

LETTER FROM AMERICA

Bangladeshis Hold the First Arsenic-Poisoning Conference in America

Dr Fakhruddin Ahmed writes from Princeton

Because arsenic is a slow-acting poison, it is not an attention-grabber like a sudden disaster. There is a latency gap in this time bomb. Silently but surely it kills in 15 to 25 years. Unless detected early on, the poisoning is irreversible. 43-98 per cent of the total arsenic is in the most toxic trivalent form.

On February 27 and 28, Bangladeshi chemists in North America held an International Conference on Arsenic poisoning in Bangladesh, at Wagner College, in the Staten Island borough of New York City. Organized by Bangladesh Chemical and Biological Society of North America (BCBSNA) and Intrinsics Technology Center, Dhaka, the conference was the brain child of Dr. Mohammad Alaudin, Professor of Chemistry at Wagner College. The conference was dedicated to 25-year-old Pinjira Begum of Mymapur in the Palna district of Bangladesh, who is dying of arsenic induced cancer. Pinjira Begum was featured in a front page article in the *New York Times*, on November 10, 1998.

The who's who among the arsenic-poison experts of the world attended the conference. Epidemiologist Professor Allan Smith, the keynote speaker from University of California, Berkeley, made the trip as did Dr. Dipankar Chakraborti of Jadavpur University, Calcutta, the person responsible for bringing the arsenic-poisoning catastrophe in West Bengal and Bangladesh to the world's attention. There were scientists from America, Canada, Sweden, India, and Bangladesh; from US Geological Survey, Massachusetts Institute of Technology (MIT), University of Connecticut, Lehigh, Columbia and Harvard Universities.

Wagner College, a marvelous host, shared the cost of the conference. Dr. Richard Guarasci, the College Provost, opened the conference. The President of Wagner College, Dr. Norman Smith, hosted a reception for the participants at his gorgeous office overlooking the Verrazano Narrows Bridge that spans the boroughs of Staten Island and Brooklyn. (Dr. Kamal Das, President of BCBSNA, thanked the Wagner College President profusely for hosting the conference.) All in attendance were united in their resolve to bridge another gap — that exists between the technological capabilities of Bangladesh and the USA — and

to solve the arsenic poisoning crisis in Bangladesh.

The water that the underground tube wells bring up to the surface is considered a mineral. It contains beneficial elements such as iron, calcium and other nutrients. It can also contain deadly poisons such as arsenic and lead. The real safe level of these poisons in drinking water is zero. That is not obtainable. For safe drinking, the World Health Organization (WHO) recommends no more than 10 parts per billion (ppb) of arsenic in water. Bangladesh adopted a much higher level — 50 parts per billion!

The rationale behind Bangladesh's embracing of the higher level of poison is that the USA, where drinking water is not a problem, recommends the same level. That was a mistake. On a given day an average American's liquid intake includes endless cups of coffee, soda (Coca Cola, Pepsi, 7-up), beer and wine. An average Bangladeshi villager drinks water exclusively. And because of the heat, he/she drinks lots of it. And if the water is poisonous, he/she ingests plenty of poison. Therefore, the recommended levels of arsenic in water for Bangladesh should be not higher, but much lower than the level recommended by WHO!

Arsenic is a human carcinogen that quietly accumulates in hair, nail and skin. Common symptoms are depigmentation, rashes on palm and soles of feet. As the poisoning advances, it retards the growth of limbs, resulting in deformities, birth defects and abortions.

The natural progression of the poisoning is hyperpigmentation through keratosis and gangrene, to finally cancer. Skin cancer looks like leprosy. People mistakenly believe that it is infectious. The victims are shunned as social outcasts; men do not get jobs, women are denied husbands. Because arsenic is a slow-acting poison, it is not an attention-grabber like a sudden disaster. There is a latency gap in this time bomb. Silently but surely it kills in 15 to 25 years. Unless detected early on, the poisoning is irreversible.

