

## ON THE TOXICITY OF METHYL ALCOHOL IN EXTRACTS AND MEDICINES.

BY H. MAIN, M.D., OF BARRY, ILL.

On Feb. 18, 1903, I was called to see J. H. R., who had "gone blind." I had known him personally for eight years. His family history was good, his health excellent. He was a watch tinker by profession; aged 44. He was an inebriate and gave the following history: For several days being unable to obtain whisky he had been drinking lemon extract; on February his sight began to fail and he stopped drinking. On the morning of February 18 the central vision was gone, but he retained some peripheral vision, and by noon he was blind. I called at 6 P. M. The clinical picture was characteristic. The mental faculties were but slightly impaired. The pupils were widely dilated and he could not distinguish light. A light held six inches from his face did not change the pupil and could not be seen. He said everything was black. There was frontal headache, nausea, rapid pulse, labored breathing, and great restlessness. He was cyanosed and scared. An ophthalmoscope was not at hand and the retina was not examined. His condition grew rapidly worse, his sufferings became agonizing, and he died at midnight after a short coma—apparently of respiratory paralysis. It was a classic picture of methyl alcohol poisoning.

I at once secured a number of samples of the brand of lemon extract he had been using, distilled it, and upon examination found it to contain methyl alcohol. A coroner's jury found that death was caused by "drinking lemon extract."

With the assistance of my friend Mr. E. W. Baker, I made a series of investigations of various culinary extracts and was surprised to find that many of them were made from methyl alcohol, although professed to be made according to the pure food laws of Illinois. I called the attention of our Pure Food Commission to this fact and sent samples of the particular extract to Dr. E. N. Eaton, state analyst at Chicago, requesting a report of his analysis, and, after considerable delay, he reported that they contained methyl alcohol, stating, however, that "our food law has no specific statute on lemon extract—a ruling of the commission requires five per cent. oil of lemon. If our law made the pharmacopeia method of preparation the standard we would not need to bother ourselves about the toxicity of methyl alcohol, as the pharmacopeia stipulates cologne spirits"—intimating that their duties ended by requiring five per cent. oil of lemon.

There is a widespread impression among the people here that lemon extract is poisonous. This impression is due to a number of deaths resulting from its over-use. Cases similar to this one I have reported have occurred at intervals in the last five years. Dr. Duffield of Pittsfield, Ill., reported to me the case of a man who drank lemon extract and was found dead. Dr. J. Smith Thomas of Pleasant Hill reported the case of a man who drank lemon extract at night and was found dead in bed in the morning. Dr. W. E. Miller of Columbus, Ill., reported a case of methyl alcohol poisoning similar to the one I have reported. I have received reports of death from drinking lemon and other extracts at Beverly, Ill., Baylis, Milton, etc., in all, no less than ten authentic cases in this immediate locality from that cause in the last few years. It is likely many more deaths have occurred which were not reported. In all these cases death was caused by methyl alcohol.

The use of methyl alcohol in culinary and medicinal extracts is of recent development. This is evident from the fact that very few cases of its poisoning are reported prior to 1897.

The first case reported, to my knowledge, was by Mengin in 1877, of a convict who drank methyl alcohol and lost his sight. The case is mentioned in recent monographs of de Schweinitz and Casey A. Wood. Medical literature is, however, free from such reports, and not until 1897 was the attention of the profession called to the subject. Since that time the cases have increased in alarming frequency. Its use in culinary extracts and in beverages, such as peppermint essence, Jamaica ginger, in "dry towns." This fact, that most cases of poisoning occur in "dry towns" or in places where other liquor cannot be secured, will account for the want of clinical observation in medical centers, and it may also in a measure account for the difference of opinion which our Pure Food Commission says exists among "medical authorities" concerning its toxicity.

This dearth of such clinical observation in medical centers is significant.

The decided toxicity of methyl alcohol is very generally conceded by the medical profession everywhere except by those "experts" who are hired by manufacturers to prove its harmlessness.

