JOINT INTERNATIONAL TOXICOLOGY CONFERENCE

"Searching for African Solutions to Human and Environmental Toxicological Challenges"

MAY 31—JUNE 3, 2011
UNIVERSITY OF BUEA, CAMEROON

Abstract booklet & Final Program
Cover image: Donated by SETAC – Europe
Back cover: Mount Cameroon overseeing the University of Buea Campus
Dear Colleagues,

On behalf of the Organising Committee, I will like to welcome you to Cameroon and specifically Buea, a colonial town located on Mount Cameroon. This is the first time such an international toxicology conference is holding in Cameroon and Central Africa in general. I hope that the Meeting will fulfill your aspirations.

This Book of Abstract is nourishing and includes abstracts in virtually all aspects of toxicology: Environmental Toxicology whose abstracts show how toxicants affect our environment; Aquatic Toxicology which deals with toxic substances affecting our marine and freshwater life; Pesticides Toxicology which shows how damaging some pesticides are despite their importance in enhancing our agricultural yields; Analytical Toxicology which measures the quantity of toxicants in our environment and living species; Veterinary Toxicology which talks of toxicants affecting our domestic animals and its products; Clinical Toxicology which tells us the effects of poisons and its treatment in humans; Descriptive Toxicology which describes the acute, subacute, subchronic and chronic effects of toxicants on animals; Occupational Toxicology which reveals the health effects of toxicants found in our workplaces; Reproductive Toxicology which looks at the effects of toxicants on our reproductive processes and finally, Regulatory Toxicology which informs us of the limits acceptable to human exposure.

In addition to these scientific activities, we shall have the opportunity of meeting each other and listening to experienced scientists in a myriad of fields. We shall come to appreciate how the government brings about the regulation of toxic substances into their various countries with emphasis on Cameroon.

Buea University will offer you the arena through which you can network with colleagues and exchange notes on various aspects of toxicology.

This conference will be unique as various local and international toxicology associations will be showcasing their activities in the areas of Toxicology.

We in CSTS, SETAC and NEF are very delighted to see you in this conference and please, make it a memorable event in your historical diary.

Sincerely,

Dr Asongalem Emmanuel Acha
(Local Organising Chair)
A perspective to this joint SETAC Africa/CSTS conference

By Dr Patricia Bi Asanga FAI

(SETAC Africa Council member and representative in the Local Organising Committee)

It is my greatest pleasure to welcome all of you who have made it to this very important international toxicology conference, which, as you know, is jointly organised by CSTS and SETAC Africa, in association with NEF. I am a CSTS founding member as well as a SETAC Africa council member who represented SETAC Africa in the local organising committee.

It is not a coincidence that SETAC associated with CSTS in organising this conference. The collaboration between SETAC and CSTS goes back to 2007 when, just one year after its birth CSTS organised its first scientific meeting in Buea supported financially by SETAC Europe and attended by both the SETAC Africa president, Prof Yogi Naik and SETAC Europe Vice President, Prof Paul van den Brink. During that meeting they worked together to offer two short courses. CSTS and SETAC continued to work closely together and this led to even greater financial support by SETAC Europe to the second CSTS scientific conference organised at the University of Dschang in August 2009. Again, Prof Paul van den Brink attended the meeting in person, giving lectures and offered a short course. One of the major outcome of that meeting was the formation of SETAC Central and West Africa regional chapters with the co-ordinators being Dr Patricia Fai and Prof. Orish Orisakwe respectively. This decision was adopted at the 4th SETAC Africa meeting in Kampala Uganda later that same year (November 2009). I was elated when during the SETAC Africa general assembly in Kampala my proposal for the next SETAC Africa conference to be held in Cameroon jointly with CSTS was accepted. The CSTS executive council also welcomed with joy this opportunity to collaborate with SETAC in such a high profile meeting. This would be the first SETAC Africa meeting to take place outside the Southern or Eastern Africa Region and we are proud to be the hosts.

Organising this meeting has been a huge challenge and I must admit that I had moments of doubt. However, thanks to the encouragement and support of so many individuals and organisations this has become a reality. I want to use this opportunity to thank everyone who has worked tirelessly with us to make this dream come true. First of all I wish to thank the SETAC Global Executive Director, Mike Mozur who, in addition to giving financial support to this meeting, backed us all the way and even sponsored me to the SETAC North America meeting in Portland where I could publicise this meeting. I am also thankful to the SETAC World Council (SWC), especially Prof Paul van den Brink (SWC President), Dr Fred Heimbach (SWC Treasurer) for their constant support and encouragement. I am particularly thankful to the Finance committee of the SWC for their tremendous financial assistance without which gave this conference a great boost. My sincere gratitude also goes to the entire SETAC Europe staff, including Dave Arnold - the Executive Director, Katrien Arijs, Barbara Koelman, Daniel Hatcher, Rita De Koninck and Veerle Vandevibeir for their untiring support of us throughout the preparations for this meeting. In addition to SETAC Europe’s financial support, they were involved in the day to day planning which involved creating and managing our conference website, managing online abstract submission and registration, advertising our conference during other SETAC events as well as updating us regularly on the state of affairs I am also grateful to the SETAC Africa council, especially the President, Prof. Micheal Kishimba and his Vice, Prof Nabil Bashir from whose experience we benefited greatly. My appreciation also goes to all our distinguished invited speakers and course lecturers as well as our sponsors, particularly OPCW and SOT. This is by no means an exhaustive list. Many other individuals and organisations assisted us and I am grateful to them. Finally, I thank all participants who have endeavoured to attend this conference. Without you, all our efforts would have been in vain. My fervent wish is that everyone feels very much at home, get to know each other and participate actively in the various sessions so that we can have fruitful discussions during this conference and in the end arrive at a conference resolution that will guide us towards the solutions to our toxicological problems and a way forward for our continent, Africa. I also hope that this conference will move SETAC Africa closer to its goal of becoming a Geographic Unit.

Dr Patricia Bi Asanga FAI
Local Organising Committee

Dr. Emmanuel Acha ASONGALEM (Chair, LOC)
Dr. Clement Jules Nguedia ASSOB (Vice Chair LOC and Chair, Scientific Committee)
Dr. Jane Francis AKOACHERE (Secretary)
Dr. Patricia Bi-Asanga FAI (Chair, Publicity and Fundraising Committee)
Mr William Gana FOMBAN (Chair, Accommodation and Transportation)
Dr. Marjorie AGBORAW (Chair, Program and Documentation)

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Prof Micheal kishimba (President, SETAC Africa) - Tanzania
Prof. Nabil Bashir (Vice President, SETAC Africa) – Sudan
Dr Aviti Mmochi (Treasurer) – Tanzania
Dr Silke Bollmohr (Secretary) – South Africa
Prof Bernard Kiremire – Uganda
Prof Yogeshkumar Naik (Past President) - Zimbabwe
Dr. Patricia Bi Asanga FAI – Cameroon
Prof Mohammad Abdel-Hamid – Egypt
Dr Norah Basopo - Zimbabwe
Mr Ammar Sorag (Student Representative) - Sudan

SETAC Regional/Country Representatives
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E. O. ORISAWKE (SETAC West Africa) – Nigeria
FRAZER-WILLIAMS (Sierra Leone)
Naré R-W Alice (Burkina Faso)
N. Bashir (Sudan)
N. Basopo (Zimbabwe)
S. Adu-Kumi (Ghana)
S. Bollmohr (South Africa)
P. Fai (Cameroon)
A. Mmochi (Tanzania)

SETAC International Advisory Committee:
M. Mozur (USA) M. Åkerblom (Sweden)
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Mr. William Gana FOMBAN (President)
Dr. Marjorie AGBORAW (Secretary General)
Mr. Napoleon CHI (Treasurer)

CSTS International Advisory Committee
Dr. Kenneth OLDEN (USA)
Dr. John S.L. FOWLER (UK)
Dr. Philip JUDSON (UK)
Elliott GRAHAM (USA)
Dr. Orish Ebere ORISAKWE (Nigeria)
Attire
The official attire for the conference is business casual. However, coats and ties can be worn. The weather shall be wet and possibly cloudy with a temperature of above 20°C.

Badges
Those who register before May 15 2011 will have their badges and registration materials at the registration desk. On-site registration will require some delay in the production of these materials. This will require filling the registration form and presenting it to the registration team.

Climate and host venue
Buea is generally conducive in June with a temperature between 25-31°C. University of Buea is at the heart of Buea and located at the foot of Mount Cameroon which is the second highest in Africa and the highest in West Africa. Mount Cameroon is an active volcanic mountain which has witnessed recent eruption, the region also has one of the untempered ecosystem due to it’s hilly nature. University of Buea was created in 1993 and was the former campus if Advanced School of Translators and Interpreters (ASTI). It has a population of 14500 students with 7 Faculties and 2 schools.

First Aid and Emergency services
The University has a health Center headed by qualified medical surgeon. In case of any emergency, two reference hospitals are located in Douala, which about 65Km from Buea.

Food services
Conference registration fees includes all coffee and lunch breaks

Housing Information and reservations
The conference organizers have reserved some rooms for the attendees at discount rates. In case you have problems booking for your hotels contact Dr. ASSOB, Jules Clement Nguedia (Email: juleclement@yahoo.fr; Tel: +237 99629452).

Internet access
Wireless Internet Access in the University of Buea is through RINGO Cameroun which operates WiFi. For those who have PCs, you need to buy a RINGO card at the cost of 5000F CFA or $12.5.00 to be used within the campus ONLY for a month. In case the credit is used, refill cards are available for 1000F ($2.50), 2000F ($5.00) and 5000F ($12.50). There will also be an Email Corner for those who do not require buying a card. Remember, that is payable.

Letter of attendance
If you require a letter of Attendance for the Conference not Short courses, please inform the registration desk.

Loss and found
Please, any loss and found articles should be handed over to the information desks located at the entrance RIGHT ENTRANCE of Amphi 150 C. Always check for this missing items at the mentioned desk.

Photography policy
As courtesy requires, we appreciate that photography of presenters is prohibited without the consent of that presenter. Cell phones and other electronic devices should be put in silence.

Registration desk
Registration will begin from the 31st of May 2011 as of 8.00 till 4.00 at the Conference Secretariat, Faculty of Health Sciences, behind Amphi 150 C, one of the venues of the conference.

Safety and Security
Demonstrations are rare in the campus. However, in case it occurs, the venue shall be changed immediately. Always carry your conference badge along wherever you go. The campus has its security agents and the police are located very close to the campus. Buea is a safe town. However, to avoid opportunistic thieves take sensible precautions like: in the night avoid walking alone and do not talk to someone on the street you do not know. All enquiries should be addressed at the information desk; hold your bags tight.

Tour information
In case, you need to carry out a tour other than that specified by the conference organizers, contact Information Desk. All tours organized by the conference organizers will begin and terminate at the University of Buea Junction.

Transportation
International participants will be transported from Douala International Airport to their hotels/conference venue. Do send your itineraries as soon as possible to Mr Fomban William (Tel: 77772222; Email: wgfomban@yahoo.com) for inclusion in the bus shuttle arrangements. In case you need to rent a car, also contact him for more details. Taxis in Buea are painted yellow and do pick and drop services. No other urban transport services are available.

Social events
In the evening of 2nd June 2011, we shall have a cultural evening in Amphi 150C. This occasion is to show the various cultures and heritage of Cameroonian. It shall be open to all participants of the conference.

Message and information corner
This will host flyers for future Toxicology conference or any other relevant information for the participants.
ANAPF = Analytical Toxicology Platform presentation
ANAPO = Analytical Toxicology Poster presentation
AQUUPF = Aquatic Toxicology Platform presentation
AQUUPO = Aquatic Toxicology Poster presentation
CLIPF = Clinical Toxicology Platform presentation
CLIPO = Clinical Toxicology Poster presentation
CURPF = Current Issues in Toxicology Platform presentation
DESPF = Descriptive Toxicology Platform presentation
DESPO = Descriptive Toxicology Poster presentation
ENVPF = Environmental Toxicology Platform presentation
ENVPO = Environmental Toxicology Poster presentation
GENPF = Genetic Toxicology Platform presentation
MIDPF = Mixed Discipline Platform presentation
MIDPO = Mixed Discipline Poster presentation
OCCPO = Occupational Toxicology Poster presentation
PESPF = Pesticide Toxicology Platform presentation
PESPO = Pesticide Toxicology Poster presentation
PREPF = Predictive Toxicology Platform presentation
REGPF = Regulatory Toxicology Platform presentation
REGPO = Regulatory Toxicology Poster presentation
REPPF= Reproductive Toxicology Platform presentation
REPPF= Reproductive Toxicology Poster presentation
VETPF = Veterinary Toxicology Platform presentation
VETPO = Veterinary Toxicology Poster presentation
Scientific Program of the CSTS/SETAC-Africa/NEF Joint Toxicology Conference

E: “Searching for African Solutions to Human Environmental Toxicological Challenge”

31st MAY – 03rd June 2011

Main Organisers
Society for Environmental Toxicology and Chemistry (SETAC) – Africa branch
&
Cameroon Society for Toxicological Sciences (CSTS)

Co-Organiser
Africa Education Initiative (NEF)

Host
University of Buea, Cameroon

Financial Support
• SETAC World Council
• SETAC Europe
• OPCW (Organisation for the Prohibition of Chemical Warfare)
• SOT (Society of Toxicology)
• Tradex
CONtinuous Education

Monday, May 30
Activity: Registration of short courses by participants
Time: 8.00 a.m – 16.00 p.m
Venue: Visiting Professors’ Room, FHS

Tuesday, May 31
SHORT COURSES
DAY 1
7:30-12:00 noon
Cultural Village I

14:00-18:00 p.m

COURSE I: GENERAL TOXICOLOGY

Tuesday, May 31
SHORT COURSES II—DAY 1
8:00-12:00 a.m
Cultural Village II

14.00-17.30pm

COURSE II: PREDICTIVE TOXICOLOGY

Tuesday, May 31
SHORT COURSES III—DAY 1
7.30-12.00 noon
Cultural Village III

14.00-18.00 p.m

COURSE III: Workshop on risk assessment

Wednesday, June 01
SHORT COURSES I—DAY 2
7.30—12.00 noon
Cultural Village I

14:00-18:00 p.m

COURSE I: GENERAL TOXICOLOGY

Wednesday, June 01
SHORT COURSES II—DAY 2
8:00-12:00 a.m
14:00 – 17:00 p.m.
Cultural Village II

COURSE II: Workshop on Aquatic Toxicology

Wednesday, June 01
SHORT COURSES III—DAY 2
8.00 – 12.00 noon
14.00 – 17.00 p.m
Cultural Village III

COURSE III: Workshop on Risk Assessment (Continues)
**SUMMARY OF ACTIVITIES**

### SCIENTIFIC SESSION

#### Thursday, June 02 2011

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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</thead>
<tbody>
<tr>
<td>08.00 - 12.00</td>
<td>Registration</td>
</tr>
<tr>
<td>08.00 - 09.30</td>
<td>Opening Ceremony</td>
</tr>
<tr>
<td>09.30 - 10.00</td>
<td>Keynote Lecture 1</td>
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<tr>
<td>10.30 - 11.00</td>
<td>Coffee Break</td>
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<tr>
<td>11.00 - 11.30</td>
<td>Plenary Lecture 1</td>
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<tr>
<td>11.30 - 13.00</td>
<td>3 Break out Sessions</td>
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<tr>
<td>13.00 - 14.00</td>
<td>Lunch Break</td>
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<tr>
<td>14.00 - 14.30</td>
<td>Plenary Lecture 2</td>
</tr>
<tr>
<td>14.30 - 16.00</td>
<td>3 Break out Sessions</td>
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<tr>
<td>16.00 - 18.30</td>
<td>Coffee Break &amp; Poster Viewing</td>
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<tr>
<td>19.00 - 20.30</td>
<td>Cultural Evening</td>
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#### Friday, June 03 2011

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08.00 - 08.30</td>
<td>Keynote Lecture 2</td>
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<tr>
<td>08.30 - 09.00</td>
<td>Plenary Speaker 3</td>
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<tr>
<td>09.00 - 10.30</td>
<td>3 Break out Sessions</td>
</tr>
<tr>
<td>10.30 - 11.30</td>
<td>Coffee Break &amp; Poster Viewing</td>
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<tr>
<td>11.30 - 12.00</td>
<td>Plenary Lecture 4</td>
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<tr>
<td>12.00 - 13.30</td>
<td>Panel Discussion - Current Issues in Toxicology</td>
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<tr>
<td>13.30 - 14.30</td>
<td>Lunch Break</td>
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<tr>
<td>14.30 - 15.00</td>
<td>Plenary Lecture 5</td>
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<tr>
<td>15.00 - 16.30</td>
<td>3 Break out Sessions</td>
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<tr>
<td>16.30 - 17.00</td>
<td>Coffee Break &amp; Poster Viewing</td>
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<tr>
<td>17.00 - 18.00</td>
<td>Closing Ceremony</td>
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<tr>
<td>18.00 - 19.00</td>
<td>Annual General Meetings</td>
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<td>(SETAC/CSTS/NEF)</td>
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</tbody>
</table>

#### Saturday, June 04 2011

Visit To Limbe Botanical Garden and Bakangili
PART I - Short Courses

Three concurrent sessions are previewed: Courses II and III are expected to be paid by participants who booked and are not members of CSTS, SETAC or NEF. The cost is 15 000F CFA or 35 US dollars. This amount is to cover your coffee and lunch breaks as well as course materials for 2 days.

Monday, May 30th 2011
Registration of participants
Time: 8.00 a.m – 16.00 p.m
Venue: Secretariat (Visiting Professors’ Room, Faculty of Health Sciences)

GENERAL TOXICOLOGY

Tuesday, May 31st 2011
SHORT COURSE I: Day 1
Venue: Cultural Village I
Outline:

08.00 – 08.45 Concepts and Terminologies – Prof. Nabil Bashir (Sudan)
08.45 – 09.30 Toxic agents – Prof. Nabil Bashir (Sudan)
09.30 Break
09.45 – 10.15 Routes of exposure – Dr. Asongalem E.A. (Cameroon)
10.15 – 11.00 Toxicokinetics – Prof. Nabil Bashir (Sudan)
11.00 – 12.00 Dose – response relationships and toxicity ratings– Dr. Asongalem E.A. (Cameroon)
12.00 - 13.00 Lunch
13.00 – 13.45 Hepatotoxicology (Dr. Assob NJC, Cameroon)
13.15 – 14.30 Ecotoxicology and it’s application in water quality and pollution (Dr Silke Bollmohr)
14.30 Break
14.45 – 15.30 Toxicology of social ‘poisons’ (Dr. Nde Peter Fon, Cameroon)
15.30 – 16.15 Toxicology of pesticides (Dr. Patricia Fai, Cameroon)
16.15 p.m Break
16.30 – 17.15 p.m Toxicology of Heavy metals (Prof. Orish Ebere Orisakwe, Nigeria)
17.15 – 18.00 p.m Reproductive toxicology (Dr. Asongalem EA, Cameroon)
18.00 Evaluation (perception of the course) – Dr. Asongalem E.A. (Cameroon)
Tuesday, May 31st 2011
SHORT COURSE II: DAY 1
Venue: Cultural Village II
Time: 08.00 a.m-17.00 p.m
Outline:

**Morning Session – 8.00-12.00 a.m**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.00 a.m</td>
<td>Hands-on Application of Computer-based Approaches in Predictive Toxicology – <em>Dr Barry Hardy (OpenTox Project Coordinator, Switzerland)</em> and <em>Dr Philip Judson (Lhasa Lt UK)</em></td>
</tr>
<tr>
<td>8.30 a.m</td>
<td>The OpenTox Framework</td>
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<tr>
<td>9.00 a.m</td>
<td>Using Internet-based Toxicology Resources</td>
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<tr>
<td>9.30 a.m</td>
<td>Searching and integrating existing toxicology data</td>
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<tr>
<td>10.30 a.m</td>
<td>Building a Validated Predictive Toxicology (Q)SAR Model</td>
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</table>

**Afternoon Session - 14.00 – 17p.m**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>14.00 p.m</td>
<td>Hands-on Application of Computer-based Approaches in Predictive Toxicology – <em>Dr Barry Hardy (OpenTox Project Coordinator, Switzerland)</em> and <em>Dr Philip Judson (Lhasa Lt UK)</em></td>
</tr>
<tr>
<td>14.30 p.m</td>
<td>Chemical Categories and Read Across in Risk Assessment</td>
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<tr>
<td>15.00 p.m</td>
<td>Evaluating the impact of Chemical Modifications on Toxicities</td>
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<tr>
<td>15.30 p.m</td>
<td>Predicting Metabolites</td>
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<tr>
<td>16.00 p.m</td>
<td>Mechanism-based use of in vitro assay data</td>
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<tr>
<td>16.30 p.m</td>
<td>Creating and Executing Predictive Toxicology Workflows</td>
</tr>
<tr>
<td>17.00 p.m</td>
<td>Evaluation (perception of the course) <em>Dr. Asongalem E.A. (Cameroon)</em></td>
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</tbody>
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**RISK ASSESSMENT TRAINING AND EXPERIENCE (RATE): PRINCIPLES AND UNDERSTANDING OF RISK ASSESSMENT**

Tuesday, May 31st 2011
SHORT COURSE III: DAY 1
Venue: Cultural Village III
Time: 8.00 – 12.00 noon
Instructors: Allen Davis, Eva McLanahan, John Stanek; under the leadership of Becki Clark
*National Center for Environmental Assessment, Office of Research and Development, United States Environmental Protection Agency*

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>08.00 a.m</td>
<td>Overview of course and introductions</td>
</tr>
<tr>
<td>08.30 a.m</td>
<td>Introduction to Risk Assessment and the U.S. Environmental Protection Agency</td>
</tr>
<tr>
<td>09.30 a.m</td>
<td>Break</td>
</tr>
<tr>
<td>09.45 a.m</td>
<td>Overview of Human Health Risk Assessment</td>
</tr>
<tr>
<td>12.00 noon</td>
<td>Lunch</td>
</tr>
<tr>
<td>13.00 p.m</td>
<td>Noncancer and Cancer Dose-Response Assessments</td>
</tr>
<tr>
<td>14.30 p.m</td>
<td>Break</td>
</tr>
<tr>
<td>14.45 p.m</td>
<td>Noncancer and Cancer Dose-Response Assessments</td>
</tr>
<tr>
<td>16.00 p.m</td>
<td>Day 1 wrap-up and review</td>
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<tr>
<td>16.30 p.m</td>
<td>End of Day 1</td>
</tr>
</tbody>
</table>
**SPECIALTIES IN TOXICOLOGY**

**Wednesday, June 1st 2011**

**SHORT COURSE I: DAY 2**

**Venue:** Cultural Village I

**Outline:**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>8.00 – 10.00</td>
<td>Clinical toxicology – <strong>Dr. Mbuagbaw J (Cameroon)</strong></td>
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<tr>
<td>10.00 – 11.00</td>
<td>Forensic toxicology (Dr. Enow Orock G, Cameroon)</td>
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<tr>
<td>11.00 – 11.30</td>
<td>Coffee break</td>
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<tr>
<td>11.30 – 13.00</td>
<td>Industrial toxicology (Dr. Asongalem EA, Cameroon)</td>
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<tr>
<td>13.00 – 13.15</td>
<td>Evaluation (perception of the course) – <strong>Dr. Assob JCN</strong></td>
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<tr>
<td>14.00</td>
<td>Lunch</td>
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**Workshop on Environmental Toxicology**

**Wednesday, June 1st 2011**

**SHORT COURSE II: DAY 2**

**Venue:** Cultural Village II

**Time:** 08.00 a.m-13.00

Monitoring exposure and effects of pesticides in surface waters – a hand-on approach - **Dr. Silke Bollmohr (South Africa)**.

The ecological risk assessment of pesticides and biocides to aquatic organisms can entail a tiered testing system with increasing reality as higher the tier is. Low tier modeling and assessment techniques do not require a lot of input information, are conservative and present a low confidence level. Higher tier modeling and assessment techniques require a higher level of information, are less conservative and more realistic, presenting a higher confidence level.

Models like PRIMET are used to predict the risk on a low tier basis. Higher tier tests comprise test systems like microcosms/ mesocosms, field monitoring and most recently species trait in order to assess the risk towards a broader aquatic ecosystem including ecological principles like predation, competition and sometimes even recovery. Effect models like PERPEST or AQUATOX are used to predict the risk on an ecosystem level. The short course will give an overview of different modeling techniques and their data requirements, especially relevant for developing countries. Furthermore, different monitoring techniques to assess pesticides in surface waters are presented.

**Course objectives**

The short course introduces the participants into the current way of thinking in the field of ecological risk assessment for pesticide, with reference to the ecological impact of these chemicals in surface waters and indirectly to human health.

At the end of the short course participants will have:

- an overview of current methodologies to assess the risk of pesticides/biocides in aquatic ecosystems, including exposure and effect assessment and different modeling techniques
- a better understanding on how to interpret chemical data
- an overview on monitoring techniques for surface waters
Wednesday, June 1st 2011
SHORT COURSE III: DAY 2
Venue: Cultural Village III
Time: 8.00 – 12.00 noon
Instructors: Allen Davis, Eva McLanahan, John Stanek; under the leadership of Becki Clark
National Center for Environmental Assessment, Office of Research and Development, United States Environmental Protection Agency

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>08.00 a.m</td>
<td>Objectives and Overview of Day 2</td>
</tr>
<tr>
<td>08.05 a.m</td>
<td>Exposure Assessment</td>
</tr>
<tr>
<td>9.30 a.m</td>
<td>Break</td>
</tr>
<tr>
<td>9.45 a.m</td>
<td>General concepts in Risk Characterization, Management, and Communication</td>
</tr>
<tr>
<td>12.00 noon</td>
<td>Lunch</td>
</tr>
<tr>
<td>13.00 p.m</td>
<td>Case study example</td>
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<tr>
<td>14.30 p.m</td>
<td>Break</td>
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<tr>
<td>14.45 p.m</td>
<td>Case study example</td>
</tr>
<tr>
<td>15.45 p.m</td>
<td>Day 2 wrap-up and review</td>
</tr>
<tr>
<td>16.15 p.m</td>
<td>Course evaluations</td>
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<tr>
<td>16.30 p.m</td>
<td>End of Day 2, End of Course</td>
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Risk Assessment Training and Experience (RATE): Principles and Understanding of Risk Assessment
Instructors: Allen Davis, Eva McLanahan, John Stanek; Under the leadership of Becki Clark
National Center for Environmental Assessment, Office of Research and Development, United States Environmental Protection Agency
# PART II - Conference Proper

## WEDNESDAY 1ST JUNE 2011

<table>
<thead>
<tr>
<th>Time: 8.00 a.m – 16.00 p.m</th>
<th>Registration of conference participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venue: Secretariat (Visiting Professors’ Room, Faculty of Health Sciences)</td>
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<table>
<thead>
<tr>
<th>Time: 18.00-20.00 p.m</th>
<th>Conference/Sponsor’s Dinner</th>
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<tbody>
<tr>
<td>Venue: Banquet Hall, Capitol Hotel, Buea</td>
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### THURSDAY 2ND JUNE 2011

<table>
<thead>
<tr>
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<thead>
<tr>
<th>Time: 8.00 – 10.00</th>
<th>Opening Ceremony</th>
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<table>
<thead>
<tr>
<th>Time: 10.00 – 10.30</th>
<th>KEYNOTE LECTURE 1: Challenges to human and environmental toxicology: What possible solutions for Africans by Mr Lemnyuy A. W. Banye</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Time: 10.30 – 11.00</th>
<th>Coffee Break</th>
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<tbody>
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<td>Venue: Staff Canteen</td>
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### PLenary session 1: Environmental Toxicology in Africa

**Chairpersons:** Dr. Michiel Adriaan Daam (Portugal), Dr. Puis Oben (Cameroon)

1st CONCURRENT PLATFORM PRESENTATIONS

<table>
<thead>
<tr>
<th>ENVIRONMENTAL TOXICOLOGY</th>
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<th>ANALYTICAL TOXICOLOGY</th>
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<tr>
<td>Amphi 150 C</td>
<td>Amphi 150 D</td>
<td>Amphi 150 A</td>
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<td>12.45</td>
<td>ENVPF7</td>
<td>PESPFP7</td>
<td>ANAPFP7</td>
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**Chairpersons:**
- Prof. Paul van den Brink (Netherlands)
- Prof. Suh Emmanuel (Cameroon),
- Prof. Efange Samuel (Cameroon)
- Dr. Patricia Fai (Cameroon)
- Prof Orish Ebre Orisakwe (Nigeria)
- Prof. Folefoc Gabriel (Cameroon)

<table>
<thead>
<tr>
<th>Time: 13.00 – 14.00</th>
<th>LUNCH BREAK</th>
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<table>
<thead>
<tr>
<th>Time: 14.00 – 14.30</th>
<th>PLENARY SESSION 2: Aquatic ecotoxicology of pesticides under temperate versus tropical climates by Dr. Michiel Adriaan Daam (Portugal)</th>
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<tbody>
<tr>
<td>Venue: Amphi 150 D</td>
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</table>

**Chairpersons:** Prof. Mathew Muzi-Nindi (South Africa), Dr. Fonge Beatrice (Cameroon)

2nd CONCURRENT PLATFORM PRESENTATIONS

<table>
<thead>
<tr>
<th>ENVIRONMENTAL</th>
<th>AQUATIC TOXICOLOGY</th>
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**Note:** All times are in 24-hour format.
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<tr>
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<td>(Amphi 150 A)</td>
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<td>Prof. Moundipa Fewou Paul (Cameroon)</td>
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<td></td>
<td>DESPF3</td>
<td>Dr. Fred Heinbach (Germany)</td>
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<td>15.30</td>
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<td></td>
<td>DESPF4</td>
<td>Dr. Fokunang Charles N (Cameroon)</td>
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<tr>
<td>15.45</td>
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<td></td>
<td>DESPF5</td>
<td>Dr. Chuissu Dieudonné (Cameroon)</td>
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**POSTER PRESENTATIONS**

**Chairpersons:** Dr. Assob Jule Clement Nguedia / Dr. Njayou Nico Frederic (Cameroon)

- ENVPO1: Poster Board 1
- ENVPO2: Poster Board 2
- ENVPO3: Poster Board 3
- ENVPO4: Poster Board 4
- ENVPO5: Poster Board 5
- ENVPO6: Poster Board 6
- ENVPO7: Poster Board 7
- ENVPO8: Poster Board 8
- ENVPO9: Poster Board 9
- ENVPO10: Poster Board 10
- ENVPO11: Poster Board 11
- ENVPO12: Poster Board 12

**Venue:** Open Commons

**Time:** Thursday 2nd June 2011 from 08.00 – 16.00

**Time:** 19.00 – 20.30 Cultural evening

**Venue:** Amphi 150 C

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**FRIDAY 3RD JUNE 2011**

**Time:** 08.00 – 8.30  
**Venue:** 150 C  
**Chairpersons:** Dr. Becki Clarke, MPH (EPA - USA)

**Keynote Lecture 2:** Toxicology in the 21st Century

**Time:** 08.30 – 09.00  
**Venue:** Amphi 150 D  
**Chairpersons:** Prof. Paul van den Brink (Nederlands)/ Dr. Chudy Nduaka (USA)

**PLENARY SESSION 3:** Technological development in mass spectrometry and chromatography: pharmaceutical personal care products, hormones, veterinary drugs residue in waste waters treatment plants, Africa's challenge

**Chairpersons:** Prof. Nabil Bashir (Sudan)/ Dr. Patricia Fai (Cameroon)

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**3rd Concurrent Platform Presentations**

<table>
<thead>
<tr>
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<th>SESSION</th>
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<tr>
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<td>Dr. Becki Clarke, MPH (EPA - USA)</td>
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<tr>
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<td>(Amphi 150 A)</td>
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<td>10.00</td>
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<td>ANAPF10</td>
<td>Dr. Paul van den Brink (Nederlands)</td>
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<td>GENPF1</td>
<td>Dr. Chudy Nduaka (USA)</td>
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<tr>
<td>Time</td>
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<td>Dr. Phillip Judson (UK)</td>
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<td>Chairpersons</td>
<td>Prof Nabil Bashir (Sudan)</td>
<td>Prof Suh Emmanuel (Cameroon)</td>
<td>Dr. Fonge Beatrice (Cameroon)</td>
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<td>Dr. Fokunang Charles N (Cameroon)</td>
<td>Dr Asongalem Emmanuel Acha (Cameroon)</td>
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<tr>
<td><strong>Time:</strong></td>
<td><strong>PLENARY SESSION 4: Role of Vanin-1 in Acetaminophen Hepatotoxicity</strong> by Manautou JE (USA)</td>
<td><strong>Venue:</strong> Amphi 150 C</td>
<td><strong>Chairpersons:</strong> Prof Nabil Bashir (Sudan)/Dr Chudy Nduaka (USA)</td>
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<td><strong>Venue:</strong></td>
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<td><strong>Chairpersons:</strong> Prof. Paul van den Brink (Nederlands)/Dr Patricia Fai (Cameroon)</td>
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<tr>
<td><strong>Time:</strong></td>
<td><strong>PANEL DISCUSSION ON EMERGING ISSUES IN TOXICOLOGY</strong></td>
<td><strong>Venue:</strong> Staff Canteen</td>
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<td><strong>Chairpersons:</strong></td>
<td><strong>4th CONCURRENT PLATFORM PRESENTATIONS</strong></td>
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<td><strong>ENVIRONMENTAL/REPRODUCTIVE TOXICOLOGY</strong></td>
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<td>Prof. Nabil Bashir (Sudan)</td>
<td>Dr Asongalem Emmanuel Acha (Cameroon)</td>
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<td><strong>POSTER PRESENTATIONS</strong></td>
<td><strong>Chairpersons:</strong> Dr. Assob Jule Clement Nguedia /Dr. Njayou Nico Frederic (Cameroon)</td>
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<td><strong>Time:</strong></td>
<td>Thursday 2nd 2011 from 08 – 16 pm</td>
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<tr>
<td><strong>17.00 – 18.00</strong></td>
<td><strong>ANNUAL GENERAL MEETINGS</strong></td>
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<tr>
<td>CSTS</td>
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**18.00 – 19.00 – CLOSING CEREMONY**

**SATURDAY 4TH JUNE 2011**

9.00 – 14.00, Visit to Limbe Botanical Garden and Bakingili
Cameroon Society for Toxicological Sciences (CSTS) was formed in October 2006 in Limbe following the successful workshop organised by African Society for Toxicological Sciences (ASTS). Since its creation, it has gracefully completed the hosting of 2 conferences in 2007 (Buea) and 2009 (Dschang).

CSTS as an autonomous and non-governmental organisation has a mandate to achieve certain objectives:

1) To sensitize the government and the populace on the importance of Toxicology as a discipline and the role it plays in our daily lives.
2) To disseminate the importance of Toxicology to Primary, Secondary and High Schools through lectures, quiz and prizes.
3) To eventually create Departments of Toxicology in Cameroonian Universities and possibly Central Africa subregion.
4) Advance research in Toxicology in Cameroon and Central and West Africa.
5) To build future reputable toxicologists in Central and West Africa.