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Apart from the widely read Chemical & Engineering News's reporter Will Lepkowski, the conference was also covered by local vernacular dailies, *India Abroad*, and for the *Voice of America* by Ms. Zain Khan. Professor Mohammad Alaudin chaired the morning session on the inaugural day. The afternoon session was devoted to analytical methods for the detection of Arsenic in water. The session was chaired by Professor Abul Hussam of George Mason University, who has developed instrumentation of his own for the detection of Arsenic. In his presentation, Dr. Hussam reported on arsenic speciation studies in Bangladeshi water, and remarked on the limitations of kit method widely used in Bangladesh for detecting arsenic. At the end of each day, there was a panel discussion on the papers and remedies presented. Drs. Quamrul Ahsan and Shamsuddin Illes were the co-chairs. All the technical sessions on the second day, dealing with the geological processes and remedial methods, were chaired by the writer.

There are about four million tube wells in Bangladesh, one million of which were dug by UNICEF in the 1970s. It is conservatively estimated that 70 million people are poisoning themselves by drinking water from these fountains of death. In 43 of Bangladesh's 64 districts, the arsenic level is more than 50 ppb; in 20 districts the level is between 500 to 2000 ppb! According to the physician Willard R. Chappell: "If this were the United States, they'd call out the National Guard and get everyone bottled water. But Bangladesh does not have resources. It may be pointed out that Bangladesh's per capita

income is 266 dollars. Poor nutrition could also be a factor as to who is affected more adversely."

In his presentation, Professor Smith cast some doubt on the role of nutrition in combating poisoning. His study in Argentina showed that Argentinians of European origin, on high protein diet (beef steak), have also been suffering from Arsenic poisoning since the 1930s. The more recent case of Arsenic-poisoning in Taiwan was very well known. Yet, in his talk, Mr. Gourishankar Ghosh, Chief, Water and sanitation Division, UNICEF, said that amidst their enthusiasm to drill tube wells in Bangladesh in the 1970s, UNICEF forgot about the Taiwan experience. The deadly water went untested for two decades! Mr. Ghosh believes that emphasis should now be on saving children. Dr. Bibudhendra Sarkar, an expert on metal-related diseases from the University of Toronto, showed a video of the victims from a recent visit to Bangladesh, that brought tears into every eye in the audience.

Dr. Dipankar Chakraborti believes that what is known about arsenic poisoning in Bangladesh is only the tip of the iceberg. Where Bangladesh is failing is in the management of the problem, he says. In remote villages, people do not know that they are arsenic patients. In one village in Jamalpur, 80 per cent of the people suffer from arsenic poisoning. The bad news is that it is estimated that only 33 per cent of tube wells in Bangladesh are safe. The good news is that there is not a single village in Bangladesh where all the tube wells are unsafe.

Bangladesh is a land of rivers, wetlands, lakes — there are over 11,000 cubic meters of

fresh water harvesting in Myanmar.

Dr. Mohammad Alaudin summarized the analytical techniques currently in use and recommended ways of handling massive number of samples. Analysis of water from 15 locations in Dhaka city in his laboratory showed an arsenic level of less than 3 ppb. Dr. Arup Sengupta of Lehigh University discussed a water purification system, in operation in India, capable of providing arsenic-free water to at least 400 families for 10 years (Cost: \$1500 per unit); he was willing to split the cost of the first unit. In Bangladesh, Dr. Shubhito Roy reiterated the effort expended by Dhaka Community Hospital in analyzing hair, nail and urine samples to establish the magnitude of arsenic poisoning in Bangladesh. Dr. State of Columbia University presented their study on how arsenic is mobilized in sediments and transported by ground water. Dr. Prosun Bhattacharya of Royal Institute of Technology, Sweden, reminded everyone that arsenic, the 20th most abundant element in the earth's crust, is not a "contamination"; it is a natural occurrence.

