



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

# Abstract Book

2<sup>nd</sup> Annual International Symposium on  
**Animal Science & Zoology**  
16-19 July 2018, Athens, Greece

Edited by  
Gregory T. Papanikos

2018



Abstracts  
2<sup>nd</sup> Annual International  
Symposium on  
Animal Science & Zoology  
16-19 July 2018  
Athens, Greece

Edited by Gregory T. Papanikos

First published in Athens, Greece by the Athens Institute for Education and Research.

ISBN: 978-960-598-219-5

All rights reserved. No part of this publication may be reproduced, stored, retrieved system, or transmitted, in any form or by any means, without the written permission of the publisher, nor be otherwise circulated in any form of binding or cover.

8 Valaoritou Street  
Kolonaki, 10671 Athens, Greece  
[www.atiner.gr](http://www.atiner.gr)

©Copyright 2018 by the Athens Institute for Education and Research. The individual essays remain the intellectual properties of the contributors.

# TABLE OF CONTENTS

(In Alphabetical Order by Author's Family name)

<b>Preface</b>		7
<b>Organizing Committee</b>		8
<b>Conference Program</b>		9
<b>1.</b>	<b>Improvement of the Quality of the Tomato (<i>Solanum lycopersicum</i> L.) under the Influence of a Bio Fertilizer of Vegetable Origin</b> <i>Lila Abidi, Sid Ahmed Snoussi &amp; Maria Stela Bradea</i>	14
<b>2.</b>	<b>Climate Change Mitigation Using on-Farm Rainfall Harvesting in Jordan</b> <i>Majed Abu Zreig</i>	15
<b>3.</b>	<b>On <i>Anahemiurus Microcercus</i> Manter, 1947 and <i>Podocotyloides Petalophallus Yamaguti</i> 1934 Trematodes from <i>Epinephelus Guaza</i> Marine Fish from Libya</b> <i>Dayhoum Al Bassel</i>	16
<b>4.</b>	<b>Contamination of Shallow Aquifer's from Oil Field Operation: An Example from Wafra Area, South Kuwait</b> <i>Mohammad Al-Murad</i>	17
<b>5.</b>	<b>Ocean Acidification and Ocean Warming in Arabian Gulf</b> <i>Ahmad Al-Mutairi Saif Uddin &amp; Abdulnabi Al-Ghadban</i>	18
<b>6.</b>	<b>210Po Transfer across the Marine Food Chain: An Example from Arabian Gulf</b> <i>Montaha Behbehani, Saif Uddin &amp; Abdulnabi Al-Ghadban</i>	19
<b>7.</b>	<b>Brazilian Competitiveness and Food Security in the Animal Production Global Market</b> <i>Gustavo Bittencourt Machado</i>	20
<b>8.</b>	<b>Use of Molecular Techniques for Identification the Kind of Nitrate Contamination in Groundwater</b> <i>Angelantonio Calabrese, Vito Felice Uricchio, Massimo Blonda &amp; Claudia Campanale</i>	22
<b>9.</b>	<b>Environmental Assessment for <i>Chirostoma Estor Estor</i> Water Management in Intensive Culture Using a Fuzzy Analytical Hierarchy Process</b> <i>Jose Juan Carbajal Hernandez, José Luis Vázquez Burgos &amp; Luis Pastor Sánchez-Fernández</i>	24
<b>10.</b>	<b>Adolescent Understanding about Climate Change: Opportunities and Challenges</b> <i>Tina Cartwright, Deb Hemler &amp; Paula Magee</i>	25
<b>11.</b>	<b>Centipede Communities as an Integrated Part of a Specific Cultural Landscape</b> <i>Stefan Catalin Baba, Andrei Giurginca, Alexandru Petculescu, Ionuț Cornel Mirea &amp; Dumitru Murariu</i>	27
<b>12.</b>	<b>Veterinary Pharmaceutical Residues in Water Resources and Tap Water in an Intensive Husbandry Area in France</b> <i>Lise Charuaud, Emilie Jardé, Anne Jaffrézic, Thierry Panaget, Maud Billon &amp; Barbara Le Bot</i>	28

13.	<b>Pharmaceuticals Compounds (PCs) in Urban Wastewater (WW) from Developing Countries: Environmental Concentrations and Toxicity</b> <i>Elmyre Cleroil, Evens Emmanuel &amp; Yves Pérrodin</i>	30
14.	<b>Use of Pilou and Shannon Diversity Indexes in Description of Edaphic Fauna in Forests in South</b> <i>Francisco Fambrini &amp; Virginia de Souza Bueno</i>	31
15.	<b>Water Quality Management in the Wildlife Lodge Industry: A Multiple Case Study in South Africa, Namibia and Botswana</b> <i>Jacobus Johannes Grobler &amp; Kevin Mearns</i>	32
16.	<b>Legal and Statistical Framework of Climate Change from the EU and International Point of View</b> <i>Asli Gul Oncel &amp; Theodore Tzanakis</i>	33
17.	<b>Antimicrobial Effect of Electro-Transferred Water Following Exposure to Resonant Circuits</b> <i>Jose Antonio Heredia-Rojas</i>	34
18.	<b>Citalopram at Environmentally Relevant Concentrations Alter Fish Behaviour</b> <i>Pavel Horky, Ondrej Slavik, Tomas Randak, Roman Grabic, Karel Douda &amp; Katerina Grabicova</i>	36
19.	<b>A New Model for Emotional Domestic Cat Meow's Identification via Artificial Intelligence Techniques</b> <i>Ursula Samantha Morales-Rodriguez, José Juan Carbajal-Hernández, César Augusto Hoil-Rosas &amp; Luis Pastor Sánchez-Fernández</i>	37
20.	<b>The Herpetofauna of Western Part of Montenegro, Preliminary Results</b> <i>Lidija Polovic &amp; Natalija Cadjenovic</i>	38
21.	<b>Psychoactive Compounds in the Aquatic Environment and their Effects on Aquatic Organisms</b> <i>Tomas Randak, Katerina Grabicova, Roman Grabic, Pavel Horky, Milos Buric, Martin Blaha, Pavel Kozak &amp; Ondrej Slavik</i>	39
22.	<b>Potential Impact of Climate Change on Ambient Air Pollution Concentrations and Respiratory Hospital Admissions</b> <i>Dawn Roberts-Semple</i>	41
23.	<b>Geological and Geotechnical Study of Badush Dam</b> <i>Varoujan Sissakian, Nasrat Adamo, Nadhir Al-Ansari, Søren Knutsson &amp; Jan Laue</i>	42
24.	<b>Effect of the Irrigation by the Pisciculture Water on the Populations of Earthworms and Nematodes in the Soil</b> <i>Nadia Tirchi &amp; Djezzar Miliiani</i>	43
25.	<b><sup>210</sup>Po Concentration in Dominant Phyto and Zooplanktons in the Northern Arabian Gulf</b> <i>Saif Uddin, Montaha Behbehani &amp; Abdalnabi Al-Ghadban</i>	44
26.	<b>Study on the Contribution of Soil Fauna to Litters Decomposition in the Tundra of Changbai Mountains</b> <i>Haixia Wang</i>	45
27.	<b>Effects of Silicon Application on Growth and Some Physiological Characteristics of Salt-Stressed Faba Bean</b> <i>Ilkay Yavas</i>	46

## Preface

This book includes the abstracts of all the papers presented at the *2<sup>nd</sup> Annual International Symposium on Animal Science & Zoology (16-19 July 2018)*, organized by the Athens Institute for Education and Research (ATINER).

In total 27 papers were submitted by 28 presenters, coming from 17 different countries (Algeria, Brazil, China, Czech Republic, Egypt, France, Haiti, Iraq, Italy, Japan, Kuwait, Mexico, Montenegro, Romania, South Africa, Turkey, and USA). The conference was organized into 9 sessions that included a variety of topic areas such as Marine Biology, Animal Production, Aquaculture, Herpetofauna, Soil Science, Climate Change, and more. A full conference program can be found before the relevant abstracts. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own work. This purpose is in congruence with the overall mission of the association. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven research divisions and 37 research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together. Specific individuals are listed on the following page.

**Gregory T. Papanikos**  
**President**

## **2<sup>nd</sup> Annual International Symposium on Animal Science & Zoology, 16-19 July 2018, Athens, Greece Organizing and Academic Committee**

ATINER's conferences are small events which serve the mission of the association under the guidance of its Academic Committee which sets the policies. In addition, each conference has its own academic committee. Members of the committee include all those who have evaluated the abstract-paper submissions and have chaired the sessions of the conference. The members of the **academic committee** of the 2<sup>nd</sup> Annual International Symposium on Animal Science & Zoology were the following:

1. Gregory T. Papanikos, President, ATINER.
2. Anthony Koutoulis, Director, Natural & Formal Sciences Division and Associate Dean Research, College of Sciences and Engineering, University of Tasmania, Australia.
3. Saif Uddin, Director, Center for Environmental Pollution, Climate & Ecology (CEPCE) & Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait.
4. Tomas de Jesus Guzman Hernandez, Professor and Researcher, Costa Rica Institute of Technology, Costa Rica.
5. Nadhir Al-Ansari, Professor, Lulea University of Technology, Sweden.
6. Majed Abu Zreig, Professor, IPDRE, Tottori University, Japan.
7. Tina Cartwright, Associate Professor, Marshall University, USA.
8. Dawn Roberts-Semple, Assistant Professor, York College, The City University of New York, USA.
9. Akbar Nikkhah, Distinguished Professor, Department of Animal Sciences, University of Zanjan, Zanjan, Iran.
10. Dolores Valentina Mariscal Aguayo, Academic Member, ATINER & Professor, Autonomous University Chapingo, Mexico.
11. Angelantonio Calabrese, Researcher, National Research Council, Water Research Institute (IRSA), Italy.

