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POISONING BY WOOD ALCOHOL.

CASES OF DEATH AND BLINDNESS FROM COLUMBIAN SPIRITS AND OTHER METHYLATED PREPARATIONS.*

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With the kind assistance of the profession in the United States and Canada, we have been able to report the following instances of methyl alcohol intoxication, most of them hitherto unpublished.

The list of deaths and cases of blindness following the ingestion of "Columbian spirits" and other forms of wood alcohol, as well as methylated "Jamaica ginger," lemon "extract," "bay rum," "cologne water," "witch hazel," essence of peppermint, essence of lemon, etc., not to mention all sorts and kinds of other official, domestic and proprietary remedies into which alcohol enters, has lately grown to alarming proportions. This record of death and blindness has been made in recent years only, since the cheap, "deodorized" methyl alcohol [untaxed, retail price 50 cents a gallon; ethyl alcohol, taxed, retail price $2.60 a gallon] has been put on the market.

Wood alcohol and methylated spirits made by the old processes subserved useful as well as harmless purposes. They possessed practically all the solvent and other properties required for the various arts in which they were employed, and no one thought of drinking them or employing them as adulterants in foods or drugs. Indeed, so abhorrent to the organs of taste and smell was even a small percentage of wood spirit in any mixture, that no person in his senses would drink so nauseous a compound, however diluted and disguised, or however much he craved an alcoholic drink.

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With the advent of preparations like "Columbian spirits," "colonial spirits," "eagle spirits," *et hoc genus omne*, the principal safeguard against poisoning by methylic alcohol has been removed. Some of these deodorized alcohols are with much difficulty distinguished by the laity from pure ethyl alcohol. Hence it is that in spite of ordinary precautions, such as *labeling bottles of these preparations* "not to be taken internally," they have been and are now, through accident and design, much used as substitutes for grain alcohol.

The appended histories by no means constitute a complete list of deaths and blindness from wood alcohol poisoning. A more careful canvass will, we are sure, bring to light numerous additional instances of this intoxication that we have not been able to gather during the limited time at our disposal. The remarks of Dr Moulton properly apply to many localities where grain alcohol beverages are difficult to procure:

> **Cases (of wood alcohol poisoning) are of frequent occurrence in Indian Territory, where the sale of ethyl alcohol is strictly prohibited by the United States government, so that those who crave stimulants drink anything they can get. I can safely say that in that country at least fifty deaths have occurred from this cause in the last few years.**

The same remarks apply, though in a less degree, to methyl alcohol blindness. A circular letter on this subject was addressed by Dr Wood to a large majority of the ophthalmic surgeons in the United States and Canada, and there is good reason to believe that, as a result of these inquiries, descriptions more or less complete of most of the well-defined and recent cases of wood alcohol amblyopia and amaurosis will be found in this report. At the same time, since blindness from methylated liquids was practically unknown until the recent introduction of this "purified" product, medical men may well be excused for not recognizing, for attributing to other causes or for afterward forgetting cases that several years ago came under their notice.

For purposes of subsequent reference we have divided these histories into four classes:

Class A.—Published cases of blindness or blindness followed by death, due to the drinking or inhalation of methyl alcohol. The cases comprised in Class A were collected, abstracted and tabulated by Dr. Buller.

Class B.—Cases (hitherto unpublished) of blindness or blindness followed by death from drinking methylated liquids.

Class C.—Cases (hitherto unpublished) of blindness from methyl alcohol absorbed through the lungs or skin, or both.

Class D.—Cases (hitherto unpublished) of death from methyl alcohol poisoning, without history of previous blindness.

The cases detailed under Classes B, C and D have been collected and edited by Dr. Wood. The sources of the information in the last three classes, arranged in alphabetical order, will be found at the head of each history.

SUMMARY OF PUBLISHED CASES.

The tabulated records (to appear later in this article) of 54 of the published cases show the ages of individuals to be from 21 to 65 years; mostly about middle life. Of 51 we note: Sex, males, 47; females, 4. Habits of life: 8 were, or had been, hard drinkers; 9 admitted occasional indulgence, 3 habitually temperate, 30 habits not stated, but no doubt most of them were more or less addicted to alcoholism. Six are reported to have used tobacco in excess, as well as alcohol. Occupations: Artistic painter, 1; attendant, 1; bricklayer, 1; barber, 1; carpenter, 2; china decorator, 1; convicts, 3; dressmaker, 1; farmer, 2; housewife, 2; hotel keeper, 1; miner, 1; millhand, 1; workmen, 4; mechanic, 1; soldier, 1; sailor, 3; woodsman, 1; watchmaker, 1; upholsterer, 1; not stated, 20.

As to the mode of occurrence: In most instances the trouble occurred as a result of a spree, generally together with friends or associates; in a few instances the alcohol was taken by accident. The preparations nearly all undoubtedly contained the drug, methyl alcohol, as the sole or chief toxic ingredient. In 28 cases methyl alcohol was specified; in 12 Jamaica ginger; in 4 Columbian spirits; in 2 essence of lemon or cinnamon; in 1 cologne spirits, so-called; in 1 an unknown alcoholic mixture; in 3 methyl alcohol vapor was inhaled.

As to the quantities consumed: The methyl alcohol series varied from half an ounce to 16 ounces. The Jamaica ginger from 3 ounces to 25 ounces, the larger quantities usually in divided doses over a period of several days. Columbian spirits from 6 ounces to 8 ounces and in 2 cases quantity unknown. Essence of lemon, 5 or 6 ounces in one case, in the other quantity unknown. Cologne spirits less than 8 ounces. Of the unknown strong alcoholic liquor, 15 ounces. Of the three inhalation cases quantity inhaled conjectural.

As to general effect: Headache was mentioned in 19 cases as a conspicuous symptom; gastric pain in 11; nausea and vomiting in 26; dilated pupils in 20.

The results as to visual disturbance were 16 total blindness; total blindness of one eye, 15 partial recoveries, 7 recoveries; 10 remaining cases terminated fatally; sight became dim in three hours in one case; six hours in 1 case; eight hours in 1 case; ten hours in 1 case; twelve hours in 2 cases; twenty hours in 1 case; twenty-four hours in 19 cases; forty-eight hours in 5 cases; three days in 2 cases; six days in one case; seven days in one case; sight became lost in twenty-four hours in 10 cases; in thirty hours in 2 cases; in twelve hours in 2 cases; in forty-eight hours in 3 cases; in three days in 3 cases; in four days in 3 cases; in five days in 2 cases; in six days in 2 cases; in seven days in 1 case; in eight days in 1 case; in seventeen days in 1 case. Of the remaining 21, facts in this connection are not definite.

Certainly few members of the medical profession, and practically no one of the general public, are as yet aware that methyl alcohol taken into the system in moderate or considerable quantity not infrequently causes death, after the manner of the cases just cited. More than this, the people are still less cognizant of the fact that a certain proportion of those who survive the poisonous effect of the drug are condemned ever afterward to the miseries of greatly impaired vision, and, indeed, not infrequently to absolute blindness. It is a remarkable circumstance that notwithstanding the accumulated evidence of many similar recorded facts, there still exists a widespread unbelief in the toxic action of wood alcohol. Not long ago, with the object of discovering cases of methyl alcohol poisoning known to have occurred in Canada, Dr. Buller wrote to thirty or more Canadian oculists, asking each one for his experience in this direction. One sent this reply, which is worthy of record. It runs as follows:

> I have not met with any case of blindness from drinking wood alcohol nor heard of any, *notwithstanding the fact that*

I live quite near one of the largest distilleries of methyl alcohol in Canada. The prevalence of the habit of intoxication from wood alcohol must be greatly exaggerated.

The italics are Dr. Buller's. Two only sent records of cases they had seen; some fifteen replied that they had no experience.

Altogether, Dr. Buller knows of only five reported and three unreported cases in Canada, and has heard of four others, without so far having been able to obtain facts regarding them. Of the five reported cases, three if not four actually occurred in the United States, giving, therefore, up to the present time only one reported and three unreported cases which have happened in Canada. It would thus appear that wood alcohol poisoning occurs much more frequently in the United States than in Canada, since of the 54 cases of which Dr. Buller has collected details, some 47 occurred in the United States and two in Europe.

B.—CASES (HITHERTO UNPUBLISHED) OF BLINDNESS, OR OF BLINDNESS FOLLOWED BY DEATH FROM DRINKING METHYL ALCOHOL.

CASE 1.—(From Dr. James A. Bach and Dr. Joseph Schneider, Milwaukee, Wis.)

D. McK., Ashland, Wis., on Nov. 26, 1903, was taken ill with abdominal pains and diarrhea, while engaged in "scaling" lumber in the northern woods of Redcliff, Wis. Being far from any doctor, he secured a bottle of Hinkley's bone liniment and took the same internally according to directions, a teaspoonful every hour for a few hours, then less often. This treatment he continued from November 26 to November 27 inclusive. On November 29 Mr. McK. found his sight leaving him. Within twenty-four hours he became totally blind in his left eye and partially so in the right eye. He thereon consulted a doctor in Ashland, Wis., who told him that the "liniment" had probably "done the work." The patient is now (May, 1904), a man of about 40 years old, strong and robust in appearance and apparently has no bad habits. There is nothing in his history to account for his condition but the fact that he took the quack medicine as above stated, which was followed so promptly by practical blindness. The left disc is gray-white, and the smaller papillary capillaries and vessels are absent, with the exception of the lower macular artery, which is still seen. The larger arteries and veins are reduced in size about 20 per cent. V. = no perception of light. The right disc is also whitish, with a decided diminution of capillary circulation, but not so marked as the left. V = 3/40. The visual field in the right eye shows a large, absolute scotoma, not quite central, with concentric limitation marked.[1]

CASE 2.—(From Dr. Wilfrid Beaupré, Quebec, Canada. Reported by Dr. Frank Buller, Montreal.)

J. D., aged 42, machinist, was in the habit of indulging in liquor to excess every month or two. After one of these "sprees" on March 6, 1898, having no more whisky on hand, he drank about half a tumblerful of methyl alcohol from a bottle in the house. He took this one drink only and in a few hours drove to the doctor's office nearly blind. His vision in either eye was finger counting at nine inches. He had intense photophobia and pain in the head; the papillæ were white, but the retinæ showed no particular change. He was immediately put on potassium iodid with bromids. For a time there was considerable improvement in his vision so that he returned to work. On March 20, however, he again noticed failing sight and when Dr. Beaupré saw him on March 21, V. R. = 15/40; V. L. = 15/200. The iodid was continued and he returned on the 31st, when V. R. = 15/20; V. L. = 15/40. April 18, 1898, V. R. = 15/40; V. L. = 15/100. April 25, V. R. = 15/50; V. L. = 15/100. Then citrate of iron and strychnia were prescribed. On May 9 the nerve heads were decidedly white. V. R. = 15/75, and V. L. = 15/200. The patient's eyesight now became so defective that he was obliged to abandon his work and engage in selling candy in a small store. Even then he found it difficult to recognize coins or to distinguish the figures on bank bills. When Dr. Beaupré last heard of him he had entirely lost useful vision.

CASE 3.—(From Dr. M. H. Bell, Vicksburg, Miss.)

M. B., man, white, aged 50; occupation, blacksmith. Now in the Mississippi State Charity Hospital under Dr. Bell's care. V., each eye, = light perception; eyes look entirely normal externally. Ophthalmoscope shows no marked changes. There is more pigment scattered over the fundi than is usually found. Nerve heads normal; vessels, both veins and arteries, are small, two-thirds usual size. Two years ago he was working in a "dry" county and, as was the habit there, used "peruna," Jamaica ginger, etc., as stimulants. The patient's usual drink was the ginger, and he told Dr. Bell that he had been taking an occasional drink of it for three or four months. While at work one day he suddenly became blind, so that he had to be led home by another man. This was followed by nausea lasting two or three hours. On the same morning he had taken two or three drinks of ginger, rather indefinite as to quantity. On the following day his sight returned, but since that time gradually failed for eighteen months, after which it has remained the same. He can not now go about without some one to guide him. Although no analysis was made of these beverages, the clinical history and the other facts in the case point directly to methyl alcohol intoxication.

CASE 4.—(From Dr. George H. Bicknell, Omaha, Neb.; Dr. George B. Simpson, Sheridan, Wyo.; Dr. Casey Wood, Chicago.)

G. W. A., ranchman, Scotch, aged 35, had always had good health. An examination by Dr. W. A. Evans of Chicago proved him to be free of syphilis, rheumatism, or any disease of his internal organs. Blood, urine, etc., normal. On July 4, 1899, in company with a number of companions, he proceeded to celebrate the day by getting gloriously drunk. It is not known exactly what sort of alcohol the party imbibed, but it was considerable in amount. For the following four days he suffered from severe and constant frontal headaches, nausea, pain in the abdomen, frequent fits of vomiting and difficulty in breathing. About forty hours after the spree began he noticed a "dazzling" sensation in front of his eyes and in two or three hours more was totally blind. Dr. Wood saw him in consultation with Dr. Bicknell on July 28, 1899, when he said that on July 25 he first noticed his returning eyesight. This improvement in vision continued for a while, but there was a relapse about the time he left for his home in Scotland, the following November. On July 28, 1899, V. R. = no p. l.; V. L. = hand movements in the lower third of the field. Pupils widely dilated. Tension normal. Light reflexes absent; doubtful as to accommodation. Lenses showed a few striæ. Both fundi exhibited blurred papillary outlines with loss of the usual transparent appearance of the nerve heads. Retinal veins somewhat engorged; arteries smaller than normal. This patient was vigorously treated by Dr. Simpson with potassic iodid, electricity and, later, was ordered full doses of iron and strychnia. Improvement for a time set in, with enlargement of the small eccentric field for white in the left eye. In July, 1899, he was able to see shadows and the outlines of large objects in the upper part of the right field and to count fingers at six inches with a small area in part of his upper left retina. On Nov. 13, 1899, his vision was much worse. He, at that time, perceived hand movements in the left eye eccentrically, but there was no light perception in his right eye. The fundus pictures were then greatly changed. The nerve heads showed shallow, atrophic excavations, the discs being whitish; veins of normal size, arteries small. Tension normal in both eyes. The patient was given a letter to Dr. Argyll-Robertson, Edinburgh, and has not been heard from since.

CASE 5.—(From Dr. Emil Bories, Seattle, Wash. Reported by Dr. Hamilton Stillson, Seattle, Wash.)

A German, aged 27, cabinetmaker by trade, drank about two ounces of wood alcohol that was used in a saloon for filling cigar lighters. Seen about an hour afterward. Was in deep stupor, snoring, stertorous breathing; could not be aroused by his companions. Features pale, body cold, bloody froth from

1. An examination of the proprietary remedy referred to in this report was recently made for me by a competent chemist, and found to contain a large percentage of methyl alcohol.—C. A. W.

16 oz MeOH = Death in 36 hr.

mouth, pupils dilated, no reflexes. Had him taken to city jail, where, after heroic rubbing, applying of hot packs, and hypodermic injections of strychnia, he was sufficiently aroused to answer his *name*. Recovery. Vision, as well as his gait, was affected for several days.

CASE 6.—(From Dr. A. H. Brundage and Dr. James W. Ingalls, Brooklyn, N. Y.)

Mrs. M., living at East Brooklyn, N. Y., aged about 35, was addicted to the excessive use of alcoholic drinks and occasionally drank grain alcohol with water and sugar. Having heard that wood alcohol was about the same thing but much cheaper, she purchased half a pint and drank most of it.

She was found partly unconscious and sweating profusely. She was nauseated, vomited severely and was delirious, with pupils dilated. Seemed chilly. Vision gradually became blurred. Died in about thirty-six hours from the time the wood alcohol is supposed to have been drunk.

Treatment.—Free syphonage of the stomach, cold effusions to head, caffein, digitalis, pilocarpin, external heat, oxygen, rectal injections of hot coffee, and also of normal salt solution.

CASE 7.—(From Dr. Henry D. Bruns, New Orleans, La.)

A man, about 50 years of age, came to the clinic in 1902 with the following history: He had made toddy one evening with Columbian spirits, of which he took several drinks, using at least an ounce of the wood alcohol. Shortly afterward his vision completely failed him. He then regained much of his sight for a brief period, but finally became totally and permanently blind.[2]

CASE 8.—(From Dr. Henry D. Bruns, New Orleans, La.)

This case,[2] is that of a man of middle age who ingeniously concocted a "highball" whose spirituous portion consisted of a popular "antiseptic." He promptly became blind, but when seen a week later had somewhat improved in vision. He left the clinic and it is not possible to say whether the improvement held or not. Dr. Bruns had the proprietary article employed by this patient analyzed by the chemist of the board of health. It contained a large percentage of wood alcohol.

CASE 9.—(From Dr. A. E. Bulson, Jackson, Mich.; Dr. Pray, physician to the State Prison, Michigan; Dr. J. F. Byington, Battle Creek, Mich.)

John C., convict, aged 48, appeared March 5, 1903, at morning sick call and asked to be excused from work. He walked unsteadily and the pupils were somewhat dilated. He said he had eaten no breakfast and had vomited. On accusing him of having taken some drug he admitted that he had drunk wood alcohol. This was used in the prison shirt shops for dampening collars for the purpose of turning them. The mixture was equal parts of wood alcohol and water with glycerin, 2 ounces to the pint. On March 3 patient consumed 10 ounces of this mixture, and on the next day 4 ounces. He was sent to the hospital and treatment, consisting of large doses of bismuth, given to quiet the intense burning pain in the stomach. At 7 p. m., although the electric light at the head of his bed was turned on, he asked to have a light; in other words, he was apparently blind. Dr. Pray says the blindness came on quite suddenly. He instituted alternate hypodermics of pilocarpin and strychnia every four hours (1/16 gr. pilocarpin, 1/30 strychnia), and potassic iodid grs. 20. On March 10 the patient could distinguish the hand held close to his eyes. March 15 he could see quite plainly. March 18 again failing vision, and on March 24 very poor vision. Discharged from hospital March 27. Strychnia and potassic iodid continued in pharmacy. Vision 7/30. Dr. Bulson examined this case later and found only light perception in the right eye with blue white discs, and marked retinal changes, the former more pronounced on the temporal side. In the left eye V.=8/200 for central vision; about the same changes in the papilla. There was a decided contraction of the peripheral field. In September, 1903, Dr. Byington again examined this man who, then a blind peddler, presented himself with the request that the physician, as a matter of charity, give him a "statement of his case" so that he could the better dispose of his small stock in trade. Dr. Byington made only the superficial examination demanded by the patient and found V.=finger counting at 3 to 4 inches in each eye, associated with white atrophy of both nerve heads—each lamina cribrosa being distinctly visible at the bottom of a shallow, atrophic excavation.

CASE 10.—(From Dr. Homer Collins, Duluth, Minn.)

J. A., aged 46, carpenter, Cromwell, Minn., was in the habit of going on several sprees yearly, but avoided liquor between these sprees. Used tobacco, smoking or chewing about "ten cents' worth a week." On Nov. 22, 1901, with a companion, he drank about one dozen bottles of Jamaica ginger bought at Cromwell. The following day the companion vomited freely, but his eyes did not suffer. The patient vomited "everything" the next day and his eyesight began to fail at once. On the second day he could distinguish only light from darkness, and remained in this condition for two days. Then improvement of vision began and continued until about Dec. 12, 1901, when V.=2/200 (white letters) in either eye. Right half of each field was covered by a scotoma, the most acute vision being eccentric, to the nasal side of the fixation point. In the left eye the field is very little contracted; central vision is best. There is some tenderness above and behind the eyeballs. The patient gave the history just outlined and stated that immediately after the poisoning he had considerable pain in his eyes, which were too sore to touch. He was put on pilocarpin treatment, under care of the county physician, and on December 22 thought he could see a little better, but tests showed no improvement, and there has since been little change in his condition. Bilateral, post-neuritic optic atrophy.

CASE 11.—(From Dr. Coote of Quebec, and Dr. Frank Buller, Montreal, Canada.)

A man between 28 and 30 years of age, well built and healthy in appearance, without any history of a serious illness, while working in a lumbering camp, caught a slight cold. To cut the trouble short he took what he considered a big dose, about a wineglassful, of methylated Jamaica ginger. He commenced to suffer from violent headaches and retching shortly afterwards. Some twelve or fourteen hours later his sight commenced to grow dim. A second dose was then taken and his sight grew worse. He was taken home and, with the exception of his eyes, he was shortly well again. About three months later, when he appeared at the hospital, central vision in both eyes was completely lost. Toward the periphery of the field of vision in both eyes a few patches of retina remained sensitive to light and fingers could be seen at a couple of feet. The pupils reacted to light and on convergence. Both discs were pale (not white) and the margins well defined; the arteries and veins were contracted, but not equally; the media were clear. He was kept in the hospital for some weeks, but the treatment was of no avail.

CASES 12 and 13.—(From Dr. Homer Collins, Duluth, Minn.)

In the year 1900 (exact date unobtainable), an Indian from one of the Minnesota reservations, accompanied by an Indian attorney (G. H. B.), consulted Dr. Collins. The history of the case showed that at least six Indians, having procured a supply of essence of lemon, drank freely of it. Three died promptly, evidently from the direct effects of the beverage, one of them becoming blind before death. Two others suffered considerably, but recovered without apparent damage to any of their organs. The sixth Indian, the patient under discussion, survived, but became totally blind. An ophthalmoscopic examination revealed marked atrophy of both optic nerves.[3]

2. This case, as well as the next one, is entered in the tables published by Dr. Bruns in the annual report for 1902 of the New Orleans Eye, Ear, Nose and Throat Hospital.

3. Through the kindness of Dr. J. W. Chamberlin of St. Paul, Mr. G. H. B. wrote me the following note, giving further information regarding this matter: "Your letter of inquiry reached me at White Earth, Minn. In reply, an Indian trader, named Malone (afterward prosecuted by the U. S.), sold to several Mille Lac Chippewa Indians a number of bottles of essence of lemon on June 28, 1897, which they drank in lieu of alcohol, when that had been exhausted. A large number of Indians drank alcohol; only six or eight drank the essence of lemon. The latter were all taken seriously ill within an hour after they began to drink the essence, and three of them died before morning. I can recall the name of only one of those who died, a chief, Mah-che-ke-wis. Another Indian, Bud-dub-ay-keshig, became blind, and has not since recovered his sight. He is still living at Mille Lac, Minn. The others, although very sick, recovered without any bad effects. It was thought at the time that the death of the Indians was due to the wood alcohol in the essence of lemon." C. A. W.

CASE 14.—(From Dr. W. G. Craig, Hartford, Conn.)

M. J., colored, aged 50, was given as a beverage a mixture of sugar, water and Columbian spirits, about three fluid ounces in all. This was on April 30, 1902. The dose was followed by nausea and vomiting and in twelve hours by complete loss of vision. She recovered her sight to some degree, but a month later it was only 1/6 in each eye. Nerve heads chalk white.

CASE 15.—(From Dr. M. M. Cullom, Nashville, Tenn.)

While acting as interne in the Manhattan Eye and Ear Hospital, New York City, the following case came under Dr. Cullom's care:

In October, 1897, a workman was brought into the hospital with the following history: Two nights before he drank some wood alcohol in his room. It threw him into a stupor and, as he expressed it, "When he waked it was so dark that he supposed it was still night." He groped his way out into the hall and asked some one the time, and was informed that it was about 9 o'clock in the morning. The following day he was brought to the hospital. His pupils were widely dilated and did not respond to light. He had only perception of light in both eyes. The ophthalmoscope showed both nerve heads to be milk white in appearance and the entire fundus was blanched, the vessels being much smaller than normal. He was put on increasing doses of strychnia nitrate, administered hypodermically, which were carried to the physiologic limit. The vision improved for a short time until with his left eye he could count fingers, but the improvement was soon lost and he was discharged as hopelessly blind. There was no attempt made to secure a sample of the alcohol.

CASE 16.—(From Dr. I. F. Dickson, Portland, Ore.)

Two teamsters, strong, healthy men, under 30 years of age, who had been working hard all night, arrived at a friend's house in the early morning, much fatigued. The friend offered them a drink of something that, he said, "would make them feel better." He accordingly prepared a mixture of wood alcohol and water sweetened with syrup. One man died toward evening. The other took only a few mouthfuls and spat some of it out, as he did not like the taste. Shortly afterward he became unconscious and remained so till next morning. When he awoke he could only distinguish light, and within three weeks the sight was entirely lost. About this time the discs began to show signs of atrophy; otherwise the fundi were normal. He was first seen by a physician shortly after taking the drink, when it was noticed that the pupils were slightly dilated, but nothing abnormal was then seen in the background of either eye and no fundus changes appeared for about three weeks. The latest report from the patient is that he is still totally blind.

The following case is of great interest owing to its early occurrence (1898). It was one of the first examples of blindness due to bay rum made from Columbian spirits:

CASE 17.—(From Dr. J. A. Edwards, Columbia, Tenn.)

In February, 1898, he was called to Centerville, a town thirty-one miles distant, to see a young lawyer, W. A. K., aged about 26 years, who gave the following history: Living in a "dry" town and being in the habit of going on periodical sprees he called on a friendly physician who was in the habit of giving him a prescription containing alcohol and any other simple drug which would protect the druggist filling it from prosecution for violation of the liquor laws. On this occasion he was given, to supply the needed alcoholic beverage, as well as to protect the druggist against the provisions of the prohibition law, the following prescription:

R. Bay rum ..... 2 fluid ounces.
Alcohol ..... 4 fluid ounces.
Sig.: To be applied externally.

He drank all this in an hour or so, and was afterward seized with violent pains in the stomach, nausea and vomiting, which continued about 24 hours, when he became totally blind. Dr. Edwards found him with pupils widely dilated and some tenderness of the globe on firm pressure. Having obtained the above history of his case the diagnosis of retro-bulbar neuritis or toxic amblyopia was made. At that time very few reports of such cases had been published, but he was given an unfavorable prognosis, and was told that his vision would probably clear up in from ten to twenty days, but that blindness, either partial or complete, might recur from secondary changes in the optic nerve. The patient promised to call on Dr. Edwards in a few days, but saw, instead, another very competent oculist, under whose care for three or four weeks his vision cleared almost to normal. Very soon thereafter his sight again declined to 20/60, with scotomata in parts of the visual field. He still sees only well enough to read very large print, and that with much difficulty, on account of the scotomata. He practices his profession, but is very much handicapped, his wife being obliged to assist him in his legal work. Investigation developed that the "bay rum" in this prescription with which he was poisoned, was put up by a firm in Buffalo, N. Y., and made of Columbian spirits.

CASE 18.—(From Dr. W. E. Driver, Norfolk, Va.)