Dr. Timir Hore was concerned about the faulty construction of tube wells in Bangladesh. Good construction should be double-cased to avoid vertical seepage from upper to lower aquifer. He explained why of the two tube wells separated by 10 feet, one can be contaminated and the other safe, and how faulty construction can result in bacterial contamination of groundwater. He suggested that contaminated tube wells be sealed, not just painted red. Ms. Susan Murcott of MIT summarized the remedial methods currently available, as well as her experience with

possits. Many of these old buried channels contain potable water. In order to save lives of millions of arsenic affected people and those jeopardized by arsenic contamination, an "Emergency Clean Water Supply Plan" needs to be developed and implemented within a short time. Potable water for domestic use should be obtained from reliable sources and delivered to the population as a government service. Before any aquifer is used to supply water, the water must be thoroughly analyzed. According to the 1955 Year Book of Agriculture, Prophet Mohammed(SM) saw water as an object of religious charity. He declared that free access to water was the right of every Muslim community and that no Muslim should want it. The precept of the Holy Koran, "No one can refuse surplus water without sinning against Allah and against man," was the cornerstone of a whole body of social traditions and of regulations governing the ownership, use, and protection of water supplies. All persons who shared rights to a watercourse were held responsible for its maintenance and cleaning. The whole community was responsible for the care of large watercourses.

One or more of the following measures should be implemented, depending on cost effectiveness, availability and ease of water distribution:

1. Extraction and distribution of arsenic free groundwater from deep aquifers.
2. Removal of contaminants in water at existing well sites.
3. Collect, filter, and chlorinate rain or surface water.

A comprehensive research plan should be developed to determine the geological, hydrogeological and geochemical factors controlling the chemical reactions generating and releasing arsenic to groundwater; determine the source(s) and nature of contaminants, how they are mobilized, direction of movement, and transport mechanism; evaluate the potential risk of each contaminant to human health and the environment; determine the vertical and horizontal extent of arsenic contamination in both soil and groundwater. The information gained from this research should be used to implement a comprehensive water distribution and monitoring plan to provide good water and prevent future contamination disasters.

The situation is so serious that immediate steps should be taken to find and deliver enough potable water to all seriously affected areas for drinking and cooking. Bangladesh has an abundance of water. This water is the life blood of the nation. The people need a project to protect the quality of water and provide good potable water to all.

Now that the problem has been enunciated, what is the solution? The best solution is not to attempt to "purify" poisonous water, but to move away from it altogether to "purified" surface water. Every claim of filters that make arsenic disappear, must be regarded with skepticism. It's not that simple. Emphasis should be on "safe" drinking water, not merely arsenic-free water. The affected population must be urged to drink water from safe tube wells, IMMEDIATELY! These must be monitored regularly. The non-safe ones should be sealed off permanently. There is a saying that, "Puri bashi khabe"; if you have to drink aged water, let water age in a kalsi; some harmful minerals may be absorbed. Filtration through 0.1 micron filters also helps. Arsenic waste can be placed in cow dung, where it will be methylated, according to reports.

Arsenic hospitals must be set up for the victims. Most importantly, over-dependence on ground water must be ended. Efforts must be made to tap other sources of water, such as harvesting of rain water (bacterial contamination is an easily overcome problem), which are practiced by our neighbours in Myanmar and Thailand. Low-cost water treatment plants to purify surface water must be considered seriously. Bangladesh must terminate its master-servant relation with UNICEF and WHO, and rely more on its own scientists.

Ironies abound in this tragedy. Switch from surface to underground water was a jump in technology. Alas, technology is not always benign. In a country of "water, water everywhere," there is "not a drop to drink!" This writer was touched by the depth of the warmth and goodwill for Bangladesh exhibited by non-Bangladeshis attending the conference. MIT's Ms. Susan Murcott broke down as she described the suffering of the people. That goodwill must be harnessed for the good of Bangladeshi villagers. Drs. Dipankar Chakraborti, Bibudhendra Sarkar and Timir Hore were all born in Bangladesh.