CSTS has devised a roadmap and some programs:

- Firstly, CSTS plans to begin offering short talks to selected schools in the country each year to deliver lectures on toxicology.
- Secondly, CSTS wishes to institute a Toxicological Symposium to take place prior to the CSTS conference of 2012 in Yaounde.
- Thirdly, in collaboration with some Cameroonian Universities, CSTS plans to carry out certificated short courses in toxicology.
- Fourthly, plans to host a Risk Assessment Summer School (RASS) in the future, for toxicologists within Central and West Africa subregion: Cameroon, Chad, Gabon, Congo, Equatorial Guinea, Central Africa Republic and Nigeria.
SOCIETY OF ENVIRONMENTAL TOXICOLOGY AND CHEMISTRY (SETAC)

The Society of Environmental Toxicology and Chemistry (SETAC) is a not-for-profit, global professional organization to provide a forum for individuals and institutions engaged in education, research and development, ecological risk assessment and life cycle assessment, chemical manufacture and distribution, management and regulation of natural resources, and the study, analysis and solution of environmental problems. SETAC is an open and democratic organization that operates in a broad social context, reflecting the needs of the environment and people. Application of sound science plays a key role in this process. Membership worldwide comprises about 5000 professionals in the field of chemistry, toxicology, biology and ecology; atmospheric, health; and earth sciences; and environmental engineering.

A global organisation

SETAC is concerned about global environmental issues. Its members are committed to good science worldwide, to timely and effective communication of research, and to interactions among professionals so that enhanced knowledge and increased personal exchanges occur.

A unique strength of SETAC is its commitment to balance the interests of academia, business and government. The society by-laws mandate equal representation from these three sectors for officers, Board of Directors, and Committee Members. And although there is no control mechanism, the proportion of members from each of the three sectors has remained nearly equal over the years.

SETAC has been established in 1979, when no forum existed for interdisciplinary communication among environmental scientists - biologists, chemists, toxicologists - and others interested in environmental issues such as managers and engineers. The Society of Environmental Toxicology and Chemistry (SETAC) was to fill the void. Based on the growth in membership, Annual Meeting attendance, and publications, the forum was needed. The Society provides a forum where scientists, managers, and other professionals exchange information and ideas for the development and use of multidisciplinary scientific principles and practices leading to sustainable environmental quality.

In the different continents, SETAC is represented by its geographical units. SETAC Europe is the umbrella organisation for members in Europe, the middle East, and Africa and comprises around 1500 members. SETAC Africa is poised to grow into a Geographic unit soon. This is the fifth SETAC Africa meeting and the first meeting to take place outside the Southern/Eastern Africa Region.

SETAC Membership benefits

SETAC members benefit from free online subscriptions to the following publications:

- Environmental Toxicology and Chemistry (ET&C, monthly), a prestigious international journal of peer-reviewed research papers, now in its 30th year
- Integrated Environmental Assessment and Management (IEAM, quarterly), SETAC’s newer journal devoted to bridging the gap between scientific research and the use of sound science in decision-making, regulation, and environmental management
- Membership Directory, with the latest available SETAC members contact information

In addition, SETAC members benefit from reduced prices on SETAC books year-round, covering topics from ecological risk assessment, environmental toxicology and chemistry, endocrine disruption, risk communication and management, life-cycle assessment, and fate-and-effects modeling.

SETAC members also benefit at all Annual Meetings worldwide from reduced registration fees as well as networking, professional and social opportunities, including platform and poster presentations

More information about SETAC, its mission, goals and main activities can be found at www.setac.org
The Africa Education Initiative (NEF) is a US-based non-profit organization dedicated to the promotion of science education and healthcare in Africa. Over time, NEF has worked with institutions in Africa to advance science education. This has been done primarily through supporting research in schools, granting travel fellowships to students and professors to attend international scientific meetings, donating computers, books, journals and laboratory equipments to schools in Africa. Note worthy is our pioneering seminar series and conferences in the area of Toxicology and Pharmacology in Africa. Complimentary to these conferences is the NEF Toxicology Internship Program, a 3-month paid intership where students learn how to conduct and report toxicology studies. These two programs have further enabled us to achieve the goals of educating young African students in the area of pharmaceutical drug development.

For more information on our activities, please visit: www.nef3.org
Wednesday 1\textsuperscript{st} June 2011

Registration of conference participants
Time: 8.00 – 16.00
Venue: Secretariat (Visiting Professors’ Room, Faculty of Health Sciences)

Conference/Sponsor’s Dinner
Time: 18.00-20.00
Venue: Banquat Hall, Capitol Hotel, Buea
(By invitation ONLY)

Thursday 2\textsuperscript{nd} June 2011

Registration of conference participants
Time: 8.00 — 18.00 pm
Venue: Conference Venue

Opening Ceremony
Time: 8.00 – 10.00
Venue: Amphi 750

KEYNOTE LECTURE 1

Challenges to human and environmental toxicology: What possible solutions for Africans.

Time: 10.00 – 10.30
Speaker: Mr Lemnyuy A. W. Banye (Ministry of Environment and Nature Protection, Cameroon).

Engineer Lemnyuy Albun William Banye is an Agro-Industrial Engineer He has a B.Sc. (Hons.) in Chemistry from the University of Buea and a Masters of Engineering in Agro-Industrial Sciences from the University of Ngoundere in 2005 as well as a Certificate of Environmental Protection Techniques from the University of Science and Technology, Suzhou-CHINA.

Eng. Banye has worked as a consultant in various NGOs and international organizations such as the United Nation High Commission for Refugees (UNHCR), the World Food Programme (WFP) and the World Health Organisation (WHO) between 2004 and 2009 during which he participated, amongst other things, in drafting the Environmental Health Strategy document for Cameroon and in training on Environmental Standards in force in Cameroon. He has held various positions in the Ministry of Environment and Nature Protection (MINEP), Cameroon since 2005 and is currently the Chief of Service for Standards and Procedures in the Department of Standards and Controls. He has several competencies and achievements in Environmental controls, notable among which is his contribution to the Drafting of the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POPs) in Cameroon. He has delivered lectures in several international conferences and seminars and has published articles in recognized journals.

Coffee Break
Time: 10.30 – 11.00
Venue: Staff Canteen

PLENARY SESSION 1

Time: 11.00 – 11.30 am
Venue: Amphi 150 C
Chairpersons: Dr. Michiel Adriaan Daam (Portugal), Dr. Puis Oben (Cameroon)

ENVPF1: Environmental Toxicology in Africa

Orish Ebere Orisakwe

Port Harcourt, Nigeria

Environmental pollution due to residential and industrial activities is a problem that is recognized in many African countries. The pollution results in contamination of air, water, sediments, and biota with toxic metals, pesticides, polycyclic aromatic hydrocarbons etc. In these African countries, adverse effects on human health have been reported and the presence of these toxic compounds in the food chain has been demonstrated. The widespread use of biomass fuel and charcoal in sub Sahara Africa as well as significant industrial activity has led to increased indoor and outdoor air pollution with increased levels of harmful particulate matter. Artisanal mining and it attendant public health implications have impacted negatively on the local population, water bodies, farmlands as well as wildlife. The relationship of pesticides exposure and birth defects has been a subject of concern. Traditional medicine is widely practiced in SSA but the toxicity to humans and livestock of only a limited number of these herbal remedies have been investigated. This paper is an attempt to quantify the size of the problem with a view of suggesting preventive/remedial actions and proactive measures that should be adopted by different African countries in the face of any environmental pollution crises.
The generation of waste electrical and electronic equipment (WEEE) containing variety of hazardous substances, and its subsequent low-end management in developing countries, is a major social problem and threat to the environment. Human exposure to this class of waste in Nigeria and many other developing nations is on the increase. This has potential short and long term ecological and human health risk. In this study, we investigated the potential mutagenic and genotoxic effects of raw and simulated leachates from the WEEE dumpsite at Alaba international electronic market in Lagos, Nigeria. The Allium cepa test, mouse bone marrow micronucleus (MN) and chromosome aberration (CA), sperm morphology and sperm count assays were utilized. These were carried out at concentrations of 1, 5, 10, 25 and 50 % (v/v; leachate: distilled water) of the leachate samples. Physico-chemical analysis of the leachates was carried out and the soil used for leachate simulation was also analyzed for USEPA and WHO priority organics and heavy metals. There was concentration-dependent significant (p<0.05) inhibition of root growth and cell proliferation and induction of cytological aberrations in A. cepa. In the mouse, MN analysis showed a concentration-dependent induction of micronucleated polychromatic erythrocytes (MNPCEs) across the treatment groups. In the CA test, there was concentration-dependent significant (p<0.05) reduction of mitotic index and induction of different types of chromosomal aberrations. Assessment of sperm shape showed a significant (p<0.05) increase in sperm abnormalities with significant (p<0.05) decrease in mean sperm count in the treated groups. High concentrations of toxic PAHs, PCBs, PBDEs and heavy metals were found in the tested samples. The interaction of these with the DNA in the test systems contributed significantly to the observed genetic damage. These findings indicate that e-waste contain potential germ and somatic genotoxic and mutagenic agents; and may be of genetic risks in exposed human population in Nigeria and other countries where there is no effective management of e-waste.

ENVPF4 – 12.00 noon

Cytogenotoxic evaluation of municipal landfill leachate using piscine, avian and mammalian micronucleus assay

Chibuisi Alimba1, Adekunle Bakare2

1University of Lagos, Lagos, Nigeria; 2Cell Biology & Genetics unit, Department of Zoology, University of Ibadan, Ibadan, Nigeria

Inappropriate disposal of wastes generated in Nigeria has elicited public health concern due to the leaching of toxic
chemical substances capable of contaminating the ecological habitats. This poses serious health risks to the fauna and flora and also endangers rare species in the ecosystems. Information on leachate-induced cytogenetic damage in vertebrates is limited. In this study, we evaluated the cytogenotoxic effects of two municipal landfill leachates using the micronucleus (MN) assay in Clarias gariepinus (catfish), Coturnix japonica (Japanese quail) and Mus musculus (albino mice). Cytotoxicity was evaluated by the polychromatic (PCE) and normochromatic (NCE) erythrocyte (PCE/NCE) ratio from bone marrow cells, and abnormal red blood cell (RBC) morphology in peripheral erythrocytes of mice. The tested leachates were also examined for some physico-chemical properties. The leachates (at 1 - 50 % concentrations) induced nuclear abnormalities (NASs) in the peripheral erythrocytes, and micronucleated cell in the gill epithelial, kidney cells and peripheral erythrocytes of C. gariepinus. It also induced MN and NAS in peripheral erythrocytes and MN in bone marrow cells of Japanese quail; and MN in PCE and NCE of peripheral erythrocytes and MN PCE of bone marrow cells of mice. The induction of MN was concentration dependent in the three species and significantly (p<0.05) different from negative control at the higher tested concentrations. There was concentration dependent significant (p<0.05) decrease in PCE/NCE ratio and induction of abnormal RBC morphology like ovalocytes, echinocytes (crenation), hypochromasia and anisocytosis. Atomic absorption spectrometry analysis of the leachate showed high concentrations of Cd, Cr, As, Cu, Fe, Pb, Mn and Zn. The interactions of these and other unidentified toxic constituents induced the observed cytogenotoxicity. These findings suggest that municipal landfill leachate is capable of inducing genotoxic and cytotoxic effects in vertebrates inhabiting different ecological habitats. Leachate induced cytogenetic effects can lead to decrease cell survival or transformation, cancer formation and reproductive anomalies during exposure. This is of significance to animal and human populations in Nigeria and other countries where solid waste management is ineffective or lacking.

ENVPF5 – 12.15 pm
Toxicity of industrial chemicals and pesticides to aquatic and terrestrial biota

Doris Ogeleka¹, Isioma Tongo², Thomas Ikpesu², Emmanuel Ogbomida³, Alex Enuneku¹, Lawrence Ezemonye³

¹Department of Chemistry, Western Delta University, Oghara, Oghara Delta State, Nigeria; ²Dept. of AEB, University of Benin, Benin City, Nigeria; ³National Centre for Energy and Environment (NCEE), ECN, University of Benin, Benin City, Nigeria

Toxicological effects of industrial chemicals (Rigwash, Oil eaters, Nalco, Glycol™) and pesticides (Propoxur, Deltrin, Atrazine, Furadan) on Tilapia guineensis (Fish) and Aporrectodea longa (earthworms) were tested using the Organisation for Economic Cooperation and Development (OECD) # 203 and 207 protocols. The water and soil ratings indicate that the test chemicals were toxic to the organisms. The estimated 96 hour lethal concentration LC50 values for Rig wash, Oil eater, Nalco EC13044/COT 505, Glycol, Propoxur, and Delthrin were 26.34 ± 0.46, 6.02 ± 0.30, 3.07 ± 0.14, 1.31 ± 0.01 20.91 ± 0 and 0.01 ± 0 mg/l respectively. In the earthworm bioassay, the estimated 14-day LC50 values for Rig wash, Oil eater, Nalco EC13044/COT 505, Glycol, Atrazine and Furadan were 80.05 ± 3.5, 151.55 ± 10.7, 172.63 ± 14.2, 63.72 ± 2.43, 4.97 ± 0 and 0.29 ± 0 mg/kg respectively. Safety factors are arbitrarily built in around the LC50 values in order to arrive at environmentally tolerable concentrations. The concentration of a chemical in the receiving environment should not exceed 10% of the LC50. The organisms exposed to the test chemicals showed significant difference when compared with the levels measured in the control group. The observed sensitivity of the test organisms to the chemicals indicate that adherence to standard safety limits/measures should be maintained during use and disposal of hazardous chemicals. This would ensure that the biotic components of the Nigerian Niger Delta ecosystem are prudently protected.

ENVPF6 – 12.30 pm
Post-impact assessment of oil spillage on earthworm abundance and distribution in Agaye community soil

Aemere Ogunlaja¹, AO Morenikeji², Olumuyiwa Ogunlaja²

¹Redemeer’s University, Ibadan, Nigeria; ²University of Ibadan, Ibadan, Nigeria; ³Lead City University, Ibadan, Nigeria

This investigation was carried out through two years on the soil of Agaye community, Ije- ododo, Iba Local Government Area of Lagos State after repeated oil spill in Dec, 2006 and Jan, 2007. In the first 12 months of study (April 2007 and March 2008), analysis showed that Lybiodrillus violaceous alone was encountered in Block A, while in Block B (control) there were two species, Lybiodrillus violaceous and Dichogaster modiglanin sp. In the next 12 month (April 2009 and March 2010), four species were identified in Block A and B, Lybiodrillus violaceous, Dichogaster modiglanin, Ephyridrilus afrooccidentalis and Heliodrilus lagoensis sp although in varying proportions. Student t-test analysis on population size of Block A and B were determined in the first year and second year; results showed that P=0.07; P>0.1 hence there was significant difference between population size of Block A and Block B in the first year and P= 0.229; P > 0.05 hence there was no significant difference between population size of Block A and Block B in the second year. Also, P= 0.095; P < 0.1 hence there was significant difference...
between population size of the first and second year. *L. violaceus* was identified to be the most abundant earthworm spp found within Agaye community.

Session 2: PESTICIDES TOXICOLOGY

Abstract No.: PESPF2 – PESPF6

Time: 11.30 am – 12.45 pm

Venue: 150 D

Chairpersons: Prof. Suh Emmanuel (Cameroon)/ Prof. Orish Ebere Orisakwe (Nigeria)

PESPF2 – 11.30 am

The major environmental factors that influence disappearance of Metribuzin in tropical Machakos semi-arid soils of Kenya

Silas Lagat1, Joseph Lalah2, Chrispin Kowenje3, Zachary Getenga3

1Masinde Muliro University of Science and Technology, Kakamega, Kenya; 2Kenya Polytechnic University College, Nairobi, Kenya; 3Maseno University, Maseno, Kenya

The behaviour and fate of Metribuzin (4-amino-6-tert-butyl-4, 5-dihydro-3 methylthio-1, 2, 4 - triazin-5-one) herbicide are governed by variety of physical, chemical and biological processes including sorption-desorption, volatilization, chemical and biological degradation, plant intake, surface run-off and leaching. The interaction of Metribuzin with the above parameters and obtaining in the adverse tropical conditions of the semi-arid soils of Machakos area were tested to determine soil adsorption /desorption and leaching behavior. The sorption behavior of the herbicide was fitted into adsorption isotherms. The sorption results showed that the Freundlich adsorption constants (Kf and 1/n) were 0.213µg/L and 0.949µg/L and the concomitant Koc was 10.14 a.u. While for the standard leaching tests for 9 hours, the study showed a total of 0.0249 mg of Metribuzin residues were recovered, distributed throughout the column with most residues in 25-30 cm column (0.011785 mg) recovered. For standard desorption test, the results showed the soils contained an initial amount at saturation (equilibrium adsorption) of Metribuzin of 0.1735µg. The data indicated a moderately desorbed Metribuzin resides in soil between 2.70, 0.711 and 0.19% in soil after 2, 4 and 6 hours respectively. These results imply the Machakos soil with low organic matter content promoted a decreased downward mobility of Metribuzin and recovery of the residues within the soil column.

PESPF3 – 11.45 am

Effects of aqueous extracts of Basil (*Ocimum basilicum* L.), Sodom’s apple (*Calotropis procera* Ait) and Coriander (*Coriandrum sativum* L.) on Flea beetle *Podagrica* spp. found on okra crop

Faiza Salah1, Rehab. Fadwal2, Mohammed Zain Elabdeen3, Elamin Elamin2

1University of Gezira Sudan, WAD Medani Sudan; 2Agricultural Research Corporation, WAD Medani, Sudan

An experiment was conducted at the University of Gezira experimental farm to evaluate the effects of 10% aqueous leaf and fruit extracts of Basil, (*Ocimum basilicum* L.), leaf extract of Sodom’s apple, (*Calotropis procera* Ait) and fruit extract of Coriander , (*Coriandrum sativum* L.) on Flea beetle *Podagrica* spp. found on okra. The experimental design comprised of 16 plots assigned to 4 treatments (replicated 4 times), and arranged in a completely randomized block design. The treatments consisted of spraying okra plants with Basil, Sodom’s apple and Coriander 10% aqueous extract or distilled water (control). The efficacy of the extracts was assessed in terms of shot holes in okra leaves i.e., where flea beetle larvae were alive and feeding. The results indicated that the three aqueous extracts significantly (P<0.05) reduced the infestation level of the flea beetle on okra leaves. Coriander extract resulted in the lowest infestation level by the flea beetle (mean number of shot holes =630), followed by Rehan (mean number of shot holes=711) and Usher (mean number of shot holes=794) while the control treatment scored 1327 shot holes.

PESPF4 – 12.00 noon

Conservation of natural enemies through using novel methods to combat insect pests

Hayder Abdelgader

Agricultural Research Corporation, WAD Medani, Sudan

In Sudan, high crop losses are encountered due to attack by different pests and diseases. Cotton (main cash crop) is attacked by numerous insect pests complex, e.g. early season pests (Cotton Flea Beetle and cotton Jassid) mid season pests (African bollworm) and late season pests (cotton whitley and cotton aphids). Vegetable crops (e.g. tomato) are also seriously attacked by various insect pests, e.g. African bollworm. Thus, these main cash crop (cotton) and vegetable food crop (tomato) are heavily sprayed with insecticides. These pests attack endanger the economic cotton production in Sudan leading to high cost of production. The use of bio-agents, such as parasitoids and predators might be the most environmentally appropriate method to combat these pests.
With the new Integrated Pest Management (IPM) strategies, resistant varieties to cotton jassid were introduced and the frequencies of aerial sprays were reduced. However, jassid-tolerant varieties are still susceptible to other pests such as the cotton whitefly (Bemisia tabaci), cotton aphids and the African bollworm (Helicoverpa armigera). IPM research in Sudan has shown that natural enemies of the whitefly and the cotton aphids (Aphis gossypii) are capable of naturally controlling these pests, rather than through insecticide spraying. The present study was aimed at seeking pest control measures that thrive to produce suitable and economically viable technologies to control pests under sustainable environment. Through the use of selective pesticides on the egg parasitoid Trichogramma spp. showed that some pesticides, like Azoxystrobin, Promethryn Tebufenozide and Triasulfuron were relatively safe to adults of Trichogramma cacoeciae. The study also includes testing the side effects of some insecticides on two predators at small scale level at the Gezira Research Farm, Wad Medani. The results indicated that Diafenthion was relatively safe to the predatory beetle Cheilomenes propinqua vicina. The result showed that some pesticides can be used selectively to save important natural enemies attacking agricultural insect pest and hence help in conserving these important natural resources.

PESPF5 – 12.15 pm  
Effects of Botanical Insecticides on the egg parasitoid Trichogramma cacoeciae Marchal (Hym. Trichogrammatidae)  
Hayder Abdelgader  
Agricultural Research Corporation, WAD Medani, Sudan  
Parasitoids of the genus Trichogramma occur naturally worldwide and play an important role as natural enemies of lepidopterous pests on a wide range of agricultural crops. Laboratory studies were carried out to investigate the side effects on both the susceptible life stage (adults of parasites) and less susceptible life stage (parasites within their hosts) of Trichogramma cacoeciae to two formulated products of each of two botanical insecticides: Azadirachtine (Neemazal T/S Blank and Celaflor®) and Quassin (alcoholic or water extracts). The results showed that by exposing adult T. cacoeciae to residues of Neemazal formulations on glass plates, the tested preparations were either harmful (Neemazal-Blank) or moderately harmful (Celaflor). The two Quassin formulations tested were harmless. When treated host eggs were offered to adults T. cacoeciae, all tested chemicals were almost harmless. In a further test, host eggs parasitized at different time intervals (1-8 days), were sprayed at the same day. The results indicated that only Neemazal T/S-Blank formulation was slightly to moderately harmful. Also, both Azadirachtine and Quassin were relatively safe to the tested parasitoid and could therefore be used in combination with Trichogramma releases. The results of this study can be utilized in designing a less hazardous biopesticides control strategy to combat insect pests with less negative impact on beneficial natural enemies as well as the surrounding environment.

PESPF6 – 12.30 pm  
Acute toxicity of cypermethrin on Oreochromis niloticus and Clarias gariepinus  
Nestor Fominka Tajoacha, Patricia. B.A Fai, Mbida Mpoame  
University of Dschang, Cameroon  
Cypermethrin, a synthetic pyrethroid insecticide and an aquatic ecosystem contaminant was investigated in the present study for acute toxicity. Nile Tilapia (Oreochromis niloticus) and Mudfish (Clarias gariepinus) fingerlings were selected for the bioassay experiments. They were exposed to different concentrations, in replicates of three and the 96-h LC50 values were determined and the sensitivities of the two fish species evaluated. The standard static acute toxicity method was used. In addition, behavioral changes were observed for the two species. Data obtained from the Cypermethrin acute toxicity was calculated using a computer program REGTOX. The 96-h LC50 values were estimated as 23.07µg/L and 12.44µg/L for Oreochromis niloticus and Clarias gariepinus respectively. The results are significant for reporting Cypermethrin highly toxic to fish fingerlings under exposure.

Session 3: ANALYTICAL TOXICOLOGY  
Abstract No.: ANAPF2 – ANAPF6  
Time: 11.30 am – 12.45 pm  
Venue: 150 A  
Chairpersons: Prof. Samuel Efange, Prof. Gabriel Folefoc (MC)  
ANAPF2 – 11.30 am  
Monitoring polycyclic aromatic hydrocarbons and other chlorinated contaminants in Slurry by Hollow Fibre Microporous Membrane Liquid-Liquid Extraction (MMLLE) and Gas Chromatography-Mass Spectrometry  
Titus Msagati1, Bhekie Mamba1, Mathew Nindi2  
1University of Johannesburg, Johannesburg, South Africa;  
2University of South Africa, Pretoria, South Africa  
A simple and green method for monitoring and removal of the biovalable fraction of PAHs and chlorinated compounds
ANAPF3 – 11.45 am
Assessment of environmental phase distribution of lead in some municipal cities of South-Eastern Nigeria

John Nduka¹, Orish Ebere Orisakwe²
¹Nnamdi Azikiwe University, Awka, Nigeria; ²University of Port Harcourt, Port Harcourt, Nigeria

Lead (Pb) level in roadside surface soils, dust particles and rain water samples of the most urbanized towns (Enugu, Awka, Onitsha, Nnewi, Aba, Port Harcourt and Warri) mostly in South-Eastern Nigeria was measured in 2007 and 2008. Soil and dust particles were collected during dry season while rain water samples were collected during early rain (April - June), mid rain (July - August) and late rain (September - October) for the two years. Soil samples were collected from the most traffic congested roads in each city; dust particles were collected by tying plastic basin on a pole 1.5m above ground level and left for 45 days. Rain water samples were collected from three points that were nearly equidistant from each other in each city by fastening plastic basin unto a table 1.5m above ground level for each point and 75m away from tall buildings and trees. All the samples were analysed by standard methods. Results show that the highest soil value of 120.00+0.00mg/kg and 80.36+0.00mg/kg of lead were reported in Onitsha in 2007 and 2008 respectively. Nnewi showed 33.40+0.01 and 4,238.29+0.00mg/kg for 2007 and 2008. Aba showed 22.56+0.01 and 21.28+0.00mg/kg for 2007 and 2008. Higher concentrations were recorded for Nnewi and Port Harcourt in 2008 than in 2007. Enugu had more in 2007 than in 2008 while Awka had more in 2008 than 2007. The lead levels for each point (point of collection) on each road of all the cities vary, the levels of Warri were smaller followed by Awka and Port-Harcourt respectively in 2007 while in 2008, the levels of warri were low and followed by that from Enugu. Lead in dust particles in all the cities ranged from 0.13 - 0.49mg/kg and 0.15 - 0.47mg/kg for 2007 and 2008 respectively. Rainwater samples showed the least concentration of lead with highest value of 0.103+0.000mg/L and 0.163+0.046mg/L in the late rain of 2007 in Onitsha and Aba. Using our results as a case study, we can conclude that Nigerians are continuously exposed to lead toxicity and recommend that government should adopt appropriate measures to mitigate lead emission and pollution.

ANAPF4 – 12.00 noon
Sugarg Industry as a source of Pollution, A Case Study Elgunaid Sugar factory (1963-2010), Gezira State, Sudan

Mohamed Elfatiq Hassan¹, Nabil Hamid Hassan Basheer² Yossif Osman Hessain Assad³
¹Department of Environmental Sciences, Faculty of Agricultural Sciences, University of Gezira; ²Department of Pesticides and Toxicology

Pollution is an important problem in the world. The industries represent one of these causes. This study aims to assess the extent of pollution in waste water (WW), plants, and soil caused by the sugar industry in Elgunaid area. The study design was by completely randomized design (CRD). Samples were collected from wastewater, plants, and soil from the area, the water samples were analyzed using titration methods to determine levels of sulphides, as well as chemical oxygen demand (COD) and biological oxygen demand (BOD). Also samples of WW, plant and soils were analyzed by atomic absorption to determine concentrations of zinc (Zn), lead (Pb), cadmium (Cd), and copper (Cu). The results obtained showed that the levels of sulphides range from 1.36-2.90 mg/L, by average 2.21 mg/L and these concentrations within the permissible limits in the world. Concentrations of (COD) was found between 160-5330mg/L, with an average of 40-73 mg/L, while the concentrations of (BOD) between 870-2730 mg/L, average 2096 mg/L, this was considered higher than allowed world levels 50 mg/L for (COD), and 35 mg/L for (BOD). All samples collected didn't show detectable levels of lead, copper and cadmium, when determined by atomic absorption. While Zn appears in all samples, its concentrations ranged from 0.1359 - 0.6375 mg/L in WW samples with an average of 0.367mg/L, 0.088 - 1.043mg/L in plant samples, average 0.399mg/L, and 0.0452 - 0.3521 mg/L in the soil samples with an average of 0.115 mg/L. The concentrations of most the tested factors were below the permissible levels. The study recommended the treatments of waste water resulting from sugar industry.

ANAPF5 – 12.15 pm
Effects of Faujasite X and Y Zeolites on the 1,1,1-Trichloro-2,2’ bis(p-chlorophenyl) ethane (DDT) degradation during water purification

Chrispin Kowenje¹, Elly Tetty¹, Lalah Joseph²
¹Maseno University, Maseno, Kenya; ²Kenya Polytechnic university college, Nairobi, Kenya

The ability of molecular sieves to abstract and denature Organochloride pesticides finds application in water purification practices. In this study, activated Faujasite X and
Y Zeolites were separately exposed to different concentrations of 1,1,1-trichloro-2,2'-bischlorophenyl) ethane (Dichloro diphenyl dichloroethylene - DDE) water solutions. For the DDT solutions of 5 ppm, the resultant degradation products and residual DDT were minimal with concentrations in zeolite treatments reducing to below World Health Organization (WHO) drinking water limits in ca. 2h. In addition, the rate of degradation was found to somewhat depend on the levels of DDT concentration and the Faujasite zeolite used. The main degradation product in the Faujasite X was Dichloro diphenyl dichloroethylene (DDE) whereas in the Faujasite Y, considerable amounts of both DDE and Dichloro diphenyl dichloroethane (DDD) were obtained.

ANAPF6 – 12.30 pm
Metal composition of Clarias gariepinus consumed in Makurdi (Nigeria) and its environs

Victoria Ayuba¹, Moses Adadu²

¹University of Agriculture, Makurdi, Nigeria; ²Department of Fisheries and Aquaculture University of Agriculture, Makurdi., Nigeria

A study was conducted to determine the concentrations of nine heavy Metals (Cadmium, Lead, Copper, Chromium, Iron, Zinc, Selenium, Nickel and Alminum) in gills, muscles and skin of Clarias gariepinus within three different locations (Kuatansule, Wadata and UAM fish farm) with the use of standard flame atomic absorption spectrophotometry techniques. Iron was found in high concentration in all the sites with the gills having the highest concentration while Lead, Cadmium, Selenium, Nickel and Aluminum were not detectable. Significant differences in metal concentrations were observed between locations with UAM fish farm having the highest metal concentration. It is concluded that concentration of heavy metals found in selected organs of Clarias gariepinus were within tolerable limits as recommended by NAFDAC.

13.00 – 14.00 pm - LUNCH BREAK

2 nd CONCURRENT PLATFORM PRESENTATIONS

ENVIRONMENTAL TOXICOLOGY (Amphi 150 C)
AQUATIC TOXICOLOGY (Amphi 150 D)
DESCRIPTIVE TOXICOLOGY (Amphi 150 A)

Session 4: ENVIRONMENTAL TOXICOLOGY
Abstract No.: ENVPF7 – ENVPF12
Time: 14.30 – 16.00 pm
Venue: 150 C
Chairpersons: Dr. Becki Clarke (NTR-EPA, USA), Dr. Fred Heinbach (Germany)
ENVPF7 – 14.30 pm
Bioactivity of synergized neem (Azadirachta indica. A. Juss) and potentiated insecticides for the control of Culex quinquefasciatus larvae

Iman Ahmed¹, Siddig Siddig²

 temperate versus tropical climates.

Michiel Adriaan Daam¹, Paul van den Brink²

¹ISA/UTL, Lisbon, Portugal; ²Alterra and Wageningen University, Wageningen, Nederland

Despite considerable increase in pesticide use over the past decades, little research has been done into their fate and effects in tropical freshwaters. Furthermore, available studies are mostly confined to single species tests and species sensitivity distributions constructed from data of such tests. In this presentation, three underlying mechanisms for differences in response between temperate and tropical freshwaters to pesticide stress are discussed: I) climate related parameters, II) ecosystem sensitivity and III) agricultural practices. To contribute to the lack in tropical higher-tier studies, outdoor microcosm experiments were conducted in Thailand by adjusting methodologies developed in temperate regions. Results of these experiments and comparisons of recorded fate and effects with temperate studies are presented. Additional tropical model ecosystem studies are urgently needed to evaluate whether study findings are also valid for a larger tropical geographical scale, e.g. for tropical Africa. Therefore, the pros and cons of the methodologies applied in Thailand and indications for i) possible improvements; ii) important aspects that should be considered when performing model ecosystem experiments in the tropics; and iii) future research, will be discussed.
Cost of insecticides, environmental pollution and insecticides resistance had been the most pressing problems that restrict the continuous use of chemical insecticides for pests and vectors control. The plant kingdom houses a diversity of plant species that form possible alternatives for chemical insecticides. The neem tree (Azadirachta indica A. Juss) proved to be one of the most promising among plant species. The present work was conducted to test synergism in neem extracts against Culex quinquefasciatus larvae by mixing them with sesamol oil and potentiation when mixing neem formulations with standard mosquito insecticides to reduce the cost. Results of experiments revealed that neem oil (NO) was the most effective against Culex quinquefasciatus 3rd instar larvae than neem seeds water extract (NSWE). On the other hand mixing sesamol oil with both (NSWE) and (NO) produced synergistic effect significantly increasing the larval mortality of Culex quinquefasciatus. Furthermore the synergized (NO) was more effective than the synergized (NSWE). Results also showed significant potentiation of standard mosquito insecticides Abate (Temephos) and Malathion when mixed with NO and NSWE. Abate (0.0002%) + NSWE (0.0002%) and Malathion (0.0002%) + NSWE (0.0002%) were equally effective against mosquito larvae as the insecticides alone at full conc. (0.0004%). The same result was obtained using NO/ Abates and NO/Malathion mixtures compared to that of the insecticides at full conc. (0.0004%). The relative potency of neem oil, neem oil/sesame oil and Abate/neem oil mixtures was assessed in terms of LC50 and LC95 values.

**EnVPF8 – 14.45 pm**

**Investigating the level of air toxics in the outdoor air in Freetown, Sierra Leone.**

**Eldred Tunde Taylor**

Graduate School of Environment and Information Sciences, Yokohama, Japan; Yokohama Environmental Science Research Institute, Yokohama, Japan

The knowledge to understand the state of the environment is necessary to address environmental problems based on risk management and public health but lack of monitoring data in Sierra Leone makes it difficult to address public health concerns. To evaluate the outdoor air level of toxic air pollutants during the wet summer and dry winter seasons in Freetown, Sierra Leone as the first step to investigate and manage the potential environmental problems such as open burning of solid wastes emission from industries and automobile exhausts. The ambient air of Freetown was monitored for polycyclic aromatic hydrocarbons [PAHs], nitrogen dioxide [NO₂], sulphur dioxide [SO₂] and carbon monoxide [CO] across industrial, residential and traffic sites in September 2010. Samples for 11 USEPA’s priority PAH pollutants were analyzed for PM⊙, PM₁₀, and PM₂.₅ by HPLC FLD. NO₂ and SO₂ samples collected by Ogawa diffusion tubes were analyzed by ion chromatograph with CO directly being monitored. The sum of PAHs across the sites is 11.9 and 77.8 ng/m³ for PM₂.₅, and PM₁₀. Mean concentration of NO₂ is 32.7, 12.6, 42.7 µg/m³ and SO₂ is 2.1, 1.8, 6.1µg/m³ at industrial, residential and traffic sites. Mean concentration of CO is 5, 4 and 7 ppm at the same sites. The preliminary results suggested that more PAHs are found in PM₁₀ at all the sites with the highest contribution coming from traffic. Results of NO₂, SO₂ and CO showed relatively low concentrations across the sites which cannot be conclusively reported because of the initial field set up.