J. B., male, white, age 25, U. S. sailor, brought July 12, 1898, from the U. S. Naval Hospital, by the surgeon in charge. He gave the following history: One week since the patient and two of his companions, who were in charge of a naphtha launch, indulged freely in the wood alcohol used in starting the engine. He and his companions were made desperately sick, and he became totally blind.

The pupils were widely dilated, but there was no visible pathologic change in the fundus. The diagnosis was wood alcohol amblyopia. Treatment was potassium iodid, ten grains three times a day at first; increased doses later. July 16, 1898, pupils still widely dilated. Had something more than light perception in each eye. Optic nerve, each eye, decidedly paler than at the previous visit. July 23, 1898, decided improvement in vision of each eye. Can now recognize large objects. Both pupils widely dilated. Eyes very bright. Both optic nerves show decided pathologic changes, and very much whiter than at previous visit. Dr. Driver learned from the Naval Hospital that soon after the last visit to his office, the patient was discharged from the Navy and nothing further was heard of his case. His two companions died during the debauch, from the effect of the intoxication.

CASE 19.—(From Dr. W. E. Driver, Norfolk, Va.)

A. H. S., male, white, aged 25, came Feb. 2, 1903. Referred to Dr. Driver by Dr. Holland of Holland, Va. The patient became suddenly blind ten days before. When he went to bed he could see as well as ever; on waking was totally blind. Had been drunk from cider purchased from a country store.

Right eye: Cornea very bright and glistening. Pupil widely dilated. Optic nerve pale, but no other pathologic change in fundus. No light perception. No reaction of pupil to light.

Left Eye: Cornea clear and bright. Pupil widely dilated. Nerve white. No reaction of pupil to light.

Diagnosis: Wood alcohol amblyopia.

Patient was sent to hospital and given potassium iodid, 10 grains three times daily, and twentieth of a grain of strychnin. On February 9 vision began to return in left eye. Has light perception. No improvement in right eye. February 15, counts fingers one foot from left eye. Light perception only in the right eye. Optic nerve, each eye, decidedly paler than normal. February 23 patient went home, with no improvement in the right eye, but counts fingers at three feet with left eye. Nerve, each eye, white, bluish tint. Pupils widely dilated. Corneal reflex extremely bright.

This man has consulted Dr. Driver three times since he left the hospital the first time. There has been no improvement in vision of the right eye. With left eye vision is 6/200.

CASE 20.—(From Dr. William H. Dudley, Easton, Pa.)

Ralph W., single, aged 30, an essence peddler, about June 15, 1903, took for a "cold," diluted with water, four ounces of what he says he bought for grain alcohol. Two days later his vision became very bad, and when seen three months later his optic discs were quite white; fields were narrowed; vision 1/200 right and left. Seven months later his condition remained practically the same. Patient states that as soon as he had

drunk the alcohol he discovered his mistake, realizing then that he had taken wood alcohol.

CASE 21.—(From Dr. H. P. Engle, Newton, Iowa.)

G. F. of Mingo, Iowa, aged 45, drank at least half a pint of Columbian spirits diluted. He lived forty-eight hours, but before death there were present gastrointestinal irritation, blindness, delirium and collapse.

CASES 22, 23 and 24.—(From Dr. W. H. Ford, Sulphur, Ind. Ter.)

As detailed elsewhere in this report, four men, aged from 30 to 40 years, went on a spree with methylated bay rum. Two, who consumed large quantities of the poisonous perfume, died. There is no history of blindness in one case, but the other, S. B. B., age 24, who succumbed to the poison, lived about eighteen hours, and suffered the most excruciating pain in stomach and bowels. Even though heroic doses of morphia, administered hypodermically, were given him, he had to be held in bed. He was totally blind most of this time. About an hour before death his pulse became imperceptible at the wrist, his heart being very rapid all the time. The odor of methyl alcohol was very noticeable in the perspiration, which was very profuse. The two that survived, aged 29 and 37, suffered for some twelve to fourteen days with marked ocular disturbances. Vision was very indistinct; it seemed at times as if they were "looking through a moving screen." Again, in a few hours there would be a total loss of the outlines of objects. After two weeks vision appeared to return.

CASE 25.—(From Dr. P. G. Goldsmith, Belleville, Ont., and Dr. Sprague, Stirling, Ont., and from the *North Hastings Reporter*, June 15, 1904.)

William Sutherland of Monteagle met his death under very distressing circumstances on Monday night. He had returned from working with the chemical company near Orillia and brought a bottle of wood alcohol with him to let his neighbors see it. Not suspecting its poisonous nature he let some of them taste it. Finding it too strong, they were all satisfied with merely tasting it. But Sutherland, it is estimated, took about a wineglassful. In a short time he complained of difficulty in breathing, then of blindness, and asked for a physician, who was sent for. He soon lapsed into unconsciousness and died before medical aid could arrive. Deceased was a respectable farmer about 45 years of age, and a widower, having two sons. The sad event cast a gloom over the community.

CASE 26.—(From Dr. A. H. Gordon and Dr. Frank Buller, Montreal, Quebec.)

B. K., aged 40, female, domestic, alcoholic. On Jan. 18, 1904, had been drinking for two days. Drank one quart of whiskey, a half-pint mixture of gin and spruce gum, as well as nearly eight ounces of wood alcohol. Vomited all one morning, and in the afternoon became excited, partially delirious. Complained of severe headache, pain in arms and fell to floor unconscious. Later, general convulsion and death in half an hour after convulsion. Half an hour before falling she groped about the room calling for light, evidently completely blind. Pupils widely dilated and inactive. The cause of death was undoubtedly the wood spirit drunk within twenty-four hours of her death. The autopsy showed no brain or kidney lesion.

(To be continued.)

POISONING BY WOOD ALCOHOL.

CASES OF DEATH AND BLINDNESS FROM COLUMBIAN SPIRITS AND OTHER METHYLATED PREPARATIONS.

FRANK BULLER, M.D.
MONTREAL
AND
CASEY A. WOOD, M.D.
CHICAGO.

(Continued from page 977.)

CASES 27 and 28.—(From Dr. Frank A. Grace, Munising, Mich., Dr. T. W. Scholes, Munising, Mich.)

J. B., aged 37, nationality French, occupation woodsman, date of death, Nov. 14, 1898. L. B., aged 40, nationality French, occupation woodsman, date of death, Nov. 14, 1898. Symptoms in both cases, great suffering from pain in abdomen, especially in region of stomach, vomiting, severe headache, total blindness and severe prostration. The post-mortem findings consisted principally of a marked congestion of the gastric mucosa, also of liver, kidneys and vessels of brain. The conclusions arrived at were that while the local changes produced by this alcohol were quite prominent, death was undoubtedly due to the systemic effect of the poison. These two men who died from the poisoning were brothers. They came to Munising, went to a saloon and, as they stated, called for "good" alcohol. The saloonkeeper says he understood them to say "wood" alcohol. He not having alcohol in stock, went to a drug store and bought two quarts of wood alcohol for each. He delivered it to them and they left town in the evening and walked to camp. The alcohol was not labeled "poison." They both reached camp and were soon taken sick and Dr. G. M. Gould, formerly of Munising, was called to attend them. He found they had drunk a little less than two quarts between them. One of the men died about fourteen hours after they bought the alcohol and the other about seventeen hours after.

CASE 29.—(From Dr. Herbert Harlan, Baltimore.)

Storekeeper in Dorchester County, Maryland, went on a spree with Jamaica ginger. He became entirely blind, but is so ashamed of his performance and, believing his case to be hopeless, declines to see an oculist or to discuss his case with one. Dr. Harlan obtained the report from his family physician, whom he knows to be a competent and reliable observer.

CASE 30.—(From Dr. Herbert Harlan, Baltimore; Dr. P. B. Barringer, Charlottesville, Va., and Dr. Francis Lee Thurman, Keswick, Va.)

W. H. J., aged 38, a respectable and well-to-do merchant of Keswick, Va. Some five years ago, on a certain Sunday (July 15, 1899), not feeling well, took a drink of Gilbert's Jamaica ginger. After taking one dose he felt no better and took a second, later in the day taking several others. On the following day he took one more dose, drinking in all two or three ounces of the "ginger." On Monday he complained of nausea, weakness, vomiting, intense headache, giddiness and, later in the day, became blind. The blindness increased so much that in three days he could not perceive light from darkness. Then his vision gradually improved so that in another ten days it reached the acuity it at present exhibits. There has been no change in the fundus conditions during the past four years. He was then treated by Dr. Thurman and saw an oculist in Richmond, Va., whose name he did not recall. Two years afterward, when examined by Dr. Harlan, he had marked optic nerve atrophy, with some vision in the periphery of each field sufficient to allow him to get about in familiar localities.

Analysis of the Jamaica ginger taken by this patient showed that it was 70 per cent. wood alcohol.

CASE 31.—(From Drs. Alvin A. Hubbell and Lucien Howe, Buffalo, N. Y.)

Dr. B. W. S., Stockton, Chautauqua County, N. Y., consulted Dr. Hubbell in April, 1901. In March, 1899, he accidentally drank about an ounce and a half of wood alcohol. This dose was repeated the next two days—three doses in all—after which his vision became dim in both eyes. He could see well enough to get about, but was unable to read print. V. R. = 5/30, and no Jaeger; V. L. = perception of light. As Dr. Hubbell saw him once only and as he failed to keep his promise to return, the visual fields were not measured. The fundi showed well-marked atrophy of both discs. Dr. Howe saw him before this, on June 12, 1899, and adds that, at that time, the patient thought his sight in the right eye had gradually improved. The right pupil was torpid, arteries small, discs pale; V. = 20/50 and Sn. three, field slightly contracted. In the left eye the same condition, only more exaggerated. Disc decidedly atrophic; V. = fingers at six feet; Sn. 20 at twelve inches; field regular, about two-thirds normal limit. In a letter to Dr. Howe from the patient six months later he reported his condition to be about the same.

CASE 32.—(From Dr. M. A. Hughes, Salt Lake City, Utah.)

T. A., aged 40, stone mason, consulted Dr. Hughes in January, 1902, for a sudden attack of almost complete blindness. The history showed that he, with several companions, had drunk freely of wood alcohol on a certain Sunday. When he awoke next morning he found that he could scarcely see. On examination his vision was reduced to 10/60 in the right eye and 10/40 in the left. Under increasing doses of strychnia, given hypodermically, his sight improved slightly. A year after the poisoning he was, however, unable to resume his trade and the damage to sight seemed permanent.

CASES 33 and 34.—(From Dr. Edwin E. Jack, Boston, Mass.)

"I have seen two cases of atrophy following the ingestion of methyl alcohol in the crude form. One, J. P., aged 71, old soldier, bought a pint and drank part of it. Both had a long period of insensibility and both were blind on regaining their senses; a neuritis followed by rapid atrophy."

Although Dr. Jack was not able to find, in his hospital records, the detailed case histories of these patients, there is every reason to believe that they have not been published before and that they have not been duplicated in this report.

CASE 35.—(From Dr. Edward Jackson, Denver, Colo.)

A woman, addicted to alcoholism, resorted to a jug of wood alcohol that her employer kept for a lamp. The quantity taken is uncertain. She suffered from severe gastrointestinal irritation, vomiting and impairment of vision. Next morning all "looked black," but she could see a light brought into the room. In three days vision began to improve rapidly. On the eighteenth day V. = 4/60, R. and L. The optic discs were red, hazy and slightly swollen, their outlines hidden. The retinal vessels not much altered. She and her daughter said that before taking the wood alcohol she could thread the finest needle. She was not seen after the twentieth day.

CASE 36.—(From Dr. J. H. Jamar, Elkton, Md.)

A drunken male tramp, aged 37, having procured a quantity of wood alcohol, ostensibly for a different purpose, proceeded with a companion (whose case is elsewhere recorded), to go on a spree by the wayside. His female companion promptly died, but he survived, was placed in jail, there being no hospital in the city, and came under Dr. Jamar's care. The patient was found to be in a highly excited, delirious condition; face purple; decided odor of alcohol about him. Emetics followed by calmatives were prescribed and the patient began to improve. His eyesight was greatly affected for the first day or so, but improved in a few days, when he was discharged. The final outcome of the case as regards vision is not known.

CASE 37.—(From Dr. Dryden H. Lamb, Owosso, Mich.)

J. F., male, aged about 25, one of three men who together went on a spree. After having absorbed all the ordinary alcoholic beverages they secured some Columbian spirits and drank a considerable quantity of it; exact quantity is not known. One died shortly afterward and the others were very ill, both of the survivors suffering from amaurosis. One case was treated by Dr. Lamb, the other elsewhere. There was marked contraction of the fields in both eyes and vision was permanently reduced to 20/100 and 20/80, right and left eye respectively. Previous history good.

CASE 38.—(From Dr. Dryden H. Lamb, Owosso, Mich.)

J. B., aged 30, imbibed an unknown quantity of Columbian spirits and in a short time was totally disabled from loss of eyesight. R. E. V. was 20/200; L. E. V. was 10/200, with

narrowing of fields. Condition at present but slightly improved. Optic atrophy.

CASES 39, 40 and 41.—(From Dr. Dryden H. Lamb, Owosso, Mich.)

Owing to destruction of complete records of these three cases (during two and one-half years' absence on military duty) Dr. Lamb is unable to give details of the visual fields, fundus changes, etc., but has a distinct recollection of the main facts, which point conclusively to methyl alcohol blindness. So far as Dr. Lamb knows, the cases are here published for the first time. About four years ago three Swedes, addicted to alcoholic debauches, purchased deodorized wood alcohol because it was cheap, reduced it with water and drank "not a large quantity" of it. The eyesight was affected in each instance and it was on account of this failure of vision that Dr. Lamb saw them. Central vision was greatly reduced, the visual fields were much contracted and the fundus pictures were those of optic atrophy. Under treatment vision improved somewhat in all the three instances, and when they could readily get about the men left town and have not been seen in Owosso since.

CASE 42.—(From Dr. Eugene Richards Lewis, Dubuque, Iowa.)

J. C., aged 38, chronic drunkard and loafer about saloons; also heavy smoker, with a "specific" history. At noon one day, while prowling about the house of a woman he had recently married, he discovered a large bottle of wood alcohol, of which he drank an unknown quantity. Toward evening Dr. J. S. Lewis of Dubuque was summoned and found the man totally blind. The patient died during the night, so that a fundus examination, which was arranged for the following morning, could not be made.

CASE 43.—(From Dr. F. Park Lewis, Buffalo, N. Y.)

M. F., aged 49 years, had used alcohol for thirty years and was in the habit of taking it to excess whenever opportunity offered. She was an inmate of the Erie County Hospital in the year 1900. One afternoon, finding a large cup half filled with what she supposed to be alcohol, and which was in fact methyl alcohol, used for cleaning purposes, she drank the whole of it in two draughts with an interval of about half an hour, the total amount consumed being about four ounces. After a short period of excitement she passed into a stupor which lasted until late the next morning when, on being aroused, she found herself absolutely blind, and from that period until the present time, about four years, she has had no perception of light whatever.

She did not come under the observation of Dr. Lewis until the beginning of his service, some six months after this event. Then both optic nerves were found to be atrophic and the retinal vessels reduced in size. The woman is still an inmate of the County Hospital. She has a catarrhal conjunctivitis, but otherwise is apparently in good health. No consequences seem to have followed the toxemia except the almost immediate complete and permanent blindness.

CASE 44.—(From Dr. J. A. Lippincott, Pittsburg, Pa.)

F. C., aged 47, laborer, drank a large quantity of wood alcohol and within twenty-four hours sight began gradually to fail and was never regained. No light perception. Pupils slightly dilated and rigid. The ophthalmoscope shows clear media. Discs a grayish silvery white, with sharply defined margins. Upper and lower temporal veins of normal caliber. All other vessels almost obliterated or reduced to mere threads.

CASE 45.—(From Dr. J. A. Lippincott, Pittsburg, Pa.)

J. R., aged 31, oil well driller, drank 24 ounces of Jamaica ginger between 2 and 3 o'clock in the afternoon. At midnight he awoke with severe browache and sight much impaired. In a few minutes he became stone-blind, in which condition he has remained ever since. External appearances are normal except that the pupils are dilated (5½ mm.) and not responsive. Tension slightly elevated, especially on right side. Eyeballs tender to touch, especially above. No light perception.

Ophthalmoscope examination: R. E., media clear; outer margin of disc perfectly sharp; upper margin very much blurred, the blurring extending upward, with radiations over the retina for fully a disc diameter, but more pronounced, and extends downward 1½ disc diameters. In this area the retina is edematous and the vessels are interrupted in places. Inner side of retina slightly hazy. Macular region normal in appearance. L. E., disc slightly hazy and surrounded by a hazy zone about 1½ disc diameters wide. Retinal vessels slightly tortuous. Knee reflex absent.

Treatment: Iodid of potassium in large doses; leeches to temples; pilocarpin sweats daily; rest in bed; strychnin to be given a little later.

Feb. 25, 1901. V. R. E. = light perception. V. L. E. = fingers close to eye. Pupils still dilated, but responsive, though sluggish. R. E. disc bluish-white, with boundaries pretty sharply defined. Retinal vessels about two-thirds of normal size. L. E., swelling of nerve head much reduced, leaving central physiologic excavation white; rest of disc is of a grayish-white color. Pilocarpin stopped. Iodid and strychnin continued.

April 23, 1901. He states that about five weeks ago could see well enough to walk about, but about that time the sight began to fail, until he became entirely blind. Dec. 10, 1901, pronounced atrophy of optic discs.

CASE 46.—(From Dr. R. S. Magee, Topeka, Kan.)

Mrs. S. P., aged 33, Topeka, consulted Dr. Magee on July 8, 1901. The patient had always had good vision until four weeks previous to this date. She suffered from painful menstruation, for which she was in the habit of taking whisky. A month before consulting the physician she discovered she had no whisky in the house, so drank instead a medicine glassful of wood alcohol diluted with the same quantity of water. This dose was taken in the evening just before retiring. The next morning she noticed decided dimness of vision, unaccompanied by pain in either eye. Dr. Magee found vision in the right eye to be 10/100; left eye 4/200. The mirror showed "woolly" discs and the remains of small hemorrhages in both fundi. He had an opportunity of seeing her once more, at a later date, and found central vision worse and gradually failing.

CASE 47.—(From Dr. J. G. McKinney, Barry, Ill.)

James Riffle, jeweler, drunkard, in the absence of whisky drank extract of lemon, which produced blindness, followed by death in less than two days. The extract of lemon was examined by an expert chemist and found to be composed almost entirely of wood alcohol.

CASE 48.—(From Dr. J. E. Minney, Topeka, Kan.)

As reported in another column, a farm hand, one of nine Poles, living in this vicinity, who indulged in a debauch and drank nearly two gallons of methyl alcohol before the termination of the spree, became blind. This was during the year 1889. The loss of vision in this instance was unequal, the one eye being much more affected than the other, although they both exhibited the fundus signs of optic nerve atrophy.

Dr. Minney saw the case first about ten weeks after the intoxication. The man was then able to go about the farm and do work not requiring good vision. The last report from him was that there was no improvement.

CASE 49.—(From Dr. T. W. Moore, Huntingdon, W. Va.)

G. S., aged 36, baker, was first seen Jan. 23, 1904. Drank an unknown quantity of wood alcohol Sept. 15, 1902, and was totally blind thereafter for nearly three weeks. Both discs are now pale, right one decidedly so. Vision: R. E., fingers at 12 inches; L. E., with lenses, 20/40.

CASE 50.—(From Dr. T. W. Moore, Huntington, W. Va.)

S. T., aged 45, white, house painter, married. Uses tobacco and alcohol, the latter to excess. Had been working in a frame factory and using wood alcohol in mixing his paints. On Oct. 6, 1900, he drank one-half pint of the methylated spirits. This was followed the next day by other alcoholics. Vomited excessively all that night, and on the following morning was totally blind. Had flashes of light before his eyes quite frequently; no pain at any time in eyes, although slight frontal headache. On October 18 Dr. Moore saw him for the first time. He had perception of light and said he could see moving objects, although he subsequently failed to do so in the physician's of-

fice. Pupils dilated and did not respond to light. Both discs were slightly blurred on the nasal side; arteries normal, veins engorged and tortuous. One year later the patient was still totally blind, and both discs were white.

CASE 51.—(From Dr. H. Moulton, Fort Smith, Ark.)

In addition to the cases reported by him in the *Ophthalmic Record* for July, 1899, and November, 1901, Dr. Moulton submits the following case history: S. W. McK., age 52, of San Bois, Ind. Ter., drank, April 22, 1902, four bottles of essence of lemon. Next day he began to lose his eyesight, and on the third day he was totally blind. After three or four days he began to see again. He reported that, as treatment, "his doctor made him sweat." On May 23, 1904, one month after the poisoning, Dr. Moulton found vision in his right eye to be 10/100; in the left, finger-counting at three feet. The ophthalmoscope showed temporal pallor of the nerve heads. The pupils were abnormally dilated. Unfortunately, the patient did not return, as arranged, to have his visual fields measured.

Dr. Moulton remarks that cases of poisoning from adulterated drinks are very common in Indian Territory.

He believes that at least 50 deaths have occurred in that country from this cause.

The sale of ordinary alcoholic beverages is strictly prohibited there by the United States Government, and thirsty souls are perforce obliged to drink anything containing alcohol, Jamaica ginger, witch hazel, or even "peruna."

CASE 52.—(From Dr. F. G. Murray, Cedar Rapids, Iowa.)

The patient was a cook (male) in a lumber camp in the summer of 1902, in northern Michigan. Previous to taking this job he had been indulging heavily in liquor, but had not had access to it for a number of days previous to his arrival at the camp. There was no liquor accessible nearer than the railroad station, 30 miles away. He seemed to have normal vision and command of his muscles at this time, for he did a little hunting and brought down game with a rifle at a moderately long range. This was the first of the week, in June, 1902. To satisfy his craving for alcohol, he commenced drinking a proprietary "liniment for both internal and external use" kept in the "van," or camp store. In the space of three or four days he drank at least 72 ounces of this remedy. He became weak and somewhat incoördinate in gait, and his eyesight began to fail, so that by the end of the week he could barely distinguish hand movements before his eyes. The pupils were widely dilated; the skin cool and moist. No ophthalmoscopic examination was made, and Dr. Murray does not remember whether there was or was not ptosis. The subsequent history of the case is not known. The patient went to Marquette, Mich., presumably to the hospital there. It was reported that he was seen some time after on the streets, with improved eyesight. There were, in addition to the "liniment," some common extracts used in cooking about the camp kitchen, but there is no evidence that he drank any of them. If he did, it was only a small amount.

The liniment referred to is largely used in the camps of that region (near Sault Ste. Marie) to "sober up" on, and it is a common belief among the woodsmen that free indulgence in it will cause blindness.

CASES 53, 54, 55.—(From Dr. Charles A. Oliver, Philadelphia, Pa.)

"I have had three indisputable cases: two at Wills Hospital and one in private consultation. Of the two public cases, one had his central vision reduced to 1/8 of normal; the other to 1/15, both by reason of large positive scotomata. Both patients, men of 30 and 35 years of age, were rendered practically useless for continuance of their daily work as skilled laborers. The private case, an important man in a not far distant community, was compelled to discontinue a remunerative employment for an extremely precarious and uncertain agency.

"The cases I saw were primarily mine, were never published, and will not interfere with Dr. Buller's statistics (of published cases). The histories of the public ones are buried in my special Wills Hospital case books. I used them alone for class demonstration. One case, I remember, was wood alcohol in coffee. I do not remember the amounts ingested."

CASE 56.—(From Dr. S. A. Oren, Lewiston, Ill.)

Frank H., aged 48, laborer, a habitual drunkard, had been on a spree, and after drinking freely of "lemon essence" was found, Nov. 4, 1903, in a barn unconscious. Dr. Oren saw him shortly afterward and endeavored to restore him, but without avail. He recovered sufficiently to articulate, but became delirious before he died, within 24 hours after finding him. He was quite blind before death. His pulse was very weak and did not respond to stimulants.

CASE 57.—(From Dr. C. E. Patterson, Grand Rapids, Mich.)

Mr. H., aged 17, an habitual drinker of spirits, consulted Dr. Patterson several years ago on account of the nervous symptoms engendered by this habit. He used to buy the pure alcohol, dilute it with water and drink it to complete intoxication. On one occasion a mistake was made, and he was given wood alcohol (probably deodorized), and, as usual, proceeded to imbibe it to full drunkenness. This was on a certain Friday night. He awoke next morning totally blind. He recovered from the other effects of his spree, but has never regained his eyesight, there being complete destruction of both optic nerves.

CASE 58.—(From Dr. J. A. Patton, Stilwell, Ind. Ter. Dr. T. S. Williams, Stilwell, Ind. Ter.)

P. F., aged 24, single. Dr. Patton saw him first Feb. 28, 1904, 9 a. m. He had vomited since 10 o'clock the night before, after drinking six or seven bottles of lemon extract. It was afterward learned that he had been drinking lemon extract for three or four days. Pulse, 80; temperature normal; respiration, 25; capillary circulation not good. Complained of some burning pain in stomach. Could see and recognize persons within a few feet of him, but at a distance of 10 or 12 feet, as he expressed it, "everything looked white." At 1 p. m. he was totally blind. Respiration very rapid; partly unconscious. Pulse, 65 or 70, but full. At 3 p. m., unconscious; pulse slow but strong; great dyspnea; skin cold and clammy. 5 p. m.—Had several severe convulsions. Died at 5:40 p. m., Feb. 28, 1904.

Dr. Patton had the lemon extract drunk by this man and by the patients whose cases are subsequently detailed by him in this report analyzed. It was found to consist largely of wood alcohol.

CASE 59.—(From Dr. J. A. Patton and Dr. T. S. Williams, Stilwell, Ind. Ter.)

W. H. H., aged 60, married, merchant. He had drunk lemon extract, with others, for three or four days. Complained to friends on the afternoon of February 29 that "everything looked white" and that he couldn't see well. Had vomiting and other gastrointestinal symptoms, such as severe cramps. He went home to his wife, who cared for him until 4 a. m., March 1, when physicians were called. At that time he was totally blind, unconscious and had a slow pulse; respirations labored. Died after convulsions, 8 a. m., March 1, 1904.

CASE 60.—(From Dr. J. A. Patton, Stilwell, Ind. Ter., and Dr. J. T. Clegg, Siloam Springs, Ark.)

S. T., aged 34, married. Had drunk lemon extract for three or four days. On the morning of Feb. 28, 1904, he went to Siloam Springs. He was apparently in good health and sober during the day. About 7 or 8 o'clock p. m. he went to the hotel and complained of blindness, dyspnea and pain in the stomach. Dr. J. T. Clegg of Siloam was called, who gave the following history: Respiration very labored, with a prolonged expiratory effort; pulse slow (48 to 50). Other symptoms closely resembled the foregoing case, with the exception of the muscular spasm; he had no convulsions. Died at 1:15 a. m., Feb. 29, 1904.