The **organizing committee** of the conference included the following:

1. Fani Balaska, Researcher, ATINER.
2. Olga Gkounta, Researcher, ATINER.
3. Eirini Lentzou, Administrative Assistant, ATINER.
4. Konstantinos Manolidis, Administrator, ATINER.
5. Kostas Spyropoulos, Administrator, ATINER.

**FINAL CONFERENCE PROGRAM**  
**2<sup>nd</sup> Annual International Symposium on Animal Science & Zoology**  
**16-19 July 2018, Athens, Greece**

**PROGRAM**

Conference Venue: Titania Hotel, 52 Panepistimiou Street, 10678 Athens, Greece

**Monday 16 July 2018**

**08:00-09:00 Registration and Refreshments**

**09:00-09:30 [Welcome and Opening Address](#) (Room A - 10<sup>th</sup> Floor)**

**Gregory T. Papanikos, President, ATINER.**

**09:30-11:30 Session I (Room C - 10<sup>th</sup> Floor): Climate Change**

**Chair:** Angelantonio Calabrese, Researcher, National Research Council, Water Research Institute (IRSA), Italy.

1. [Tina Cartwright](#), Associate Professor, Marshall University, USA, Deb Hemler, Professor, Fairmont State University, USA & Paula Magee, Clinical Professor, Indiana University, USA. Adolescent Understanding about Climate Change: Opportunities and Challenges.
2. Dawn Roberts-Semple, Assistant Professor, York College, The City University of New York, USA. Potential Impact of Climate Change on Ambient Air Pollution Concentrations and Respiratory Hospital Admissions.
3. [Asli Gul Oncel](#), Associate Professor, Galatasaray University, Turkey & Theodore Tzanakis, Judge of Supreme Court, Supreme Civil and Criminal Court of Greece, Greece. Legal and Statistical Framework of Climate Change from the EU and International Point of View.

**11:30-13:30 Session II (Room C - 10<sup>th</sup> Floor): Special Topics I**

**Chair:** Tina Cartwright, Associate Professor, Marshall University, USA.

1. Jose Antonio Heredia-Rojas, Chairman of the Department of Exact Sciences and Human Development, Autonomous University of Nuevo León, México. Antimicrobial Effect of Electro-Transferred Water Following Exposure to Resonant Circuits.
2. [Stefan Catalin Baba](#), PhD Student and Researcher, University of Bucharest and "Emil Racovita" Institute of Speleology, Romania, Andrei Giurginca, Senior Researcher, "Emil Racovita" Institute of Speleology, Romania, Alexandru Petculescu, Senior Researcher, "Emil Racovita" Institute of Speleology, Romania, Ionuț Cornel Mirea, PhD Student, "Emil Racovita" Institute of Speleology, Romania & Dumitru Murariu, Senior Researcher, "Emil Racovita" Institute of Speleology, Romania. Centipede Communities as an Integrated Part of a Specific Cultural Landscape.
3. [Ursula Samantha Morales-Rodriguez](#), Student, Center of Computer Research – National Polytechnic Institute, Mexico, José Juan Carbajal-Hernández, Research Professor, Center of Computer Research – National Polytechnic Institute, Mexico, César Augusto Hoil-Rosas, Student, Center of Computer Research – National Polytechnic Institute, Mexico & Luis Pastor Sánchez-Fernández, Research Professor, Center of Computer Research – National Polytechnic Institute, Mexico. A New Model for Emotional Domestic Cat Meow's Identification via Artificial Intelligence Techniques.
4. [Lidija Polovic](#), Director, The Natural History Museum of Montenegro, Montenegro &

Natalija Cadjenovic, Museum Advisor at Amphibian Collection, The Natural History Museum of Montenegro, Montenegro. The Herpetofauna of Western Part of Montenegro, Preliminary Results.

5. Varoujan Sissakian, Private Consultant Geologist, University of Kurdistan, Iraq, Nasrat Adamo, Consultant, Lulea University of Technology, Sweden, Nadhir Al-Ansari, Professor, Lulea University of Technology, Sweden, Sven Knutsson, Professor, Lulea University of Technology, Sweden & Jan Laue, Professor, Lulea University of Technology, Sweden. Geological and Geotechnical Study of Badush Dam.
6. Saif Uddin, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait, Montaha Behbehani, Associate Research Scientist, Kuwait Institute for Scientific Research, Kuwait & Abdulnabi Al-Ghadban, Principal Research Scientist, Kuwait Institute for Scientific Research, Kuwait. <sup>210</sup>Po Concentration in Dominant Phyto and Zooplanktons in the northern Arabian Gulf.

### 13:30-14:30 Lunch

### 14:30-16:30 Session III (Room B - 10<sup>th</sup> Floor): Water Quality and Pollution

**Chair:** Saif Uddin, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait.

1. Jose Juan Carbajal Hernandez, Research Professor, Centre for Computer Research – National Polytechnic Institute, Mexico, José Luis Vázquez Burgos, Student, Centre for Computer Research – National Polytechnic Institute, Mexico & Luis Pastor Sánchez-Fernández, Research Professor, Centre for Computer Research – National Polytechnic Institute, Mexico. Environmental Assessment for Chirostoma Estor Estor Water Management in Intensive Culture Using a Fuzzy Analytical Hierarchy Process.
2. Angelantonio Calabrese, Researcher, National Research Council, Water Research Institute (IRSA), Italy, Vito Felice Uricchio, Technologist, National Research Council, Water Research Institute (IRSA), Italy, Massimo Blonda, Researcher, National Research Council, Water Research Institute (IRSA), Italy & Claudia Campanale, PhD Student, National Research Council, Water Research Institute (IRSA), Italy. Use of Molecular Techniques for Identification the Kind of Nitrate Contamination in Groundwater.
3. Elmyre Clervil, PhD Student, Université Quisqueya, Haiti, Evens Emmanuel, Professor, Université Quisqueya, Haiti & Yves Péroddin, Professor, Université de Lyon, France. Pharmaceuticals Compounds (PCs) in Urban Wastewater (WW) from Developing Countries: Environmental Concentrations and Toxicity.
4. Lise Charuaud, PhD Student, University of Rennes 1, France, Emilie Jardé, CNRS Research Scientist, University of Rennes 1, France, Anne Jaffrézic, Assistant Professor, UMR SAS, France, Thierry Panaget, Engineer in Charge of Regional Water Policy, Agence Régionale de Santé de Bretagne, France, Maud Billon, Engineer, Regional Environment Directorate Housing Renovation of Brittany, France & Barbara Le Bot, Professor, University of Rennes 1, France. Veterinary Pharmaceutical Residues in Water Resources and Tap Water in an Intensive Husbandry Area in France.
5. Jacobus Johannes Grobler, MSc Student, University of South Africa, South Africa & Kevin Mearns, Professor, University of South Africa, South Africa. Water Quality Management in the Wildlife Lodge Industry: A Multiple Case Study in South Africa, Namibia and Botswana.

**16:30-18:00 Session IV (Room B - 10<sup>th</sup> Floor): Soil Science**

**Chair:** Nadhir Al-Ansari, Professor, Lulea University of Technology, Sweden.

1. Francisco Fambrini, Professor, FESB - Fundação Municipal de Ensino Superior de Bragança Paulista, Brazil & Virginia de Souza Bueno, Professor, FESB - Fundação Municipal de Ensino Superior de Bragança Paulista, Brazil. Use of Pilon and Shannon Diversity Indexes in Description of Edaphic Fauna in Forests in South.
2. Haixia Wang, Doctor, Northeast Normal University, China. Study on the Contribution of Soil Fauna to Litters Decomposition in the Tundra of Changbai Mountains.

**18:00-20:00 Session V (Room B - 10<sup>th</sup> Floor): ATINER's 2018 Series of Academic Dialogues A Symposium Discussion on *The Future of Teaching and Researching in a Global World***

**Chair:** Gregory T. Papanikos, President, ATINER.

1. Michael P. Malloy, Director, Business and Law Research Division, ATINER & Distinguished Professor & Scholar, University of the Pacific, USA. Experiential Learning in the Classroom.
2. Dawn Roberts-Semple, Assistant Professor, York College, CUNY. USA. Next Generation Air Quality Measurement Technologies.
3. Majed Abu-Zreig, Professor, International Platform for Dryland Research and Education (IPDRE), Japan. Jordan University of Science and Technology: Road to the Globe.
4. Juan Martinez Solis, Assistant Professor, Chapingo Autonomous University, Mexico. The Near Future of Agriculture Graduate Programs in Mexico.
5. Nadhir Al-Ansari, Professor, Lulea University of Technology, Sweden. Higher Education in Iraq.
6. Ronald Griffin, Professor, Florida A&M University, USA. Higher Education: Liberalism, Literature, and Law.

