



Interuniversity Consortium "Chemistry
for the Environment" (INCA)



Alma Mater Studiorum
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FIRSTFARADAY

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Water & Soil Remediation

European Summer School

***"INNOVATIVE APPROACHES TO THE BIOREMEDIATION OF
CONTAMINATED SITES"***

Faculty of Engineering, University of Bologna, Bologna, Italy

September 7-11, 2004

Directors:

Prof. Fabio Fava, University of Bologna
Prof. Pietro Canepa, University of Genova & Vice-President of INCA

Organized by:

University of Bologna & Consortium INCA

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INTRODUCTION

According to a recent survey, more than 500,000 sites, often former industrial sites, contaminated by organic pollutants and/or heavy metals occur in the European Union (EU). EU candidate states also possess a large number of contaminated lands, often located in areas within or near highly populated cities. Therefore, taken together, these sites constitute an enormous environmental problem which the recently enlarged EU has to take care of in the next few years. To address it, innovative and effective site-monitoring tools and strategies along with remediation technologies capable of combining high decontamination efficiency with low costs and impacts on the site infrastructure and living organisms are necessary. In terms of monitoring, biosensors along with ecotoxicity tests and molecular microbiology measurement techniques have become essential tools to reinforce the modern analytical chemistry tools, as they can offer specific information on the actual toxicity and microbial life occurring at the site. In terms of decontamination technologies, the biological ones, i.e., those that typically exploit the activity of pollutant-degrading site-occurring organisms, are greatly preferred to the chemical and physical technologies currently available on the market, as they fully fit the requirements listed above. Both the biological monitoring tools and in particular the innovative bioremediation technologies consist of a sophisticated combination of different aspects of modern biology, chemistry and engineering sciences, and therefore their design, development, and management require a broad and interdisciplinary background that is often not provided by the current EU University programs. Thus, it is necessary to train young EU researchers and technicians in the field of the design, implementation, assessment and site-specific management of the innovative biological monitoring tools and bioremediation technologies that have been recently introduced into the EU.

The main objective of the School is to provide 25 selected young European scientists, engineers and technicians with a critical overview of the innovative aspects of the bio-chemical and molecular microbiology tools and bioremediation technologies currently available on the international market, along with experienced guidelines on how these tools and technologies can be selected, combined and adjusted to perform an efficient, reliable, sustainable, and cost-effective monitoring and ex-situ and/or in situ restoration of sites contaminated by organic pollutants and heavy metals.

SCHOOL VENUE

All school activities will take place at the Faculty of Engineering of the University of Bologna (Viale Risorgimento 2, 40136 Bologna). Coffee-breaks and lunches will be provided by the facilities existing at the same Faculty. The selected participants will be accommodated in double rooms at the "Erasmus Collegium" located in the old part of Bologna city and about 1 km far from the Faculty of Engineering.

PROGRAM

TUESDAY SEPT. 7, 2004

Introductory remarks

15.00-15.45 Welcome and opening remarks

Prof. Fabio Fava

(Summer School Co-Director, University of Bologna, Italy),

Prof. Guido Masetti

(Dean of the Faculty of Engineering of Bologna),

Prof. Pietro Canepa

(Vice-Director of INCA & Summer School Co-director, University of Genoa, Italy),

Prof. Davide Zannoni

(Chairman of the Italian Society of General Microbiology & Microbial Biotechnologies, University of Bologna).

15.45-16.45 "State-of-the-art" of the contaminated sites in Europe and role of the biotechnologies in their remediation.

Prof. Peter Werner (Technical University-Dresden, Germany)

16.45-17.15 Coffee break

Modern approaches to site characterization

17.15-18.15 Risk Assessment of contaminated sites in the development of the EU Soil Policy

Dr. Francesca Quercia (APAT, Roma, Italy).

18.15-19.15 Biological tools for the soil ecotoxicity evaluation

Prof. Katalin Gruiz (Budapest University of Technology and
Economics, Budapest, Hungary)

Get together party (kindly offered by Ultra Scientific-Italia & MicroBiotech, Italy)

WEDNESDAY SEPT. 8, 2004

Modern approaches to site characterization (continued)

9.00-10.00 Recent bioanalytical tools for the screening of organic and inorganic pollutants

Prof. Aldo Roda (University of Bologna, Italy)

New aspects of bioremediation fundamentals

10.00-11.00 New insights on the aerobic biodegradation of organic xenobiotics

Prof. Enrica Galli (University of Milan, Italy)

11.00-11.30 Coffee break

11.30-12.30 New insights on the anaerobic biodegradation of organic xenobiotics

Prof. Alfons Stams (Wageningen University, The Netherlands)

12.30-14.00 Lunch

14.00-14.30 Poster viewing

14.30-15.30 New approaches to the microbial transformation of heavy metals

Prof. Franco Baldi (University of Venice, Italy)

15.30-16.30 Evolution/construction of new pollutant biodegradation pathways in bacteria

Prof. Walter Reineke (Bergische Universität, Wuppertal, Germany)

16.30-17.00 Coffee break

17.00-18.00 Role of fungi in the remediation of contaminated soil: problems and solutions

Dr. Václav Sasek (Academy of Sciences of the Czech Republic, Prague, Czech Republic)

THURSDAY SEPT. 9, 2004

New aspects of bioremediation fundamentals (continued)

9.00-10.00 Plant potential in the field remediation of inorganic and organic pollutants

Prof. Gian Attilio Sacchi (University of Milan, Italy)

10.00-11.00 Integrated microbial and plant systems in the rhizosphere bioremediation