**Acknowledgement:** This study is supported by Leadership Program in Sustainable Living with Environmental Risk, Yokohama National University, Japan.

**EnVPF9 – 15.00 pm**

**Passive air monitoring of Polychlorinated naphthalene in Ghana**

**Jonathan Hogarh**

Yokohama National University, Yokohama, Japan; National Institute for Agro-Environmental Sciences, Tsukuba, Japan

As compounds that exhibit characteristics similar to most POPs, polychlorinated naphthalenes (PCNs) have been suggested as candidate POPs. Their concentrations in air were monitored nationwide in Ghana for the first time applying polyurethane foam (PUF) disk passive air sampler (PAS). ∑63 PCNs concentration was averagely 49 pg/m³, higher than what has been presently observed in East Asia. Tri- and tetra-CNs constituted approximately 90% of total PCN homologues in the atmosphere, which provided evidence of strong volatilization of these pollutants as a result of high tropical temperatures. Emissions were generally greater along the coastal southern parts of Ghana compared to the middle and northern belts. Even rural sites in the southern regions had concentrations that exceeded those of urban sites in the mid to northern regions. The sampling point with the highest concentration was located at Teshie, a district in Accra which harbored very huge open waste dumpsite notorious for open burning of waste. Combustion might thus constitute a major source of PCNs in Ghana. A more detailed evaluation of congeners profiles is being undertaken to factor out all other potential local sources of PCN emissions in the country.
Due to its high toxicity mercury is regarded as a significant health risk to the population. We conducted two cross-sectional studies investigating, inter alia, mercury levels in hair of children. One further study examined mercury levels in different fish species. We summarize our findings to characterize the environmental exposure to mercury in Austria. The project “Air and Children” (LuKi) aimed at evaluating indoor pollution in nine elementary schools. Additionally concentrations of mercury in hair of school children were assessed. The Austrian Human Biomonitoring Survey (HBMOe) determined exposure of the population to industrial chemicals and methylmercury. Fifty women–children–men pairs living in one household were recruited. In the QUESEFI-study mercury was analysed in 965 fish-samples (aquacultures, wild caught). In the Luki-study mercury levels (median 149 µg/kg) correlated mainly with fish consumption. Further influencing factors were children’s age and parents education. In the HBMOe-study mothers had significant higher levels (median: 64 µg/kg) than their children (median: 6 µg/kg). Higher methylmercury levels correlated with CNS-symptoms and fish consumption. In the QUESEFI-study wild fish showed significantly higher mercury levels than cultured fish. Our data showed a relatively low internal exposure of participants. Fish consumption was main reason for higher mercury levels. However, even at these low levels correlations with CNS-symptoms were demonstrated. It is reasonable to continue improving waste management (e.g. energy-saving bulbs) and to promote local fish, which is warranted for Europe as well as for Africa.

Atmospheric loading of persistent organic pollutants (POPs) into Lake Victoria has not been investigated despite evidence of their availability in fish and sediments from the same lake. We present results of a study monitoring to establish atmospheric levels and deposition of POPs and PAHs in the Ugandan part of the Lake Victoria watershed. Results from a monitoring period of about one year (2008/2009) are compared with those from the only available data set from a similar study done in the same watershed from 1999 - 2006. In the 1999/2006 study, samples were taken intermittently using high volume air samplers stationed at Jinja and Entebbe. Samples were taken using polyurethane foams, and analysed for PCBs, organochlorine and current use pesticides (CUPs) using GC-EC and GC-MS. PCBs (sum of 107 individual and co-eluting congeners) had the highest mean concentration with a range of 30 - 1729 pg/m3. Entebbe levels (range 56 - 1729 pg/m3 and average of 265.5 pg/m3 for 21 samples) were higher than those from Kakira (range 30 - 503 pg/m3 and average of 243.7 pg/m3 for 26 samples). Kakira samples showed higher levels (range 22-733 pg/m3) of sum-DDT than Entebbe samples (range 7-80 µg/m3). Generally pp’-DDE, pp’DDE and op’-DDE were consistently higher than other metabolites in samples from both sampling stations. Other POPs detected include; Aldrin, Dieldrin, Endrin, HCB, Heptachlor, Mirex, α-chlordane and g-chlordane. CUPs of interest detected included endosulfan and lindane isomers. Alpha-endosulfan (max conc. 247 pg/m3) and g-HCH (max conc. 220 pg/m3) were the predominant isomers in samples from both stations. Partial and preliminary results from the 2008/2009 study show a general decline in ‘-PCBs (range 29-159 pg/m3),increase in average ‘-DDT (from 28pgm/m3 to 40pg/m3) and a decline in ‘-PAHs. Generally, similar levels of ‘-endosulfan and ‘-HCH were observed. A complete data set for the 2008/2009 study will be presented.

The warm climate in equatorial Africa favours elevated
Session 5: AQUATIC TOXICOLOGY

Abstract No.: AQUPF 2- AQUPF6

Time: 14.30 – 16.00 pm

Venue: 150 D

Chairpersons: Prof. Mohammed Abdel Hamid (Egypt)/Dr. Fokunang Charles N (Cameroon)

AQUPF2 – 14.30 pm

Inter-annual trends of heavy metals in marine resources from the Nigerian territorial waters

- Olubunmi Ayoola Nubi, Laoye Oluwafemi Oyediran, Afolasade Tosin Nubi

1Nigerian Institute for Oceanography & Marine Research, Lagos, Nigeria; 2Environmental Laboratories Limited, Lagos, Nigeria; 3University of Twente, Enschede, Nederland

In an attempt to monitor and assess the pollution status of marine resources in the Nigerian territorial waters, and also to ascertain their safety for various use, this study was carried out to reveal the levels and inter-annual trend of heavy metals in surface water, bottom sediment, and fish samples from the Lagos lagoon marine ecosystem. Ten (10) Monitoring locations were carefully selected along Lagos lagoon where human activities are prevalent. Studies were carried out annually in the month of July between 2007 and 2009; and the observed levels and trends are herein reported and discussed. Drastic shoot up was observed in year 2009 at all locations in the levels of Fe, Zn, Cu, Cr, Pb, and Cd in surface water, with maximum values of 0.62 mg/l, 1.14 mg/l, 0.07 mg/l, 0.06 mg/l, 0.08 mg/l, and 0.09 mg/l respectively reported at the near shore locations. The maximum values recorded in year 2007 for Fe, Zn, Cu, Cr, Pb, and Cd in bottom sediments were 11533 mg/kg, 76.57 mg/kg, 16.23 mg/kg, 38.3 mg/kg, 41.29 mg/kg, and 0.94 mg/kg respectively. The levels of these metals were found to be higher in Illisha africana than in Pseudotolitus senegalensis at all locations. This study revealed the inter-annual trends in the levels of heavy metals in the marine resources to be 2009 > 2008 > 2007. This trend is alarming and it is of great concern considering the associated health and economic implications. Generally, the heavy metals levels in the marine resources were found to be higher near shore than in the offshore region; and this could be a clear cut case of greater impact from coastal activities.

AQUPF3 – 14.45 pm

The use of ecologically relevant and cost-effective biomarkers to assess the health status of estuarine and coastal waters

- Olivia Fossi Tankoua, Jean-Claude Amiard, Brigitte Berthet, Catherine Mouneyrac, Claude Amiard-Triquet

1University Of Nantes, Nantes, France; 2ICES, La Roche sur Yon, France; 3Université Catholique de l’Ouest, Angers, France

Estuarine and coastal areas are crucial for their high productivity and thus their economical role but they are also at risk because human activities are responsible for many disturbances including chemical pollution. The methodology of biomarkers has been developed since the early nineties and may be very useful in biomonitoring programmes. Those linked directly or indirectly to reproduction are particularly interesting since they allow forecasting effects on populations well before tragic population depletion may be observed. Among these ecologically relevant biomarkers, several are of interest because they are cost-effective: biochemical markers such as acetylcholinesterase (revealing neurotoxicity), digestive enzymes (involved in energy acquisition), behavioural markers (feeding, burrowing) and physiological markers based on biometric measurements (condition index, gonado-somatic index[3DOTS]). In addition, more specific biomarkers, used in battery, may be useful to link observed deleterious effects to causal factors (e.g. detoxificatory enzymes such as metallothionein, biotranformation enzymes such as glutathione S-transferase,
biomarkers revealing oxidative stress such as catalase, malondialdehyde). These biomarkers have been determined in two sentinel species, the worm *Nereis diversicolor* and the bivalve *Scrobicularia plana*, which are important in estuarine and coastal food chains. They were able to reveal intersite differences along a gradient of pollution in estuaries and bays in Northwest France. This methodology may be applied to other species recognized as sentinels for other marine ecosystems. However, it is recommended to evaluate carefully the potential effects of confounding factors such as the size or sexual status of specimens, food availability, salinity, temperature [3DOTS].

**AQUPF4 – 15.00**

**Use of some aquatic organisms in toxicological experiments**

Maher Haeba1, Ludek Bláha*

1Garyounis University, Benghazi, Libya; 2Research Centre for Toxic Compounds in the Environment (RECETOX), Masaryk Uni, BRNO, Czech Republic

To evaluate effects of chemicals in *vivo* on aquatic organisms (invertebrate, plant, and amphibian) at different endpoints to figure out which parameters can be more sensitive than others at various life span. In standard *Daphnia magna* toxicity tests (i.e. acute and chronic) endpoints such as growth, molting, reproduction, as well as behavior can be determined. In our studies, we have examined effects in three *Daphnia magna* bioassays to evaluate effect of chemicals on different levels in a specific time of development. We have used sex ratio of neonate Daphnia, as a short time (sub-chronic) along with acute and chronic assay. Fresh-water plant species have been suggested as potential biomarkers of water quality. Duckweed plants are composed of two parts, frond, and root. The plants are colonial and form aggregates of two or more fronds in a colony. Lemna minor has a single rootlet. The plant size is about (2-4mm). Changes in the community dynamics of aquatic plants can affect not only other biota but also the quality of drinking water and the recreational and navigational use of the water body. We have evaluated 168h effects of some chemicals on frond numbers, growth rate, dry weight, doubling time as well as roots length. The frog embryo teratogenesis assay - Xenopus FETAX one such alternative bioassay that can be effectively used in aquatic toxicity, because it is cultured and handled easily in a laboratory setting, and a relatively strong developmental biology knowledge base exists, standard methods have been described for FETAX which is a 4-day. The test is initiated with blastula-stage embryos exposed to test solutions. *Xenopus laevis*. This assay is well established for ecological and human health hazard assessment. Our data demonstrate significant variability in sensitivity to chemicals among biota, and we conclude that several bioassays together can provide realistic results about possible effects of chemicals on biota.

**AQUPF5 – 15.15 pm**

**Traits-based ecological risk assessment (TERA): realizing the potential of ecoinformatics approaches in ecotoxicology**

Paul van den Brink1, MN Rubach1, JM Culp1, T Pascoe1, SJ Maund1, DJ Baird1

1Alterra and Wageningen University, Wageningen, Nederland; 2Syngenta, Basel, Switzerland; 3Environment Canada at Canadian Rivers Institute, Fredericton, Canada

In this presentation we discuss the application of traits-based bioassessment approaches (TBAs) in retrospective (bioassessment) as well as prospective ecological risk assessments (ERA). While bioassessment infers the ecological condition of an area by periodically examining the organisms that live there, ERA determines the probability and extent of an adverse effect occurring to an ecological system due to a potential stress or suite of stress events. So, both approaches address the interaction between species and stressors and their consequences at different levels of biological organisation. In this paper a SWOT (strengths, weaknesses, opportunities and threats) analysis of TBA in both applications was used to identify respective challenges and potentials. This presentation is part of a series describing the output of the TERA (Trait-based Ecological Risk Assessment: Realising the potential of ecoinformatics approaches in ecotoxicology) workshop held between 7 and 11 September 2009 in Burlington, Canada. The recognised strengths were that traits are transferrable across geographies, add mechanistic /diagnostic knowledge, require no new sampling methodology, have an old tradition and that they can supplement taxonomic analysis. Weaknesses are their autocorrelation, redundancy and that they cannot be used to protect biodiversity directly. Automated image analysis, combining them with genetic/biotech tools and improved data analysis to solve auto-correlation problem were identified as opportunities, low availability of trait data, their transferability, their quantitative interpretation, the risk of developing non-relevant traits, too low quality of historic databases and their standardization were listed as threats.

**AQUPF6 – 15.30**

**Whole effluent toxicity assessment of the Blesbokspruit using a battery of toxicity tests and bioindicators**

Oluwatoyin Olubambi1, Victor Wepener2

1Univ. of Johannesburg, Johannesburg, South Africa
Large volumes of mining effluent are being continuously discharged into the Blesbokspruit which is very important for drinking water in South Africa. Whole effluent toxicity (WET) assessment was used to monitor environmental stress and further understand differences in responses to stressors in biota across different trophic levels in the wetland. Water samples were collected at five sites during the 2009 high flow. Toxicity tests conducted include 

- Poecilia reticulata (fish)
- Daphnia Pulex (water flea) lethality test
- Vibrio fischeri (bacteria) luminescence
- Selenastrum capricornutum (Algae) growth inhibition tests.

For the lethality tests, samples were placed in effluent water and monitored for immobilization and mortality. Biotox TM and Algal Toxkit F TM were used for the inhibition tests. Immobilization or mortality was at sites 1, 3 and 5 ≤10% for fish and water fleas. EC50 and EC20 % for bacteria inhibition were e.g.; sites 1 (56.943, 45.3), 5 (88.403, 47.534) and for algae inhibition; sites 1 (79.338, 34.938), 5 (21.4, -6.44). EC50 for site 1 (upstream) was lower for bacteria but higher for algae (P < 0.5) than other sites. The reverse is the case for site 5 (reference site, downstream). The WET assessment was highly useful in further understanding differences in responses to stressors in biota from one trophic level to the other within the system.


AQUFP7 – 15.45 pm

Bio-accumulation of metals in Oreochromis mossambicus related to surface water and sediments in Loskop Dam, South Africa.

Jackie Brown¹, Paul Oberholster¹, Brent Newman¹, Jan Myburgh¹

¹University of Pretoria, Pretoria, South Africa; ²CSIR, Stellenbosch, South Africa

Deteriorating water quality in Loskop Dam has caused fish kills in recent years. The Olifants River is the main inflow and impacts in the catchment include coal-mining, sewage, industry, atmospheric deposition and agriculture. Oreochromis mossambicus have been found in large fish kills as well as an annual die-off of predominantly large (> 40cm) males. All fish have similar symptoms and have been diagnosed with pansteatitis. The objectives were to: (i) evaluate the physico-chemical status of Loskop Dam including metals in the water and sediment; (ii) determine metal accumulation in tissues of O. mossambicus and relate these to the water and sediment. Four sites at Loskop Dam and a control site at Kranspoort Dam were sampled monthly from July to December 2010. Water and sediment samples were analysed for Al, Mn, Fe, Cu and Zn. Wild O. mossambicus were collected as well as fresh mortalities from Loskop Dam. A bio-monitoring cage was built in each dam and 20 aquacultured fish placed into each cage for six weeks. Fish gills, liver, brains and muscle were analysed for Al, Mn, Fe, Cu and Zn. Concentrations of Al, Fe and Mn exceeded water quality guidelines while Cu and Zn were below detection limits in both dams. Loskop Dam sediments were enriched in Al, Mn, Cu and Zn while Kranspoort Dam was enriched in Al. All sampled wild fish from Loskop Dam had pansteatitis. Metals did not differ significantly between fish apart from high concentrations of Al and Fe in the gills of the natural mortalities. Apart from Al, the lack of distinct differences in metal concentrations between fish from different sites makes it unlikely that bio-accumulation of the metals investigated were responsible for the development of pansteatitis.

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Session 6: DESCRIPTIVE TOXICOLOGY

Abstract No.: DESPF2 – DESPF6

Time: 14.30 – 16.00 pm

Venue: 150 A

Chairpersons: Prof. Moundipa Fewou Paul (Cameroon)/Dr. Chuisseu Dieudonné (Cameroon)

DESPF1 14.30 PM

Toxicity risk assessment of Ageratum conyzoides leaf extracts in male albino rats

- Banseka ET¹ Wirkom VK² Agba MI² Nwobu GO³

¹Humanity Health Association; ²Department of Medical Laboratory Sciences, Igbinedion University, Okada, Benin City, Edo State, Nigeria

Folk medicinal uses of Ageratum conyzoides are very extensive in the control of both urinary and gastrointestinal tract bacteria. The objective was to determine the acute toxicity of methanolic extract and the LD50 in rats. The leaves of the plant were dried and extracted with methanol. The extract was subjected to acute toxicity test at two stages. Doses of 10, 100 or 1000 mg/kg body weight respectively were administered to three groups (I, II and III) of five male albino rats weighing 150 - 200g by gavages for 14 days while the control group received only distilled water (phase1) after which pathological changes were assessed and single-dose of 2900 and 5000 or 16000 mg/kg body weight (phase 2) were administered to determine the LD50. At 14 days post-treatment in phase 1 there was constant weight gain, signs of restlessness with reduced frequent food and water intake was observed. Single-dose rats in phase 2 presented pale blood, slight enlarged liver, spleen and kidneys after autopsy. Methanolic extract of A. conyzoides was found to be non
toxic. The LD50 lie above 5,000 mg/kg in male albino rats.

Acknowledgement: We are grateful to Humanity Health Association for funding this project

DESPF2 14.45 pm
Antioxidant and antifungal potential of Ocimum gratissimum from Dschang and Yaoundé (Cameroon)

Hzounda Fokou Jean Baptiste¹, Pierre Michel Jazet Dongmo², Fabrice Fekam Boyom³

¹University of Yaoundé I, Yaounde, Cameroon; ²University of Douala, Douala, Cameroon;

Mycoses have increased in the last two decades affecting millions people. Our aim was to evaluate the antioxidant and antifungal properties of the essential oils of Ocimum gratissimum L. from Cameroon. The fresh leaves of Ocimum gratissimum harvested from Dschang and Yaoundé and essential oils were extracted by hydrodistillation. The chemical composition was analysed using GC and GC/MS. The antioxidant properties were evaluated using the free radical scavenging activity of DPPH and the β-carotene bleaching methods. The sensitivity on Aspergillus flavus, Aspergillus fumigatus, and Aspergillus niger were evaluated using agar dilution method. Then that of Candida albicans, Candida parapsilosis and Cryptococcus neoformans was done using the paper disc, broth microdilution and spectrophotometric methods. The major compounds found in Dschang extract were thymol (40.7%), γ-terpinène (24.5%), and that of Yaoundé were eugenol (46.2%), thymol (20.6%). Furthermore the essential oil of Dschang with PA = 5.88±10-4±9.95±10-5mol/g and IC50 = 0.28±0.03g/ml possess more antiradical and antioxidant activities than the one from Yaoundé with PA = 3.37±10-5±1.86±10-6 mol/g and IC503.28±0 µg/ml (p <0.05). There was no statistical difference in the sensitivity of the mould strains to the essential oils. The more susceptible yeast strain was Candida albicans (CMI=0,32±0,00 µg/mL and 2,5±0,00µg/mL) and the most resistant was Cryptococcus neoformans (CMI=2,57±0,00µg/mL and 4,68±0,00µg/mL) of the essential oils from Yaoundé and Dschang respectively. This study highlights in one hand the antioxidant property of the essential oils and in other hand the in vitro antifungal activity against human pathogens causing mycosis. But it also opens the door to in vivo anti fungal investigation.

Acknowledgement: This work was supported by Leadership Program in Sustaining Living with Environmental Risk (SLER), Yokohama National University, Japan.

DESPF3 15.00 pm
Antiradical properties and acute toxicity study of the extracts of Ageratum conyzoides Lin leaves (Asteraceae) from Cameroon

Brice Ulrich Saha Foudjo, Germain Kansci, Gustave Demmano, Vincent Ngouana

University of Yaoundé I, Yaounde, Cameroon

Off-flavour and other deteriorations occurring in lipid-based foods are generally due to oxidation. The aim of this study was to evaluate the antiradical activity of the crude extracts and fractions of Ageratum conyzoides Lin (Asteraceae) leaves and the acute toxicity of the crude extract. The crude extract, obtained by maceration in methanol (98%) was concentrated and fractionated using 7 solvent systems. This crude extract and its fractions were assayed for their antioxidant activity using the DPPH scavenging method. The parameters evaluated were the 50% scavenging concentration (SC50), efficient concentration (EC50) and the antiradical capacity (AC). Vitamin C was used as the reference antioxidant. The phytochemical screening of the extracts was investigated and the acute toxicity of the crude extract was conducted using Wistar albino rats, according to the experimental procedure of the World Health Organisation. The lethal dose 50 (LD50) was the toxicity indicator. The phytochemical analyses revealed in the extract the presence of alkaloids, phenolics, anthraquinones, anthocyanines, tannins, courmarins, sterols, flavonoids, terpenoids and glycidos. Antiradical activity was registered in the crude extract and fractions with SC50 ranging from 86 mg/ml to 125 mg/ml, EC50 from 10.87 105 mole/l to 1.73 105 mole/l and AC from 0.92 10-6 to 5.78 10-6. The acetate methanol 5% (Agf6) and Methanol 100% (Agf7) fractions had the highest antiradical activity compared to the crude extract and the other fractions. Vitamin C (SC50 = 0.2 mg/ml) was more active than all the extracts. The acute toxicity showed a low level of toxicity in wistar albino rats, with an LD50 above 12 g/kg. These fractions (Agf6 and Agf7) could have potential for use as food additives to prevent lipid oxidation.

DESPF4 – 15.15 pm
Antihapatotoxic activities of the methylene chloride-methanol extract of Xylopia phloiodora against acetaminophen-induced hepatocellular lesions in primary cultures of rat hepatocytes

Borris Rosny Galani Tietcheu, Dieudonne Pascal Chuisse Djamen, Nico Frederic Njayou, Paul Moundipa Fewou Paul

University of Yaounde I, Yaounde, Cameroon

Hepatocytes are the main targets of hepatotoxic agents that cause liver injury. In this study, the cytoprotective effect of the methylene chloride-methanol extract of Xylopia phloiodora against cell injuries induced by acetaminophen (APAP) in primary cultures of rat hepatocytes was evaluated. Treatment of primary hepatocytes with APAP 250 mM showed a decrease of the percent of cell viability and an
increase of alanine aminotransferase (ALT) levels in culture medium. Pre-treatment of hepatocytes with *Xylopia phloiodora* at different concentrations resulted in a dose dependant hepatoprotection by increasing cell viability with a IC50 of de 0.21 ± 0.008 µg/ml compared to de 0.21 ± 0.008 µg/ml with Silymarine. Moreover extract was effective in the decreasing of ALT activity with an IC50 of 1.8 ± 0.325 µg/ml and 4.37 ± 0.52 µg/ml with silymarine used as reference drug. These findings clearly indicate that *Xylopia phloiodora* contents bioactive compounds able to inhibit membrane alteration and thus to reinforce hepatocyte integrity.

**DESPF5 – 15.30 pm**

**Protective activities of *Khaya grandifoliola* CDC stem bark extract against carbon tetrachloride toxicity in rats**

**Njayou Nico Frederic**, N'goungoure Florence, Tchana Angele, Moundipa Fewou Paul

*University of Yaounde I, Yaounde, Cameroon*

The protective action of the methylene chloride methanol extract of *Khaya grandifoliola* (EKG) against CCl4-induced hepatotoxicity and immunosuppression in rats were evaluated. Male albino Wistar rats were divided into 5 groups of 4 animals each and treated for 14 days. During the first 7 days, rats received the EKG or silymarin pre-treatment and were poisoned with CCl4. During the last 7 days, we continued to administer EKG and silymarin without the poison. At day 15, rats were killed, blood, liver and macrophages were collected. For the hepatoprotective effect of EKG, biochemical markers of cell damage in the serum and some components of the antioxidant system in liver were assessed in addition to histological studies. Regarding the immunomodulatory effect of EKG, phagocytic activity of macrophages and the production of H2O2 and NO were assessed. As results, administration of CCl4 caused liver damage and a significant decrease (p< 0.05) in macrophage phagocytic activity in rats. Liver damage was repaired and phagocytic activity restored after treatment of rats with silymarin or EKG as proven histologically. In conclusion, EKG protects rats against toxicity.

**DESPF6 – 15.45 pm**

**Evaluation of acute and subacute toxicity of the aqueous extract of Allanblackia floribunda on mice.**

**Kada Sanda Antoine**, Pierre MP1, Mesmer NN2, Dzeufiet-Djoméni Paul Désiré1, Dimo Theophile1, Pierre Kamtchouing1

1Animal Biology and Physiology, University of Yaounde 1, Yaounde, Cameroon; 2Research Center of Laval Hospital, Quebec, Canada

A great number of plants are frequently employed as phyto medicines for therapeutic practise. It is the case of Allanblackia floribunda which is plant of Clusiaceae family widely spread in tropical Africa as well as Cameroon. It is used to treat hypertension, male infertility and cough. To ensure the quality and the safety use of this plant, the present study was carried out to evaluate acute and subacute toxicity of aqueous barks extract of A. floribunda in albino mice. For the acute toxicity test, two months aged albino mice were used and randomly assigned in groups of four males and four females each. Animals of each group were once administered by oral gavage of distilled water (control group) and plant extract at graded doses of 9, 12, 15, 18, 21 g/kg body weight (treated groups). The number of death, some behaviour changes (sensitivity to sound and to touch, movement, exploratory, aggressiveness and defecation appearance) were recorded over first hours after treatment. Body weight changes, food and water intake were evaluated during 48 hours and for 7 days observations period. In subacute toxicity test, two months aged albino mice were distributed in groups of 5 males and 5 females each. Animals were daily given distilled water (control group) and plant extract at doses of 150 and 300 mg/kg body weight (treated groups) during 8 weeks. Effects of extract on food and water intake, body weight, some haematological and serum biochemical parameters, organs weight and histological analysis were evaluated. Single administration of aqueous extract of A. floribunda cause recovery signs of toxicity at the level of behaviour at doses of 18 and 21 g /kg body weight, 2 hours after treatment. No death, any appreciable alterations in body weight, food and water intake were recorded after treatment. The LD50 of the extract was found to be above 21 g/kg body weight suggesting that the aqueous of A. Floribunda is safe. Daily administration of aqueous extract of A. floribunda reduced water and food intake and body weight of treated animals. Extract at dose of 150 mg/kg caused significant increase of ALAT (60.02 % in males and 44.97% in females) and of ASAT (48.02 % in males) activities ; a decrease of red blood cell count and blood proteins by 85.96 % in males and 38.4 % in females ; an increase of white blood cell; slight injuries at the level of liver, kidneys and lungs. Extract dose of 300 mg/kg did not show any significant variations on all analysed parameters. These results suggest that, extract at therapeutic doses may present risks when taken for a long period.
Chairpersons: Dr. Assob Jule Clement Nguedia /Dr. Njayou Nico Frederic (Cameroon)

ENVIROMETAL TOXICOLOGY

ENVPO1— Poster Board 1
Chromium III in Gezira Tannery Corporation Wastewater

Ammar Sorag¹, Nabil Bashir², Yousif Assad³

¹Dongola University, Dongola, Sudan; ²Gezira University, WAD Medni, Sudan

This study was initiated to investigate the level of chromium III in Gezira Tannery wastewater and compare with the permissible limit for chromium III. Also the study initiated to investigate the potential of lettuce (Lactuca sativa L. var. buttercrunch) seeds as a bioindicator (BI), or a biological tool for detecting the presence of one of the toxic materials used in tanning industry using the germination percentage as a parameter (indicator). This can help in cost reduction of analysis and might substitute for the highly sophisticated unaffordable analytical equipments. Samples of Gezira Tannery Corporation (GTC) wastewater (WW) were collected from both the mouth and the tail of the drainage stream. These samples were analyzed to determine the concentrations of Cr using atomic absorption spectrometric (AAS) method. Lettuce seeds (10/Petri dish, replicated 3x and each experiment was repeated 3x) were treated by GTC WW. Results of AAS method showed high quantities of Cr III (1.85%), i.e. above the permissible limit (0.0001%). The bioassay experiment revealed that the seeds were intoxicated (i.e. reduced the germination percentage), when exposed to the WW. The IC50 of WW was 35.5µl/ml. The slope of the log-dose probability lines (Ld-P) showed that this BI response to all treatments was homogeneous (>2). Lettuce seeds satisfied almost all the required properties of the ideal BI.

ENVPO2— Poster Board 2
Heavy metal contamination of green leafy vegetable gardens in Itam road construction site, Nigeria

Olawale Oittoju¹, Monday Akpanabiatu¹, Grace Oittoju¹, Jessi Ndem¹, Anthony Uwah¹, Edet Akpanyung¹, Justine Ekanem¹

¹University of Uyo, Uyo Nigeria; ²University of Nigeria, Nsukka, Nigeria

Human exposures to heavy metals have been the focus of increasing attention among researchers, health and nutrition experts due to their impact on public health. Green leafy vegetables (GLVs) are important part of diets in the South-South Region of Nigeria. Consumption of vegetables exposed to heavy metal contamination may be of serious health consequences. This study was aimed at estimation of some heavy metals (Pb, Hg, Al, Cd, Fe and Zn) concentrations in GLVs harvested from vegetable gardens in the residential areas along Itam road construction site and a control farm land 7-10 kilometers away from the construction site in Uyo, Nigeria. The results showed that Pb, Hg, Al, and Cd concentrations were significantly high (P<0.05) in all GLV samples than the control but Telferia occidentalis had higher values of heavy metals than Talinum triangulare. However, zinc and iron levels in the GLVs were not significantly (P>0.05) higher than the control. Our findings showed that heavy metal contamination of edible vegetable is high at road construction sites and may impact negatively on the people living in such environment. We suggest that health impact assessment be carried out at construction sites in order to suggest necessary measure that can alleviate the effects of such environmental contaminants.

ENVPO3— Poster Board 3
Study of natural degradation of Cypermethrin residue on tomato fruits, Soil and water at desert environment of Owjala oasis Ifdial O. S.

Ifdial El-Awami

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The study conducted to know the natural degradation of cypermethrin insecticide in three samples soil, waters and tomato fruits in the same environmental circumstances in Owjala oasis. The results have showed that the concentration of the insecticide in the tomato fruits in the first day was 0.06 ppm less than the maximum limits according to the codex (2008) and the degradation rate reach 91.6% from the initial amount at the end of study. The degradation of insecticide in the waters was semi stable (1.061 ppm) and in the middle of the study the concentration of the insecticide was 0.35 ppm, the insecticide collapsed at a rate of 67 % of the primary value. and a concentration recorded at the end of the study with a value 97.8 %. The initial concentration of the insecticide in the soil was higher than the waters and the tomato fruit with a value of 2.44 ppm but the destruction was fast in the soil and especially in the initial three days where the ratio of the destructive loss came from the primary value in the third day 32.4 % and was the loss ratio at the end of the study 99.1 % with the concentration of 0.021 ppm destruction. The fast degradation was in soil then water and tomato fruit.
Biological remediation of polychlorinated biphenyls (PCB) in the environment by microorganisms and plants

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It is a known fact that our environment is suffering severe contamination as a result of various uncontrolled activities of man and chemicals in the biosphere. This acute and diffuse contamination of air, soil and water by metals, chemicals and metalloids causes wide environmental concerns, which if left unchecked will be detrimental to man and organisms. Biological methods for the cleaning of the environment especially our soil have been receiving increasing attention especially for the past two decades. Bacteria and fungi have been the natural detoxification agent for contaminants in the environment. Recently, research has shown that with the combination of plants and microorganism in the right proportions and technique, detoxification of environmental contaminants will produce a desirable and better result and most importantly our natural environment will not be affected as some of the processes are environmentally friendly. However, the hydrophobic organic molecules such as polychlorinated biphenyls (PCBs), tend to be much less responsive to bioremediation strategies. The wide spread presence of this compound and others in the prominent group known as persistent organic pollutants (POPs), that share common chemical, toxicological and environment properties continues to increase in the environment, even with the various measures taken to control its presence in the environment. This review focused on the possible trends of remediation of PCBs in the environment and the methodologies applied. It also viewed the merits and demerits of using plants and microorganisms as biological detoxification agents. This will highlight the possible improvement measures on the combination of plants and microorganisms in bioremediation, thereby filling the gap left behind by the conventional methods of remediation with its enormous limitations and disadvantages.

Prevalence of POPs and Selected Perfluorinated alkyl compounds in water from Lake Victoria, Uganda.

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Lake Victoria is a source of fish and water for domestic, industrial and agricultural use for the surrounding urban and rural communities. It is also a sink for industrial effluent from the surrounding urban centres, both treated and untreated. This effluent exposes the lake to chemical contaminants. Other significant routes of exposure of the lake to chemical contaminants include inflowing rivers & channels and atmospheric deposition for organic pollutants. Studies on sediment, ambient air and biota from Lake Victoria have shown presence of POPs in these matrices but similar studies with water are very limited and as such, there is an acute lack of sufficient reference data. In order to contribute to bridging this knowledge gap, we took water samples at offshore sampling points, within the Ugandan part Lake Victoria, close to the mouths of the major inflowing water channels; Nakivubo Channel, rivers Kagera and Sio. Some water samples were taken at points in the open lake at points away from urban and daily human activity. High volume samples (100 litres pumped through columns with XAD resin) and low volume samples (1 litre) were taken from each of the sampling points. The large volume samples were analysed for POPs (using gas chromatography) while the low volume samples were analysed for Perfluorinated alkyl compounds, PFCS, (using liquid chromatography). The data is currently being analysed with preliminary results showing more elevated levels of PFCS in Murchison Bay (mouth of Nakivubo Channel) of Lake Victoria compared to other sampling locations. The data for POPs will also be analysed and the complete data set will be presented.
from homes, offices, apartments, day care centers, and cars in Stockholm, Sweden. The results were used to estimate general human exposure to these compounds from indoor environments.

**ENVPO7— Poster Board 7**
The loss of forest resources and societal adaptive strategies

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Most rural dwellers in Africa rely on the surrounding natural resources for their subsistence. There has been a loss/decline of natural resources in most of rural Africa due to rapid population increases that has led to agricultural and settlement expansions. The rural population, therefore, do not get enough natural resources to sustain their livelihoods. Studies on how fringe communities are coping with the loss/decline of natural resources, on which they rely, are very scarce. This research sought to assess the loss/decline of forest resources in the southern part of Ashanti Mampong District (SPAMD) in Ghana and to understand the coping adaptive strategies that the fringe communities have put in place. The research used satellite image analysis by applying remote sensing and GIS techniques to locate communities which have recently lost tree resources as a result of land cover changes. Socio-economic surveys were carried out using participatory approaches, focus group interviews with semi-structured questionnaires and household survey with structured questionnaires on 33% households each in 4 communities which gave a total of 182 households. Appropriate softwares were used for data analysis. The results show a loss of 19.84% area covered by tree resources and a gain of 16.42% and 3.43% area covered by grass/farm and built-up/bare lands respectively between 2002 and 2007. The quantities of forest resources to fringe communities had decreased relatively from 80% in 2002 to 20% in 2007. Cola nuts and wild cocoyam were extinct. These make the communities move further away from their settlement to get forest resources that could sustain their livelihood and at times buy to supplement and substitute. The loss/decline of forest resources also affected the soil fertility and climatic conditions which has negatively impacted on their agricultural yields. This has made them resort to use of fertilizers or completely abandon farming as main occupation and turn to other livelihood options. Several coping strategies were put in place by the fringe communities which were however, not sustainable to the natural resources base and to the communities’ natural resources needs. More sustainable strategies like tree planting and the domestication of some of the forest resources should be encouraged for long term benefit to both the fringe communities and the natural resources base.

