July 2, 1965

Professor Harry V. Warren
Department of Geology
The University of British Columbia
Vancouver 8, Canada

Dear Professor Warren:

Thanks for your letter of May 5th, both for its information and for its kind words. I hope we shall be able to meet in the not too distant future.

With respect to my retirement and future plans, I can only say at this time, that I'll be going to Montana for a vacation and rest and some very excellent fishing (dry flies), leaving Cincinnati on July 10. On my return, my wife and I are heading for Santiago, Chile where I shall act as temporary consultant to the Pan American Sanitary Bureau (assisting an old friend, J. J. Bloomfield) in setting up an Institute for research and training in occupational and environmental health. I'll return late in November or early in December, and we shall then decide what to do. I'll maintain some connection with this Laboratory, in association with my successor, Edward P. Radford, Jr., M.D., if that appears to be feasible and desirable. I shall, at the least, direct the present experimental work on lead until it can be lodged in good hands. Beyond that I expect to be heavily engaged in writing that has been side-stepped for the past ten or more years.

I am interested in several bits of current work, including that of Sir Ernest Marsden, and I expect, after this year, to be able to review the work of others in a systematic manner that has not been possible for some time. Incidentally, in connection with the alleged exposure to lead in tobacco, through smoking, I should point out a fact that many persons have ignored; namely, that lead (probably certain other metals, but certainly lead) is found in the ash of cigarettes, and

only in trace in the smoke. This has been known for some time, but because of the recrudescence of remarks about the degree of exposure to lead based purely on the analysis of tobacco, we had another look at it. I send you, herewith, a typical analytical report. Similar bits of information have been published. It would be helpful if opinions expressed in the literature were not based on unsupported assumptions. It is an age-old fault but one that should be discouraged.

I should hope that arrangements could be made for you to conduct one of our regular weekly seminars some time next year (for which traveling expenses are provided). I shall make no suggestion about it however, until I return, for I want to be here, when and if you visit the Laboratory.

Cordially yours,

Robert A. Kehoe, M.D.

RAK:meh

Enclosure

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF GEOLOGY

May 5, 1965.

Dr. Robert A. Kehoe, M.D.,
Director,
Department of Preventive Medicine
and Industrial Health,
University of Cincinnati,
Eden Avenue, Cincinnati 19, Ohio.

Dear Dr. Kehoe:

Marking and dealing with our Spring examinations has prevented me from replying before now to your most welcome letter of April 12th.

You ask me whether I have seen the reports of C.C.Patterson. I have seen two or three of his papers, and naturally, as a geologist, have found them very interesting. However, before drawing any conclusions as to the possible significance from a health point of view, I feel it would be essential to follow up some of the work on lead described recently by Sir Ernest Marsden,("Nature", July 18th, 1964 - "Incidence and Possible Significance of Inhaled or Ingested Polonium").

Sir Ernest draws attention to the fact that lead can occur in various forms, and that whether we are dealing with lead in tobacco or in tetra-ethyl lead, the proportion of Lead 210 present may assume some significance. Such evidence as Sir Ernest has already collected suggests that tobaccos with a high Lead 210, and hence a significant amount of Polonium 210, may be far more dangerous healthwise than other tobaccos much lower in Lead 210.

We have just got to the point of looking at some foods and finding that there are wide variations in the amount of alpha particles emitted. I presume the next step will be to determine how much tetra-ethyl lead carries Lead 210 in abnormal amounts.

However, as you say, there are so many things to do, and so much to learn, that one must be cautious in making any rash conclusions. As I think you, yourself, must realize by now, we look upon ourselves, not as crusaders for a particular point of view, but as seekers after facts. We have never hesitated to disseminate the facts, and, although we have from time to time suggested some conclusions which might arise from these facts, we have always tried to draw a sharp line between hypothesis and facts.

May I say that we hope that your retirement will not mean an end to our correspondence.

I would like very much to visit you, but that seems a most unlikely

possibility at the present time because the University I have the privilege of working for is unable to give very much encouragement to her staff members to go wandering around the Continent.

Did you see our latest contribution in the April 23rd issue of "Science"? I would very much appreciate your reaction to that article.

Kindest regards,

Yours sincerely,

Harry V. Warren

Harry V. Warren, Professor, Department of Geology.

HVW/w.
Dictated but not read.

April 12, 1965

Professor Harry V. Warren
Department of Geology
The University of British Columbia
Vancouver 8, Canada

Dear Professor Warren:

Please accept my thanks for your letter of March 10 and the material enclosed with it. I am hard pressed for time, especially at this end of the year, and we shall be short-handed until Dr. Radford comes to take over. Therefore, I have had time only to glance at the material. I hope soon to have time to review it more carefully.

