

July 31, 1956

AIR MAIL

Dr. Philip Boyd
Chief Medical
The Associated
20 Berkeley
England

any Limited
n, W.1

Dear Philip:

Befer
repl

vacation (next Wednesday morning) I must
ers, and catch up on any loose ends in our
ll not resort to empty explanations, but I've
ime in keeping up with my correspondence,
nder such circumstances time flies and what
seems, in intention, to be a mere delay, becomes, in fact, an utter
discontinuity.

I was glad that we could help Ian Moffat. One of the men in Frank
Princi's group, Dr. Paul Foldes, handled the matter for me. We are
in the process of getting the bills together in proper form, and when
that has been done I'll let you know about it, if you insist. I
wouldn't bother you or Associated Ethyl with it for a moment except
for the fact that you might not wish to call upon us again in emergency
otherwise. I would prefer to let it go as something between friends,
if you (and Beery) will permit me to let it go as a medical service
of The Kettering Laboratory. As you, personally and professionally,
and Associated Ethyl in its personality and status, are outposts of
The Kettering Laboratory, so I and we (of the Laboratory) are an out-
post of professional service to Associated Ethyl - at least in so far
as its own personnel are concerned. I dare say that in the long run
the balance is not too heavily weighted to one side or the other.

As to your letter of June 29th and its inquiry about the variations
in the excretion of lead, I am not quite sure just what you want. If
you are interested in the variations in both the fecal and urinary
output of lead (the fecal output being only partially a matter of
excretion but mostly an expression of the lack of absorption of swal-
lowed lead from food or atmosphere and hence not "excreted" but
merely evacuated) in association with variations in the dietary lead
from day to day, individual to individual, group to group, and
geographical area to area, the data obtained in this Laboratory are
about the only source of information of any considerable scope. If
you are interested in the variability of the fecal and urinary out-
put in relation to the experimental feeding of lead to human beings,
the same is true, I believe, with reference to the source of data,
but this is another matter. Finally, if you are concerned about the
variations in the urinary output or the urinary concentration of lead

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from hour to hour in the same individual under a variety of conditions, ours again is the main source of information, I believe. There are a few other papers and sources of information on the subject but none, so far as I know, are very comprehensive. We will check up on these matters, but I need to know what you want.

I believe you have our early papers on the excretion of lead by normal persons. I think you also have some of our more recent publications, such as "Experimental Studies on the Ingestion of Lead Compounds - J. Ind. Hyg. and Toxicol., 22:381-400, (1940) and "Exposure to Lead" - Occup. Med. (the successor of the J. Ind. Hyg. and Toxicol., and the antecedent of the present A.M.A. Archives) 3:156-171, (1947). I have reams of data, obtained during these experiments and since, which have not been published in detail, which depict the variability of normal persons, and of human subjects under known conditions of exposure to lead, with respect to the lead output and concentration in the urine, from day to day. Little has been done to measure these responses from hour to hour. The few data which we have published on page 394 of the first article referred to above are not all we have, but I have not thought that this deserved much investigation, beyond the disclosure of the possibilities. I may be wrong in this, and therefore I need to know the reason for your interest.

So far as I know, little or no investigation of this type has been done in Britain, and you will remember, I suspect, that I thought that it would be interesting and practically useful if your group would devote some of its time and energies to the elucidation of the problems of intake and output in the normal population of your country. There are a number of reasons that give me to believe that these matters will be brought into question in your country and others, in relation to the problem of pollution of the atmosphere of cities with lead from the exhausts of motor cars, as they have been recently and somewhat urgently in this country, especially - as you might expect - in Los Angeles.

Let me know just what you want and I'll see what we can find. Our bibliography is just about up to date, and it will not take much time or trouble to give you the references.

I was sorry to hear of your case of tetraethyl lead poisoning at Ellesmere Port. I am afraid these will continue to occur from time to time. They emphasize the need for the precautionary measures which we have recommended, and if they are not too serious, they could, I suppose, be regarded as the type of warning that we must have now and then to maintain the alertness of the responsible people in the oil industry. In any case I have tried to make as much good use of these unfortunate occurrences as circumstances would permit.

I think now that I shall make every reasonable effort to attend the Congress in Finland. I feel some sense of obligation to do so - just enough to allow me to feel that I might sidestep some continuing obligations in this country without being accused by my associates or by my own conscience of negligence or frivolity. Not that I have such a stern conscience as to feel the need of an excuse for seeking

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pleasure, but there are certain elements of both choice and duty in this complicated life of ours. Whether or not I attend this meeting, I should like very much to see you, and I should think it highly desirable for professional reasons as well, to spend some time with you, here or in London, or perhaps in both places. It may be that the matters referred to above and in your letter would justify a trip on your part to this country.