The lemon extract drunk by this patient was analyzed and found to contain wood alcohol.

CASE 61.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

H., aged 46, December, 1898. Drank alcohol, and in 12 hours was very dizzy, vomited a great deal, headache, eyeballs sensitive to touch, blind in three days, optic neuritis followed by atrophy.

CASE 62.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

Miss F., aged 19, lived in Indian Territory, February, 1899. Had been drinking cologne spirits. Suffered much with headache, eyes tender, gastric disturbances; blind in five days from time when she first noticed dimness of vision. Papillomacular atrophy.

CASE 63.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

H., aged 63, April, 1899. Drank "alcohol." Violent headaches and vomiting. Improved under pilocarpin and potassium iodid. Relapsed and vision was reduced to counting fingers in the left eye at three feet. R. E. = 20/200. Central scotoma; optic atrophy.

CASE 64.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

W., Indian Territory, aged 54, May, 1900. This man was one of a party that drank Columbian spirits on Sunday morning. Two stopped at a friend's house for dinner, ate heartily of wild turkey and never noticed any bad symptoms. Williams, however, continued his journey on horseback, riding nearly all day, taking three more small drinks (half a pint), and next morning had headache, dimness of vision, vomiting and was entirely blind in 48 hours. He improved slightly under pilocarpin and strychnin.

CASE 65.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

K., aged 43, October, 1900, Indian Territory. Protracted spree with Jamaica ginger, lemon extract and "peruna." Noticed one morning that a cloud was before his eyes. He became blind in six hours afterward, had headache, vomiting and other gastrointestinal symptoms. The final outcome was optic atrophy, with narrowing of the retinal vessels.

CASE 66.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

S., aged 56, October, 1899. Had been dyeing and cleaning clothes in alcoholic preparations. No evidence that he had drunk the methylated mixture. Headache and vomiting. Vision reduced to perception of light in ten days from first symptoms. Under pilocarpin he recovered most of his sight in 61 days.

CASE 67.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

E., aged 24, January, 1901, Indian Territory. Drank one-half pint of "bitters." Next morning had headache, dimness of vision, vomiting, etc. In 48 hours V. R. E., counting fingers at three feet; L. E. = 20/200. Treatment consisted of pilocarpin, followed by strychnia. When last seen patient's sight was almost normal.

CASE 68.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

M., aged 29, June, 1902, Indian Territory. Drank one pint of Columbian spirits. This was followed by vomiting and headache. Eyes tender on pressure. Result, much diminished vision, central scotoma and contracted fields.

CASE 69.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

S., aged 34, August, 1902. This man drank four bottles of Jamaica ginger, and was found in a semi-comatose condition and totally blind. At first improvement occurred, but in a few days there was a relapse, followed by optic atrophy.

CASE 70.—(From Dr. Norman B. Saunders, Schenectady, N. Y.)

McA., aged 38, single, steamfitter, admitted to New York City Hospital, Aug. 5, 1902, in a condition of delirium due to alcohol. Under the use of large doses of strychnin and high intestinal irrigation he recovered and was subsequently employed as ward attendant. On the morning of Sept. 17, 1902, he was sent to the superintendent's office on account of intoxication the previous evening. He left the ward, but was soon brought back in a state of collapse by two patients. Pupils moderately dilated. Breathing labored and deep. Face flushed. Skin bathed in sweat. Was very restless. He complained of pain in stomach, was nauseated, and said he felt as if he was going to die. He then told the nurse that he had been drinking wood alcohol. Pulse quick and feeble; heart sounds very feeble. Patient said everything looked black; he was actually blind. Asked for water and stretched out his hand, grasping for water. Continued to moan and was restless. Soon had a spasm of muscles of clonic character, the forearm being flexed and drawn tight to the body; cyanotic during spasm; in a few minutes relaxed. In absolute coma. In five minutes another spasm; entire body stiffened; no opisthotonos. Death. The autopsy revealed nothing of importance.

CASE 71.—(From Dr. J. W. Scales, Pine Bluff, Ark.)

H. E., male, aged 46, a hard drinker. Complained of poor vision for a year previous to May, 1903. One evening in the course of one hour drank six ounces of wood alcohol and two of brandy. Felt "soggy," but ate supper, got up next morning and ate his breakfast and later his dinner, but about 3 p. m. (22 hours after drinking the alcohol) vomited severely, and at 5 p. m. he went to bed. He slept 24 hours, and on awakening found that he was entirely blind, and remained so for 36 hours. He then saw dim shadows with the left eye. In a month the right eye recognized hand movements. Vision continued to improve slowly for six months, but remained unaltered afterward. At the present time, R. E.=1/20. L. E.=1/10. No lens improves vision. Fields greatly contracted, irregularly concentric; all color perception lost. Optic discs very white, with sharp edges. Pupils, very sluggish reaction to light. Nine months later vision was unchanged, despite treatment, and the retinal vessels were narrow, as if there was some endovasculitis.

CASE 72.—(From Dr. J. W. Scales, Pine Bluff, Ark.)

M. O'C., aged 45, railroad section "boss," in December, 1900, drank three bottles of Jamaica ginger, followed by a smaller quantity of bay rum and Hostetter's bitters. During the night he was seized with violent headache and intestinal irritation. In the morning he was blind in both eyes, and although the other symptoms shortly disappeared, he never recovered his eyesight, the blindness persisting until his death from pulmonary disease, two years later.

CASE 73.—(From Dr. K. W. Sneed, Wortham, Texas, and Dr. L. O. McReynolds, Dallas, Texas.)

A negro, barber, a chronic alcoholic, had been in the habit of drinking "almost everything," including "bitters" and other patent medicines, as stimulants. He bought some bay rum made with wood alcohol for use in his business. The druggist warned him of the poisonous character of the mixture, but he seems to have disregarded the warning and imbibed an unknown quantity of it on the night of July 30, 1904. At 5 o'clock next afternoon he complained of vertigo and almost total blindness. The following day at noon, when Dr. Sneed saw him, he was suffering from dyspnea, with respirations 10 a minute and very labored; pupils dilated and irresponsive to light; pulse, 104.

Examination showed no organic disease of heart, kidneys or lungs. On Sept. 3, 1904, his general condition had much improved, but his vision was no better. He could barely recognize the outlines of his room door.

CASE 74.—(From Dr. Eugene Smith, Detroit, Mich.)

April 19, 1903, Dr. Smith was consulted by Mr. A. L. B., aged 20, who stated that Feb. 8, 1903, he drank four or five tumblers of wood alcohol. On February 10 was "unable to see to get around." Dr. Smith found his vision to be only perception of light in the right eye; nerve white; all vessels attenuated. Left eye, V. = 10/200. Nerve waxy-white; vessels attenuated. Did not see patient again.

CASES 75, 76.—(Courtesy of the Surgeon General of the Army.)

A. and B. were admitted soon after noon on July 25, 1898, with symptoms of acute poisoning. Both men were able to walk into the ward, and admitted, when confronted with the query, that they had, in lieu of whisky, drank wood alcohol diluted with water and sweetened. They were but two of a number of privates in this regiment who drank this concoction, but having indulged in it to much greater degree than almost any of the others they were more seriously affected. One of their companions did, however, die in his regimental hospital. The symptoms which these two men presented were gastric pain of an acute character, relieved at times by cessation of the pain; almost persistent vomiting, dryness of the mouth and throat, though the tongue and buccal cavity seemed moist. An inordinate and insatiable desire for water which is characteristic of poisoning cases of this class was noticeable in both men, who drank eagerly the water that was given them, only to vomit it a few moments after its reception into the stomach. Temperature of both men about normal when admitted, and did not rise above 99 at any time. The speech quite coherent, but the eyes with dilated pupils, incapable of recognizing either persons or things only a few feet distant. A., after an awful struggle, in which he tossed about incessantly, crying all the while for water, gradually sank into unconsciousness, in which state he died at 7:30 p. m. the same day. For an hour before death he was almost pulseless, heart dicrotic, and toward the last, Cheyne-Stokes' breathing.

B. died at 2 a. m. on the morning of July 26, after evidencing practically the same effects of the poisoning as did A. His temperature at 9 p. m., five hours before death, registered 93.4, but after the application of hot-water bags rose to 95.3. It is believed that both men died from an acute nephritis, although no necropsy was permitted. Both men, it was learned, had been drinking the wood alcohol for two days before admission, but no alarming symptoms made their appearance until the conclusion of 36 hours' time. A. died six hours after admission, and B. 13 hours after.

Treatment: Before admission strychnin hypodermatically for stimulation, and bismuth and egg albumin as a sedative and an emetic. At First Div. Hosp., strychnin, hot-water bags, friction and emulcents.

CASE 77.—(Courtesy of the Surgeon General and of the surgeon in charge of the post at Fort Terry, N. Y.)

Private T. H., aged 29. On the same night, Feb. 20, 1904, that four other soldiers had drunk methylated bay rum, he was found drunk and put in the guard house. He denied that he had taken any wood alcohol. Two days later he was reported to be in bad condition, and as having drunk some bay rum and Florida water while in confinement. When he was brought to the hospital he was in a state of partial collapse; temperature 96; pulse, 80, weak; respiration about 12. Was given strych. sulph. gr. 1/20 and whisky 8 c.c. hypodermatically; M. of oil tiglii in oil per orem; hot applications to body. Bowels not responding in three hours, were emptied by enema, and later freed themselves of oil. Temperature rose to normal in one hour, pulse and respiration becoming stronger. Whisky and strychnin continued till next morning, when man complained of blindness in both eyes; otherwise much improved. As this man had a specific history, he was put on large and increasing

doses of potassium iodid and strychnin. At that time patient could not count fingers at all; light perception remained, but only in lower part of retina, the man having to cast his eyes strongly upward in order to see even light. Under treatment this condition improved for about a week, when it remained the same, though at this time he could count fingers at about 18 inches and could tell time on large-faced clock by putting face about 1 inch from face of clock and hunting each hand separately. April 15, as he showed no further signs of improvement, application was made to have him discharged from service. His retinæ at this time were congested and edematous, but the visual field was not tested, as he could not see sufficiently well for the purpose. Except for the amblyopia, the man returned to a normal condition, but was discharged April 26, for amblyopia caused by wood alcohol poisoning.

The Columbian spirits taken by this man was bought as such by the company barber in a regular barbers' supply house and was intended for use in preparing his face preparations. He and four other soldiers (whose histories are elsewhere given) went into the barber shop and helped themselves to the stuff either through ignorance of its nature or through an uncontrollable desire to "taper off" from their spree, as most of them had been drinking heavily for a day or two previously. None of them took any wood alcohol after February 28; Nos. 1, 2, 3 and 5 only taking one or two drinks (mixing about 60 c.c. of the poison and an equal part of water). No. 4 took about a pint, the five drinking about a quart in all. Beside this, they drank "Florida water" and bay r[illegible] of cheap grades, which doubtless contained methyl alcohol in large proportions.

All of these men were what is known as "booze-hoisters," and Nos. 1, 2, 3 and 5 had been drinking for several days before they took the wood alcohol, and had been on the sick report a number of times for acute alcoholism, yet they strenuously denied, all but No. 4, that they had taken any of the poison, and it was only found out positively at the court martial which followed. Only the Columbian spirits was tested; this was found to be nearly pure methyl alcohol; but the other preparations, being of inferior grade, it is supposed that the alcohol used in their manufacture was impure wood alcohol.

CASE 78.—(From Dr. Frank C. Todd, Minneapolis, Minn.)

H. T. J., aged 45, consulted Dr. Todd on the morning of Sept. 28, 1900. Occupation, painter for 33 years. Referred by Dr. L. B. Wilson. Patient denies syphilis; does not drink more than one glass of liquor in six months. Eyes and sight were normal on Monday, though the patient had suffered from a very bad cold in the head for two weeks. Has worked with wood alcohol frequently, but vision has never been affected, although he has many times been dizzy, and last summer had trouble in accurately determining colors when mixing paint, due probably to the absorption of evaporating alcohol or turpentine while working. Saturday being a rainy day, he did some varnishing with shellac in a small room, and inhaled the alcohol evaporating from the shellac; on Sunday this same work was continued. Patient had purchased what he supposed was pure alcohol, but which proved to be, on investigation, Columbian spirits. This was used in mixing his shellac. Not feeling well, he mixed some of the Columbian spirits with water and sugar, from which he sipped, drinking altogether a glassful or more (only a small portion of this glassful of water, sugar and alcohol was alcohol.) Tuesday, on awakening, he first noticed dimness of vision, and although it was morning he thought daylight had not yet come. He now could read signs, but not ordinary print. Sight was worse Tuesday night, and on Wednesday he could not see the firelight. He then consulted Dr. Wilson, who prescribed strychnin and referred him in consultation to Dr. Todd.

Examination Friday morning showed total blindness in both eyes; careful examination in dark room proved that he had no perception of light. Pupils, medium dilatation, no response. The following treatment was advised and carried out by Dr. Wilson: Catharsis, diaphoresis by the administration of pilocarpin, hypodermic injections of strychnin in increasing doses. After nine days of treatment patient first saw daylight; then his vision rapidly improved. Dr. Todd did not see him again until Nov. 5, 1900, when his sight, with glasses, became normal in every way.

CASE 79.—(From Dr. S. W. S. Toms, Nyack-on-Hudson, N. Y.)

A. B., servant, aged 45, addicted to alcoholism, in March, 1903, deliberately drank, during the absence of her mistress, nearly half a pint of wood alcohol from a bottle so labeled. Early the next morning Dr. Toms was called to see her, on account of what seemed a transitory blindness. This soon deepened, however, and was followed by excitation, which later lapsed into coma, pulmonary edema and death. As the pupils became widely dilated an ophthalmoscopic examination was comparatively easy, but nothing abnormal was noticed in the fundus.

CASE 80.—(From Dr. J. F. Van Kirk, Whatcom, Wash.)

On Feb. 24, 1902, T. P. presented himself at Dr. Van Kirk's office with the following history: He was 38 years of age, a laborer, of not very good habits, but no history of syphilis. Had always enjoyed good health and exceptionally good vision. On Oct. 4, 1901, while employed as a watchman in a warehouse at St. Michaels, Alaska, he discovered a barrel labeled "Wood Alcohol." On this date, Oct. 4, 1901, he drank about one-half ounce, as he said, to "cure a cold." On Oct. 6, 1901, at 9 a. m., he drank about three-fourths ounce more, and again took a third drink of three-fourths ounce on the afternoon of the same day; in all, 2½ ounces in two days. On the night of October 6 he had occasion to rise, when it was discovered that he could not see a ray of light from the lighted candle in the room. At daybreak his vision had so returned that he was able to walk one-half mile to breakfast. He went about his work until noon, when he felt an oppression in the region of his stomach which prevented him from eating dinner. He continued at work for an hour after dinner, when objects began to look cloudy. This obscuration of his vision increased rapidly until 4 p. m., when he was obliged to stop work, and at 9 p. m. he again became totally blind, being unable to see light from a candle burning in the room. He remained blind from this date, October 7, until October 15, when he began to see a faint ray of light. On Oct. 18, 1901, he took the steamer for Seattle, Wash., where he arrived on October 30. During the voyage his vision so improved that he could walk around unaided. He began to work on the railroad section, but found his vision again slowly failing, more rapidly in the left eye. On Feb. 24, 1902, he came to Dr. Van Kirk for treatment. On examination he found R. E., V. = 20/30; L. E. V. = fingers at 5 feet. Entire lower field in each eye was obscured, with a small central scotoma in both. Color sense uncertain; eyes not tender nor sensitive to light. Right pupil somewhat contracted (or left dilated); both pupils reacted feebly to light, both directly and consensually. Media clear, fundus nearly normal, showing only a suspicious pallor, with arteries somewhat contracted. The discs were clearly atrophic and exhibited an ashy paleness. The treatment consisted of 1/30 gr. doses of strychnia sulph., which was later changed to increasing doses of potassium iodid, without appreciable change in the condition. This case was characterized by frequent transient changes. The vision would be markedly improved for a few hours, and then it would suddenly fail. Often the morning vision would be good, while exercise seemed to increase the amblyopia. The patient continued under Dr. Van Kirk's care until May, 1902, when, at Dr. Van Kirk's suggestion, he secured work on an ocean fishing boat. The marked improvement noticed while on his previous sea voyage was less noticeable now, but some transient benefit was apparent. The last report from him was dated late in the summer of 1902. Vision in the left eye was light perception only. Vision in the right eye was quite useful. The patient was unsteady, and apparently much worse when on land. At this time Dr. Van Kirk lost track of the patient, and has not heard from him since.

(To be continued.)

POISONING BY WOOD ALCOHOL.

CASES OF DEATH AND BLINDNESS FROM COLUMBIAN SPIRITS AND OTHER METHYLATED PREPARATIONS.

FRANK BULLER, M.D.
MONTREAL.
AND
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CHICAGO.

(Continued from page 1062.)

CASE 81.—(From Dr. John E. Weeks, New York City.)

E. V., aged 38, came to the New York Eye and Ear Infirmary, Dr. Weeks' service, Nov. 21, 1903. In the early part of August the patient suffered from intermittent fever, and on August 7 he drank a cupful of wood alcohol for the purpose of breaking up the fever. On the following day the vision of the left eye failed almost entirely, and the vision of the right eye became impaired. The maximum failure of vision was reached at the end of 48 hours. Since then, according to the patient's statement, there has been some improvement.

At the present time the vision of the right eye equals 30/40; the vision of the left eye equals fingers at eight feet. There is (see Fig. 1) concentric limitation of the field of vision, most marked in the left eye, an absolute central scotoma in the left eye and a relative central scotoma in the right eye.

The patient has been seen from time to time, and since November 21 the vision has remained approximately the same.

CASE 82.—(From Dr. D. Emmett Welsh, Grand Rapids, Mich.)

J. D., aged 15, living in the country, was in the habit of visiting quite frequently a neighboring village, where he acquired the drink habit. It was his custom to become intoxicated on wood alcohol, in the company of farm laborers, and sleep off his fits of indulgence in the barn. When at home he procured and drank Jamaica ginger. One morning after such a spree he awoke to find himself completely blind. Dr. Welsh was consulted some time afterward and found him very shaky and nervous, speech difficult, general muscular tremor, marked anemia and complete loss of vision in all parts of the field. The fundi exhibited white atrophy of both nerves. In spite of treatment, vision was not improved, and he was finally sent to one of the state institutions for the blind.

CASE 83.—(From Dr. D. Emmett Welsh, Grand Rapids, Mich.)

J. M., aged 14, acquired the drink habit and, "as it was so cheap," bought wood alcohol ostensibly for burning in a lamp, but really for use as a beverage. Previous to consulting Dr. Welsh he had never had any ocular defect. When seen he was totally blind in both eyes, but treatment improved his sight somewhat, until he now has about 3/200 in either eye. This boy exhibited the same degree of nervousness and anemia as the other boy, whose history is given elsewhere, and like him presented the fundus picture of optic atrophy.

CASE 84.—(From Dr. Joseph White, Richmond, Va.)

A young man, S. N., was brought to Dr. White June 22, 1897. On May 1 he drank quite a quantity of Jamaica ginger; it is not known exactly how much. The next morning, May 2, he woke up vomiting. He walked home, six miles, over the mountains and arrived there exhausted, with cold feet and legs. He went to bed sick and continued nauseated for three days, during which time his sight gradually left him. When he came to Dr. White his vision was so bad that he could hardly make out the 20/200 type at four inches. His fields, taken with a light, seemed to be very much contracted. The fundus was normal, except some pallor about the outer third of the disc. The diagnosis was retro-ocular neuritis, with atrophy of the papillomacular bundle. He remained under treatment for ten days and went home. The only information received from him subsequently was that he made no improvement whatsoever.

CASE 85.—(From Dr. Joseph White, Richmond, Va., and Dr. W. R. Williams, Richlands, Va.)

In March, 1898, Dr. White saw a young man, S. W., clerk, 21 years of age, who had been on a spree February 12, when he drank four bottles of essence of lemon, each bottle containing between two and three ounces. On Sunday morning at 10 o'clock he began to lose his vision. He also suffered great difficulty in breathing, the respirations reaching 40 to the minute, with no radial pulse, widely dilated pupils, general collapse and stupor. In spite of all treatment, he continued in a sort of stupor for two days. When he recovered from this mental condition he had no light perception. Five days later light perception began to return, and when Dr. White first examined him, three weeks afterward, his vision was 3/300. The pupils were widely dilated and not responsive to light, the retina was normal, the outer and central parts of the disc were bluish-white and slightly excavated. Dr. White made a diagnosis of optic atrophy from methyl alcohol. He heard from the physician who brought him, some time afterward, that the patient had made no improvement under treatment. In a report to Dr. White, dated May 8, 1904, Dr. Williams, who originally saw this case, says that the patient's vision improved for three or four months, so that he could resume his duties as clerk. However, he again took to drinking and smoking, his sight again deteriorated, fell to 3/20, and has so remained ever since.

CASE 86.—(From Dr. Jay Philon Whitney of Vinton, Iowa, and Dr. Lee Wallace Dean, Iowa City, Iowa.)

W. H., aged 37, married, printer, of regular habits up to 1900. At that time he began to drink whisky heavily and continued for about a year, when, on being refused liquor at various places, he began to take Jamaica ginger. He was soon refused this at the drug stores, but was in the habit of handing boys small sums of money and inducing them to obtain it for him. In the early months of 1901 he began to notice failing eyesight and consulted various opticians and oculists for relief, but obtained none. He complained that if he stood so as to look down at his type case that he could see fairly well, but on raising the eyes he noted a very distinct blurring. About April, 1902, after taking on Sunday a considerable quantity of peruna and Jamaica ginger, on attempting to go to his work on Monday morning he became entirely blind and had to be led back home. "I saw him one hour later; the vision was totally lost, the pupils did not respond to light and shade, dyspnea was urgent, pulse rapid, feeble and irregular; cyanosis was present, the extremities cool. From this precarious condition he rapidly recovered his vision and usual health, and returned to work in about ten days. In June of the same year, after drinking freely of Jamaica ginger on Thursday evening, he awoke the next morning to find himself entirely blind. I saw him about one hour later; the same symptoms were present as in the first attack, but coma supervened about 1 p. m., and he died quietly about 5 p. m."

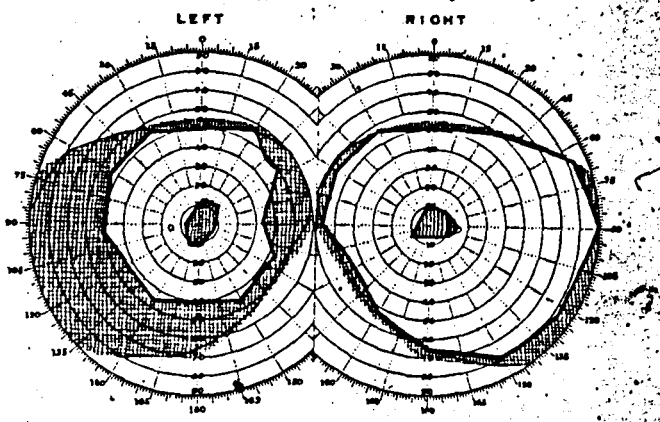

Figure 1.

CASE 87.—(From Dr. Jay Philon Whitney, Vinton, Iowa, and Dr. Lee Wallace Dean, Iowa City, Iowa.)

C. F., aged 36, married, printer, of regular habits, except an occasional prolonged spree; no eye defect. About Jan. 15, 1903, began to drink whisky heavily and continued for two weeks, when he was unable to obtain any more liquor. He sobered up at that time and remained sober until Feb. 4, 1903. About 7 o'clock that evening he called on his former employer,

arranged to take up his work again and remained with him until 9 o'clock. At 11 o'clock, according to the testimony of his landlord, he returned to his hotel somewhat the worse for liquor and went to bed unassisted. On the following morning he awoke to find that he was totally blind. He managed to get into his clothing and reach the hotel office unassisted. His employer was telephoned for and saw him 30 minutes later. The patient told him that on the night previous, after leaving his office, he fell in with some kindred spirits and drank one dozen small bottles of essence of lemon. At that time he had an essence of lemon bottle with a small quantity in it on his person. He was then entirely blind, dyspneic and cyanotic; the extremities were cool. He felt a sense of impending dissolution and desired that his people be communicated with. An attempt was made to get him back to his room, but on the first landing he had a convulsive seizure and they were obliged to carry him the rest of the way. The dyspnea and cyanosis increased, the extremities became quite cold, and he died quietly at 11 a. m. Dr. C. C. Griffin, Jr., and Dr. A. R. Fellows also saw this man.

CASE 88.—(From Dr. James P. Widmeyer, Rolla, N. D.)

One of at least ten Indians of the Turtle Mountain Reservation, who went on a spree with lemon extract and Florida water, drank half a teacupful of the latter. He had intestinal pains, burning in his stomach and nausea. After walking a couple of miles from the scene of the spree he vomited freely and did not suffer as did his nine companions, who all died. Along with the blindness (exact details of which could not be obtained) he had a marked dysuria. One other survivor also complained of difficulty in passing his urine. The poison was drunk Aug. 31, 1904, and the amblyopia was noticed a few days afterward.

CASE 89.—(From Dr. Hiram Woods, Baltimore, Md.)

"The wife of a laboring man, to improve her digestion, has been in the habit, at intervals for several years, of taking three or four tablespoonfuls of Jamaica ginger daily. She is about 40 years of age and her husband now reports that her sight has recently failed and that attempts to obtain glasses to improve it have met with no success. He also said that she sees better to one side than straight ahead. So far he has not brought the patient to my office, as I urged him to do, and I can not speak more definitely, but the case certainly looks like one of methyl alcohol amblyopia."

CASE 90.—(From Dr. Emil Bories, Seattle, Wash. Reported by Dr. Hamilton Stillson, Seattle, Wash.)