**21:00-23:00 Greek Night and Dinner**

**Tuesday 17 July 2018**

**07:45-11:00 Session VI: An Educational Urban Walk in Modern and Ancient Athens**

**Chair:** Gregory A. Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.  
Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

**11:15-13:00 Session VII (Room B - 10<sup>th</sup> Floor): Special Topics II**

**Chair:** Tomas de Jesus Guzman Hernandez, Professor and Researcher, Costa Rica Institute of Technology, Costa Rica.

1. Gustavo Bittencourt Machado, Adjunct Professor, Federal University of Bahia, Brazil. Brazilian Competitiveness and Food Security in the Animal Production Global Market.
2. Nadia Tirchi, Teacher Researcher, Université Djilali Bounaama Khemis Miliana, Algeria & Djeddar Miliani, Université Djilali Bounaama Khemis Miliana, Algeria. Effect of the Irrigation by the Pisciculture Water on the Populations of Earthworms and Nematodes in the Soil.
3. Lila Abidi, Teacher Researcher, Université Djilali Bounaama Khemis Miliana, Algeria, Sid Ahmed Snoussi, Teacher Researcher, University of Blida, Algeria & Maria Stela Bradea, Teacher Researcher, University of Blida, Algeria. Improvement of the Quality of the Tomato (*Solanum lycopersicum* L.) under the Influence of a Bio Fertilizer of Vegetable Origin.

**13:00-14:00 Lunch**

**14:00-15:30 Session VIII (Room B - 10<sup>th</sup> Floor): Marine Biology and Aquaculture**

**Chair:** Majed Abu Zreig, Professor, IPDRE, Tottori University, Japan.

1. Tomas Randak, Head of Laboratory, University of South Bohemia České Budějovice, Czech Republic, Katerina Grabicova, Academic, University of South Bohemia České Budějovice, Czech Republic, Roman Grabic, Academic, University of South Bohemia České Budějovice, Czech Republic, Pavel Horiky, Researcher, Czech University of Life Sciences Prague, Czech Republic, Milos Buric, Researcher, University of South Bohemia České Budějovice, Czech Republic, Martin Blaha, Academic, University of South Bohemia České Budějovice, Czech Republic, Pavel Kozak, Dean of Faculty, University of South Bohemia České Budějovice, Czech Republic & Ondrej Slavik, Academic, Czech University of Life Sciences Prague, Czech Republic. Psychoactive Compounds in the Aquatic Environment and their Effects on Aquatic Organisms.
2. Dayhoum Al Bassel, Professor, Fayoum University, Egypt. On *Anahemiurus Microcercus* Manter, 1947 and *Podocotyloides Petalophallus* Yamaguti 1934 Trematodes from *Epinephelus Guaza* Marine Fish from Libya.
3. Pavel Horiky, Researcher, Czech University of Life Sciences Prague, Czech Republic, Ondrej Slavik, Czech University of Life Sciences Prague, Czech Republic, Tomas Randak, University of South Bohemia in Ceske Budejovice, Czech Republic, Roman Grabic, University of South Bohemia in Ceske Budejovice, Czech Republic, Karel Douda, Czech University of Life Sciences Prague, Czech Republic & Katerina Grabicova, University of South Bohemia in Ceske Budejovice, Czech Republic. Citalopram at Environmentally Relevant Concentrations Alter Fish Behaviour.

**15:30-17:00 Session IX (Room B - 10<sup>th</sup> Floor): Climate Change & Other Issues**

**Chair:** Dawn Roberts-Semple, Assistant Professor, York College, The City University of New York, USA.

1. Majed Abu Zreig, Professor, IPDRE, Tottori University, Japan. Climate Change Mitigation Using on-Farm Rainfall Harvesting in Jordan.
2. Ahmad Al-Mutairi, Research Associate, Kuwait Institute for Scientific Research, Kuwait, Saif Uddin, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait & Abdulnabi Al-Ghadban, Principal Research Scientist, Kuwait Institute for Scientific Research, Kuwait. Ocean Acidification and Ocean Warming in Arabian Gulf.
3. Mohammad Al-Murad, Associate Research Scientist, Kuwait Institute for Scientific Research, Kuwait. Contamination of Shallow Aquifer's from Oil Field Operation: An Example from Wafra Area, South Kuwait.
4. Montaha Behbehani, Associate Research Scientist, Kuwait Institute for Scientific Research, Kuwait, Saif Uddin, Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait & Abdulnabi Al-Ghadban, Principal Research Scientist, Kuwait Institute for Scientific Research, Kuwait. <sup>210</sup>Po Transfer across the Marine Food Chain: An Example from Arabian Gulf.
5. Ilkay Yavas, Lecturer, Adnan Menderes University, Turkey. Effects of Silicon Application on Growth and Some Physiological Characteristics of Salt-Stressed Faba Bean.

**20:00- 21:30 Dinner**

**Wednesday 18 July 2018**  
**Mycenae and Island of Poros Visit**  
**Educational Island Tour**

**Thursday 19 July 2018**  
**Delphi Visit**

**Friday 20 July 2018**  
**Ancient Corinth and Cape Sounion**

**Lila Abidi**

Teacher/Researcher, Université Djilali Bounaama Khemis Miliana, Algeria

**Sid Ahmed Snoussi**

Teacher/Researcher, University of Blida, Algeria

&

**Maria Stela Bradea**

Teacher/Researcher, University of Blida, Algeria

**Improvement of the Quality of the Tomato (*Solanum lycopersicum* L.) under the Influence of a Bio Fertilizer of Vegetable Origin**

Seaweeds bio fertilizers constitute an excellent source of natural fertilizers used in farming. They act on the growth, the development and thus on the quality of the fruit which is an essential criterion for the consumer. The main purpose of the present work is to estimate and to compare the effect of various treatments with a bio fertilizer of vegetable origin, on the organoleptic and technological parameters of the quality of two varieties of tomatoes. The truck-farming tomato (Saint-Pierre) and the industrial tomato (Rio-Grande). For that, roots applications of the bio fertilizer were tested in four doses (25%, 50%, 75%, and 100%) and compared with a control at various periods of development of both varieties of tomatoes. It was noticed that the effect treatment exercises a very remarkable action on the following parameters: Brix, acidity, ratio Brix/acidity and ascorbic acid. The best technological qualities were obtained in the doses of 50%, 75% and 100% for both varieties of tomatoes.

**Majed Abu Zreig**

Professor, IPDRE, Tottori University, Japan

## **Climate Change Mitigation Using on-Farm Rainfall Harvesting in Jordan**

Rainfall harvesting in arid and semi-arid regions increases soil water availability for plant during the growing season, thus increasing crop production. Jordan is facing the most serious water shortages in the Middle East. It is an arid country located east of the Jordan River with a land area of about 90,000km. Contour stone terraces have been widely used by Jordanian farmers in the hilly areas for soil and water conservation purposes. Traditionally, farm lands were subjected to systematic deep plowing to break up the surface rocks and then remove stones for installation of stone terraces.

A new land reclamation method for water harvesting has been experimented in the hilly parts of Jordan that improves the effectiveness of traditional stone terraces. The method consists of designing semi-circular stone bunds randomly based on the micro topography of land. Semicircular bunds were located at areas having deep soil pockets and adequate runoff rocky area and do not require deep plowing with minimum land disturbance. This method minimizes soil erosion and maximizes rainfall harvesting due to the high runoff efficiency from runoff rocky areas and promotes biodiversity. The cost of this method is about 85% less than that of the traditional stone terraces used by Jordanian farmers. Field evaluations showed that semi-circular bunds increased soil moisture in the cropping areas by about 7% compared to control areas. The soil depth in some of the cropping terraced areas increased by about 3 cm at the end of the 2003/2004 rainy season.

**Dayhoum Al Bassel**  
Professor, Fayoum University, Egypt

**On *Anahemiurus Microcercus* Manter, 1947 and  
*Podocotyloides Petalophallus* Yamaguti 1934 Trematodes  
from *Epinephelus Guaza* Marine Fish from Libya**

50 specimens of *Epinephelus guaza* marine fish were collected from Missurata fish market in Libya. 2 different species of trematodes isolated from the intestine of fish were briefly redescribed. *Anahemiurus microcercus* Manter, 1947 and *Podocotyloides petalophallus* Yamaguti, 1934. The parasites were identified to the species level. The highest incidence of infection (94%) was recorded by *Podocotyloides petalophallus* Yamaguti, 1934 and the lowest (20%) by *Anahemiurus microcercus* Manter, 1947. The updated description agreed fully with the original description, but there are certain minor differences in the body shape and some measurements. The present work extends our knowledge about the prevalence of trematode parasites in commercial fish *Epinephelus guaza* in the Mediterranean Sea in Libya. The present work is reported for the first time in Libya.

**Mohammad Al-Murad**

Associate Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

**Contamination of Shallow Aquifer's from Oil Field Operation:  
An Example from Wafra Area, South Kuwait**

The oil abstraction operations result in the production of excess water which is regarded as produced water. The produced water is often discharged into evaporative ponds (EP) and affects the groundwater quality in shallow aquifers. In this study, a case study of South Kuwait is presented, where the groundwater is important since it supports an agricultural area that is considered strategic to meet the local demand of vegetables if imports are curbed due to any reason. This agriculture area is called the Wafra agriculture area, and the adjacent oil field is Wafra oil field. There was a massive EP that spanned over 3.5 km<sup>2</sup> in size and was used to discharge the produced water from Wafra Oil field since the early seventies of the last century.

This study was conducted to assess the impact of produced water on the underground aquifers. Twenty multi-channel wells were constructed, and groundwater samples were collected from these wells and analyzed for total dissolved solids (TDS), major anions and cations, Benzene, Ethylbenzene, Toluene and Xylenes (BETX), and polycyclic aromatic hydrocarbons (PAHs). The results of the analyses show that produced water was saline and had polluted the groundwater in the Wafra area. The salinity of groundwater in the western side of Wafra (adjacent to EP) was 30,000 mg L<sup>-1</sup> in the Lower Kuwait Group aquifer, while in the nonimpacted area the salinity is about 6,000 mg L<sup>-1</sup>.

