The Chain Reaction

Humanitarian Solutions Worldwide

Newsletter 22 • December 30, 2016

Chemists Without Borders Holds Successful Symposium and Mixer at the National American Chemical Society Meeting

BY RONDA GROSSE

At the invitation of the Analytical Chemistry Division of the American Chemical Society, Chemists Without Borders organized a symposium at the 2016 Fall National ACS meeting in Philadelphia. This symposium was selected by Chemical & Engineering News as one of the meeting's "symposia you shouldn't miss". http://cen.acs.org/articles/94/i31/guide-ACS-national-meeting-Philly.html

Mobilizing Chemistry Expertise to Solve Humanitarian Problems was presented on Sunday, August 21. A collection of outstanding speakers from academic, industrial, government and non-profit sectors discussed approaches toward resolving some long-standing humanitarian issues. These included clean water for all, quality medicines and food sources, and science education in developing countries. The audience actively participated in the discussion both at the ACS symposium and the CWB-sponsored mixer following. Based on the fall meeting, the efforts of Chemists Without Borders were highlighted in the September 12, 2016 issue of C&E News. http://cen.acs.org/articles/94/i36/CEN-profiles-Chemists-Without-Borders.html

Projects covered at the symposium as well as additional humanitarian work using chemistry will be published in an upcoming ACS Symposium Series eBook.

Sierra Leone Chemistry Education Project

BY DR. A BAKARR KANU

The Ongley-Myers Sierra Leone Chemistry Education Project continues to make progress. The project goal has remained the same; to develop green chemistry laboratory experiments that support introductory chemistry for high schools and first-year college courses in Sierra Leone, Africa. Sierra Leone suffered a brutal Civil War from 1991 to 2001 that devastated much of the country's infrastructure. In an effort to provide much needed educational help to Sierra Leone, Chemists Without Borders volunteers are continuing to partner with other organizations to develop greatly-needed chemistry materials to resume science coursework and enhance student learning in Sierra Leone. The hope is to have a basic kit with lab activities ready for use in Sierra Leone by September 2017.

CONTINUED ON PAGE 2

What's Inside this Issue

Our Mission

Chemists Without Borders solves humanitarian problems by mobilizing the resources and expertise of the global chemistry community and its networks.

Our Vision

A global support network of volunteers providing mentoring, information and advice to ensure every person, everywhere, has affordable, consistent and persistent access to:

- Essential medicines and vaccines
- Sufficient safe water
- A sustainable energy supply
- Education in green chemistry and business which people can apply in their daily lives and teach to others
- Safe processes in work environments where chemical hazards exist
- Emergency support, including essential supplies and technology

Chemists Without Borders is a registered 501(c)(3) with the Internal Revenue Service. EIN: 14-1984379

SIERRA LEONE FROM PAGE 1
At the beginning of 2016, our team was successful in securing a small grant from the American Chemical Society (ACS) Global Innovation Section. We are happy to report that kits and chemicals have been purchased for twelve developed labs from this grant. Currently, twelve labs have been written and we are planning to start testing these labs with the micro-kits in January 2017. In August 2016, our team received an invitation from Dr. Ronda Grosse to participate at the 252nd ACS National Meeting in Philadelphia. The theme for this meeting was “Chemistry of the people, by the people, for the people, Mobilizing Chemistry Expertise to Solve Humanitarian Problems”. Based on this invitation, Dr. Kanu gave a presentation about the project in Philadelphia. The team led by Dr. A Bakarr Kanu has also continue to identify and approach several funding agencies to secure more funding for the project. We want to acknowledge the funding support from ACS Global Innovation grant. We also thank Hopevale Church in Michigan and the Lois Ongley family for their donations towards the goals of this project. There is still a need to secure more funds if the project is to proceed to the next stage. Our plan moving forward is to submit more proposals to secure funding from organizations that support international projects.

Developing a Method to Measure Arsenic in Rice in Bangladesh.

