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July 1, 1968

Robert A. Kehoe, M.D.
Department of Environmental Health
College of Medicine
University of Cincinnati
Cincinnati, Ohio 45219

Dear Dr. Kehoe:

In discussing this problem with Don Fowler at Lead Industries Association, Inc., he suggested I write you directly since you and I have had several conversations and associations relating to the lead problem.

As you undoubtedly know, there has been a resurgence of suggestions of health hazard resulting from alleged accumulation of lead in the bone. As an example, see the attached recent clipping from the Washington Star.

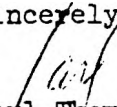
In your comments published in the Journal of Occupational Medicine, February 1968, there is this observation:

"The author presumes that changes in body pH and/or negative calcium balance shortly before his illness resulted in the out-pouring of lead from bone into circulation to cause his acute illness. The hypothesis of the 'mobilization' of lead from the skeleton by such metabolic disturbances has been discredited these many years, and can now safely be said to be entirely fallacious."

I refer particularly to the second sentence and would like to know if you could give me one or two specific references of either your own or someone else's work which relates to the discrediting of the hypothesis of mobilization of lead from the skeleton. It's very possible that a memorandum based on the scientific literature could be very useful if there is continued suggestion that lead accumulation in bones is established as a health hazard.

I hope that you will be able to help us on this without imposing too much on your time.

Sincerely,


Carl Thompson

CT:sdd

cc: Mr. Don G. Fowler

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(front page)

POISON FROM THE AIR

There's More Lead in Us

By JOHN LANNAN
Star Staff Writer

Modern Americans appear to be accumulating up to 10 times as much lead in their bones as some of their primitive forebears.

What it may mean for the future no one can say, but equivalent accumulations in birds and animals are poisonous, according to the experts.

Findings of increased concentrations over the centuries were first reported in the Journal of Bone and Joint Surgery in March. They were based on analysis of bones of modern residents of Syracuse, N.Y., and the mummified remains of ancient Peruvian Indians.

Other unpublished studies, buried until now amidst reports on other trace metals, indicate that current phenomenally high lead levels are apparently peculiar to Americans. They are based on comparisons with modern human bone samples from the less industrialized Far and Near East.

The Peruvian study was the work of Dr. Robert O. Becker,

director of research at the Syracuse Veterans Administration Hospital, graduate student Joseph Spadaro and Dr. Edward M. Berg.

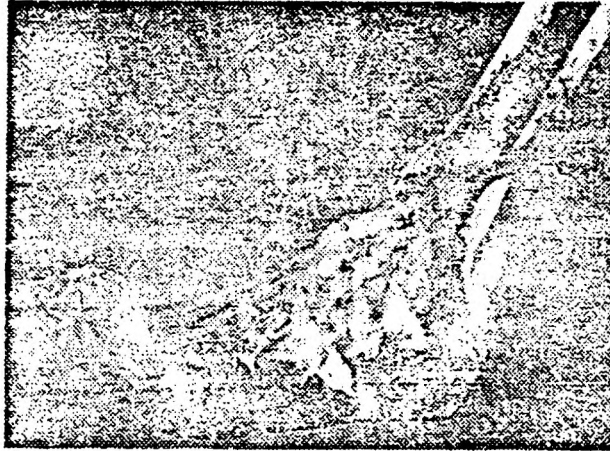
In an interview, Dr. Becker said he believes the Syracuse bone content "is no doubt derived from the lead content of the air."

"Lead is a cumulative poi-

son," he added, "and there is no doubt in my mind that since we feel lead atoms in the bone occupy a functional position that the increase will, if it has not done so already, lead to disease."

The lead showed up in a routine study of trace elements — those elements found only in mere traces — of bone. Dr.

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1,000-year-old foot from the sands of Peru.

LEAD

The Poison From the Air

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Becker and his associates are involved in long-term study of the mechanisms of growth and healing and were looking primarily for traces of copper in modern bone.

Mummies Unearthed

In the course of their investigation, Dr. Berg came up with the 1,000 year old mummified remains of several Chancay Indians. Their bodies had been buried on Peruvian sands where it has not rained in the memory of man.

Extreme dryness prevented the bones from leaching their minerals into the soil and also forestalled the reverse process.

Spectrographic analysis of the bones showed the ancients had fewer than five parts per million of lead in their solid tissue.

Modern Syracusans had anywhere from five to 110 ppm.

The analyses correlate with an earlier series done by Dr. Isabel Tipton and Jane P. Shafer. Dr. Tipton is a professor of physics at the University of Tennessee. Their findings had been part of an undistributed Atomic Energy Commission report, overlooked since 1964.

Multiplied Intake

Their spectrographic analyses showed that American males have a mean of 50 parts per

million while comparable adults from the Far East (Japan and Taiwan) had fewer than 30. Those in the Near East (Bombay, Delhi and Beirut) had fewer than 10.

Dr. Tipton's research on lead and 25 to 30 other trace elements also disclosed that men have more lead in their bones than women, 30 parts per million versus 50 for males.

"It's a function of their exposure," she said yesterday. "Men are outside, driving. They breathe more of it."

Lead has been a big issue in air pollution circles since 1955 when Dr. Clair Patterson of California Institute of Technology published a report showing lead, presumably airborne and the product of modern engine fuels, was present in Antarctic glacial deposits.

Under a subsequent change in the Air Quality Act of 1967, all fuel additives, such as lead, must now be registered with the government as federal investigators attempt to determine the extent of their use and potential effects.

Industry Reports

No one is either willing or equipped to say what effect lead has on humans at present levels. The Lead Industries Assn. Inc., in a current publication called "Facts About Lead And The Atmosphere," says:

"All studies conducted by government, university and other research groups have shown that the levels of lead in the general or ambient air are low and no not constitute a health hazard."

However, these same studies do not prove that it is not a health hazard either, say the trace element experts.

Dr. Henry A. Schroeder of the Dartmouth Medical School Department of Physiology has shown that lead concentrations equivalent to those found in humans do affect small animals.

Animals Tested

He has established that rats and mice die younger, age ear-

lier and are more susceptible to infection if their tissues are lead permeated.

However, animal experiments are not always directly applicable to men, even the animals show no specific clinical effects, except for ducks who absorb lead from spent shot.

Dr. Schroeder, one of the country's leading researchers in the trace element field, feels that there is only one major source of lead intake for humans — the air.

He is also about to publish a paper refuting the idea that lead does not accumulate in the body.

Others, particularly those involved with lead blood level studies at the University of Cincinnati's Kettering Laboratory, have long felt that lead reached a certain limit then went into "a lead balance" in which further intake is balanced by excretion.

Of the Syracuse historical study, he said: "it's extremely interesting. I've been waiting for someone to do it. I was going to try it myself ... with bones from the Catacombs or someplace."

Source Defined

Dr. Schroeder says that at current production and distribution rates that "two pounds of lead for every man, woman and child in the country go into motor fuel every year. One pound apiece comes out the tailpipe and falls on the ground or goes into the atmosphere. This is the obvious source of increased lead uptake by the body."

He also argues that 5 to 10 percent of the element eaten with food, beverages etc. is absorbed. Some 50 percent of that breathed in through the lungs is also retained.

In congested cities, at least half that retained comes through the lungs he insists.

Of all the lead ingested, 91 percent lodges in the bones, Dr. Schroeder says, "and if it stayed there, it wouldn't be toxic to the rest of the body. But we don't know what mechanism mobilizes lead into the blood or what it does once it gets there."