December 26, 1963

Dr. S. Colum Gilfillan
615 Linda Vista
Pasadena, California

Dear Doctor Gilfillan:

I am sorry that I could not reply promptly to your letter of November 29, but the immediate demands on my time were such that this was impossible. I hope this letter to you at your permanent address (or the copy addressed to Le Fontaine at Naples) will reach you in time to be of some help.

I am in no position at this time to discuss your hypothesis, nor can I assure you that the bones which you will obtain from various sources will not have been contaminated significantly with lead from the soil, air, water or other materials with which they may have come into contact during the years. I can, however, give you good advice concerning the sampling and the care of the samples after you obtain them, and also concerning their identification and analysis. I do not know any of the men of whom you have spoken (as analysts), nor am I familiar with their facilities. I can tell you, however, that the methods of analysis which we employ in this Laboratory, are specific for lead. We would consider it wise to use both the spectrographic and the dithizone method. The latter, as we employ it (I say "we," meaning my associate, J. Cholak, who developed the methods which he uses to their present high degree of precision) is not subject to the interference of any other metal, and certainly not copper or tin, with which we deal regularly.

If you so desire we can carry out the analyses which you require. This can be done in this Laboratory, along with the many others which are in constant flow through the analytical laboratory (this constant flow is highly important in relation to precision, for the principal difficulties with such analysis, under other circumstances, lie in the fact that the work is done sporadically, in facilities used for other purposes). We would do these at their actual cost to us (approximately $12.50 per sample), because of our keen interest in the information to be had, as a supplement to that which we now possess. We might be able to scrape up funds from some other source, with which to cover the cost of this work, although I cannot promise to do so. We are operating on a fairly tight budget, at this time, or I would offer to do this work at no expense to you. In any case we can be of help to you, if you wish. When you return with your samples, if you wish us to help you, I would like for you to visit us, and give us all the first-hand information that is available, to the end that we may be able to interpret the results in the most comprehensive manner that is possible.

With respect to the samples, I advise you to obtain at least one bone from each skeleton, such as the rib, on the one hand, or any one of the long bones.

The concentration of lead in the long bones differs from that of the flat, and therefore comparisons from one skeleton to another are best based on the analyses of the analogous bone from each. The more bones that are available (within reason) from each skeleton, the better is the information, but I repeat that it is best to compare analogous bones from different skeletons.

There will be no great advantage in having large samples of bone. Samples of 10 grams would be sufficient if the sample can be ascertained to be free of contamination. Fifty grams would be better, and 100 grams better still, especially if it is necessary to cut away all of the outer surface in order to eliminate contamination to the degree that this is possible.

It will be highly advisable, if it is at all possible, to obtain bones that have not been in contact with soil or water. A full description of the immediate surroundings of every bone should be recorded and the bone should be identified in relation to this description. No assumptions can be made in this regard. One should learn, also, if possible, the composition of the materials used in embalming. It is very likely that lead-containing compounds, will have been used. If this is the case, it may be fruitless to carry out analyses.

There are so many pitfalls in this entire survey, that I fear it may not be possible to establish the facts. That is why you should not rely on any investigator who has not had extensive experience with the many problems that present themselves. It is not enough to employ precise analytical methods. You must assure yourself that the materials are worthy of analysis. This will be your greatest problem, and I cannot help you on the scene, in any other manner than that of warning you, that lead is everywhere in nature, in soil, in water, in all vegetation (and hence in all decomposed vegetation such as disintegrated wood). Bones taken from a marble or other (smooth) stone receptacle will probably be essentially clean. Bones buried in permamently dry earth will be contaminated on their surface, but will probably be clean inside. Bones buried in moist earth will not be worth analyzing, for their lead content may be largely the result of contamination. Even those taken from the cabinets and shelves of a museum will have to be freed of their outer (contaminated) surfaces before analysis. And so it goes in numerous other situations, in which the opportunities for artefact are great. Yours is far from being a simple problem, and it may be that you will have to look far to find satisfactory specimens that will yield the truth.

Sincerely yours,

Robert A. Kehoe, M.D.

RAK:vr

cc - Sent to Le Fontaine, Naples

Dictated but not read.