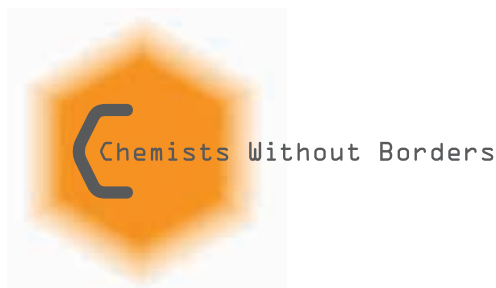


The Chain Reaction

Humanitarian Solutions Worldwide

Newsletter 19 • March 31, 2016



Letter from the President, Ray Kronquist

I have been working with Chemists Without Borders for the past year and a half as the project manager for our Arsenic Education Project in Bangladesh.

At the beginning of this year I was asked by the Board of Directors to take the position of President as Co-Founder Steve Chambreau retired from the office after a number of years of leading the organization.

In this letter, I'd like to thank Steve, Bego, the other board members and countless volunteers who over the years have given their service to bring Chemists Without Borders to where it is today. I'd like to summarize where we are currently and give my vision of where we can go in the months and years to come.

In Bangladesh, our initial work starting in September of 2014 to educate high school students about the health hazards of arsenic in their drinking water has grown to encompass a number of other projects. For the past year we have worked to bring a number of parties together to mitigate the wells at Sitakunda High School and Tereail High School, which we found to be heavily contaminated with arsenic.

In February of 2016, under our management, a ring well was constructed at Sitakunda High School, which will supply clean water to about 2500 students. We are planning with our partners the construction of several additional wells in the next couple of months.

We have three other projects related to arsenic in Bangladesh:

A project to manufacture arsenic test strips in Bangladesh to take advantage of lower labor and chemical costs, to generate employment in Bangladesh, and to keep their money in their country. The test strips provide an affordable measurement tool to monitor current wells for arsenic throughout the country.

In cooperation with the University of Massachusetts Amherst, we will be setting up a pilot lab at the Asian University for Women in Chittagong, Bangladesh, to provide a testing service to monitor the concentration of arsenic in rice, an important source of arsenic contamination in the diet of Bangladeshis.

What's Inside this Issue

- 1 Letter from the President
- 2 Letter from Steve Chambreau
- 3 Sierra Leone, upcoming presentations, Algae cleanup in Lake Erie, letter from Bego Gerber
- 4 MOU with eAKASH, health education with Agami
- 5 Distributed Pharmaceutical Analysis Laboratory updates
- 6 Penny per Test update, Remediation of Arsenic Contamination
- 7 Open positions

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

We have also formed a partnership with [Agami](#) to provide a health education course to the schools they support in Bangladesh. We are now developing the course and plan to start classes in May of 2016.

We also have a variety of other projects:

1. Development of chemistry lab kits for use in Sierra Leone and other developing countries.
2. Use of Paper Analytical Devices for detecting unsafe drugs in developing countries.
3. Environmental cleanups in areas such as Lake Erie
4. Research of work that has been done on Climate Change Reversal and Control
5. Memorandum of Understanding with eAKASH, a supplier of tablet computers and educational software for students in Bangladesh.
6. More on the way...

While we currently have an impressive range of projects that promise to bring important health, educational and environmental benefits to many people in Bangladesh and in other countries, there are important improvements we are working on to improve our internal procedures. We are updating the way our member database is maintained, so that we can quickly keep all of our members informed about the important work we are doing. We are updating our website so that it accurately describes all the work that is being done.

Once these internal projects are completed in the weeks to come, we will begin an expansion program to reach out to three important constituencies: Bangladeshis in the U.S. and Europe, Rotary Clubs in the U.S. and Europe, and chemists worldwide. Members of each of these constituencies are already part of our base of members and volunteers, and we share mutual interests with all of them.

We also intend to grow the current projects to benefit a much larger number of people and to enlarge the list of projects that we take on. My goal for the organization is to truly fulfill our mission: to solve humanitarian problems by mobilizing the resources and expertise of the global community of chemists and its networks. I invite you all to join us as we attempt to make a significant impact on humanity's many problems across the world.