I wonder if you have seen the publications and some of the other reports of C.C. Patterson and his associates concerning some of their investigations. I find it difficult to appraise the technical oceanographic work, and the direct interpretation of the findings, in relation to the sources of lead, seems to carry inferences that go far beyond the facts. These matters I cannot judge with competence. As to his venture into the biological field and his sweeping conclusions therein, he has certainly gone a bit wild, and because of this I am forced to question his judgment in his own field. Be these things as they may, I am due to be involved in a controversy, it seems, and this controversy starts out in a professional atmosphere which I find very unfortunate. It appears to Dr. Patterson, I am told, that I am and have been the tool of the lead industries for many years, and that he has no wish to communicate with me in any manner. This is in such contrast with the usual attitude of one's scientific colleagues, including those like yourself, whose technical approach to the problem of the mineral elements is so different and hence so intriguing, that I find it difficult to view it charitably. I am all the more interested in talking with you on this account, since your field and that of Dr. Patterson are related.

There is so much to be done in this field of phenomena, and there are so many things that are of intense interest and of practical importance in the fields of industrial and public health, not to mention the over-all nutritional and general physiological

significance of these elements, that one should be cautious in his conclusions. The posture of the crusader is not the posture of the scientist, albiet it is not always feasible to define the characteristics of the scientific teacher in terms that differentiate him from the crusader. Perhaps, the differential characteristic is that of humility in facing the realms of the unknown, and perhaps one should not expect this in the young scientist.

I wonder whether any engagements or meetings may bring you in this direction between now and the middle of July. If there should be such an opportunity, please let me know, and I'll undertake to arrange a meeting with our graduate students.

Sincerely yours,

Robert A. Kehoe, M.D.
Director

RAK:meh

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF GEOLOGY

March 10, 1965.

Dr. Robert A. Kehoe, M.D.,
Department of Preventive Medicine
and Industrial Health,
University of Cincinnati,
The Kettering Laboratory,
College of Medicine - Eden Avenue,
Cincinnati, Ohio 45219, U.S.A.

Dear Dr. Kehoe:

It was very good to hear from you, but I am a little saddened to think that you will be retiring before I ever get a chance to visit you.

I realize that you are very busy, but I think you will agree that the material I am sending you is of considerable interest.

In view of the work of Sir Ernest Marsden and others, on the importance of Polonium 210, I am wondering if we should not do some work in this field?

With kindest regards,

Yours sincerely,

Harry V. Warren

Harry V. Warren, Professor, Department of Geology.

HVW/w.
Enc."Some Data"&c.
Dictated but not read.

March 5, 1965

Professor Harry V. Warren
Department of Geology
The University of British Columbia
Vancouver 8, Canada

Dear Professor Warren:

Please accept my sincere thanks for your letter of March 1. I shall be delighted to see the results of your observations on soils and vegetables. I cannot promise to comment extensively on them or with any great degree of promptness, since I am even more hard pressed than usual (in an attempt to get the decks cleared, so far as may be possible, by the time of my retirement in July). I do wish to see them, however, and I'll hope to be able to make some response.

I must answer your final question in the negative. My successor, Edward P. Radford, has done some work on polonium, but not in the relationship with which you are concerned.

Cordially yours,

Robert A. Kehoe, M.D.

RAK:meh

LE 00527

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

March 1, 1965.

DEPARTMENT OF GEOLOGY

Dr. Robert A. Kehoe, M.D.,
Kettering Laboratory,
College of Medicine,
University of Cincinnati,
CONCINNATI, OHIO, 45219. U.S.A.

Dear Dr. Kehoe:

Thank you very much indeed for sending me a copy of the "Symposium on Lead". I had acquired a copy earlier, but I am delighted to have another one.

I have just finished work on some dozen suites of soils and vegetables from various parts of the world where there are abnormal disease patterns. I was going to send you a copy of these, but felt that it might be imposing too much on your good nature. Would you be interested in seeing these and commenting on them?

Have you done any work in connection with Lead 210 and its daughter product, Polonium 210? This seems to be opening up a new field of investigation.

Kindest regards,

Yours sincerely,

Harry V. Warren

Harry V. Warren, Professor, Department of Geology.

HVW/w.
Dictated but not read.

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF GEOLOGY

January 29, 1964.

Dr. Robert A. Kehoe, M.D.,
Department of Preventive Medicine
and Industrial Health,
The Kettering Laboratory,
College of Medicine - Eden Avenue,
Cincinnati 19, Ohio.

Dear Dr. Kehoe:

This is just a hasty line to thank you very much for your gracious letter of January 23rd.