Due to concerns raised by the environmental authority, the evaporative pond was closed, and as a result, the TDS values started dropping from the peak values of 56,000 mg L<sup>-1</sup> in 2010 to 30,000 mg L<sup>-1</sup> measured in 2016, ensuring the sustainability of the Wafra agriculture area that helps partially meet local vegetable demand. The produced water should be injected back into deeper nonoil producing formation since surface disposal was also leading to soil salinization. As a remediation solution, the treated wastewater should be used for irrigation in Wafra agriculture area this could be a better quality water than the shallow brackish water in Kuwait Group Aquifer.

**Ahmad Al-Mutairi**

Research Associate, Kuwait Institute for Scientific Research, Kuwait

**Saif Uddin**

Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait

&

**Abdulnabi Al-Ghadban**

Principal Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

## **Ocean Acidification and Ocean Warming in Arabian Gulf**

The increasing atmospheric levels of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases have changed the global climate. The most pronounced effects of climate change on the marine environment is the ocean acidification (OA) and ocean warming (OW). The plants by the process of photosynthesis remove CO<sub>2</sub> from the atmosphere both in the terrestrial and marine environment. The most likely removal pathway for CO<sub>2</sub> in arid regions around the world is by aquatic sequestration; the situation is same in Kuwait. Arabian Gulf acts as a major sink in the Gulf, Biweekly measurement of pH and temperature in surface waters of the northern Arabian Gulf over a decade suggest that the Arabian Gulf waters are becoming increasingly acidic and warm with time. The effects of these physico-chemical changes are seen as coral bleaching and frequent fish kill episodes. Supporting evidence for increased CO<sub>2</sub> sequestration comes from increased marine primary productivity over the past decade. There is a need to tackle the issue of OA-OW on an urgent basis to ensure the long-term sustainability of marine ecosystem functioning. The pace of change in the Gulf waters is much higher than most oceanic waters suggesting that the biogeochemical functioning and osmoregulation can be affected in the much shorter span of time.

**Montaha Behbehani**

Associate Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

**Saif Uddin**

Senior Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

&

**Abdulnabi Al-Ghadban**

Principal Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

**<sup>210</sup>Po Transfer across the Marine Food Chain:  
An Example from Arabian Gulf**

The tendency of <sup>210</sup>Po to concentrate in body tissue poses a serious concern of radiological safety. This study compiles available information and presents recent <sup>210</sup>Po data for the marine food web in the northern Gulf waters. Since <sup>210</sup>Po is concentrated in marine biota, a large number of samples of various marine organisms covering several trophic levels, from microalgae to sharks, were analyzed. <sup>210</sup>Po was found to be highly concentrated in several marine species with the highest <sup>210</sup>Po concentrations found in yellowfin tuna, i.e. 37.3-44.9, 451-548, and 1511-1693 Bq kg<sup>-1</sup> wwt in muscle, digestive system and liver, respectively. In most dissected fish samples, <sup>210</sup>Po showed increasing concentrations in the following order: edible tissue, gills, digestive system, liver and fecal matter. Fish feces had <sup>210</sup>Po concentrations several orders of magnitude higher than that in seawater, fish muscle, and the fishes' ingested food. The high <sup>210</sup>Po concentration in fish fecal matter suggests that the bulk of <sup>210</sup>Po content in fish is eventually excreted back into the environment as fecal pellets. In most fish high concentrations were noted in liver, with the highest <sup>210</sup>Po concentration recorded in yellowfin tuna liver. Moreover, <sup>210</sup>Po concentration in the soft tissue of tunicate and bryozoan samples were 872-1012 and 402-527 Bq kg<sup>-1</sup> wwt, respectively, far higher than that in fish muscle (0.04 - 44.9 Bq kg<sup>-1</sup> wwt). It was observed that the maximum <sup>210</sup>Po concentration in edible fish tissue among the fish in trophic level 2 was an order of magnitude lower than those in trophic level 3 and two orders of magnitude lower compared to fish in trophic level 4. The highest concentrations in the muscle tissue were observed in the following order: tunicate>bryozoan>mollusc>crustacean>algae>fish. Among all the biota analyzed, the highest overall concentration of <sup>210</sup>Po was noted in yellowfin tuna (*Thunnus albacores*) indicating a potential biomagnification of <sup>210</sup>Po in this particular top predator species.

**Gustavo Bittencourt Machado**

Adjunct Professor, Federal University of Bahia, Brazil

## **Brazilian Competitiveness and Food Security in the Animal Production Global Market**

In the world, Brazil is an agricultural potency and a great producer in the animal global market. The country is the first exporter of chicken meat and other its industrialized foods; is the second one in the bovine meat and its industrialized foods and the biggest livestock in the world. It is the fourth exporter of swine meat and has enormous potentialities to extend its fish production from aquaculture production to feed its population and to export. Brazil had become a big player in the commodity markets. The classical and historical modernization process is accepted in Brazilian literature, with agricultural credits and agricultural research since the institution of the Empresa Brasileira de Pesquisa Agropecuária (Agricultural Research Brazilian Company), in 1972, as a public enterprise that has grown quickly, becoming the main agricultural research organization in the tropical zone. The Embrapa has developed various technologies for different production systems in the Brazilian diversity of ecosystems and biomes, including, equatorial and tropical forests (Amazon Forest e Mata Atlântica), caatinga (steppe), cerrados (savane), Pantanal Matogrossense and Pampa Gaúcho, fields for cattle breeding systems. The country became an important producer of hone, propolis to export.

The agrarian structure continues to be concentrated so this modernization is known for some researcher as conservator modernization that did not modified the land concentration. This modernization was possible by the green revolution with all technological packages, maintaining the best lands for the big producers. Several agricultural innovations from Embrapa has become possible the soybean producer in tropical regions with acid soils, for example. Brazil is the one of the main soybean producer in the world.

Recently, the world agriculture is changing based on biotechnologies, nanotechnologies, information technologies, precision agriculture, with the augmentation of patents and geographical indications.

Brazilian agriculture is the result of cheap natural resources exploration with successive technological and organizational innovations in the agricultural production systems.

The problem is to combine the animal production expansion and the environmental restrictions, mainly in the Amazon Forest and Cerrados. The productivity augmentation is the target of the researches aiming to avoid the space deforestation. This target consists to combine the environmental and economic perspectives, typical of the double green

revolution. Embrapa develops researches based on green revolution historically, biotechnologies (tendencies), agro-ecologies (tendencies) and double green revolution in less scale in the whole of researches. The private enterprises increased its participation in agricultural research in the world and particularly in Brazil, offering biotechnologies and machines for the farmers, so the public participation in these markets had decreased.

**Angel Antonio Calabrese**

Researcher, National Research Council, Water Research Institute (IRSA),  
Italy

**Vito Felice Uricchio**

Technologist, National Research Council, Water Research Institute (IRSA),  
Italy

**Massimo Blonda**

Researcher, National Research Council, Water Research Institute (IRSA),  
Italy

&

**Claudia Campanale**

PhD Student, National Research Council, Water Research Institute (IRSA),  
Italy

### **Use of Molecular Techniques for Identification the Kind of Nitrate Contamination in Groundwater**

The ecosystems of the underground waters are characterized by the presence of limiting environmental factors (absence of light, limited availability of nourishing, low temperatures, etc.) that characterized the presence of peculiar microbial community well fit for conditions of "extreme" life. The microbial communities in the subsoil mainly consist of bacterias and Archaea, but also of protozoa, fungi and nematodes, and these microbial communities are active and remarkable for the trials bio-geochemical. The present microbial communities in the groudwater are mainly constituted by well adapted eterotrophy to the underground environment (Ghiorse & Wilson, 1988; Madsen & Ghiorse 1993) and they are characterized by the state of hydrological chemistry and geologic heterogeneity of the stratum (Madsen & Ghiorse 1993).

Presence of different factors biotic and abiotic can check in direct or indirect way the microbial difference in the ecosystems. Stability of the bacterial communities is interrupted if there is a contamination of the groudwater. Such change can determine three different dynamics of transformation of the microbial communities present: increase of already determined present bacterial (Cho & Kim, 2000; Baker, 2001; Ro`Ling, 2001; Franzosa, 2004b; Johnson, 2004); developed of new alien bacterial (Cho & Kim 2000); disappearance of some bacterial. The microbial communities of the groundwater develop according to the typology of contamination (point or diffused) and the category of contaminants (C. Griebler and T. Lueders, 2008).

The "standard" procedures of microbial community analysis, or "classical methods", provide for the identification of microorganisms from pure culture isolation, followed by tests that analyze some morpho-physiological and biochemical characteristics. These analyzes are not sufficient to identify most

species of microorganisms and are limited to cultivable species which represent a very small percentage of all species present in nature. Over the last few decades, research into environmental microbiology has shown that microbial communities play a functional role in controlling ecosystems, which cannot be attributed to individual species. For these reasons, new methodologies have been developed that have allowed us to analyze the structure of microbial communities independently of the isolation phase, in order to characterize them as a whole. These techniques, which are based on the biomolecule produced by microorganisms study, they are joining and partly supplanting classical methods (Head et al., 1998).