**ENVPO8— Poster Board 8**
Household generating sets, ambient air quality and the prevalence of respiratory diseases in Onitsha, Nigeria

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Power supply remains a singular prevailing problem to economic activities in Nigeria. Given the unreliable and epileptic nature of power supply in Onitsha, the use of household generating sets has become a compulsive obsession for industries, commercial and business outfits as well as living homes. Onitsha reputed to house the biggest market in West Africa is an industrial and commercial nerve centre with the highest population density in South-east Nigeria. A bee hive of industrial manufacture and corporate activity, virtually all industrial and corporate organizations own and operate a generating set for more than eight hours daily. This is a preliminary study to assess the extent of ambient air pollution arising from fuel combustion by these generating sets, as well as evaluating the impact of this indoor air on human health. Apart from the analysis of ambient air, the use of questionnaire and physical examination of selected subjects were used in evaluating health impacts. Noise levels were also measured. Result of studies show that indoor air pollution from combustion of fuel are reasonably consistent with what exists in literature with Co, Co2 oxides of nitrogen and particulate matter occurring at levels higher than the permissible amount. There is a strong significant increase in risk for exposed population with an appreciable population complaining of lacrimation, phlegm, cough and tightness of the chest. The noise levels exceed the threshold for hearing damage. Associated with this practice is a considerable pollution of ambient air. The poor air quality has serious impact on respiratory system. Hospital records show a high incidence of respiratory distress syndrome in Onitsha when compared with Awka, a neighbouring town with less commercial activity and population density. The full picture of the extent and dimension of ambient air pollution by this practice will emerge at the end of the study. These preliminary results are indicative of the extent of damage to both the environment and human health. Due to the unrestricted access to generating sets, the practice will endure and the problem will worsen. The way is to improve on national electricity power supply. These preliminary results are indicative of the extent of damage to both the environment and human health.

**ENVPO9— Poster Board 9**
Effective solid waste management: a solution to the menace marine litter poses on coastal communities - The case study of Lagos, Nigeria
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In an attempt to carry out a study on effective waste management system as a solution to the menace marine litters pose on coastal communities, three coastal areas in Lagos State, Nigeria namely Makoko, Ebute metta, and Victoria Island Bar Beach, known for various human activities were selected. Three groups of research questions were formulated based on the problem perception and impacts, actors and level of governance, and strategy and instrument. Each question was examined and specific strategy was developed for necessary data gathering. This report was based on the observational findings and interviews conducted for various actors; and conclusion and recommendations were based on the evaluation of the research questions. While a clear-cut of marine littering resulting from ineffective solid waste management was the case at Makoko and Ebute metta, the dividend of relatively effective solid waste management system with multi-actor approach was seen clearly at Victoria Island Bar beach as this location was found to be clean and tidy, thus reducing the chances of litters escaping into the marine system. LAWMA has been identified by all stakeholders as the main actor responsible for solid waste management in Lagos state, but her effectiveness is yet to be felt by coastal residents due to some limiting factors such weak collaborations, bad road networks, and defective awareness. Generally, the major impacts identified are aesthetics impairment, health issues, and economic downscale. Based on the studied sites, the framework for requisite action, to address the problem of marine littering in an effective and sustainable manner is documented herein.

ENVPO10 — Poster Board 10

Sequential digestion

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Result of investigation of 10 elements (Cd, Hg, Pb, Co, Ni, Cu, Cr, Mn, Zn and Fe) content in organs (muscles, liver, kidneys, heart, spleen, ovary, gills) of 9 game fish species (tai men, gray lyng, pike, perch, pike-perch, dare, roach, common bream and orfe) from the Obe river basin carried out from 1999-2004 are presented. The character of accumulation and distribution of heavy metals in organs of all studied fish species was complicated. In common bream affected by Ligula intestinalis the pattern of distribution of heavy metals was significant different comparatively with healthy common bream. In spite of obvious theoretic and practice significance the investigations of accumulation and distribution of heavy metals in the fish of the Obe river are carried out insufficiently and do not correspond to requirements of complete and system monitoring (Nicanorov, et al, 1985). It is necessary to note that at present only 10 publications are available, which concern this problem.

ENVPO11 Poster Board 11

Concentration and bioaccumulation of 10 metals in soil, river sediment, plant and hippopotamus (Hippopotamus amphibius L) in the South Luangwa National Park, Zambia

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Hippopotamus (hippo) is semi-aquatic animal and living in the river, but it leaves water to graze the land plant at the river bank. Therefore, they are considered to be exposed to environmental chemicals from both terrestrial and aquatic environments. Until now, there is little information about the metal levels in hippo. Furthermore, there is no study on relationships of metal levels in hippo as well as environmental samples such as soil, river sediment and plant. Our objective was to (1) assess the metal and metalloid (As) levels in hippo, (2) compare these levels in soil, river sediment, land plant and hippo liver, and (3) evaluate differences in metal and metalloid accumulation patterns among them. Concentrations of Cr, Co, Cu, Zn, Cd, Pb, Ni, As, Se and Hg in soil, sediment, land plant and hippo liver from the South Luangwa National Park were measured by AAS. Hippo liver contained significantly higher values of Cu and Zn compared with soil, sediment and plant. For Cr, Ni, As and Pb, higher concentrations were observed in soil and sediment than plant and hippo liver. This result may indicate that these metals do not bio-accumulate in hippo. Interestingly, hippo liver accumulated significantly higher concentration of Hg compared with those of soil, sediment and plant most likely due to the bio-accumulation. Also, hippo liver and plant showed significantly higher Cd levels than that of soil. Principal component analysis (PCA) was performed to clarify the pattern of metal accumulation. Result was divided to three major groups: (1) soil/sediment, (2) plant, (3) hippo), which indicated different accumulation patterns among them. Higher concentrations of Cd and Hg in hippo than environmental samples suggest that these metals could bio-accumulate in hippo.
ENVPO12 — Poster Board 12
Plasma –chemical treatment of industrial wastes enhanced by natural material
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The gliding arc plasma technique produces an electric discharge that is able to create highly oxidizing species (OH, NO). In this study, the electrical Oxidation Process is coupled with Oyster Shell powder incorporated after (PA) and before (PB) exposition to the plasma arc. Modification of the process by PA and PB treatments was assessed by means of pH, Biological Oxygen Demand (BOD5), Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC) measurements. Coupled treatments were found more efficient than the single plasma treatment of polluted liquids in terms of operation cost, waste abatement ratio and reaction rate.

PESTICIDES TOXICOLOGY

PESPO1 — Poster Board 13
Larvicidal activity of Neem (Azadirachta indica A. Juss) plant parts aqueous extracts against Anopheles arabiensis
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With the advent of environmental problems of chemical insecticides and their high cost, recent research work has been directed towards the natural products as ecofriendly alternatives for chemical insecticides in pests and vectors control programs. The present work was established to study the activity of neem seed kernels and leaves aqueous extracts against third instar larvae of Anopheles arabiensis (malaria vector). After 24 hour exposure to1% neem seed kernels, neem young leaves and neem old leaves aqueous extracts, results of experiments revealed that neem seed kernels aqueous extract produced larval mortality highly significant(p<0.01) than neem young leaves and old leaves aqueous extracts respectively. After 48 hours, the effect of the young leaves extract was comparable to the seed kernels aqueous extract. In other separate experiments the activity of neem seed kernels aqueous extract was tested on Anopheles third instar larvae from two areas: Sennar and Elsurogia. The results showed LC50 and LC95 of 1.54x104mg/L, 13.3 x104g/L for Anopheles larvae from Sennar area and 0.04x104g/L, 0.066 x104g/L for Anopheles larvae from Elsurogia. It was apparent from the results that, larvae from Sennar were more tolerant than larvae from Elsurogia which may reflect the selective pressure exerted by continuous spraying in Sennar area; a point which needs further investigation and should be considered by control programs managers.

PESPO2 — Poster Board 14
Histopathological changes in fresh water cat fish (Clarias gariepinus) and toad (Bufo regularis) exposed to Endosulfan
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Endosulfan, an organochlorine pesticide regularly use in the Niger Delta region of Nigeria was evaluated for its effects on the liver of freshwater fish (Clarias gariepinus) and toad (Bufo regularis). These organisms were exposed to doses of 0.00 (control), 0.0025, 0.005, 0.0075 and 0.01 μg/l (Fish) and 0.01, 0.02, 0.03 and 0.04 mg/l (Toad) for 28 days. Alterations were determined in the laboratory by light microscopy using standard technique of Haematoxylin and Eosin staining. No histopathological alteration was observed in the control for both organisms, but several histological alterations were observed in the liver of the treated organisms, such as vacuolar degeneration, pale stained hepatocyte, focal necrosis, aggregations of inflammatory cells between the hepatocytes, cellular rupture and thrombosis formation in the central veins. At the lowest concentration of 0.01 μg/L, which is lower than the recommended ecological concentration (0.01 mg/L), severe dilation and nuclear degeneration were observed after 28 days exposure. The alterations in liver tissue reflect the severity of the different concentrations of the toxicant. More pronounced poisoning symptoms were observed at higher concentrations. The severity of the effects was more pronounced in the fish than the amphibian, which may be due to the dual life of the latter. The aquatic biomarkers assays described in this study can therefore be used as alternative endpoints in Ecological Risk Assessment for the evaluation of residual effects of Endosulfan in the course of regulatory surveillance and monitoring of the aquatic ecosystem in Nigeria.
Mix farming, a more effective approach to reduce pesticides effects to humans and the environment

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Pesticide (fungicide, insecticide [3DOTS]) poses a lot of toxicological adverse effect to both human and the environment, though a little of advantageous effect to both human and the environment. The overuse of these chemicals by human causes a situation of toxemia by the absorption of this substances through skin, nose, mouth causing an increase in the bloodstream (dose-respond relationship) which becomes a poison (according to Paracelsus) leading to pestilent situation like sterility, skin diseases. For the environment these chemicals like that use to spray aphids on wheat may also kill the predator that control other pests or the bees that pollinate flowers, hence reducing or putting an end to some food chain leading to some species extinction or this substances could be washed by rainwater into streams and since they contain compounds like nitrates, phosphate good for the formation algae bloom (eutrophication) on water surfaces lingering the activities of aquatic organisms or contaminating the water source, making it dangerous to the environment. So the method of intercropping (mix) which involves the planting of more than one crop on the same piece of land reducing the pest load of a particular type, example that causing the Panama disease in Bananas hence limiting the use of pesticides, leading to the production of organic foods which are natural and pure. This method has been used and results show positive by subsistence farmers in their small scale production. To accentuate this method not only to small scale farming but to commercial farmers, who are the ones mostly involve with the use of these pesticides, but to explore the above method which will not only increase the profit of the firm but enhancing the use of land properly hence reducing land pressure. Also it encourages the use of little and highly selective pharmacological pesticides with precise targets.

Levels of organochlorine pesticide residues in grasscutter (Thryonomys swinderianus) tissues

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Organochlorine pesticide residues were determined in the meat, liver and kidney tissues from a total of 45 grasscutter (Thryonomys swinderianus) meat samples obtained from the Gomoa district, a vegetable farming area in the Central Region of Ghana. All the samples were analyzed for their residue content of the following organochlorine pesticides; DDT, DDE, hexachlorocyclohexane isomers, lindane (γ-HCH) and δ-HCH, dieldrin, aldrin, endrin, endrin aldehyde, endrin ketone, alpha-endosulfan, endosulfan sulfate, chlordane, heptachlor and methoxychlor. The results indicated that all the analyzed samples were contaminated with the studied organochlorine pesticides. Aldrin and heptachlor were the principal contaminants in all the samples. The meat had the highest pollutant load. All the organochlorine pesticides investigated were detected in the muscle tissues of the grasscutter at the following mean concentrations; aldrin 1.883 μg/kg, heptachlor 0.695 μg/kg, γ-HCH 0.283 μg/kg, δ-HCH 0.108 μg/kg, dieldrin 0.040 μg/kg, p,p'-DDT 0.019 μg/kg, p,p'-DDE 0.014 μg/kg endrin 0.018 μg/kg, endrin aldehyde 0.090 μg/kg, endrin ketone 0.340 μg/kg, α-endosulfan 0.162 μg/kg, endosulfan sulfate 0.183 μg/kg, gamma-chlordane 0.174 μg/kg and methoxychlor 0.101 μg/kg wet weight. The organochlorine pesticide residues were detected in the liver tissues at the following mean concentrations; aldrin 1.315 μg/kg, heptachlor 0.530 μg/kg, dieldrin 0.050 μg/kg, γ-HCH 0.233 μg/kg, δ-HCH 0.070 μg/kg, p,p'-DDT 0.123 μg/kg, p,p'-DDE 0.043 μg/kg endrin aldehyde 0.110 μg/kg, endrin ketone 0.115 μg/kg, gamma-chlordane 0.093 μg/kg and methoxychlor 0.128 μg/kg wet weight. No endrin was however detected in the liver. The highest concentrations of γ-HCH, δ-HCH, endrin ketone and endrin aldehyde were measured in the kidney. The mean concentrations in of γ-HCH and δ-HCH in the kidney were 0.435 μg/kg and 0.107 μg/kg respectively. Endrin aldehyde was detected at 0.135 μg/kg in the kidney. The level of endrin ketone was higher than endrin aldehyde in all the tissues analyzed. The mean concentration of endrin ketone was 0.347 μg/kg in the kidney. The mean level of α-endosulfan was 0.140 μg/kg wet weight. Endosulfan sulfate was detected at 0.033 μg/kg the kidney. The mean concentration of gamma-chlordane was 0.020 μg/kg kidney. Methoxychlor was detected at 0.183 μg/kg wet weight in the kidney. The levels of organochlorine pesticide residues detected in all the tissues were below the accepted maximum residue limits (MRL), as adopted by the WHO/FAO Codex Alimentarius Commission.

Pesticide levels in vegetables and related health risk assessment in Central Amazon - Brazil

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Food consumption is an important route of human exposure to pesticides. In the Brazilian Amazon, intensive and incorrect use of pesticides in floodplain areas, where fresh vegetables are produced for regional urban markets is
a common practice. As a consequence of that, it is possible that pesticide residues on vegetables are above maximum residue limit (MRL) posing health risk to consumers. The aim of this study was to assess the level of pesticide residues (Deltamethrin, lambda-cyhalothrin, Malathion and methyl-parathion) on vegetables cultivated in rural areas near Manaus and marketed in this city to estimate the health risk resulting from long term and short term dietary exposure. A total of 190 fresh vegetables composite samples were collected, being 100 pre-harvest samples at plantation areas 45 post-harvest samples were collected from major markets and 45 post-harvest samples were obtained at supermarkets. The pesticide residue levels in vegetables were analyzed by headspace solid phase microextraction (HS-SPME) and gas chromatography with electron capture detection (GC-ECD). Residues were found in 88 to 95% of samples, with 32% exceeding the maximum residue limits (MRL). Post-harvest samples had higher pesticide concentrations than pre-harvest samples. Health risk assessment indicated that deltamethrin, malathion and lambda cyhalothrin did not pose health risk for short and long term exposure, and parathion methyl poses chronic risk to human health. The assessment undertaken indicates a potential risk and represents an important step towards a more comprehensive understanding and evaluation of human health risks associated with pesticide exposure in developing countries.

PESPO6— Poster Board 18
Diagnostic des risques liés à l’emploi des pesticides en zone cotonnière: cas du village de Gombélédougou au Burkina Faso.

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L’usage des pesticides permet de réduire fortement les pertes dues aux ennemis des cultures. Malheureusement dans le context paysan, l’usage des pesticides n’est pas toujours approprié. un diagnostic des risques liés à l’emploi des pesticides en culture cotonnière a été effectué en 2006 dans un village du Sud-ouest du Burkina Faso (Gombélédougou). Les pratiques des producteurs en matière d’utilisation des pesticides ont été recensées et les risques sanitaires et environnementaux associés ont été évalués. Cent vingt producteurs représentant 26% des producteurs de coton du village, ont été enquêtés. Les deux sexes étaient représentés à part égale. Les résultats indiquent que les producteurs de Gombélédougou bien qu’ayant une longue expérience de plus d’une décennie dans la culture du coton, ont une formation très insuffisante sur l’usage des pesticides et leur impact sur la santé et l’environnement. Ainsi aucun producteur n’a une tenue adaptée à l’usage des pesticides, 56,7% d’entre eux ont des malaises après un traitement pesticide et 5% rejettent les eaux de rinçage des appareils dans les eaux de surface ou les y nettoient directement. On note aussi une mauvaise perception de la nocivité des pesticides et des mauvaises pratiques de leur utilisation. Ainsi, 10% des producteurs réutilisent les contenants des pesticides à des fins alimentaires et 98,3% associent les légumes au coton pour les faire bénéficier de la protection des pesticides. Suite à notre étude, des recommandations de bonnes pratiques d’utilisation des pesticides applicables dans le context local ont été formulées.

PESPO7— Poster Board 19
Comparative toxicological effect of paraquat and crude cassava water extracts on weeds and crop performance of cowpea (Vigna unguiculata (L) Walp).

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Field studies were conducted at Ijako - Owode village in Sango Otta Ogun State Nigeria, in 2001 and 2002; to assess the comparative toxicological effect of paraquat at 1.00 and 2.00kg ai/ha and Bulk and TMS crude cassava water extracts at 50% and 100% respectively for control of weeds in cowpea plots. The herbicides were applied post emergence on a field with fallow weed population of 90% broad-leaved weeds in cowpea [Vigna unguiculata (L). Walp]. The result shows that there were no significant differences (P<0.05) in vegetative growth in cowpea when both herbicides were used for weed control in 1st and 2nd experiments. In both experiments the unweeded control had significantly higher weed biomass than all other treatments at harvest (P<0.05). The weed biomass of treated plots of paraquat and crude cassava water extracts were similar with significant difference (P<0.05) to handweeded which recorded lowest weed biomass. The yield and yield components of crude cassava water extracts at 50% and 100% and paraquat at 1.00 and 2.00kg ai/ha compared favourably with the weeded control. The grain yield of Bulk crude cassava water extract at 50% compared favourably with weeded plots. TMS crude cassava water extracts at 50% recorded no significant difference (P<0.05) with paraquat at 2.00kg ai/ha on cowpea grain yield. Cowpea grain yield from all the treated plots was 3 -10 times more than that from unweeded control in both experiments.
ANALYTICAL TOXICOLOGY

**ANAP01— Poster Board 20**

Distribution and phytochemistry of toxic plants in central Sudan, Gezira (Gezira state)

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Animal wealth (ca. 134.2 million heads) is considered as one of the major components of the Sudanese income, most of which depend on natural pastures, thus, large number of animals are expected to be exposed to severe poisoning, due to feeding on some toxic plants in these pastures. Herders usually complain from sickness or death of their animals that graze naturally, especially during the rainy-season where grasses cover most of the pasture area. The objectives of this study were to survey and identify the toxic plants in central Sudan Gezira State and to identify the major chemical groups in these toxic plants. The study involved both field and laboratory experiments. Three common toxic plants were selected to be subjected to phytochemical analysis. The groups tested were alkaloids, saponins, steroids and triterpene. The results showed that Seventeen toxic plants belonging to 12 families were found, viz: *Ricinus communis* L, *Indigofera oblongifolia*, *Calotropis procera*, *Xanthium brasiliicum*, *Citrus colocynthis*, *Ocimum basilicum*, *Solanum dubium*, *Senna alexandrina*, *Cyperus rotundus*, *Tribulus terrestris*, *Datura stramonium*, *Heliotropium sudanicum*, *Chrozophora picata*, *Aristolochia bracteolate*, *Ipomoea carnea*, *Momordica balsamina* and *Crotalaria senegalensis*. The three commonly found toxic plants *C. procera*, *C. colocynthis* and *A. bracteolate* were found to contain alkaloids, steroids and saponins.

**ANAP02— Poster Board 21**

Impact of the duration of the conservation on the active compounds of *Clausena anisata* and *Plectranthus glandulosus*

Goudoum A1; Ngamo Tinkeu LS2; Ngassoum MB3; Mbafung CM1

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Les huiles essentielles des plantes aromatiques sont utilisées dans le Nord Cameroun comme alternative aux pesticides chimiques de synthèses ayant des effets néfastes sur le consommateur et l’environnement. Leurs composés sont très volatiles, facilement biogéradables, par conséquent les traitements devraient être faits à intervalle de temps court et régulier pour être efficaces. Ce mode d’utilisation pourrait rendre impropre la denrée par l’accumulation des composés de ces huiles essentielles et entraîner d’une part, un problème de sécurité et de sûreté alimentaires. Cette étude a pour objectif d’identifier et d’évaluer les teneurs les composés persistants des huiles essentielles de *C. anisata* et *P. glandulosus* dans les grains et la farine de maïs après traitement. La concentration des huiles essentielles de *C. anisata* et *P. glandulosus* diminue sur les denrées avec la durée du stockage, avec les temps de demi-vie de 24,16 et 34,61 jours pour *C. anisata*, et 25 et 38,75 jours pour *P. glandulosus*, respectivement sur les grains et farine. Après 150 jours de stockage, le nombre de composés présents de 6 pour *C. anisata* et 3 pour *P. glandulosus* sur les grains, 10 et 7 sur la farine respectivement. Les teneurs de ces composés persistants sont à plus de 62,5 fois inférieures à la dose toxique au jour du traitement. Ces teneurs de composés persistants des huiles essentielles étudiées sont infiniment petits comparés aux doses des composés toxiques des huiles essentielles connues dans la littérature. En somme, les composés persistants des huiles essentielles étudiées, au vue de leurs teneurs, ne seraient pas toxiques pour le consommateur aux doses utilisées.

AQUATIC TOXICOLOGY

**AQU01— Poster Board 22**

The pollution status of the Congo River: the case of persistent organic pollutants and selected pesticides.

Vera Verhaert1; Lynn van Haecke2; Adrian Covaci3; Dieudonné Musibono4; Lieven Bervoets1; Erik Verheyen1; Ronny Blust1

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The Congo River is one of the largest freshwater systems of the world and considered pristine, although very little information is available concerning the presence and impact of anthropogenic pollution. Both urban and industrial activities may result in the release and accumulation of inorganic and organic contaminants in the aquatic system but no or very little regulation and control exists. In addition, also the global transport and atmospheric deposition of pollutants may be a source of contamination. This study is the first to investigate the pollution status of the Congo River by persistent organic pollutants (OCPs, PCBs and PBDEs) and other selected pesticides (eg. Dimethoate, Isoproturon, Terbutylazine, Metolachlor, Chlorpyrifos). Part of these contaminants was selected because of their documented local use and others because of their global use and
distribution. Samples of surface water, sediment and biota (i.e. invertebrate and fish species) were collected from three tributaries (Lomami, Aruwimi and Itimbiri) and the Congo River itself to determine the degree of contamination by POPs and pesticides with a GC-MS and a UHPLC-MS/MS, respectively. First results indicate that traces of POPs and pesticides can be found in the different abiotic and biotic compartments. However, quantification of the results is still in progress. As this study was the first to address the pollution status of the Congo River by POPs and pesticides and traces of pollutants are found, we can conclude that more research regarding the pollution status of the Congo River is urgently required.

**AQUPO2 — Poster Board 23**  
Comparative account of the fauna and planktonic communities of two polluted creeks in Lagos

Nnamdi Amaeze, Rosemary Egonmwan, Adebayo Otitolou, Ikenna Onyema  
University of Lagos, Lagos, Nigeria

The hydrochemistry, physiology, microfaunal and planktonic communities of two tidal creeks situated within the Lagos lagoon basin were investigated. Sampling was done in six stations in both the rainy and dry seasons in DLI and Ogbe creek. Assessed physico-chemical characteristics include temperature, pH, salinity, conductivity, total dissolved solids, turbidity, dissolved oxygen, biological oxygen demand, phosphates, nitrates, copper, lead and cyanide. Physico-chemical conditions in both creeks in most cases differed with season (DLI: \( r = 0.666 \), Ogbe: \( r = 0.898 \)) and station (\( p<0.05 \)). Overall, Ogbe creek had higher levels of phosphate (water:0.03-0.09mg/L, sediment:0.34-1.12mg/L), nitrate (water:0.74-5.24mg/L, sediment:0.59-6.62mg/L) and biological oxygen demand (17-55mg/L) while DLI creek had higher concentrations of heavy metals (Pb:water;0.007-0.23mg/L, sediment; 0.01-1.55mg/L, Cu:water; 0.96-2.52mg/L, sediment;0.74-1.82mg/L). Cyanide was detected in all samples except in water from Ogbe (0.03-0.35mg/L) while colliforms were higher in Ogbe creek (\( p<0.05 \)). Oscillatoria sp. was the most abundant plankton while Chironomus sp. was the most abundant microfauna in both creeks. Diplogasteroides were exclusive to Ogbe while Alona, Diaphanosoma and Cyclops spp. were observed only at DLI and Daphnia was the only crustacean common to both creeks. *Tympanotonus fuscatus var. radula* was the only gastropod observed in Ogbe creek. The relevance of these observations was discussed.

**AQUPO3 — Poster Board 24**  
Benthic algae diversity and abundance on polluted agricultural wetland in Ndop plain, Cameroon.

Fonge-BA1, AchuRM1; Egbe AE, 1 Fongod-AN1, Tening-AS1, Focho-DA1; Yinda G1

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Benthic algae have been identified as a valuable option for biomonitoring of stream and river ecosystems. This is because it has short life cycles and can therefore be expected to respond quickly to changes in the environment. A study was carried out on the diversity, distribution and abundance of benthic algae communities in the Ndop wetland ecosystem in Cameroon was used as a tool for monitoring pollution across different age gradient (5, 21, 31 and 33 years). Bottom sediments samples were collected with a soil auger at 0-5 cm using a line transects method. The physico-chemical properties of soil were analyzed during the growing and off seasons using standard methods for pH micronutrients, organic carbon and matter, total Nitrogen, Nitrate, Phosphate, and available Phosphorus. Fifty three (53) species were identified, belonging to 17 Families with Nitzschiaeaceae as the most abundant family and *Anacystis* sp the most frequent species. The most abundant species were *Microcystis* sp, *Chlorococcus dispersus*, and *Nitzschia sigmoidea*. The pH of the rice field in the plain was basically acidic ranged from 4.60 – 5.27 while those of the adjacent farm land had a range of 2.71 – 7.44 and both have low exchangeable cations. The Oldest farms had the highest nitrates and phosphate levels. The nitrate decrease with the age 31years (12.37g/kg) having the least capacity during the growing season. P decrease with increase in age gradient except age gradient 33 years which showed an increase. Principal component analyses carried out to determine the seasonal fluctuation of benthic algae in the different sites showed that, Ca, Mg, pH, nitrate, total Nitrogen and organic matter are vital abiotic factor that contributes in ecosystem management during the wet season while, Mg, Ca, Total N, N-NO3, and PO4 were vital during the dry season. The diversity and abundance of the Diatom and cyanophytas show a polluted environment couple with the fact that the nitrate and phosphate levels were more than the EPA values.

**AQUPO4 — Poster Board 25**  
Occurrence and distribution of Feecal coliform bacteria in Fish in the South West Region, Cameroon

Rhoda Bughe, Benedicta OO, Jane-francis A J-K, Lucy, M Ndip, Pius M Oben
The coastal waters of South West Cameroon especially Limbe beach and to a lesser extend Tiko are used for recreation, fishing, and a vital habitat for fish and shellfish that in turn support wild-life and human. Unfortunately, increase human activities in these areas have resulted in the pollution of coastal water with excessive microorganisms and other pollutants. It has, however been suggested that sewage disposal contribute to pollution in the sites, this may be also influenced by flood situations. Feacal coliform bacteria not only contaminate the coastal waters but also aquatic food sources, thus posing a health risk to consumers. Fish is a major source of protein in Cameroon, especially in the coastal areas. The use of feacal coliform as the most accurate indicator of animal or human waste pollution was effective. The objective of this study was to investigate the occurrence and distribution of feacal coliform in fish and the sea water of the coastal waters of the South West Cameroon. This study was carried out in Limbe and Tiko beaches from the month of May to October 2005. We isolated Coliform bacteria from three anatomic sites (skin, gills, intestine) of fifty fishes (150 samples) and 50 water samples. Data were analyzed statistically using Chi square test with significance set at p<0.05.

Eight coliform bacteria species were identified from which six were feacal coliform bacteria, including Escherichia coli type 1 (27.1%), Citrobacter freundii (20.2%), Klebsiella pneumoniae (15.6%), Klebsiella ozaenae (10.1%), Enterobacter cloacae (7.8%), Serratia marcescens (6.4%), Serratia odorifera (5.5%). Fishes in the Limbe station presented higher occurrence and distribution of coliform bacteria than those from Tiko. Ranking occurrence and distribution of the coliform bacteria with respect to the anatomic site of fish, increased in the order, gills>intestine>skin. The results of our study demonstrated that feacal coliform bacteria can be isolated from fish which is a strong indication of the degree of pollution of our coastal water with animal and human waste. Implementation of the environmental protect rules will solve this problems of pollution.

**AQUPO5 — Poster Board 26**

**Neurotoxins in locally popular reef fishes from the Cameroon coastline.**

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Ciguatera, a poisoning caused by eating coastal fish containing ciguatoxin (a neurotoxin) produced by a dinoflagellate alga, Gambierdiscus toxicus, is the single most prevalent illness resulting from fish consumption particularly affecting tropical countries (Lewis, 2001). Symptoms range from short-term gastro-intestinal distress to long-term neurological and in severe cases, paralysis, coma and death. In 2007, sixty-four locally popular fish from Cameroon coastal waters were analyzed for the presence of ciguatera-associated toxicity. Methods: A sodium-channel specific bioassay using mouse neuroblastoma (N2a) cells, cytotoxic-based bioassay using N2a cells, and an organismic-based bioassay using Artemia salina. A majority of these fish samples showed toxicity using the latter two methods. Two barracuda and one snapper tested positive by the sodium-channel specific N2a. Chemical analysis by LC/MS showed that these three samples contained toxins with masses of 1222 and 1279 amu. These results represent the first analytical report on the presence of sodium channel specific neurotoxins (i.e., ciguatoxin) in fish from this West African coastline. Results indicate a clear basis for educational measures in local communities and high level of collaboration between Africa researchers to create regional initiatives for their study.

**References:** Lewis, R.J., 2001. The changing face of ciguatera, Toxicon 39, 97–106.

**Acknowledgement:** Centers for Oceans and Human Health (COHH) program of the National Institute of Environmental Health Science (PS15S012740), National Institutes of Health, National Science Foundation (OCE04-32479) and the Fulbright Program.

**DESPO1 – Poster Board 27**

**Study of acute and subacute toxicity of aqueous extract of Jateorhiza macrantha in mouse.**

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**Jateorhiza macrantha** (minispermaceae) is a species of evergreen or semi evergreen commonly used in African traditional medicine. Extracts of the leaves are used traditionally to stop bleedings during pregnancy and in the treatment of urogenital syphilis and female infertility regardless of its side effects. Toxicological risks potentially associated with the therapeutic use of the aqueous extract of leaves of Jateorhiza macrantha were evaluated in this study in white mice (Swiss) in experimental acute and subacute toxicity. In acute toxicity, 50 male and female albino mice were used. After administrating a single dose of the extract orally at doses of 0, 2.5, 5, 10 and 15 g/kg of body weight, behavioral responses, mortality rate, food and water...
consumption and as well as body weight were evaluated. The extract produced at doses of 5-15 g/kg, behavioral disorders characterized by decreased sensitivity to noise and touch, locomotion and aggression associated with the issue of pasty faeces. The maximum tolerated dose was 2.5 g/kg, the median lethal dose (LD50) is above 15 g/kg. In subacute toxicity, 64 male and female albino mice were used. After multiple doses of the extract (6 weeks) at doses of 150, 300 and 600 mg/kg of body weight, about 2/3 of the animals were sacrificed and the rest of animals were left untreated for two more weeks to assess the reversibility or not toxic effects caused by the extract after six weeks of treatment. Biochemical analysis of serum from animals sacrificed after 6 weeks of treatment revealed metabolic abnormalities (significant decrease of serum proteins, a significant increase in transaminases, creatinine, bilirubin and triglycerides) and blood (decrease in the number of red cells, white cells and platelets). These metabolic and hematological abnormalities may justify the histological changes observed in the organs of detoxification (liver, lung, and kidney). Metabolic and histological alterations observed were not reversible two weeks after stopping treatment with the extract. These results suggest that high doses of Jateorhiza macrantha could induce long-term damage to the liver, lungs and kidneys. The aqueous extract of Jateorhiza macrantha leaves is relatively harmless (LD50 8 g/kg; 15 g/kg). These results show that long-term use of high doses of this extract requires careful monitoring.

DESPO2 – Poster Board 28
Sub-acute hepatotoxicity of Anacardium occidentale (Anacardiaceae) inner stem bark extract in rats

1Tochukwu Okonkwo, 2Okorie O, 2Aferioho OE, 3Orisakwe OE

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The extracts of Anacardium occidentale have been used in the management of different cardiovascular disorders in Nigeria. These have necessitated the assessment of the toxicity of this plant extract in sub-acute administration. The inner stem bark of Anacardium occidentale was extracted with 80 % methanol and quantitatively analysed for antinutrients and some heavy metals. The phytochemical compositions and acute toxicity of the extracts were determined also. Toxicity profiles of the extract on some liver function parameters were evaluated following a sub-acute oral administration at doses of 1.44 and 2.87 mg/kg. The phytochemical screening of extract revealed the presence of high amount tannins, moderate saponins and traces of free reducing sugars. The antinutrient levels were 5.75 % (tannins). 2.50 % (oxalates), 2.00 % (saponins), 0.25 % (phytate) and 0.03 % (cyanide). The quantity of iron detected from dried crude was 8.92 mg/100 g, while Lead and Cadmium were non-detectable. The extract had LD50 of 2.154 g/kg p.o. in mice. Sub-acute administration of the extract significantly increased the serum levels of alanine aminotransaminase and aspartate aminotransaminase, which are indicative of liver damage. The serum levels of alkaline phosphatase and total protein of the treated animals were not significantly increased. The damaging effects of sub-acute administered extract on hepatocytes were moderate as the serum alkaline phosphatase, total bilirubin and total protein levels in treated animals were not (p<0.05). Thus, sub-acute administration of Anacardium occidentale inner stem bark extract significantly (p<0.05), but moderately, depressed the function of hepatocytes in Wistar rats.

CLINICAL TOXICOLOGY

CLIP01 — Poster Board 29
Endocrine disruptor substances and anthropometric parameters of Nigerians: any possible link?