On May 23, 1903, Dr. Bories was called to attend S. M., German, aged 32, painter by trade, who had drunk about three ounces of Columbian spirits (wood alcohol), the same being used in the shop for dissolving shellac. Had frequently drunk alcohol in large quantities, and not being able to read the English labels, and supposing from the smell that the stuff was alcohol, he drank it, not knowing it was poisonous. Dr. Bories found him at his residence, where his fellow workmen had taken him. They noticed that he acted very strangely and, becoming alarmed, carried him to his home. One of the workmen stated that he had seen him drink alcohol before, but had never seen him so affected by it. General symptoms, pulse very weak and became countless, temperature subnormal for nearly three days; total blindness, could not discern light; had a ghastly, vacant expression; sighed often and deeply; lips bloodless. In dread of dying; was getting weaker; could not extend his hand; respiration stertorous; movements of limbs convulsive, constantly jerking; speech finally inaudible. Gave him at once 1/60 strychnia and pilocarpin, had him wrapped in blankets which had been wrung out of hot water, syphon to stomach; followed the same by pouring down about 6 ounces of hot, strong, unsweetened coffee, which was retained. Gave him a large enema of salt water. Also gave hypodermic injections of glonoin and had ice-bags placed on top of head and spine. Instructed wife and friends to rub the body well and constantly. Pupils dilated, conjunctiva very much inflamed. After two hours of hard work he showed signs of returning sensibility. One pupil contracted, but the other remained dilated. Lips showed better circulation, body became warmer and he was able to answer questions coherently, but was not able to discern light, although a bright electric light was burning. The following morning he was much better and retained nourishment. Blindness continued for three weeks, when sight was gradually restored. Dr. Kibbe saw the patient three days after he was taken home and advised a continuation of treatment. About ten days after, at the suggestion of Dr. Kibbe, performed venesection, without beneficial results.

(C) CASES HITHERTO UNPUBLISHED OF BLINDNESS FROM METHYL ALCOHOL ABSORBED BY THE LUNGS OR SKIN, OR BOTH.

CASE 1.—(From Dr. W. McL. Ayres, Cincinnati, O.)

W. E. C., aged 44, painter. Six or eight years ago had symptoms of lead poisoning, but his eyes were unaffected by this intoxication and were, so far as he knew, perfectly healthy. Shortly before he was seen by Dr. Ayres (October, 1901), he had been varnishing and shellacing the inside of the closets in one of the large Cincinnati hotels. The shellac had been cut by, or dissolved in, wood alcohol instead of grain alcohol. While in one of the closets he became dizzy, had an intense headache and was forced to stop for a time and get some fresh air. After this he returned to work, but was again attacked by nausea, vomiting and headache, that forced him to discontinue his work entirely for several days. On the third or fourth day his eyesight began to fail, and at the end of a week central vision was 5/100 in each eye.

Examination with the ophthalmoscope disclosed a double optic neuritis, which in a few months was followed by partial atrophy, with a large central scotoma in both eyes. At present he is practically helpless and unable to do any work requiring the use of his eyes.

CASE 2.—(From Dr. Daniel Conboy, Bad Axe, Mich.)

On Nov. 3, 1903, a call was received to visit Mrs. H., aged 58, bright and intelligent, and withal good looking, the latter partly due to the good (though on this occasion, unfortunately, excessive) care she took of her complexion. She was found with sight very much diminished, "almost blind," as she described her condition, central acuity being especially impaired. A large parlor coal-burner about 10 feet distant was recognized by its outline only. The eyes of a person four feet distant appeared like dark spots on a white background, no color or form being distinguishable. This fact, after the exclusion of nephritic and diabetic retinitis by urinalysis, led to a provisional diagnosis of an ocular affection of toxic origin. The trouble had been coming on gradually for two weeks. She also had had vertigo occasionally, particularly at church, and would have fallen the Sunday morning previous had it not been for her husband's help. Autointoxication was suspected, but nothing abnormal was discovered about the digestive tract. Inquiry was then made with regard to the use of Jamaica ginger, with the explanation that the essence of Jamaica ginger, of lemon and similar flavoring and culinary mixtures sometimes contained methyl alcohol, which might cause the condition from which she was suffering. The patient immediately raised her hands in surprise, and stated that she had been using wood alcohol for weeks, both for heating her rheumatic bath and as a cleansing application to her head and face daily, especially on Sunday mornings before church. The alcohol was at once discontinued and sodium salicylate administered *ter in die* after meals. The usual diminution of sight was arrested immediately, but the impaired vision remained *in statu quo* for four or five days, when it began to improve. Both on account of her blindness and the continuous stormy weather, she was unable for over a week to come to the office for ophthalmologic examination. The fundi even then presented an interesting picture. The temporal half of each optic disc showed a pallor very much emphasized by the hyperemia and neuritis of the remaining part. At the first office examination, nearly two weeks after patient was seen, the vision for distance was, R. 7/40 and L. 7/50. On November 18, R. = 7/30, and L. = 7/30. On the 24th, R. was 7/20 and L. 7/30. December 3, one month after first visit, R. = 7/20 and L. = 7/30 —. December 7, R. = 7/20 — and L. = 7/30 +. December 9, R. = 7/20 and L. = 7/30 +. The last examination was on December 18, when both R. and L. were 8/20, which the patient thought was about the same vision that had existed before she used the "nasty stuff." When the papillitis had vanished from both fundi, strychnin in increasing doses was administered in the hope of preventing optic atrophy.

CASE 3.—(From Dr. W. E. Driver, Norfolk, Va.)

E. L., male, white, aged 54, consulted Dr. Driver on June 15, 1901. He gave the following history: In August, 1894, after shellacing the benches and interiors of several school houses he awakened in the morning of the second night to find that he was totally blind. Prior to that time he had not had trouble with his vision. He remained totally blind for about two weeks, when the sight began to improve, especially in the left eye. He thinks the vision in the left eye has improved somewhat during the past two years. The shellac used had been dissolved in wood alcohol.

The general appearance of the eye was that of ordinary nerve atrophy. The pupils were widely dilated and the cornea appeared unusually bright. Right eye, V. = light perception. Iris slightly active to light. Optic nerve bluish-white, showing marked atrophic condition. Tension normal. Left eye, V. = 20/100; with + 50 D. Sph. = 20/70. Cornea very bright and clear. Pupil widely dilated, as in the right eye. Iris slightly active to light. Optic nerve white, showing marked atrophic condition. No other visible disease of fundus.

The diagnosis was optic nerve atrophy from inhalation of wood alcohol.

CASE 4.—(From Dr. Harold Gifford, Omaha, Neb.)

A woman of about 35 came in the spring of 1902, complaining of gradual loss of sight for the past two weeks. Dr. Gifford found the fundus of each eye normal, except for a slight pallor of the outer quadrant of each disc, which might easily be physiologic. Vision, 20/200, each eye, not improved by glasses. Outer limits of the fields normal, but the center of each field showed a large relative scotoma about 30 degrees in diameter, in the center of which the color sense was practically abolished. On being questioned about the possibility of methyl alcohol poisoning, she positively denied ever having drunk methyl or any other alcohol, or any of the various commercial products which are apt to be adulterated with it; but she had been burning methyl alcohol in an alcohol lamp with a large, flat wick for heating water in her room. Her custom for two or three months had been to light the lamp nearly every evening and allow it to burn out. This was during the winter season, in a small bedroom, without any other fire, so that it can easily be imagined that the ventilation must have been somewhat defective. She had nothing else wrong with her that could be discovered. Her vision began to improve almost immediately after Dr. Gifford advised her to stop burning the methyl alcohol, when it gradually rose to 20/20 in the right eye and 20/70 in the left (the left eye had had convergent squint since childhood.) It seems probable, therefore, that the amblyopia was due to the fumes of the methyl alcohol or to the formaldehyd generated in burning it. Considering the relative quantities of the substances which must have been present in the air of the room, it seems more likely to have been the formaldehyd; but whatever the fact in this respect, the case suggests an additional way in which the eyesight can be injured by this villainous stuff.

CASE 5.—(From Dr. J. A. Lippincott, Pittsburg, Pa.)

S. E. S., aged 44, April 12, 1902, worked a whole day varnishing tanks in a brewery, using a varnish which had been mixed with wood alcohol. In the evening when he left his work—according to the statement of his physician, Dr. Brock of Waynesburg—he acted like an intoxicated man, and two hours later went into a comatose condition, which lasted 24 hours. When aroused the sight of the right eye was somewhat impaired and that of the left eye was entirely gone. His vision since then has improved considerably. The pupils on both sides small (2 mm.) and sluggish. T. normal. R. E., V. = 15/lxxx. No glass helps. Field of right eye shows moderate concentric limitation. That of left a more decided contraction, and also a small complete central scotoma. The ophthalmoscope showed right disc hazy, left swollen and blurred at margins and vessels tortuous. Advised jodid of potassium, salicylate of soda and nux vomica. June 24, 1904—Did not see the man subsequently, but Dr. Brock, in reply to a recent note, states that the vision of the left eye in time failed entirely. He also states that soon after the poisoning he was taken with left-sided pneumonia, from which recovery was never complete. About six months ago tubercular trouble developed and ended in death June 8, 1904.

CASE 6.—(From Dr. Nelson L. North, Jr., Brooklyn, N. Y.)

H. E. W., German, aged 48; not robust, light weight and poorly nourished. He was employed, with a companion (to whose history this one bears a close resemblance), as a varnisher of closed beer vats. These vats were badly (if at all) provided with ventilation, and wood alcohol was employed to dissolve the shellac used in the varnish. While engaged in this work he experienced the usual constitutional symptoms of methyl alcohol intoxication, and he began to have foggy vision. When seen in hospital by Dr. North, central acuity had fallen to 20/70 in each eye. Optic papillæ pale. Fortunately, in this case prompt treatment was followed by improvement to almost normal in either eye.

CASE 7.—(From Dr. Nelson L. North, Jr., Brooklyn, N. Y.)

A. H. S., German, aged 35, strong and healthy, weighed 190 pounds. He was employed as a beer vat shellacer. During the winter of 1900-1901 he was engaged in his employment of varnishing the interior of ill-ventilated vats with shellac dissolved in wood alcohol. He began to suffer from loss of eyesight, and when seen by Dr. North his vision was 10/200 and there was every indication of optic atrophy, the discs being very white. Abstinence from work and long-continued treatment brought about some amelioration of vision, but improvement of central sight did not extend beyond 20/50.

CASE 8.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

A. J., infant, 6 months old, December, 1903. Parents noticed something wrong with the eyes and thought she could not see. Pupils contracted. After dilatation optic discs were found to be pale, more so on the temporal sides, and the arteries narrow. Parents said they had been burning a wood alcohol lamp by the crib in which the infant slept. Discontinued lamp, and child improved slowly. Total recovery.

CASE 9.—(From Dr. Norton L. Wilson, Elizabeth, N. J.)

O. E. H., aged 42, workman in the cabinet department of a large factory where Columbian spirits were used in mixing shellac and other polishing mixtures. His vision was reduced to 10/200. His discs were pale and the vessels were small. He was also a whisky drinker, but said he never drank wood alcohol to his knowledge. He probably absorbed it through his hands, as he frequently bathed his hands in Columbian spirits to "cut" the shellac.[4]

It has been claimed by some observers that serious intoxication from inhalation or from "alcohol rubs" is not only highly improbable, but that its occurrence has not as yet been experimentally proven. They assert that sufferers from methyl alcohol blindness who have been working with the poison in closely confined chambers have drunk some of the methylated liquor and have suppressed the fact. Moreover, the amount actually absorbed must have been too small to produce serious effects. It is further claimed that amblyopia among workers in hat factories, where the air is highly charged with the fumes of methylated spirits used in dissolving the resins required for "stiffening" the straw, rarely or never occurs.

On the other hand, many of the alleged cases are so well authenticated; a few of them have occurred in children; it is well known that in those people who are not immune to the poison a very small quantity of methyl alcohol is sufficient to produce blindness, and finally, the absorption of rebreathed air with wood spirit fumes certainly adds to the toxicity of the latter; in hat factories, also, the fumes are constantly diluted by fresh air. If this be true of wood alcohol inhalation, it is probably also true, albeit to a less degree, of the poison absorbed by the skin. On the whole, we must conclude that it is safer to avoid absorption of the poison in any of its forms.

(D) CASES (HITHERTO UNPUBLISHED) OF DEATH FROM METHYL ALCOHOL POISONING, WITHOUT HISTORY OF PREVIOUS BLINDNESS.

CASE 1.—(From Dr. Emil Bories, Seattle, Wash. Reported by Dr. Hamilton Stillson, Seattle, Wash.)

J. F., Irish, tramp by occupation, was, Feb. 8, 1902, picked up in an alley in a state of collapse after drinking a large quantity of "union spirits" (wood alcohol). When found he had a bottle in his pocket which originally contained about four ounces, from which at least one-half had been taken. He was taken to the city jail. No method of treatment sufficed to revive him, and he died about 45 minutes after reaching the jail. Pupils widely dilated, bloody mucus running from mouth; involuntary defecations from bowels. Patient was a well-built and apparently robust man.

CASE 2.—(From Dr. Randolph Brunson, Chicago.)

B. M., a negro woman, aged about 40, was in good health and apparently had no organic lesions of any kind. She was in the habit occasionally of getting on a "spree" of two or three day's duration, drinking whisky. After having been on one of these debauches two days, she was found on her bed uncon-

4 As taking a drink from the supply of alcohol kept for dissolving the gums used in making varnishes is a very common habit among varnishers, it is probable that this patient drank wood alcohol, thinking it was ethyl spirits, or not knowing that the dissolvent was poisonous.—C. A. W.

scious, and died about an hour afterward. A pint bottle labeled Columbian spirits was found on the table, and more than one-half of the contents had evidently been drunk. It is a not uncommon custom for negroes and "poor" whites to mix equal quantities of whisky and alcohol and drink it, as the alcohol is cheaper, and the results the same as if whisky alone is used. The subsequent investigation disclosed the fact that this woman had purchased the bottle of alcohol at a drug store, the druggist supposing that she wanted to use it as a burning fluid. There seemed every evidence that she had been drinking the Columbian spirits. No ophthalmic examination was made, as she was dying when found.

CASE 3.—(From Dr. George A. Fagan, North Adams, Mass.)

Dr. Fagan saw Mrs. X., aged 29, at 10 a. m., Feb. 15, 1904. The patient was the mother of five children. Nationality, French-Canadian. He found her in bed, unconscious; eyes partly opened, dull and lusterless. The pupils were somewhat contracted and the reflexes abolished. The face was drawn; mouth opened a little. The muscles of the trunk seemed rigid rather than lifeless. The pulse was not felt at the wrist; heart rapid and feeble;. respiration shallow and accompanied by a moan. Body was moist and cold. The temperature was not taken. The woman was a chronic drunkard and had been drinking during the week. Sunday at breakfast she seemed to be pretty well, but suddenly complained of dizziness and weakness, was put to bed and became unconscious. A bottle of Columbian spirits for use in a lamp was found empty, as was a bottle of Jamaica ginger. She was known to indulge in the latter.

Odor of breath aromatic and smelled of alcohol. Dr. Fagan gave intravenous injections of adrenalin and strychnia, also salines by rectum. Body warmed and pulse returned to wrist, but in an hour she died in convulsions.

CASES 4, 5, 6.—(From Dr. Homer Collins, Duluth, Minn.)

Six or eight Indians on one of the Minnesota reservations procured a supply of essence of peppermint and drank freely of it. All suffered severely from gastrointestinal symptoms, and three died from the effects of the poison; one of them blind. Two escaped without, so far as is known, any serious damage, while the sixth (one of the survivors) became totally and permanently blind. The cases of blindness are elsewhere described in this report.

CASE 7.—(From Dr. W. G. Craig, Hartford, Conn.)

J. P., Polish, aged 45, drank, April 30, 1902, a mixture of sugar, water and Columbian spirits as a beverage. This was followed first by nausea and vomiting and later by repeated convulsions, coma and death in 24 hours.

CASES 8, 9, 10, 11.—(From Dr. Joseph Springer, Coroner's Physician, Cook County, Ill.)

About April 10, 1904, five negroes, laborers, between 25 and 40 years of age, bought a large amount, probably a gallon, of wood spirits and drank an unknown quantity of it. Four of them, Thomas Smith, James E. McCarthy, Edward Williams and Silas Robinson died from the effects of the poison. Two, the first mentioned, were found dead, while the others were discovered in their boarding house unconscious. On removal to the hospital (Samaritan and Cook County), one of the three recovered. Dr. Springer found, in each of the fatal cases, the stomach and intestines very much congested and soft. The blood was dark and very fluid. Liver congested and friable. Spleen engorged with dark blood; very friable; tore on removing it. Patches of extravasation in the lungs; hemorrhages into the kidney structure, which showed a passive congestion. The odor and other indications supplied by the stomach contents clearly pointed to poisoning from wood alcohol.

CASE 12.—(From Dr. G. G. Davis, Philadelphia, Pa.)

"The only case of poisoning by wood alcohol coming under my notice occurred late last June or early in July, 1903, at Lily Bay, Me. A lumberman (from New Brunswick, Canada) died from drinking wood alcohol used in painting. He was wildly delirious and died in a few hours."

CASE 13.—(From Dr. J. F. Dickson, Portland, Ore.)

Two men, teamsters, strong, healthy and under 30, who had been working very hard all night, arrived at a friend's cabin in the early morning, much fatigued. The friend told them he would give them something that "would make them feel better." He prepared a drink containing wood alcohol, sweetened with syrup. One man took several drinks, and shortly afterward fell to the floor, unconscious. They picked him up and put him to bed, supposing he was simply drunk. He was found dead that same evening, but the exact hour of his death is not known.

CASE 14.—(From Dr. J. A. Dingman, Spring Valley, N. Y.)

In June, 1903, the doctor was called to see A. McK., aged 47, a domestic servant, addicted to chronic alcoholism, who had drunk about 3 p. m. an unknown quantity of fluid from a bottle labeled "alcohol." She was unconscious on his arrival and died in deep coma the next day, about 20 hours after taking the poison. The bottle contained wood alcohol.

CASES 15, 16, 17.—(From Dr. John A. Donovan, Butte, Mont.)

Over two years ago a man in this locality was tried, convicted and sent to the penitentiary for selling intoxicating liquor to the Indians. It was proved that the alcohol in the liquor was methyl alcohol. Three Indians died from the poisonous effects of the drug.

CASES 18, 19, 20, 21, 22, 23, 24.—(From Dr. W. E. Driver, Norfolk, Va.)

R. N., male, white, aged 29, patient of Dr. Hargroves of Deans, Va. With two friends, patient visited Portsmouth, Va., on Sunday, Sept. 27, 1903. Not being able to procure intoxicating drink, they all imbibed freely of essence of lemon. He was made drunk and otherwise ill. Sight not affected. He did not recover from the effects of the intoxication and gastritis, and died on the sixth day. The two associates of this man died after a week's illness, never having recovered from the debauch. During Dr. Driver's investigations of three cases of methyl alcohol amaurosis (reported under class B), he learned that four other people—boon companions of the patients who survived and subsequently became blind—had died with the usual symptoms of acute wood alcohol poisoning. As these cases occurred in a part of the country not covered by any report included in this investigation, we may safely publish them as four additional examples of death from drinking methylated preparations, in spite of the lack of more definite information.

CASE 25.—(From Dr. Calvin R. Elwood, Menominee, Mich.)

C. H., cook in lumber camp, while in woods went on a spree with lemon extract in November, 1903. On Tuesday he received 12 bottles of the extract, and by Friday had drunk seven of them. He spat some blood on Thursday, and his fellow workman warned him that the lemon extract was killing him. He replied that it was, but he couldn't leave it alone. He continued the debauch the following day and evening, when he suddenly fell over dead, taking his last drink only a few minutes before death. This man was a habitually heavy drinker, and had been on a rather protracted spree just before he received the consignment of lemon extract.

CASE 26.—(From Dr. Charles Enfield, Jefferson, Iowa.)

In 1901 an adult, being unaware of the poisonous character of wood spirits, and only knowing it to be a cheap form of alcohol, purchased a pint in Jefferson for use as a beverage. He drank it all while on his way to a neighboring town and died in a few hours. These facts were fully established at the coroner's inquest.

CASE 27.—(From Dr. H. P. Engle, Newton, Iowa.)

Mrs. N., Mingo, Iowa, aged 20, drank, as evidenced by sworn testimony, a "few ounces" of diluted Columbian spirits. This was followed by gastrointestinal irritation and sudden death in 20 hours.

CASE 28.—(From Dr. H. P. Engle, Newton, Iowa, and the Des Moines, Iowa, *Register-Leader* of May 31, 1904.)

Mt. Ayr, May 30, 1904 (Special.)—"Abe Baker is dead, Glenn McLeish is so ill as to require the attendance of two physicians, and others of their party are suffering as a result of drinking wood alcohol at the close of a protracted spree. The scene of the tragic occurrence is in Worth County, Mo., near the town of Allendale ,and about three miles south of the line of Middle Fork Township, this county. The men had been on a spree for several days, and late Friday evening Baker and McLeish were found not far from the latter's home, about 13 miles southwest of Mt. Ayr. They begged bed clothing from the tenant on Joseph Dehart's place and slept in an unoccupied house, declining an invitation to spend the night in the dwelling. The next morning Baker was discovered dead and McLeish in a critical condition, while reports came that others of the crowd were suffering. The coroner's jury decided that Baker's death was due to drinking wood alcohol. Baker was single, about 30 years of age, and a good deal of a wanderer, having lately returned from the west. McLeish is about 17 years of age and the only son of a widowed mother."

CASE 29.—(From Dr. W. H. Ford, Sulphur, Ind. Ter.)

About Oct. 1, 1903, four men, from 30 to 40 years of age, went on a spree with bay rum made from methyl alcohol. Two were barbers and two Territory sportsmen. One of the barbers, W. A., aged 39, was found dead after drinking probably a

quart. Autopsy showed the mucous membrane of the stomach extremely congested; it "resembled a piece of black rubber." The odor of wood alcohol was very strong.

CASES 30, 31.—(From Dr. Allen A. Greene, Anniston, Ala.)

Two employes, McK. and C., of the Interstate Roofing Company in Anniston were sent, June, 1898, to Montgomery, Ala., to assist in building a roof over the passenger station there. Wishing to get a drink, and finding the saloons closed, they sent, in the afternoon, to a drug store and purchased eight ounces of alcohol, not specifying the kind they desired. The druggist sent wood alcohol. They invited an employe of the L. & N. Railroad Company to join them and proceeded to drink the poisonous fluid. When toxic symptoms set in a physician was summoned, who used a stomach pump. In spite of his efforts, two of the men died within a few hours after drinking the mixture. The railroad employe, who survived, stated that he had taken only a small quantity of the wood spirits and on a full stomach.

CASES 32, 33.—(From Dr. Allen Greenwood, Boston, Mass.)

Several years ago three painters, living in the adjoining town of Newton, were in the habit of drinking alcohol mixed with water, taking the alcohol (used as a solvent) from the barrel in which it was kept. Wood alcohol was substituted in this barrel for ethyl alcohol, with the result that two were poisoned and died.

CASE 34.—(From Dr. G. E. Hartshorn, South McAlister, I. T.)

G. G., white, barber, of Haileysville, I. T., drank a pint of bay rum, March 23, 1904. Death occurred in 12 hours.

CASE 35.—(From Dr. G. E. Hartshorn, South McAlister, I. T.)

Ed. W., aged 16, on Dec. 23, 1902, drank nearly a pint of wood spirits, thinking it was grain alcohol. Died in six hours.

CASES 36, 37, 38.—(From Dr. Reid Hunt and Dr. H. A. Stansfield of the Public Health and Marine-Hospital Service, Washington, D. C.)

In California, about 1894, when Dr. Stansfield was connected with a drug store, he sold four Italian woodchoppers a quantity of wood alcohol. They went on a "spree" with it, and three of them died. None of these cases have been included in other reports furnished for this investigation.

CASES 39 and 40.—(From Dr. Reid Hunt, Public Health Service, Washington, D. C., being two autopsy reports of Dr. L. W. Glazebrook, Coroner for the District of Columbia, 2022 P St., N. W., Washington, D. C.)

Autopsy Cases, vol. xii, p. 4, No. 566. Dated Dec. 21, 1903. Arthur P. Baer, died, Washington Barracks; color, white; occupation, soldier. Previous history: "Man has been drinking, so the authorities say, for some time, and used every means to get intoxicants." Odor of wood alcohol about mouth. Stomach markedly distended, and acutely irritated; marked odor of wood alcohol. Remarks: Man had had access to the place in which wood alcohol was kept.

Autopsy Cases, No. 150, Jan. 24, 1899. Name, Joseph Washburn, negro, cook, aged 48. Drank a gill of wood alcohol early one morning. He groaned and had intense cramps and vomiting. The alcohol was for use in a coffee urn burner. He was sent to the Emergency Hospital and died at 9:45 a. m. Stomach had marked odor of wood alcohol. At the base of the brain two ounces of water infusion. Marked odor of wood alcohol.

CASE 41.—(From Dr. Reid Hunt, Public Health Service, Washington, D. C., and the Baltimore *News*, Feb. 27, 1904.).

E. E., a woodsman, said to be from St. Louis, died at Horton, W. Va., yesterday, from drinking "hot drops" as a substitute for whisky. Analyses of these same hot drops, sold in Virginia two or three years ago, showed the presence of about 95 per cent. wood alcohol.

CASE 42.—(From Dr. J. H. Jamar, Elkton, Md.)

While acting as surgeon to the jail in Elkton, Dr. Jamar had under his care three cases of wood alcohol poisoning in habitual drunkards. The first case was that of a woman, who, with a male companion, tramping about the country, begged money and bought six ounces of methylated spirits. They went on their way and when three miles from town proceeded to drink the mixture. The woman was soon unconscious and was removed to a neighboring farmhouse. She shortly afterward died comatose, in spite of Dr. Jamar's efforts to revive her.

CASES 43, 44, 45.—(From Dr. G. L. Knowles, Maquon, Ill.)

About December, 1902, the newspapers reported that in a suit Mrs. D. of Maquon obtained damages for the death of her husband, poisoned by lemon extract, and that two others also died from the same debauch. Dr. Knowles has kindly furnished the following comments on these three cases: "No. 1 was that of a farmer, aged about 35. He had been an intemperate man all his life, or from early manhood. I have no knowledge of his last symptoms. An eight ounce bottle, one-fourth full, labeled lemon extract, was found in his possession. So far as I know, no analysis was made of any of the cases. No. 2 was that of a blacksmith, aged 65, an inebriate from boyhood. He was found dead in his bed, and lying beside him was a bottle similar to that used by No. 1, about a quarter full of lemon extract. No. 3, a farmer, was a victim of the same poisoning and was very ill for two or three days prior to death. The two prominent features of these cases is that they were all backsliding graduates of the "Keeley Cure," and that it required about six ounces of the decoction to kill each individual.

CASE 46.—(From Dr. R. H. Main, Barry, Ill.)

Dr. Main reports a recent death (June 30, 1904) of a man, aged 40, from drinking Jamaica ginger. The victim was a pedler, apparently in good health, who sold this essence about the country. It was manufactured by a patent medicine "concern" in Peoria, Ill. Dr. Main's analysis of the liquid showed it to be made from methyl alcohol. The patient, unaware of its poisonous qualities, drank the compound for its intoxicating effects.

CASE 47.—(From Dr. J. G. McKinney, Barry, Ill.)

April 18, 1904, G. K., a painter, aged 25, was greatly addicted to drink. He was employed to do a job of painting, and drank the methyl alcohol that was intended for filling the knots in the wood before painting. Death followed in a few hours as a result of the drink.

