

Arsenic, silent assassin

The presence of arsenic in well water in Bangladesh and has raised questions of geology, hydrology, international aid, the responsibility of Government agencies and of how to control the damage done. **S.Ananthanarayanan** takes a peek at what arsenic poisoning is about.

It was Physicist William Thompson who set the first regulatory limit of arsenic in foodstuff. This was in the year 1900, when beer was found to contain arsenic and a public enquiry was ordered!

It was well known that arsenic, in small doses and over long periods, was deadly, and England's pub-goers wished to be assured that their daily pint was not sending them the way of many a wealthy duchess whose heirs hastened their inheritance with a pinch of arsenic in the old lady's bedtime cocoa!

Something about Arsenic

Arsenic occurs in nature as a yellow mineral, arsenic sulphide, and it gets its name from arsenikon, Latin for yellow pigment. In another form, of white arsenic, or arsenic oxide, it is extremely poisonous, with symptoms that could be confused with those of many other illnesses. And the arsenic itself, until recently, was difficult to detect after the death. A handy feature when getting rid of someone!

The single deadly dose is 125 milligrams, which is just a fourth of the dose which you need with mercury. But more deadly, as slow poisoning begins with much smaller doses and, according to a document from Harvard University, a person who drinks water with 0.3 mg in a litre will soon die! But at levels in between, arsenic poisoning progressively causes skin ulcers, lung and stomach illness, bladder and blood disease, gangrene and cancer.



How does arsenic work?

The arsenic atom has a quality of binding very strongly to groups of atoms that contain sulphur. Now, the body chemistry is regulated by enzymes, which are very finely sculpted proteins that are able to facilitate specific processes, by virtue of their being structured just so. And most enzymes contain one or more sulphur atoms.

When arsenic binds to the sulphur in the enzyme, this upsets the sensitively balanced enzyme structure and renders it ineffective, leading to the many symptoms of different organs not functioning. And, as the rest of the arsenic goes out in urine and sweat, there is much confusion in diagnosing the cause of death!

Some of the arsenic remains

Hairs, or fingernails, contain keratin, a protein that contains sulphur atoms. Some of the arsenic thus binds to the sulphur atoms in the hair, and a sample of hair lasts a long time. Since hair is constantly growing, the sample can even show the level of arsenic in someone's body at different times, like the rings of a Redwood tree!

	<p>The controversy about whether Napoleon died of stomach cancer or was poisoned with arsenic is now sought to be settled by testing samples of his hair! Locks that the emperor's paramours preserved have thus become important evidence, as has the question of whether the samples are genuine!</p>
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Arsenic in Bangladesh well water

In Bangladesh, the acceptable level of arsenic has been set at 0.05 mg/litre, which is about 10 parts in a billion, and within what the WHO has recommended. This level of contamination is mainly in the 'low bored' tube wells and the deeper wells are still unaffected.