The primary effect of the ingestion of methyl alcohol is that of the grain alcohol, it will produce drunkenness in proportion to the amount taken, but the symptoms are produced more slowly. This is the report to me of persons who drank a quantity. The poisonous results are shown in the following compilation:

1. The first report of methyl alcohol poisoning that came to my notice was reported by Dr. A. G. Thompson entitled "A case of complete blindness due to acute poisoning from over-use of Jamaica ginger." Dr. Thompson did not seem to know what element in the Jamaica ginger could have produced the blindness, and could not account for it, but this same case was reported later by Dr. Thompson, and the blindness was shown to be due to methyl alcohol.

2. Dr. H. Gifford reported a "Case of blindness by ingestion of wood alcohol" in which blindness was permanent.

3. In a report by Dr. Casey A. Wood before the Chicago Ophthalmic and Otological Society of two cases of methyl alcohol amaurosis from inhalation while working in a beer vat with "shellac" dissolved in wood alcohol.

4. Reports by Raub, "Blindness from methyl alcohol." A man on the night of October 4, 1898, drank two to five teaspoonfuls of methyl alcohol, and on the following morning his vision was impaired — improved for a time, then gradually faded away and was lost. Also a case in which three men in the U. S. Navy, who, on July 4, 1898, drank a quantity and were received on the hospital ship July 5th. One was unconscious and died in a few hours. Another suffered from gastroenteritis only, while the third was semi-conscious, pupils widely dilated, and remained so. On July 8th he partially regained consciousness, but was totally blind. Under treatment he partially regained his vision, but it was subsequently permanently lost.

5. Dr. Edward Stiner of Pittsburg reported a case of "amblyopia, following the intoxicating use of Jamaica ginger," in which he does not seem to be aware of the probable presence of methyl alcohol in the Jamaica ginger, but in an editorial on this same case and others in the same journal, "Jamaica Ginger Drinkers' Amblyopia," the cause is shown to be methyl alcohol.

6. Dr. Herbert Harlan reports cases of blindness and death from drinking Jamaica ginger, essence of peppermint, etc., demonstrating the presence of methyl alcohol.

7. Dr. John Dunn reports two cases of amblyopia, following the use of Jamaica ginger.

8. Expert testimony by Dr. H. V. Wurdemann of Milwaukee shows blindness from inhalation and ingestion by mouth of methyl alcohol. After reporting a number of cases of poisoning he concludes by saying, "From the foregoing it seems that it (methyl alcohol) will produce blindness of a

characteristic type, which is sudden and in most cases complete."

9. Dr. Swan M. Burnett reports several cases of methyl alcohol poisoning and classes it as a "dangerous poison," and suggests that its use should be prevented. He says that "the country is flooded with a poison dangerous to vision and life itself under various and unsuspected forms in the use of wood alcohol."

10. In a paper read before the Section of Ophthalmology of the fifty-second meeting of the American Medical Association, entitled "Blindness from Drinking Bay Rum, etc.," by Dr. H. Moulton, he says: "Those who record cases of blindness due to this cause mention in all 30 persons who drank from 1 dr. to 2 drs. to an ounce or more of the substance and were made sick by it. Fifteen, or 50 per cent., lost their sight. Analysis of fifteen cases of wood alcohol blindness and analysis of 12 cases of blindness due to Jamaica ginger, etc., shows the striking identity of important symptoms." His references will be found in the *Journal of the American Medical Association*, Vol. 37, pages 1448-1449. In the discussion Dr. Hitam Woods of Baltimore said: "There can be no question in regard to the identity of symptoms in the Jamaica ginger, bay-rum, and methyl alcohol cases. I am not familiar with any form of blindness which gives the clinical features that all these cases show." Dr. A. B. Hale and Casey A. Wood of Chicago, Dr. Edward Jackson of Denver, and Dr. R. W. Miller of Los Angeles agreed to the identity of symptoms.

11. Dr. E. G. Hoitt gives the report of a family of six who drank a quantity of wood alcohol at night and in the morning four were found dead, at Marlboro, Mass. One, the mother, was ill for a long time and was lost track of. Another was a boy aged 14, who escaped by vomiting the substance.

