

The Chain Reaction



Humanitarian Solutions Worldwide

Newsletter 18 • July 1, 2015

Chairman's Message

I am delighted to welcome Dr. Ronda Grosse, our newest Board member. In addition to the fundraising role of a board member, Ronda will be our liaison with the American Chemical Society, and will help guide our project management processes, among other things. (Please see Ronda's biography in this newsletter.) Ronda is very friendly and approachable. Please welcome her to the team.

We have a new European Chapter of Chemists Without Borders being spearheaded by Montserrat Perez-Navarro, who is currently based in Dusseldorf, Germany. Montse will seek volunteers in Europe to support our mission. She has recently spoken on our behalf at a conference in Munich, Germany (see Newsletter 17), and another in the United Kingdom. Please give Montse any support you can, including sharing connections with people you think might be interested in joining the team.

Professor Alex Scheeline recently spoke on one of our regular, twice-monthly, "Chemists Without Borders Café" conference calls. He described SpectroClick, a remarkable, low-cost, hand-held spectrophotometer. Particularly striking was the story of the SpectroClick's origin. Alex was teaching a high school lab in Vietnam.

At the end of the day, one of the students picked up a variety of bits and pieces that the students had discarded on the floor during the class, and took them home. She came into class the next day with the essence of the new spectrophotometer, assembled from these various discarded bits and pieces. That young inventor is now the chief technical officer of the SpectroClick company. As they say where I come from, "You never know the minute!" Things can change almost in an instant.

But wait, there's more. Connect that story with the Bangladesh Arsenic Education Project led by the excellent Ray Kronquist. Ray's outstanding team of graduates from the Asian University for Women goes into Bangladeshi high schools and teaches the students about arsenic in their drinking water, how to test for it, and what to do about it. Indeed, two of the six schools where the project was piloted were found to have a dangerously high 250 parts per billion (ppb) of arsenic in their drinking water, whereas the World Health Organization's recommended maximum is 10 ppb! The high school students have been very enthusiastic about these trainings and the plan is to expand the project in phases to ensure every student throughout Bangladesh and beyond learns about these arsenic issues. Indeed,

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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

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Bangladesh Arsenic Education Project

BY RAY KRONQUIST

In Stage 2 of the project, the Bangladesh team has concentrated on meeting with other organizations in search of partnerships or grants in order to get the funds to continue the high school presentations as they did in [Stage 1](#).

To confirm the presence of arsenic in the water supply of Sitakunda High School and Teriail High School, the interns also submitted water samples to Professor Dr. Reaz Akter Mullick (Assistant Professor, Department of Civil Engineering) at Chittagong University of Engineering and Technology (CUET), who conducted lab-based tests on the water samples.

Additionally, the interns consulted with experts from national and international organizations, including Dr. Meera Smith (Founder and CEO of Project Well) and Professor Kazi Matin Uddin Ahmed (Professor of Geology, Dhaka University), to recommend the best option for ensuring safe drinking water in Sitakunda and Teriail. We are planning to set up a ring well (which is also sometimes called a dug well) in the two schools that have high arsenic, as suggested

by the Department of Public Health Engineering (DPHE), a Bangladesh government organization that works in Sitakunda.

We also built relationships with strategic and academic partners such as Dhaka Community Hospital, Dhaka University, Dhaka WASA (Water Supply and Sewage Authority), BRAC (formerly Bangladesh Rural Advancement Committee), UNICEF, Water Aid Bangladesh and Chittagong University of Engineering and Technology (CUET).

Most recently, the Bangladesh team built a fund raising website for SVGives which has many details about the project. The SVGives campaign ended on May 5, 2015, but donations for the Arsenic Education Project in Bangladesh are still gladly accepted at our donations page.

Meetings on funding have also been held with the Rotary Club of East Chittagong, and this Rotary Club Chapter has endorsed the project and recommended support by U.S. Rotary Club chapters. Grant applications are being written for a number of other foundations.

For more information about the Bangladesh Arsenic Education Project, please contact Ray Kronquist.

Lois Labs Micro-Chemistry Labs for Sierra Leone

BY RUSTY MYERS

The Lois Ongley Sierra Leone Education project continues to develop. Our goal was to have 12 labs ready to distribute by this summer and we are on target to accomplish that. Labs are posted on the PBworks web site.