There was genuine disappointment with Bangladesh government's inadequate response to the catastrophe. Arsenic-poisoned Bangladeshis write to Dr. Dipankar Chakraborti for help, not their own government. The first case of arsenic poisoning in West Bengal was reported in the *Daily Telegraph* in 1983. Bangladesh government was informed of arsenic poisoning in its ground water in 1992; but was very slow to act. Since Dhaka was not affected (I am not convinced of that) the government sat tight. The patriotic Bangladeshi expatriate community in North America is willing, eager and desperate to aid their fellow country folks in their hour of need. The question is: will the Bangladeshi government let them, or stand in the way?

Mustafizur Rahman as I Knew Him

By Barrister Harun ur Rashid

Bengal Ambassador to Russia and China.

While we were posted overseas, we met several times in a third country. In 1982 on my way to Australia, I stopped at Kuala Lumpur with Mustafiz who was High Commissioner to Malaysia. In 1985 he came for a visit to Manila with his wife Suraiya and lived with us while I was posted in the Philippines.

Mustafiz was able to identify the core issue in a given matter and quick in the disposal of matters entrusted with him. In my view the purpose was more important to him than process. He was committed to public service in the broadest sense of the term. He had a picture of the kind of Bangladesh he wanted to contribute to and he worked in pursuit of what he believed. Mustafiz occupied the highest position as a career diplomat after having served as



Late Mustafizur Rahman

I wish to comment on the splendid diversity of his interests and contribution. He started with a career in Airforce and ended up as a seasoned diplomat joining Pakistan Foreign Service in 1964. He was a person with great love of art and music. He played violin during his leisure time.

It is a great tragedy that he should have left us at an age of only 57. He was a Bengali first, last and always. Let me end with the lines that Horatio spoke on the death of Hamlet:

Now cracks a noble heart. Good-night, sweet prince. And flights of angels sing thee to thy rest.

In Memoriam

An Officer in the Ministry of Foreign Affairs

For obvious reason I declined to be named. But a certain event that I have observed as an officer in the Ministry of Foreign Affairs. I find it too irresistible to keep from sharing with other readers. It happened recently. A two-year contract for the outgoing Foreign Secretary.

There had already been so much speculations on the appointment of a new Foreign Secretary. There almost ran a competition among the diplomatic correspondents and political analysts to first dig out the confidential move by the government. They analysed, judged and ascertained the principal candidate and the alternate candidate. From their choice of good places(!) the UK and the USA.

In one hazy languor of an October afternoon the despatchman delivered a circular on my desk at work. I grabbed it perfunctorily as we do mostly the government circulars! My good God, the government has extended the tenure of the Foreign Secretary! I straightened my back and sat tightly on my chair.

I am basically not in favour of such extensions. It might turn boomerang for me! My turn of becoming the Head of any office could be badly affected. Undeserving people will try (if have already seen them doing) their utmost to deprive the deserving of their due credits. Who would not like to leave their children saying proudly — yes, my father retired as Secretary/DG, instead of faltering Yeh, he was AFS/DDG.

Competence may be a common aspect but INTEGRITY is truly a rare thing among our senior officials. Perhaps there has been a single instance in the extension of service of a secretary that there came no reaction or any repercussion either. It is our Foreign Secretary Mustafizur Rahman's. Suffice it to say his contributing factors are, apart from his professional competence — his being soft-spoken yet firm, his calm disposition and forbearance in place of sycophancy (a common trait in many others) and vengeance, his pleasant personality and above all that matters, his integrity. His being Foreign Secretary was due earlier but he was deprived of it. Despite that fact, he was not re-

ported to have shown any resentment or have gone for any lobbying. It could be because of his habit of writing it is susceptible in nature. Otherwise as being a pro-liberation force and a translator of *Ektaur Din-guli* he could have duly taken advantage or exploited his plus point in turning to be an astute person. It should stand as an example for other aspiring officials.