Sincerely,
Ray Kronquist
President
Chemists Without Borders

Letter from Steve Chambreau

Dear Chemists Without Borders colleagues,

After ten years of working for Chemists Without Borders as Membership Manager, Vice President, President and Director, it is time for me to retire from my executive duties and transition the role of President to Ray Kronquist. Ray has demonstrated enthusiasm and competence by leading the Arsenic Education in Bangladesh Project, and I am confident that he will lead the organization to future success. I would like to take this opportunity to thank all of you who have helped Chemists Without Borders to grow over the last ten years, and I plan to continue to assist the organization in the transition and in the future.

Warmest regards,
Steve Chambreau
Co-Founder
Chemists Without Borders

Sierra Leone update

BY DR. A. BARKARR KANU

The Ongley-Myers Sierra Leone Chemistry Education Project continues to progress. The goal of the project is to develop green chemistry laboratory experiments that support introductory chemistry for high schools and first-year college courses in Sierra Leone, Africa. Due to the Civil War from 1991-2002 much of the country's infrastructure and educational system was devastated. Chemists Without Borders volunteers have continued to partner with other organizations to provide greatly-needed chemistry materials to resume science coursework and enhance student learning in Sierra Leone (S.L.). The hope is to have a basic kit with 12-15 lab activities ready for use by September of 2017 in S.L. Currently, eleven labs have been written and the main goal of the project in 2016 will be to test labs, make modifications as appropriate and assemble kits that will be taken to S.L. in 2017 to conduct the first workshop. The team led by Dr. A. Bakarr Kanu is currently identifying and approaching several funding agencies to secure funding for this project. In spring 2016, Dr. Kanu will recruit undergraduate chemistry students to test the labs and help evaluate and prepare additional lab exercises.

Upcoming Chemists Without Borders Presentations/Discussions

BY RONDA GROSSE

During 2016, we look forward to interesting discussions about Chemists Without Borders' work and your ideas and contributions. Chemists Without Borders volunteers attended PittCon in Atlanta in March. We appreciated the enthusiastic response from Pittcon attendees to our poster "Applying Analytical Chemistry to Solve Problems in the Developing World". It was great to meet many like-minded chemists interested in using science to address humanitarian issues. Additionally, the American Chemical Society has asked us to lead a symposium at the Fall National ACS meeting in Philadelphia. In conjunction with the meeting theme Chemistry of the People, by the People and for the People, this symposium will be titled "Mobilizing Chemistry Expertise to Solve Humanitarian Problems". We will highlight efforts to apply chemistry to improve lives of those across the globe. Presentation topics include clean water initiatives, expanding access to quality medicines, science education and advancements in inexpensive analytical methodologies that can be readily applied in developing countries. Chemists from academia, industry and non-profit organizations are uniting to work toward solutions to longstanding humanitarian issues. We anticipate more fruitful discussions regarding far-reaching benefits of these efforts and ideas toward addressing technical and logistical challenges. If you are in Philadelphia this August, please join us!

Algae cleanup in Lake Erie

BY TED WYSOCKI

Lake Erie needs your help, and ideas to help capture the nutrients that nourish the massive algae blooms. Remember that life on Earth is a very complex "closed loop" system, that constantly recycles everything through the various geochemical, and biochemical processes. Air, Water, carbon dioxide, energy, minerals are converted into plants animals, farms and forests that led to society and its cities, and towns, and human population growth. Eventually it gets recycled.

Storm water run-off events are increasing in both frequency and intensity that are overwhelming the capabilities of waste water treatment and farm run-off mitigation systems. These discharges appear the primary nutrient source of the algae. Current technology can handle the nitrogen compounds fairly well, but the technology to capture bio-available phosphorus compounds from water without the use of toxic compounds is still in the early stages.

Soil chemistry is the basis for farming, and as such requires an interdisciplinary approach to begin to appreciate and under-

Algae cleanup in Lake Erie continued on page 4

Letter from Bego Gerber

It is my pleasure to report that Chemists Without Borders continues to grow apace in the number of volunteers, the projects they are working on, and the impact they are having in the field. In the words of Lt. Col. Jimmy Doolittle, "There's nothing stronger than the heart of a volunteer." So it is with Chemists Without Borders. Our volunteers show a rare dedication and commitment often without ever knowing whom it is they are serving so honorably. Anything and everything you can do to assist and support these volunteers is always most welcome. Do, please, come and join us.