Molecular diagnosis is generally more sensitive and / or more specific to traditional culture methods and requires shorter time for identification. The gene sequencing of amplified fragments also allows to identify the present bacterial species and to conduct molecular epidemiology studies and phylogenetic analyzes. With specific reference to the definition of the source of nitrate contamination, the identification of the microbiological species present in the groundwater allows to identify the source of contamination. Several studies have shown that certain sources of contamination are related to well-defined bacterial species, in particular anthropogenic contamination can be identified by identification of BIFIDOBACTERIUM (Barrett et al., 2002) and by ENTEROCOCCUS FAECALIS AND FACIUM (Boccia et al., 2002; Eigner et al., 2008), or contamination due to incorrect spillage or manure accumulation can be detected by identifying BACTEROIDES PREVOTELLA, ENTEROCOCCUS AVIUM, ENTEROCOCCUS CASSELI FLAVUS, ENTEROCOCCUS DURANS, ENTEROCOCCUS GALLINARUM, ENTEROCOCCUS HIRAE , ENTEROCOCCUS SACCHAROLYTICUS (Savichtcheva et al., 2006).

For this purpose, a pilot action has been carried out to identify potentially contaminating sources of nitrate in the ground on the whole Apulian territory, distinguishing the origin of nitrate from mineral fertilizers, livestock effluents, urban wastewater, sewage sludge, etc. Consequently, the priority objective of this action was to identify with greater certainty the causes of nitrate contamination by distinguishing the agricultural, livestock or civil source.

With specific reference to the definition of the source of nitrate contamination, the identification of the species present in the environmental matrix (water) of its nucleotide sequences allows to identify the certain source of contamination. Through the recognition bacterial species with their genetic kit, it is possible to determine whether contamination comes from a strictly anthropogenic source (such as untreated septic tanks or sewage sludges) or it comes from an inadequate spread of animal flywheels.

**Jose Juan Carbajal Hernandez**

Research Professor, Centre for Computer Research – National Polytechnic  
Institute, Mexico

**José Luis Vázquez Burgos**

Student, Centre for Computer Research – National Polytechnic Institute,  
Mexico

&

**Luis Pastor Sánchez-Fernández**

Research Professor, Centre for Computer Research – National Polytechnic  
Institute, Mexico

**Environmental Assessment for *Chirostoma Estor Estor* Water  
Management in Intensive Culture Using a Fuzzy Analytical  
Hierarchy Process**

*Chirostoma estor estor* is an endemic and important fish that inhabits the Patzcuaro Lake region, located in Michoacan, Mexico. Overconsumption and ecological problems have endangered this important specie. Governmental organizations have focused on protecting this type of fish, creating new aquaculture technologies based on deep studies about its environment requirements and how it can be cultured. This work, proposes a computational model for water quality parametre assessment in intensive cultured ponds in order to preserve this kind of fish. Dissolved oxygen, pH, total ammonia, non-ionized ammonia, temperature and total dissolved solids were measured because they represent the most critical set of parameters. According to their importance in water quality and negative situations, importance weights have been defined using an analytical hierarchy process. As a result, a water quality indicator provides an evaluation concerning about the good or bad water quality condition generated by critical parameter interactions in intensive ponds. *Chirostoma* farms were assessed in order to improve water management processes in the growth, reproduction and survival of this important fish, preventing its endangered situation and providing an alternative for current fisheries activities.

**Tina Cartwright**

Associate Professor, Marshall University, USA

**Deb Hemler**

Professor, Fairmont State University, USA

&

**Paula Magee**

Clinical Professor, Indiana University, USA

## **Adolescent Understanding about Climate Change: Opportunities and Challenges**

Climate change is an increasingly pervasive global topic but how much of this discussion has accurately translated into understanding and improving students' conceptions? Conceptualizing the small fluctuations associated with long term changes in temperature and precipitation is a daunting task for the general public let alone for the middle-aged adolescent (Harker-Schuch et al., 2013, Lambert et al., 2012). Scientists who study climate change should be familiar with the educational research associated with student understanding to facilitate a stronger connection between content specialists and educators who translate that understanding to the classroom for instruction.

This study examines students' conceptual changes over four years in a region of the US in 2011/2015 and compares these results to student conceptions in the UK and Australia between 1991 and 2001. Forty-seven students from the Appalachian region of the US were surveyed and interviewed in 2011 (phase 1) and again in 2015 (phase 2). The study utilized the survey instrument developed by Boon (2009) which provided the conceptions of 13/14 year olds in the UK (N=351) and Australia (N=389). The US students' understandings were analyzed longitudinally and compared with the published Boon results. Although sampled much earlier (in 1991 and 2001), UK and Australian students scored significantly higher on the climate change questionnaire. Additionally, US students in phase 1 were inconsistent in their knowledge of global impacts and connections between phenomena. After four years of US science instruction (phase 2), US students still did not recognize the benefits of the greenhouse effect, could not accurately identify greenhouse gases, and persistently expressed misconceptions regarding the ozone layer and the greenhouse effect. Only 60% of students in all three countries recognized the impact of using alternative energy to impact greenhouse gases. The relatively low performance by US students should not be surprising since climate change has been missing from their school curriculum. Future studies will determine if the newly adopted Next Generation Science Standards (NGSS) in the US, which incorporate climate change standards, will improve US

students' conceptions bringing them more in-line with UK and Australian students.

This presentation will focus on the following: overview of the research of misconceptions associated with the key climate change topics, the longitudinal research project described above which monitored students changing understanding, and the areas of research in student understanding needed.

**Stefan Catalin Baba**

PhD Student and Researcher, University of Bucharest and "Emil  
Racovita" Institute of Speleology, Romania

**Andrei Giurginca**

Senior Researcher, "Emil Racovita" Institute of Speleology, Romania

**Alexandru Petculescu**

Senior Researcher, "Emil Racovita" Institute of Speleology, Romania

**Ionuț Cornel Mirea**

PhD Student, "Emil Racovita" Institute of Speleology, Romania

&

**Dumitru Murariu**

Senior Researcher, "Emil Racovita" Institute of Speleology, Romania

## **Centipede Communities as an Integrated Part of a Specific Cultural Landscape**

The biodiversity of edaphic organisms represents an integrated part of the specific, but less studied, associative cultural landscapes but in their assessment only the cultural value is assumed to be significant and the natural importance is often ignored. We targeted the Rupestral Assembly from Bozioru Mountains, an area identified as less investigated by our previous analysis of the sampling effort for centipedes on the Romanian territory. The studied site, covered by mixed beech forest, forms the limit between two Romanian ecoregions. The nearest investigated area is Meledic Plateau where the presence of only 4 of Chilopoda was recorded.

A wide spectrum of collecting methodes (direct sampling, soil sampling, barber traps and Winkler leaf litter sampling) to cover all ecological groups of centipedes corroborated with microclimate monitoring and digital mapping in the GIS system, was used. The sampling took place between March and November 2017.

22 species of centipedes were indentified, from all ecological groups (larger, abundant lithobiomorphs, larger, scarcer lithobiomorphs, smaller, soil lithobiomorphs, abundant geophilomorphs, and scarcer geophilomorphs) most of them with European, South-European and Central-European chorotype.

Our study is part of an interdisciplinary research model for the Aluniș-Bozioru cultural landscape, with the development of an online interactive digital product (<http://certo.inoe.ro/web/artemis.php>).

**Lise Charuaud**

PhD Student, University of Rennes 1, France

**Emilie Jardé**

CNRS Research Scientist, University of Rennes 1, France

**Anne Jaffrézic**

Assistant Professor, UMR SAS, France

**Thierry Panaget**

Engineer in Charge of Regional Water Policy, Agence Régionale de Santé  
de Bretagne, France

**Maud Billon**

Engineer, Regional Environment Directorate Housing Renovation of  
Brittany, France

&

**Barbara Le Bot**

Professor, University of Rennes 1, France

## **Veterinary Pharmaceutical Residues in Water Resources and Tap Water in an Intensive Husbandry Area in France**

**Background and objectives:** The continuous use of veterinary pharmaceuticals may represent a diffuse and pseudo-persistent pollution in the environment. This is supported by the fact that veterinary pharmaceutical residues (VPRs) have been detected in natural waters at concentrations ranging from ng/L to µg/L, thanks to advances in analytical methods. Furthermore, there is a public health concern as VPRs may reach drinking water treatment plants, and consequently, the population could be chronically exposed to these compounds.

Brittany is an intensive husbandry area in France. Moreover, 75% of tap water in this region is produced from surface waters, which are very vulnerable to contamination. VPRs can be released into the environment either directly with urine and feces of animals in pastures or during aquaculture activities, or indirectly during the spreading of contaminated manure and slurry.

The project aims at realizing an overview of the contamination (types molecules and levels of concentrations) of water resources and tap water in an area subjected to a high subjected to a strong agricultural pressure.

**Selected sites and sampling strategy:** 25 catchments (23 surface waters and 2 ground waters) used for tap water production in Brittany, located in intensive husbandry watersheds (ARS / DREAL 2013-2015). Sampling strategy's purpose is to reflect variations in veterinary practices, manure/slurry spreading times and water regime (low water or high water) (Jaffrézic et al., 2017). Four sampling campaigns (March 2017, May 2017, September 2017 and January 2018) were carried out on the sites of interest, on water resources and corresponding tap waters (200 samples).

**Methods:** 35 VPRs ranked according to 4 criteria: veterinary practices in Brittany (Soulier et al., 2015, ARS/DREAL 2013-2015), pharmacokinetics, fate in the environment and analytic feasibility (Lise Charuaud Ph.D., 2016-2018). VPRs are analyzed by solid phase extraction, followed by a liquid chromatography separation coupled with tandem mass spectrometry detection.