In the upcoming weeks we plan to put together an actual kit to perform the developed labs and upload several more labs based on water quality and water purification. During the fall semester I will utilize some of the labs in my introductory chemistry class and my students will help evaluate and prepare additional laboratory exercises.

During March, I spent two weeks at the RADMASTE Center at Witwatersrand University in Johannesburg South Africa. A general presentation on Chemists Without Borders was made to the University's Chemistry Department. The high point of the trip was teaching in secondary schools in Soweto and Pretoria. I will make a presentation on project progress and my visit to RADMASTE during the regularly scheduled July 2 telephone chats (see right).

For more information on this project, please contact Rusty Myers.

Special Conference Speaker

Chemists Without Borders is pleased to announce that our 9 AM PST, July 2, 2015, "Chemists Without Borders Café" open conference call will feature Professor Rusty Myers of Alaska Pacific University, who leads our "Lois Labs" project to develop and distribute micro chemistry labs to schools in Sierra Leone. Rusty will update us about his recent trip to South Africa (see the article below).

The FreeConferenceCall conference dial-in number is +1 (605) 562-3130, and the participant access code is 796976#. When prompted enter the access code that has been assigned, including the # key. If you are calling from outside the US, check this link for local access phone numbers.



Professor Rusty Myers presenting the microlabs to students in South Africa.

CWB Presents Arsenic Education Program

Chemists Without Borders participated in a presentation of its Arsenic Education Program at the Bay Area Bangladesh Association (BABA) in May 2015. This project, which encourages high school students to learn in their classrooms how to test for arsenic in water, was presented to the **United States Ambassador to Bangladesh, the Honorable Marcia Bernicat, and Congressman Mike Honda of the 17th Congressional District of California**, and other participating non-profit and



Ms. Nazneen Khanam, Ms. Tina Jabeen and Ms. Sitara Khan

for-profit organizations. The Project was well received by the Ambassador and the potential support and collaboration with USAID and other organizations were discussed.

The attendees from Chemists Without Borders were, Bego Gerber, Co-founder, Chairman of the Board; Ladan Aslani Artusy, Executive Director; Ray Kronquist, Manager of Bangladesh Arsenic Education Project; and Nazneen Khanam, Distinguished Member. Ray Kronquist is continuing the conversation with a few participants regarding potential partnerships for larger outreach and the expansion of the Project.



Ms. Sitara Khan, Ray Kronquist, Ms. Ladan Artusy and Bego Gerber



Ms. Ladan Artusy (right) meets Ambassador Bernicat (left) and Muhammad Quamruzzaman, Chairperson of BABA



Ray Kronquist and Congressman Mike Honda

MEET THE TEAM

Chemists Without Borders Welcomes Board Member Dr. Ronda Grosse



Dr. Ronda Grosse was recently elected as a Director on the Board of Chemists Without Borders. She is a Research Manager at Dow Corning Corporation, currently working in the R&D division. Past roles in her 25+ year career have included industrial chemist and science & technology leader in Analytical Sciences and Process Engineering. Her primary expertise is in molecular spectroscopy, chromatography and mass spectrometry for materials characterization. She has served as a technical commercialization liaison and customer relationship manager. While in Dow Corning's Business & Technology Incubator group, she led a team focused on developing novel materials for engineered components and other emerging technologies. Her international experience includes scientific research in Japan and an affordable housing project in India.

Ronda is an active member of the American Chemical Society and will serve as ACS Liaison for Chemists Without Borders. She is an advocate for science education and conducts chemistry demonstrations in local schools as well as other outreach activities. Ronda is passionate about improving quality of lives by combining science and service, and exploring sustainable ways that we can collectively create positive change in our global community.

Ronda received a B.S. in chemistry from Bethel University in St. Paul, Minnesota and a Ph.D. in analytical chemistry from the Ohio State University in Columbus. Originally from New Castle, Pennsylvania, Ronda resides in Saginaw, Michigan, with her husband and two daughters.

Welcome aboard Ronda!

