

# Environmental Toxicology

**WIT***PRESS*

WIT Press publishes leading books in Science and Technology.

Visit our website for the current list of titles.

[www.witpress.com](http://www.witpress.com)

**WIT***eLibrary*

Home of the Transactions of the Wessex Institute.

Papers presented at Environmental Toxicology 2006 are archived in the WIT eLibrary in volume 10 of WIT Transactions on Biomedicine and Health (ISSN 1743-3525).

The WIT eLibrary provides the international scientific community with immediate and permanent access to individual papers presented at WIT conferences.

Visit the WIT eLibrary at [www.witpress.com](http://www.witpress.com).

FIRST INTERNATIONAL CONFERENCE ON  
ENVIRONMENTAL TOXICOLOGY

**Environmental Toxicology**

CONFERENCE CHAIRMEN

**A. Kungolos**

*University of Thessaly, Greece*

**C. A. Brebbia**

*Wessex Institute of Technology, UK*

**C. P. Samaras**

*TEI of West Macedonia, Greece*

**V. Popov**

*Wessex Institute of Technology, UK*

INTERNATIONAL SCIENTIFIC ADVISORY COMMITTEE

D.S. Achilias

M. Altstein

C. Blaise

T-S. Chon

D. Fayzieva

E. Gidaracos

S. Grigson

P-D. Hansen

J. Iliopoulou

D. Kaliampakos

A. Karagiannidis

D. Koronakis

M. Latif

N. Marmioli

Z. Romanowska-Duda

A. Soupilas

H. Takanashi

**Organised by**

*Wessex Institute of Technology, UK and  
The Department of Planning and Regional Development,  
University of Thessaly, Greece*

**Sponsored by**

*WIT Transactions on Biomedicine and Health*

# Environmental Toxicology

## Editors

**A. Kungolos**

*University of Thessaly, Greece*

**C. A. Brebbia**

*Wessex Institute of Technology, UK*

**C. P. Samaras**

*TEI of West Macedonia, Greece*

**V. Popov**

*Wessex Institute of Technology, UK*

**WIT**PRESS Southampton, Boston



**A. Kungolos**  
*University of Thessaly, Greece*

**C. P. Samaras**  
*TEI of West Macedonia, Greece*

**C. A. Brebbia**  
*Wessex Institute of Technology, UK*

**V. Popov**  
*Wessex Institute of Technology, UK*

Published by

**WIT Press**

Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK  
Tel: 44 (0) 238 029 3223; Fax: 44 (0) 238 029 2853  
E-Mail: [witpress@witpress.com](mailto:witpress@witpress.com)  
<http://www.witpress.com>

For USA, Canada and Mexico

**Computational Mechanics Inc**

25 Bridge Street, Billerica, MA 01821, USA  
Tel: 978 667 5841; Fax: 978 667 7582  
E-Mail: [infousa@witpress.com](mailto:infousa@witpress.com)  
<http://www.witpress.com>

British Library Cataloguing-in-Publication Data

A Catalogue record for this book is available  
from the British Library

ISBN: 1-84564-045-4  
ISSN: 1747-4485 (print)  
ISSN: 1743-3525 (online)

*The texts of the papers in this volume were set  
individually by the authors or under their supervision.  
Only minor corrections to the text may have been carried  
out by the publisher.*

No responsibility is assumed by the Publisher, the Editors and Authors for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein.

© WIT Press 2006

Printed in Great Britain by Cambridge Printing.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Publisher.

## Preface

This volume contains the contributions presented at the 1<sup>st</sup> International Conference on Environmental Toxicology, which was held on the island of Mykonos, Greece, from September 11<sup>th</sup> – 13<sup>th</sup> 2006. The conference was organized by the Wessex Institute of Technology in collaboration with the Department of Planning and Regional Development at the University of Thessaly, Greece. It was sponsored by WIT Transactions on Biomedicine and Health.

