Correspondence

LACK OF EVIDENCE FOR CHRONIC CARBON MONOXIDE POISONING

To the Editor:—Whether there really is such a disease as that termed "chronic carbon monoxide poisoning," as a consequence of prolonged or repeated exposure to small amounts of the monoxide and continuing after the exposure is stopped, is very doubtful. Certainly its importance in many cases is less medical than legal and financial as a basis for claims for damages to be awarded by a compensation commissioner or a court of law. There is a large literature presenting numerous cases, described with clinical fulness and accuracy in respect to the symptoms of the disorder but with little or no evidence that the patients had ever been exposed to any significant extent to carbon monoxide.

If, then, numerous false claims are not to be bolstered by such papers, it is essential that writers on this subject should be required to report evidence as to the analytic method by which the amount of carbon monoxide in the air or in the blood was determined, how much was found and how long the exposure continued. Such a requirement would at once deprive the greater part of the literature in this field of all evidential value.

The lack of such evidence is exemplified in a paper by Drs. Beck, Schulze and Suter entitled "Carbon Monoxide—A Domestic Hazard with Especial Reference to the Problem in West Virginia" (THE JOURNAL, July 6, p. 1) as well as by the previous papers by Dr. Beck and his associates there cited. Among the conditions alleged to be due to carbon monoxide are diseases of the central nervous system, cardiovascular system and gastrointestinal system, and specifically encephalitis, epilepsy, multiple sclerosis, tetany, petechial hemorrhages, coronary thrombosis, cardiac dilatation, hemiplegia, syncopal attacks, emotional episodes, visual disturbances, various forms of neuroses and psychoses, some with marked mental deterioration, ataxia, myalgia, muscular twitching, stiff and painful joints and angina pectoris. This is not the entire list of disorders alleged to be induced by repeated exposure to low concentrations of carbon monoxide but is sufficient in view of the fact that all these disorders are known to occur from other causes, and that in this paper no real evidence is presented that in the cases reported carbon monoxide was involved to any appreciable degree. Such involvement or causation is assumed merely on the basis of blood counts somewhat above normal in some cases and below normal in others: conditions that may also occur apart from carbon monoxide.

It appears that in West Virginia natural gas is extensively used for domestic cooking and heating, that the appliances in which the gas is burned are often without flue connections, and that during cold weather windows are rarely opened either by day or by night. Now natural gas is methane, which is no more poisonous than nitrogen, the chief constituent of air. Natural gas contains no trace of carbon monoxide. With a good supply of air to a flame of methane the gas burns with no production of carbon monoxide. What is produced is heat, water vapor and an atmosphere that is stuffy and unhealthful. No appreciable decrease of oxygen or increase of carbon dioxide in the air of the room so heated is usually involved. If the occupants exhibit poor health, it is fair to assume that bad ventilation may be a factor. But without positive demonstration of the presence of carbon monoxide by analysis of the air or the blood, no inference of "chronic carbon monoxide poisoning" is justifiable. Certainly not to the extent of the varied disorders listed.

The proverbial belief in regard to "chronic carbon monoxide poisoning" had its chief origin in the cases of prolonged asphyxiation by city gas, which were once common but are now rare. The small gas lighting fixtures then used in bedrooms were easily turned on accidentally, and as the small stream of gas flowed into the room the victim was exposed to a gradually increasing concentration of carbon monoxide. Often it was insufficient to cause immediate death by acute asphyxia but was sufficient over many hours to induce lasting damage to the brain. Today carbon monoxide asphyxiation commonly occurs in garages and kitchens and is generally acute and brief. Since the introduction of inhalation resuscitation, the large majority of cases fall into one or other of two classes: that in which the victims die immediately and that in which they recover rapidly and completely. But even in the cases of permanent damage that do still occasionally occur, the term "chronic carbon monoxide poisoning" is a misnomer. Before the patient comes out of coma the last trace of carbon monoxide has been eliminated from his blood. A better term would be permanent postasphyxial myelitis.

The question remains whether repeated exposures to amounts of carbon monoxide only sufficient to induce a headache but falling considerably short of rendering a man unable to stand or drive a car can do more than impair health temporarily. At present the probability is that termination of the unhealthful condition is always rapidly followed by return to health. Certainly the men who drive taxis in our larger cities and those who work in repair shops, although liable to all the disorders mentioned by Dr. Beck and his co-authors, have not yet been shown to be appreciably more liable than the rest of the population. We all breathe some carbon monoxide nearly every day of our lives.

The expression "chronic poisoning" can be properly applied only to the action of substances that are protoplasmic poisons and that may accumulate in the body. Lead is a typical example. Carbon monoxide, on the contrary, is rapidly eliminated by respiration, and its action while in the blood is wholly due to the temporary displacement of oxygen. The anoxia due to carbon monoxide acts essentially as does that induced by the low pressure of the air (i. e. oxygen deficiency) at great altitudes. The headache of mountain sickness and that of a temporary 20 or 30 per cent saturation of the blood with carbon monoxide are identical. Yet, given time for compensatory physiologic adjustments—of which an increase of red corpuscles in the blood is one—men are quite healthy at Denver and even on Pike's Peak.

It would be a valuable service if the board of health in one of our cities would institute an investigation by a gas analyst and a clinician jointly with regard to the amounts of carbon monoxide in the atmosphere in as many automobile repair shops as possible and as to the health and symptoms of disease of the mechanics who work in them. Experiments in this laboratory have shown that in dogs repeated asphyxiations of the severest character—just short of death—are required to induce any considerable impairment of health.

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[This letter was referred to Dr. Beck, who replies:]

To the Editor:—The criticism offered by Dr. Yandell Henderson, of our article in THE JOURNAL, July 6, affords me an opportunity to discuss some phases of the subject which have been misconstrued.