and it was one of the events in the program of Argeş and Muscel Days, 2009. The pre-workshop proceedings volume was published (as TR 3/2009) by the Research Group on Natural Computing of Seville University, with the support of Proyecto de Excelencia con Investigador de Reconocida Valía, de la Junta de Andalucía, grant P08 – TIC 04220. Further local support by the City Hall of Curtea de Argeş and Hotel Posada is gratefully acknowledged.

The editors warmly thank the Program Committee, the invited speakers, the authors of the papers, the reviewers, and all the participants, as well as all who contributed to the success of WMC 2009. Special thanks are due to Springer for the pleasant cooperation in the timely production of this volume.

October 2009

Gheorghe Păun
Mario J. Pérez-Jiménez
Agustin Riscos-Núñez
Grzegorz Rozenberg
Arto Salomaa

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