**Results:** VPRs were quantified in water resources (23 surface waters and 2 groundwater) in 25% (January 2018) to 47% (September 2017) of the samples according to the campaigns. The diversity of quantified molecules was greater during the low water levels period campaign in September (10 different compounds). The quantified concentrations ranged from 5 ng.L<sup>-1</sup> (quantification limit) to 2946 µg.L<sup>-1</sup>, for the antibiotic sulfadiazine in September.

In the corresponding tap waters, VPRs were also quantified in 4% (March 2017) up to 65% (May 2017) of the samples according to the campaigns. Positive samples percentage and diversity of quantified molecules were greater during manure/slurry spreading period in May. Concentrations in tap waters ranged from 5 ng.L<sup>-1</sup> to 211 ng.L<sup>-1</sup>, for the florfenicol antibiotic in September.

**Conclusion:** VPRs have been quantified both in water resources and tap water in Brittany. Thus, the population may be exposed chronically via tap water to those contaminants. To our knowledge, this study in the most complete dataset of contamination by VPRs in France (200 samples), over a long period (about 1 year) and at the scale of an entire region.

**Elmyre Clervil**

PhD Student, Université Quisqueya, Haiti

**Evens Emmanuel**

Professor, Université Quisqueya, Haiti

&

**Yves Pérodin**

Professor, Université de Lyon, France

## **Pharmaceuticals Compounds (PCs) in Urban Wastewater (WW) from Developing Countries: Environmental Concentrations and Toxicity**

Pharmaceuticals and personal care products (PPCPs) are emerging environmental contaminants, whose potential risk for the ecological environment has caused wide attention in recent years. Not only the multiple activities that take place in health centers- hospitals (surgery, drug treatments, radiology, cleaning of premises and linen, chemical and biological analysis laboratories, disinfectants, detergents, drug residues, etc.), but also the modern animal production practices are increasingly large sources of pollution for water resources. In fact, many of these contaminants are found in hospital effluents, in urban effluents and ultimately in water resources. The consumption per person and the occurrence of PCs in waste water in developed countries (USA, China, India, France, UK, and Germany) have been largely identified, these study present an overview. Compare to that the human consumption and the occurrence of PCs in waste water in developing countries like Haiti is very limited, probably due to the relatively limited available data and the informal market of PCs and non-controlled operation of health centers. This study summarized environmental concentrations of PCs and their toxicity with a focus on developing countries, especially in Haiti<sup>1</sup>. Among the PPCPs (antibiotics, analgesics, steroids, antidepressants, antipyretics, stimulants, antimicrobials, disinfectants, fragrances, cosmetics, etc.) this study has focused on the human consumption and the occurrence of two pharmaceuticals compounds (PCs), antibiotics and anti-inflammatory in WW. This article helps understand the general situation and the potential risk of PCs in developing countries especially in Haiti.

---

<sup>1</sup>This data are being processed.

**Francisco Fambrini**

Professor, FESB - Fundação Municipal de Ensino Superior de Bragança  
Paulista, Brazil

&

**Virginia de Souza Bueno**

Professor, FESB - Fundação Municipal de Ensino Superior de Bragança  
Paulista, Brazil

## **Use of Pielou and Shannon Diversity Indexes in Description of Edaphic Fauna in Forests in South**

The recognition and identification of the fauna and flora of an area, in particular a conservation unit, is of fundamental importance to protect and conserve local biodiversity. Agroforestry Systems (AFSs) are forms of use of land or management, in which tree species (fruit and timber) are combined with agricultural crops. When compared to conventional agriculture, AFSs such as advanced systems for supplying green fertilizers, controlling weeds and mainly, recovering and maintaining soil fertility, since it maintains a great variety in the fauna, simultaneously or in temporal sequence promote the economic and ecological benefits. A diversity index is a mathematical measure of species diversity in a community.

Measuring diversity is important in understanding the structure of the community. Diversity indexes are important because they provide more information about a community than just species richness. Diversity indexes also consider the relative abundance of different species and provide information on the rarity of the species, as the number of different species present as well. The biodiversity of edaphic fauna can be measured using statistical parameters derived from the idea of Entropy. In the present work, the following parameters were used: the Pielou index, Pielou Equability, Pielou Equitability and Shannon-Wiener index. Five areas were selected: one for AFS, one Pasture Area, and one Preserved Forest area located at Private Reserve of Natural Heritage (RPPN) Serrinha Farmer (Serrinha Neighborhood - Bragança Paulista city, São Paulo State, Brazil). The fourth place was an area formerly used as a vegetable garden in a basic education school in the same city, and the fifth was an area for eucalyptus (Eucalyptus) in the rural zone of city of Pedra Bela, São Paulo. The area of the greatest biodiversity was the Eucalyptus Plantation, followed by the area of Preserved Forest and Agroforestry. The Pasture area was in fourth place, presenting the largest number of individuals, however, divided into a few groups. The area of lower biodiversity was the area represented by the vegetable garden.

**Jacobus Johannes Grobler**

MSc Student, University of South Africa, South Africa

&

**Kevin Mearns**

Professor, University of South Africa, South Africa

## **Water Quality Management in the Wildlife Lodge Industry: A Multiple Case Study in South Africa, Namibia and Botswana**

Water is one the most important substances on earth as all living organisms require it to survive. It is a vital component for human survival in the form of direct consumption as well as food production. Water is equally important for the tourism industry as water is utilised throughout the tourism value chain for the provision of services to guests. Many tourism lodges in the wildlife lodge industry in South Africa, Namibia and Botswana are in remote areas where little to no infrastructure exists. These lodges are dependent on natural water sources such as rivers, dams and boreholes to supply their water demands. Another significant aspect of the lodges is that staff have to reside on the property due to the lack of nearby housing, roads and public transport. One of the challenges for the lodges is that residing staff have to use the water for domestic purposes and therefor managers have to ensure that the water quality is of such standard that it does not pose health risks for staff and guests. Water quality management in the wildlife lodge industry is one of the most important, if not the most important aspect of the industry. The authors obtained secondary data in the form of water quality analysis done at the lodges across these three countries. The study investigated whether lodges did water quality analysis at source, tap and wastewater discharge. Furthermore, the results of the water quality analysis were subjected to their adherence to the relevant water quality standards of each country. These results provided important information regarding the comprehensiveness of the water quality analysis. The frequency of water quality testing was also determined as this provides a measure of the adherence of lodges to the legal, concession or company requirements as stated in various standards and procedures. The authors concluded that the current systems can be improved to ensure that water quality is managed more sustainably in the wildlife industry. The biggest concern relates to wastewater discharge, where very little water quality at points of discharge is available, this has the potential to cause pollution and ecosystem degradation.

**Asli Gul Oncel**

Associate Professor, Galatasaray University, Turkey

&

**Theodore Tzanakis**

Judge of Supreme Court, Supreme Civil and Criminal Court of Greece,  
Greece

## **Legal and Statistical Framework of Climate Change from the EU and International Point of View**

Climate change is not only ecological circumstance but also related with economy, law, energy, industrial processes and daily life habits. Within the framework of our work, we will first focus on the factors affecting the climate like greenhouse effect, carbon emissions, methane effect, warming in oceans and on different climate change scenarios. A literature review will be given on the first part.

A big effort is made on International and European Law basis for facing the climate change and the rapid environmental consequences. EU member countries accept urgent need for the protection of the environment which plays a great role in climate change. According to Article 174(2) of the E.C Treaty, *“Community policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Community. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay”*

A comprehensive legal approach will be done from the side of EU law and International law on Climate change and environmental law. An extensive information will be given about different conventions and agreements like UN Climate Convention, Paris Convention, Kyoto Protocol, UNFCCC Meetings, The Aarhus Convention and other international Fora. Special attention will be given to the human Rights related with the climate change. And to the sanctions provided on domestic, European and international field. The Study will explore the legal framework on the European and International Jurisprudence.

*Second* aim of our work is also to use statistical methods and tools about climate change. Chosen statistical methods with current statistical data will help to make prediction for the future and to show the trend of global warming as long as the current activities continue. On this view, we will examine if the recommendations that we will develop will be taken in consideration how this trend will be affected.

The legal recommendations and statistical studies will be an important step to prevent climate change.

**Jose Antonio Heredia-Rojas**

Chairman of the Department of Exact Sciences and Human Development,  
Autonomous University of Nuevo León, México

**Antimicrobial Effect of Electro-Transferred Water Following  
Exposure to Resonant Circuits**

Water possesses a number of paradoxical physical qualities in comparison with other substances. It is extremely sensitive to the impact of physical factors, for instance; temperature, magnetic and electric fields, and mechanical effects. Moreover, it has been proposed that water has “memory”. The present study was aimed to evaluate the antimicrobial effect of water samples that were previously electro-transferred with vibrational information of antibiotics on microorganisms as bacteria and parasites. An oscillator of bioresonance (Bicom, versión 4.4 by Regumed - Regulative Medicine Technik GmbH, Germany-) was used for electro-transference. Pure deionized water was treated in the oscillator for 15 minutes using a specific program called “substance to substance transference”. The obtained results indicated that water samples electro-transferred with metronidazole and ceftriaxone vibrational information were capable to inhibit the growth of axenically cultured *Entamoeba histolytica* (100%), and 44% of growth inhibition in *Listeria monocytogenes* cultures when compared with negative controls (non-electro-transferred water). The original chemical antibiotics were used as positive controls in the bioassays. Furthermore, we included in the bioassays sham electro-transferred water samples (water to water transference) as controls. Based in these results, the current study showed evidence for a measurable biological activity induced by electro-activated water samples that somehow acquires, or at least mimics, the antimicrobial properties of the antibiotics metronidazole and ceftriaxone. However, with the results presented in this study, we are not supporting any therapeutic technique nor recommending bioresonance procedures, rather we evaluated an unorthodox behavior of water. More studies are necessary to elucidate the mechanism by which such electro-transferred water resembles the activity of antimicrobial agents. Finally, we consider that today’s biology dominated by the molecular approach developed since about 1940, is suffocated by an immense number of experimental data on molecular aspects of biological functions, which present an extremely fragmented view of the living state. Thus, the holistic approach to biological studies is a complement to the contemporary practice. Field theories, as a central element of holistic models, possibly will be dominant models in the near future. In addition, we believe that it is important to draw the scientific community attention on experimental results obtained by an unconventional approach. Every really new approach is labeled as

unconventional until we fully disclose its mechanism of action. As a matter of fact, in the biological domain we are more acquainted with chemical than with physical approaches, but the last ones, may become the next step in the evolution of pharmacology.