Chinna Orish

Port Harcourt, Nigeria

Both in humans and animals, endocrine signaling is involved in reproduction and embryo development, growth and maturation, energy production, use and energy storage, electrolyte balance and maintenance and behavior. If the regulatory role of the endocrine system is impaired, abnormal function and/or development of the reproductive, the nervous and the immune systems may occur. Prenatal or neonatal exposure to BPA has been associated with anomalies in male reproductive function, including increased anogenital distance amongst others. Given the widespread dumping of banned baby bottles from developed nations in sub Saharan African countries, can it be said that SSA is living with an invisible poison. The present work has used a meta analysis of the effect of EDS on anthropometric parameters in a Nigerian population. The paucity of relevant data in this area of study may be a reflection of negligence and ignorance of the effect of these environmental pollutants on public health.
Dr. Rebecca (Becki) Clark is Acting Director of the National Center for Environmental Assessment (NCEA) of the United States Environmental Protection Agency. Prior to that, she was the Deputy Director of NCEA. From July, 2001 to July, 2007, she served as Director of the Environmental Sciences Research Division in EPA’s National Center for Environmental Research (NCER). From 1998 to 2001, Dr. Clark directed the Analytical Support Branch in EPA’s Office of Environmental Information. From 1988 to 1998, Dr. Clark served in a variety of scientific and management positions in EPA’s Office of Research and Development’s (ORD) headquarters and field offices, including the Office of Science Policy, where she led regulatory support and research planning teams, and NCEA’s Cincinnati Division, where she served as a team leader and branch chief. Dr. Clark began her career at EPA in 1985, as an Environmental Health Scientist in the former Office of Policy, Planning and Evaluation (now Office of Policy).

Mohammad Abdel-Hamid (Egypt)

University of Mansoura, Mansoura, Egypt

Standard algal inhibition tests were carried out to assess the toxicity of eight pesticides on growth of some green unicellular algae. The tested pesticides include six herbicides (Atrazine, Dichlorprop, Glyphosate, Chlorsulfuron, MCPA, and Simazine), an insecticide (Dimethoate), and a fungicide (Propiconazole). The test algae were *Monoraphidium convolutum*, *Monoraphidium contratum*, *Monoraphidium griffithii*, *Scenedesmus obliquus*, and *Chlorella homosphaera*.

All the test algae were isolated from the River Nile in Egypt except *Chlorella homosphaera* which was isolated from a soil sample. Parallel biotests were carried out using the ISO standard test alga *Pseudokirchneriella subcapitata* (formerly, *Selenastrum capricornutum*), for results comparison and validation. All biotests were carried out in polystyrene microplates and kept for four days under conditions favorable for algal growth. The lowest pesticide concentration (mg l\(^{-1}\)) inhibiting algal growth by 50% (EC\(_{50}\)), compared to control, was quantified from dose-response curves. Relatively low concentrations of some pesticides stimulated the growth of certain algal species. Pesticides toxicity (EC\(_{50}\)) fluctuated within a wide range between 0.0025 mg l\(^{-1}\) to 155 mg l\(^{-1}\) and was highly dependent on the test alga and the tested pesticide. Most of the Egyptian isolates maintained growth responses greatly comparable to those of the standard test alga *Pseudokirchneriella subcapitata*. The remarkable variation in sensitivity of the test algae to pesticides toxicity indicates that biotests using single species representing algae in general involve distinct limitations. The results were validated through proper statistical analyses.
Alterations in biochemical and haematological indices in *Bufo regularis* (Amphibian) and *Clarias gariepinus* (Fish) exposed to Endosulfan.

Isioma Tongo\(^1\), Doris Ogeleka\(^2\), Thomas Ikpesu\(^3\), Emmanuel Ogbomida\(^4\), Alex Enuneku\(^5\), Lawrence Ezemonye\(^6\)

\(^1\)University of Benin, Benin City, Nigeria; \(^2\)Department of Environmental Science, Western Delta University, Oghara, Delta State, Nigeria; \(^3\)National Centre for Energy and Environment (NCEE), ECN, University of Benin, Benin City, Nigeria

The sublethal effects of endosulfan, an organochlorine insecticide on selected biochemical and haematological indices of the dominant African Toad, *Bufo regularis* and the economically important freshwater fish, *Clarias gariepinus* were assessed. They were exposed to 0.01, 0.02, 0.03, 0.04 mg/l (toad) and 0.00, 0.0025, 0.005, 0.0075, 0.01 mg/ l(fish) Endosulfan for 28 days. The activity of Glutathione S-Transferase (GST), Acetylcholinesterase (AChE), Glucose, Cortisol and Total protein levels in serum were the assessed Biochemical indices like GST activities and glucose levels of the toad and fish species exposed to the pesticide significantly \((p<0.05)\) increased with increasing concentrations of endosulfan compared with the control. The activity of AChE in Endosulfan exposed animals was nominal indicating that the pesticide had no effect on AChE activity. Cortisol and Total protein levels reduced significantly \((p<0.05)\) compared with the control. Findings of this study also showed that the pesticide had some effect on the haematological parameters of the toad and fish species. It was determined that the use of the pesticide caused significant decreases \((P < 0.05)\) in Erythrocyte Sedimentation Rate (ESR), Erythrocyte count (RBC), Haemoglobin (Hb), Pack Cell Volume (PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Haemoglobin (MCH), White Blood cell (WBC), Lymphocytes, Basophils and Monocytes counts with increasing concentrations. However, there was significant increase in Neutrophile granulocytes and Eosinophils compared with the control. More pronounced effects were observed at higher concentrations. The observed changes in biochemical and haematological indices may therefore be useful diagnostic tools in evaluating the effect of the endosulfan on aquatic species.

PESP9 – 9.30 am
Development and validation of an indicator designed to estimate the relative exposure and risks of pesticides to the aquatic ecosystem.

James Dabrowski

CSIR, Pretoria, South Africa

Numerous studies performed in South Africa have indicated the presence of pesticides in surface and ground water. As a result there is a need to develop cost effective methods of predicting the mobility and risks of pesticide use on a catchment specific basis, so as to identify hotspots and pesticides of concern. Using GIS, a pesticide risk indicator was developed that integrates exposure variables (i.e. pesticide application, geographic, physicochemical and crop data) and toxicity data (using species sensitivity distributions) to estimate a PUI (Pesticide Use Index), PeXI (Pesticide Exposure Index and PeRI (Pesticide Risk Index). The indicator provides a relative comparison of exposure and risk potential of different pesticides applied in a catchment. This system was applied in the Lourens River catchment, Western Cape, South Africa. Five sampling sites were selected and sampled on a weekly basis from the beginning of the spraying season (October) till the beginning of the rainy season (April). All samples were analysed for pesticides applied according to the local farmers spraying programme. Pesticides detected in samples were compared to the outputs of the PUI and PeXI. The PeXI successfully identified hotspot sites and also gave a reasonable estimation of the relative contamination potential of different pesticides at a site. It also successfully identified important routes of exposure (i.e. runoff or spray drift) of different pesticides at different sites. All pesticides detected during a runoff event on 15 November 2009, were successfully indicated as being more associated with runoff than spray drift by the PeXI. The PeRI identified azinphos-methyl and chloropyrifos as high risk pesticides towards the aquatic ecosystem.
PESPF10 – 9.45 am
Estrogen receptor status and concentration of organochlorine pesticides in the subjects suffering from breast cancer

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1Indian Institute of Toxicology Research, Lucknow, India; 2Sir Ganga Ram Hospital, Delhi, India

The organochlorine pesticide, dichlorodiphenyltrichloroethane (DDT), which is fat-soluble and persistent in the body and environment, has estrogenic activity. There has been an apparent association with breast cancer, which has implicated DDT binding with estrogen receptors (ERs). The mechanism of DDT-ER interaction at target sites is similar to estrogen, with protein synthesis resulting in an estrogenic response. To compare the levels of pesticides in the blood and tissue in the subjects suffering from malignant (ER-positive and ER-negative) and benign breast disease as control. This study was conducted among 93 women underwent surgery for breast disease. Blood tumor and surrounding adipose tissue of the breast were collected from the subjects and analyzed to determine organochlorine pesticides. The α,β,γ and δ isomers of HCH, and metabolites of DDT were frequently detected in three specimens. Total HCH levels were higher in the blood of the ER-negative group (21 cases) whereas total DDT levels were higher in the blood of ER-positive group. In tumor tissue, the level of total DDT (p<0.05) and p,p’-DDE (p<0.001) found significantly higher in ER-positive group. The level of total HCH was higher in the breast adipose tissue of the study group. The distribution of known confounders of breast cancer did not differ significantly between the groups. Study shows that exposure to DDT increases the risk of developing ER-positive tumors. This finding should be interpreted with caution due to the limited number of ER-negative cases.

PESPF11 – 10.00 am
Assessment of organochlorine pesticide residues in cows’ fresh and pasteurized milk sold from Kampala markets, Uganda

Edwige Kampire
Kigali Institute of Education, Kigali, Rwanda

Fresh and pasteurized milk samples collected from Kampala markets were analyzed for organochlorine pesticides using a gas chromatograph equipped with an electron capture detector. Five organochlorine pesticides, namely; Aldrin, Dieldrin, Endosulfan, Lindane, DDT and its metabolites were detected in the milk samples and confirmed with a gas chromatograph equipped with a mass spectrometer [GC-MS]. The average concentrations in the fresh milk (n=54) were: 26 ± 1.7 μg kg⁻¹, 4 ± 0.3 μg kg⁻¹, 7 ± 4 μg kg⁻¹, 9 ± 0.7 μg kg⁻¹ for lindane, Endosulfan, dieldrin and aldrin respectively. The mean concentrations of p,p’-DDE, p’-DDT and o, p’-DDT were 9.5 ± 2.0 μg kg⁻¹, 33 ± 6.9 μg kg⁻¹ and 9 ± 2.0 μg kg⁻¹ respectively in the fresh milk samples. In the pasteurized milk samples (n=47), the mean concentrations recorded were: 8 ± 1.0 μg kg⁻¹, 25 ± 5.0 μg kg⁻¹ and 7 ± 4.0 μg kg⁻¹ respectively for p,p’-DDE, p, p’-DDT and o, p’-DDT. Lindane, endosulfan, dieldrin and aldrin recorded the following concentrations of 22 ± 1.5 μg kg⁻¹, 3 ± 1.0 μg kg⁻¹, 7 ± 4 μg kg⁻¹ and 6 ± 1.0 μg kg⁻¹ respectively. Although, most of the organochlorine residues detected were below the maximum residue limits set by the FAO/WHO, bioaccumulation of these residues is likely to pose health risks to the consumers of milk in Uganda.

PESPF12 – 10.15 am
Dosage des residus de pesticides dans les eaux du bassin du Niger en Republique du Benin

Yari Issa Mohamed
UREEQ/EPAC/UC, Cotonou, Benin

This study was undertaken to investigate the occurrence, spatial distribution and temporal and seasonal variations of sixteen Polycyclic Aromatic Hydrocarbons (PAHs) at three selected sites in Nairobi, Kenya on a monthly basis from February to July 2008. A concurrent study was carried out in the cities of fourteen other African countries. The sixteen PAHs have been identified by various Regional and International Agencies as priority compounds due to their toxicity, potential for human exposure and adverse effects on human health and the environment. Identification and quantification of the PAHs in air was done using a Varian CP 3800 gas chromatograph equipped with a flame ionisation detector. Confirmatory analysis was conducted using Gas Chromatography equipped with a mass spectrometer (HP 6890-HP 5972). Compound detection limits ranged between 0.0165 ng/filter for acenaphthene and 0.117 ng/filter for anthracene. Levels of PAHs in air were lower at the Kabete site than in Dandora and Industrial Area. The concentrations of individual PAHs in air ranged from below detection level to 3939.66 ±10.28 ng/filter. The sum of the concentrations of the compounds (Σ16 PAHs) ranged from 1704.05 ±191.16 ng/filter to 1881.81 ±202.86 ng/filter in Kabete; 6470.27 ±724.42 ng/filter to 8726.93 ±716.53 ng/filter in Dandora; and between 5853.69 ±631.28 ng/filter and 7822.87 ±851.89 ng/filter in Industrial Area. Levels of Σ16 PAHs in Kabete (1943.91 ±241.03 ng/filter) were within the same range of magnitude as some urban sites but generally lower than those in some major cities in Africa. Average concentrations of Σ16 PAHs in air from Industrial Area and Dandora in Nairobi were higher than those reported in Khartoum (4230.67 ±699.53 ng/filter), Tunis (1604.17 ±484.79 ng/filter), Sheda in Nigeria (3667.83 ±1769.06 ng/filter), Lusaka (1628.33 ±513.84 ng/filter) and the industrial Vander Park of South Africa (5147.86 ±1360.82 ng/filter). However, the levels of the Σ16 PAHs were much higher at an urban sampling site in Dakar (13872.80 ±2904.16 ng/filter) than those at the Kenyan urban sites. Venue: Amphi 150D

**Session 8: ANALYTICAL TOXICOLOGY**

**Abstract No.: ANAPF7 – ANAPF12**

**Time:** 9.00 – 10.30 am

**Venue:** 150 C

**Chairpersons:** Prof. Suh Emmanuel (Cameroon); Dr. Fokunang Charles N (Cameroon)

**ANAPF7 – 9.00 am**

**Assessment of polycyclic aromatic hydrocarbons in air at selected sites in Nairobi, Kenya**

**Dorice Situma, Paul Shiundu, Shem Wandiga**

*University of Nairobi, Nairobi, Kenya*

This study was undertaken to investigate the occurrence, spatial distribution and temporal and seasonal variations of sixteen Polycyclic Aromatic Hydrocarbons (PAHs) at three selected sites in Nairobi, Kenya on a monthly basis from February to July 2008. A concurrent study was carried out in the cities of fourteen other African countries. The sixteen PAHs have been identified by various Regional and International Agencies as priority compounds due to their toxicity, potential for human exposure and adverse effects on human health and the environment. Identification and quantification of the PAHs in air was done using a Varian CP 3800 gas chromatograph equipped with a flame ionisation detector. Confirmatory analysis was conducted using Gas Chromatography equipped with a mass spectrometer (HP 6890-HP 5972). Compound detection limits ranged between 0.0165 ng/filter for acenaphthene and 0.117 ng/filter for anthracene. Levels of PAHs in air were lower at the Kabete site than in Dandora and Industrial Area. The concentrations of individual PAHs in air ranged from below detection level to 3939.66 ±10.28 ng/filter. The sum of the concentrations of the compounds (Σ16 PAHs) ranged from 1704.05 ±191.16 ng/filter to 1881.81 ±202.86 ng/filter in Kabete; 6470.27 ±724.42 ng/filter to 8726.93 ±716.53 ng/filter in Dandora; and between 5853.69 ±631.28 ng/filter and 7822.87 ±851.89 ng/filter in Industrial Area. Levels of Σ16 PAHs in Kabete (1943.91 ±241.03 ng/filter) were within the same range of magnitude as some urban sites but generally lower than those in some major cities in Africa. Average concentrations of Σ16 PAHs in air from Industrial Area and Dandora in Nairobi were higher than those reported in Khartoum (4230.67 ±699.53 ng/filter), Tunis (1604.17 ±484.79 ng/filter), Sheda in Nigeria (3667.83 ±1769.06 ng/filter), Lusaka (1628.33 ±513.84 ng/filter) and the industrial Vander Park of South Africa (5147.86 ±1360.82 ng/filter). However, the levels of the Σ16 PAHs were much higher at an urban sampling site in Dakar (13872.80 ±2904.16 ng/filter) than those at the Kenyan urban sites. Venue: Amphi 150D

**ANAPF8 – 9.15 am**

**Characterization of sorption of endosulfan isomers and chlorpyrifos on container walls using mixed solvent systems**

**John Wasswa¹, Peter Nkedi-Kizza², Bernard Kiremire¹**

¹Makerere University, Kampala, Uganda; ²University of Florida, Gainesville, United States of America

The reliability of sorption data for organic contaminants with low water solubility has generated great concern due to the variability in literature of the soil-water partition coefficients (KOC) values for these compounds. In particular, sorption on container walls in aqueous systems when measuring the sorption coefficient, KD (used to calculate KOC values) for strongly hydrophobic compounds (SHOCs) is a potential source of discrepancies in the KOC values. In this paper, sorption on container walls when measuring sorption of three halogenated compounds (α-endosulfan, β-endosulfan and chlorpyrifos) has been eliminated using mixed solvents. Various mixtures of methanol and water were used. Sorption experiments were designed using polytetrafluoroethylene (Teflon) lined centrifuge tubes and an HPLC-syringe. Solution sample analysis was performed using HPLC equipped with a UV Diode Array Detector and C-18 column at a wavelength of 214 nm with Acetonitrile: Water (80: 20 v/v) as the mobile phase. The Solvophobic model was used to calculate the percentage recovery (% RM) in water of the test compounds. The results show that there is considerable sorption on container walls for the three chemicals at volume fraction of methanol (fc < 0.4). The data further show that in aqueous systems, percentage recoveries for α-Endosulfan, β-endosulfan and Chlorpyrifos are 48, 45 and 61, respectively. Thus in order to generate reliable sorption data for α-endosulfan, β-endosulfan and Chlorpyrifos, and other SHOCs, experiments may be conducted using Teflon lined centrifuge tubes and HPLC-syringes at volume fractions of Methanol (fc ≥ 0.5).

**ANAPF9 - 9.30 am**

**Organochlorine pesticide residues in young leaves of Mangifera indica from sites near a point source in coast region, Tanzania**

**Michael Kishimba, John Marco**

*University of Dar es Salaam, Dar es Salaam, Tanzania*

Young leaves of Mangifera indica (mango tree) from nine sites were used as bioindicators of local atmospheric contamination by organochlorine pesticides and metabolites from a point source, an old storage site at Vikuge farm in Tanzania. Sample extracts were analysed by GC-ECD and GC-MS. The concentrations ranged 2.7-649 ng g⁻¹ p.p”-DDT,
below detection limit (bdl)-290 ng g\(^{-1}\)p,p\(^{''}\)-DDT, 0.4-13 ng g\(^{-1}\)p,p\(^{''}\)-DDE, bdl to 4 ng g\(^{-1}\) o,p\(^{''}\)-DDE, 1.231 ng g\(^{-1}\) p,p\(^{''}\)-DDD and 0.5-55 ng g\(^{-1}\) o,p\(^{''}\)-DDD. The concentrations of other compounds were up to 3.9 ng g\(^{-1}\) pentachloroanisole, 1.3 ng g\(^{-1}\) α-HCH, 12 ng g\(^{-1}\) β-HCH and 2 ng g\(^{-1}\) γ-HCH, on fresh weight basis. The compounds p,p\(^{''}\)-DDT, p,p\(^{''}\)-DDE, p,p\(^{''}\)-DDD and o,p\(^{''}\)-DDD were found in 100% of the samples, while pentachloroanisole, o,p\(^{''}\)-DDE and o,p\(^{''}\)-DDE were detected in 78%, 56% and 67% of the samples, respectively. The low DDE/DDT ratios (0.01-0.20) in all samples indicate recent input of significantly non-degraded DDT from the point source. The low α/γ-HCH ratios (<0.3-0.7) in most samples indicate recent input of lindane (99% γ-HCH). The slightly high α/γ-HCH ratios in some samples might be due to photochemical or bacterial transformation of γ-HCH to α-HCH, or could reflect input of technical HCH. The very strong positive correlations in the concentrations of p,p\(^{''}\)-DDT, p,p\(^{''}\)-DDE, p,p\(^{''}\)-DDD, o,p\(^{''}\)-DDE, o,p\(^{''}\)-DDE and o,p\(^{''}\)-DDD (r = 0.91-0.98, n = 18, p < 0.01) indicate that they have a common source. The results suggest that young mango leaves are suitable bioindicators of recent inputs of organochlorine contaminants from a point source.

ANAPF10 - 9.45 am

**incidences of endocrine disrupting phthalate esters in selected foods and food wrappers around Tshwane Metropolis, South Africa**

Omotayo Awofolu, Ntsako Baloyi

*University of South Africa, Johannesburg, South Africa*

Oral ingestion is one of the pathways by which xenobiotic and toxic compounds enter the physiology of man and wildlife. This entry can be facilitated through chemico-dynamics of these toxic compounds from materials such as food wrappers (plastics, papers, tins, aluminium etc) into human. This article reports on the incidences of Phthalate Esters (PEs) in selected foods and food wrappers from some commercial stores in Tshwane Metropolis in South Africa. Three food samples (Vienna, Polony and Cheese) were purchased from selected commercial stores and processed. Phthalate Esters in these food samples were extracted using soxhlet extraction, cleaned-up via the column chromatography and quantification was by capillary Gas Chromatography equipped with Flame Ionization Detector (GC-FID). Quality assurance experiment through the standard addition procedure revealed percentage recovery range of 73-92%; 63 - 93.3%; 92.3 - 104%; 51 - 106% and 61 - 74% for DMP; DBP; DnBP; BBP and DEHA respectively across the food samples, hence applicability of the procedure. Results of the analyses of commercial food samples revealed general contamination and presence of these compounds. Continual consumption has dire health implications.

ANAPF11 - 10.00 am

**Assessment of the role of heavy metals in neuropsychiatric disorders**

Onyenmechi Afonne\(^1\), Godwin Molokwu\(^1\), Ejeatuluchukwu Obi\(^1\), Orish Ebere Orisakwe\(^2\)

\(^1\)Nnamdi Azikiwe University, Nnewi Campus, Nnewi, Nigeria; \(^2\)University of Port-Harcourt, Port-Harcourt, Nigeria

The effects of heavy metals on health are a growing public health concern. Repeated exposure to these heavy metals overtime is associated with myriads of adverse health effects, including, heart and liver damage, nephrotoxicity and neurotoxicity. Neuropsychiatric disorders are the fifth most significant health risk associated with exposure to environmental components such as lead. We set out to study the role of heavy metals (Lead, Cadmium And Nickel) in neuropsychiatric disorders in patients attending a Neuropsychiatric Hospital in Nawfia, Nigeria. 104 patients who are attended to at the Neuropsychiatric Hospital, Nawfia participated in the study after giving informed consent either personally or through their caregivers. The participants or their caregivers were administered a well structured questionnaire to elicit factors surrounding the ailment and demographic characteristics of the patients. Also blood was collected from the patients for analysis of Lead, Cadmium and Nickel using the atomic absorption spectrophotometer. Blood Pb (BPb) level was found in the range of 0.01-0.85 mg/L, Cd 0.02-0.35mg/l, and Ni 0.07-0.50mg/L. There were higher levels of nickel in the patients than lead and cadmium. Only 5 patients had no detectable BPb level, whereas all others had BPb levels ≥ 0.01mg/L. For Cd, all the patients, except 2 that were not detectable, had blood Cd level of > 0.0012mg/L. Nickel levels in all the patients were > 0.003mg/L. In conclusion, blood Pb, Cd and Ni levels were increased in the neuropsychiatric patients studied. Heavy metals contaminations may be contributing to the pathogenesis of neuropsychiatric disorders.

ANAPF12 – 10.15 am

**Introducing the top-down approach in estimating measurement uncertainty for testing toxic chemicals and environmental parameters**

Ghirma Tafesse

*ChemTest Consulting, Addis Ababa, Ethiopia*

The standard definition of Uncertainty of Measurement (MU) is a parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand. The result of a measurement is the best estimate of the value of the measurand, and the combined uncertainty arises from
Fluoroquinolones (FQ’s) are a group of synthetic, highly potent antibiotics widely used in human and veterinary medicine. In poultry production antibiotics are improperly used as growth promoters [1]. Residues of these drugs may accumulate in animal tissues if adequate withdrawal times are not observed [2]. Drug residues in food may trigger allergic reactions in some hypersensitive individuals.

Although several analytical methods have been developed to identify and quantify FQs, the biological sample preparation is one of the most crucial and difficult steps in residue analysis. Dispersive Liquid Liquid Microextraction (DLLME) is a preconcentration technique that employs a mixture of high density extraction solvent and a water miscible polar solvent (disperser) and the analytes are generally extracted from the aqueous into the extraction solvent [3]. The goal of this work is to assess whether DLLME can be applied for the determination of six FQ’s (ciprofloxacin, difloxacin, danofloxacin, enrofloxacin, ciprofloxacin and norfloxacin) in solid tissue sample (chicken livers) using high performance liquid chromatography, where the FQ’s will be extracted from the organic extract (disperser) instead of the aqueous into the extraction solvent. In the development and evaluation of the procedure purified water was used as the model matrix to study various parameters affecting the extraction efficiency such as sample pH, volume of extraction and disperser solvents and the effect of extracting from the disperser solvent to the extraction solvent was also studied. The optimal conditions for DLLME procedure were 0.8 ml of methanol (disperser), sample pH 8.00 and 150 µl dichloromethane (extraction solvent). The calibration curves of six FQ’s in the range of 0.25 to 2.5 µg/ml were linear with correlation coefficients ranging from 0.9976 to 0.998. The extraction recoveries in purified water at spiking level of 1µg/ml ranged from 78.4 to 110.8%. The method was then applied to chicken liver samples where methanol was used to extract the FQ’s in chicken livers and the methanol extract then used as a disperser solvent in the DLLME procedure. The DLLME extraction method gave high extractions efficiencies and when applied to real chicken liver samples it gave satisfactory results.

References

Acknowledgements
This study was financed by UNISA and National Research Foundation. We also acknowledge the NRF for the studentship.

ANAPF14 – 9.15 am
Investigation of water sources as reservoirs of Vibrio cholerae in Bepanda, Douala and determination of physico-chemical factors maintaining its endemcicy.

Akoachere J-F, Mbuntcha, CK, Ndip LM and Njom HA.
Toxigenic strains of *Vibrio cholerae* O1 and O139 are the causative agents of cholera, a severe watery diarrhea disease that can progress to death if not properly managed. Although clinical management of cholera has advanced over the past 40 years, cholera remains significant cause of mortality in developing countries, where it is a marker of inadequate drinking water and sanitary infrastructures. *V. cholerae* is autochthonous to the aquatic environment and its survival and persistence has been shown to depend on several physico-chemical factors. Cholera has been endemic in Douala since 1971, with most outbreaks starting form Bepanda, an overcrowded neighbourhood in the city of Douala with limited access to portable water and very poor sanitary conditions. In our study, we analyzed water samples from various sources in Bepanda as possible reservoirs of *Vibrio cholerae*, determined its susceptibility to antibiotics previously used for cholera treatment in Douala, in a bid to determine the best treatment option(s) in the event of an outbreak. Physico-chemical factors (temperature, pH and salinity) that could maintain the endemcity of the organism in this environment were analyzed. A total of 318 samples from various sources (well n=45; tap n=8; stream n=1) were analyzed for *Vibrio cholerae* from February to July 2009, using standard microbiological techniques. Isolates were identified and characterized based on their colonial and biochemical characteristics and their identity confirmed using the API 20E kit. *Vibrio cholerae* isolates were serologically characterized using the polyvalent O1/ O139 antisera. Eighty-seven (27.4%) samples were contaminated with *V. cholerae* with high isolation rates being obtained from the stream (52.4%) and wells (29.8%). The rate of isolation from the different sources was significantly higher (P< 0.05) in the rainy season (35.5%) than in the dry season (18.5%). Of the 96 *V. cholerae* strains isolated, 23 (24%) belonged to O1 serogroup while 64 (66.6%) were serogroup non-O1/non-O139. Nine strains (7.4%) could not be typed as they exhibited auto-agglutination and were designated 'non-typeable'. Serogroups O1 was isolated only from well and stream water. Temperature and salinity positively correlated with the occurrence of *Vibrio cholerae* and hence could be maintaining its endemcity in Bepanda. All isolates irrespective of serogroup were susceptible (100%) to fluoroquinolones but exhibited high resistance rates to trimethoprim/sulfamethozaxole and tetracycline. Thus the use of these drugs in the management of cholera should be discouraged. Resistance to 2 or more drugs was common with the predominant resistance pattern being AML®-TE®-SIX®. Serogroup O139 was not isolated in our study. The present study confirms the endemcity of *V. cholerae* in Bepanda with O1 and non-O1/non-O139 serogroups co-existing in the stream and wells and indicates the possibility of future outbreaks of cholera in this locality if sanitation and drinking water quality are not improved. Findings underscore the need for water disinfection and continuous monitoring of water sources in high-risk cholera areas of Cameroon, for a better preparedness and control of cholera.

ANAPF15 – 9.30 am

The effect of the Kingtom dumpsite on nearby ecosystems

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University of Free Town, Sierra Leone

The Kingtom dumpsite is situated in the west-central part of Freetown, the capital of Sierra Leone. The dumpsite is characterized by crude, uncontrolled and unacceptable methods of collecting and handling of its waste. A study to assess the nature and level of harmful pollutants such as heavy metals and uncontrolled persistent organic pollutants (POPs) the site contribute to nearby ecosystems was conducted. Water and sediment samples were collected and analysed by spectrophotometric method of analysis after treatment by standard methods (APHA, 1998). Estimation of dioxins and furans was done according to UNEP's Standardised Toolkit (NIP, 2008). Leachates that drains into nearby streams and eventually into the White Man’s bay during the peak of the rainy season gave the following results: Ni = 0.73 × 10⁻², Cr = 0.20 × 10⁻², Cu = 2.44× 10⁻², Al = 0.74 ppm. Heavy metal levels in the bay average: Al = 0.07, Zn = 0.03, Cu = 0.073, Pb = 0.006 ppm. Pollutants level of underground spring at the dumpsite during the raining season showed high levels of pollution: carbonate alkalinity = 180 mg CaCO₃/L, CI - = 191.7 ppm, NO₃-N = 32.8 ppm, E. coli and faecal coliforms too numerous to count, etc. Uncontrolled burning of wastes (plastics, materials containing chlorine, metals etc) at the site is estimated to emit between 49.3 – 192.7 TQ/a dioxins and furans. The Kingtom dumpsite contributes to the load of heavy metal pollutants in the nearby aquatic environment as well as the surrounding air quality.

References:

PREPF1 – 9.45 am:
Opentox community developments in predictive
toxicology

Barry Hardy

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Africa is undergoing significant development growth on a
continent that has unique, diverse and valuable ecosystems. Improved computer-based models of
these systems and the consequence of potential perturbations
introduced by development would provide valuable
scientific knowledge supporting better informed
development decisions. The potential for OpenTox to help
support the educational and research activities of African
scientists and their collaboration with scientists in other
parts of the globe will be discussed. As OpenTox actively
supports the development of Open Source tools and
Internet resources, barriers to the application of computer
and Internet-based computational toxicology in the
African context should be lowered. OpenTox addresses
requirements of regulatory guidance through providing
tools for the support of alternative testing methods in the
risk assessment of chemicals in the environment. Progress
on a well-engineered modernization of predictive
toxicology information technology and interoperability
between toxicology systems and resources is urgently
required to achieve such goals. The OpenTox Framework
(1,2) has been developed to support the communication
between toxicology resources, based on standard
representations of data, and the ability for distributed
Internet-based resources to exchange that data, build and
validate predictive models, and generate reporting
information relevant for research analysis or risk
assessment. I will describe the activities of the OpenTox
community, the design and architecture of OpenTox and
example applications it can enable, current challenges and
future directions, including the need and benefits for
community and collaborative approaches and the
infrastructure requirements for supporting interdisciplinary
science in an extensible way.

(1) OpenTox - An Open Source Predictive Toxicology Framework, is funded
under the EU Seventh Framework Program: HEALTH-2007-1.3-3 Promotion,
development, validation, acceptance and implementation of QSARs
(Quantitative Structure-Activity Relationships) for toxicology, Project
at www.opentox.org

(2) Collaborative Development of Predictive Toxicology Applications
Barry Hardy, Nicki Douglas, Christoph Helma, Micha Rautenberg, Nina
Jeliazkova, Vedrin Jeliazkov, Ivelina Nikolova, Ramualdo Benigni, Olga
tcheremenskaia, Stefan Kramer, Tobias Girschick, Fabian Buchwald, Joerg
Wicker, Andreas Karwath, Martin Gutlein, Andreas Maunz, Haralambos
Sarimveis, Georgia Melagraki, Antreas Afantitis, Pantelis Sopasakis, David
Gallagher, Vladimir Poroikov, Dmitry Filimonov, Alexey Zakharov, Alexey
Lagunin, Tatyana Glorizova, Sergey Novikov, Natalia Skvortsova, Dmitry
Druzhilovskiy, Sunil Chawla, Indira Ghosh, Surajit Ray, Hitesh Patel and
Sylvia
Escher
Journal of Cheminformatics 2010, 2:7 (31 August 2010). Full text and
supplementary information available in Open Access at:
www.jcheminf.com/content/2/1/7

PREPF2 – 10.00 am
Contribution of Toxicogenomics in Pharmaceutical
Drug Development

Fokunang, CN1, Asongalem EA2, Kechia, FA2, Ngameni
B3, Ngadjui BT4

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Health Sciences, University of Buea

Genomics has an important role in two areas of the drug
development process, the predictive toxicology and
mechanism-based risk assessment. Predictive toxicology
investigates the potential for a compound to be toxic. The
goal of toxicology is the assessment of possible risk to man.
An emerging technology with the potential to have a major
impact on risk assessment is toxicogenomics. Toxicogenomics is a powerful tool for compound
classification, for mechanistic studies, and for the detection
of toxicity markers. This emerging discipline is still unknown
in the Cameroon scientific discipline. Toxicogenomics has
contributed significantly in the extrapolation of findings
across species and increases predictability. By developing
databases of expression profiles for a wide variety of toxic
compounds and toxic models it has been possible to create
statistical and computational methods which provide an
indication of toxic potential of a drug from the gene
transcript profile it elicits in the in vitro and in vivo systems.
Gene expression is central to many responses to
xenobiotics, thus genomic approaches contributes to
mechanistic toxicology studies. The examination of changes
in gene expression in cells and tissues in response to
drugs makes it possible to generate hypotheses as to
the underlying mechanism and in some cases it is possible to
evaluate hypothesis of toxic mechanism. This review aims
at providing an overview of the potential of
toxicogenomics, which can no longer be regarded as a new
technology, in drug development. There is also the need for
sensitization of the importance of the emerging discipline
into the research platform in Cameroon. The overview
highlights many possibilities for toxicogenomics including
technology platforms, data interpretation, and regulatory
perspective.
The presence of pharmaceutical and personal care products (PPCPs), prescription medicines, veterinary drugs residue and related compounds in the municipality wastewater systems has become very important in developed and emerging economies countries. As the demand for safer drinking water increases the need to consider recycling wastewater has forced the water industry to seriously review the presence of these compounds in our wastewater systems. It has been established that the wastewater treatment plants do not successfully remove these compounds from the water system. Unfortunately, some of these compounds especially PPCPs, hormones and related compounds are known to have adverse effect on humans. Hormones for example have been reported to have an effect on fishes at concentration levels as low as ng L⁻¹. There is limited research carried out on the presence, levels of these compounds in many of the African WWTPs. The wide range of PPCPs, veterinary drugs residue and related compounds in the municipality wastewater systems taking into account the diversity of the matrix would not only require an efficient sample preparation and separation methods, but also a sensitive and selective detection methods. The diversity of chemical properties of these compounds and matrix of the wastewater, makes method development challenging. The technological development in the these areas, i.e. sample samples, separation science and mass spectrometry has increased the potential of analysing diverse compounds in wastewaters. In this presentation the use of liquid chromatography-mass spectrometry (LC-MS/MS), other instrumentation development for PPCPs and related compounds will be reviewed. The potential of charged aerosol detector-high pressure liquid chromatography (CAD-HPLC) as a cheap and sensitive detector for multi-residue determination of hormones, prescription medicines and personal health care products will be also assessed. This detector offers high sensitivity, broad and useful range in addition to its universal capability. The universal capability of CAD-HPLC would enable the direct monitoring of hormones without the derivitization. The levels of hormones, prescription medicines, personal health care products, endocrine disrupting chemicals in our water systems would be compared with levels obtained in other countries. The method would empower the local water laboratories to use the CAD-HPLC for the monitoring of hormones in water without GC-MS prior to derivatization.
According to World Health Organization, environmental hazards are responsible for about a quarter of the total burden of disease worldwide, and as much as 30% in sub-Saharan Africa (1). It has therefore become crucial in prevention programmes, to understand the ways by which specific environmental factors can interfere with health. Environmental epidemiology is a sub-specialty of epidemiology that focuses on the identification of environmental hazards that may pose a risk to human health. It is the science of studying and interpreting the relationships between environment and health in populations (2). Long-standing risk factors such as poor access to safe drinking-water, indoor and outdoor air pollution, poor food hygiene, poor sanitation, ineffective waste management, unsafe disease vector control, exposure to chemicals and injuries continues to pose public health challenges in Africa. Additional to these are emerging environmental challenges such as climate change, persistent organic pollutants, electronic waste and radiation. Public health in Africa is being severely impacted by climate change, with negative health impacts from water scarcity and natural disasters such as floods and droughts, variability in the transmission of malaria, diarrhoea and other water and air-borne diseases. While epidemiological studies have provided abundant evidence for effects of environmental exposures from air pollution, land and water contamination on a wide range of adverse health outcomes in developed countries, there is relatively little such evidence base in Africa. Much of the evidence underpinning environment and health policies in Africa in general, is derived from studies conducted in developed countries; how well these translate to the African environment is unclear. Research information about the effect of environmental exposures on health and the magnitude of such effect in Africa is required to help target and drive effective abatement strategies. A system governed by Africans in Africa is needed to provide a sustainable multi-disciplinary research mechanism that would encourage African scientists to collaborate on common environment and health concerns, share expertise and build capacity. This paper will discuss the role of environmental epidemiology research and linkages with other fields such as toxicology in establishing disease causation and control. It will share perspectives on framework required to create health-supporting environments in Africa and practical application of research findings towards achievement of the Millennium Development Goals related to health and environmental sustainability.