Peace,
Bego Gerber,
Board Chair,
Chemists Without Borders

Algae cleanup in Lake Erie from page 3

stand the nature of these complex geochemical and bio-chemical interactions. Over 19 natural elements are necessary for good nutrition in both plants and animals. Many of them in only trace quantities. We have been successful in capturing the nitrogen compounds, and a some of the phosphorus compounds using natural products that could re-purposed or recycled. We are using a porous carbon substrate that the American Chemical Society coined in the early 2000's as biochar (aka horticultural biomass charcoal).

We are looking for suggestions from the membership about using safe, natural, locally available material for increasing the capture capacity of bio-available phosphorus.

Memorandum of Understanding with eAKASH

BY RAY KRONQUIST

Chemists Without Borders recently signed a Memorandum of Understanding with [eAKASH](#). eAKASH is a manufacturer of a computer tablet for students in Bangladesh that is preloaded with educational software and digital books, with much of the material in the local language, Bangla. Under the MOU, eAKASH will load educational material developed by Chemists Without Borders and its partners onto its tablet for distribution to students throughout Bangladesh.

Chemists Without Borders is also starting a project, "Generation of Educational Material", soliciting educational material from teachers, professors and tutors in Bangladesh, the U.S. and other countries, with all the material to be uploaded to the eAKASH tablet platform. The material can be written in English, and we will arrange to have it translated into Bangla for the Bangladesh students. The first educational material supplied to eAKASH by Chemists Without Borders will be the Chemists Without Borders Arsenic Education presentations give to high school students and the Health Education Course being developed for [Agami](#) schools. We look forward to building on our relationship with eAKASH and providing an extensive collection of educational material for the students of Bangladesh.

Health Education Course with Agami

BY RAY KRONQUIST

In 2015, Chemists Without Borders agreed with Agami to develop a Health Education Course to provide to high school and elementary students in Agami schools some basic health information. The course will first be given to BSRM School, a secondary school in Chittagong, Bangladesh. These are students in grades 7 to 9. After completion of the course at BSRM School, the course will be modified for younger students and will be given at a primary school in Dhaka, grades 3 to 5.

An important component of the lessons will be the class discussions and exercises the students engage in to understand and apply each of the lessons to their own health. Another important component will be the homework, where the students discuss questions related to the lesson with their families and try to see how improvements in the home

routine can improve the health of all family members. The course will last for nine weeks and cover the following lessons:

1. Water contaminants, including arsenic and organic contaminants: How unsafe water can make us sick.
2. Discussion of health measurements, such as blood pressure, heart rate, glucose, blood tests, X-rays, etc. How medical tests can tell us about our health.
3. Nutrition: What kinds of food keep us healthy?
4. Exercise: Why we need it to stay healthy?
5. Hygiene: How bacteria and viruses make us sick. Importance of washing hands.

6. Mental Health: Stress, Bullying, Empathy, Friendship. How our situations make us feel bad, and how we can feel better again.

7. Meditation: How to relax and quiet our mind.

8. Sleep: Why it is important and how we can fall asleep more easily?

9. Conclusion: What did we learn about staying healthy?

We plan to make some simple health measurements on the students, such as blood pressure, heart rate and blood glucose level at the beginning and the end of the course. It is hoped that through these measurements and the material and activities in the course, the students will understand how to improve and maintain their health and that this course can be extended to other schools throughout Bangladesh.

Distributed Pharmaceutical Analysis Laboratory Updates

BY PROFESSOR MARYA LIEBERMAN AND ASSISTANTS

Chemists Without Borders is working with researchers at the University of Notre Dame, Purdue University, and Moi Teaching and Referral Hospital to detect low quality medicine in Kenya and other countries in the region. Samples are collected by covert shoppers, and rapidly screened using a Paper Analytical Device, or PAD. Confirmatory testing by HPLC is being conducted in several locations through the Distributed Pharmaceutical Analysis Laboratory, or DPAL. In May 2015, the project received an inaugural "Partners for Progress and Prosperity" award from the American Chemical Society.