CASE 48.—(From Dr. H. S. Miles, Bridgeport, Conn., and the Bridgeport *Telegram-Union*, July 23, 1904.)

Sheridan Knowles of this city, aged 45, a private in the United States Coast Artillery, stationed at Fort Terry, Plum Island, N. Y., died yesterday afternoon after drinking a quantity of wood alcohol. Knowles had been drinking heavily of late and made visits to New London, Conn., at every opportunity during the week. Each time he imbibed freely, and finally returned to the island for the first time Thursday. He was finishing his spree, and could not stop entirely from drinking liquor, so that the temptation to drink the wood alcohol was more than he could resist, although he knew well the deadly effects of the poison. He was the barber of the fort, and so had no difficulty in getting what he wished from the barber shop. He drank the wood alcohol, and inside of an hour was dead. This is the seventh case of wood alcohol poisoning at Fort Terry within a few months.

CASES 49, 50.—(From Dr. J. E. Minney, Topeka, Kan.)

In the year 1889 nine Poles, living in this vicinity, together indulged in a spree, toward the end of which they bought and consumed nearly two gallons of wood alcohol. Two promptly died from the acute intoxication; the other seven recovered. As related elsewhere, one of the latter became blind.

CASE 51.—(Newspaper report, Feb. 1, 1903.)

P. O., engineer in the Straube Piano Company, Downer's Grove, Ill., was found dead in his room in East Grove. Near his body was a bottle of wood alcohol, from which he had evidently been drinking. It is not known, however, whether he drank the fluid by mistake or intent.

CASES 52, 53, 54.—(Newspaper report, Philadelphia; October, 1903.)

Frank Helms, aged 43; Thomas Helms, 24, and William Conn died to-day from drinking wood alcohol. The first two, who were brothers, died while on their way to the hospital; the third, after reaching it.

CASE 55.—(Newspaper report, April, 1903.)

The death is announced, in Rockland, Mass., of Mrs. Frank Progin from drinking wood alcohol.

CASE 56.—(From Dr. J. A. Patton, Stillwell, Ind. Ter.)

L. G., aged 65, carpenter. Had drunk lemon extract for three or four days in company of friends, whose cases are also described in this report. He lived alone, and some friends, hearing of the death of one and the sickness of his other companion, went to his room about 10 p. m., Feb. 28, 1904. He answered and seemed all right. At daylight, the morning of the 29th, other parties, getting no answer to their questions, broke into the house and found him dead. Dr. Patton saw him soon after death; his limbs were flexed, head drawn back, and he presented every appearance of having died in a convulsion.

The lemon extract was analyzed and shown to contain wood alcohol.

CASE 57.—(From Dr. George H. Powers, San Francisco, Cal.)

5. Charlotte, N. C., Medical Journal, 1903, p. 104. This and the next case, although previously published, are recorded here as they are not referred to in other recent articles on this subject. —C. A. W.

A. C. G., aged 26, took during the night a single dose of wood alcohol with suicidal intent. He was found dead in bed next morning, the interval of the ingestion of the poison and the fatal issue being less than eight hours. Dr. Powers was present at the autopsy, which revealed great congestion of the vessels of the stomach and intestines, and a very strong and characteristic odor of wood alcohol.

CASE 58.—(From Dr. E. H. Robb, Newton, Iowa. Reported by Dr. H. P. Engle.)

G. C., a barber, aged 60, after a debauch, drank three or four ounces of bay rum made with wood alcohol. Shortly afterward gastrointestinal irritation, dilated pupils, irregular heart action and death in 36 hours.

CASE 59.—(From Dr. O. J. Short and the Coroner of Garland County., and Dr. A. D. Shaw, Hot Springs, Ark.)

W. T. was one of three young men who went on a spree and drank an unknown quantity of wood alcohol. All three suffered from severe abdominal distress and lost consciousness. One of them survived and testified that on awakening from his stupor he found himself alone. Search was made, and the bodies of his companions (see next report) were discovered.

CASE 60.—(From Dr. O. J. Short and Dr. A. D. Shaw, Hot Springs, Ark.)

J. A., the companion of the man mentioned in the foregoing report, was found dead after a wood alcohol debauch. A third party to the spree vomited almost immediately after drinking the alcohol, and, although he had cramps in his stomach and became unconscious for a time, finally recovered, apparently without permanent damage, and was able to give an account of what had happened previous to the death of his fellow sufferers. A postmortem examination revealed all the appearances of wood alcohol poisoning.

CASE 61.—(From Dr. C. Storz, Toledo, Ohio.)

W., man, aged 42, painter and paperhanger by occupation, died April 16, 1904, at the Marine Hotel, East Toledo. He drank a few ounces of wood alcohol and succumbed within two and one-half hours. This alcohol he had used as a liniment on a limb which he had broken about five months before. He woke his roommates and complained of terrible pains in his stomach and abdomen and said that he had drank some of the alcohol. He asked them to open the windows, as he was in want of fresh air, and suffered a great deal. When the physician arrived he was unconscious, and died within a few minutes.

CASE 62.—(From Dr. W. T. Salmon, Oklahoma City, Okla.)

R., aged 36, October, 1900, Indian Territory. A protracted spree on bitters. He died on the third day, with symptoms of wood alcohol poisoning.

CASE 63.—(From Dr. C. Storz, Toledo, Ohio.)

I. B., a well-educated Hebrew, aged about 40, died at the infirmary hospital of wood alcohol poisoning, April 9, 1902. The man was addicted to the habitual use of alcohol and, consequently, was very much demoralized. In tramping from one town to another he reached Toledo a few days previous to his death. Being too poor to obtain liquor in the usual form, he bought four ounces of wood alcohol in a drug store and drank most of it. He soon became very ill, complained of pains in his abdomen, and in a couple of hours became unconscious. He was sent to the infirmary hospital and died soon after his arrival, possibly within three or four hours, without regaining consciousness.

CASES 64 and 65.—(From Dr. J. W. Scales, Pine Bluff, Ark.)

J., male, aged 45, and S., male, aged 42, both of Ogama, Ark., drank, each, three bottles of Jamaica ginger and two of bay rum in December, 1900. Both died during the following night, with all the symptoms of wood alcohol poisoning.

CASES 66, 67, 68.—(Courtesy of the Surgeon General of the Army and of the surgeon in charge of the post at Fort Terry, N. Y.)

Private J. W. R., aged 36, Company C, A. Had been habitual drunkard. Returned to post after protracted spree, Feb. 26, 1904. About noon, February 29, went to hospital complaining of abdominal pain and showing evidences of spree; was not seen by surgeon at the time. At 8 p. m., same day, he returned to hospital; condition of profound collapse; intense pain in abdomen and lumbar region; temperature, 96; pulse thready, 50; respiration, 12, sighing; cyanosed; extremities, cold; surface of body, clammy; said he had "drank a little Florida water" and wanted something for the pain in abdomen. Assistant Surgeon R. was called immediately, but when he reached the patient he was unconscious, with above symptoms intensified. Temperature, 92; pulse, 42, scarcely perceptible; breath cold, but reeking of alcoholic fumes, which even at the time smelled peculiarly of the acid property of the methylated alcohol, or the pyroligneous acid in it. Heroic stimulation was of no avail, and the man died, 8:40 p. m.

"Investigation showed that this man and four others had been drinking the day previous from a large bottle of Columbian spirits, not knowing that it was wood alcohol; or not caring what it was, just so it was "splits" (alcohol). This Columbian spirits had been used by the company barber to mix his toilet articles, and he told us he had bought it as, and for, such. The odor and burning properties confirmed his assertion."

Corporal T. O'B., 23 years, Company C, A., was found in quarters, at time of investigation, drunk (this was about 9 p. m., February 29). When shown the bottle and told of death of Private R., he became nauseated, through fear it is believed, but declared he had not taken any of the contents of the bottle, nor had he ever seen bottle before. Corporal O'B. was sent to hospital; temperature at 9:30 was 95.5; pulse 82, soft; mind clear, conversation rational. Temperature taken every half-hour during the night ranged from 95.5 to 96 at 7 a. m., when the collapse came, the temperature dropping to 92. Pulse during night from 80 to 94, soft. Became unconscious at 7:10, a moment after he had "cussed out" the attendant for his trouble. Same profound collapse as in the previous case. In addition to the treatment used previously, a varying strength of galvanic electricity was used, the heart only responding for a minute or so to each stimulation. About five minutes before death clonic spasms beginning with the orbicularis palpebrarum and extending thence downward over the entire body and limbs, to the number of about ten, ensued at about ten seconds' interval. Death.

Private M. O'C., 36 years, Company C, A., was found in his bunk at the same time others were found, but was too drunk to take to hospital, and his condition was only what one would expect in such a case, the bottle of whisky being found in his locker. Denied boisterously that he had taken any wood alcohol. Next morning he was apparently no worse than was expected; temperature, 99; pulse, 86, fair. Protested strenuously against being put in hospital, again declaring that he had not touched the wood alcohol. He was watched all that day and temperature taken every half-hour, ranging from 99 at time of admission to 97 at 2 a. m., March 2, when it dropped to 92 at 2:15 (this collapse coming just after he had finished a tirade against all the medical corps for not believing what he told us). His symptoms from that on were identical in every way with those of previous case, even to the spasmodic contractions. Death at 3:05 a. m.

CASE 69.—(Reported to the Surgeon General of the Army by the acting assistant surgeon at Fort Banks, Mass.)

"I have the honor to make the following report of an autopsy made on the body of Private A., who died at this hospital on June 21, 1900 (Case No. 709, sick and wounded report for June). The man had been drinking heavily of late, and the day before his death had been asking one of the mechanics at the post for some wood alcohol, which request was refused. This information relative to his asking for wood alcohol was not obtained until after I had made the autopsy. The man was moribund when admitted to the hospital at 4:35 a. m., June 21, 1900, and died the same morning at 5 o'clock. The autopsy was made six hours after death. The body was that of a well nourished man. Rigor mortis and lividity of the dependent parts were noted. No external marks were visible. Brain slightly edematous and presented strong odor of wood alcohol; lungs normal except for strong odor of wood alcohol; heart normal in size, slight thickening of endocardium, blood in right and left auricles liquid and black, and had a strong odor of wood alcohol; liver normal except for a strong odor of wood alcohol; spleen small, dark in color and of good consistency; stomach contained about six ounces of dark greenish fluid, which had strong odor of wood alcohol; lining membrane of stomach covered with mucus, with areas of reddened patches and points due to submucosal hemorrhages; kidneys normal in size, capsules not adherent, cortex appeared perfectly normal, pelves and calices filled with pus; intestines normal with the exception of the sigmoid flexure which had two distinct strictures; bladder normal and contained about two ounces of urine, highly perfumed with wood alcohol. Cause of death, acute poisoning from methyl alcohol; source unknown."

CASES 70 and 71.—(Reported to the Surgeon General of the Army by the surgeon at Fort Terry, N. Y.)

Record Case No. 809. Private B. was admitted to hospital at about 9:15 p. m., Oct. 30, 1902, with acute alcoholism. He was put in bed, heat applied and aromatic spirits of ammonia given, and later 1/60 of a grain of strychnin hypodermically.

At about 9:45 he had a convulsion followed by collapse. Stimulation with strychnin, whisky and ether had little effect, and he died from cardiac paralysis at 10:07 p. m.

At this time Private C. was found on the floor of his quarters (tailor shop) in a state of profound collapse, and was brought to the hospital. Heat was applied and stimulants given, but without avail, and he died without regaining consciousness shortly after admission.

On investigation it was found that these men had been drinking heavily for several days, and being unable to procure more liquor, they concocted a punch from 13 bottles of bay rum, one of witch hazel, one of vanilla extract and one of hair oil, with sugar, lemons and water, of which mixture they drank deeply.

CASE 72.—(Report to the Surgeon General, U. S. Army, through the chief surgeon, Department of Dakota, by the surgeon at Fort Snelling, Minn.)

"I have the honor to submit the following report of two cases of methylic alcohol poisoning caused by drinking for purpose of intoxication an inferior quality of bay rum made from bay oil dissolved in wood spirit. A. was admitted to the hospital March 16, 1904, complaining of severe pains in the stomach and persistent vomiting with headache. His mental condition was not clear. His temperature was 98.4. He denied having been drinking. His urine contained albumin in large quantities. The patient became gradually unconscious, his respiration became labored and he died about 6 p. m. on the day of admission from paralysis of respiration. The heart continued to beat for some time after the cessation of respiration. Postmortem examination showed the following conditions: Brain much congested, blood dark and fluid, mucous membrane of stomach showing evidences of irritation with numerous small ecchymoses; no odor of bay rum or wood alcohol; kidneys markedly congested; liver and spleen somewhat congested; heart filled with dark fluid blood. Organs otherwise normal.

The other man, Private B., did not report at the hospital, but in investigating the cause of Corporal T. O'B.'s illness it was found that he had been drinking bay rum in company with Private B., who was the company barber, and that B. had been lying on his bunk in the barracks sick all day, but had not reported at the hospital. He was sent for at once and brought to the hospital on a litter. He complained of pain in stomach and persistent vomiting. His temperature was 97.6. His urine contained albumin and epithelial tube casts. The albumin in the urine continued present in lessening amounts until March 23, when it disappeared, and he made a satisfactory recovery and was returned to duty March 27.

CASES 73 to 81 inclusive.—(From Dr. James P. Widmeyer, Rolla, North Dakota.)

On the evening of Wednesday, Aug. 31, 1904, an unknown number of Indians of the Turtle Mountain Reservation went on a spree, and being unable to obtain the ordinary alcoholic beverages, secured a large number of bottles of "Florida water" and, it is reported in the papers, lemon extract, and drank freely of them. Nine Indians died, most of them Friday morning, September 2, and a survivor is known to have become blind. Empty "Florida water" bottles were found in the Indian encampment after the debauch. All who partook of the spirits complained of burning in the stomach and bowels, pain in the head, slow pulse (as low as 43); finger nails and lips were blue and they finally died comatose. Investigation showed the fluids to be largely methyl alcohol.

CASE 82.—(From Dr. G. H. Woodward, New York City.)

"A man of my acquaintance (from Longdale, N. Y.), died from drinking essence of lemon and witch hazel. He got on pretty well with the lemon, but died very soon after taking the witch hazel."

(To be continued.)

POISONING BY WOOD ALCOHOL.

CASES OF DEATH AND BLINDNESS FROM COLUMBIAN SPIRITS AND OTHER METHYLATED PREPARATIONS.

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MONTREAL.
AND
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CHICAGO.

(*Continued from page 1123.*)

These additional cases of death and blindness from the ingestion of methyl alcohol, collected by Dr. Wood, demonstrate that the baleful influence of the poison is still on us in undiminished force. The form of the drink has, as might be expected, assumed a variety in keeping with its extended employment. Thus we find that in some hitherto unpublished instances the victims drank, in addition to the commoner forms of wood spirits, methylated "essence of peppermint," numerous patent medicines whose chief menstruum was "deodorized" methyl alcohol, "eau de cologne," "Florida water," "bay rum," "witch hazel," lemon "extract," "punch," "high-balls," "hot drops," and red ink. In other respects the histories parallel those collected by Dr. Buller. We propose to use the histories thus made available for a few additional remarks on the general subject of methyl alcohol intoxication.

TOTAL NUMBER OF METHYL ALCOHOL VICTIMS.

From Dr. Buller's tables of published histories we have a well-authenticated list of 54 cases of methyl alcohol amblyopia, to say nothing of the deaths that are incidentally mentioned, of which no particular record was made. As the proportion of deaths to survivals with blindness is a fairly constant one, and reading the reports intended to describe the blindness only, we may put down 40 as the minimum number of published deaths.

Reference has already been made to the experience of Dr. Moulton with deaths from wood alcohol on Indian reservations. Other ophthalmologists tell the same story about these "strictly preserved" localities. One observer, who has reported several cases of methyl alcohol amaurosis, says regarding them: "Almost the first question I ask an amblyopic patient from a reservation is, What have you been drinking? The answer almost invariably is, Columbian spirits, Jamaica ginger, or something of that sort. It is no trouble to find the deleterious effects of methyl alcohol among these people. As for Indians, they will drink anything they think has alcohol in it, even red ink."

Nor is the consumption of methylated compounds as a substitute for ethylic alcohol confined to Indian reservations. Wherever men in any walk in life are deprived of a chance of indulging in the usual forms of ethylated beverages, they are very likely to drink some tempting form of methylated mixture. Assistant Surgeon X. writes me: "The temptation of the men of this post is particularly great, as we are over ten miles from the nearest saloon. At the time the deaths occurred the men, having consumed all their grain alcohol, had to have something to 'sober up' on, so they got hold of Columbian spirits and drank it, hardly knowing or caring what they were taking." Perhaps if the United States Army had been supplied with a properly regulated canteen, where light wines and good beer were sold, these soldiers would have "sobered up" on non-poisonous drinks and not on wood alcohol!

The list of previously unrecorded cases of blindness, so far as Dr. Wood has been able to collect them, includes 89 well-authenticated cases from the drinking of methylated liquids. Absorption of the fumes is responsible for ten instances of amblyopia; while the deaths (without history of previous blindness) number 82. Altogether, then, we have 153 instances of blindness and at least 122 cases of death from methyl alcohol poisoning during the past few years—275 in all.

Our reasons for believing that these figures by no means complete the roll of serious intoxication from this poison we have already pointed out. How many cases of death and blindness (or both combined) have resulted from methylated preparations since the comparatively recent introduction of Columbian spirits is a matter of conjecture; probably 400 instances.

Since this article went to press, the newspapers report the deaths of twenty-five persons in a certain district in New York City from drinking whisky which contained wood alcohol and which was purchased in a saloon. The newspaper account continues: "The police to-night arrested Rudolph Fritsche, the proprietor, and closed the place. A chemical analysis of the stomach of one of the victims who died of acute gastritis showed the presence of wood alcohol, which also was found in a bottle of whisky purchased at the saloon."

COMMERCIAL FORMS OF METHYL ALCOHOL.

Although that nauseous and vile-smelling fluid is still purchasable as wood alcohol, wood spirit, pyroligneous spirit, wood naphtha and methylated spirit, its place in commerce has been almost altogether taken by the deodorized variety, of which "Columbian spirits" is easily the best known and most widely used. There are many other forms of this fluid on the market, such as "colonial spirits," "union spirits," "eagle spirits," etc., in the United States. "Green wood spirits" (mostly used for fuel) and "standard wood spirits" (a more thoroughly deodorized article) are largely sold in Canada and intended for the same purposes as the American Columbian spirits. The deodorized fluids all have the same volatile, agreeable, vinous odor, and the pungent, biting taste as pure ethyl alcohol; and it is often difficult for the average individual to distinguish them from grain alcohol. It is, therefore, quite easy to understand how the thirsty one, unaware of the danger to life and eyesight, might indulge in a drink of the methylated product. Manufacturers of all sorts of alcoholic potions have not been slow to take advantage of this fact; indeed, there is hardly a "liniment," an "essence," an "extract" or a "bitters"—hardly any nostrum or concoction, medical or domestic, in whose preparation alcohol is employed—that has not been, or is not now, adulterated with this poison. We have within the past few months had several proprietary remedies, suspected to have produced blindness, carefully analyzed; they all contained wood alcohol.

As stated on the highly ornate labels of the bottles intended for retail consumption, one form of methylated "spirits" is highly recommended for "bathing, burning and cleaning." Among the uses specified are "bathing and sponging the sick; making liniments; rubbing for rheumatism, bedsores, etc.; veterinary uses where alcohol is required; Turkish bath cabinets; burning under chafing dishes and in spirit lamps; removing oil and grease from brass and woodwork." In all these instances ample opportunity is afforded for absorption of the poison.

A few instances—there are hundreds of others—of the use of "deodorized" wood spirit as an adulterant of or substitute for grain alcohol may be given:

In the 1903 report of Dr. R. O. Brooks, state chemist of New Jersey, it is shown that from four to eight samples of paregoric (page 7) and from four to eleven samples of ginger (page 24) contained wood alcohol—a fact that would seem to indicate that drug adulteration with wood alcohol is still practiced to a considerable extent.

Scoville[5] reported that he found two out of six commercial liniments containing wood spirit; also the same poison in several brands of witch hazel.

Dr. Allen Greenwood of Boston found quite recently that two of his patients had been furnished tinctures whose menstruum was "Columbian spirits." The druggist, on being called to account, stated that many tinctures are now being made with "spirits" of this kind!

The president of the New York Board of Health ordered in 1902 an examination of the ingredients in the Jamaica ginger and spirits of ammonia sold by druggists throughout the city. The official chemist found that 40 out of 215 drug stores were substituting wood alcohol for grain spirits. Warrants were issued for these offenders.

Dr. Warren, the pure food commissioner of the state of Pennsylvania, reports that to Feb. 5, 1904, he had collected and examined 1,000 samples of cheap whisky from all parts of the state. Over 95 per cent. of the samples contained varying quantities (some as high as 75 per cent.) of wood alcohol. He believes that 5,000 cases will be found in the state and is determined to prosecute them.

In 1902 E. L. Patch of Stoneham, Mass., reported to the American Pharmaceutical Association that he found wood spirit in 40 out of 225 samples of spirit of camphor.

Without further multiplying examples of this brazen attempt at wholesale poisoning we finally present a recent report of the dairy and food department of the state of Minnesota, who condemned and pronounced illegal, because of their containing wood alcohol, samples of lemon "extract" from all parts of the state. These poisonous products were put up and sold by wholesale manufacturers of (?) respectable standing in Chicago, St. Paul, Minneapolis, Duluth and Milwaukee. In addition to this list they also found four cases in which methyl alcohol was used in the manufacture of Jamaica ginger, two cases of vanilla extract, one of pineapple and two of strawberry.

TOXICITY OF METHYL ALCOHOL.

While a study of the cases reported in this article must undoubtedly establish the fact that the majority of those who imbibe a moderate quantity—say two or three ounces—of wood alcohol or its equivalent of methylated liquids, escape permanent damage, i. e., most persons are, to some extent, immune to serious poisoning by small quantities of methyl alcohol, this is by no means true of larger quantities; nor does it, by any means, prove the immunity of every person from poisoning by very small quantities. Until the experiment has been made nobody can be assured of safety to eyesight from the ingestion of much smaller amounts of the poison. There are many well-authenticated instances in which the drinking of a couple of teaspoonfuls of wood spirits was followed by blindness.

The intoxication of persons from inhalation of the fumes of methylated alcohol is another example of poisoning by small quantities of the intoxicant, because the actual bulk of liquid so absorbed by the lungs and skin must be comparatively small.

The cumulative quality of methylism has been referred to by several writers. This matter will be further discussed in speaking of the pathology of the subject. Meantime our investigations undoubtedly demonstrate that in many instances no marked poisonous symptoms were noticed until twenty-four hours or longer after the last of a number of doses (usually small "drinks") had been taken. Unlike most poisonous agents that are responsible for acute symptoms, these may not much disturb the patient for a relatively long interval after the ingestion of the poison. Indeed, it may be set down as a rule that, except in persons exhibiting an idiosyncrasy against wood alcohol, or unless a large dose of the poison is drunk within a few hours, not only may the severe abdominal symptoms, the cardiac and nervous collapse and the blindness be postponed, but even the fatal termination has, in some instances, been delayed for several days.

This information, derived from the histories just published demonstrate the fact that there is danger, albeit an unknown degree of danger, to life and eyesight attending the ingestion of *any* amount of wood alcohol. Moreover, while the acute, unmistakable symptoms of the ordinary forms of intoxication enable us to recognize them at once there can be no doubt but that much smaller quantities, taken into the system, as methylated quack remedies, adulterated foodstuffs (Jamaica ginger, "lemon extract," essences), or the secret dram drinking of bay rum, cologne water, etc., may, in persons not immune, injure the digestion and permanently damage the vision.

There are very few poisons that more distinctly exhibit the selective character of the intoxication than wood alcohol. It has again and again been demonstrated that a minority of those who imbibe methylated fluids suffer no permanent damage from them. In other words, many people are practically immune to moderate doses of methyl alcohol. In most cases where small doses are taken serious intoxication means that there is in the poisoned individual an idiosyncrasy against this agent. It is owing to this fact that in times past many perfectly sincere observers asserted, and interested parties loudly proclaimed, the innocence of methyl alcohol. During the trial of the Baltimore suits against Gilbert & Co. a dramatic incident occurred, based on this belief. A chemist drank a quantity of methylated spirits in open court. Of course, we now know that, although this was a dangerous act, the chances were greatly in favor of the witness, especially if at the time his stomach were full of food, or if he took an emetic shortly after the draught of wood alcohol.

Prof. W. A. Puckner, in the *Western Druggist* for December, 1897, wrote:

"The only constituent of wood alcohol likely to be present in sufficient amount to be poisonous is acetone and, since methyl alcohol is comparatively free from this, the preparations now in the market are presumably also free from the poisonous properties ascribed to wood alcohol."

Supporting this proposition, he took internally single 30 c.c. doses of a commercial wood alcohol containing about 0.5 per cent. of acetone, and experienced no unpleasant results therefrom.

"Further doses of 15 c.c. taken at intervals of thirty minutes until 90 c.c. had been drunk, left the body temperature normal, at first somewhat accelerating, later slightly depressing the pulse—i. e., producing the characteristic effects of ethyl alcohol."

On the other hand, Dr. Reid Hunt[6] of Johns Hopkins showed that, in experimenting on dogs, the latter were all killed by doses of Columbian spirits and other fluids containing methyl alcohol, while animals survived the same and larger quantities of ethyl alcohol and pure acetone.

In considering the actual poisonous agent in the methyl alcohol of commerce, one must not forget the secondary organic compounds formed in the intestine

5. Mass. Pharm. Assn., 1897.

6. Toxicity of Methyl Alcohol, 1903.

and in the blood. It is quite likely that these play an important rôle in the damage inflicted on the system. Prof. C. S. N. Hallberg believes that the untoward effects of methyl alcohol are mainly due to formation of the poisonous formaldehyd.

In respect of its varying toxicity, however, this poison does not differ from many other lethal compounds, paris green, for instance. The effect on the individual, in the case of this arsenical drug, will be largely governed by the amount ingested, the condition of the patient's alimentary tract, whether his stomach is full or empty, whether already irritated by other agents, whether vomiting sets in early or late, and whether absorption of the poison is complete or not. If the conditions are adverse a fatal termination might ensue from a small dose and in a short time; if favorable, the drinker might escape after the ingestion of a relatively large quantity of the poison.

The manufacturers of wood alcohol no longer contend that the internal use of their product is innocuous, but they do deny that any harm arises from its external application, or from its employment in the arts or as a fuel. This contention will be considered later.