The present government is already disappointed and not happy with the performance of some of the persons put to the top of some offices on contract basis. These people are seen as barely deserving but they leave no stone unturned to attain their goals which are too high for them. It is a good sign and we feel relieved that the government now realises to take stern measures in making sensitive selections discarding any kind of strong *tadrib* for any unworthy person. It would be wise of the government to consider competence, integrity and acceptability in choosing someone from outside on contract or extending the tenure of someone in the service as has been in case of Mr. Mustafizur Rahman.

While we hail the government's commendable decision of extending the tenure of Foreign Secretary it is also expected that it will closely monitor for the performance of the persons on contract and will not vacillate to take the right decision again whenever it becomes necessary in the interest of the country.

Arsenic Disaster in Bangladesh
An Urgent Call to Save a Nation

Many questions have been raised regarding the groundwater poisoning by arsenic in Bangladesh: When did the arsenic poisoning in Bangladesh start? How long have the people of Bangladesh been drinking the arsenic contaminated water? How many people have already been exposed to it? What will happen to this nation if the people continue to use the arsenic contaminated water for their daily requirements? Can we protect and save the people of Bangladesh from the arsenic disaster?

In this foregoing article by Thomas E. Bridge Ph.D., Professor Emeritus(Geology), Emporia State University, Emporia, and Meer T. Husain, Environmental Geologist, Kansas Department of Health and Environment, Wichita, Kansas who are currently developing a research plan for arsenic disaster mitigation in Bangladesh, an attempt has been made to find some answers to these questions.

also diagnosed severe arsenic poisoning among the people drinking contaminated tube well water. They estimated about 50 per cent of all the wells in the country exceeded the safe maximum contaminant level. According to the recent report of UNDP, 40 per cent of all wells are contaminated by arsenic.

The two following diseases are common indicators of arsenic poisoning:

1) Arsenic compounds are known carcinogens.

2) Amount of arsenic intake required to cause harmful effect depends on the chemical and physical form of arsenic.

3) Inorganic forms of arsenic are more toxic than organic forms.

4) People are more sensitive to arsenic than animals are.

5) Medical tests demonstrate a variation in contamination among individuals. Some can ingest over 150 µg/kg/day without apparent ill-effects. Sensitive individuals can be affected at 20 µg/kg/day (1000-1500 µg/kg/day for adults).

6) Doses of 600-700 µg/kg/day (around 50,000 µg/kg/day for adults; 3,000 µg/kg/day for infants) have caused death in some cases.

Contamination of the groundwater by arsenic was discovered in 1994 by the Dhaka Community Hospital and NIPSON in the western areas of Bangladesh. Since 1994, the Department of Public Health Engineering (DPHE) with the assistance of WHO/UNICEF/IFC collected and analyzed 31,651 well water samples. The DPHE recently indicated that about 59 out of 64 districts have been affected by arsenic contamination. The known contamination covers almost 60 per cent of total country area. Today many people in Bangladesh and the neighboring Indian state of West Bengal show one or more advanced signs of arsenic poisoning such as ulcers or skin lesions on their hands and feet.

During 1998 under "A Rapid Action Programme," 200 out of 60,000 villages were surveyed for arsenic poisoning by Dhaka Community Hospital and Jadavpur University of Calcutta, India. They found arsenic concentrations above 50 ppb. They

lengthy period of time often taking up to 8-14 years from the initial days of contamination. This period differs from individual depending on the quantity of arsenic to volume of water ingested, immunity level of the individual and the total time-period of actual arsenic ingestion.