**Pavel Horky**

Researcher, Czech University of Life Sciences Prague, Czech Republic

**Ondrej Slavik**

Czech University of Life Sciences Prague, Czech Republic

**Tomas Randak**

University of South Bohemia in Ceske Budejovice, Czech Republic

**Roman Grabic**

University of South Bohemia in Ceske Budejovice, Czech Republic

**Karel Douda**

Czech University of Life Sciences Prague, Czech Republic

&

**Katerina Grabicova**

University of South Bohemia in Ceske Budejovice, Czech Republic

## **Citalopram at Environmentally Relevant Concentrations Alter Fish Behaviour**

Pharmaceuticals are considered as one of the most important threats for aquatic ecosystems worldwide. Their effects are related to the increasing amount of pharmaceuticals used and to the fact that they are subsequently discharged from the wastewater treatment plants in biologically active form to freshwaters. Especially consumption of antidepressants is increasing nowadays with their reported common occurrence in various systems of aquatic environment. The aim of the present study was to determine the effect of antidepressant citalopram in environmentally relevant concentration on the behaviour of chub *Squalius cephalus*. Laboratory experiments were conducted repeatedly during the six weeks long exposition as well as after the two weeks long depuration period. Comparison of exposed and control fish showed differences in various behavioural characteristics like movement activity, aggressiveness or boldness. Our results suggest that citalopram used for depression treatment in human medicine significantly alter fish behaviour in freshwaters with possible consequences for the whole ecosystems.

**Ursula Samantha Morales-Rodriguez**

Student, Center of Computer Research – National Polytechnic Institute,  
Mexico

**José Juan Carbajal-Hernández**

Research Professor, Center of Computer Research – National Polytechnic  
Institute, Mexico

**César Augusto Hoil-Rosas**

Student, Center of Computer Research – National Polytechnic Institute,  
Mexico

&

**Luis Pastor Sánchez-Fernández**

Research Professor, Center of Computer Research – National Polytechnic  
Institute, Mexico

**A New Model for Emotional Domestic Cat Meow's  
Identification via Artificial Intelligence Techniques**

Animal sounds have been studied in order to find characteristics of their behavior. In this work, a computational model for cat vocalization identification is proposed to recognize moods. According to this, domestic cats were studied, processing their different sound signals belonging to several cat situations (fear, anger, hunger and happiness). In measured signals, environmental noise was removed in order to increase effectiveness in the classification process. Cat vocalization patterns were extracted using spectral estimation; it allows differentiate particular type of vocalizations. Additionally, a similarity function to compare cat vocalizations was developed, excluding useless patterns that introduce computational problems in the learning phase of a classifier. Then, a Lernmatrix model was used for establishing pair associations between sounds and moods. Experimental results show a good performance of the models where a high vocalization rates were obtained. This model emerges as a suitable tool that can be helpful in animal care.

**Lidija Polovic**

Director, The Natural History Museum of Montenegro, Montenegro  
&

**Natalija Cadjenovic**

Museum Advisor at Amphibian Collection, The Natural History Museum  
of Montenegro, Montenegro

## **The Herpetofauna of Western Part of Montenegro, Preliminary Results**

In this paper we present preliminary results of study conducted in western part of Montenegro, close to the border with Bosnia and Hercegovina. This part of the country can be considered as poorly explored regarding herpetofauna. This region is under the influence of Mediterranean climate, characterized by communities of the sub-Mediterranean and Mediterranean vegetation.

The data were collected during field surveys in 2016, 2017 and 2018. The specimens were mostly directly observed, but some of them were captured and released in the study area after determination.

In the study area we recorded 6 species of amphibians: *Lissotriton vulgaris graecus*, *Bombina variegata*, *Bufo bufo*, *Bufo viridis*, *Hyla arborea*, *Pelophylax ridibundus* and 17 species of reptiles: *Testudo hermanni*, *Lacerta viridis*, *Lacerta trilineata*, *Podarcis muralis*, *Podarcis melisellensis*, *Algyroides nigropunctatus*, *Dinarolacerta mosorensis*, *Dalmatolacerta oxycephala*, *Pseudopus apodus*, *Natrix natrix*, *Natrix tessellata*, *Hierophis gemonensis*, *Dolichophis caspius*, *Zamenis longissimus*, *Elaphe quatuorlineata*, *Malpolon insignitus*, and *Vipera ammodytes*.

**Tomas Randak**

Head of Laboratory, University of South Bohemia České Budějovice,  
Czech Republic

**Katerina Grabicova**

Academic, University of South Bohemia České Budějovice, Czech  
Republic

**Roman Grabic**

Academic University of South Bohemia České Budějovice, Czech Republic

**Pavel Horky**

Researcher, Czech University of Life Sciences Prague, Czech Republic

**Milos Buric**

Researcher, University of South Bohemia České Budějovice, Czech  
Republic

**Martin Blaha**

Academic, University of South Bohemia České Budějovice, Czech  
Republic

**Pavel Kozak**

Dean of Faculty, University of South Bohemia České Budějovice, Czech  
Republic

&

**Ondrej Slavik**

Academic, Czech University of Life Sciences Prague, Czech Republic

## **Psychoactive Compounds in the Aquatic Environment and their Effects on Aquatic Organisms**

Pharmaceuticals (PhACs) is one of the important groups of emerging environmental contaminants that are extensively and increasingly being used in human and veterinary medicine. Pharmaceuticals are excreted unchanged or as metabolites into sewage water. Not all of these compounds are removed during treatment processes and they enter to aquatic environment. Thus aquatic organisms are unintentionally exposed to a mixture of pharmaceutical residues in their natural habitats. While PhACs toxicity for mammals is studied in depth, reports on ecotoxicity and especially ecological effect of these highly biologically potent compounds are underrepresented. Some groups of PhACs such as antidepressants, psycholeptics, anxiolytics, analgesics, opioids, illicit drugs, etc. are designed to impact pathways in human brain. The presence of these psychoactive compounds in the aquatic ecosystem can result in behavioural changes of exposed animals associated with e.g. predator-prey relationships, social traits, reproduction, migration strategy. The aim of our project was to assess the occurrence of wide spectra of psychoactive compounds and some their metabolites in real sites of aquatic environment of the Czech Republic and to study effects of selected compounds (sertraline, citalopram, tramadol, methamphetamine,

venlafaxine, oxazepam) at environmentally relevant concentrations on behaviour of exposed aquatic organisms (fish, crayfish, dragonfly nymphs) in laboratory conditions. The groups of testing organism were exposed to single compound or mixture during defined times before the behaviour testing. The reactions of exposed organisms to different impulses were compared to non-exposed (control) animals. The records of camera systems and PIT tag systems monitored movement activity were used for the experiments evaluation. The results obtained in our studies have demonstrated that many target compounds is present not only in water but also in fish (e.g. sertraline, citalopram, mirtazapine). The sertraline accumulates in fish tissues especially in the brain. The results of laboratory studies suggest significant influence of environmentally relevant concentrations of the most of tested compounds (esp. methamphetamine, sertraline and citalopram) on selected behavioural characteristics of tested organisms. Further research is needed to provide information about potential ecological effects related to presence of psychoactive compounds in aquatic environment.

**Dawn Roberts-Semple**

Assistant Professor, York College, The City University of New York, USA

**Potential Impact of Climate Change on Ambient Air  
Pollution Concentrations and Respiratory Hospital  
Admissions**

Ambient concentrations of ground level ozone (O<sub>3</sub>) and its key precursors, nitrogen oxides (NO<sub>x</sub>), were observed at levels below federal standards. We examine the meteorological dependence of NO<sub>x</sub> and O<sub>3</sub> for respiratory health outcomes. The objective was to assess adverse health effects of O<sub>3</sub> and NO<sub>x</sub> concentrations that may be associated with regional climate change. These were analyzed through path analytic models by using stepwise multiple regressions and bivariate correlations. Increases in O<sub>3</sub> and NO<sub>x</sub> were associated with respiratory hospital admissions (RHA). The lowest hospital admissions occurred at the lowest NO<sub>x</sub> concentrations and corresponded to months with maximum photochemical activity. RHA were higher in the fall, winter and spring than in summer. There was a positive relationship between RHA and personal exposure to NO<sub>2</sub> ( $r=0.359$ ) and NO<sub>x</sub> ( $r=0.317$ ) over the short-term. With one unit increase in O<sub>3</sub>, RHA increased by 0.7 (95% CI: 0.254, 1.23) at 2 lag days and 0.5 (95% CI: 0.107, 0.969) with one unit increase in NO<sub>x</sub>. RHA were distinguished by high O<sub>3</sub> concentrations in the summer at lag intervals. Unlike O<sub>3</sub>, NO<sub>x</sub> did not show consistent seasonal behavior. This study provides evidence that climate change may strongly influence chemical processes in the atmosphere to warrant additional plans for protection against respiratory illnesses. Future climate change may increase O<sub>3</sub> concentrations through photochemical processes that can exacerbate respiratory diseases and reduce lung function in the long- and short-term, respectively. This may be an incentive to incorporate control strategies in the assessment of air pollution effects, aiming to reduce levels by setting improved air quality standards in regions vulnerable to future climate variability.