The varying effects of methylated fluid on individuals is largely due to idiosyncrasy, exactly as in the case of ethyl alcohol and other poisons. For example, a peripheral neuritis, sometimes associated with blindness (toxic amblyopia), is one of the well-known results of ethyl alcoholism, but it does not so affect every drunkard. That about 50 per cent. of those exposed to the poisonous influences of wood spirit escape permanent damage is now a recognized fact, and this immunity is mostly due to a peculiar resistance inherent in the nervous and digestive apparatus.

Another fact, fully recognized by Reid Hunt in his laboratory studies, is clearly shown in the clinical history of those cases in which the poisoning was brought about by the ingestion of various mixtures containing different proportions of this drug, together with other things. In every instance the toxic action was that of methyl alcohol, as clearly and sharply defined as if nothing but the pure spirit had been consumed. It can, therefore, no longer be maintained that the poisonous effects of Jamaica ginger, lemon extract, bay rum, etc., are due to anything else than the methyl alcohol which some of these preparations are well known to contain.

PATHOLOGY OF METHYL ALCOHOL AMBLYOPIA.

The irregular onset and variety of the symptoms (especially the eye-signs) set up by methyl alcohol intoxication argues a variety in the lesions produced by it. There can be no doubt but that the ophthalmoscopic changes described in the foregoing case-histories bear out such an idea. In one series, for example, although the blindness was complete, no fundus alterations were discovered except, possibly, slight blurring of the disc outlines, or a faint congestion of the papillary vessels. These are, in all probability, cases of deep-seated retrobulbar optic neuritis, with no changes present in the nerve-head. In the course of time most of these cases suffer a postneuritic atrophy with abundant evidence of the lesion in the pallid papilla.

On the other hand, a well-marked anemia of the nerve is perceptible in many cases of intoxication a very short time after the ingestion of the poison. In this regard wood alcohol acts like quinin. It is a question whether this condition should be called "atrophy," first, because fairly good vision has been recovered in not a few of these cases, and, second, because sufficient time to bring about true atrophic changes had not elapsed since the poisoning. Later on, without possibly any marked alteration in the ophthalmic picture, the sight grows dimmer with the occurrence of veritable optic atrophy.

A third picture is that of a mild papillitis. The outlines of the disc are obscured, the physiologic excavation is filled by an edematous swelling, and the vessels, especially the veins, are distinctly turgescent. Vision will, in these, as in other cases, depend on the extent to which the central bundles of optic fibers are affected. A well-developed neurotic process situated far behind the globe and not discoverable by the ophthalmoscope may result in an early, sudden, complete and permanent blindness, while recovery, sometimes complete, may follow a superficial papillitis or an early blanching of the nerve-head.

These apparent anomalies must not, however, blind us to the fact, certified by all careful observers, that in the great majority of instances of intoxication an early retrobulbar neuritis, whose signs and symptoms shortly improve (with more or less clearing of sight), is the precursor of a genuine postneuritic or secondary atrophy, from which most or all of the patient's useful vision is wiped out.

The lesions in the majority of instances of methyl alcohol amblyopia and amaurosis are local ones—that is to say, they are not secondary to central circulatory or nervous changes. Unlike other forms of toxic amblyopia, e. g., quinin, tobacco and ethyl alcohol, the poisoning is frequently accompanied by scleral and ciliary congestion, tenderness of the eyeball, painful excursions of the globe, pain in the eyes and forehead, and other evidences of an acute inflammation of the orbital or intraocular contents. The exact character of the morbid alterations that give rise to these symptoms and to the blindness probably varies somewhat, according to the severity of the intoxication.

Whatever the primary process may be—whether it affects first the retina and then the optic nerve, or *vice versa*—the final outcome is a rapid atrophy of the fibers of the nerve and retina. Friedenwald, Holden and Birch-Hirschfeld take the former view. They believe that there is a degeneration of the ganglion cells of the retina in general, and of all the percipient elements of the macular region in particular. This metamorphosis of the retinal nervous elements, they agree, is the result of a sudden interference with their nutrition, the result of vasoconstrictor effects of the poison on the retinal vessels. On the other hand, Gifford holds that the orbital pain and ophthalmoscopic evidences of positive neuritis met with in some cases, together with complete blindness, followed by a temporary improvement, indicate a primary affection of the optic nerve. Hotz, who has seen optic neuritis in this affection, considers that if the primary effect were to destroy the central nerve elements of the retina, a partial recovery, followed by a second lapse of visual acuity, would not be likely to occur, but that this would be the natural sequence of a nerve lesion of an inflammatory type, the effusion at first clearing away, with relief to the compression of the nerve fibers; then follows renewed pressure on these with the advent of atrophic changes. Gifford noticed in one case total absence of retinal changes, as seen by the ophthalmoscope, a few hours after the blindness had come on, and holds this to be proof that the primary lesion is not in the retina. On the other hand, De Schweinitz states that in animals experimented on with

methyl alcohol its toxic action is first on the ganglion cells of the retina, and that the optic nerve changes are secondary.

Certainly the early and often complete loss of vision can scarcely be regarded as other than positive proof of profound disturbance in the optic nerve, and the subsequent rapid alterations in the vision, without visible ophthalmoscopic changes in the fundus, seem to point in the same direction. There were changes in the optic nerves in Buller's third case which indicated a retrobulbar neuritis at an early period, but nothing that would justify the assumption of pathologic alterations in the region of the macula lutea.

The whole controversy reminds one of the difficulties that surround the question of the exact nature of the lesions in the amblyopia of chronic (ethyl) alcoholism and in the blindness from tobacco, especially as to whether the optic nerve degeneration, so well described and pictured by Uhthoff and others, is primary or secondary. On the whole, it seems highly probable that the ocular changes in methyl alcohol poisoning are mainly a peripheral neuritis affecting in some cases the nerve trunk only, sometimes the retinal fibers only, and sometimes both these tissues. Occasionally recovery follows, more or less rapidly, in all forms of the disease, but as a rule the changes proceed to entire destruction of the light percipient elements of the parts that had been primarily the site of the neuritis.

The clinical histories in both the recorded and unrecorded cases fully bear out this view of the pathology of methyl alcohol amaurosis. The ophthalmoscopic changes and other symptoms generally correspond to the amount and kind of the blindness, and enable one to foretell their character so far as vision is concerned, but this is not always the case. Recovery sometimes occurs even when evident optic neuritis is present, and, on the other hand, a patient now and then becomes blind when the mirror does not reveal any neuritic changes.

This, however, is less frequently the case so far as concerns the association of white atrophy and permanent blindnes. Sooner or later we find the one in cases that exhibit the other.

SYMPTOMS OF METHYL ALCOHOL POISONING.

From a study of these cases we may conclude that there are three degrees of wood alcohol poisoning.

1. An ordinary mild intoxication, with perhaps some dizziness, nausea and mild gastrointestinal disturbance, terminating in perfect recovery within a few days, but occasionally followed by more or less serious damage to vision.

2. A toxic effect more pronounced in every way, dizziness, nausea, vomiting and gastroenteritis being conspicuous symptoms. Dimness of vision, often increasing to total blindness, is characteristic of this degree of poisoning.

3. An overwhelming prostration which terminates in coma and death.

The clinical picture of wood alcohol poisoning usually depends on the quantity taken, modified, of course, by the resisting power of the individual. Generally there will be observed the ordinary effects of alcoholic intoxication (vertigo, nausea, gastric discomfort, and general malaise), with disturbance of vision.

The more pronounced cases exhibit headache, muscular weakness, vomiting, dimness of vision, often progressing to complete blindness, with considerable gastrointestinal disturbance, and evidence of depression of the heart's action.

A step further and, with the exaggeration of all these symptoms, the patient becomes suddenly blind, or nearly so, with widely dilated, reactionless pupils, slow respiration, weak pulse, sweating, delirium or unconsciousness, often passing into coma and terminating in death.

It rarely happens that a patient suffering from methylic alcohol intoxication recovers if he once becomes comatose. He almost invariably dies unconscious or, having regained consciousness, suffers a relapse and death shortly follows.

The characteristic feature in nearly all the severe cases not terminating fatally is bilateral, total blindness, coming on in a few hours, or perhaps not for several days; then a partial restoration of vision, which again in a few days or weeks gives place to more or less complete and permanent blindness, with atrophy of the optic nerve.

Surely this is a picture entirely different from any other known form of intoxication and sudden amaurosis, and it has been drawn by many observers from actual clinical observation over a widespread area. *It is a picture which methyl alcohol alone can create.*

VISION IN METHYL ALCOHOL AMAUROSIS.

As already noted, vision is frequently good for several days after recovery from the intoxication, when without warning blindness, often total, sets in. After a few days or weeks of darkness the eyesight returns, and the improvement may even be very marked—may, indeed, be almost as good as ever. Yet a relapse is almost certain to occur, and before long the blindness once more returns, and this time, as a rule, is permanent.

The visual field is nearly always contracted, and absolute central scotomata are rarely absent. The pupils are widely dilated and do not respond to light or accommodation. The optic neuritis characteristic of the early stages of methyl alcohol intoxication shows itself in blurring of the optic discs, congestion of the papillary vessels and slight swelling of the nerve head. Later the congestion of the optic papilla disappears and complete atrophy, with a white or grayish nerve head and contracted retinal vessels, is easily made out with the ophthalmoscope.

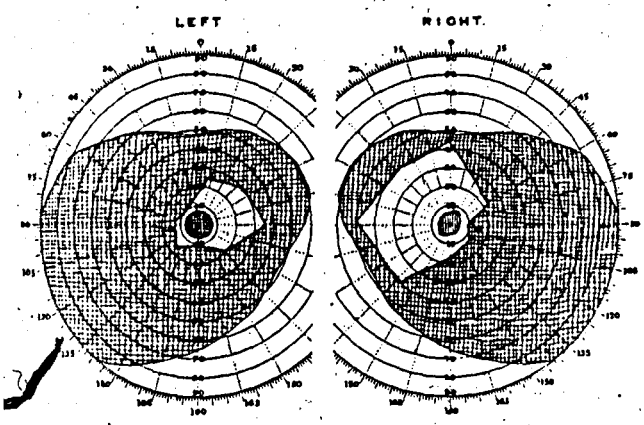
CASES OF MINOR DEGREES OF INTOXICATION.

The circular letter addressed by Dr. Wood to medical men throughout the country asked for reports of what he termed "partial intoxication," in which it was assumed that the patient escaped with small damage to eyesight—atypical cases exhibiting low degrees of amblyopia, with slight contractions of, or small scotoma in, the visual field. It was thought that, in susceptible individuals, small and repeated doses of this powerful poison might explain eye symptoms otherwise inexplicable. Persons who, unaware of the danger to health and eyesight, indulge in repeated "nips" of Columbian spirits (or of punch or other drinks made with it), methylated Jamaica ginger, bay rum, eau de cologne, or some patent medicine, or who use wood alcohol for "rubbing," or are exposed to the fumes of the poison, might suffer from failing eyesight, "dyspepsia" and headaches, without either themselves or the physician suspecting the cause of the trouble. Beyond an occasional "indigestion" or a mild "bilious attack," nothing might happen to draw the attention of either doctor or patient to the true character of the intoxication or the accompanying failure in vision. That such cases occur is evidenced by several of the published histories. Dr. Albert H. Brundage, president of the New

York State Board of Pharmacy, writes in this particular:

In two other cases where small quantities of wood alcohol were taken there were noticed nausea, headache, slight delirium, dilated pupils, finally developing blurred vision, which persisted on recovery from the other symptoms; also sweating, chilliness and quite marked debility. I have also thought I observed in two cases, where the external use of wood alcohol for "rubbing in" over quite an extensive surface was resorted to, mild but quite distinctive symptoms of a similar character. One of these cases was that of a man about 70 years old, suffering from cardiac dilatation and general debility. The other that of a child suffering from pneumonia. Therefore, the directness of the symptoms were somewhat uncertain. In the case of the old man the effect on vision was quite decidedly referable to the wood alcohol and was never fully recovered from.

That many instances of mild methyl amblyopia have been and are now attributed to other causes there is every reason to believe. The following cases, among a number seen by Dr. Wood and of which he has preserved records, are probably examples of methyl alcohol amblyopia, and yet the evidence is not so convincing that he felt justified in publishing them among the histories in Class B. Doubtless other ophthalmologists will recall similar instances. Whenever a patient presents himself with a history of recent "dyspepsia" or "bilious attacks,"



Figs. 2 and 3.—J. E. B. Field of vision for white. 5 mm. object. Left eye: Absolute central scotoma for white; no field for green. Right eye: Slight blurring of white object at fixation point, more marked on the nasal side.

accompanied by failing vision and central scotomata and the symptoms are not otherwise clearly explicable, poisoning by wood alcohol in small doses should be suspected. One can never tell, without careful inquiry, which of one's patients may be secretly indulging in the delights of the cologne or bay rum bottle, or taking "XXX bitters" or cheap whisky, for his stomach's sake.

CASE 1.—G. E. B., patient of Dr. F. W. Cook, Plattsmouth, Neb., aged 40, machinist, was seen in consultation, first by Dr. Harold Gifford of Omaha, and on April 28, 1889, by Dr. Casey Wood of Chicago.

History.—Apart from a gonorrhea (from which he entirely recovered) at 25 years of age there is no history of venereal or other general disorder. He has had many attacks of "dyspepsia" during the past few years which has not been treated with success. He does not smoke, but drinks "not much but many things." His knee jerks are unaffected and his pupil reflexes normal, although sluggish to light. Tension normal. On Sept. 28, 1898, he noticed a heavy sensation in both eyes, with some pain, photophobia and dimness of sight. After some decrease in pain and improvement in vision a steady lessening of vision followed, and now he sees "as if through a mist" at all distances. Objects also have a reddish or yellowish appearance.

Examination.—V. L. = fingers at 4 feet and Jaeger XX only; V. R. = 20/100, and with glasses words of Jaeger IV at 8 inches. The fundi show clear media, nerve heads gray-white with shallow atrophic cupping, and arteries much smaller than normal. Retinal veins smaller left than right. On the whole, the mirror exhibits fewer signs of optic atrophy right than left. The visual fields (See Figs. 2 and 3) show a well-marked absolute scotoma in both eyes with decided contractions of their boundaries.

Treatment by strychnia, etc., was of no avail.

In view of the history of acute indigestion, the bibulous habits of the patient, the condition of the fundi, the form of the fields, the progress of the disease and the probable exclusion of other causes of amaurosis, Dr. Gifford and Dr. Wood suspected a mild form of methyl alcohol poisoning, although it was not possible to trace the intoxication to its probable origin.

The second case is better defined.

CASE 2.—R. F. F., "burner" in a brickyard, aged 43, was referred to Dr. Wood April 19, 1904, by Dr. Seim of Blue Island, Ill.

History.—He is a man of good habits and has always enjoyed the best of health and good eyesight until six months ago. Since that time his vision has failed and he has had attacks of severe "indigestion," including vertigo, nausea, vomiting, headache and pain in the stomach. He now has foggy vision for both distance and near, and, suddenly he found he could not read even the coarsest print. On several occasions he has had aching in both eyeballs, when the vision seemed more foggy than before. He also thinks that during the attacks of "biliousness" his sight is worse. A careful examination of this man's urine, blood and internal organs generally show them to be all practically normal. There is no history of rheumatism, gonorrhea or syphilis. He has smoked considerably for several years. Feeling much fatigued by his work he began, six

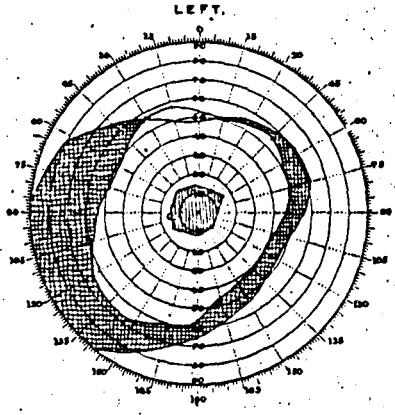


Fig. 4.—R. F. F. Visual field for white. 5 mm. object. Left eye: Central absolute scotoma for white; no field for red.

months ago, to drink wine fortified with various kinds of spirits, especially cheap whisky bought at saloons. Since the attacks of indigestion he has rather increased the amounts and number of these alcoholic potations although the stomachic distress is rather worse than better. On two occasions the drinks of wine and spirits were followed by nausea and vomiting.

Examination.—His pupillary and patellar tendon reflexes are about normal. The pupils do not, however, respond quickly to accommodation. V. in each eye is 2/7, and words of Jaeger XIV; no improvement with glasses. The ocular media are clear, but the nerve heads are distinctly grayish and the papillary tissue is woolly, with indistinct edges. No changes in the vessels or retina. The fields of vision were measured at various periods (See Figs. 4, 5, 6 and 7), showing condition when first seen and after a month's treatment.

Treatment and Result.—All stimulants were stopped and the patient given pilocarpin sweats, followed by strychnia and iron tonics and large doses of strychnia hypodermically. Vision rapidly improved, so that on Sept. 17, 1904, he had 6/6 and Jaeger I almost, in each eye. A faint central scotoma for red and green can still be demonstrated in each eye. His general health is much improved.

DIFFERENTIAL DIAGNOSIS.

The picture presented by methyl alcohol intoxication is so uniformly clear and characteristic that, once the attention of the observer has been drawn to it, there

can hardly be any difficulty in recognizing any of the degrees of poisoning. However, as it is only in recent years that the signs of methyl alcohol intoxication could be studied, and as the meaning of its symptom-complex could, consequently, be understood only by a comparatively small number of practitioners, we may be pardoned for a few words on this subject.

When dilated pupils and blindness (total or partial, temporary or permanent), accompanies, or follows shortly after, an alcoholic debauch, the presumption is that the intoxication is due to wood alcohol.

The necessity of better knowledge on the part of physicians generally of the dangerous qualities possessed by wood spirit, in whatever form it may be taken, is well illustrated in the following brief history of a lethal case:

A physician was called to see a woman, 43 years of age, and found her comatose, fairly good pulse, sighing respiration, widely dilated pupils, and was informed that before his arrival she complained of loss of vision. He suspected uremia and returned to his office for a catheter, being gone about fifteen minutes. On his return she was dead. Some urine was drawn off and found to contain albumin. No autopsy was made, but the cause of death was considered to be uremia, and, no doubt, certified accordingly.

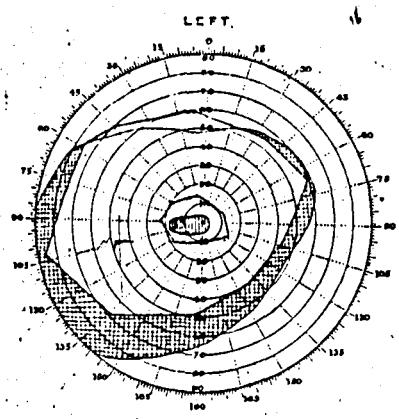


Fig. 5.—R. F. F. Left eye: Field of vision for white and red. Relative scotoma for red, which is seen at the fixation point as dark red.

With slight variations in some of the symptoms, this brief exposition of a sudden and fatal illness is typical. It would be interesting to know how many practitioners could under similar circumstances arrive at a correct diagnosis. Just out of curiosity we have "supposed" this case to many, and so far have not found one who could even guess at its real nature. We have a right to assume, therefore, that many deaths may have occurred in a similar manner, without recognition of the causation. If this be true, thousands of people are daily exposed to the hidden danger which may bring about a similar result.

The fact that death has followed the drinking of spirituous liquor generally means that the deadly fluid was methylated, because, although large quantities of ethyl alcohol may cause death, such a result is extremely rare.

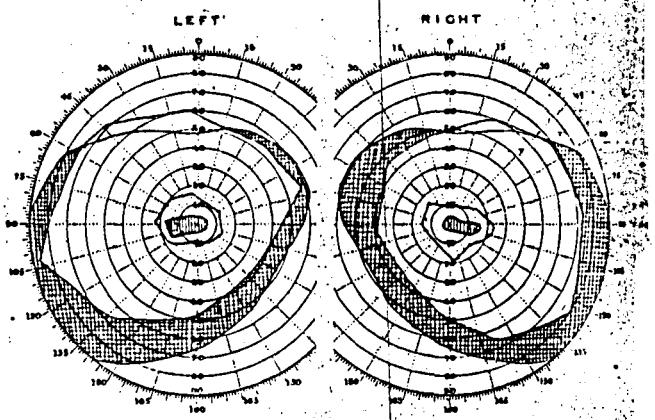
When blindness supervenes after symptoms of severe intoxication, the case might be mistaken for quinin amaurosis, but in acute cinchonism the deafness, ringing in the ears, the intense anemia of the whole fundus oculi, and almost total obliteration of the retinal vessels, serve to distinguish it from methyl alcohol amaurosis.

MIXED INTOXICATION.

Methyl alcohol poisoning, complicated with other poisons or with systemic diseases capable of producing some of the severer symptoms of methylism are, of course, not so easily diagnosed. Death from uremia in an ethyl-alcoholic, who has recently been imbibing quantities of grain alcohol, might easily be preceded by symptoms simulating wood alcohol poisoning, and it might require an analysis of the stomach contents to determine the cause of death.

In the same way, when a large dose of quinin, administered in cheap whisky or other suspicious alcoholic beverage, is followed by gastrointestinal disturbances, cardiac depression, headache and blindness, it may be difficult to say which of the two intoxicants, possible adulteration by wood alcohol in the menstruum or the quinin (or both), is responsible for the amaurosis. The following case illustrates a difficulty of this sort:

In May, 1904, Dr. Casey Wood examined, through the kindness of Dr. Oscar Dodd, whose clinic at the Illinois Eye and Ear Infirmary he attended, J. A. B., druggist, aged 33. On Nov. 27, 1903, he had a chill and took, as a remedy for it, three or four ounces of Armstrong's bitters, following this with 8 or 10 grains of quinin and some acetanilid. The same evening his



Figs. 6 and 7.—R. F. F. Field of vision for white and red. Right eye: Relative scotoma for red, which is seen as "gloomy" red. Left eye: Relative scotoma for red, which is seen at the fixation point as "dark" red.

sight suddenly failed and grew slowly worse for three weeks. On Jan. 13, 1904, he was admitted to the infirmary.

Examination.—V. R. = light perception; V. L. = shadows. Both pupils dilated. The ophthalmoscopic findings are the same in each eye, viz., disc sharply outlined and very white, lamina cribrosa plainly marked; arteries very small; some disappear a short distance from the disc. The veins are engorged.

Treatment.—Treatment, with pilocarpin and increasing doses of strychnia, was given until April 4, 1904, when he was discharged with light perception only in either eye.

When seen by Dr. Wood the retinal arteries were smaller than normal, but not so markedly reduced in caliber as one usually sees in quinin amblyopia; nor were the veins abnormally increased in size—conditions probably the result of treatment—but the nerve-heads were very white and sight was so reduced that it was impossible to outline the visual fields. There was no history of deafness. The remainder of the bottle of "bitters" was examined for Dr. Wood by Dr. Wesener of the Columbus Laboratory. No methyl alcohol was found in the concoction.

PREVENTION OF WOOD ALCOHOL POISONING.

Notwithstanding all that has been said and written in the last few years in reference thereto, the medical profession experiences difficulty in educating the people in any questions pertaining to public health. It is only by persistent effort on our part that a subject so important as the abuse of methyl alcohol has now become

will ever receive the recognition and attention it deserves, not from the public, but from their rulers, the makers of laws.

Here, then, we have a fair field for the exercise of preventive medicine. It remains to be seen how the evil may best be dealt with. Whenever these cases are brought before medical societies the unanimous opinion has always been that something should be done. So far, however, comparatively little has been done. It would be useless to try and educate the public to the knowledge that wood alcohol is a poisonous substance, since it appears under the disguise of many attractive names, such as Columbian spirits, cologne spirits, colonial spirits, Florida water, Jamaica ginger, lemon essence, essence of peppermint, etc., names intentionally misleading, and in no way suggesting the nature of the liquid, which, moreover, is further concealed by methods which remove most of its naturally unpalatable qualities.

Moreover, this new (1896) and distinct form of poisoning by a substance so widely and indiscriminately used in arts, trades, manufactures, and even in the preparation of many articles intended to be taken internally, either as food, condiments or medical preparations, is chiefly dangerous in consequence of new methods of manufacture, so cunningly devised that there is now produced a harmless-looking, and even palatable, fluid which unfortunately retains all the dangerous qualities of the crude and essentially repulsive form previously in general use.

Individual effort has done something in the way of reform. We might refer particularly to the work in this direction of Dr. Swan Burnett of Washington, D. C.; Dr. Joseph White of Richmond, Va., Dr. Harold Gifford of Omaha, Dr. H. Dickson Bruns of New Orleans, and many others.

Dr. Frank Buller has urged that in addition to, or as a substitute for, the poison label, the notice, "this fluid, taken internally, is likely to produce blindness," appear on each package. This label would be even a more effective warning than the word "Poison" and the pictured skull and crossbones familiar to us all. All of them would not be out of place under the circumstances.

In this connection it is of particular interest to know why there are so many cases of methyl alcohol poisoning in the United States and practically none in other countries. The explanation lies in the fact that a more palatable form of the drug has come into general use in this country; that, consequently, it is taken in larger quantities. This view is sustained by information obtained in regard to its use abroad, as in the contribution of J. C. McWalter to the *State Journal of Medicine*, in London, England.[7]

He states that the "methylated spirits" of commerce (in England) is a compound containing only 10 per cent. of wood naphtha, 2 per cent. of mineral oil and 64 per cent. of absolute alcohol. So long as its composition conforms to this formula, there is absolutely no legal restriction as to its sale, provided the seller obtains a license costing 10 shillings a year. He points out that this spirit contains a combination of three powerful intoxicants, capable of producing intensely greater effects than the most virulent form of raw whisky. Yet so unattractive is it as a beverage that no cases of poisoning result from its use.

He estimates that there are in Great Britain and Ireland about 10,000 retailers of methylated spirits, and that three and a half millions of gallons are consumed annually; possibly half of this is used for legitimate purposes, as polishing, dressing, etc.

McWalter believes that he has discovered a growing tendency to use even the nauseating (British) methylated spirits as a drink for securing intoxication, and thinks its employment for such a purpose should be controlled by legislation; he suggests making it absolutely undrinkable by adding naphthalin. He also suggests placing it on the list of poisons, so that it can be sold only by licensed druggists, duly labeled as poison. In spite of this alleged use of methylated spirits as a drink, he does not allude to any ill effects on vision. He thinks that sometimes cirrhosis of the liver, splenic enlargement and albuminuria may occur in consequence of its abuse.