As no doubt you realize, we have not been at all anxious to become involved in the medical aspects of the points we have raised as a result of our biogeochemical investigations.

However, I am sure you will be interested to learn that, as a result of the evidence we have produced concerning the widely varied amounts of trace metals in various food supplies, that the College of General Practitioners in Great Britain are initiating epidemiological investigations, which, amongst other objectives, will endeavour to see whether there are any tangible links between abnormal trace metal concentrations in foods and some specific ailments.

Furthermore, in our own University, the Faculties of Pharmacy and Medicine are now sponsoring an investigation into variations in the trace element content of various human biological material.

In the fullness of time, I am sure these studies will contribute new light on the problems in which you yourself appear to have been so interested.

Dr. Delavault joins with me in wishing you a happy and prosperous 1964.

Yours sincerely,

Harry V. Warren

Harry V. Warren, Professor, Department of Geology.

HVW/w.

January 23, 1964

Harry V. Warren, Professor
Department of Geology
The University of British Columbia
Vancouver 8, Canada

Dear Professor Warren:

Please accept my thanks for your letter (and enclosure) of January 8th. I offer no criticism of the work. I would be less than frank if I were not to say that in my view, the somewhat repetitive reference in your talk of the relationships between the geological phenomena to such diseases as cancer and multiple sclerosis tends somewhat to subtract from the virtue of the specific scientific inquiry, but I do not agonize over this, and in fact, I consider it more or less inevitable as speculation. The work itself, however, should be directed toward the understanding of the matter in its actual setting.

You may have encountered the observations of Patterson and his associates on the occurrence of lead in the oceans and the significance of the findings. This is a good case in point, for while these men are properly excited about the meaning of their findings in their own field, and are very cautious in their interpretations, they go at once boldly and without anything approaching caution, in their consideration of the meaning of their observations in the field of the public health, and what should be done about it. Certainly, everyone should be concerned about these matters, but science and wisdom are served notably jumping to "important" conclusions, but by the patient observations that may go far afield but lead to clear relationships.

In reply to your previous letter, I must comment further on the alleged toxicity of the inorganic compounds of lead. It have not checked into Professor Vernes work (I haven't the time now to look it up, but I have asked the help of our bibliographic staff in doing so) but I should consider this statement, however, made and in whatever context, to be irrelevant. It is quite possible that he is talking of intravenous injections, and if so, one can expect dramatic results from embolism (which has nothing to do with toxicity as such, but is rather a mechanical result of the intravenous clumping of erythrocytes or the coagulation of protein or a combination of both). In any case, when the inorganic salts of lead are absorbed into the tissues of the common experimental animals, the lethal dose is of the order of 35 mg. (as Pb) per kilogram. An absorbed dose that is well tolerated, periodically (daily or two or three times per week over a considerable period of time) may be of the order of 0.1 mg. per kilo (or more dependent upon the duration of the experimental regimen). There are quite a few publications on the toxicology of lead compounds,

and you seem to have been unfortunate in referring to one which, to me, at least, has a very strange sound. I shall find out about this"strangeness" when time permits.

Sincerely yours,

RAK:vr

Robert A. Kehoe, M.D.

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF GEOLOGY

January 8, 1964.

Dr. Robert A. Kehoe, M.D.,
Department of Preventive Medicine,
and Industrial Health,
University of Cincinnati,
CINCINNATI, OHIO.

Dear Dr. Kehoe:

I thought you might be interested in seeing our latest publication. I think you will have seen some parts of it, but I trust you find the whole presentation satisfactory.

Kindest regards,

Yours sincerely,

Harry W. Warren, Professor, Department of Geology.

HVW/w.
#117

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF GEOLOGY

December 2nd, 1963.

Dr. Robert A. Kehoe, M.D.,
Department of Preventive Medicine
and Industrial Health,
The Kettering Laboratory,
University of Cincinnati,
Cincinnati, 19, Ohio.

Dear Dr. Kehoe:

Thank you very much for your letter of November 19th.

I appreciate very much your taking the time out to drop us a line when you have been even busier than usual because of the death of your associate, Professor Frank Princi. When I was in New York I learned of this unfortunate happening - I believe from Mr. Fowler of the Lead Research Association.

The one point which you raised in your letter is of course most important.

Our remarks about the toxicity of lead resulted from a quotation from Professor Arthur Vernes in his book "Mesure es Médecine", Paris 1943, chap. XLV, page 278 - an English translation being approximately as follows:-

> "One remark has to be done about the use of lead (acetate), poisonous even in dose of the order of a few hundreds of milligram; one must use it with great precaution.
>
> In current practice, and when its turn to be used comes, we make only 2 shots per week, at 2 or 3 days distance, separated by shots of platinum or iridium given during the other four days."