Role of Vanin-1 in Acetaminophen Hepatotoxicity

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Mice treated with the peroxisome proliferator clofibrate are known to be more resistant to acetaminophen (APAP) hepatotoxicity. A recent transcriptome analysis revealed marked induction of Vanin-1 gene expression in association with the hepatoprotective actions of clofibrate. To investigate the role of Vanin-1 in APAP hepatotoxicity, male Vanin-1 null and wild-type mice were dosed with APAP (400mg/kg). Liver toxicity was assessed by plasma ALT activity and histopathology. 24 hr after APAP, plasma ALT values were 2.6 times greater in vanin-1 knockouts than in wild-type mice. This difference in ALT between genotypes was even more pronounced at 48 hr. We then investigated if this differential susceptibility to APAP toxicity was due to differences in APAP bioactivation, disposition or detoxification. Livers of naive Vanin-1 null and wild-type male mice were analyzed for gene expression of APAP metabolizing enzymes and transporters by RT-PCR. No differences in hepatic gene expression of phase I and II enzymes (Cyp1a2, 2e1, 3a11, Ugt1a6) or transporters (Abcc2, Abcc3, Abcc4) were detected between genotypes. Gene expression of the catalytic subunit of gamma glutamylcysteine synthetase (Gclc) was slightly increased in Vanin-1 null mice. However, no differences in hepatic total glutathione (GSH) concentrations were detected. Collectively, these data suggest that while Vanin-1 mice are more susceptible to APAP hepatotoxicity, it is unlikely due to differences in APAP bioactivation, disposition or basal GSH concentration.

4th CONCURRENT PLATFORM PRESENTATIONS

CLINICAL/VETERINARY TOXICOLOGY (Amphi 150 C)
AQUATIC TOXICOLOGY (Amphi 150 D)
ENVIRONMENTAL/REPRODUCTIVE TOXICOLOGY (Amphi 150 A)

Session 10: CLINICAL/VETERINARY TOXICOLOGY
Abstract No.: CLIPF1 – CLIPF3. VETPF1-VETPF3
Time: 15.00 – 16.30 pm
Venue: 150 C
Chairpersons: Dr. Mbuagbaw Josephine (Cameroon)/Dr Chudy Nduaka (USA)

CLIPF1 - 15.00 pm
Drug and non drug poisoning in sub Sahara Africa (SSA): a call for poison information centre

Orish Ebere Orisakwe
Port Harcourt, Nigeria

We live in a world of sundry chemicals. Chemical safety is a global concern due to the continuous proliferation of new pharmaceuticals, industrial chemicals, household chemicals and pesticides and the resultant public health problem of poisoning. Poison information centres (PICs) are specialized units that advise on, or assist with, the prevention, diagnosis and management of poisoning. The need for poison centres in Sub Sahara Africa countries have been well demonstrated...
over the years as evidenced by the occurrence of a variety of cases of poisoning. Important causes are accidental poisoning from mishandling of pesticides, accidental poisoning among children from kerosene and pesticide ingestion due to unsafe storage methods in the home, use of herbal potions of unknown composition, overdoses of certain pharmaceuticals for illegal abortion and suicidal intents, and accidental food poisonings. Bites from venomous animals particularly snakes are also common. Artisanal mining and other occupational exposures have lead to environmental contamination of public health importance in SSA countries. At the moment only less than 13 percent of the SSA countries have established PICs. The records of these poisonings are rarely documented and diagnosis /management modalities often not standardized. This paper examines the weight of the problem with an emphasis on a call for establishment of PICs in SSA counties now.

CLIPF2 - 15.15 pm
Recognizing the potential usefulness of uric acid in genetic toxicology

John I. Anetor¹, Titilola Akingbola², Adesegun Adeola³, Ijeoma Esiba³

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Uric acid is an end product of nucleoprotein metabolism. Though previously recognized as an indicator of gout or renal impairment, genotoxic carcinogens interacts with nucleic acids to produce adducts, determination of which is an indicator of the dose of active material which reaching the cells under study. The role of uric acid in protecting the DNA against chemical damage is poorly recognized. Rapid reaction of uric acid with the guanyl radical has been suggested to indicate that uric acid acts as a repair agent of oxidative damage to DNA bases¹. This is further explored in this presentation. Systematic literature review and our published data were employed. Comments: During primate evolution, a major factor in increased life span and decreased age-specific cancer rates has been attributed to the improved protective mechanisms against toxic free radicals. It has been proposed that one of the protective systems is uric acid; the level of which increased markedly during primate evolution as a consequence of a series of mutation². Uric acid is a potent antioxidant and a scavenger of singlet oxygen radical. 8-Hydroxydeoxyguanosine (8-OHdG, 8-OXO-dG) is an oxidation product of deoxyguanosine, a component of DNA. Studies have established its biological significance; 8-OHdG is produced in cellular DNA, its repair systems such as Ogg1 and MYH, are ubiquitously present in various organisms, and the accumulation of 8-OHdG in Ogg1 and MYH double knock out mouse correlates well with cancer induction³. Uric acid level has been inversely correlated with 8-OHdG, a marker of oxidative DNA damage⁴. Overwhelming evidence supports the potential usefulness of urate in genetic toxicology. It promises to be of great advantage in resource poor countries that have need for risk assessment but lack advanced techniques.

References

CLIPF3 - 15.30:
Drugs and fake drugs in the treatment of malaria: Toxicological implications

Asongalem Emmanuel Acha

Pharmacology and Toxicology Unit, Department of Biomedical Sciences, Faculty of Health Sciences, University of Buea

Counterfeit and substandard drugs have pervaded our society and due to their cheapness and ignorance of the part of the populace, the purchase of these drugs in on the rise. These drugs have got a lot of consequences ranging from morbidity to mortality. Due to poor surveillance of these consequences, most of patients die unnoticed. These unscrupulous dealers have targeted drugs which are used often such malaria drugs and antibiotics. This presentation will examine picture in Cameroon.

VETPF1 - 15.45 am
Changes to Newzealand rabbits attributed to toxicity of poly DADMAC (Polydiallyl Dimethyl Ammonium Chloride)

Amna Medani¹, Samia El Badwi², Ahmed Mohamed³

¹Khartoum college of medical sciences, Khartoum, Sudan; ²University of Khartoum, Faculty of Veterinary Sciences, Khartoum, Sudan

Toxicity of treatment agents in Sudan namely polyDADMAC was done using Newzealand Rabbits at multiple daily oral
doses for a period of 10 weeks. Thirty-three heads of Nubian goats were divided into 11 groups, each of three. Group 1 animals were the undosed controls. Test groups of either species were given polyDADMAC at similar dose rates of 0.5, 2.5, 4.5, 10, 15, 20, 25, 50, 100 and 150 mg/kg body weight respectively for groups 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11. Clinical signs were closely observed with postmortem and histopathological examinations. Chemical investigations included enzymatic concentrations of ALP, GOT, CK, GPT and LDH and metabolic changes of albumin, urea, total protein, cholesterol, P, were monitored together with hematological changes in Hb, PCV, RBCs and WBCs. Mortalities occurred to variable degrees irrespective of the dose level. On polyDADMAC challenge, the test species showed clinical signs of dullness, loss of weight, anorexia, diarrhea, difficulty in respiration, posture abnormalities and recumbency. Notably oral dosing of Newzealand Rabbits with polyDADMAC caused lung emphysema, hepatic and renal dysfunctions, irregularity in enzymatic activities and serum metabolites, sloughing of intestinal epithelium, decreased electrolytes in serum, and splenic haemosiderosis. On evaluation of the above results, polyDADMAC was considered toxic to Newzealand Rabbits at all dose rates tried. Practical implications of the results were highlighted and suggestions for future work were put forward.

**VETPF2 – 16.00**

**Essential and toxic metals in cow's whole milk from selected sub-cities in Addis Ababa, Ethiopia**

Gulelat Haki, Negussie Retta, Dawd Gashu

Addis Ababa University, Addis Ababa, Ethiopia

Milk is considered as a nearly complete food and it is the main constituent of the daily diet since it is a good source of protein, fat and major minerals. However, micronutrients may become harmful when their ingestion rates are too high. Essential (Fe, Zn, Ni, and Cr) and non essential (Pb and Cd) metals in whole cow milk (n = 32) from dairy farms at Addis Ababa, Ethiopia was determined by Flame Atomic Absorption Spectrophotometer (FA-AAS). Statistical analysis was performed using SPPS version 17. Significant differences between means were subjected to one way ANOVA using Duncan’s multiple range test (P < 0.05). The average concentration of the elements were: Zn (4.923±0.277 mg/kg), Fe (1.213±0.077 mg/kg), Pb (0.998±0.251 mg/kg), Ni (0.784±0.054 mg/kg), Cd (0.100±0.006 mg/kg), and Cr (0.036±0.004 mg/kg). The results indicate that concentrations of the selected metal constituents varied with respect to farm. The levels of toxic metals (Pb and Cd) were beyond the acceptable limit which can be potential health concern for consumers.

**VETPF3 – 16.15**

**Contamination of animal feed by aflatoxins and fumonisins in some regions of Cameroon.**

Simo NG., Fung CE, Tchana AN and Moundipa PF

Laboratory of Pharmacology and Toxicology, Department of Biochemistry, University of Yaoundé I, P.O.Box 812 Yaoundé, Cameroon.

Aflatoxins (AFs) and fumonisins (FMs) are toxic metabolites produced by *Aspergillus* and *Fusarium* fungi, respectively. These fungi are able to grow on food commodities and produce the toxins. The consumption of contaminated food or feed may have hazardous effect. The contamination of poultry, swine and rabbits feed by these toxins in some area of Cameroon was studied as well as the influence of AFs on chickens’ growth rate. A survey was conducted in 5 localities namely Yaoundé, Bagangté, Bamenda, Douala and Bafoussam according to the climate. A total of 163 feed samples were collected. FMs and AFs were assayed in the sample extracts using densitometry after TLC separation and ELISA techniques, respectively. As results, 97.5% of samples were found to be contaminated by AFs and 27.7% by FMs in Yaoundé. This contamination level was 100 and 10.52% in Bafoussam, 100 and 18.8% respectively in Bamenda respectively. In Bagangté, 100% of samples were found to contain AFs and, 6.66% contained FMs in Douala. A significant (p<0.05) slow down of the growth rate of chickens consuming feed with AFs content was observed. Level of contamination of chicken feed high than 10 ppb were found to reduce daily weight of 29% (p<0.05). This study suggests the reality of contamination of poultry, swine and rabbits feed by mycotoxins. This should attract rearing and health stockholders attention in the objective of healthy and economically performance in rearing.

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**Session 11: AQUATIC TOXICOLOGY**

**Abstract No.: AQUPF8 – AQUPF13**

**Time: 15.00 – 16.30 pm**

**Venue: 150 D**

**Chairpersons:** Prof. Mohammed Abdel Hamid (Egypt)/Prof. Nabil Bashir (Sudan)

**AQUPF8 – 15.00 pm**

**Assessing the potential use of indigenous micro-algae in direct toxicity assessment of power station ashwater**

Pearl Gola¹, Alex Holland²

¹Assessing the potential use of indigenous micro-algae in
Direct toxicity assessment has been widely used to assess hazardous effects of complex effluent discharged into natural water resources. The South African Department of Water Affairs has also come up with tools, such as the Direct Estimation of Ecological Effects Potential (DEEEP), and the National Toxicity Monitoring Programme (NTMP) to assess and manage effects of industrial and in-stream effluents, using a battery of toxicity tests with organisms from different trophic levels. The standard algal growth inhibition assay with Pseudokirchneriella subcapitata and the daphnia acute toxicity test with Daphnia pulex are included in the battery of tests listed for use in the above mentioned hazard assessment tools. Although test s with standard toxicity test species are reproducible and generate much needed toxicity test data, there remains a question of ecological relevance and environmental realism of such data. In this study, indigenous freshwater micro-algae have been isolated from natural water resources and identified for potential use in toxicity tests with power station ashwater, in order to compare the sensitivity of these indigenous algae to that of standard toxicity test species P. subcapitata and D. pulex, and assess the applicability of using indigenous micro-algal species in direct toxicity assessment to supplement the data generated by the standard toxicity test species.

AQUPF9 – 15.15 pm
Potential eco-toxicological implications for environmental mutagens on some aquatic organisms along the Cameroon coastline

Pius Oben1, Benedicta Oben1, George Nkeng1, Dieudonne Alemagi1, Joseph Uponi1

1University of Buea, BUEA, Cameroon; 2BTU, COTTBUS, Germany;

Metals and nitrate-nitrogen concentrations, and harmful algal bloom (HAB) distribution were recorded during the rainy and dry seasons along the Atlantic coast of Cameroon. The concentration of Copper ranged from 0.0-8.06 ppm, Zinc concentration ranged from 0.21-20.57 ppm. Manganese ranged from 0.07-28.79 ppm and iron ranged from 0.80-548.40 ppm. In most sampling stations, the levels of Zinc recorded far exceeded the 0.008-0.227 ppm that adversely affects aquatic invertebrate fauna. During the rainy season, the high values of nitrate-nitrogen concentration recorded in the Douala Lagoon was 1030.4 mg/L, 1223.05 mg/L in Mudeka creek, 2647.94 mg/L in Tiko creek and 766.56 mg/L in Idenau beach. The maximum allowable concentrations of nitrate-nitrogen for fisheries and other aquatic life by the EC (European Community), Canada and Russia ranged from 0.005-0.0112 ppm. The nitrate values are astronomical when compared with the Russian maximum allowable concentrations for fisheries and other aquatic life. Nitrate-nitrogen concentrations were extremely high during the rainy season, ranging from 240.07 mg/L-927.07 mg/L and comparatively low, ranging from 1.79 mg/L to 10.39 mg/L during the dry season. There was a positive correlation (r = 0.73) between nitrate-nitrogen and cyanophycean concentration. The low species diversity observed in the studied sites suggests a stressed situation along the Atlantic coast of Cameroon which is due to these high levels of pollutants. In the light of the potential mutagenic impact of metals in aquatic environments, it is hoped that the results of this work will contribute to the scanty database on the impact and management of metal pollutants in marine environments in Africa.

AQUPF10 – 15.30 pm
Fish (Aris heudelotii) as bio-indicator of heavy metals in Douala estuary, Cameroon

Fonge-B.A1, Egbe A.E.1, Awo E. M.1, Tening-A.Si, Focho-D. A1, and Yinda G1

1Department of Plant and Animal Sciences, University of Buea, P.O. Box 63. Buea.Cameroon; 2Department of Chemistry, University of Buea, P.O. Box 63. Buea;
3Department of Geology and Environmental, University of Buea, P.O. Box 63. Buea. Cameroon; 4Department of Plant Biology, University of Dschang, Cameroon.

Aris heudelotii is one of the prominent mangrove fish species consumed and it is abundant in the Douala Estuary, Cameroon. 70% of the industries in Cameroon are located in the Littoral Region, most of which are found in the city of Douala. Effluents from these industries are all emptied into the coastal environment. This has led to pollution problems in the lagoon complex adjacent wetlands. Aruis heudelottii was selected because it is a benthic mangrove fish species and has shown some sign of decline. The objective of this work was to assess the bioaccumulation of some heavy metals by this of fish species in the Wouri estuary. Water samples were analyzed for Temperature, pH, Conductivity in situ while NH-NO3, P-P04, Pb, Zn, Fe, Mn and Cu were analyzed using standard methods for both water and fish samples. The results revealed the presence of these heavy metals in the Estuary in concentrations ranging from 0.01 to 0.09 mg/L. In the fish heavy metal concentration was about 0.03 to 0.130 mg/kg for Fe, from 0.38 to 0.41 mg/kg for Pb, from 0.35 to 0.36 mg/kg for Cu and from 0.36 to 0.39 mg/kg for Zn. Chromium was not detected in the organs of the fish. In the fish organs it varies as follows: Fe: Liver > Gut> Flesh = Bones > Gills; Pb: Gills = Flesh > Gut = Liver> Bones; Cu: Gills > Gut = Flesh > Liver = Bones and Zn: Gills > Flesh > Gut > Liver > Bones. Conclusively heavy metals in the water was above the permissible level set by USEPA for water supporting aquatic life, this study therefore advocates environmental surveillance of the river Wouri.
Dibamba and the estuary in order to achieve good water quality that supports all the aquatic life forms and contaminant-free fish for safe human health.

AQUPF11 – 15.45 pm
Performance of Cyperus papyrus in yard-scale horizontal flow constructed wetlands for wastewater treatment in Cameroon

Fonkou Théophile¹, Ivo Baloko Sako¹ and Amougou Akoa³

The objective of this study was to evaluate the performances of Cyperus papyrus in horizontal flow constructed wetlands used for domestic wastewater treatment. Two system configurations were used: the horizontal surface flow (HSF) and the horizontal subsurface flow (HSSF). Wastewater was continuously fed to the beds, at an average organic loading rate of 106 kg BOD/ha.d. Growth and productivity of the plants were assessed alongside the reduction of physicochemical and microbiological characteristics of water in both wetland configurations. Progressive increase in the plant density and plant height were observed. Above-ground and underground biomasses of 41 and 90 tonnes of dry weight/ha/year were estimated. The reduction of several physicochemical parameters and that of faecal coliforms and faecal streptococci were higher in the planted bed as compare to the control in the two wetland configurations. HSF was more efficient in the removal of faecal coliforms and faecal streptococci as compared to HSSF. Uptake of Ammonia nitrogen, nitrate nitrogen and orthophosphate phosphorus by the vegetation throughout the study period was estimated at 3.1 g/d, 1.7 g/d and 0.8 g/d in the HSF and 2.7 g/d, 1.3 g/d and 0.6 g/d in HSSF respectively.

AQUPF12 – 16.00 pm
Metal concentration and stable isotope ratio analysis (d13C and d15N) in water, sediment and fish from Lake Itezhi-tezhi, Zambia.

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We previously reported that the concentration of Cu in sediment and fish liver (Oreochromis sp.) from Lake Itezhi-tezhi (ITT) were very high, most likely due to the discharge of Cu wastes from the Copperbelt mining area, located about 450 km upstream (north) of the Kafue River. However, it is still not clear whether Cu wastes from the Copperbelt actually reach Lake ITT and influence the lake ecosystem. Our objectives were to clarify the distribution of Cu in sediment from Lake ITT and to predict the source of Cu pollution. Another objective was to determine the relationship between stable isotope ratio and metal levels in fish. Concentrations of Cu and other metals in the sediment and fish from Lake ITT were measured by AAS. Stable isotope ratio in the sediment and fish muscle was determined using an isotope ratio mass spectrometer equipped with an elemental analyzer. According to Geographic Information System (GIS) analysis, relatively higher concentration of Cu was recorded in the sediment from the northern part of the lake, suggesting that Cu wastes actually reached Lake ITT. Oreochromis sp. showed significantly higher concentrations of Cu (164-7205 mg/kg) than other fish species. Interestingly, there was no difference in the concentration of Cu in stomach contents among the fish species. These results suggest that diet may not be the reason for high accumulation of Cu in Oreochromis sp. Nitrogen stable isotope ratio (d15N) and liver Cu concentration was negatively correlated, indicating bio-dilution profile of Cu. GIS analysis suggested that Cu wastes from the Copperbelt mining area could be the source of pollution in Lake ITT. There could be some other mechanisms for higher accumulation of Cu in Oreochromis sp. apart from diet.

 Session 12: REPRODUCTIVE/ENVIRONMENTAL TOXICOLOGY

Abstract No.: REPPF1 – REPPF2; ENVPF13 – ENVPF16

Time: 15.00 – 16.30 am
Venue: 150 A

Chairpersons: Prof. Paul Fewou Moundipa/Dr. Asongalem Emmanuel Acha (Cameroon)

REPPF1 – 15.00 pm
Effects of dimethoate (organophosphate insecticide) on the reproductive system and fertility of adult male rats (Rattus norvegicus)

Ngoula Ferdinando¹, Tchoumboye Joseph¹, Watcho Pierre¹, Kenfack Augustave¹, Defang Fualef Henry¹, Manga Nzouck Joseph¹, Kamtchouing Pierre¹

¹University of Dschang/FASA, Dschang, Cameroon; ¹University of Dschang/Faculty of Sciences, Dschang,
Organophosphate insecticides represent one of the most widely used classes of pesticides with high potential for animal and human exposure in farm, rural and residential environments. In the present study, we investigated the effect of dimethoate (an organophosphate insecticide) on the reproductive system and fertility of male rats. For this purpose, 24 adult Wistar male rats were divided into four groups of 6 animals per group, and force-fed with 0, 3.66, 5.50 and 11 mg / kg body weight of dimethoate for 90 days. The results showed a significant decrease (p<0.05) in body weight gain in rats gavaged with dimethoate as compared to control. In addition, the insecticide at the doses of 3.66, 5.5 and 11 mg/kg caused a significant (p<0.05) increase of the relative weight of epididymis. Dimethoate at its highest dose caused a decrease in the relative weight of testes and that of the ventral prostate. The doses 3.66, 5.50 and 11.00 mg/kg body weight of dimethoate caused a significant decrease (p<0.05) of the sperm concentration and motility. The level of protein and cholesterol in the serum and testes as well as the activity of prostatic acid phosphatase decreased significantly (p<0.05) in rats treated with dimethoate compared to control. Fertility, gestation and parturition indices and the litter size decreased significantly in animals treated with 5.50 and 11.00 mg/kg body weight of dimethoate compared to control. The testicular and epididymal histology of animals treated with high doses of dimethoate were generally shown in the testes, span of Sertoli cells destruction and disorganization of the germinal epithelium and at epididymal level, the proliferation of epithelial cells. The lumen of seminiferous tubules and epididymis were generally poor in sperm. It could then be concluded that dimethoate (5.50 and 11.00mg/kg) seriously deteriorate the male reproductive system resulting in decreased fertility.

REPPF2 – 15.15 pm
Incidence of intersex along a contamination gradient in 13 estuaries of NW France: Relation with endocrine disruptors compounds?

Olivia Fossi Tankoua1, Francesca Perisi1, Claude Amiard-Triquet1, Brigitte Berthet2, Emmanuelle Maillot-Marechal3, Karyn Lemenach4, Helene Budzinski5, Selim Ait-Aissa3

1University of Nantes, Nantes, France; 2ICES, La Roche sur Yon, France; 3INERIS, Verneuil en Halatte, France; 4LPTC, Université Bordeaux I, Bordeaux, France

Some reports showed that the presence of endocrine disrupting chemicals (EDCs) may be linked to the incidence of intersex in the clam Scrobicularia plana. We aimed at assessing the prevalence of intersex in estuaries of NW France and the possible correlation with EDCs. In thirteen estuaries contaminated at different levels (data from ROCCH, Réseau d’Observation de la Contamination Chimique du milieu marin at http://wwz.ifremer.fr/envlits/), intersex and parameters associated with reproduction (sex-ratio, gonadosomatic index) were examined. Clams were collected at the beginning of gametogenesis and at the peak of sexual maturity. Intersex was determined on thin cuts of gonad tissues embedded in paraffin or on gonad smears. The presence of EDCs in sediments collected in parallel with clams was assessed by using an approach combining quantitative chemical analyses of the main classes of EDCs and a battery of in vitro bioassays. Histological observation at the peak of sexual maturity revealed the presence of intersex in seven sites at different levels of intensity from 7 to 57% of males impacted. In vitro bioassays showed estrogenic activities in all the 13 sites with the highest level in the site where the highest impact of intersex was observed. A slight androgenic activity was observed in 3 sites whereas anti-androgenic activities were found in 11 sites. All the sites showed dioxin-like activities with different intensity. The observation of thin cuts of gonad tissues at the beginning of gametogenesis and the chemical analysis of sediments are ongoing to strengthen these findings.

ENVPF13 – 15.30 pm
PBDE and HBCD in indoor dust from Stockholm and offices from Buea Cameroon

Justina Björklund

Stockholm University, Stockholm, Sweden

PentaBDE, OctaBDE, DecaBDE and HBCD are additive flame retardants in textile coatings, foams, and plastics that are used in TVs, computers, various electric and electronic equipment, insulation sheets, upholstery, bed-ticking, carpeting, etc. These products are found in homes, public buildings such as day care centers and schools, office buildings as well as in cars, subways, trains, airplanes, etc. PBDEs, primarily the tri-heptaBDEs have been measured in indoor air in several studies of North American and UK homes, office buildings and in one study, cars1-6. In a few studies, BDE-209 has been included but HBCD has not. PBDEs and HBCD have also been found in indoor dust in studies from North America and a few European countries1,3;5,7-13. There is no Data from Cameroon Sweden are few but show the presence of PBDEs in air and dust14;15. The aim of this project was therefore to sample and quantify polybrominated diphenyl ethers (PBDEs), particularly decabromodiphenyl ether (BDE-209) and hexabromocyclododecane (HBCD) in indoor air and dust from homes, offices, apartments, day care centers, and cars in Stockholm, Sweden and dust from Offices buildings in Buea, Cameroon. The results were used to estimate general human exposure to these compounds from indoor environments.
ENVPF14 – 15.45 pm
Improving the practice of environmental health protection in Africa in the 21st Century: The role of environmental health indicators

Onyemaechi Nweke

Washington, United States of America

Many African cities and communities are caught in a transition from environmental hazards related to underdevelopment such as poor sanitation and lack of access to safe drinking water to modern environmental health hazards related to industrialization. This transition is anticipated to change patterns of environmental exposures and risks. To effectively manage the emergence of these new hazards and their impacts on human health in the continent, environmental public health protection strategies must be adapted to rapidly detect new patterns of exposures and diseases. In the United States, environmental indicators have proved effective for detecting and monitoring trends in environmental hazards, assessing the extent of human exposure, evaluating the impacts of policy on human exposure, raising awareness about emerging contaminants, and studying the health effects of environmental contaminants. The purpose of this presentation is to introduce and illustrate the concept of environmental health indicators using examples from the United States and Africa.

ENVPF15 – 16.00 pm
Pollutant mixtures as stressors of esterases of the aquatic snail Helisoma duryi

Norah Basopo¹, Langton T. Mumbamarwo¹ and Yogeshkumar S. Naik²

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Pollutants emanating from agricultural, domestic and industrial activities ultimately end up in aquatic reservoirs, where they exert various toxicological effects on aquatic biota residing in these aquatic ecosystems. Of great concern is the fact that these chemical stressors enter aquatic ecosystems rarely exist as single entities but appear as chemical mixtures. There is need therefore, for easy methodologies for monitoring effects of chemical mixtures on aquatic organisms. We investigated the effects of a mixture of a pesticide, a metal and a detergent on esterase activity of an aquatic snail Helisoma duryi. Adult snails reared in outdoors aquaria were exposed to 5 ppb copper, 15 ppm oxyfoam (a detergent) and 25 ppb carbaryl for 96 hours. Post-mitochondrial supernatants of whole snail homogenates were used to measure esterase activity using three different substrates namely; acetylthiocholine iodide, 4-nitrophenyl acetate and phenyl acetate. Esterase activity was inhibited in all snails exposed to the pesticide, metal or detergent. Individual pollutants inhibited cholinesterase, carboxylesterase and arylesterase activities in the range 24-26%, 25-54% and 13-26% respectively depending on the pollutant. Binary and triple mixtures of the different chemicals resulted in enhanced inhibition of esterase activity when compared to the effects of the individual chemicals suggesting additive interactions of the chemical water pollutants. The inhibitory effects of the triple mixtures of pollutants on esterase activity was however, observed to be lower than the inhibitory effects of the binary mixtures of the pollutants indicating antagonistic reactions when the pollutant classes increased to three. The results show that water pollutants affect the normal wellbeing of aquatic organisms such as snails indicated by the altered enzymatic activities in H. duryi.

The need however, for more studies on effects of a wider range of pollutant mixtures on aquatic organisms for us to fully appreciate the reactive interactions that take place in complex mixtures which ultimately affect aquatic biota.

ENVPF16 – 16.15 pm
The Polluter Pays Principle in the Cameroonian Waste Management Framework Directive

Nguelo C.,

Environmental and Renewable Energy Engineer, Consultant; Yaoundé-Cameroon.

The polluter pay principle (PPP) has gained influence in environmental politics as a ‘policy principle’ – an idea that can spur policy change. Yet, exact definitions of the PPP remain elusive, making evaluation of its actual political influence difficult. Given the controversy over the PPP’s meaning and policy utility, analysis of different environmental laws is overdue. Elite discourse on the PPP is analyzed in the search for the formulation. The analysis of the definition, of who is considered as a polluter, when this takes place and the pay cost in environmental waste framework is found to be a mix of stronger and weaker elements. It can be suggesting that the principle has become weaker over time, and that its critics formulate it more strongly than proponents. It is also looks like PPP has been introduce in the way of copy and paste format from European or American waste framework policy interpretation.
The management of e-waste environmental disaster in many developing Nations implies long term solutions, from the expected international regulation of the e-waste flow, the implementation of proper infrastructures and protocols for disposal and recycling, to the remediation of environmental compartments on large scale by innovative detoxification technologies and body burden mitigation measures. Scientific guidance is pivotal to develop a “social toxicology”, by extricating challenges posed by multiple contamination pathways, mixture effects and multifactorial health outcomes, especially in areas where e-waste does not constitute a contamination “event” but somewhat dangerously becoming “structural”. In this scenario, a more than chronic exposure is expected, as the (body) burden is continuously re-established and amplified. E-waste entrains exposure to a cocktail of Endocrine Disrupters (chemical elements, brominated flame retardants, non dioxin-like polychlorinated biphenyls, polycyclic aromatic hydrocarbons, polychlorinated dibenzo-p-dioxins and furans, dioxin-like polychlorinated biphenyls) for most of which neuro- and immuno toxicity are also proven. The crucial point is that a high exposure level may not significantly increase health risks in adult population but may compromise the chance for a healthy adulthood of embryos, foetuses and infants. In fact, during the ‘developmental programming’ e-waste toxicants may constitute a stimulus in utero or in the early childhood, often with common targets, establishing a permanent abnormal response leading to enhanced risk of developing adulthood diseases (mainly endocrine, metabolic, reproductive, neurobehavioural and immune disorders) and/or impaired responses to later environmental stimuli. Evidence exists also for modulation of responsiveness to hormones and growth factors, thymic atrophy and enhanced cancer predisposition as consequence of disturbed programming/maturity of target tissues. For such short and vulnerable life stages windows as peri- and early postnatal development, the intervention is imperative, both in communities living in e-waste proximity and remote, i.e. less directly exposed, areas. Due to major e-waste toxicants characteristics (persistence, lipophlicity, bioaccumulation, biomagnification), the prevention of poor health burden heritage through the transgenerational exposure (mother-child dyad) should focus on the management of both production and consumption of foods of animal origin. Veterinary public health actions are therefore central in the management of toxicants-related zoonoses associated with toxic exposures of food producing animals. In spite of the potency of the UN statement on "sustainable development", the irreversible damage to the natural capital in the long term has never included the “health”: the concept of Sustainable Food Safety is introduced here to describe intervention proposals to mitigate the exposure of vulnerable sub-populations as well as of other sub-groups (women in childbearing age and women planning pregnancy) with key role in the prevention of health effects of e-waste.

**VETPO2— Poster Board 2**

**Evaluation of consumption of aflatoxin contaminated feeds on hematological parameters of broilers**

Yemisi Jeff-Agboola¹, Anthony Onifade², Bamidele Akinyele¹, Osho I¹

¹Federal University of Technology Akure, Akure, Nigeria
²Department Of Microbiology, Akure, Nigeria

The aim of this study was to evaluate the effect of contaminated feed with aflatoxin on hematological parameters of broilers. A day old broilers (A total of 384 ) were purchased from a poultry farm in Oyo State Nigeria and fed with normal commercial starter feed for 6 weeks. Thereafter were divided into groups and fed with sample feeds (A = Basal diet free from mycotoxin contamination, B= diet containing standard AFB1(0.5µg/Afkg), C= diet containing standard AFB1(1µg/Afkg), D= diet containing standard AFB2(0.5µg/Afkg), E= diet containing standard AFB2(1µg/Afkg), F= diet containing standard AG1(0.5µg/Afkg), G= diet containing standard AG1(1µg/Afkg), H= diet containing standard AG2(0.5µg/Afkg), I= diet containing standard AG2(1µg/Afkg), J= diet containing toxicgenic Aspergillus flavus (1µg/Afkg), K= diet containing toxicgenic Aspergillus (1µg/Afkg) parasiticus) for 4 weeks. The initial body weights of the birds were recorded at 7 days interval up to the end of the experimentation. The result obtained from this research showed that, the average weight gain (g) increased in birds fed with normal diet from day 0 up to day 21(39. 31±0.13d, 60.72±0.99a), 89.82±0.24c, 121.22±0.62a). There were reduction in weight of birds fed with feed containing the aflatoxin moulds and standard with increase in concentration
of the toxin. The highest reduction was found in sample containing toxigenic A. parasiticus (25.33±0.19k, 38.45±0.09i, 49.12±0.02n and 62.34±0.32n) and flavus (28.15 ±0.65i , 31.32±0.02 i , 57.43±0.05m and78.45±0.21l ) respectively after feeding up to 21 days. Significant decreases were noted in the following hematologic parameters: Red blood cell (RBC), Hemoglobin (Hb), Packed cell volume (PCV), and White blood count (WBC) heterorphils, and monocytes counts. There was increase in lymphocytes and eosinophilcs count compared with control.

