

April 1, 1936

Dr. A. V. von Frisch
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Vienna, Austria

Dear Dr. vonFrisch:

I hasten to reply to your letter of March 7th since the questions raised in your letter are of some consequence. I have never had an opportunity to discuss the hygienic aspects of Ethyl Gasoline distribution with the Austrian officials, although I have had such discussions with officials in many of the countries of central Europe. When I was there last, the problem of gasoline distribution was essentially a negligible one since there had been no commercial distribution. It is highly advisable that they have all the information available on the subject.

I am somewhat surprised that you have not obtained most of the answers to your questions from the article which I sent you entitled "An Appraisal of Lead Hazards Associated with the Distribution and Use of Gasoline Containing Tetraethyl Lead - Part I". In this article there is a very complete discussion of all the potential dangers and a citation of all the items of experimental work which had been done on the subject up to the time the article was written. In the article there was a detailed description of observations made on a large number of filling station attendants and garage mechanics which demonstrated that not only was there no danger of lead poisoning among these men, but that there was no actual lead absorption associated with their occupation. I suggest that you refer to that article which I believe is in your possession. For your further information I am sending you the second article in this series which gives the results of somewhat more refined experimental studies on corresponding men.

In terms of the investigative work which has been done, the following statements may be made with entire accuracy.

(1) No evidence has been found of danger of lead poisoning or lead absorption among men who handle gasoline and who repair automobiles in the routine manner.

(2) There have been no cases of lead poisoning in any part of the world among filling station attendants and among garage mechaniss as a consequence of the handling of leaded gasoline.

(3) No preventive measures are required in the handling of the gasoline or in the repair of automobiles beyond those which are customary in these industries. Gasoline itself is quite toxic when inhaled in sufficient concentrations, and since it is inflammable and explosive in certain air mixtures, it is necessary for safety to avoid spillage of gasoline so far as possible, particularly in enclosed places. If these precautions are followed out in even a moderately effective manner, opportunities for significant lead exposure do not occur. Moreover gasoline has irritating effects on the skin and should not be permitted to come in contact with the skin more than is absolutely necessary. Cases of dermatitis are seen more or less regularly in association with a continuous handling of gasoline. There is no evidence that leaded gasoline is more irritating than ordinary gasoline. Also the evidence is adequate to demonstrate that in the commercial concentrations in gasoline, tetraethyl lead is not absorbed out of the gasoline through the skin. As to governmental control of gasoline distribution by the authorities in the United States, no precautionary measures have been considered necessary or advisable beyond the use of warning signs indicating that the gasoline contains tetraethyl lead, and should be used as a motor fuel and for no other purpose. At the present time these signs have no other function than to dissuade purchasers of gasoline from employing leaded gasoline in lamps, stoves and other heating devices, or for use in cleaning clothing, tools and motor parts.

(4) In short, after ten years of the use of leaded gasoline in the United States and Canada, during which time many thousands of filling station attendants and garage mechanics have been exposed to the hypothetical dangers associated with its use, no clinical or experimental evidence of lead absorption has been obtained in the study of these exposed persons. During the past several years, more than fifty percent of the gasoline in the United States has been treated with lead, and at present approximately eighty percent of automobile gasoline in the United States contains lead. All of this has occurred without a single case of poisoning and without any reason for believing that cases of poisoning will ever develop.

In connection with the last paragraph above, I must say that I am always a little bit surprised when I find that public health officials in other countries are willing to assume that an actually hazardous lead exposure would be permitted to exist in connection with Ethyl Gasoline in the United States. The problem has been investigated very carefully indeed and more carefully, I believe, than any other public health problem of similar proportions with which I am familiar. I can also assure you that if I had not been convinced years ago by adequate evidence that the distribution of leaded gasoline could be accomplished without danger to gasoline distributors and to the public, I would never have associated myself with the Ethyl Gasoline Corporation in my present capacity, nor would I have been willing to encourage any way the expansion of this industry. I may also say at this point that if I had ever arrived at the conclusion on demonstrable evidence, that there was any danger in the distribution of Ethyl

Gasoline from the point of view of significant lead absorption among the handlers of gasoline and among garage mechanics, my conclusion and my advice to the Ethyl Gasoline Corporation would have resulted in the immediate withdrawal of this commodity from the American market. Obviously if this industry had been discontinued in the United States, it would never have expanded into countries outside of the United States through any efforts of Ethyl Gasoline Corporation.

To mention briefly our advice that workmen with unusually bad teeth be rejected for the mixing of Ethyl Fluid with gasoline, it should be said that this point of view does not arise from any belief that lead poisoning would result from oral intoxication in these men. Rather we regard pronounced oral infections as a very frequent factor in general systemic disease, and we, therefore, deliberately advise the avoidance of men for this work whose chances of developing such disease are greatly increased. It has been my experience that chronic infections are the most difficult to differentiate from lead intoxication and it is also true, I believe, that chronic infections associated with lead intoxication produce very much more pronounced illness than either would cause in itself. My point of view has been that we should start out in this work with healthy men who may be expected to maintain their health. Under these conditions there would be less opportunity for confusion in diagnosis and also less opportunity for serious consequences if a case of lead intoxication should inadvertently develop. As to the further danger of lead poisoning in the mixing personnel, I am quite certain that if the equipment for mixing is constructed as it should be, and if it is kept in order, and if the mixing is carried out in accordance with the Regulations, there will be no cases of lead poisoning among these men. The evidence on which this statement is based has been obtained over a period of ten years during which I have had intimate knowledge of the nature of the mixing equipment, the manner of mixing, the magnitude of the lead hazards, and the actual practices of the mixing personnel. Under suitable conditions men engaged in this work do not show the slightest evidence of lead absorption as shown by increase in their lead excretion.

I trust this will serve to answer your questions and I shall appreciate it very much if you will raise any further questions which come to your mind from time to time.

Cordially yours,

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Robert A. Kehoe, M.D.

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