Katy is here with us at present, and will go with me to Colorado for a time. We are delighted, naturally to have her, and interestingly enough, and probably not too surprising to you, her coming brings a touch of England and my English friends to Cincinnati, as well as some restoration of the unity of our American household.

Going back now to your letter of April 24th, and to your exchanges of May 17th with Dr. Stevens and Mrs. Campbell, I regret to say that I cannot give you much help on these matters nor, I fear, have they. I don't believe that enough work has been done on these lead compounds to give us much information as to their toxicity (in simple terms), their mode of action, their metabolism or, for that matter their determination in their original intermediate or final forms in the body. If you learn anything about them from your laboratory or from other sources, we shall be glad to know about it. Incidentally, you need not concern yourself for a moment about writing directly to any of my associates without word to me. I would only want you to remember that they may not be fully acquainted with our own data on various aspects of the lead problem, since some of what we have done has accumulated in my hands, and not having been studied completely or published, has not been known to some of our own staff. Certainly, however, there is no formality about which you need be concerned.

I think I should point out to you something which you know in all probability, but which is rarely appreciated fully. The extent of the toxicity of lead compounds generally - in the sense of their lethal dosages - is of very little importance in occupational medicine. The real question is the extent of their absorption, particularly from the alimentary tract and through the skin. If they are absorbed to any practically significant extent, the factor in the hazard is the continuity and the duration of the exposure. Therefore the matter of industrial hazard from absorbable compounds has little to do with varying degrees of toxicity, per se, and everything to do with the conditions of handling and use. We have not investigated any of the lead salts of fatty acids thoroughly, but because certain of their uses involve contact with the skin and sometimes prolonged and regular contact, we have examined the percutaneous absorption of a few. Lead octoate is inappreciably absorbed through the skin of the rabbit. I suspect that this is true of most of these salts, but each would have to be investigated separately, since no generalization is really justified. The extent of the absorption of these compounds in the alimentary tract also requires investigation, I believe. I am not sure but I think there is little useful information. I would be willing to make a bet that their alimentary absorption will differ little from that of many other lead compounds - that, in short, such absorption is practically significant but quite incomplete.

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I have looked over your various letters of the past year to see if I have failed to respond to them. I find that I have done so in two respects, at least, in that I have not sent information on the air pollution problem to you, nor have I concerned myself sufficiently with the analytical procedures for lead which were giving your people some trouble some time ago. I shall not try to deal with these matters in this letter, partly because the letter is quite long enough now, and partly because it is hardly feasible to deal with these matters without extensive discussion. I shall dispose of the analytical matter by sending you, under separate cover several copies of the A.P.H.A. report on methods. I don't believe that I have sent this to you, despite my intention to do so, and in any case, the extra copies may well serve a useful purpose. I do not suggest that this booklet contains the last or necessarily the best word on certain points. Certainly, the screening method has a number of faults, especially since it tends to promote a sort of sleight of hand performance. I did nothing to dampen Cholak's enthusiasm for the attempt, but I have never encouraged the use of the method when my advice was asked. In general, however, the methods described are adequate.

In the matter of air pollution, so much water of various kinds has gone over the dam in the past year, that if I were to attempt to bring you up to date on all aspects of it, as it relates to lead alone, this would become a volume and yet be inadequate. If you run into problems, I hope you will let me know. I believe, however, that we could best deal with this problem in a face to face discussion at an appropriate time. We shall need to compare notes on a number of matters in the not too distant future, and this can be one of them. If circumstances permit, it can wait a while.

I believe I have touched upon matters of professional concern between us. There are many other things of interest, and perhaps of prime interest to you as the fact that we have been virtually compelled to take on a large class this year. There are eight men and one woman in this class. It is a larger number than I like to accept, but so many good people applied, and in addition groups with whom we have relationships wished to have a man or men in the school that we found ourselves led on step by step. It is gratifying to see the development, but in my opinion we have not solved the problem of larger numbers, and I dislike having to adapt ourselves to numbers.

Let me hear from you at your convenience. Meanwhile my kind regards and best wishes to you.

Sincerely,

Robert A. Kehoe, M. D.

RAK:jw

P.S. Before I had time to do anything about the bills for the gamma globulin, I received payment from Moffat as a personal bill. You can do anything you wish about it with him.

R. A. K.