Environmental Toxicology is one of the most interdisciplinary sciences. Biologists, microbiologists, chemists, engineers, environmentalists, ecologists and other scientists work hand in hand in this new discipline. Assessment of the environmental effects of chemicals is complicated as it depends on the organisms tested and involves not only the toxicity of individual chemicals, but also their interactive effects (including synergistic ones), and genotoxicity, mutagenicity and immunotoxicity testing. Hazardous waste management is closely related to environmental toxicology and there is a growing need for techniques and practices to minimize the environmental effects of chemicals, and for the implementation of the corresponding principles in policy planning and decision-making.

The editors would like to thank all the authors for their papers and, in particular, the members of the International Scientific Advisory Committee for their help during the review process.

The Editors,  
Mykonos, 2006



# Contents

## Section 1: Risk assessment

How to predict the potential effect of chemicals on human health: an extended question of environmental toxicology <i>A. Mueller, C. Graebisch, G. Wichmann, M. Bauer &amp; O. Herbarth</i> .....	3
Estimation of vapour pressure, solubility in water, Henry's law function, and Log Kow as a function of temperature for prediction of the environmental fate of chemicals <i>J. Paasivirta</i> .....	11
Human fluorosis related to volcanic activity: a review <i>W. D'Alessandro</i> .....	21
Toxicity of atmospheric particulate matter using aquatic bioassays <i>C. Papadimitriou, V. Evagelopoulos, P. Samaras, A. G. Triantafyllou, S. Zoras &amp; T. A. Albanis</i> .....	31
Influence of ozone air contamination on the number of deaths ascribed to respiratory causes in Madrid (Spain) during 1990–1998 <i>P. Fernández, R. Herruzo, A. Justel &amp; F. Jaque</i> .....	41
Risk assessment of toxic <i>Cyanobacteria</i> in Polish water bodies <i>J. Mankiewicz-Boczek, K. Izyorczyk &amp; T. Jurczak</i> .....	49
Bacteriological monitoring of ships' ballast water in Singapore and its potential importance for the management of coastal ecosystems <i>V. Ivanov</i> .....	59

**Section 2: Integrated approach in risk assessment  
(Special session organised by T.-S. Chon)**

Modeling of denitrification rates in eutrophic wetlands by artificial neural networks  
*K. Song, M.-Y. Song, T.-S. Chon & H. Kang* ..... 67

Recurrent Self-Organizing Map implemented to detection of temporal line-movement patterns of *Lumbriculus variegatus* (Oligochaeta: Lumbriculidae) in response to the treatments of heavy metal  
*K.-H. Son, C. W. Ji, Y.-M. Park, Y. Cui, H. Z. Wang, T.-S. Chon & E. Y. Cha* ..... 77

Computational analysis of movement behaviors of medaka (*Oryzias latipes*) after the treatments of copper by using fractal dimension and artificial neural networks  
*C. W. Ji, S. H. Lee, I.-S. Kwak, E. Y. Cha, S.-K. Lee & T.-S. Chon* ..... 93

**Section 3: Effluent toxicity**

Studies of produced water toxicity using luminescent marine bacteria  
*S. Grigson, C. Cheong & E. Way* ..... 111

*In situ* sludge reduction by microorganisms  
*S. Banerjee & U. Hooda* ..... 123

**Section 4: Pharmaceuticals in the environment**

Pharmaceuticals and personal care product residues in the environment: identification and remediation  
*E. Heath, T. Kosjek, P. Cuderman & B. Kompare* ..... 131

The presence and effect of endocrine disruptors on reproductive organs of fish in a reservoir used for aquaculture  
*L. S. Shore & M. Gophen* ..... 139

Ocular manifestations of occupational exposure to corticosteroids in the pharmaceutical industry  
*F. M. Metwally, S. El-Assal & E. A. Kamel* ..... 145

## Section 5: Genotoxicity

- Toxicity and genotoxicity studies of surface and waste water samples using a bacterial SOS/*umu* test and mammalian MTT and comet assay  
*B. Žegura, E. Heath, A. Černoša & M. Filipič* ..... 159
- Cytogenetical and histochemical studies on curcumin in male rats  
*A. El-Makawy & H. A. Sharaf*..... 169