CWB Partners to Provide Clean Water in Post-Earthquake Nepal

Chemists Without Borders and Filters for Families raised funds to purchase and provide Sawyer water filters in Nepal which was stricken by a devastating 7.8 magnitude earthquake at noon on April 25th. Recovery efforts are now hindered by rain and aftershocks. In Kathmandu, the capital, (population ca. 1 million in 2011), over 7000 people have been killed, and over 14,000 were injured. Many are homeless and afraid to return to buildings. In Bhaktapur, 4,000 homes are deemed unsafe or destroyed. Kathmandu is in a valley in the center of the country. The earthquake cut off the valley from other areas due to road heaving and landslides, but the airport is open.

Safe water is a key issue in disaster situations. Sewage and water

pipes were originally placed together in trenches. Earthquakes shift the ground and pipes break, causing cross contamination. Our goal is to provide long-term, safe water in communities and hospitals, while the city water system is being restored. As the water crisis worsens, vendors are selling 20-cent one-liter water bottles for \$5, a good days wage! Each filter we have provided will help around 30 people for decades. We have set up three distribution centers in Kathmandu Valley. Filters will be tracked by GPS, mapped and maintained. Dr. Linda Smith from Filters for Families, who departed for Nepal on May 19, has taken extra suitcases of filters (50 units fit in a suitcase.) Different sized water-storage buckets will be purchased in



Kathmandu, depending on the size of the community need. Our on-the-ground team will identify locations to set up the filters where communities either have water nearby or can haul it. Filters for Families (FFF) has provided safe water in Nepal for over 12 years.

Donations to support this clean water relief project in Nepal can be made [here](#).

Letter from Dr. Linda Smith

I'm leaving on May 19 and will stay through Aug. 11. I hope to take 300 Sawyer filters with me in 3 suitcases. I'll buy buckets in Ktm which are readily available. We've adapted the Sawyer to have a 50 liter or a 100 liter reservoir bucket. This allows a community to keep refilling the upper bucket as they use the reservoir water. Usually the Sawyer uses just one bucket and people have to lift the unit up and down to fill a glass or bucket. The flow rate is 45 liters an hour or 12 gallons an hour = 72 gallons for 6 hours. We've estimated that this will provide water for 30 people a day. The filter removes 99.9% of bacteria and cysts, is easy to clean and has a life of decades. (Sawyer.com).

We have established 3 distribution centers in Kathmandu Valley, north, south, east (Bhaktapur). We have teams locating water sources and communities now, so when I arrive we will assemble the filters and start delivery. My team in our Field Office are making holes for the taps in the buckets and adding an upper filter (small nylon net on a basin) that removes larger particles. Will send photos from Kathmandu. In some areas we'll use Bagmati River water which is very dirty.

The filters will be tracked for 2 years to make sure there are no problems. Each unit will be given a GPS location, placed in a caretaker's yard, street, etc., the names of the community members will be recorded to assure the filters are used for the community not an individual. The community will need to conduct regular back flushing with a syringe (provided). The unit is completely gravity flow since electricity is intermittent and we need the water to flow at night to restore the lower bucket. We've also thought about using a 650 or 1000 liter tank, and may test this in a larger community. The buckets will sit on bricks, not on a stand. These are estimated costs as best as we can do at this time. Prices in Kathmandu seem to go up every few days.

Linda

Estimated Cost per filter:

Upper 30 liter with lower 50 liter reservoir

Sawyer Filters	\$42
Shipping to Denver	\$3
Extra Baggage Charge	\$4
Transport within Kathmandu	\$3
50 liter lower bucket in Ktm	\$7
30 liter upper bucket	\$6

Tap, bushnut & teflon tape	\$2
Extra tubing	\$2
Labor	\$8

~\$80 for 30 people

Upper 50 liter lower 100 liter reservoir

same	\$42
same	\$3
same	\$4
Additional charge from Butwal	\$3
100 liter bucket	\$25
50 liter	\$7
basin with net for upper filter	\$7
same	\$2
same	\$2
Labor	\$10

~ \$103 for 70 people

We have two GPS units and could use one more for the third distribution site, ~ \$125.