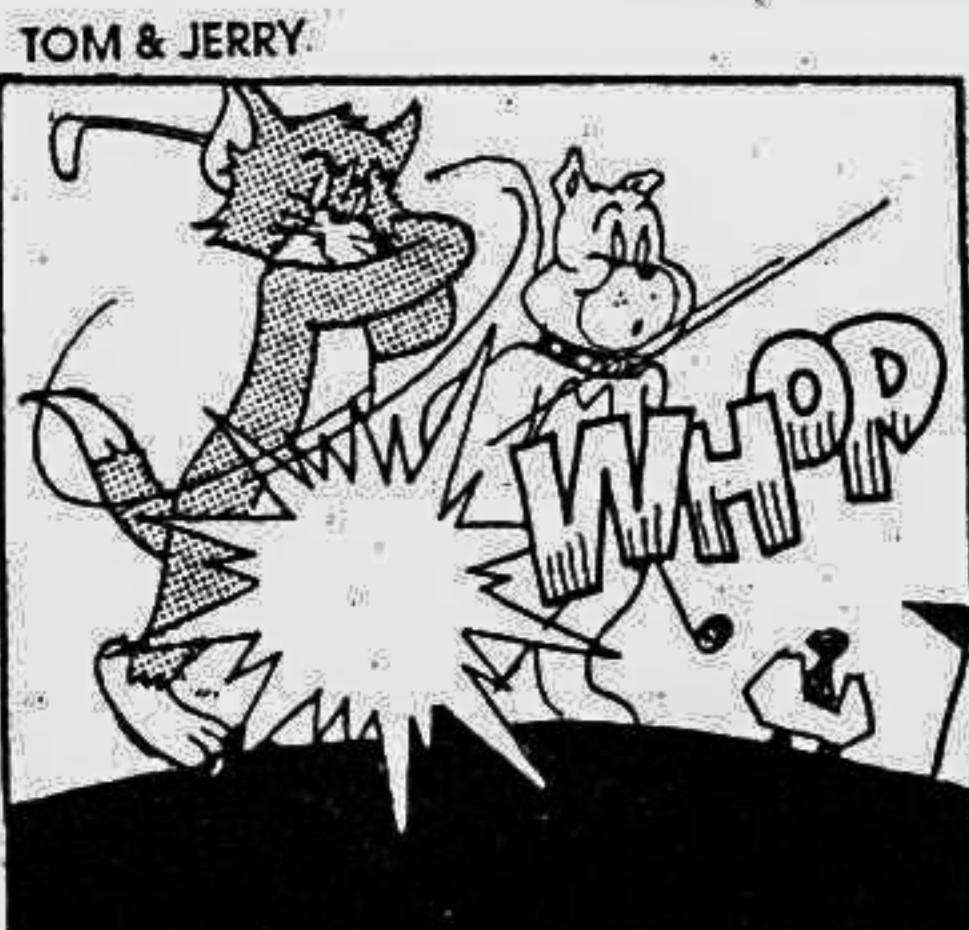
The two following diseases are common indicators of arsenic poisoning:

- 1) Melanosis: Melanosis results in the gradual change of complexions towards blackishness and or duskeness. The affected are either avoided or discouraged to appear in public. Affected children are often barred from attending schools and adults discouraged from attending offices, visit medical professionals in the hospital, etc. Those affected with a higher level of contamination are considered incapable of working and hence victimized by growing poverty. Young women affected by the contamination are often compelled to stay unmarried. Married women affected by arsenic are sent back to their parents with children. Contamination in one could potentially affect the lives of both the couples in given family. Eligible persons are refused jobs when found suffering from arsenicosis.
- 2) Keratosis: Initial stages of keratosis witness the hardening of hand palms and foot soles. In medical terms, this hardening is "diffuse keratosis" and may gradually lead to gangrenous ulcer. Physicians often relate this kind of ulcer to a pre-cancerous stage. Gangrenous ulcers have the potential of turning into skin cancer, such as squamous cell carcinoma and basal cell carcinoma. If the gangrene or ulcer affects the limbs, amputation is the final remedy. Worst cases of keratosis may result in wart-like seeds growing on palms and soles. These seeds (tumors) are commonly referred to as "spotted keratosis". Other relatively minor symptoms might be evident such as, physical weakness, burning sensation, constant warm feeling, chronic cough, etc.

They also described the usual symptoms of arsenicosis: The symptoms of arsenic toxicity may develop over a

Relevant information obtained from Arsenic Pollution

TOM & JERRY



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