## Section 6: Bioaccumulation of chemicals

- Total mercury and methylmercury in fish from a tropical estuary  
*A. P. Baêta, H. A. Kehrig, O. Malm & I. Moreira* ..... 183
- Use of urinary porphyrin profiles as an early warning biomarker for Monomethylarsonous acid (MMA<sup>III</sup>) exposure  
*M. Krishnamohan, S.-H. Huang, R. Maddalena, J.-P. Wang, P. Lam, J. C. Ng & M. R. Moore* ..... 193
- Gastropod molluscs as indicators of the cadmium natural inputs in the Canarian Archipelago (Eastern Atlantic Ocean)  
*R. Ramírez, C. Collado, O. Bergasa, J. J. Hernández & M. D. Gelado* ..... 203
- Prolactin levels are positively correlated with polychlorinated biphenyls (PCB) in cord serum  
*L. Takser, J. Lafond & D. Mergler* ..... 213

## Section 7: Interactive effects of chemicals

- Toxicity assessment of fosthiazate, metalaxyl-M and imidacloprid and their interaction with copper on *Daphnia magna*  
*A. Kungolos, V. Tsiridis, H. Nassopoulos, P. Samaras & N. Tsiropoulos* ..... 223
- Set-up of a dynamic *in vitro* exposure device for the study of indoor air pollutant effects on human derived cells  
*F. Pariselli, M. G. Sacco & D. Rembges* ..... 231

## **Section 8: Hazardous waste environmental effects. Monitoring and remediation**

Bioindication of microcystins toxicity by germinating seeds <i>Z. Romanowska-Duda B., M. Grzesik, J. T. Mankiewicz &amp; M. Zalewski</i> .....	243
Method for selective determination of polybrominated diphenylethers (BDE-47 and BDE-99) in landfill leachates by capillary gas chromatography and electron-capture detection <i>D. Odusanya, J. Okonkwo &amp; B. Botha</i> .....	253
Study of metals in leached soils of a municipal dumpsite in Tampico, Tamaulipas, Mexico: preliminary results <i>P. F. Rodríguez-Espinosa, D. Chazaro Mendoza, J. A. Montes de Oca, G. Sánchez Torres E &amp; A. Fierro Cabo A</i> .....	263
The durability of stabilized sandy soil contaminated with $Pb(NO_3)_2$ <i>S. R. Zeedan, A. M. Hassan &amp; M. M. Hassan</i> .....	271

## **Section 9: Biodegradation and bioremediation**

Toxicity and biodegradation potential of waste water from industry producing fire protection materials <i>T. Tišler, M. Cotman &amp; J. Vrtošek</i> .....	285
Isolation and characterization of endophytic bacteria of coffee plants and their potential in caffeine degradation <i>F. V. Nunes &amp; I. S. de Melo</i> .....	293
Contamination of agricultural soil by arsenic containing irrigation water in Bangladesh: overview of status and a proposal for novel biological remediation <i>S. M. A. Islam, K. Fukushi &amp; K. Yamamoto</i> .....	299
Synthesis and biodegradation of three poly(alkylene succinate)s: mathematical modelling of the esterification reaction and the enzymatic hydrolysis <i>D. S. Achilias &amp; D. N. Bikiaris</i> .....	309
Basic evaluation of sorting technologies for CCA treated wood waste <i>K. Yasuda, M. Tanaka &amp; Y. Deguchi</i> .....	319
Kinetics of nitrobenzene biotransformation <i>A. V. N. Swamy &amp; Y. Anjaneyulu</i> .....	329

**Section 10: Biotests**

Microbiotests in aquatic toxicology: the way forward  
*C. Blaise & J.-F. Férard* .....339

Combining three *in vitro* assays for detecting early signs of  
UVB cytotoxicity in cultured human skin fibroblasts  
*C. Khalil* .....349

**Author index** .....361