Prof. Katerina Demnerova (University of Prague, Czech Republic)

11.00-11.30 Coffee break

11.30-12.30 Molecular tools to track complex microbial populations in polluted environment and during reclamation

Prof. Daniele Daffonchio (University of Milan, Italy)

12.30-14.00 Lunch

14.00-14.30 Poster viewing

14.30-15.30 Surveying the biodegradation landscape of polluted sites

Dr. Victor De Lorenzo (Centro Nacional de Biotecnología CSIC, Spain)

15.30-16.30 Assessing and overcoming constraints to bioremediation

Dr. Simon Jackman (FirstFaraday, Oxford, UK)

16.30-17.00 Coffee break

17.00-18.00 Biogenic agents for improving the bioavailability and biodegradation of hydrophobic organic pollutants in soil

Prof. Fabio Fava (University of Bologna, Italy)

FRIDAY SEPT. 10, 2004

Ex-situ bioremediation of contaminated sites

9.00-10.00 Innovative slurry-phase and solid-phase technologies for soil bioremediation

Prof. Nicolas Kalogerakis (Technical University of Crete, Greece)

10.00-11.00 Improvement of the ex-situ bioremediation techniques: the approach by the deep landfarming vs. biopile and standard landfarming approaches

Dr. A. Prandi/ Dr. G. Di Luise (Water & Soil Remediation, Italy)

11.00-11.30 Coffee break

Innovative aspects of in-situ bioremediation

11.30-12.30 Modern in situ clean up biotechnologies

Dr. Peter Middeldorp (TNO Environment, The Netherlands)

12.30-14.00 Lunch

14.00-15.00 Bioaugmentation as a strategy for in situ bioremediation

Prof. Spyros Agathos (University of Louvain, Louvain-la-Neuve, Belgium)

15.00-16.00 Bioventing - an efficient in-situ technology for remediating the vadose zones

Prof. Andreas Loibner (IFA-Tulln, Universität für Bodenkultur Wien, Austria)

16.00-16.30 Coffee break

16.30-17.30 Natural attenuation: principles and applications. Case of the MTBE bioremediation

Prof. Peter Werner (Technical University-Dresden, Germany)

17.30-18.30 Monitoring of natural or enhanced biogeochemical processes in contaminated groundwater.

Prof. Andreas Dahmke (Christian-Albrechts Universität Kiel, Germany)

SATURDAY SEPT. 11, 2004

Innovative aspects of in-situ bioremediation (continued)

8.30-9.30 Bioremediation of unconfined aquifers

Prof. Gijs Breedveld (University of Oslo, Norway)

9.30-10.30 Biobarriers for the management of (chlorinated) hydrocarbon contaminated sites

Dr. Ludo Diels (VITO, Belgium)

10.30-11.00 Coffee break

11.00-12.00 Remediation of chlorinated solvent-contaminated groundwater through in situ cometabolic process stimulation

Prof. Massimo Nocentini (University of Bologna, Italy)

12.00-13.00 Natural attenuation and enhanced natural attenuation of an anaerobic groundwater contaminated by chlorinated solvents

Prof. Marco Petrangeli-Papini (University of Roma, Italy)

13.00-14.30 Lunch

14.30-15.30 Development and in situ implementation of a biological and chemical process for immobilisation of the chromate contained in an industrial ground

Dr. Yannis Ignatiadis (BRGM, France)

15.30-16.30 Bioremediation of heavy metal contaminated sites

Dr. Ludo Diels (VITO, Belgium)

16.30-17.00 Coffee break

Poster section and conclusive remarks

(coordinators: Prof. Pietro Canepa and Prof. Fabio Fava)

17.00-18.30 Selected Poster presentation

18.30-19.00 Panel section and Conclusive Remarks

WHO CAN ATTEND THE SCHOOL

Twenty five young European scientists and engineers possessing a PhD, MS or *Laurea* degree and working at Universities, public and private Research Centers or private Companies can participate in the School. Seven (of the 25) positions are reserved for people from Eastern Europe Countries (Albania, Bosnia, Byelorussia, Bulgaria, Czech Republic, Croatia, Cyprus, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldavia, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, Ukraine). Candidates will be selected on the basis of their *curriculum vitae* and proved experiences in the field objectives of the School. Participants are encouraged to present their activities through one or more posters (1 m x 0,70 m) that will be presented and discussed during the School; a 1-page A4 abstract related to each poster presented should be submitted to the School secretariat (by e-mail, together with the *Curriculum vitae*) as it will be published in the final book of the School presentations.

English is the official language of the School. Papers and other provided documents will be in English.

REGISTRATION

Registration fee is 500 € (+20%VAT) for participants from Western European Countries and 300 € (+20%VAT) for participants coming from Eastern Europe Countries. The registration fee includes: a copy of the teaching material, a copy of the final book (that will be published within 6 months after the end of the School), along with coffee breaks and lunches from Tuesday 7 afternoon to Saturday 11 afternoon and the accommodation of scientists from the 7th to the 12th of September, 2004.

People interested in participating in the school must send an e-mail with their data and *Curriculum vitae* to Mrs. Stefania Evangelisti stefania.evangelisti@mail.ing.unibo.it before June 1, 2004. The selected participants will be reached by e-mail within June 15, 2004, and they have to pay the registration fee (by transferring the due fee to the account that will be indicated in the e-mail message) and send their abstracts before July 1, 2004. Cancellation refunds will be made for written cancellations received by the school secretariat prior to July 15, 2004. No refunds will be made for cancellations after this date, but the final Summer School book will be mailed.

For additional information, participants should contact:

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