12. Dr. S. W. Abbott gives a report of three men who drank a quantity of colonial spirits, and all of them died soon after. Dr. Abbott thinks such articles should be labeled

"poison," adding that "the grasping spirit of commercialism vs. the public health and safety" has defeated many a life-saving measure of recent years.

13. A reprint sent to me by Dr. Reid Hunt gives the result of a series of 28 experiments made by him with methyl alcohol or Columbian spirits and with ethyl alcohol. From his experiments he deduces the following:

"The action of methyl alcohol differs from that of grain alcohol in that the symptoms are produced more slowly and the duration of intoxication is more prolonged. While ethyl alcohol could be given to animals in doses sufficient to produce intoxication for months, or even for almost a year, without causing marked anatomic or functional disturbances, methyl alcohol given in small doses every other day was tolerated for only a few weeks. The animals remained comatose for days, did not eat, and died, although the administration of alcohol was discontinued.

"The highly important discovery has been made that methyl alcohol differs markedly from ethyl alcohol in that it is but partially oxidized in the body and that its administration leads to the formation within the body of a markedly poisonous acid (formic acid). When methyl alcohol is given to animals or men formic acid can always be found in the urine. The formic acid is excreted very slowly. This is probably the cause of the blindness which so frequently follows methyl alcohol poisoning in man. Highly differentiated nerve structures are especially likely to suffer when exposed to the action of a poison for a long time."

Dr. Hunt's conclusions are that "however pure the preparation (methyl alcohol) may be it is totally unfit as a substitute for grain alcohol in any preparation which is to be taken internally, and especially in preparations which are to be taken for any length of time." Dr. Hunt also states that there is no material difference in the action of the purified and of the crude methyl alcohol.

It is interesting to note the difference in the results of experiments of Birch-Hirschfeld with methyl alcohol on monkeys.

Birch-Hirschfeld describes experiments with methyl alcohol on three monkeys. Small doses were given every one or two days. When it became evident that the animals were at the point of death they were killed in order that the eyes and optic nerves could be obtained in good condition. The first was in a dying condition on the eighth day, the second on the fifteenth day, and the third on the eleventh day. Two monkeys had marked degenerative changes in the retina and one was totally blind.

Dr. de Schweinitz's experiment he gave a small monkey 3.75 cc. of 95 per cent. alcohol for six months. At times as much as 7.5 cc. of alcohol was given every day for several days. The animal was repeatedly very drunk, yet no disturbance of vision could be made out. The animal was finally killed. No degenerative or inflammatory changes were found in the eyes or optic nerves.

It is particularly important to note that the action of methyl alcohol differs widely in different individuals. This is aptly described by Dr. Casey A. Wood, who says in a recent letter that "the majority, perhaps, of those who drink it escape without permanent damage. The individuals differ as to the effects of the poison. Suppose six men go on a spree together and consume about the same amount of Columbian spirits, lemon extract, Jamaica ginger, essence of peppermint, or any other liquor containing, say, eight ounces of methyl alcohol in all; one of them will probably die within 48 hours of marked intestinal and cerebral symptoms, one other will be very ill, but recovering, will become totally blind in a few weeks, while the other four will suffer about as they would from a drunken orgy with ordinary alcohol."

In a recent letter from Dr. Hiram Woods of Baltimore, who seems to have had more experience in this direction than anyone else, he is unable to explain the fact that "methyl alcohol

is often taken with impunity for some time and then becomes poisonous," and that "to some persons it seems innocuous always, while a minute dose is toxic to others." This first question is probably answered by Dr. Hunt. A few cases of methyl alcohol poisoning are reported from using it externally in the bath, etc.

I have by no means exhausted the literature proving the toxicity of methyl alcohol, for our journals are frequently reporting cases of death and blindness, explainable and unexplainable, which are clearly traced to methyl alcohol. In this immediate vicinage no less than 12 deaths have recently occurred which are now known by me to be due to methyl alcohol, mostly in unsuspected forms, as lemon extract, etc. Some damage suits are now pending against manufacturers of Jamaica ginger, etc., for alleged poisoning, but so far as I know none have succeeded in securing damages. Dr. Hiram Wood writes me that the case tried last February which resulted in a hung jury has since been settled out of court.

