

RESEARCH BUREAU	
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January 20, 1931

Frederick S. McKay, D.D.S.,
 2 E. 24th Street,
 New York, N. Y.

My dear Dr. McKay:

Recently we have been doing some analytical work on the Bauxite (Arkansas) water and have discovered the presence of hitherto unsuspected constituents in this water. This new revelation may have an important bearing on the dental problem not only at Bauxite but also at the other localities mentioned in your various publications on the subject.

We have discovered that the Bauxite, Arkansas, deep well water has a fluorine content of about 15 parts per million. At the present time we believe that this fluorine is present as calcium fluoride. Its presence was revealed when the evaporation residue from this water was spectrographed. The spectrum produced showed the characteristic band spectrum of calcium fluoride. The presence of fluoride was so unexpected in water that a new sample was taken with extreme precautions. Again the characteristic band spectrum of calcium fluoride was obtained.

It is worthy of note to recall that the only deposit of cryolite in the United States is found on Pikes Peak. Cryolite

is a double fluoride of sodium and aluminum. Fluorides are very often found in the vicinity of volcanic activity and in those localities where hot or warm springs are encountered.

If you care to do so, we will appreciate your arranging to furnish us with waters from localities where the peculiar dental trouble has been experienced. Or possibly if you would suggest to us a list of localities where the dental trouble was common we could otherwise arrange to obtain samples. Naturally at this time we do not wish to broadcast our findings since this presence of fluorides may or may not have significance. It was our thought that possibly you could arrange to procure water samples with a minimum of publicity.

In any event, we will be glad to get your reaction to this revealed presence of fluorides in the water. There are many ways in which this fluoride content of water might function and it is conceivable that it might play an important part in the trouble being experienced.

There are some other points worthy of consideration. If as has been surmised the trouble is due in part to a lime deficiency, this might be caused by the fact that while there was calcium present it might be unavailable on account of the fluorine present. We also call your attention to another interesting fact, namely that the presence of fluoride often obscures or defeats the detection of iron. In this connection a common device of sophistication used to conceal the presence of iron

in many materials is to add a small amount of fluoride. In the presence of fluoride, iron salts give practically none of their characteristic reactions.

The acidity of the water may be very important since in the presence of almost any acid some hydrofluoric acid might be evolved.

We have also noted in Chemical Abstracts for January 10, 1931 - Vol. 25, #1 on page 48 an interesting abstract of a paper published in Spain on fluorine in bones and in teeth. This abstract may be of interest to you.

It has also occurred to us that possibly there may be dental trouble of this kind in Southern Illinois or Western Kentucky in the vicinity of the fluorspar mines located there. We plan to make discreet inquiry in the vicinity of our fluorspar mines to ascertain whether further investigation is worth while. Of course, it is quite possible that the domestic water is so derived that it has not contacted with the fluorspar minerals, or it may be that the pH of the water is such that it would not extract any calcium fluoride upon contact therewith.

In considering this matter, it is interesting to note that in the published methods of the American Public Health Association covering "Standard Methods for the Examination of Water and Sewage" no method for fluorine is included. It is also worthy of note that the methods given for iron are "colorimetric" which renders them useless in the presence of fluorides.

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We trust that we have awakened your interest in this subject and that we may cooperate in an attempt to discover what part "fluorine" may play in the matter.

Very truly yours,

ALUMINUM COMPANY OF AMERICA
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H. V. Churchill - Chief Chemist

HVC-RL