As before stated, the manufacturers of the various forms of "deodorized" methyl alcohol regard their products as poisonous when taken internally, and packages sent out by them are, as a matter of fact, labelled "not to be taken internally," but this notice, even if it occupied a more prominent place on the bottle than it generally does, is usually offset by the recommendations on and the harmless air imparted to the rest of the label. It is quite incompetent to protect the man in search of "any kind of alcohol for a drink."

The immunity of foreign countries from methyl alcohol intoxication gives us our clue to the only effective prophylaxis. No labelling of bottles and packages will guard against the evil effects of this powerful poison, one-tenth as effectually as adding to it naphthalin or some other pungent ingredient in such quantities as, in the case of the corresponding German and British article, will prevent its employment for any of the poisonous purposes indicated in this investigation. As long as we allow deodorized wood alcohol to be sold in its present shape, just as long will we have the usual record of death and blindness from its entrance into the bodies of human beings. The reader will readily perceive that "deodorized" wood alcohol has no legitimate place in commerce. Its mere existence must always be a menace to the lives and eyesight of the community. As in Europe, safety lies in an untaxed mixture, for commercial uses, of ethyl alcohol, with some nauseous protective agent, corresponding to the "methylated spirit" of Great Britain and the "Brennspiritus" of Germany.

TREATMENT OF METHYL ALCOHOL POISONING.

The conduct of some of the cases has been outlined in the foregoing reports. There does not seem to be any antidote to the poison in the common acceptance of that term, but one's efforts, if the case be seen early, should be directed to getting rid as promptly as possible of the poison from the alimentary tract, and so to prevent its absorption. Whether vomiting has set in or not, there seems no reason why careful use should not be made of the stomach pump, with an oily emulsion as a diluent. The subsequent treatment should be directed to the symptoms.

Lieutenant R., who recently had considerable experience in the treatment of five cases at Fort Terry, in which there was one complete recovery (neither death nor blindness), reports it as follows:

Private J. F. W., aged 27 years, was found on duty at the post exchange at the same time the other patients were found in their quarters. Though showing the effects of alcohol, he was able to go about his duties (cooking). He was sent to

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the hospital, or, rather, carried, though he had walked to the quarters from the canteen, about 100 yards, a few minutes before. This man had sense enough to tell the truth; he admitted that he had taken about a pint of Columbian spirits, and also a pint of bay rum in addition, the "alcohol" on the day before and the bay rum on the 29th. When his fears had been sufficiently quieted, he was given 44 c.c. of oleum ricini, which only caused more vomiting than he had already experienced, of a mawkish, bay-rumish-acid smelling fluid. This was followed by 30 c.c. of whisky, and the dose continued every hour. Next morning the bowels were opened with enema. Temperature on admission (29th), normal; pulse, 68, soft; temperature during night varying from 97 to 99. Sleepless; complained of precordial pain and oppression and sense of impending danger. Next morning, condition fairly good; still complained of pain around heart, in bowels and in region of kidneys. General condition continued to improve on the whisky and strychnia treatment, though the pain around heart and weak pulse continued to a slight extent for two or three weeks. Returned to duty about the fifth day, but kept on strychnia for two weeks longer. The fact that this man told the truth about the affair, and thus was enabled to get most of the poison out of the alimentary canal, is, no doubt, the reason he is alive. Present condition, normal.

Dr. R. would call particular attention to the fact that none of the three deaths occurred within twenty-four hours of the ingestion of the poison, but took place in from twenty-eight to sixty hours thereafter. This long range (as to time) effect renders the stuff a most dangerous poison, for the reason that there seemed to be a paralyzed condition of the bowels, due, doubtlessly, to the methyl alcohol. It is the belief of Assistant Surgeon R., from his experience of five cases of poisoning, that methyl must be replaced by ethyl alcohol, in order to combat a collapse and sustain the patient's vitality. This, with the speedy clearing out of the poison from the alimentary canal and the continued stimulating and supportive treatment for several weeks, should constitute the principal aim in treatment.

Dr. Albert H. Brundage, who has had experience of several patients, thinks the acute, severe cases should be treated by thorough siphonage of the stomach, cold affusions to the head, cardiac stimulants, pilocarpin injections, inhalations of oxygen, external heat to body and extremities, moist heat over the kidneys, rectal injections of hot coffee and normal salt solution.

The treatment of the optic atrophy is not very satisfactory in the severe cases, although the use of pilocarpin, sweat baths and potassium iodid (as soon as the patient's condition permits) during the early stages of neuritis, followed by strychnia in full dose hypodermically, seems to have been beneficial in some instances by limiting the extension of the secondary atrophy.

CONCLUSIONS.

We believe that a study of the case histories in this investigation justify us in drawing the following conclusions:

1. Methyl, or wood alcohol, in any of its forms, as well as all methylated preparations made from it, are dangerous poisons, menacing both life and eyesight.

2. It is best known to us in its deodorized form as Columbian spirits, purified wood alcohol, cologne spirits, colonial spirits, standard wood spirits, union spirits, eagle spirits, green wood spirits, and a variety of other fluids.

3. It is used as an adulterant of, and substitute for, grain alcohol in cheap whisky and other alcoholic beverages, not to mention Jamaica ginger, lemon extract and many other essences and flavoring fluids.

4. Methyl alcohol is largely used in the preparation of many proprietary and patent medicines, witch hazel, domestic liniments, as well as bay rum, cologne water, Florida water and other perfumes.

5. To this date, at least 153 cases of blindness and 122 deaths have resulted from this poison; in all, 275 instances of lost life and eyesight. This total would probably be raised to 400 if a more thorough search were made.

6. The injury to the ocular apparatus consists chiefly of a destructive inflammation of the optic nerve fibers or retinal elements (or both), followed by their atrophy.

7. The symptoms of poisoning are gastrointestinal disturbances, more or less severe, accompanied by abdominal pain, general weakness, nausea, vomiting, vertigo, headache, dilated pupils and blindness. If recovery does not occur, there is marked depression of the heart's action, sighing respiration, cold sweats, delirium, unconsciousness, coma and death.

8. The blindness is bilateral and may set in a few hours after the inhibition of the poison, or it may be delayed for several days. It is generally complete, with a subsequent improvement, and, finally, a relapse into permanent blindness.

9. The visual fields are contracted and exhibit absolute central scotomata. The ophthalmoscope reveals at first a congested nerve-head, followed by grayish or white atrophy and contracted vessels.

10. The diagnosis can hardly be mistaken. Methyl alcohol poisoning presents a picture unlike that of any other intoxication. Acute abdominal distress, followed by blindness, should always awake a suspicion of methyl alcohol poisoning.

11. The prevention of poisoning by this insidious drug can only be brought about by prohibiting the sale of "deodorized" wood alcohol in all its forms. The number of deaths may meantime be limited by putting all methylated preparations on the list of poisons and prosecuting all persons adulterating foods and drinks with it. Labelling it with the notice, "This fluid, taken internally, is likely to produce blindness," will certainly have a deterrent effect.

12. Methyl alcohol intoxication is an example of idiosyncrasy. As in the case of several other poisons, some persons are largely immune so far as permanent damage to the organism is concerned. If ten persons drink, say, four ounces of Columbian spirits within three hours, all will have marked abdominal distress and four will die, two of them becoming blind before death. Six will eventually recover, of whom two will be permanently blind. With still larger doses, the proportion of death and blindness will be greater.

13. Poisoning by inhalation of the fumes of methyl alcohol generally occurs when the exhalations are mixed with rebreathed air, as in varnishing the interior of beer vats, small rooms, etc. It is also highly probable that in susceptible subjects repeated or even single methylated "alcohol rubs" may produce poisonous symptoms, through absorption of the spirit by the skin.

14. Chronic (or partial) poisoning from methyl alcohol (in the shape of "nips" of methylated Jamaica ginger, bay rum, punch made with Columbian spirits, etc.) is the most insidious and probably not an uncommon

form of intoxication. Its symptoms are not so pronounced or so easy of recognition as in the acute form, but the eyes, digestive apparatus and nervous system undoubtedly suffer.

15. The use of ethyl or grain alcohol in the arts, as in the manufacture of varnishes, as a burning fluid, for "stiffening" hats, lacquering brass, etc., is without danger to life or eyesight. By adding to it a small percentage of naphthalin, for example, the fluid would be undrinkable. A combination of ethylic alcohol with 10 per cent. of wood spirit would answer the same purpose. Such a mixture is the "methylated spirit" of Great Britain, where not a single case of acute poisoning or amaurosis from methyl alcohol is recorded, in spite of the extensive commercial use of methylated preparations in the British Isles.

16. The treatment of methyl alcohol intoxication consists chiefly in getting rid of the poison from the stomach and intestines by means of the stomach-pump and rectal injections; stimulants, especially ethyl alcohol, strychnia and coffee; heat to the body and extremities.

17. The treatment of the amaurosis is unsatisfactory. In the early stages pilocarpin and potassium iodid; later, strychnia hypodermically and by the mouth.

EDITOR'S NOTE: This concludes the report save for the tabulated summaries of the cases previously published elsewhere, which will appear next week.

REFLEX APNEA AND CARDIAC INHIBITION IN OPERATIONS ON THE RESPIRATORY TRACT.*

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The following case, reported elsewhere by one of us,[1] gives some idea of the practical importance of this subject:

In 1900 one of my students came to me for an explanation of certain curious phenomena that occurred during massage of an epithelioma of the lower lip. It was about 1 1/4 inches in diameter and surrounded by an indurated area. The center was very sensitive. When this part was massaged the patient cried: "Don't cut my wind off! You are choking me!" He gripped the chair and grew dark in the face, breathing hard, with a pulse of 100, subsiding quickly to 20; respiration about 12. Massage next day caused the same alarming symptoms.

No doubt it was a case of reflex inhibition caused by mechanical stimulation of the abnormally sensitive endings of the trifacial.

Reflex inhibition has not received from laryngologists the attention it deserves. The text-books do not refer to it, and yet it is a subject familiar to most general surgeons and physiologists. It seems worth while, therefore, to discuss in a brief way the subject as a whole. We would call attention to the value of inflation of the lungs when death seems imminent from cardiac inhibition.

CAUSES OF INHIBITION.

Reflex inhibition of heart and respiration is caused in the following way: Afferent impulses, following irritation of the trifacial and sensory branches of the vagus (superior laryngeal and pulmonary), are carried to the cardioinhibitory center in the medulla. This center is thrown into greater activity, and strong inhibitory impulses are sent to the heart. At the same time the respiratory center is so acted on as to cause a cessation of respiratory movements, until the accumulated carbon dioxid again drives it into action. The consequent inflation of the air vesicles of the lungs then reflexly lessens the activity of the cardioinhibitory center,[2] and in this way inhibition is overcome.

Inhibition of this kind must not be confused with syncope or shock, for syncope is due to a sudden vasodilation; the blood, from gravity, collects in the abdominal viscera and dependent parts of the body, and loss of consciousness ensues from cerebral anemia. Inhibition following trifacial and superior laryngeal irritation, on the contrary, causes a reflex stimulation of the vasoconstricting mechanism and is not necessarily associated with loss of consciousness.

Of course, reflex inhibition can be produced by irritation of other sensory terminals than those in the respiratory tract; it frequently occurs in operative procedures on the trifacial area about the lips,[1] teeth,[3] eye[4] and ear.[4] As this paper will deal with the respiratory tract only, we can now take it up in detail.

Nose.—Those who have inhaled strong ammonia know that it is several minutes before they can get their breath, or, technically speaking, before the inhibition of respiration passes off. Also, in etherizing rabbits, it is noticed that as soon as ether is applied to the nose the animal stops breathing over a more or less prolonged period. At the same time the heart is markedly inhibited—in fact, almost stopped. This reflex inhibition is also produced when applications of irritating solutions, e. g., dilute sulphuric acid, are made to the turbinates. Such result was observed by Kratschmar,[5] who experimented with tobacco smoke as an irritant. Quite frequently in operations on septum reflex inhibition will cause a patient to suddenly feel faint, "lose his nerve," although the tissues being cocainized, he experiences no pain. Some of these cases can be ascribed to psychical causes, a few to the cocain[6]; indeed, it is apparent at once that a large percentage of cases of so-called cocain idiosyncrasy may properly be ascribed to reflex inhibition. Doubtless many of the deaths occurring in primary anesthesia can also be attributed to this cause. The effect of slight irritation of the nasal terminals of the fifth nerve is illustrated by the following case:

John C., aged 10 years. Acute purulent rhinitis. Pulse before examination, 100. During cleansing of nasal mucosa pulse fell to 66. Inhibition gradually decreased as cocain was applied.

Rhinopharynx.—The rhinopharynx is also very sensitive to reflex inhibition. Applications to this region produce in some instances a momentary catching of the breath, and in the removal of adenoids a marked slowing of the pulse almost invariably occurs when the instrument—forceps, curette or finger—is introduced behind the soft palate.

CASE 1.—Edward C., aged 3 years. Adenoids operated on under ether. Before operation pulse was 145. No change in pulse occurred during removal of faucial tonsils; respiration was, of course, interfered with. The pulse immediately afterward

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* Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Laryngology and Otology, and approved for publication by the Executive Committee: Drs. G. Hudson Makuen, George L. Richards and John F. Barnhill.

1. Good: American Medicine, Aug. 23, 1902.
2. Sitz. d. k. akad. Wissensch., vol. lxiv, p. 11.
3. New Orleans Med. and Surg. Jour., 1850.
4. H. O. Reik: Trans. Amer. Otolog. Soc., 1903.
5. Sitz. d. k. akad. Wissensch., vol. lxii, p. 11.
6. Harland: Philadelphia Med. Jour., May 23, 1903.

POISONING BY WOOD ALCOHOL.

CASES OF DEATH AND BLINDNESS FROM COLUMBIAN SPIRITS AND OTHER METHYLATED PREPARATIONS.

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(*Concluded from page 1221.*)

(A.) PUBLISHED CASES OF WOOD-ALCOHOL POISONING.

The following tables, prepared by Dr. Buller, are practically complete to June, 1904. As previously stated, they furnish characteristic accounts of intoxication from various methylated drinks, as well as from inhalation of the vapor of methyl alcohol. That only two of these cases occurred in Europe points the moral so often urged in these papers: wherever a government permits the sale of "deodorized" wood alcohol (as in the case of Columbian spirits in the United States and standard wood spirits in Canada), the only effective safeguard against the ingestion of the poison is removed and the annual sacrifice to death and blindness will certainly continue. Either the manufacture and sale of "deodorized" wood spirit should be absolutely prohibited, or, as in Germany and Great Britain, an untaxed ethyl alcohol, rendered undrinkable by the addition of pyroligneous spirit, mineral oil, naphthalin or some other nauseous compound, should be employed in the arts in the place of Columbian spirits and similar dangerous preparations. Either enactment would prevent the use of Columbian spirits and other forms of "deodorized" wood alcohol in the adulteration of Jamaica ginger, lemon extract, bay rum, essence of lemon, whisky, witch hazel, cologne water, and innumerable other alcoholic mixtures now employed in the preparation of food and drink.

That this menace to the health of the community is an ever-present reality is evidenced by the recent death in New York within two days of seventeen persons from drinking whisky adulterated with wood alcohol. Commenting on this tragedy, Dr. H. W. Wiley, chief of the Government Bureau of Chemistry, expressed the opinion that "85 per cent. of the whisky sold in this country, in hotel restaurants, clubs and bars, is nothing less than a cheap imitation—an adulterated article distinctly injurious to the health."

A. METHYL ALCOHOL INTOXICATION.—PUBLISHED CASES.

No.	Reporter and Date	Journal	Age	Sex	Occupation and Habits of Life	Mode of Occurrence	Preparation and Quantity of Spirits Consumed	General Effect	Visual Disturbances	Results	Remarks
1..	Viger and later by Mengin, 1879.	Rec. d'Ophtalmologie, p. 638.	..	M	Convict, drank small quantities of methyl alcohol for some three months previously.	Washed out a varnish barrel with two liters of water and drank a half liter of the liquid.	As above stated . . .	An hour later intense headache, vomiting, profuse sweating, dilatation of pupils and delirium; next day delirium gone.	Completely blind next day and remained so for a week, then slow improvement in left eye so that he could see to get about.	Later on became entirely blind again and two years later Mengin found optic discs dull, snowy white, lam. crib. not visible; vessels not markedly reduced in size.	This is said to be the first typical case of blindness from methal alcohol on record and was first reported by Viger in L. Annee Medicale, June, 1877.
2..	Dr. H. G. Kipp. 1888.	Baltimore Medical Journal.	28	M	Artistic painting; took prolonged spree occasionally.	At the end of a spree one Sunday, began to take wood alcohol, within twenty-four hours had taken a considerable quantity.	About a pint; the preparation was said to be composed of 90 per cent. pure alcohol and 10 per cent. methyl alcohol.	When seen by Dr. Kipp on Aug. 6, eyes protruding, lips open, pupils widely dilated, in a state of mild opisthotonos, respirations slow, and labored, pulse weak, unconscious, cyanotic.	Masked by profound general effect.	Died in the course of a few hours from the time when first seen.	About fifteen minutes before death the conjunctiva became dry and very much congested.
3..	Dr. A. G. Thompson. 1897.	Proc. of Philadelphia County Medical Society. 1897, p. 172.	32	M	Sailor, ...	Drank about 20 ozs. of essence of Jamaica ginger in two days.	Essence of Jamaica ginger, 20 ozs.	Headache, nausea and vomiting next day.	Next day everything looked hazy; blindness complete by Sixth day. Fasted one week; improvement for four weeks and subsequent failure of vision.	Examination 3½ months subsequently showed, R. V. = counting fingers at 1 meter; L. V. = 1/100th, excentric, optic discs exceedingly pale; lower outer quadrants completely atrophied.	
4..	Drs. C. MacCoy and F. M. Michael, May, 1898.	Medical Record. Vol. 53.	21	M	Attendant; habits good.	When convalescing from measles, drank about four ounces of Columbian spirits, mixed with water and sugar, and repeated this dose in two hours.	Columbian spirits with water, 8 ozs.	After the first dose he experienced pleasant effects, after the second at first highly exhilarated, then slept ten hours; on awakening violent emesis and gastric pain.	Twenty-four hours after last dose, pupils wide and fixed; vision = 0; there was said to be double optic neuritis with congested retinæ.	Perception of light returned after 21 days but 12 months later was totally blind, with atrophy of optic nerves.	
5..	Dr. Hiram Woods, Jr., Baltimore, Md., Feb., 1899.	Ophthalmic Record, Chicago.	32	M	Bricklayer . .	Christmas week, Dec. 1898, was on an oyster boat with a lot of men who were drinking Jamaica ginger mixed with cider for five or six days, after this mixed with water.	Jamaica ginger, quantity not estimated.	No mention is made of early effect on health; only on Jan. 27, said to have frequent sharp pains in stomach and lancinating pains in legs.	First noticed that oyster shells as they dropped into the water looked like drops of blood; vision soon became dim, then totally blind for four days; four weeks later could see to read.	After several weeks vision again failed and on Feb. 7 could not see newspaper headings; vision excentric and optic nerves atrophied; contracted fields; absolute central scotoma.	In this case the early symptoms were not observed and only imperfectly described.
6..	Dr. Hiram Woods, Jr., Baltimore, Md., 1899.	Ophthalmic Record, Chicago.	38	M	Workman in a mill; often drank to excess Saturdays and Sundays.	During two days unusually hard work during a flood, he took more ginger [mixed with water] than usual perhaps four or five ounces on Saturday and the same on Sunday, also a little alcohol.	Jamaica ginger, mixed with water, also a little alcohol; quantity not known.	On Monday night [? morning] taken with vomiting, diarrhea, gastro-intestinal cramps, severe headache, several of these attacks ensued in the last of which "sight went, quick as a flash."	Vision went and came several times and then he became unconscious; on awakening Tuesday morning, Feb. 7, was totally blind; afterwards vision partly returned.	On April 9, V. = fingers at 20 in. for right and 10 ft. for left, uncertain; irregularly contracted fields, central and paracentral scotomata.	
7..	Dr. Hiram Woods, Jr., Baltimore, Md., Feb. 1899.	Ophthalmic Record, Chicago.	47	M	Stock herder; heavy smoker and often drank to excess.	Habitual inebriate and heavy smoker; had been using ginger essence mixed with cider more or less for 3 years; the day before vision failed had taken 3 or 4 half pint bottles of ginger essence besides other stimulants.	Ginger essence and other stimulants, 3 or 4 half pint bottles.	On getting up next morning had a severe attack of nausea and vomiting with sharp pains in the head.	Sudden blindness came on during this attack; vision returned slowly to some extent.	Vision reduced to counting fingers at about six inches; fields each limited to small area on temporal side; small central scotomata.	
8..	Dr. Hiram Woods, Jr., Baltimore, Md., Feb., 1899.	Ophthalmic Record, Chicago.	50	M	Shoemaker; occasionally went on spree.	In the habit of "going on a spree;" after one of these, commencing with whisky on "tapering off" he drank during three days about six ounces of Jamaica ginger.	As stated above . . .	No particular effect until 48 hours after the last dose, then sudden giddiness and "a cloud came over his vision;" soon followed by headache, vomiting and gastro-intestinal pains.	Dimness variable the first day, next morning blind; four days later seen by Dr. Harlan, then pupil widely dilated, inactive, light-perception doubtful; ophthalmoscopic appearances nil.	Five months later optic nerves atrophic, fundus otherwise normal. Vision = 0.	
9..	Dr. Hiram Woods, Jr., Baltimore, Md., Feb., 1899.	Ophthalmic Record, Chicago.	32	M	Physician; habitual inebriate.	Drank 3 pints of whiskey in 3 days; on July 22, commenced to "taper off" with Jamaica ginger, took 6 or 7 bottles of 2 fl. oz. in each be-	As stated above . . .	Next day felt indisposed. Thursday night atrocious headache, vomiting and abdominal pains; these continued through most of night.	Awoke Friday morning totally blind; intermittent slight returns of vision up to Aug. 8.	On Sept. 28, "No light," discs becoming clearly atrophic.	When first seen, a possible slight optic neuritis, eight days later choked discs a month later, atrophy.

						tween July 22 and July 27; Wednesday took 7 bottles of ginger in two hours.					
10..	Dr. Hiram Woods, Jr., Baltimore, Md., Feb., 1899.	Ophthalmic Record, Chicago.	52	M	Mechanic; a periodical drinker and heavy smoker.	On Saturday, July 30, drank altogether 10 bottles (2 ozs. each) of Jamaica ginger and peppermint essence, and two or three bottles on Sunday.	As stated above . .	Monday morning headache, nausea, abdominal pains, which continued most of the day.	On Tuesday morning awoke with very dim vision and soon lost sight entirely; up to September has occasional momentary glimpses of vision.	On leaving hospital, Sept. 28, V. = 0.	
11..	Dr. R. S. Patillo, Chicago, 1899.	Ophthalmic Record, Chicago.	31	M	Painter, partner case 19; tobacco and stimulants moderately.	Shellacing beer vats as cause.	Vapor from 8 vats, 20 x 11 ft., at 70° F., of shellac made with Columbian spirit.	After two weeks, nausea dizziness, and headache.	16th day after beginning work sight dim, following day total blindness; blind 24 hours and gradually improved.	Right eye, fingers at three feet; left fingers at one foot, vessels normal; discs opaque white.	Sight previously good; moderate use of tobacco and stimulants.
12..	Dr. Harold Gifford, Omaha, Neb., Sept. 1899.	Ophthalmic Record, Chicago, Vol. VIII.	45	M	Not stated.	On Dec. 5, 1898, drank about half a pint of a mixture consisting of hard wood alcohol (sold to him as pure alcohol by a young doctor) and yards water, next day another swallow of the same liquid.	As stated above. . .	For two days head sore and confused, at 9 p. m. on Dec. 7, began to vomit and kept it up all night, same time had terrific headache.	On the morning of the eighth vision foggy, slowly got worse, and on the ninth could see no light; pupils wide and fixed; movements of eyeballs painful, after 20 days sight slowly returned.	After being able to count fingers at several feet, vision again deteriorated and he subsequently became blind, with atrophy of the optic nerves.	Two deaths are said to have been caused by drinking alcohol obtained from the same source.
13..	Dr. Harold Gifford, Sept. 1899.	Ophthalmic Record, Chicago, Vol. VIII.	..	M	Miner	Drank an unknown quantity of a mixture containing probably a pint of Columbian spirits made up to half a gallon with water.	As stated above. . .	Became wildly excited, pulse and respiration very rapid; temperature normal.	Was found totally blind with reactionless pupil. 24 hours afterward and two hours later died.	Death took place about 26 hours after taking the alcohol.	Eight persons took part in this conviviality; one other died within 24 hours the other six who took less suffered from severe gastro-intestinal disturbance but recovered.
14..	Dr. Kuhnt of Königsberg, Germany, 1899.	Zeit-schrift für Augenheilkunde.	24	M	Workman . . .	On June 23, (?1898), he drank a single long pull of a mixture of mythyl alcohol and ordinary whiskey.	Probably several ounces of methyl alcohol and whiskey.	Felt nothing amiss until afternoon of next day, then nausea and giddiness followed by deep sleep which lasted, excepting two short intervals, till June 27; on awakening had severe headache and dim vision.	On the 28th had become entirely blind with pale optic nerves which a little later became milky white.	Vision began to return on July 3, and was again normal when last seen on July 28, the previously pallid nerves also recovered their color.	A comrade of this man who was supposed to have taken a larger quantity died next day with symptoms indicating a violent gastro-enteritis.
15..	Dr. J. E. Raub, Nov. 18, 1899.	Ophthalmic Record, Chicago, Vol. VIII, p. 619.	..	M	. . . . .	During the night of Oct. 3, 1898, drank two to five tea-spoonsful of methyl alcohol.	Methyl alcohol; about half an ounce.	Not stated	Vision much impaired on following morning and became gradually less till Oct. 10, then "No fundal changes, and V. = 0."	Atrophy of the optic nerves and total loss of vision.	There was slight temporary return of vision between Oct. 10, and 26, while taking K. I. and strychnin; this appears to be a pure case of methyl alcohol poisoning, but the statement as to quantity consumed was probably incorrect.
16..	Dr. J. E. Raub, Nov. 18, 1899.	Ophthalmic Record, Chicago, Vol. VIII., p. 619.	..	M	Sailor	Drank mixture of methyl alcohol and benzine.	Quantity not known.	Semi-conscious, pupils widely dilated at first and remained so; retained consciousness on July 8th.	Then found to be totally blind; an examination by an oculist showed atrophy of optic nerves.	Under strychnin and K. I. slight temporary improvement up to Aug. 2; on Oct. 11, 1898, was found to be totally blind; optic nerves atrophic.	
17..	Dr. J. E. Raub, Nov. 18, 1899.	Ophthalmic Record, Chicago, Vol. VIII, p. 619.	..	M	Sailor	On July 4, 1898, drank a mixture of methyl alcohol and benzine in company with two others.	As stated, quantity not known.	On July 5, received on an ambulance ship in a state of total unconsciousness.	Masked by profound general effect.	Died within a few hours after coming under observation.	Communicated to Dr. Gifford, in a letter from Dr. Raub, dated Washington, Nov. 18, 1899; the others suffered from a gastro-enteritis.
18..	Dr. H. Moulton, Fort Smith, Ark., July 1899.	Ophthalmic Record, Chicago, Vol. VIII, p. 335.	33	M	Painter . . .	On Oct. 8, 1897, patient with 30 or 40 men in the Indian Territory, drank wood alcohol, some taking very little, five indulged freely.	Wood alcohol, perhaps each of the five took half a pint.	All five, including patient were made very ill; the patient became very weak, heart's action feeble, but he himself was at no time unconscious.	Next day his sight began to grow dim, and in a few hours was lost entirely; in a few days some vision returned and has remained.	Vision, R. = Pl., L. = fingers at one foot; complete atrophy of right nerve, incomplete of left.	Remaining field of vision of L. E. small, horizontally oval, within this absolute central scotoma; of 4 comrades 2 died within 24 hours; 2 were believed to have recovered perfectly all pure methyl alcohol poisoning