**VETPO3— Poster Board 3**
**Toxicity of Acacia nilotica (Garad) to Nubian Goats**

Amna Medani1, Ahmed Mohamed2, Samia El Badwi2

1Khartoum College of Medical Sciences, Khartoum, Sudan; 2University of Khartoum, Faculty of Veterinary Sciences, Khartoum, Sudan

The clinical , pathological ,haematoalogical and biological changes in Nubian goats given daily oral doses of 1 or 5 g/kg body weight of Acacia nilotica .Other than the dose co-related mortality rates, the clinical signs were observed to be salivation ,staggered gait, intermittent loss of voice and low appetite. On histopathological testing ,the main lesions were hepatic centrolobular necrosis and fatty changes associated with the significant changes in GGT and ALP are indicating hepatic dysfunction .Renal malfunction is indicated by haemorrhages in addition to the change in the urea concentration. The congested, haemorrhagic, emphysematous, edematous and cyanotic lungs may contribute to the development of dyspnea .Acacia nilotica poisoning may lead to an immunosupression pointed out by the lymphocyte infiltration. On evaluation of the above results Acacia nilotica was considered toxic to Nubian goats at the above mentioned doses. Future work for Acacia nilotica was forwarded and practical implications of the result were highlighted.

**VETPO4— Poster Board 4**
**In vitro antibacterial and growth-promoting effects of stem extracts of Ageratum conyzoides in broilers**

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The claimed therapeutic and probable growth-promoting effectiveness of Ageratum conyzoides by traditional healers in the control of bacterial infections and growth enhancement has been investigated in vitro and in vivo. The dried powdered stem of the plant was extracted with water, methanol, hexane and diethyl ether. The susceptibility of some bacteria Salmonella typhi, Proteus vulgaris, Pseudomonas aeruginosa; Staphylococcus aureus, Salmonella gallinarum, Salmonella pullorum and Salmonella paratyphi A, to the various stem extracts as well as the minimum inhibitory concentration (MIC) were studied using standard methods. The growth-promoting-effect of whole stems of Ageratum conyzoides was determined in broilers. Results showed that most of the bacteria (80.3%) were susceptible to the diethyl ether extract, while only Salmonella typhi and Salmonella gallinarum were susceptible to the aqueous extract. The extracts inhibited the growth of these micro organisms in a concentration-dependent manner. None of the extracts was active against Staphylococcus aureus. The MIC ranged between 6.25 and 100mg/ml. Whole stems of the plant exhibited growth-promoting effects at 10mg/kg body weight and growth suppressing effects occurred at doses ≥ 100 mg/kg body weight. These results prove that, Ageratum conyzoides has anti-bacterial inhibitory effects, growth enhancing effects at lower doses and growth suppressing effects at higher doses.

**REPRODUCTIVE TOXICOLOGY**

**REPOO1— Poster Board 5**
**Effect of sub-chronic administration of U&D Sweet Bitter herbal supplement on the accessory sex organs of Wistar rats**

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Herbal medications are widely believed to be beneficial, however there have been reports of acute and chronic intoxications resulting from their use. Cases of reproductive failure after a prolonged intake of herbal preparations have been anecdotaly reported in Nigeria. This study was aimed at investigating the sub-chronic effects of U&DDE Sweet bitter a brown liquid herbal preparation, registered and marketed in Nigeria on accessory sex organs of male Wistar rats. To investigate the effects of sub-chronic administration of U&DDE Sweet bitter herbal supplement on the accessory sex organs of male wistar rats. Twenty male wistar rats were allocated to four dose groups of five rats each namely 0.00 539, 1077, 1616mg/kg of the herbal product orally for 90 days. Animals had access to deionized water and were fed ad libitum with rat chow for 90 days. The feed and fluid consumption of the animals were measured on daily basis while the body weight was measured weekly. Animals were anaesthetized after 90 days, bled-sacrificed; epididymis (E), seminal vesicle (SV) and prostate (P) were excised and weighed, protein, DNA, epididymal sperm counts were also determined. There was non-significant increase (p> 0.05) in feed and fluid intake, and a significant decrease (p≤ 0.05) in
absolute and relative weights of the E, SV and P in all the treated animals when compared with the control. There were significant (ps 0.05) decreases in ESN, DNA, and protein levels in all the treated animals when compared with the control. The present work suggests that U&B sweet bitter herbal supplement may be toxic to the accessory sex organs of male wistar rats.

**REPOO2— Poster Board 6**

Spermatoxic and hormonal effects of Forcados blend crude oil and oil dispersant in guinea pig

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Crude oil and many of its individual components have been reported to cause a variety of sub-lethal effects in a wide array of living organisms. Some of the most frequently observed effects of chronic petroleum pollution on individual organisms include, among others, impaired reproduction. To determine the effects of Forcados blend crude oil (FB) and Emulsol L.W. oil dispersant (DISP) on reproductive hormones (testosterone and estradiol) and testicular functions of guinea pig. FB and DISP were administered alone and in combination at doses of 1250, 2500 and 5000 mg/kg p.o. to sexually mature male Dunkin-Hartley guinea pigs for 7 days. Serum testosterone and estradiol levels were measured to check the effects of crude oil on reproductive hormones, while epididymal sperm number (ESN) was counted in seminal fluid. The right testis and accessory sex organs were homogenized for the assay of enzymes, protein and glutathione, while the left testis was processed and stained by H & E for histological examination. There was a dose-dependent significant increase (p < 0.05) in the hormone levels and sperm counts when compared to FB treatment alone. Combined administration of FB and DISP produced no significant changes (p > 0.05) in the hormone levels and sperm counts when compared to FB treatment alone. Histological examinations revealed some toxic effects on the testicular architecture, leading to spermatogenic arrest. FB and DISP are capable of impairing male reproductive functions in guinea pigs.

**REPOO3— Poster Board 7**

Systemic toxicity study of the aqueous extract of the mixture of Aframomum melegueta, Mondia whitei, *Piper guineense*, and *Zingiber officinale* in Rats.

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The mixture of *Aframomum melegueta, Mondia whitei, Piper guineense* and *Zingiber officinale* is traditionally used for the management of male infertility and sexual impotence. To determine the risk to human health associated with this substance use, an assessment of the toxicity of aqueous extract of the mixture taken in single and daily doses was performed in rats according to the OECD guidelines 423 and 407 for the testing of chemicals. In single dose, the test substance was tested only in females, more susceptible. In daily doses (33 days), 3 doses (100, 200, and 400 mg / kg) and a control group were used, the dose of 100 mg / kg being the therapeutic dose estimated in rats. 10 animals (5 per sex) were used for each dose. In acute test, no major changes related to treatment were observed throughout the observation period. The LD50 was estimated &gt; 2.5 g/kg, which was used to classify the product as slightly toxic substance. In subchronic test, 4 animals (2 males and 2 females) of 28 died as a result of treatment (200 and 400 mg/kg) during the test period. The animals concerned had prior to death lethargy, tachypnea, thinness, and bristling fur. One of the surviving females also exhibited the symptoms mentioned above, associated with a reduction of nociceptive, auditory, and prehensile capacities (400 mg/kg). Autopsy of animals showed damage to the liver in both sexes (200 and 400 mg/kg). A reduction in the relative lung weight (400 mg/kg) was noted in females. The blood and serum at the end of the trial showed a reduction in mean corpuscular hemoglobin concentration (400 mg/kg) reduced serum total cholesterol (200 and 400 mg/kg) and a dose-dependent increased on serum AST levels in females. The histopathology revealed on the liver and lung inflammation related to treatment at all doses in females. In conclusion, the daily consumption of aqueous extract of the mixture of our 4 test plants in therapeutic doses does not seem to have significant health risks for male, supporting the traditional use of the product. However, any daily use at higher dose exposes male to serious ailments, including liver and nervous ones.

**REGULATORY TOXICOLOGY**

**REGPO1— Poster Board 8**

Evaluation of potential dietary toxicity of heavy metals in some common Nigerian beverages: A look at mercury, antimony and tin.

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A wide range of beverages locally produced and imported (Dairy products, soft drinks, fruit juices and drinks, bottled waters) are now commercially available. However, information on concentrations of heavy metals (antimony, tin and mercury) in these products especially in the African environment is scarce and limited. In this study we determined the concentrations of heavy metals (mercury, antimony and tin) in fifty different brands of beverages (37), dairy products (10) and bottled water (3) purchased randomly from retail outlets in the Niger Delta area of Nigeria and compared these to recommended limits of the European Union (EU), World Health Organization (WHO) and United States Environmental Protection Agency (USEPA). The aim of this study is to access the extent of violation of mercury, tin and antimony from the guidelines of the United States Environmental Protection Agency (USEPA), European Union (EU) and World Health Organization (WHO). Fifty different samples beverages, dairy products, cola drinks, water, fruit juice drinks, fruit juice concentrates and fruit juices were purchased in May 2010 in the Niger Delta area of Nigeria were used in the study. These products were digested in nitric acid and analyzed using atomic absorption spectrophotometry (AAS) using air-acetylene (antimony) flame nitrous-oxide-acetylene (tin). The amount of heavy metals mercury, tin and antimony detected in the beverage (37) sample had an average of 2.385±0.2532, 3.659±0.2200 and 0.4884±0.04815 µg/l and a range of 0.61 - 6.04, 0.97 - 6.33 and 0.21 - 1.86 µg/l mercury, tin and antimony respectively. In the case of dairy products (10) heavy metals detected had an average of 2.925±0.3425, 3.599±0.4585 and 0.488±0.09877 µg/l and a range of 1.44-4.88, 1.69-6.17 and 0.28-1.35 µg/l of mercury, tin and antimony respectively. Bottled water samples had an average of 0.94±0.01732, 4.34±0.4764 and 0.4767±0.05457 µg/l and a range of 0.91-9.97, 3.66-5.26 and 0.37-0.55 µg/l of mercury tin and antimony respectively. The highest values of heavy metals mercury, tin and antimony were 6.04 µg/l (Robust sugar free, Sun Mark Ltd England), 6.33 µg/l (Ginger Beer Sun Mark Ltd England) and 1.86 µg/l (Ice Tea Lemon Chi Ltd Nigeria) respectively all beverages. The number of products that violated the permissible limits for mercury were 89.2% (33), 2.7% (1) and 89.2% (33) for WHO, USEPA and EU permissible levels respectively. About 100, 88.9 and 90% of the bottled water, beverages and dairy products respectively were all in violation of the WHO permissible level for tin. This study shows that antimony is detected below the permissible levels of WHO, USEPA and EU in all products while mercury levels found in most samples were above the acceptable levels established by the WHO, USEPA and EU.

Acknowledgement: (This work has been developed with the support of the Noodles.ONLUS, (www.noodlesonlus.org)
**REGP03 — Poster Board 10**

Dumping of banned baby bottles from advanced economies: an invisible poison for African children?

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Bisphenol A (BPA) is the monomer of polycarbonate plastic and epoxy resins widely used in food contact materials such as infant feeding bottles. BPA has potential estrogenic effects; excessive prenatal and postnatal exposure has been associated with reduced fetal growth, altered puberty timing and impaired programming of target tissues. African infant BPA exposure is unknown. Monitoring the dumping of BPA baby bottles from advanced economies to Cameroon and Nigeria, getting an overview of the most purchased and realize whether infants BPA exposure rate through baby bottles is of concern. Preliminary survey was carried out in two regions of Cameroon and two States in Nigeria by questionnaire and interview. In Cameroon, baby bottles are all imported: they are sold in pharmacies, local markets and shops around hospitals; 95% of bottles in pharmacies were labeled “BPA free” while 100% in shops and markets were not. In Nigeria figures were almost the same except that some of the plastic baby bottles were locally made. Even if uncertainty areas remain around the effective BPA health implications, the high vulnerability of infants makes the group of Countries banning BPA-baby bottles increasing worldwide, with Europe recently adhering. The need emerges for an African assessment of BPA adverse effects and for information/communication activities to both sellers and consumers.

**REGP04 — Poster Board 11**

Creating a virtual global toxicology village: The World Library of Toxicology, Chemical safety and Environmental health

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The science of toxicology, and its associated policy and societal issues is of paramount global concern. With the use of toxic chemicals increasing in all corners of the world, particularly in developing countries, toxicology is stepping into the forefront as a major science than can help in our understanding of environmental problems and provide solutions for protecting public health. The multi-lateral, multi-lingual web-base world library of toxicology (www.wltox.org) was developed to facilitate this exchange by decreasing the barriers to sharing information among countries and building capacity within countries. Volunteer country correspondents share their countries’ specifics knowledge of toxicology and public health. The correspondents build their respective country pages by contributing links to resources, such as relevant governmental and non-governmental organizations, universities or others training programs, poison control centers, professional associations, databases, books, journals, general country information and others topics. The WLT uses a modified wiki based technology that provides the country correspondents with control with their individual page contents, allowing for rapid and continually updated information. There are currently some 50 countries represented and we actively recruit new country correspondents as part of our effort to expand the program. The WLT is a joint project of the International Union of Toxicology (IUTOX), the U.S National Library of Medicine (NLM), the U.S Institute of Neurotoxicology & Neurological Disorders (INND) and supported by Toxipedia (www.toxipedia.org). The WLT was launched in South Africa at the 7th Congress of Toxicology in Developing Countries in September 2009 and has had over 2500 unique visitors around the world in the month following its release. The WLT offers a unique way to share information, acknowledge our ethical responsibilities, and build global capacity in toxicological research, application and training for a healthy and sustainable world.

**CLIP02 — Poster Board 12**

Ameliorative effect of Moringa oleifera, activated charcoal and charcoal on lead toxicity in wistar rats

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Lead poisoning is one of the largest environmental problems. Conventional treatment of lead poisoning has been based on chelating agents which are relatively expensive for poor communities. In this present study, we evaluated the efficacy of Moringa oleifera aqueous leaf extract, activated charcoal and charcoal in treating lead induced toxicity in Wister rats. The rats were divided into 5 groups of 10 rats. An oral daily dosage of 1000 mg/kg body weight of lead acetate was
administered to rats in 4 groups for 7 days. The positive control group received distilled water. After 7 days of lead acetate administration, 10 rats were sacrificed from a lead acetate group and control group. From day 8 to day 21, an oral daily dosage of 1000 mg/ kg body weight of *M. oleifera*, activated charcoal and charcoal were administered separately to 3 of the lead acetate treated groups while one of the groups was allowed untreated. On day 21, all the remaining rats were sacrificed. During and after the administration period, rats were examined for clinical signs, body weight changes, serum biochemistry, haematological parameters and histopathological lesions. Lead acetate significantly decreases body weight, aspartate aminotransferase, alanine aminotransferase, and red blood cells count. Gamma glutamyl aminotransferase, mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration were increased. Histopathology examination revealed damages in the liver, brain, muscle and kidneys. Activated charcoal and *M. oleifera* showed ameliorative effects in the haematology, serum biochemistry and histopathological analysis. Our results suggest that *M. oleifera* aqueous leaf extract and activated charcoal can ameliorate lead induced toxicities.

**CLIPO3 — Poster Board 13**

**Efficacy of Senna occidentalis in the amelioration of tetracycline induced hepato- and nephrotoxicities in rabbits**

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Management of liver disease remains a challenge to contemporary medicine, especially as hepatotoxicity is the most common single adverse effect associated with drugs, including withdrawals and refusals. An example of such a drug is tetracycline; discovered in the 1940s as a broad-spectrum antibiotic, malaria prophylactic and animal growth promoter. However, a serious factor which has negatively influenced the use of tetracycline is its toxicity on the liver aside other effects like nephrotoxicity. In the absence of reliable liver-protective drugs in allopathic medical practices, herbs play a vital role in the management of liver disorders. Consequently, the ameliorative effect of *Senna occidentalis* crude extract on tetracycline induced hepato and nephro-toxicities was evaluated in female cross-breed rabbits for validation of its traditional use in combating these toxicities. An oral daily dose range of 25, 50, and 100 mg/kg body weight of the aqueous leaf extract of *S. occidentalis* was administered to the rabbits in addition to 1000 mg/kg Tetracycline HCl (orally, every 48 h) for 14 days. The rabbits were monitored for clinical signs, body weight changes, serum biochemical and haematological parameters and pathologic lesions. The LD50 of the orally administered aqueous leaf extract of *S. occidentalis* in rabbits was found to be >2000 mg/kg. A significant decrease in body weight, increases in serum alanine aminotransferase, aspartate aminotransferase, creatinine, urea and bilirubin were observed in animals treated with tetracycline; indicative of hepato- and nephro-toxicities. Gross and histopathology of the liver and kidneys also confirmed tetracycline induced hepato- and nephro-toxicities. *S. occidentalis* produced a significant (p < 0.05) dose-dependent ameliorative effect by reducing weight loss, serum level of liver enzymes and serum biomarkers of renal damage.

**OCCP01 — Poster Board 14**

**Occupational pesticide intoxications among farmers in the South West Region of Cameroon**

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The South West Region of Cameroon consists of fertile volcanic soils which have attracted both mechanized and small scale farming in the region. Pesticide use and its consequences are of concern in the region due to an intensive and increasing use on the farms. To assess the magnitude and reasons for occupational pesticide intoxication, a cross sectional study with interviews was performed among 100 volunteer farmers with a regular use of pesticides on their farms from Buea and it’s environ in the South West Region of Cameroon. Data collected from the farmers was analyzed statistically, including linear- and logistic regression analysis. This study documented a frequent use of toxic pesticides by farmers most of whom claim to have had instructions on how to use pesticides and protect themselves against the dangers of intoxication. Exposure of farmers to pesticides was high due to the inability of farmers to purchase protective wears and probably because of negligence as reflected in the hazardous practices used when handling the pesticides by both farmers claiming to have had instructions on pesticides use and those who have had no instructions. Symptoms of intoxications like headache, dizziness, blurred vision, vomiting, skin irritation, burns, respiratory disturbance and vomiting were common in connection with spraying operations. The experience of symptoms was influenced by the type of pesticides used, educational level, poverty, hygienic and personal protective measures taken during spraying operations. The study concluded that occupational pesticide intoxications were common among farmers and did depend on multiple factors. Pesticide use is probably one of the largest toxicological problems in the
South West Region of Cameroon, and a coordinated action by government, society and international bodies is needed to limit the number of intoxications and the environmental pollution. Also, the donations of safety wears to farmers can greatly reduced intoxication.

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TOXINOLOGY

**TOXPO1 — Poster Board 15**

Contamination of animal feed by aflatoxins and fumonisins in some regions of Cameroon.

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Aflatoxins (AFs) and fumonisins (FMs) are toxic metabolites produced by Aspergillus and Fusarium fungi, respectively. These fungi are able to grow on food commodities and produce the toxins. The consumption of contaminated food or feed may have hazardous effect. The contamination of poultry, swine and rabbits feed by these toxins in some area of Cameroon was studied as well as the influence of AFs on chickens’ growth rate. A survey was conducted in 5 localities namely Yaoundé, Bagangté, Bamenda, Douala and Bafoussam according to the climate. A total of 163 feed samples were collected. FMs and AFs were assayed in the sample extracts using densitometry after TLC separation and ELISA techniques, respectively. As results, 97.5% of samples were found to be contaminated by AFs and 27.7% by FMs in Yaoundé. This contamination level was 100 and 10.52% in Bamenda respectively. In Bagangté, 100% of samples were found to contain AFs and, 6.66% contained FMs in Douala. A significant (p<0.05) slow down of the growth rate of chickens consuming feed with AFs content was observed. Level of contamination of chicken feed high than 10 ppb were found to reduce daily weigh of 29% (p<0.05).This study suggests the reality of contamination of poultry, swine and rabbits feed by mycotoxins. This should attract rearing and health stockholders attention in the objective of healthy and economically performance in rearing.

**TOXPO2 — Poster Board 16**

Risk assessment related to aflatoxin B, AFB, in some foods of Cameroon: Case of maize flour, cassava flour and groundnuts

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Many substances interact with human health. Among them some are involved in human fitness. These include Food. Food conserving is a great challenge in many societies. In most African countries as in Cameroon, sunlight is the most drying technique used. The climatic conditions in Cameroon where it coexists high temperatures and high humidity is known to be favorable to mould grow. Foods like corn, peanuts and mostly cassava tubers and leaves are in front line use. During drying and storage periods, these foods can undergo secondary alteration due to infestation by moulds including the Aspergilli known to be aflatoxins (AFB) producers. Aflatoxins search on samples of corn, peanuts and cassava collected in Yaoundé and Douala has shown that 9 (42.86%) of the 21 of cassava tuber contained aflatoxins. Seven of the 9 infected samples were cassava tuber while the two others were samples of corn. Aflatoxins content was as high as 29µg/Kg, obviously higher than the 8µg/Kg FAO limit. People education on practice of better drying and storage as well as providing information on the such mouldy foods use would help to decrease the rate of primitive liver cancer associated to AFB1 ingestion.

MIXED DISCIPLINE

**MIDPO1 — Poster Board 17**

In vitro study of the antiamoebic and antioxidant properties of the aqueous extract of Euphorbia hirta (Euphorbiaceae)

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The antiamoebic activity of the aqueous extract of E. hirta was evaluated on an axenic culture of Entamoeba histolytica (HM-1:IMSS strain) according to Chitravanshi et al. (1992). Metronidazole was used as the reference drug. Further more, the antioxidant property of this extract was studied by evaluating its antiradical activity using DPPH scavenging method, its β-CLAMS and ferric ions reducing powers. Here, vitamin C was used as standard. Then, a phytochemical screening of this extract was done in order to search groups of compounds responsible for these properties. As results, the aqueous extract of E. hirta inhibits significantly the HM1:IMSS strain growth at the concentrations of 50, 100 and 200µg/ml after 24, 48 and 72 hours of incubation. The EC50 of this inhibition were respectively 88.467µg/ml, 72.948µg/ml and 89.432µg/ml. The antioxidant tests showed that this extract scavenges efficiently the DPPH free radicals,
inhibits efficiently the oxidative degradation of 8-carotene and reduces efficiently ferric ions respectively with an EC50 of 62.534µg/ml, 73.175µg/ml and 83.955µg/ml. The phytochemical screening of this extract revealed the presence of polyphenols, flavonoids, alkaloids, tannins, terpenes, sterols and sugars. According to these results, the aqueous extract of *E. hirta* is a potential source of antiamoebic and antioxidant compounds.

**MIDPO2— Poster Board 18**

*Evaluation of the efficacy of aqueous extract of Phyllanthus niruri in the amelioration of acetaminophen-induced hepatotoxicity and nephrotoxicity in rabbits*

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Overdose of acetaminophen causes hepatotoxicity and nephrotoxicity due to N-acetyl-p-benzoquinamine, formed by cytochrome P450 enzymes in the liver. *Phyllanthus niruri* is a medicinal plant used in folklore medicine for the treatment of liver and kidney diseases. This study sought to evaluate the efficacy of the aqueous crude extract of *P. niruri* in the amelioration of acetaminophen-induced hepatotoxicity and nephrotoxicity in rabbits. The aqueous extract was screened for phytochemicals. LD50 was found to be > 2000 mg/Kg. Six groups of 3 rabbits each were used for sub-acute study. Control groups received distilled water, 300 mg/Kg APAP and 100 mg/Kg *P. niruri* aqueous extract respectively. The remaining groups were exposed to 300 mg/Kg acetaminophen and treated with 100, 50 and 25 mg/kg body weight of the aqueous crude extract. The effect of the aqueous extract on blood and serum parameters was found to be dose-dependent. Histopathological examination confirmed signs of hepatotoxicity as coagulative and centrilobular necrosis. The effective dose of this extract in hepatoprotection and nephroprotection was found to be 25 mg/Kg body weight.

**Acknowledgement**

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**MIDPO3— Poster Board 19**

*Sub-acute Hepatotoxicity of Anacardium occidentale (Anacardiaceae) Inner Stem Bark Extract in Rats*

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The extracts of *Anacardium occidentale* have been used in the management of different cardiovascular disorders in *Nigeria*. These have necessitated the assessment of the toxicity of this plant extract in sub-acute administration. The inner stem bark of *Anacardium occidentale* was extracted with 80% methanol and quantitatively analysed for antinutrients and some heavy metals. The phytochemical compositions and acute toxicity of the extracts were determined also. Toxicity profiles of the extract on some liver function parameters were evaluated following a sub-acute oral administration at doses of 1.44 and 2.87 mg/kg. The phytochemical screening of extract revealed the presence of high amount tannins, moderate saponins and traces of free reducing sugars. The antinutrient levels were 5.75 % (tannins), 2.50 % (oxalates), 2.00 % (saponins), 0.25 % (phytate) and 0.03 % (cyanide). The quantity of iron detected from dried crude was 8.92 mg/100 g, while lead and cadmium were non-detectable. The extract had LD₅₀ of 2.154 g/kg p.o. in mice. Sub-acute administration of the extract significantly increased the serum levels of alanine aminotransaminase and aspartate aminotransaminase, which are indicative of liver damage. The serum levels of alkaline phosphatase and total protein of the treated animals were not significantly increased. The damaging effects of sub-acute administered extract on hepatocytes were moderate as the serum alkaline phosphatase, total bilirubin and total protein levels in treated animals were not (p<0.05). Thus, sub-acute administration of *Anacardium occidentale* inner stem bark extract significantly (p<0.05), but moderately, depressed the function of hepatocytes in Wistar rats.

**MIDPO4— Poster Board 20**

*Subchronic Toxicity Assessment of Fluclocaxillin in Rabbits*

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Flucloxacillin is a beta-lactam, semi-synthetic antibiotic belonging to a group of antibiotics called penicillin, used to treat gram positive bacterial infections. Bacteria are resistant to other penicillin-type antibiotics because they form penicillinase, an enzyme which breaks down penicillin and renders it ineffective at killing bacteria. Flucloxacillin is not affected by the enzyme and is thus the primary treatment against bacterial infections that are resistant to other penicillin antibiotics. It is used to treat gram positive bacterial infections, through interference with a bacterium’s ability to form cell wall which is vital for their survival. However, it is reported to cause drug-induced liver injury in patients affecting mostly first time users, although its disposition in the body has not been fully explained. This research sought to investigate flucloxacillin toxicity in rabbit liver hepatocytes and consider potential mechanisms of toxicity. 30 female and 30 male bacterial-infected rabbits were treated with flucloxacillin syrup for 2 weeks. Liver Function Test (LFT) and bilirubin levels were evaluated. Tissues from the liver were observed microscopically for histopathology. As with many idiosyncratic drug reactions, there was a delay between the start of drug treatment and the onset of clinical symptoms such as nausea, abdominal pain, fever, and in severe cases sclerosis of bile ducts. Levels of ALP, AST and ALT were greatly elevated, indicative of damage due to bile duct obstruction. Susceptibility to flucloxacillin-induced cholestasis was found to be age and sex-related as mostly the older and female rabbits were affected. Although, flucloxacillin is used as first line treatment against bacterial infection, it equally induces injury on the liver. An elucidation of its effects on the liver’s biochemical and molecular parameters as well as cholestatic effects is still only the starting point to identify susceptible individuals with good patient characterisation essential to understanding the additional role of contributory genetic, environmental and immunological factors.

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**MIDPO5— Poster Board 21**

**Assessment of packed cell volume (PCV) and plasma iron levels following treatment for malaria and helminthic infections in children in rural Muea, Cameroon.**

Moses Samje, Irene Sumbele, Anna Njunda, Elsy Mankah, Lucien Kamga, Theresa Nkuo Akenji

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In many tropical regions, anaemia, iron deficiency, malaria and helminth infections co-exist and are interrelated. To investigate the effect of malaria and soil-transmitted helminthic (STH) infections on anaemia and plasma iron levels, 203 children (< 15 years) residing in rural Muea were enrolled into a longitudinal study in which they were followed up weekly for six weeks between April and October 2006. Malaria parasitaemia was determined microscopically, packed cell volume (PCV) was determined using a haematocrit, and plasma iron levels by spectrophotometry. Stool samples were prepared by the Kato-Katz technique and examined microscopically for the presence and intensity of intestinal helminths. Overall, 99% of the children had malaria parasites while 53.7% were infected with STH. The prevalence of anaemia (PCV<31%) and plasma iron deficiency (plasma iron<50µg/dl) was respectively, 43.4% and 50.2%. Of the worm-infected children 54.1% and 51.4% were anaemic and iron deficient respectively. Following appropriate malaria and worm treatment mean PCV increased progressively from 31.14 ± 5.24 to 35.23 ± 5.04 and mean plasma iron levels from 65.05 ± 68.56 to 68.57 ± 84.05 on day 0 and day 42 respectively. The difference between pre-and post-treatment mean PCV was significant (P<0.05). Our findings indicate that malaria and helminth infections have an impact on PCV and plasma iron levels. The co-existence of these infections in this community contributes to the severity of anaemia and iron deficiency. The population has to be educated on the benefits of prompt and proper treatment of these parasitic diseases.

**MIDPO6— Poster Board 22**

**Potent antimalarial acetogenin-enriched fractions from Polyalthia suaveolens (Annonaceae)**

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Malaria remains the most dangerous parasitic infection in many tropical and subtropical countries and therefore is a major public health concern. In spite of the availability of Artemisinin-based combination therapies, resistance development has been reported. This raises the urgent need to discover and develop new antimalarial drugs. Natural products constitute a potential source of new antiplasmodial molecules. Some plants families such as Annonaceae have specific constituents like acetogenins with a broad range of bioactivities. The aim of this study was therefore to evaluate the in vitro antiplasmodial activity of extracts of Polyalthia suaveolens (Annonaceae).
The leaves, twigs and stem bark of *P. suaveolens* were extracted by maceration in 95% ethanol and subsequently partitioned between CH₂Cl₂/H₂O and MeOH/Hexane (v/v) respectively. The total lactones in methanolic fractions (acetogenin-enriched) were characterized by spectrophotometry using Kedde’s reagent. The susceptibility of erythrocytes to extracts was evaluated in vitro by the MTT/Formazan colorimetric test. The antiplasmodial activity of fractions was evaluated in culture against the W2 strain of *Plasmodium falciparum* and expressed in terms of 50% inhibitory concentrations (IC₅₀). From the results achieved, the leaf methanolic fraction has shown the highest yield of 3.73% extraction and the strongest absorbance at 450 nm. The extracts of *P. suaveolens* were found to be non toxic to erythrocytes. The acetogenin-enriched fraction (methanolic) of the twigs was the most active with an IC₅₀ value of 3.235 µg/ml, while that of the stem bark showed moderate activity with an IC₅₀ of 5.517 µg/ml. From this investigation, these activities of extracts of *Polyalthia suaveolens* denote the presence of bioactive natural products, and most likely of acetogenins, that could be developed into new therapy against malaria.

**MIDPO7— Poster Board 23**

**Antifungal and Antioxidant Potentials of Piptostigma Calophyllum, Uvariodendron Calophyllum and Uvariodendron Molundense Crude Extracts**

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Fungal infections generally associated with free radical generation. The present study describes the in vitro antifungal and antioxidant activity of the ethanolic extracts of the leaves and twigs of *Uvariodendron molundense, Uvariodendron calophyllum* and *Piptostigma calophyllum* (Annonaceae). The antifungal activity was evaluated on *Candida albicans, Candida glabrata,* and *Candida lusitaniae*, using the agar well diffusion and broth microdilution method; and on *Aspergillus flavus, Aspergillus niger* and *Aspergillus fumigatus* using agar dilution method. DPPH free radical scavenging and the metal chelating activity methods served for antioxidant activity. Plant extracts undergo a phytochemical screening. These plant extracts presented different potencies with the highest MIC value being 1.30 mg/mL on *C. albicans* and the least 25 mg/mL on *C. lusitaniae* for *U. molundense* and *U. calophyllum* leaf extracts respectively. *A. flavus* was sensitive to *U. calophyllum* twig extract with an MIC of 22 mg/mL. The MFC/MIC ratio showed that the extracts are fungicidal. The strongest scavenging activity obtained for *P. calophyllum* leaf extracts with SC₅₀ of 0.201 mg/mL and the weakest was that of *U. molundense* twig extracts with an SC₅₀ > 4mg/mL. The plant extracts proved to be potent iron chelators with *U. Calophyllum* twig extract being the most active with IC₅₀ of 3.07mg/mL. The other plant extracts showed IC₅₀ > 4mg/mL. The phytochemical analyses revealed the presence of tannins, phenols, and glycosides being common among the crude extracts. These results suggested that the studied plants could be a potential source of antifungals and antioxidants.

**MIDPO8— Poster Board 24**

**Assessment of fascioliasis and other intestinal parasites of cattle in Douala abattoir, Cameroon.**

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Cattle constitute a major source of animal protein in the diet of most Cameroonians and many people make their living through the rearing of these animals. Prevalence and intensity of fascioliasis and other intestinal parasites of cattle in Cameroon was assessed. Three hundred and twenty cattle were examined post-mortem, consisting of one hundred females and two hundred and twenty males. Bile and faecal samples were collected to determine the prevalence and intensity of liver and other gastrointestinal parasite infections. 10 mL of the bile of each animal was concentrated by centrifugation at 3000 rpm for two minutes and a drop of it examined at X 10 objective. Two methods were used for stool analysis; formol ether and salt floatation concentration techniques. Liver flukes had a general prevalence of 81.3% distributed thus: single infections with *Fasciola* and *Dicrocoelium* had respectively 12.2% and 25.6% while mixed infection of the two had a prevalence of 43.4%. The following parasites were observed: *Trichostrongylus sp, Haemonchus contortus, Oesophagostomum sp, Ascaris vitulorum, Eimeria spp, Cooperia sp, Dicrocoelium dendriticum* and *Fasciola spp.* The general prevalence of infection was 74.4% and *Haemonchus contortus* and *Trichostrongylus sp* showed the highest prevalence of infection in both techniques. The mean prevalence of infections of these two parasites from the two techniques were 56.75% and 50.8% respectively. This was followed by *Eimeria* and *Fasciola* with 15.6% and 15.3% respectively. *Ascaris vitulorum* and *Fasciola spp* showed very low prevalence with salt floatation technique (respectively 0% and 1.6 %). Generally, formol ether technique showed a higher prevalence of infection than salt floatation technique, but the difference was not significant at p=0.6325. Males had a higher prevalence and intensity of infection than females with the highest intensity being from *Trichostrongylus sp* (1100 epg of stool). It was observed that salt floatation technique was not sensitive enough for heavy eggs (*Fasciola* and *Ascaris*). Subsidising and educating the Fulani herdsmen by the government on the
administration of anthelminthic drugs and better field management will reduce drug resistance and prevent expenditure on drugs and improve on the quantity and quality of meat produced and consumed by the local population.