New Determination Methodology for Arsenic in Drinking Water

BY CHRIS LIZARDI

Recent research into the scientific literature has shown the success of an emerging technique for determining arsenic concentrations in ground and surface drinking waters. By using a hydride source such as sodium borohydride, the common analyte arsine gas can be generated in a shorter reaction time than the previous method, with reliable results. Working with Professor Julian Tyson at the University of Massachusetts, Amherst, several team members from Chemists Without Borders are exploring the potential of this new method for testing the drinking water of low income communities with few technically trained workers to perform such a test, such as in Bangladesh. In addition to studying the efficacy of the test for reliability and practicality, the team also seeks to determine if the new method can be

cheaper than current methods, thus providing universal access to households in the developing regions of the world.

Bangladesh Production Lab Start-Up

Several team members at Chemists Without Borders are exploring starting a production lab in Bangladesh which can manufacture arsenic test kits designed specifically for the country's massive problem of arsenic contamination of drinking water. Dr. Ray Kronquist is in charge of delegating the team members and serving as a focal point for all the information needed to create a start-up in Bangladesh, including looking into the necessary regulatory hurdles that must be overcome, and exploring the option of setting up Chemists Without Borders in Bangladesh. Team members Anowara Begum, Shahena Begum, and

Professor Andrea Phillott are searching for chemical and equipment suppliers or manufacturers in Bangladesh and neighboring areas in Southeast Asia, providing pricing and shipment options for all the necessary materials needed for the production lab to perform its daily processes in Bangladesh. Chris Lizardi and Professor Julian Tyson were given consulting roles in the technical side of the start-up lab, including providing chemical and manufacturing expertise in production facilities, standard operating procedures (SOP's), reagent and equipment acquisition, and pilot plant set-up and construction. The team so far has generated most of the SOP's needed for workers in Bangladesh to produce arsenic test kits in their own country, along with a detailed list of the necessary equipment and reagents.

For more information on this project, please contact [Chris Lizardi](#).

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one goal is to have students themselves become teachers on the subject and to share their knowledge throughout the country.

What's the connection with SpectroClick? Imagine what could follow on from this. What would the Bangladeshi field agents' classroom lessons look like if there were, for instance, Khan Academy lessons to complement and support the classroom efforts? Some students might be interested in the chemistry behind the test and how it works. There could be several lessons of increasing depth or breadth depending on interest, such as how science actually works; the scientific method; the Null Hypothesis; how the arsenic got there, the geology and geochemistry; why the 10 million wells were dug; water-borne diseases and their sources; the history of the issue,

including geopolitics and colonialism; other countries like Vietnam and Cambodia that have similar arsenic and other water problems, etc. Now, imagine what solutions young students might devise, especially if there were tens of thousands of them collaborating and sharing ideas in this new Millennium, this Information Age. As with SpectroClick, who better to devise solutions to local (and global)

problems than the bright young people who live daily with the challenges? If we empower them with enough information, who knows what they, too, will invent?

It is an honor to be working with each and every one of you. Thank you for your commitment and your service.

Peace,
Bego Gerber,
Co-Founder and Chairman

Chemists Without Borders Social Media Survey

BY [MICHAEL SCHUR](#)

Chemists Without Borders has a social media survey and would like you to tell us what are your favorite social media tools. Please take a moment to take the survey [here](#). It will greatly help us to see if we should gauge our social media route in a certain direction.

Chemists Without Borders Facebook [page](#).

Volunteer Opportunities: Pharmaceutical Analysis Laboratory

BY DR. MARYA LIEBERMAN

A research program at Notre Dame uses paper analytical devices (PADs) to perform desperately needed rapid characterization of suspect medications, such as antibiotics, in several developing countries. Suspect products are collected for HPLC analysis. The analysis is conducted through the Distributed Pharmaceutical Lab (DPAL) in partnership with Chemists Without Borders.