A. METHYL ALCOHOL INTOXICATION.—PUBLISHED CASES—Continued.

No.	Reporter and Date	Journal	Age	Sex	Occupation and Habits of Life	Mode of Occurrence	Preparation and Quantity of Spirits Consumed	General Effect	Visual Disturbances	Results	Remarks
19..	Dr. R. S. Patillo, Chicago, Dec., 1899.	Ophthalmic Record, Chicago.	36	M	Painter	Shellacing some beer vats, July 10, 1899; shellac mixed with Columbian spirits 97.98 p. c. alcohol, 3 coats applied to each of 8 vats, 20x11 ft., tightly closed except vent-hole 18 inches square.	Vapor from vats mentioned above inhaled, temperature 70° F.	In four days discontinued work on account of nausea, dizziness and headache.	On 5th day sight was fogged; 6th day totally blind; total blindness lasted one week, gradually returned until able to go around two weeks later, sight again failed.	R. E., fingers at three feet; disc bluish tint, vessels normal, tension normal; L. E., light percep. only; disc white, vessels slightly contracted.	Inhalation only.
20..	Dr. R. S. Moulton, 1900.	Proc. Medical Society of Arkansas, 1900, 285-292.	33	M	Painter	Oct. 8, 1897, with 30 or 40 others drank wood alcohol.	About eight ounces of wood alcohol.	Weakness, feeble pulse, no unconsciousness.	Twenty-four hours, sight dim, entirely lost in a few hours more; returned in a few days partially.	5 months later condition unchanged; pupils dilated and inactive; L. V. = fingers at 1 ft., color perception absent, field contracted with absolute central scotoma; R. V. = Pl. fundus complete atrophy of right nerve and retina; arteries much contracted; lt. eye the same except slight pinkish hue of papilla.	
21..	Dr. E. Stieren, Jan. 5, 1901.	Journal of American Medical Association.	Adult	M	Not stated .	The drug was taken about noon when he fell asleep and on awakening about 3 p. m. was totally blind.	Jamaica ginger; quantity not definitely known.	Not stated	Total blindness in three hours; partial return of vision three hours later; complete recovery in five days.	Recovery of normal vision and no impairment fields.	Active diaphoresis and cathartsis were resorted to early in this case.
22..	Dr. H. Harlan, Baltimore, Feb., 1901.	Ophthalmic Record, Chicago.	30	M	. . . . .	A hard drinker; when he could not get whiskey or brandy drank essence of peppermint, cinnamon, lemon, etc.; on Saturday drank three bottles of essence of peppermint and part of a bottle of essence of lemon.	Three bottles of essence of peppermint and part of a bottle of essence of lemon.	Unnerved, sick and stupid on sunday, eyesight became dim and by Wednesday could only distinguish light from darkness.	Both nerves were atrophic, fields small and irregular; central vision was 5/200 in each eye.	Under treatment of pilocarpin, strychnin, and later K. I., he became better, the fields improved and the central V. was 6/200 the rt. 7 cc. in the left, when he left the hospital.	The peppermint was prepared by the same firm as the Jamaica ginger taken by Dr. Harlan's case 1; Dr. V. Hawkins wrote me details of the death of two men from drinking essence of ginger put up by this same firm.
23..	Dr. H. Harlan, Baltimore, Feb., 1901.	Ophthalmic Record, Chicago.	28	M	Not given . . .	On election day, Nov. 1, he had taken seven bottles of Jamaica ginger, walked home 2 miles and then took seven more.	Fourteen bottles of Jamaica ginger in one day.	Very sick, unconscious for three days; awoke almost blind, and since Feb. 1, his vision has been failing.	The optic nerve showed atrophy, a good deal of variation in the vision from day to day.	Little if any improvement in vision when he left hospital; later became entirely blind.	The Jamaica ginger was made by a well known drug house of Baltimore; the chemical examination of this essence of Jamaica ginger was made by Drs. Hynsent and Dunning.
24..	Dr. Edward Jackson, Denver, Colo., April, 1901.	Medical Times, Denver.	30	M	Colored	Drank an unknown amount of wood alcohol.	. . . . .	Unconscious for 48 hours.	Blind in 48 hours, after which gradual improvement to normal; in 2-3 weeks again failure.	A month after V. was reduced to fingers at 3 ft.; field much contracted; optic discs white; vessels small.	
25..	Dr. G. E. DeSchweinitz, June, 1901.	Ophthalmic Record, Chicago.	30	M	Painter; tobacco and alcohol moderately.	After using wood alcohol varnish for "some time would have dizziness and temporary haziness of vision; after working for two months continuously at varnishing felt sick and chilly and one morning found himself unable to work.	Used wood alcohol in varnish and to wash hands and arms after working.	Chilliness and pains in the legs in morning; no headache, nausea nor vomiting.	At midnight unable to see the gas light in his room; absolute blindness for two weeks; two weeks later could distinguish faces and three weeks more vision failed again.	Complete blindness.	
26..	Dr. Harold Gifford, 1901.	Medical Herald, St. Joseph.	35	M	. . . . .	On Nov. 23, 1900, took 2 or 3 drinks of spirits flavored with something to take away the characteristic odor of methyl alcohol, also perhaps some the next day.	Quantity uncertain probably less than eight ounces; the jug from which the spirits were taken was labeled Cologne spirits.	Felt ill that evening and poorly on Nov. 24 and 25.	On the morning of Nov. 26, sight began to fail; when first seen by Dr. Gifford on Nov. 28, V. = 0, after four days vision began slowly to return.	Recovery of nearly normal vision after two months, though the optic nerve showed atrophic changes and the field was contracted below.	L. eye had shrunken cataract, been blind many years; one of the few cases recovering perfect vision; Dr. Gifford points out why the L. eye can stop blindness in the optic nerves.

[illegible]	[illegible] 1901.	[illegible], Palermo, 1901-02, ix, 170-142.	13	M	Hotelkeeper	Drunk on June 11, 1901, about 15 ozs. of an unknown strong alcoholic liquor; became completely drunk, was put to bed and slept till next morning.	Preparation not known, 15 ounces taken.	Patient became completely drunk and went to sleep; obstinate constipation; cardiac stroke weak; micturition difficult.	Awoke on morning of June 12, 1901, blind; sensibility of conjunctiva and cornea almost completely gone; pupils dilated and rigid with a diameter of 6.5 m.; oculopalpebral, single ocular and assoc. normal movements showed slight esophoria of bulbs.	Vision [illegible] eye [illegible] examination showed a large grey-yellowish [illegible] covering the temporal half to the emergence of central vessels, terminating without marked limits; arteries thin and pale, while the veins are swollen and compare with arteries as 6:1; soft, uniform and striated radially; shows a rose-yellow color, quite pale in consequence of strong constriction of retina and choroid vessels.	Patient has [illegible] doubtful whether this case can properly be classed as one of methyl alcohol poisoning.
28..	Dr. Swan M. Burnett, Washington, D. C., 1901.	Therapeutic Gazette.	65	M	Not stated	While suffering from pain in the stomach bought ten cents worth of alcohol from a druggist to "rub on" his stomach, this not proving satisfactory he swallowed about a teaspoonful mixed with water.	One half ounce evidently wood spirit.	None mentioned	Inside 48 hours vision impaired, 48 hours more only perception on movement; pupils dilated and inactive; no fundal changes.	Two months later right field slightly contracted peripherally, left externally; no color perception; no further fundal change.	Patient was operated on for hemorrhoids shortly (48 hours) after taking the spirit.
29..	Dr. Swan M. Burnett, Washington, D. C., 1901.	Therapeutic Gazette.	64	M	Not stated.	Three years previously after a spree in a prohibition town, drank "quite a lot" of essence of Jamaica ginger; recovering from spree found himself quite blind and has remained so since.	Jamaica ginger, amount not known.	. . . .	Perception of movement only in outer fields, best in left eye; pupils widely dilated and inactive to light; white discs, well defined outlines; no vascular changes, a number of small yellowish dots in retina near macula lutea.	Permanent blindness.	
30..	Dr. Swan M. Burnett, Dec. 1901.	Therapeutic Gazette.	32	M	Served in Spanish-American war.	On Oct. 6, took, by mistake, he claims, from 2 to 4 ounces of wood alcohol.	Two to four ozs. pure wood alcohol.	None	Rapid failure of vision within 48 hours, resulting in total blindness 4 days later; slight improvement in R. up to Oct. 26, but after that slow return to blindness.	Atrophy of optic nerves and total blindness.	The man contended before the bureau that his loss of sight was not the result of drinking the wood alcohol, but due to malarial poisoning which he had contracted while in Cuba; this case reported also in Report No. 117 (Oct., 1899) of U. S. Dept. of Interior.
31..	Dr. Swan M. Burnett March 21, 1902.	Washington Medical Annals, 1 p. 76 and 150, 1902.	..	M	Not stated, dipsomaniac	At the end of a prolonged spree drank 6 ounces of Jamaica ginger.	As above stated . . .	Not stated	After 48 hours decided dimness of V., and inability to read; improved for a time; 6 months later drank after a spree, 3 ozs. more Jamaica ginger and a month later V. = 5/15 rt., 5/35 lt., fields normal for white.	Central scotoma of 10°, of total color blindness, outside of which blue could be discriminated but red and green not; R. eye, central scotoma for red and green.	Several others drank of the same brand of Jamaica ginger with no apparent effect; a committee recommended that methyl alcohol be placed on list of poisons in District of Columbia.
32..	Dr. Swan M. Burnett, June, 1902.	Ophthalmic Record, Chicago.	..	M	Not stated.	In Aug., 1901, while "tapering off" from an attack of dipsomania in a prohibition community, patient took about three ozs. of Jamaica ginger, being unable to obtain alcohol in any other form.	Jamaica ginger three ozs.	None stated.	Within 48 hours foggy vision and inability to read; from this gradual recovery so as to be able to read, though all objects had a "gray" look; still further deterioration of vision followed ingestion of more Jamaica ginger after Christmas, 1901.	R. V.: 165 1.0 8.05 15; T. V.: 180 1.0 7.05 35.	Optic discs pale, fields of vision for white practically normal, marked impairment of color sense, especially green; blue, relatively well maintained.
33.	Dr. H. W. Ring, New Haven, Conn., July, 1902.	Trans. American Ophthalmological Society, 1902.	.	F	Washer-woman.	Drank during the forenoon four 2 oz. whiskey glasses of a mixture of wood alcohol and sweetened water.	A mixture; took in all about four ozs. of wood alcohol.	In the afternoon dizziness, nausea and vomiting with dim vision.	By 6 p.m. vision so blurred could not see flame of a lighted candle; at 9 a.m. next day vision began to return and in an hour or two was thought to be as good as usual.	So far as known made a perfect recovery.	

A. METHYL ALCOHOL INTOXICATION.—PUBLISHED CASES Continued.

No.	Reporter and Date	Journal	Age	Sex	Occupation and Habits of Life	Mode of Occurrence	Preparation and Quantity of Spirits Consumed	General Effect	Visual Disturbances	Results	Remarks
34..	Dr. H. W. Ring, New Haven, Conn., July, 1902.	Trans. American Ophthalmological Society, 1902.	13	F	Housewife . .	Drank about ½ of a sweetened mixture containing about half a pint of each of black coffee, water and wood alcohol at night and next day took about the same quantity of the mixture.	A mixture; took probably about five ozs. of wood alcohol.	The first night there was nausea and vomiting and soon after the second indulgence, complained of dim vision and lapsed into coma with sighing respiration and greatly dilated pupils.	As above stated.	Died the same day . .	The nature of this case was not suspected by the attending physician.
35..	Dr. H. W. Ring, New Haven, Conn., July, 1902.	Trans. American Ophthalmological Society, 1902.	..	F	Housewife . .	Between noon and 7 p. m. drank about 4 2 oz. glasses of a mixture containing wood alcohol ⅓ and ⅔ home-made wild cherry wine, coffee and water, well sweetened.	A mixture; took in all about three ozs., or less, of wood alcohol.	Slept well that night but next forenoon was dizzy, nauseated and vomited; in the afternoon much worn, became comatose with wide fixed pupils, cold with clammy perspiration and with deep sighing respiration.	General effect too profound to note.	Died at 6 p.m the same day.	It is likely there was some mistake as to the actual quantity taken by this patient.
36..	Dr. H. W. Ring, New Haven, Conn., July, 1902.	Trans. American Ophthalmological Society, 1902.	..	M	Workman. . .	Drank 6 or 8 glasses of the same mixture as case 35, and next morning one glass more.	A mixture; took in all about five ozs. of wood alcohol.	Worked till 3 p.m. on that day, then quit on account of dizziness; next morning still dizzy, nausea and vomiting.	About noon vision became dim and at 6 p.m. was practically blind with wide fixed pupils and great prostration.	Remained totally blind. . .	
37..	Dr. H. W. Ring, New Haven, Conn., July, 1902.	Trans. American Ophthalmological Society, 1902.	..	M	Workman . .	Drank 6 or 8 glasses of the same mixture as preceding four cases.	A mixture; took in all about four and one half ozs. of wood alcohol.	Slept heavily that night, awoke at 5 a. m., but could not get up on account of weakness, vertigo and headache; slept until 1:30 p. m., grew worse; at 9 p. m. vision blurred, pupils wide, partly delirious.	In a few days vision so reduced he could not count fingers, but never became entirely blind.	Ultimately recovered vision to 5 200ths for right and 10 200ths for left with restricted fields but no central scotoma.	Two other persons partaking in this debauch to a less extent escaped with transient dizziness.
38..	Dr. E. L. Bell, North Woodstock, N. H., 1902.	Trans. of the New Hampshire Medical Society.	..	M	Prisoner . . .	As in case No. 40	Same as case No. 40, though quantity taken may have been less than was taken by those who died.	17 days later there was noted tremor, restlessness, loss of sleep, epigastric pains, faintness and loss of appetite.	Blurred vision which seems to be growing dimmer.	Recovery partial and perhaps complete.	Pure case.
39..	Dr. E. L. Bell, North Woodstock, N. H., 1902.	Trans. of the New Hampshire Medical Society.	..	M	Carpenter . . .	Had at one time been a hard drinker but had not been on a spree for some time; admitted his illness had come on shortly after having taken a considerable quantity of wood alcohol.	Wood alcohol, "a considerable quantity."	Intense epigastric pain, vomiting, great prostration, small pulse, face pale, pupils dilated.	A few hours after he was first seen the vision became dim, all objects looked white to him.	He soon became delirious, then lapsed into coma and died about 10:30 a. m. on the following day.	This patient was seen by Dr. Bell on Aug. 20, 1896, and is therefore one of the first cases seen in this country.
40..	Dr. E. L. Bell, North Woodstock, N. H., 1902.	Trans. of the New Hampshire Medical Society.	..	M	Woodsman. . .	Drank freely of wood alcohol which had been sent them for "good alcohol" they had ordered and also treated some friends to the same.	Wood alcohol, quantity unknown.	Seen on the following day one was already dead, the other delirious; severe abdominal pain, free emesis, great prostration and muscular incoordination, soon followed by coma and death.	Effect too profound to admit of information on this point.	Death in both cases. . . .	
41..	Dr. E. L. Bell, North Woodstock, N. H., 1902.	Trans. New Hampshire Medical Society.	..	M	. . . . .	Drank some of the same stuff as taken by the ones who died; they were seen the same day.	Wood alcohol, quantity not stated.	Nausea and vomiting in the morning, later in the day headache and feebleness, and pain on movement of the eyes.	Dim vision, objects appeared as seen through a thick fog; pupils dilated and sluggish; eyes otherwise normal.	Recovery with some slight defect of vision of a permanent character. .	
42..	Dr. E. L. Bell, North Woodstock, N. H., and communicated to him by Dr. E. R. Smith, of Rockland, Me., on May 2, 1902.	Trans. New Hampshire Medical Society.	..	M	Convict in Maine State Prison.	Seven convicts obtained a can of Columbian spirits which they drank during the day, diluted with about the same quantity of water.	Columbian spirits; quantity consumed by each, not known.	Next morning at 6 o'clock, 3 had violent fits of vomiting; at 8 a.m. very rapid, weak pulse, dilated pupils, white tongue and epigastric pain; they soon became unconscious.	Masked by violence of general effect.	Two died the same morning and the others about 2 p. m. the following day.	Pure cases

43.	Dr. J. W. Sherer, May 9, 1903.	Philadelphia Medical Journal.	32	M	Farmer.	Four persons celebrating July 4, drank of a mixture containing cheap alcohol, water and other materials.	As stated above.	Next day very sick, nausea, vomiting, vertigo, headache, sweats, stiffness in limbs, lasting some three days.	Vision began to fail after about 24 hours and in 48 hours attained present degree of impairment.	R. V. [illegible], eccentric vision, absolute central scotoma, field somewhat contracted; L. E. Pl. only, optic nerves atrophic.	The writer [illegible] of the left visual field [illegible] what [illegible] with his statement that vision was reduced to mere Pl.
44.	Dr. J. W. Sherer, May 9, 1903.	Philadelphia Medical Journal.	..	M	Farmer, probably drank only occasionally.	Same as case No. 43, but drank less of the mixture.	Same as case No. 43.	Dizzy, nauseated, headache and vomiting.	Vision became very dim for a few days, then slowly recovered to R.= 6/9, L. 6/12.	Recovery.	Of the other two companions one died in 18 hours after taking the drug, the other went blind in 2 or 3 days and did not recover; no particulars obtained.
45.	Drs G. E. Hartshorn, South McAlister, I. T., May, 1903.	Charlotte (N. C.) Medical Journal.	38	M		Drank with four others 18 oz. bottles of lemon extract.	Patient's part of the methylated extract was drunk at 2:30 p. m.	Following night vomiting, headache vertigo, tenderness of eyeballs and aching along spine.	Eyesight began to fail in 24 hours; on 8th day V. = fingers at 3 feet; 10th day shadows; hyperemia of retinal veins.	Patient slowly improved as to vision and after several months had regained most of lost sight; field remained contracted.	
46.	Dr. R. H. Main, Barry, Ill., Sept. 5, 1903.	American Medicine, Vol. VI., No. 10.	41	M	Watchmaker.	Habitual inebriate, for several successive days being unable to obtain whisky he had been drinking lemon extract; on Feb. 17, sight began to fail and he stopped drinking.	Lemon extract, which on examination contained methyl alcohol; quantity consumed not stated.	On Feb. 18, there was frontal headache, nausea, rapid pulse, labored breathing and great restlessness; he was exposed and scared looking but his mental faculties were but slightly impaired.	Widely dilated pupils and total loss of vision.	Became rapidly worse with intense suffering, lapsed into coma and died at midnight, apparently of respiratory paralysis.	No ophthalmoscopic examination was made; a coroner's jury found that death was caused by drinking lemon extract.
47.	Drs M. E. Armstrong, Bridgetown, N. S., Oct., 1903.	Maritime Medical News, Halifax, N. S.	33	M	Upholstering and varnishing.	Living in a Scott Act (prohibition) town he drank bay rum on Sunday and Monday, and on Monday evening between 7 p. m. and 12 he also drank about 7 ozs. of methylated spirits, diluted with water.	About a pint of bay rum on each of two succeeding days, which may have contained wood alcohol, finishing up with 7 ozs. of methylated spirits obtained from a hardware store.	Vomiting and gastric pains, during the evening, slept well, but next day still had vomiting and pains; at 1 p. m., an anxious expression, great general distress; and free perspiration; at 3 p. m. became dull and later comatose.	Dim vision same evening, following day at 1 p. m., pupils fully dilated and reactionless with complete blindness.	Died about 17 hours after last dose of the methylated spirits had been taken.	When seen by Dr. Armstrong at 1 p.m., the vomited matter contained no odor of spirit and the pulse was about normal, notwithstanding this profound depression with subnormal temperature came on in a few hours later and soon terminated in death.
48.	Dr. M. E. Armstrong, Bridgetown, N. S., Oct. 1903.	Maritime Medical News.	35	M	Laborer.	Habitual inebriate after a drinking bout of several days, wound up by taking methylated spirits obtained from a hardware store.	Common methylated spirits, of which he took about 7 ozs., diluted with water, between 7 p. m. and midnight.	Before retiring had some vomiting, gastric pain, dim vision, slept well, but next morning still had abdominal pains, grew rapidly worse, at 1 p.m. in great distress, sweating freely, pupils dilated and quite blind.	Total blindness 13 hours after last dose of the spirit.	About 3 p.m. became very dull, then comatose, with subnormal temperature, and died.	No ophthalmoscopic examinations recorded.
49.	Dr. F. Buller, Montreal, Jan. 1904.	Montreal Medical Journal.	34	F	Dressmaker, habits strictly temperate.	Took by mistake Feb. 1902 a quantity of medicine used as a liniment for rheumatism, just after a vapor bath.	About a wine glass = 3 or 4 ozs. of methyl alcohol containing wintergreen, intended for external use only.	Soon afterwards fell asleep and at the end of two hours awoke feeling very ill, with intense headache and quite blind.	Total blindness, lasted about two weeks then vision slowly returned to present condition.	Counts fingers at three feet, each eye; V. fields somewhat narrowed, small, absolute scotoma; optic nerves atrophic; two years later condition said to be unchanged.	A rather delicate overworked woman, very much fatigued at time of taking the dose; no improvement by treatment except that peripheral fields enlarged somewhat; pure case showing effects from a single moderate dose; it is not likely the admixture of wintergreen increased the toxic effect of the alcohol.
50.	Dr. F. Buller, Montreal, Jan. 1904.	Montreal Medical Journal.	39	M	Barber, always temperate.	Took by mistake on the evening of March 9, 1903, a dose from a bottle which he supposed to be a simple tonic he was taking at times for indigestion.	A wine glass of methyl alcohol, perhaps 3 or 4 ozs.	None till next morning; headache and dim vision so that he could not see to do his work; was told he looked ill.	Varied for several days, then became "stone blind" for 8 days; gradual improvement and about middle of April could see to work, then failed again.	Came for advice Oct. 1903; R. V. fingers at 8 feet, L. V. fingers at 3 feet; nerves atrophied; visual fields consisted of small excentric areas; the condition was permanent when seen some months later.	Pure case, showing disastrous effects from a single moderate dose.

A. METHYL ALCOHOL INTOXICATION—PUBLISHED CASES—Continued.

No.	Reporter and Date	Journal	Age	Sex	Occupation and Habits of Life	Mode of Occurrence	Preparation and Quantity of Spirits Consumed	General Effect	Visual Disturbances	Results	Remarks
51	Dr. F. Buller, Montreal, Jan. 1904.	Montreal Medical Journal.	42	M	Carpenter, habitually temperate.	Took a small wine glass of what was supposed to be ordinary alcohol, morning and evening of Saturday, Nov. 7, 1903, and on the morning of the 8th, three doses in all.	Columbian spirits, about six ozs. in all were taken.	No ill effects until Monday, some 30 hours after last dose, then dim vision, that evening increased dimness and splitting headache; on Tuesday awoke entirely blind.	Seen Nov. 15, V. fingers at 2 feet each eye, pupils rather dilated and sluggish, central scotoma, fields narrowed, fundus changes suggestive of retrobulbar neuritis.	Gradually improved under active treatment; left hospital Dec. 7, R. V. 6/22, L. V. 6/27, later continued improvement was reported.	A pure case showing effects of a moderate quantity of methyl alcohol on a healthy and temperate man; in June, 1904, both nerves atrophic, visual fields contracted, vision R. 6/15, L. 6/22.
52	Dr. W. E. Brunner, Cleveland, O., Feb. 1904.	Ophthalmic Record, Chicago.	47	M	. . .	After a seven days' spree went with some strangers to a low resort and there drank a decoction called white lye, said to consist of wood alcohol, lemon, sugar and water.	Beyond the statement that the mixture was a concoction of wood alcohol, definite facts are wanting.	Prostration and vomiting for several days with blurred vision.	After several days of blurred vision, awoke in the morning entirely blind.	At end of 6½ months, R. V. 1/15, L. V. 2/10, nerves highly atrophic, vessels rather small, visual fields much reduced.	Seen shortly after the blindness came on, ophthalmoscope showed no changes; three weeks later disc pale.
53	Dr. Foucher, Montreal, March, 1904.	L'Union Medicale du Canada.	22	M	Laborer.	Addicted to alcohol and tobacco; during a morning, presumably for want of something better, drank a divided dose of some wood alcohol.	The wood alcohol was that used for burning in an alcohol lamp and about a pint of spirits was consumed.	At 2 p.m. could no longer stand, at 5 was found unconscious in a barn; during the night awoke with nausea and vomiting, in the morning was found cyanotic with depressed heart action.	"Half blind" the day after taking the alcohol.	Seen by Dr. Foucher some months later, totally blind; optic nerves completely atrophic, pupils wide and fixed.	This patient was probably living in Michigan at the time of the accident, as he is said to have come from there to Montreal.
54	Dr. W. H. Wilder, Chicago, May 10, 1904.	Ophthalmic Record, Chicago, May, 1904.	33	M	China Decorator.	On Dec. 24, 1903, drank some of the methyl alcohol used in his work of drying colors.	About a pint of methyl alcohol between 8 a. m. and noon.	He then began to have nausea and dimness of vision, and at 5 p. m. there was vomiting, headache and some vertigo.	By 6 p.m. he was seen by a physician and then was so blind he could scarcely count fingers; next morning totally blind remained so 14 days; gradually improved for two weeks or more.	At end of two and a half months right eye totally blind; fingers at one foot in temporal field; pupils both dilated.	Ophthalmic changes not noted in early history; ultimately there was great pallor of the optic discs with slo ing excavation but no other coarse changes.