There can be no doubt that methyl alcohol is used extensively in the manufacture of our culinary and medicinal extracts, spirits, essences, etc. This is abundantly proved by my own investigations as well as those of others.

The Bulletin of Pharmacy, Detroit (March, 1903), reports five deaths from the substitution of methyl for ethyl alcohol in drug stores. Three of these deaths occurred in Albany, N. Y., and two in Columbus, Ind.

Reports of the Health Department of New York City show an extensive substitution there, as well as reports of boards of health elsewhere.

The reports of its substitution are so numerous that it is useless to enter into a bibliography of the subject. In fact in many cases little effort seems to be made to conceal its use. This is, no doubt, because of our defective food laws and the inertia or indifference of our boards of health and pure food (?) commissions. It is easy to find fault, but it seems to me that

even a superficial consideration of this subject will show the urgent necessity of some action to protect the public health.

A review of this paper will show:

1. That methyl alcohol is an active and dangerous poison.
2. That it is capable of producing and has produced in numerous instances death and permanent blindness, even when taken in small quantities (Burnett 5.6 cc., dram. 1 $\frac{1}{2}$ ; Raub 7.5 cc., dram. 2-3).
3. That it is used extensively in substitution for grain alcohol and in the manufacture of extracts, spirits, and medicines intended for internal use, and that its use is not suspected by the consumer.

If, in the face of the evidence presented to us daily, anyone should deny its toxicity we may certainly be justified in considering him beyond the reach of argument.

The use of methyl alcohol has proved lucrative, and so long as that is so it will be used extensively. A series of what are called facts are produced to prove its harmlessness, but the cases of blindness and death give them the lie. If it is not poisonous I see no reason why it should escape a federal tax.

A theological seminary of the Free Lutheran Church in Minnesota has taken up the subject of "Alcohol and the Drink Evil." A course of lectures has been given to its students to which clergymen and lecturers of all the Norwegian temperance associations have been invited. The president of the seminary declares that the alcoholic subject has become so prominent a part of the evils of the world that clergymen must be trained to meet and teach the public its extent, and how to remove it. A movement is projected to have a course of lectures at the World's Fair in October, in St. Louis, designed particularly for temperance lecturers, teachers, and reformers. These lectures are to be exclusively devoted to the action of alcohol on the body and the disorders which follow from its use. In Norway, at the University of Upsala, a course of lectures has been given by the medical professors, which was very largely attended by clergymen and others interested in the subject.

## ABSINTHISM IN FRANCE.

DR. LAGRAN, SUPERINTENDENT INSANE ASYLUM.

**Absinthism:** A term used especially in France to denote the effects of the poison of absinthe and of the ingredients which form part of that liquor; clinically it denotes also all the results produced by the class of beverages known as apéritifs, such as the vermouths and bitters. The term "absinthism" has come into use because it is especially this beverage which produces the cardinal symptoms of this form of poisoning. The following varieties may be noted:

**Acute absinthism:** drunkenness. The symptoms are giddiness and vertigo. Troubles of orientation fix the subject to the spot in a condition of stupefaction; he dares not arise from fear of falling, and, should he attempt to walk, he staggers or falls as if affected with paraplegia. From the moral point must be noted a great instability of character. The least excitement provokes violent reactions, which are often of a criminal nature. It is this condition of torpor and enervation which is sought after by the drinker. Some degenerates find in this state of semi-hallucination that they possess the power of living in an artificial world.

**Chronic absinthism.** In this class of subjects drunkenness takes on the character of convulsive epilepsy, with transitory delirium followed by amnesia. Outside of the condition of drunkenness there are especial characteristics in the psychic and nervous sphere.

(1) Episodes of excessively delirious hallucination, with delirium, come on with remarkable suddenness and intensity.