Project updates: January of 2016, Prof. Lieberman visited her Moi Teaching and Referral Hospital collaborators Dr. Sonak Pastakia, Dr. Rakhi Kharwa, Dr. Mercy Maina, and Mr. Phelix Were to kick off the US-AID funded project that will support the team through 2016. Notre Dame undergraduates Paulina Eberts and Tabitha Healy participated in the trip; they helped to set up lab equipment and did intake and packaging examinations on over 400 drugs collected by covert shoppers. One of the suspect products they found is shown below; it's a sample of amoxicillin/ clavulanic acid with a serious error on

the package--see if you can spot the error. The Pharmacy and Poisons Board has been notified of the problem with this product; we do not yet know if the product is authentic but misprinted, or a clumsy fake. Sample collection and PAD testing are well underway and we look forward to receiving our next batch of suspect samples for HPLC confirmatory analysis. Visitors to the Eldoret site included Dr. Lyani Sitti, a pharmacist working with the University of Nairobi School of Medicine to improve supply chain quality in Kiambu and Kirinyaga counties, and Victor Okoth, who works with MITI Health in Kisumu.



Tabitha Healy and Paulina Eberts

What's wrong?

Phelix Were demonstrates the HPLC



Members of UCSB Chemistry Club 2015: From left to right: Maddy Beeson, Jenna Ott, Tsuyoshi Kohlgruber, Dr. Leroy Laverman, Andrew Dawson, Nicholas Higdon, and Adnan Hasib. Photo credit: Andrew Dawson.

Updates from DPAL partners:

At UC Santa Barbara, the Chemistry Club tries to help students understand the fun and altruistic aspects of science. After hearing about Chemists Without Borders, we contacted Dr. Chambreau about getting involved, and he told us about the "Got Fakes?" project. We found a HPLC machine and columns to use, but we needed money to buy experimental supplies. Fortunately we found an undergraduate grant that UCSB offers, and applied under the sponsorship of the club mentor, Dr. Leroy Laverman. With

some information about the project that Dr. Lieberman provided, we wrote a proposal with budget and we were awarded the maximum funding available. Right now we are working with the HPLC machine to be able to accurately and precisely test the medicines. By the end of the school year, we hope to be able to start working with real samples. With this project, Chemistry Club members can experience how science can have a lasting impact on people's lives and learn laboratory skills that will be valuable in their future endeavors.

At the University of San Diego, Ms. Claire Tolan has been doing system suitability testing for amoxicillin as an undergraduate research project with analytical faculty member Julia Schafer. She is using the DPAL Methodology Manual as a guideline for her project. Testing the USD instrument requires demonstrating precision and linearity, establishing a control chart, determining accuracy and range, testing quality check samples, and carrying out a matrix spike-recovery to establish specificity. So far the analytical work is going well and Claire plans to run assays on samples collected in Uganda by another USD faculty member.

Penny per Test Project

BY CHRIS LIZARDI

Chemists Without Borders previously held an IdeaConnection event to find the best possible solution for providing a means for testing arsenic contamination in Bangladeshi drinking waters. Of all the possible solutions, the one that gained the highest score through the IdeaConnection process was that of manufacturing the arsenic test strips in Bangladesh.

Here at Chemists Without Borders, we envision this will provide the lowest cost option available to Bangladeshi laboratories and public health departments, while employing Bangladeshi citizens, empowering and giving them greater

chances to protect their families with knowledge on their water supplies.

As of right now, several Chemists Without Borders members have been in fruitful contact with staff and students at the Asian University for Women in Chittagong, Bangladesh. We have worked extensively with the dean of Biological Sciences, Prof. Andrea Phillott, and recently posted a student intern position for sourcing the materials and reagents for manufacturing the arsenic test kits. We have also been in contact with a Mr. Shawon Barua, who we aspire will serve as a laboratory manager and mentor the student interns in laboratory



Claire Tolan

safety and chemical operations. The project managers have set a deadline of February 18th for the internship applications, after which time we will be conducting our first interviews of the interested students.

With the employment of a student intern, we hope to have the materials sourced for the manufacturing facility by the summer of 2016. From here, the next step will be fundraising to provide the capital for a pilot scale study of the process.

Remediation of Arsenic Contamination

BY RAY KRONQUIST

We started working on our Arsenic Education Project in September of 2014 to educate high school students in Bangladesh about the health hazards of arsenic in drinking water. We found that two high schools out of the six that we were working with had very high levels of arsenic in the water from their school wells.

