October 21, 1966

Mr. C. L. Goodacre
The Associated Octel Company Limited
20 Berkeley Square
London, W.I.

Dear Charles:

Finding your letter on my desk when I returned from Athens was a pleasant surprise. I shall undertake to clarify the issue which you have raised, although the answer is not quite definitive. Before doing so, however, let me say what a good trip we had.

As usual, London, with the opportunity to visit my good friends there was an unalloyed pleasure, which was heightened by the excellent weather with which England favored us. Vienna and the International Congress on Occupational Health was something else again. It was good to meet and talk with friends and associates in many countries, but certain of the arrangements left much to be desired, as Dr. Barry can tell you as well as I.

We had a marvelous time in Greece, and again beautiful weather for our wanderings about. It was strenuous, however, and we have to rest up at home. Our daughter made the rounds of classical Greece with us and enjoyed it hugely.

Now as to Patterson and his thesis. I would suppose that he is reasonably competent, perhaps highly competent in his own field, which does not extend to biology, into which he has ventured vigorously and dogmatically, but not cautiously.

I do not doubt the facts stated about the lead in the upper layers of the seas in certain areas. I don't think, however, that I said the concentration of lead is increasing rapidly. I hardly think the findings justify this conclusion. It seems likely that they are increasing slowly, but I suspect that this remains to be ascertained. I would suppose that this is due to the run-off in the streams from the surface of the earth, as these have conveyed their burden of lead mined and scattered about over the land from many sources (disintegrated paint, solder and metallic lead and lead alloys used for hundreds of purposes as flashings, rooves, bearings, etc., etc., etc.). This has been going on for centuries, and has been augmented, no doubt, by the decomposition and combustion products of the alkyl lead compounds. The concentration in the sea is insufficient, however, to affect the life in the sea according to Patterson.

As to the change downward (not very dramatic but seemingly valid in Cincinnati) in the atmospheric concentration, there are several possible explanations. First, the soot and flyash from the combustion of coal has been greatly diminished since World War II. (I understand that this is true in London).

Second, the traffic patterns in Cincinnati have been altered considerably, so as to spread the discharge from automobiles over a wider area, thus reducing the local levels of concentration. It is more than likely that the total lead has increased within and around the city, but the concentration has been diminished at the worst points, becoming more uniform over a wider area. (This means, of course, that such risk as might be occasioned by localized maximum concentrations in the air breathed by certain individuals, has been diminished, or, perhaps, the maximum level has not increased, as the total discharge into the atmosphere has increased.) At any rate, there has been no progressive increase during the past 30 years, in so far as the response of persons in the population has been observed.

It is worthy of consideration, I think, that the run-off into the sea has been of noticeable proportions. This suggests that the deposition on the land, generally, is being carried away. It is even possible, that something in the nature of a general equilibrium has been reached whereby the accumulation of lead on the surface of the earth is counteracted. If this should turn out to be the case, Patterson's observations point to an advantageous phenomenon. This, of course, is pure speculation at this time, but it is worthy of investigation.

There are other aspects of this matter, particularly the fate of the lead deposited along highways, which require examination. Moreover, there are areas of the earth in which the surface soils are high in lead naturally. What happens in such places is of considerable interest. The whole subject is extensive and varied, and there is much to be learned. The biological problem, however, relates not so much to the presence of lead in the human (animal) environment, as to the lead that gains access to the human (and other animal) organism. And, even more important are the physiological mechanisms for dealing with that which gains such access. There is simply no sense in talking about lead poisoning in non-quantitative terms in relation to the animal organism or man. All life on this planet is associated with the presence of lead in the living organism, and since this is true, and has always been so, one must learn what is physiological and what is the least threshold of toxicity. This has been the direction and goal of our investigations over the years, and to ignore the information on this aspect of the matter (even though it is not comprehensive and much of it is negative) is to take the unreasonable and unscientific approach of the complete novice. That is to say that it is simply naive to believe that since much (or a sufficient quantity) of lead is toxic, any quantity must be somewhat toxic. Such a belief is possible only to a novice. Unfortunately, the novice in this instance is wholly unaware of his innocence. So much so that he acuses me of being the deliberate tool of the lead industries. I hope this will be of some help to you in thinking further on this matter.

With best regards,

Sincerely,

Robert A. Kehoe, M.D.

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