BY JULIAN TYSON

In November of 2015, the Professor Joerg Feldmann’s research group at Aberdeen University in Scotland described the “Detection of Inorganic Arsenic in Rice Using a Field Test Kit: A Screening Method” in an article in Analytical Chemistry (doi 10.1021/acs.analchem.5b02386). The article was featured in the American Chemical Society’s weekly magazine, Chemical and Engineering News, where it caught the eye of Ray Kronquist. Chemists Without Borders (CWB) has been working on a project under Chris Lizardi’s direction to develop a field test kit for the determination of inorganic arsenic compounds in ground water that can be constructed in Bangladesh. Therefore, Ray’s challenge to me was, “Could a method be developed to measure arsenic in rice with the same CWB test kit?” I said I thought we (being my group of undergraduate researchers at UMass Amherst) could.

I was confident we could do this because we had been working on a method that could be deployed in the kitchens of “citizen scientists” in the US based on the “EZ test kit” made by the Hach Company. The significant differences between the Aberdeen procedure and the UMass procedure were:
(a) they extracted with hot, dilute nitric acid; we extracted with hot water.
(b) they used the Wagtech Arsenator test kit; we used the Hach EZ test kit. The crucial difference between the test kits is that the Arsenator uses sodium borohydride (in tablet form) to generate the arsine gas (that reacts with the test strip to give a yellow-brown color), whereas the Hach EZ kit uses powdered zinc.

We find that the Hach EZ test kit is not suitable for the measurement of inorganic arsenic extracted from powdered rice by hot, dilute mineral acids. The starch that is also extracted problem suppresses arsine generation. We are currently investigating the alternative borohydride chemistry, which looks promising. However, the reaction is much faster than that with zinc, and we need to find a way to slow it down. Several methods are being studied. A short video and press release has been issued by UMass Amherst (http://www.umass.edu/newsoffice/article/measuring-arsenic-bangladesh’s-rice-crops).

Analysis of Quality Pharmaceutical Drugs in Cameroon

BY DR. ROLANDE HODEL

Call for participation to build a Quality Control Laboratory in Cameroon

AIDSfreeAFRICA is looking for **donations of new or gently used but fully functioning laboratory equipment** such as an HPLC, a FT-IR, analytical balance, Eppendorf pipettes, Ph-meters, GC-MS, and other laboratory supplies. We are also looking for **volunteers** who would take on the task of contacting manufacturers of such equipment and entice companies to help with a humanitarian effort that will prevent unnecessary suffering and premature death due to ineffective drugs.

Much has been published about counterfeit drugs in developing countries. In Cameroon, counterfeit drugs seem less of a problem since profit margins for pharmaceuticals is low. Poor quality of drugs is more often caused by improper handling, such as exposure to extreme conditions that exceed the specified requirements listed on the package. These conditions, such as high

CONTINUED ON PAGE 3

CONTINUED FROM PAGE 2

temperature and humidity, are associated with the **rapid degradation of the active pharmaceutical ingredient**, API. Once the drugs have been exposed to this kind of environment, they're comparable to counterfeit. Whether degraded or counterfeit, these drugs aren't going to make a difference to improve the well being of patients.

Comparision photos of legitimate drugs to their fake counterparts

AIDSfreeAFRICA has been working in Cameroon for the past 11 years. Recently, we have proposed to help with the task of analyzing a cross section of the existing drugs that are available in the country's pharmacies, hospitals, black market, and roadside shacks. It is difficult for the Cameroonian government to keep track and to know the exact conditions of the drugs, so they make assumptions based off of their origin. Just because a drug is from a trusted source doesn't mean that it will be viable by the time it reaches the patient. In Cameroon, each source of drugs serves a purpose and provides people of different economic backgrounds with the access to treatment. The question to be answered is: are the drugs a patient buys of high quality by the time they purchase them?

If the government can analyze the quality of medicine being distributed throughout the country, then it could make rational decisions on where and how to implement regulations, offer training, and eventually develop a comprehensive quality control plan. Until this happens, AIDSfreeAFRICA wants to step in and provide a **Quality Control Laboratory** that could analyze those drugs.