**MIDPO9— Poster Board 25**

*In vitro antimicrobial activity on gastrointestinal pathogens and acute oral toxicity study of methanol extract from bark of *Nauclea latifolia* (Rubiaceae)*

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The aim of this research was to investigate the *in vitro* antimicrobial and acute oral toxicity using the methanol extract from bark of *Nauclea latifolia* (Rubiaceae). Methanol, Methanol / Methylene chloride mixture (1v:1v), aqueous and other aqueous/methanol mixture extracts of *N. latifolia* were screened for their antimicrobial activities against nine pathogenic microbes involved in gastrointestinal tract diseases. The antimicrobial efficacy was evaluated based on the determination of inhibition zones (IZ) using the agar-disc-diffusion assay and minimal inhibition concentration (MIC) and minimal bactericidal concentration (MBC) values. Gentamicin and nystatin were used as standard antibiotics. The results indicated that: (1) the inhibition zone produced by the test ranged from 8,66 to 21 mm, the minimal inhibition concentration (MIC) ranged from 1,95µg/ml to 62,5µg/ml. (2) The methanol extract was the most active while *C. albicans* was the most sensitive to all the extracts tested for antimicrobial activities. An acute oral toxicity study using the administration of the methanol extract in male and female rats, based on the Fixed Dose Procedure (FDP) (OECD Test Guideline N°420) was performed. Single acute dose 5000 mg/kg of methanol extract of *N. latifolia* dissolved in distilled water were administered by oral gavage. The major toxicological endpoints examined included animal body weight, food and water consumption, selected tissue weights and blood chemistry (ALAT, ASAT, PAL, glycaemia, proteins, total cholesterol, creatinin). None of these parameters were significantly affected. Moreover, the phytochemical analysis of the aqueous methanol extract was performed and indicated the presence of saponins, cardiotonics glycosides, alkaloids, polyphenols, coumarnes, steroids, tri terpenes, sterols, reducing sugar, glycosides, hydroxanthraquinones, anthraquinone derivatives. The overall results suggested that the methanol extract of *N. latifolia* exhibited *in vitro* antimicrobial activity and no toxic effect was observed.

**MIDPO10— Poster Board 26**

*Evaluation of the activity of lipase extract present in laundry detergent marketed in Yaounde*

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Enzymes are proteins endowed with specific catalytic activities. Their production in this decade represents a global market of close to two billion dollars per year. Approximately 45% of the total volume of these enzymes is used in the detergent industry. These are: proteases, amylases, cellulases and lipases. Because of the difficulties in removing oily stains during washing, lipases are added in the formulation of detergents. In Cameroon, detergents are used in variable conditions (temperature, pH). However, several physicochemical factors may denature enzymes or at least reduce their activities. This work presents the results of the study of the influence of physicochemical factors on the activity of lipase extracted from washing powders which are market in Yaoundé (ARIEL Apta, Mir, Le Chat, OMO and PAX). The Lowry method showed the presence of proteins in our samples. Their quantities were also determined. The study of the kinetic activity revealed that these proteins have a lipase activity. The influence of physicochemical factors showed that lipases remain active at pH range between 5 to 9 and a temperature range of 30 to 90°C. The optimum activities are obtained at pH 7.5 and at a temperature of 50 °C. A survey on the use of powder detergents by the student population in Yaoundé revealed that the use of biological detergents is not well known and is consumed just by 24% of the population. Efficiency was the main reason motivating these consumers to use this type of detergents. 83% of consumers did the washing at room temperature and within a short time (less than 30 min). The application of such a biotechnology to domestic detergent industries may solve the problem of pollution linked to the use of non-biological detergents, and give an added value to detergent products. Thus, it will contribute to the fight against poverty.

**MIDPO11— Poster Board 27**

*Antiplasmodial activity and toxicity profile of enriched-fractions from Annona muricata (Annonaceae) growing in Cameroon*

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Malaria remains a serious public health threat in tropical and sub-tropical endemic countries. Emergence and spread of parasite resistance to available drugs underline the urgent need to develop new drugs against malaria. Acetogenins that are specifically found in plants of the Annonaceae family are promising natural products that could be investigated, and further developed into antimalaria drugs. To contribute in the achievement of this goal, we have evaluated the antiplasmodial activity of acetogenin-enriched extracts from *Annona muricata* (Annonaceae). To achieve the goal, leaves, flowers, twigs, pericarp, seeds and fruit pulp were extracted, and thereafter partitioned using organic solvents. Lactone-containing compounds were characterized in acetogenin-enriched fractions by spectrophotometry using the Kedde’s reagent at 700-300nm. The susceptibility of red blood cells and the W2 strain of *Plasmodium falciparum* were assessed in culture using the MTT/formazan microtest and flow cytometry respectively. The acute toxicity of acetogenin-enriched fractions was evaluated according to the Organization for Economic Cooperation and Development protocol. From the results achieved, the extraction yields were found to vary from 0.06 to 4.85%. The leaf, twig, and flower extracts were found to contain higher lactone contents. The extracts exhibited no toxicity on red blood cells. Eight out of eighteen extracts tested showed antiplasmodial activity with IC₅₀ values ranging from 2.032 to 5.174 µg/ml. Acute toxicity studies showed that acetogenin-enriched fractions have LD₅₀ values greater than 0.8g/kg of body weight. Therefore, they were categorized as weakly toxic. From this investigation, the results obtained highlight that *Annona muricata* produces potent antiplasmodial natural products. Previous findings on this plant support that the active ingredients are highly likely the acetogenins. Further investigations on this subject will contribute in the clarification of this issue.

**MIDPO12 — Poster Board 28**

Impact evaluation of the Universal Salt Iodization (U.S.I) in the students of Pi and Ju Anglo-Saxon International College Nkomo-Maetur Yaoundé aged 9-13. October 2010

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Iodine Deficiency Disorders (IDD) before the early 90s was a public health problem. School children presented IDD such as goiter, cretinism, deaf mutism and low IQ with low levels of iodine in their urines as discovered in the 1990 Baseline survey. This was due to insufficient iodine in the salt, water and food they eat. In 1991, the USI was realized and all salts were iodized in order to terminate IDD. To assess the level of iodized salt consumption in Pi and Ju college students Yaoundé aged 9-13, after the USI/IDD and assess the change between 1991 and 2010, in Yaoundé 19 years after and provide possible explanations. 199 urine and 118 salt samples were randomly collected from students aged and their iodine contents analyzed using the Karmakar’s method of the Alkaline Ashing, based on the Sandell-Kolthoff’s reaction and the quantitative iodometric /colorimetric titration with thiosulphate for the Iodine Contents in salts. Analysis of salts showed 2.01% inadequate, 96.49% adequate and 1.50% excess iodine content. Analysis of urines showed 1.5% adequate and 98.5% excessive iodine nutrition. High levels of iodine in circulation lead to excessive excretion but present no symptoms of Iodine Induced Hyperthyroidism (Iih). Students presented no IDD but almost excess urinary iodine and adequate iodine nutrition. It is certain that the USI is successful. We strongly recommend that similar impact surveys be carried in other sentinel sites or that a national survey should be conducted. The ministerial order of 1991 prescribing 100ppm of KIO₃ should be reduced to 25-45ppm as iodine or 35-65ppm as KI₃. Mothers should purchase only salt marked “IODIZED” to ovoid IDD and increase children’s IQ.

**References**


**Acknowledgement:** We acknowledge the ministry of Basic education, the Principal of Pi and Ju College Yaoundé, the Director of IMPM/MINRESI Yaoundé and the ICCIDD for their contributions towards the successful realization of this Survey.

**MIDPO13 — Poster Board 29**

Malnutrition and intestinal helminth infections in school children in Dibanda, a rural village in Buea, Cameroon

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Intestinal helminth infestations and malnutrition are a major health burden in developing countries with infants and children being the most vulnerable groups. The extent
of the burden of intestinal helminth infections and malnutrition was investigated in a cross-sectional study involving 265 children ≤14 years residing in Dibanda, a semi-rural area located in Buea, the South West Region of Cameroon. The prevalence of intestinal helminth infection was determined microscopically after faecal samples were prepared by the formol-ether sedimentation concentration technique of stool analysis. Nutritional status was determined using age and the anthropometric parameters of weight and height. Z scores of height-for-age (HAZ), weight-for-age (WAZ) and weight-for-height (WHZ) were computed based on the World Health Organisation 2006 growth reference curves. Anaemia was assessed by packed cell volume (PCV). Malaria parasitaemia was determined microscopically from Giemsa-stained thick blood films. The prevalence of intestinal helminth infection in the study population was 47.2% (125/265). All the infections were of low intensity with Ascaris recording the highest geometric mean egg count (GMEC) ± SEM of 363.51 ± 60.35 (egg count range: 76-3000 eggs per gram of stool). Anaemia (PCV <31%) was diagnosed in 42.3% of the children; 47.2% of those with intestinal helminth infections were anaemic while 57.1% of those with malaria were anaemic. The prevalence of malnutrition was 30.2% (80/265). Of the 80 malnourished children, 5.3% were wasted (<-2 SD weight-for-height Z-score), 7.2% underweight (<-2 SD weight-for-age Z score) and 24.2% stunted (<-2 SD height-for-age Z score). The mean values of all the anthropometric indices were lower in helminth infected children. There was a negative correlation between nutritional status and malaria parasitaemia (r = -0.042). Findings from this study are strongly suggestive that intestinal helminth infections and malnutrition exist in children residing in Dibanda and constitute a major health problem which needs to be immediately addressed to reduce morbidity and mortality.

**MIDPO14 — Poster Board 30**

**Serum level of bone minerals and alkaline phosphatase in HIV seropositive subjects in Nnewi, Nigeria**

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Bone alterations have been observed in the course of HIV disease. The high prevalence of bone mineralization among HIV-infected patients in the current therapeutic era has been reported in multiple studies. This study was designed to investigate the serum levels of bone minerals (calcium, phosphate and magnesium) and alkaline phosphatase (ALP) in HIV-seropositive subjects with and without highly active antiretroviral therapy (HAART). A total of 100 subjects (50 males and 50 females; aged 20-50ys) were recruited for the study. Of these, 80 were HIV-seropositive with 40 on HAART and 40 not on HAART. The remaining 20 subjects were HIV-seronegative which served as the control subjects. 5mls of venous blood was drawn from each subject and the serum was electronically assayed for the various levels of calcium, phosphate, magnesium and ALP. Results showed that there were no significant difference (p>0.05) in the mean serum calcium levels between the case groups and control subjects. The mean serum magnesium level of the HIV-seropositive subjects on HAART was significantly higher (p<0.05) than that of the control subjects, also the mean serum magnesium level of HIV-seropositive subjects on HAART was significantly higher (p<0.05) than that of the HIV-seropositive subjects who were not on HAART. A significantly higher (p<0.05) mean serum phosphate level was observed in the HIV-seropositive subjects on HAART when compared to the control subjects. However, a significantly higher (p<0.05) mean serum phosphate level was found in HIV-seropositive subjects who were not on HAART than those on HAART. The mean serum ALP activities of both the HIV-seropositive subjects who were not on HAART and those on HAART were significantly higher (p<0.05) than the control subjects. Since there were significant increase in the serum levels of magnesium, phosphate and ALP activity in both the HIV-seropositives on HAART and those not on HAART compared to the control subjects, HIV infection could be said to affect bone mineral levels. These significant pathological alterations may be caused by an imbalance in the osteoblasts/osteoclasts interaction resulting from hormonal, immunological and metabolic disturbances caused by the HIV proteins and/or HAART in the HIV-seropositive subjects. We suggest the monitoring of the bone minerals and alkaline phosphatase activity in HIV subjects.

**MIDPO15 — Poster Board 31**

The *Onchocerca ochengi* Model in The Discovery of Anti-Onchocerca Drugs: Development of New Assays

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Onchocerciasis, a chronic infection caused by *Onchocerca volvulus* is the second leading cause of infectious blindness worldwide. Ivermectin which is the only drug currently recommended for the treatment of onchocerciasis is effective only against the microfilariae and there are already fears of ivermectin resistance in *O. volvulus*. Herein, we report on the use of the bovine dwelling *O. ochengi* model in developing an optimised assay for anti-Onchocerca drug screens. Pieces of umbilical cattle skin
infected with *O. ochengi* worms were collected from the Buea abattoir immediately after slaughter and stayed under non-sterile environment for different time intervals after which skin was prepared and macro- and microfilariae worms extracted using the macrofilariae assay and microfilariae-only assay. The sterility of the cultures was followed up for 120 hours. The effect of distilled water quality on the performance of microfilariae and macrofilariae in cultures was determined. The performance of microfilariae and macrofilariae in cultures containing 5% of fetal bovine serum, fetal bovine serum heat inactivated, new born calf serum, horse serum, SIGMA prepared adult bovine serum and locally prepared adult bovine serum was evaluated. Finally, the filaricidal activity of two compounds namely TDR008 and TDR089 was evaluated on *O. ochengi* worms for assay validation. It was observed in five set of experiments carried out that macro- and microfilariae from pieces of cow skin that stayed under non-sterile environment for less than two hours after slaughter were uncontaminated while those from skin that stayed for more than 2 hours under non-sterile environment were contaminated with bacteria and fungi. The viabilities of microfilariae harvested and cultured in complete culture medium prepared with distilled water from a low grade distiller (< 18.2 mega ohm resistivity) were considerably reduced compared to those cultured in the SIGMA prepared medium with ultra-pure water. Both macro- and microfilariae recorded a 100% viability score in all the cultures consisting of the different sera tested. TDR008 and TDR089 showed microfilaricidal activities while only TDR089 was macrofilaricidal. These results are useful for the rapid discovery of new anti-Onchocerca volvulus drugs.

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**MIDPO16—Poster Board 32**

**Antimalarial drug discovery from Cameroonian medicinal plants: screening efforts at the Biotechnology unit, University of Buea (Cameroon)**

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Natural products play a key role in malaria control in Africa, especially in remote areas where health facilities are limited. In order to evaluate these for their claimed potentials and safety, a Malaria Drug Discovery Project which (an interdisciplinary initiative) was initiated at the Biotechnology Unit, University of Buea, in collaboration with the Laboratory of From this project, a wide range of activity was observed from crude extracts. The recent findings showed the methylene chloride/methanol extracts from leaves of *Dacryodes edulis* with the highest activity (IC50 of 6.45 µg/mL), followed by the leaves and roots of Vernonia amygdalina (IC50 of 8.72 and 9.01 µg/mL respectively), *Kigelia africana* stem bark and *Coula edulis* leaves (IC50 = 13.80 µg/mL). Bioassay-guided fractionation of the *K. africana* extract led to isolation of three compounds with good antimalarial activity and less cytotoxicity (IC50< 1 µg/mL, CC50> 30 µg/mL).

These findings justify the use of five of the seven plants in malaria treatment by traditional healers of West Cameroon. Further studies of these plants are likely to yield new antimalarial drug candidates and/or improve their local use as natural drugs.

**MIDPO17—Poster Board 33**

**Kinetics of lipid mediated hemozoin formation in the malaria parasite**

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Malaria parasite forms a pigment called hemozoin as a by-product of heme detoxification inside the red blood cell. Chloroquine and other quinoline derivatives act by blocking the conversion of toxic heme into non-toxic hemozoin. Hemozoin (Hz) formation therefore still remains an important biochemical target albeit its poorly understood biochemistry. Lipids have been shown to invariably involved in Hz formation and it occurs as a neutral lipid blend (NLB) of MPG/MSG/DPG/DLG/DOG (2:4:1:1:1 by vol) inside the parasite but much relating to its exact kinetics and yields in Hz formation still awaits elucidation. β-hematin (synthetic Hz) was prepared by pre-incubating citric acid buffer (50 mM, pH 4.8) at 37 °C for 15 min. Hemin was dissolved in 0.1M NaOH and 1:9 aceton/methanol solvent. This was mixed with the NLB followed by careful layering of the solution on the buffer and incubating further at different time points (Kinetics) or 30 min (yield). The solution was centrifuged at 10000 rpm for 15 min, the pellets dissolved in 5% pyridine and quantify for Hz formed spectrophotometrically by measuring absorbance at 405 nm. Dried crystals confirmed to be Hz by Fourier transformed infrared Spectroscopy. Yields of above 80% Hz formed was obtained at higher lipid/heme (L/H) mole ratios within 30 min with a sudden drop below 0.54 L/H (result not shown). The kinetics was very fast within 1 min with a linear acceleration after 2 min with about 80% yield above 0.54 L/H mole ratio (Fig 1). The fast kinetics as indicated by k and halflife of NLB fully supports its role in Hz formation in vivo. The cutoff mole ratio and relatively slow kinetics at
were similar to those produce by indomethacin (10 mg/kg) and dexamethasone (2.5 mg/kg). The plant extract significantly inhibited pain induced by acetic acid with a percentage of inhibition of 52.82 %, 58.66 % and 70.84 %, for doses of 25, 50 and 100 mg/kg respectively. The highest analgesic effect of plant extract (100 mg/kg) was produced at 2nd hour in tail immersion test with about 48.24 % (P <0.05) inhibition. The plant extract (25, 50 and 100 mg/kg p.o.), like aspirin (100 mg/kg) exhibited significant (P < 0.05) inhibition of yeast-induced hyperthermia in mice, compared to untreated control. No gastric lesion was observed after seven consecutive days of treatment with the aqueous extract of Z. mauritiana. Preliminary phytochemical analysis revealed the presence of chemical entities such as polyphenolics, flavonoids, tannins, saponines and phenols. Based on these results, aqueous extract of the roots of Z. mauritiana has anti-inflammatory, analgesic and antipyretic properties.

**MIDPO19— Poster Board 35**

A Survey of Indigenous Methods of Post-Harvest Pest Management of Dry Farm Produce Around Buea

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Fresh produce from farms are often dried for future benefit. However, dry products are vulnerable to pests and this has led to food shortages. In order to keep these produce to meet the desired task and overcome some of these deficiencies, the produce are often treated. Dried product treatment involves many approaches (some are chemical while others are non chemical). Some are even associated with pesticide and environmental toxicity. This work seeks to identify the indigenous methods of post harvest pest management of dried farm products around Buea with objectives being to make an inventory of techniques used in post harvest pest management crops around Buea and also to obtain epidemiological data on the shelf life of dry crops preserved by use of different techniques. Data on demographic characterization, ingredients used and reasons for storage etc was collected via administration of questionnaires to consenting participants. The findings of this work revealed that wood ash was the most commonly used natural product for the preservation of dry farm produce.

**MIDPO20— Poster Board 36**

Assessment of the acute and subchronic oral toxicity of the methanol extract from the stem bark of *Erythrina senegalensis* DC (Fabaceae) in rodents

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**MIDPO18— Poster Board 34**

Etude des propriétés anti-inflammatoires, analgésiques et antipyrétiques de l’extrait aqueux des écorces des racines de *Ziziphus mauritiana* Lam (Rhamnaceae)

Liber Kekem

Département des Sciences Biologiques ; Faculté des Sciences ; Université de Ngaoundéré

*Ziziphus mauritiana* Lam. (Rhamnaceae) is a traditional plant used in Northern Cameroon as a folk remedy for the treatment of various inflammatory affections. The aim of this study was to evaluate anti-inflammatory, analgesic and antipyretic properties of the aqueous extract of roots of *Z. mauritiana*. The anti-inflammatory activity was evaluated using two models of acute inflammation namely carrageenan-induced paw edema in rat and xylene-induced ear edema in mice. On the other hand, the effect of the extract on chronic inflammation was evaluated using cotton pellet-induced granuloma in rat. The pain was induced in mice by acetic acid (1%) and in rats by tail immersion test. The antipyretic activity was evaluated against yeast-induced pyrexia in mice. At 25, 50 and 100 mg/kg (p.o.), *Z. mauritiana* aqueous extract produced significant inhibition of carrageenan-induced paw edema, xylene-induced ear swelling in mice and .cotton pellet-induced granuloma in rat. At 100 mg/kg, *Z. mauritiana* caused maximum inhibition of acute inflammation induced by carrageenan (65.49 %), by xylene (55.56 %) and chronic inflammation induced by cotton pellets (41.53 %). Anti-inflammatory effects produced by the aqueous extract of *Z. mauritiana* were similar to those produce by indomethacin (10 mg/kg) and dexamethasone (2.5 mg/kg). The plant extract significantly inhibited pain induced by acetic acid with a percentage of inhibition of 52.82 %, 58.66 % and 70.84 %, for doses of 25, 50 and 100 mg/kg respectively. The highest analgesic effect of plant extract (100 mg/kg) was produced at 2nd hour in tail immersion test with about 48.24 % (P <0.05) inhibition. The plant extract (25, 50 and 100 mg/kg p.o.), like aspirin (100 mg/kg) exhibited significant (P < 0.05) inhibition of yeast-induced hyperthermia in mice, compared to untreated control. No gastric lesion was observed after seven consecutive days of treatment with the aqueous extract of *Z. mauritiana*. Preliminary phytochemical analysis revealed the presence of chemical entities such as polyphenolics, flavonoids, tannins, saponines and phenols. Based on these results, aqueous extract of the roots of *Z. mauritiana* has anti-inflammatory, analgesic and antipyretic properties.

**MIDPO19— Poster Board 35**

A Survey of Indigenous Methods of Post-Harvest Pest Management of Dry Farm Produce Around Buea

Mih Mathias, and Mbei Karin Kum

Faculty of Science, University of Buea

Fresh produce from farms are often dried for future benefit. However, dry products are vulnerable to pests and this has led to food shortages. In order to keep these produce to meet the desired task and overcome some of these deficiencies, the produce are often treated. Dried product treatment involves many approaches (some are chemical while others are non chemical). Some are even associated with pesticide and environmental toxicity. This work seeks to identify the indigenous methods of post harvest pest management of dried farm products around Buea with objectives being to make an inventory of techniques used in post harvest pest management crops around Buea and also to obtain epidemiological data on the shelf life of dry crops preserved by use of different techniques. Data on demographic characterization, ingredients used and reasons for storage etc was collected via administration of questionnaires to consenting participants. The findings of this work revealed that wood ash was the most commonly used natural product for the preservation of dry farm produce.

**MIDPO20— Poster Board 36**

Assessment of the acute and subchronic oral toxicity of the methanol extract from the stem bark of *Erythrina senegalensis* DC (Fabaceae) in rodents

Albert D. Atsamo 1, Télesphore B. Nguelefack 1, Jacques Y. Datté 2, Albert Kamanyi 1

1. Faculty of Science, University of Buea, Cameroon
2. Institute of Health and the University of Cape Town, Department of Chemistry, South Africa

Acknowledgment: Financial support came from the United States National Institute of Health and the University of Cape Town, Department of Chemistry, South Africa.

**MIDPO18— Poster Board 34**

Etude des propriétés anti-inflammatoires, analgésiques et antipyrétiques de l’extrait aqueux des écorces des racines de *Ziziphus mauritiana* Lam (Rhamnaceae)

Liber Kekem

Département des Sciences Biologiques ; Faculté des Sciences ; Université de Ngaoundéré

*Ziziphus mauritiana* Lam. (Rhamnaceae) is a traditional plant used in Northern Cameroon as a folk remedy for the treatment of various inflammatory affections. The aim of this study was to evaluate anti-inflammatory, analgesic and antipyretic properties of the aqueous extract of roots of *Z. mauritiana*. The anti-inflammatory activity was evaluated using two models of acute inflammation namely carrageenan-induced paw edema in rat and xylene-induced ear edema in mice. On the other hand, the effect of the extract on chronic inflammation was evaluated using cotton pellet-induced granuloma in rat. The pain was induced in mice by acetic acid (1%) and in rats by tail immersion test. The antipyretic activity was evaluated against yeast-induced pyrexia in mice. At 25, 50 and 100 mg/kg (p.o.), *Z. mauritiana* aqueous extract produced significant inhibition of carrageenan-induced paw edema, xylene-induced ear swelling in mice and .cotton pellet-induced granuloma in rat. At 100 mg/kg, *Z. mauritiana* caused maximum inhibition of acute inflammation induced by carrageenan (65.49 %), by xylene (55.56 %) and chronic inflammation induced by cotton pellets (41.53 %). Anti-inflammatory effects produced by the aqueous extract of *Z. mauritiana* were similar to those produce by indomethacin (10 mg/kg) and dexamethasone (2.5 mg/kg). The plant extract significantly inhibited pain induced by acetic acid with a percentage of inhibition of 52.82 %, 58.66 % and 70.84 %, for doses of 25, 50 and 100 mg/kg respectively. The highest analgesic effect of plant extract (100 mg/kg) was produced at 2nd hour in tail immersion test with about 48.24 % (P <0.05) inhibition. The plant extract (25, 50 and 100 mg/kg p.o.), like aspirin (100 mg/kg) exhibited significant (P < 0.05) inhibition of yeast-induced hyperthermia in mice, compared to untreated control. No gastric lesion was observed after seven consecutive days of treatment with the aqueous extract of *Z. mauritiana*. Preliminary phytochemical analysis revealed the presence of chemical entities such as polyphenolics, flavonoids, tannins, saponines and phenols. Based on these results, aqueous extract of the roots of *Z. mauritiana* has anti-inflammatory, analgesic and antipyretic properties.

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**MIDPO20— Poster Board 36**

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Albert D. Atsamo 1, Télesphore B. Nguelefack 1, Jacques Y. Datté 2, Albert Kamanyi 1

1. Faculty of Science, University of Buea, Cameroon
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Acknowledgment: Financial support came from the United States National Institute of Health and the University of Cape Town, Department of Chemistry, South Africa.
The stem bark of *Erythrina senegalensis* is traditionally used in the Western region of Cameroon against liver disorders. The present study evaluated the potential toxicity of the methanol extract of *Erythrina senegalensis* (EMES) after acute and sub-chronic administration in rodents. In acute study, a single administration of EMES was given orally to mice at doses ranging from 1.25 to 12.5 g/kg. General behaviour adverse effects and mortality were determined for up to 14 days post treatment. In the sub-chronic study, EMES was given orally as a single administration to Wistar rats at doses of 300, 600 and 1200 mg/kg/day for 28 days. Animal body weight was observed throughout the experimental period while haematological and biochemical parameters of blood and urine, as well as kidney and liver tissues histology were evaluated at the end of experiment. In the acute study in mice, none of the doses used induced mortality or significant behavioural changes. In the sub-chronic study in rats, daily oral administration of EMES at the dose of 1200 mg/kg resulted in a significant decrease in the relative body weight at the last two weeks of treatment. Only the liver relative weight was affected by the treatment at the dose 1200 mg/kg. No haematological changes were observed a part of a significant increase in platelets count at all the doses. Serum AST, ALT, ALP, total protein, total cholesterol and HDL decreased significantly while total and conjugated bilirubin significantly increased. Renal function indices assay in blood showed significant modification in all the treated groups compared to control while, in urine, urea, creatinine and chloride excretions reduced markedly. Histological analysis did not show any liver or kidney alteration. These results demonstrated that there is a wide margin of safety for the therapeutic use of EMES and further corroborated the traditional use of this extract as hepatoprotective agent.

**MIDPO21— Poster Board 37**

**Effect of ascorbic acid on hematological parameters and excitability scores in Yankasa sheep deprived of feed and water.**

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A study was conducted on the effect of ascorbic acid (AA) on selected physiological parameters in 16 Yankasa sheep deprived of feed and water for 12h during the dry season. Ten sheep were given AA at 250mg/kg per of while the remaining six were used as control and treated with 25ml of sterile water orally. Blood samples were collected pre and post administration of AA to determine the erythrocyte osmotic fragility and full blood count. Excitability scores was tested at 0, 6 and 12h after administration of AA. There was a lesser hemolysis in the AA treated group compared to the control. The hemoglobin concentration, erythrocyte count, total protein and leucocyte count were significantly higher in the AA treated group. The excitibility score decreased significantly in the control group. These findings indicate that protracted feed and water deprivation induced nutritional stress in Yankasa sheep. It also indicates that osmotic resistance of erythrocytes may serve as a biomarker of oxidative stress in sheep deprived of feed and water. Taken together, AA administration prior to deprivation can ameliorate nutritional stress, combat hemolytic changes and improve alertness in sheep when faced with feed and water deprivation.

**MIDPO22— Poster Board 38**

**The effect of aqueous extract of *Bryophyllum pinnatum* on serum electrolyte of salt loaded rats.**

Okwuosa CN1, Anagbosho NO2, Ezema M2, Nzewi W2, Onu CO3.

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*Bryophyllum pinnatum* (Eng: Life plant; Igbo: Oda opua) is a perennial herb growing widely and used in folkloric medicine in tropical Africa, tropical America, India, China and Australia. The plant flourishes throughout the southern part of Nigeria. The leaves have been claimed to be an antihypertensive agent. The present study was carried out to evaluate the effect of aqueous extract of *Bryophyllum pinnatum* on serum electrolyte of salt loaded rats, the LD50 and the phytochemical constituents of the leaves. Twenty-five (25) male albino rats (100 – 135g) were used for the study and they were placed into five groups (A to E). Group A was the ‘normal’ control, Group B, C and D were the test groups while group E was the ‘salt’ control. Groups B, C, D and E were given Nacl (8g/100g animal), Groups B, C and D received 125mg/kg, 250mg/kg and 500mg/kg dose of the extract respectively for 21 days through the oral route. Group A was given deionized water. The LD50 of the extract was determined and the phytochemical constituents of the extract were also evaluated. At the end of the 21 days treatment, blood samples were collected from all the animals through the retro-orbital sinus. The sera were extracted and used for the assay of serum sodium, potassium, chloride and bicarbonate. Results showed that the LD50 of the plant was greater than 2500mg/kg and the phytochemical constituents were alkaloids, tannins,
flavonoids, and saponins. Results showed a significant decrease in mean serum Na⁺ in groups B, C, D and E (p<0.05) when compared with the normal group (Group A). Also, there was a significant decrease in serum K⁺ and Cl⁻ (p<0.05) in Group E when compared with the normal group (Group A). Also, when compared with the salt control (Group E), there was a significant increase (p <0.05) in the mean serum Na⁺, K⁺ and Cl⁻ of Groups A and the mean serum HCO₃⁻ (p<0.01) of Groups D. The study revealed that the reduction in blood pressure by *B. pinnatum* may not be as a result of its effect on serum electrolyte but as a result of flavonoid content of the plant.

**MIDPO23**—Poster Board 39  
Influence of Abattoir on the prevalence of *Salmonella* in the fresh beef sold in Awka, Anambra state, Nigeria

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*Applied Microbiology and Brewing, Nnamdi Azikiwe University, Awka, Anambra state, Nigeria*

A survey of Kwatar and Amansea abattoirs in Awka was made to determine the influence of abattoir environment on the prevalence of *Salmonella* in the fresh beef sold in Awka, Anambra State. Swab samples were collected from surfaces of slaughtering floors, slaughtering tables, butchering knives, workers’ hands and washing water from Amansea and Kwatar abattoirs. Eight swab samples were collected for each of the specimen from both Kwatar and Amansea abattoirs. Forty swab samples were collected from each of the abattoir making a total of 80 swab samples from the two abattoirs. *Salmonella* species were isolated from all the sample sources. The percentage of isolation of *Salmonella* in the two abattoirs from the positive sample sources are washing water (20%), workers hands (17.5%), slaughtering floors (16.25%), slaughtering tables (15%) and butchering knives (12.5%). The washing water had the greatest percentage of *Salmonella* isolation.

**MIDPO24**—Poster Board 40  
Efficacy of *Senna occidentalis* in the amelioration of tetracycline induced hepatoto- and nephro-toxicities in rabbits

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¹National Veterinary Research Institute (NVRI), Vom, Nigeria; ²University of Buea, Cameroon; ³Medicolegal Labs, Egypt

Management of liver disease remains a challenge to contemporary medicine, especially as hepatotoxicity is the most common single adverse effect associated with drugs, including withdrawals and refusals. An example of such a drug is tetracycline; discovered in the 1940s as a broad-spectrum antibiotic, malaria prophylactic and animal growth promoter. However, a serious factor which has negatively influenced the use of tetracycline is its toxicity on the liver aside other effects like nephrotoxicity. In the absence of reliable liver-protective drugs in allopathic medical practices, herbs play a vital role in the management of liver disorders. Consequently, the ameliorative effect of *Senna occidentalis* crude extract on tetracycline induced hepato and nephro-toxicities was evaluated in female cross-breed rabbits for validation of its traditional use in combating these toxicities. An oral daily dose range of 25, 50, and 100 mg/kg body weight of the aqueous leaf extract of *S. occidentalis* was administered to the rabbits in addition to 1000 mg/kg Tetracycline HCl (orally, every 48 h) for 14 days. The rabbits were monitored for clinical signs, body weight changes, serum biochemical and haematological parameters and pathologic lesions. The LD₅₀ of the orally administered aqueous leaf extract of *S. occidentalis* in rabbits was found to be >2000 mg/kg. A significant decrease in body weight, increases in serum alanine aminotransferase, aspartate aminotransferase, creatinine, urea and bilirubin were observed in animals treated with tetracycline; indicative of hepatoproliferative and nephro-toxicities. Gross and histopathology of the liver and kidneys also confirmed tetracycline induced hepatotoxicity and nephrotoxicity. *S. occidentalis* produced a significant (p < 0.05) dose-dependent ameliorative effect by reducing weight loss, serum level of liver enzymes and serum biomarkers of renal damage.

**MIDPO25**—Poster Board 41  
Assessment of factors influencing the microbial quality of household drinking water in Molyko and Muea: impact on diarrhoeal disease incidence

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¹University of Buea; ²Research Foundation in Tropical Diseases and Environment; ³Integrated Health for All Foundation

In Cameroon many studies have focused on source water quality and little is known on the quality of water at the point-of-use and its impact on diarrhoeal disease incidence in households. This study aimed at assessing the factors influencing household drinking water quality and the impact on diarrhoea incidence in a rural (Muea) and a semi-urban (Molyko) community in the South West Region of Cameroon. Questionnaires were administered in randomly selected households to collect data on their source of drinking water, the history of diarrhoea and hygienic practices. Water samples collected from these houses and from the main water sources in the study sites were.
analysed using the Multiple Tube (MPN) Technique. Faecal contamination was investigated using *E. coli* as an indicator. All 50 water samples in Muea were contaminated with most houses recording MPN values >1100 as opposed to 4 samples out of 50 in Molyko. Two (2) of the 3 main water sources in Muea were contaminated while the only source in Molyko (CDE) was not. A great proportion (68.4%) of households with poor hygienic conditions had poor water quality. Households with poor water quality were found to be further away from the main water source and had more persons with lower educational level. Over 90% of households that had poor water quality reported at least one diarrhoeal disease episode within 6 months prior to the start of the study. Households in the rural community had a monthly diarrhoea incidence of 2.95 cases/month as compared to 0.2 cases/month in the urban community. We concluded that household water quality is directly affected by source water quality and hygienic conditions while distance of house from main water source and educational level indirectly affected drinking water quality in households in Muea and Molyko. There is a strong relationship between household drinking water quality and incidence of diarrhoea in the households.
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