We spent most of 2015 building partnerships with a number of partners and looking for funds to remediate the contaminated water in these wells. We considered arsenic filters, but the cost seemed too high, and the use of filters would have required a lot of maintenance to keep them effective. We were advised by the local Department

of Public Health Engineering (DPHE) that the best solution would be to dig replacement ring wells (shallow wells to the first aquifer, fortified by concrete rings to form the walls of the well.) In this region of Bangladesh the shallow aquifer was known to be free of arsenic.

Our team was able to get the coordinated cooperation from the following partners:

1. Approval of use of the school property at Sitakunda High School for the new well;
2. Engineering support from the local office of the DPHE;
3. Funding commitments for two wells

from Rotary Club Khulshi of Chittagong;

4. Labor and materials to carry out the well construction by the contractor introduced by DPHE;
5. Help in handling the funds involved with the project from the Asian University for Women in Chittagong, with which Chemists Without Borders has a Memorandum of Understanding to advance our humanitarian work by utilizing the students, alumnae and other resources of the University;
6. Water testing services by the central laboratory of the DPHE in Dhaka;

7. Technical advice regarding arsenic, wells and other aspects of the project from Meera and Allan Smith of Project Well, Peter Ravenscroft of the UNDP, Sut Ahuja of Chemists Without Borders and other experts;

8. Support from many volunteers and donors of Chemists Without Borders during the time all of the roles of the above parties were being organized;

9. Especially the work of Ano Begum and Shahena Begum, local Chemists Without Borders managers in Bangla-

desh who put together this coalition of partners to complete the project.

As a result of the work of all the above parties, the ring well was completed at the end of February 2016, the water was tested and found safe, and it will be used by about 2500 students of the school. We are in the process of organizing the projects to construct two more wells in the next two months and the next well will be funded by Rotary Club Shallotte of Shallotte, North Carolina in the U.S. We are also investigating arsenic filters, deep tube

wells and other solutions for arsenic remediation, in cases where ring wells cannot produce clean water.

While we are a small organization in Bangladesh, compared to the large governmental and international organizations, we feel we have found a “market niche”, the ability to organize projects of a single well at a time, that are not practical for the larger organizations to undertake. We look forward to identifying additional contaminated wells and remediating them in the years ahead.



Starting the well



Installing the rings



Installing the pump & finishing the well

Open Positions

Chemists Without Borders is currently going through a transition. We are increasing the number and scope of our projects, and we are rapidly increasing the number of our volunteers.

We are working on solving humanitarian problems in a number of countries using the expertise of chemists in our community but also with a number of non-chemists. In Bangladesh, for example, we are working with high schools to educate students on the health hazards of arsenic in drinking water. In two of those schools, we have been able to raise funds to replace their wells contaminated with arsenic. This project will bring safe water to about 4000 people. We are also developing a Health Education Course for Bangladesh elementary and secondary students. In Bangladesh, we are also setting up a facility to manufacture inexpensive test strips to measure arsenic concentration in water and another facility to measure arsenic concentration in rice.

We are also developing chemistry kits using small quantities of chemicals for high school students in Sierra Leone. This will allow schools without a chemistry lab to still do chemistry experiments. We have many other projects. These are just examples. We could do much more with your help. We need help from people with scientific backgrounds to work on some of our projects.

However, we also need people with a variety of other skills to do things like helping to raise funding for the projects, helping to publicize our work, telling our story to the world, recruiting new volunteers, helping with accounting and other administrative

tasks. Below are some specific job listings. For more information on our current open positions or if if none of them seem to fit you exactly but you still want to help with our mission, contact us at HR@chemistswithoutborders.org. Either way, we probably will have a place for you. Keep an eye on our [Volunteer Opportunities page](#) for frequent updates.

Sincerely,
Ray Kronquist
President
Chemists Without Borders
raykronquist@chemistswithoutborders.org
+1-408-929-9066

Current Open Positions:

VP of HR and Membership

Web Designer

VP of Communication

Deputy Webmaster

Deputy VP of Business Development

Chief Operating Officer

Web Developer

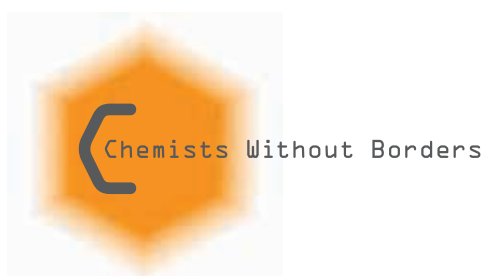
Accountant

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>.