**Varoujan Sissakian**

Private Consultant Geologist, University of Kurdistan, Iraq

**Nasrat Adamo**

Consultant, Lulea University of Technology, Sweden

**Nadhir Al-Ansari**

Professor, Lulea University of Technology, Sweden

**Sven Knutsson**

Professor, Lulea University of Technology, Sweden

&

**Jan Laue**

Professor, Lulea University of Technology, Sweden

## **Geological and Geotechnical Study of Badush Dam**

Tigris and Euphrates Rivers are the two main rivers of Iraq. The Tigris flows from Turkey inside Iraq from the northwest to the southeast dissecting the whole Iraqi territory and the capital Baghdad. A very large earth fill dam was constructed on the River Tigris; called Mosul Dam. It is the largest dam in Iraq and one of the largest in the Middle East. The geological conditions in the dam site and near surroundings are not suitable due to thick exposures of karstified gypsum rocks, which extend deep down into the foundations. Accordingly, Mosul Dam suffers; since the construction and hitherto from serious problems due to the presence of karstified soluble rocks; therefore, many suggestions were considered to protect Mosul Dam from collapsing. Among those suggestions was the construction of Badush Dam downstream as a protection dam.

The geological conditions at Badush Dam site are similar to as those at Mosul Dam site, which means the foundations of the dam, are located on karstified gypsum beds also. Grouting works were planned and designed, and they were partly performed; And about (30 - 40) % of the whole work items were from the beginning of the construction in 1988 until the works in the dam were suspended in 1991.

In this study, we have discussed whether Badush Dam can be a protection dam to protect the population and infrastructure downstream of Mosul Dam; or can it be remodeled to become a normal storage dam to replace Mosul Dam. Moreover, what will be the consequences if its construction will be continued as a normal storage dam?

**Nadia Tirchi**

Teacher Researcher, Université Djilali Bounaama Khemis Miliana, Algeria  
&

**Djezzar Miliani**

Université Djilali Bounaama Khemis Miliana, Algeria

### **Effect of the Irrigation by the Pisciculture Water on the Populations of Earthworms and Nematodes in the Soil**

The abundance of the animal populations in soil can be influenced by irrigation as well as the source of the irrigation water. This survey consists to the assessment of the effect of the irrigation by the pisciculture water, used in the setting of the integration of the pisciculture to agriculture, on the densities of the populations of earthworms and nematodes in soil. The test has been achieved in full field: a plot of land has been divided in four under plots, two have been cultivated in peas and the two others have been cultivated by bean. For the two cultures, one of the under plots has been irrigated by the pisciculture water and the other has been irrigated by the water of boring (serving like a control). To estimate the abundance of the populations of the both groups of animals in both under plots for the two cultures, sampling has been done before the implementation of the culture (before the irrigation) and at the approach of the harvest (to see the effect of the irrigation). Methods of sampling and extraction appropriated were used for every group of animals. The results revealed that earthworms are positively affected by the pisciculture water since, their abundance and their biomass were significantly more elevated in the under plots irrigated by the pisciculture water in comparison to the under plots irrigated by the water of boring for the two cultures, Two groups of nematodes have been studied: cyst nematodes and the free living nematodes. The first were not significantly affected by this type of irrigation. However, for the second group, we noted a negative effect only in the plot of land cultivated in bean.

**Saif Uddin**

Senior Research Scientist, Kuwait Institute for Scientific Research, Kuwait

**Montaha Behbehani**

Associate Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

&

**Abdulnabi Al-Ghadban**

Principal Research Scientist, Kuwait Institute for Scientific Research,  
Kuwait

**<sup>210</sup>Po Concentration in Dominant Phyto and Zooplanktons in  
the northern Arabian Gulf**

Marine phytoplankton is a primary producer in the ocean that forms the base of the marine food web and supports the pelagic food chain. The two dominant groups of phytoplankton observed in northern Gulf waters are diatoms and dinoflagellates. While the most abundant metazoans are Copepod, that form a vital food chain link between the primary producers the phytoplankton and fish. This study presents some baseline levels and concentration factors in these group of biota.

The concentration of <sup>210</sup>Po among diatoms varies between 6.99 - 11.4 Bq kg<sup>-1</sup> wwt, whereas a higher concentration range of 8.51 - 15.41 Bq kg<sup>-1</sup> wwt was observed among dinoflagellates. The diatoms analyzed includes *Thalassiosira spp.* - 10.2 - 11.4 Bq kg<sup>-1</sup> wwt; *Chaetoceros spp.* - 6.99 - 7.14 Bq kg<sup>-1</sup> wwt; *Rhizosolenia spp.* - 9.12 - 9.95 Bq kg<sup>-1</sup> wwt. The analyzed dinoflagellate genera include *Gymnodinium spp.* - 8.51 - 8.78 Bq kg<sup>-1</sup> wwt; *Noctiluca spp.* - 15.2 - 15.4 Bq kg<sup>-1</sup> wwt; and *Karenia spp.* - 14.1 - 14.9 Bq kg<sup>-1</sup> wwt. The concentration of <sup>210</sup>Po in six dominant species of copepod in Gulf water, including *Subeucalanus flemingeri*, *Parvocalanus crassirostis*, *Acartia pacifica*, *Calanopia elliptica*, *Acrocalanus gibber*, and *Euterpina acutifrons* were 151.26 - 158.79 Bq kg<sup>-1</sup> wwt, 121.10 - 129.53 Bq kg<sup>-1</sup> wwt, 51.23 - 54.91 Bq kg<sup>-1</sup> wwt, 38.88 - 40.09 Bq kg<sup>-1</sup> wwt, 38.07 - 38.29 Bq kg<sup>-1</sup> wwt, and 33.46 - 36.50 Bq kg<sup>-1</sup> wwt respectively.

The <sup>210</sup>Po concentration in seawater shows a seasonal variation, with a higher concentration range of 0.70 and 0.58 mBq L<sup>-1</sup> during summer and autumn, whereas a lower range in concentration of 0.38 and 0.30 mBq L<sup>-1</sup> occurring during winter and spring. The resultant computed concentration factors vary between 2\*10<sup>4</sup> - 5\*10<sup>4</sup> among the phytoplankton and 8\*10<sup>4</sup> - 5\*10<sup>5</sup> among the calanoid copepods i.e. an order of magnitude higher than the phytoplankton demonstrating a significant <sup>210</sup>Po enrichment in the base of the pelagic food chain.

**Haixia Wang**

Doctor, Northeast Normal University, China

## **Study on the Contribution of Soil Fauna to Litters Decomposition in the Tundra of Changbai Mountains**

Material cycling and energy flowing are the basic process of ecosystem and maintain the stability and balance of ecosystem. Litter decomposition is the main way of material cycling and nutrient supply in natural ecosystems. As a typical representative of alpine tundra, Changbai Mountain's Tundra plays an important role in maintaining the stability and running of the tundra ecosystem. As the participant, the functions of soil fauna cannot be neglected in litter decomposition and nutrient release. At present, the study of the contribution of soil fauna to litters decomposition in Changbai Mountain tundra has not been reported yet. In order to reveal the contribution of soil fauna on vegetation litters decomposition in Changbai Mountain tundra, in this paper, the dominant species, *Vaccinium uliginosum* and *Dryas octopetala var. asiatica*, were selected as the research object. And from setting different mesh sizes of litterbags (2mm and 0.01mm) with the litters of *Vaccinium uliginosum* and *Dryas octopetala var. asiatica*, the functions of soil fauna to litters decomposition was studied. The test results showed that the decomposition rates of different species litter were different. In prophase, the decomposition rate of *Vaccinium uliginosum* litter was faster than *Dryas octopetala var. asiatica* litter. The decomposition rate in 2mm mesh size litterbags were significantly faster than in 0.01mm. Based on above, the meso-micro soil fauna played an important role in litter decomposition. In different interannuals and seasons, the cumulative decomposition quantity and the individual density and the group density of soil fauna in different litterbags were different. For the calculation results, we found that the contribution of meso-micro soil fauna to the decomposition of litter was obvious in the middle and later periods.

**Ilkay Yavas**

Lecturer, Adnan Menderes University, Turkey

### **Effects of Silicon Application on Growth and Some Physiological Characteristics of Salt-Stressed Fava Bean**

Salinity is one of the major environmental stress all around the world which seriously threatens crop productivity because of the hinder plant growth. And, the problem of salinization is increasing steadily. Silicon is known to ameliorate the deleterious effects of abiotic stress on plant growth. This study investigated the application of silicon (Si) on the growth and physiology of faba bean under salinity conditions. After 30 days of growth faba bean seedlings were applied 4 different saline applications (50, 100, 150 mM NaCl). One week after of the salt application, foliar silicon application (2 mM) was carried out using sodium silicate. Salinity stress decreased faba bean growth by increasing the salinity levels. Besides, chlorophyll index values were reduced with increasing salt concentrations. During salinity stress, Si prevented oxidative damage by increasing the activities of antioxidant enzymes. Overall, the results illustrate that Si application induced resistance against salinity stress in faba bean by regulating the physiology and antioxidant metabolism.