The Department of Chemistry and Biochemistry at the University of San Diego (USD) is one of many involved with the DPAL project. In Fall of 2014, two groups of students in the USD Instrumental Analysis lab course validated the HPLC analytical method to quantify the amount of the active ingredient in a pharmaceutical drug. As their class project, these chemistry majors learned how to isolate and quantify amoxicillin in pills. Students investigated the use of different mobile phases and gradients in order to optimize peak shape and analytical parameters. Students created their own calibration curves from standards and analyzed a small number of pills from Kenya. They found that these Kenyan



Mercy Maina tests drugs using the card device.

samples were all within specification. At the end of the semester, students prepared posters summarizing their projects and presented to each other. Overall, students enjoyed working on this project because of its real-world application.

Starting in Fall of 2015, students in the USD Analytical Chemistry lab courses will be able to use the validated method to quantify the amoxicillin in more pills collected by DPAL. We encourage chemistry faculty teaching analytical or instrumental

analysis labs to become involved with this project. It will be fulfilling to your students to learn about HPLC as they help quantify problems with pharmaceutical drugs in developing nations. To become involved, visit the DPAL web site (<https://padproject.nd.edu/get-involved/distributed-pharmaceutical-analysis-lab/>).

If you have questions about the USD experience doing this project as part of an Instrumental Analysis class, feel free to contact Melanie Zauscher, Teaching and Research Postdoctoral Fellow, USD: mzauscher@sandiego.edu.

In some cases, low quality pharmaceuticals are associated with improper manufacturing or distribution practices, rather than deliberate falsification. The DPAL project is seeking Chemists Without Borders volunteers with experience in pharmaceutical manufacturing, packaging, or analysis to provide advice and consulting to manufacturers associated with products that do not meet quality standards. Please contact Prof. Marya Lieberman, Associate Professor, Department of Chemistry and Biochemistry, University of Notre Dame (mlieberm@nd.edu) if you have relevant experience.

PAD Project in the News

The PAD project was recently featured in a BBC International [HealthCheck program](#) article (with video). Professor Lieberman was recognized for her partnerships with Moi Teaching and Referral Hospital in Kenya and with Chemists Without Borders, and recently received the [Partners for Progress and Prosperity \(P3\) Award](#) at the American Chemical Society 2015 Joint Great Lakes/Central Regional Meeting on Friday, May 29. Congratulations!

Here is a heartwarming letter Professor Lieberman received from one of the PAD Project participants, Beryl Ajwang':

This was Beryl's comment when we teased her about being the next Lupita:

Hey team,

An amazing piece indeed. The next Lupita is Telna mwenyewe! [her child who appears in the BBC piece]. Mine is to make sure she is well fed and to drive her around. This young lady is famous at a tender age. If this is what she can do at 4yrs, the future is bright. Can't wait to see her at my age. Counterfeit medicine almost robbed me of her. So, to the PAD team, keep doing the great things you are doing. We appreciate you.

Sincerely,

Beryl Ajwang', Pharmacist, Moi Teaching and Referral Hospital, Eldoret Kenya

Partner AIDSfreeAFRICA Needs Equipment Donations

AIDSfreeAFRICA is a 501(c)(3) non-profit helping people in Cameroon build a pharmaceutical infrastructure. This project is specifically to build an Analytical Laboratory for Quality Control of drugs and water in Cameroon. Please see the AIDSfreeAFRICA website here or contact either Dr. Elliott Bay (ebay@Mannkindcorp.com) or Dr. Rolande Hodel (RRHodel@aol.com).

Need #1: Software for Perkin Elmer Spectrum BX, a.k.a. Spectrum 1000 FT-IR

AIDSfreeAFRICA purchased this FT-IR Serial # 44239 from a state forensic lab in Connecticut, USA. However, we are in need of a copy of the software. Anyone who can give us a copy is much appreciated. The FT-IR is currently in a 40 ft ocean container on the way to Cameroon where it will be made useful in a university laboratory. Contact Dr. Elliott Bay (ebay@Mannkindcorp.com) or Dr. Rolande Hodel (RRHodel@aol.com).

Need #2: A female US standard to a male BNC adapter

The picture is a scan from the latest Cole-Parmer catalog page 1335. It shows the T-05983-25, US standard meter to BNC. The adapter that is still available is a male US standard to female BNC. We are looking for the opposite version: a female US standard to a male BNC. Anyone who has that adapter and does not need it, or knows where we can buy one, please contact Dr. Elliott Bay (ebay@Mannkindcorp.com).



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