Help us in our effort to assure the quality of drugs in Cameroon by **donating** or **volunteering**.

Please contact Dr. Rolande Hodel at RRHodel@aol.com.
www.AIDSfreeAFRICA.org

Thank you!

Report on Conclusion of Health Education Course at BSRM School

BY SONIA SHORIF

Students from Burhani BSRM School presented their learning from the Health Education program of Chemists without Borders. This course at BSRM School was the first in a series of courses planned in collaboration with Agami for the schools that Agami supports all over Bangladesh.

On Saturday, Nov. 12th, 2016, Chemists without Borders visited BSRM School, where the students presented their attained knowledge on health education and demonstrated their learning in front of their teachers, parents and CWB volunteers and workers. For the last few months, Program Coordinator, Shahena Begum, from Chemists without Borders has worked with the students and held classes to teach them about health education. Burhani BSRM School is situated in a shantytown of Chittagong,

CONTINUED ON PAGE 4

CONTINUED FROM PAGE 5

but the natural view of the hills from the roof op of the school, where the students held the presentation, and the enthusiasm of the students will make anyone feel eager to spend more time with the students.

Introduction of the program

Questions and answers

The students came up in groups and presented the topics they were taught one by one. The first group explained the importance of clean water and how contaminated water can deteriorate our health. The second group explained the importance of regular health check-up to prevent heart diseases, diabetes and low or high pressure. The third group came up with examples of foods for nutrition and the next two groups explained the importance of hygiene and required sleeping time. Students discussed about the importance of mental health, which is mostly considered a taboo in the society. They explained stress, empathy, relationship, bullying and so on. Lastly, the students not only explained the importance of exercise and meditation but also demonstrated the whole act and later on encouraged everyone to practice.

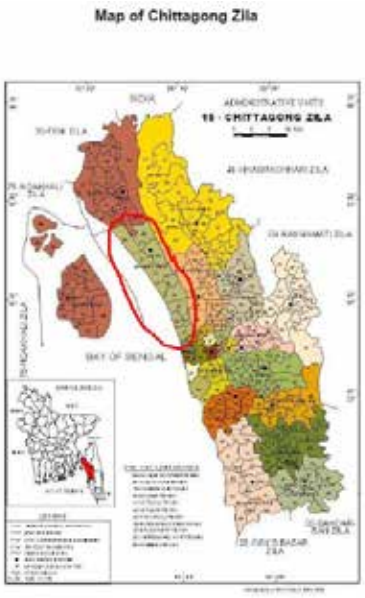
The presentations prepared by the students were well informed and well prepared, which also gave the parents a lot of information. The parents and teachers participated with the students in meditation and exercise while the students led the activities. The students, teachers and parents wholeheartedly thanked Chemists without Borders for the initiative to teach the students about their health. The purpose of holding the presentation was not only to evaluate the program but also to encourage the students to spread the information in their community. Thus, the students were asked to involve teachers and parents in the activity. The event held in BSRM School reflects great success of the Health Education Program by Chemists without Borders.

After the presentations, Shahena gave a demonstration of how a simple blood glucose meter can be used to measure the blood glucose level in a patient's blood. One parent had a very high level of blood glucose and was referred to a doctor.

Two Year Strategy for Arsenic Remediation in Sitakunda Upazila, Bangadesh

BY RAY KRONQUIST

LOCATION:



The small country colored in orange in the first map above is Bangladesh. The center map shows Bangladesh in the lower left corner with the district of Chittagong colored red and an enlarged map of Chittagong District. The area enclosed by the red line is Sitakunda Upazila in Chittagong District. The map on the right is an enlargement of Sitakunda Upazila.

HISTORY:

Chemists Without Borders began its work in Bangladesh in the Fall of 2014. We worked with six high schools near to the city of Chittagong to educate the students about the health hazards of arsenic in drinking water.