I would not like you to think that we had carelessly inserted this comparison, and, should I be unfairly representing Professor Vernes, I would certainly be grateful for your help in correcting the matter.

The meeting in New York was most successful in that Dr. Kurland and Dr. Banta, and many others concerned with health problems had a most useful part in the program, together with agriculturists and geologists from many parts of North America.

I hope that some of these papers are published in due course, and that some useful co-operation may result.

Knowing your interest in the matter of lead you may be interested to know that recently we have had some lettuces submitted to us for analysis, and, although their"normal" lead content seemed to be of the order of from 2 to 10 parts per million (oven-dried), we did get one sample running a prodigious 250, and several running in the range of from 50 to 100 parts per million.

I have been wondering whether this has any significance or not. The Medical Officer who submitted these samples sent them from a district which he has been investigating for many years, and which contains abnormal numbers of deaths from cancer.

I am afraid we are imposing perhaps too frequently on your good nature, but, as you have surmised, it is extremely difficult to make advances in this field when ones knowledge is largely geological.

Kindest personal regards,

Yours sincerely,

Harry V. Warren

Harry V. Warren, Professor, Department of Geology.

HVW/w,

November 19, 1963

Professor Harry V. Warren
Department of Geology
The University of British Columbia
Vancouver 8, B.C., Canada

Dear Professor Warren:

Your letter of October 25th arrived at a time when I scarcely had time to read it (and no time to read your paper), so that I was unable to reply to you in any useful manner. I have little more time now, and certainly I cannot review your paper before replying, but I cannot bring myself to ignore your nice letter for longer than present circumstances require of me.

Perhaps, I should explain to you, that while I was in Madrid at an international meeting, my associate, Professor Frank Princi, died suddenly, and all of the responsibilities which he had shared with me for years were returned to me. Considering that we were both very busy at the time, and that the schedule of the Graduate School involved the opening of school on the first of October, I have been unable to finish my day's work at any time since my return home. I shall catch up, ultimately, no doubt, but not very soon.

I am sure that you are aware of the difficulties of the position which you occupy in relation to biological and medical problems, for the second paragraph of your letter so indicates. It seems to me that, so long as you retain this attitude, you will not make any very serious blunders. I noted what you said on page 8 of your paper about toxicity, and I cannot but regard this as an example of naivete. It is, in fact unwise for the inexperienced person to talk about toxicity in any other than very broad lay terms, for the entire matter depends so upon physiological considerations as to be utterly unintelligible otherwise. Incidentally, the dosage of "colloidal lead" used hopefully at one time in the treatment of cancer was not small, as your words suggest, but was dangerously large. This was abandoned not because of the danger, but because it was an unsuccessful type of therapy. The dose could easily have been kept within safe limits, but the therapy would then have been even less promising. This is neither here nor there, for your words have not done any damage to my views, although they suggest that I was willing to take a chance on inducing ill effects in my subjects. The fact is that I was investigating the physiologic responses of human subjects wholly within safe limits, being certain in advance that they were incurring no risk.

I shall read your entire paper when I can find the time, and if I have any criticisms to offer I'll send them along. I have no doubt, however, that the facts and their meaning will be sorted out fairly well and that I need not be unduly concerned about my failure to make suggestions before the publication of your paper.

Sincerely yours,

RAK:vr

Robert A. Kehoe, M.D.

LE [redacted] 00535

(P 8)

THE UNIVERSITY OF BRITISH COLUMBIA

VANCOUVER 8, CANADA

DEPARTMENT OF GEOLOGY

October 25, 1963.

Dr. Robert A. Kehoe, M.D.,
Department of Preventive Medicine
and Industrial Health,
University of Cincinnati,
CINCINNATI, Ohio, U.S.A.

Dear Dr. Kehoe:

I do not know whether you have heard or not, but I have been asked to present a paper to initiate a discussion on "The Relation of Geology and Trace Element Distribution to Nutritional Problems", before an informal group of the Geochemical Society, and the Geological Society of America meeting in New York on November 17th.

In trying to bring together the geologists and the medical men, I am afraid that some of the remarks I make must seem a little naive. However, as long as they are not incorrect or misleading, I feel that the paper will be justified.

As I find myself using your name in the paper, I thought I had better ask you if you would be kind enough to look it over, and see if in any way I am offending or misrepresenting your ideas.

With apologies for troubling you, I am,

Yours sincerely,

Harry Warren

Harry V. Warren, Professor, Department of Geology.

HVW/w.
Paper sent under
separate cover by airmail.