We found two of the six high schools had very high levels of arsenic in the water from their wells, 250 ppb, five times the level allowed in Bangladesh and 25 times the level allowed by the World Health Organization. Both schools were in Sitakuna Upazila shown in the map on the right above.

It turns out that the contaminated wells were deep tube wells. They were drawing water from deep aquifers, and arsenic was coming out of the surrounding rock. The local office of the Department of Public Health Engineering (DPHE) explained a solution to us. They had found that, in this region, the aquifer nearest the surface (20 to 30 feet deep) was not contaminated with arsenic and that we could reach this aquifer by constructing a shallow ring well.

We were able to get funding for the first well at Sitakunda High School from Rotary Club Khulshi in Chttagong, and from Rotary Club Shallotte for the second well at Teriail High School. Both wells were constructed this year and together they now supply arsenic-free water to about 4000 students at these schools.

STRATEGIC PLAN FOR 2017:

Operations:

1. Compile a list of all the high schools and colleges in Sitakunda Upazila. (We have 38 listed so far)
2. Contact the schools, arrange to visit and test the water at each for arsenic. (Contacting has started. First visits will take place in the next few weeks, led by our Program Manager for Bangladesh, Shahena Begum.)
3. Compile a list of the schools whose wells are contaminated with arsenic (To be done in the next several months)

4. Determine which of the contaminated wells are deep tube wells. (To be done at the same time as action 3)
5. Drill pilot wells to the first aquifer of each of the schools with contaminated tube wells.
6. Test the water from the pilot wells for arsenic and several other common contaminants.
7. Construct ring wells to the first aquifer for all schools at which the water from the first aquifer is free of arsenic and the other contaminants tested.
8. The above steps would provide arsenic-free water at all the high schools and colleges in Sitakunda Upazila for which ring wells are a viable solution. We will try to achieve this by the end of 2017.
9. Home delivery: We will also investigate the possibility of delivering water from the new school ring wells to the families of students at their homes.

Fund Raising:

1. We have recruited three media interns from the Asian University for women: Noreen Akhtar, Chathuri Weerasinghe, Sonia Shorif. The interns will visit each of the schools that need new ring wells. hey will take photos of the school, the students and the wells, and they will interview the students and the teachers. They will produce a 5 minute media piece showcasing each of these schools.
2. Our CWB teams in the U.S. will give presentations, including a media piece on one of the schools to Rotary Clubs, American Chemical Society Sections and other organizations. They will solicit sponsors to fund the new wells at each of the schools. We believe that personalizing each of the schools with a media piece will enable prospective donors to relate to the school and its students.
3. Two of our CWB members have already provided funding for the next two wells; we believe that we can recruite sponsors for the additional wells that will be needed.

STRATEGIC PLAN FOR 2018:

1. Finish the strategic plan for 2017, if parts of it remain unfinished
2. Collaborate with all other organizations involved with water quality in Sitakunda Upazila, such as DPHE, UNICEF, BRAC, Water-Aid and others to identify all residents of this upazila who do not have access to arsenic-free water.
3. Conduct, again in collaboration with other organizations, a well testing program to determine which wells can be used safely and which cannot.
4. Ramp up home delivery of water from safe wells to all residents who otherwise would not have arsenic-free water.
5. Our goal is to accomplish the above by the end of 2018, but we are mindful that unseen obstacles may extend that time time-line.

STRATEGIC PLAN FOR AFTER 2018:

If we are able to accomplish the goals described above, and all residents of Sitakunda Upazila have access to arsenic-free water, we intend to offer the above program as a template that can be replicated throughout Bangladesh. This will be done again in collaboration with other organizations to provide arsenic free water to all residents of Bangladesh.

Support Chemists Without Borders!

Please support our work by making a generous donation.
Chemists Without Borders is a 501(c)(3) non-profit corporation registered with the Internal Revenue Service.
All donations are tax-deductible as permitted by law.

You can make a donation at http://www.chemistswithoutborders.org/index.php/donate.