BULLETIN

OF THE

BUREAU OF LABOR.

No. 100. WASHINGTON. MAY, 1912

LIST OF INDUSTRIAL POISONS AND OTHER SUBSTANCES INJURIOUS TO HEALTH FOUND IN INDUSTRIAL PROCESSES.

PREPARED AT THE REQUEST OF THE COMMITTEE OF THE INTERNATIONAL ASSOCIATION FOR LABOR LEGISLATION BY PROF. DR. TH. SOMMERFELD AND INDUSTRIAL COUNCILOR DR. R. FISCHER, AND EDITED BY THE PERMANENT ADVISORY COUNCIL OF HYGIENE OF THE INTERNATIONAL ASSOCIATION.

[The Bureau of Labor in January, 1910, in Bulletin No. 86, published the translation of a list of industrial poisons prepared for the International Association for Labor Legislation by Dr. Th. Sommerfeld, in collaboration with Sir Thomas Oliver, M. D., and Dr. Felix Putzeys.[2] This list, while prepared with great care by recognized experts in the field of industrial poisons, was intended as a preliminary draft from which, by further study and discussion, a revised and more authoritative list of industrial poisons could be worked out. The revised list of poisons, based on the list above referred to, has recently been published in German by the International Association for Labor Legislation, and its translation in full is given in the following pages.

At the time of the publication by the Bureau of Labor of the earlier list of industrial poisons little accurate information was available concerning the prevalence of cases of industrial poisoning in American factories. No State had made any legal requirement for the reporting of cases of industrial poisoning, and in the absence of such definite basis for statistical information a general impression had prevailed

[1] Liste der gewerblichen Gifte und anderer gesundheitsschädlicher Stoffe, die in der Industrie Verwendung finden; Nach den Beschlüssen des Komitees der Internationalen Vereinigung für gesetzlichen Arbeiterschutz entworfen von Prof. Dr. Th. Sommerfeld und Gewerberat Dr. R. Fischer, Redigiert durch den ständigen hygienischen Beirat der Internationalen Vereinigung. Internationales Arbeitsamt. Jena. Gustav Fischer, 1912.

[2] Entwurf einer Liste der gewerblichen Gifte, im Auftrage der Internationalen Vereinigung für gesetzlichen Arbeiterschutz unter Mitwirkung von Sir Thomas Oliver, M. D., und Prof. Dr. Felix Putzeys, verfast von Prof. Dr. Th. Sommerfeld. Jena, Gustav Fischer, 1908.

that American employees were largely exempt from the dangers from which industrial workers in other countries suffered.

The publication in the Bulletin of the Bureau of Labor at the same time with the earlier list of poisons of the results of the special investigation of the white phosphorus match industry [1] disclosed that so far as American match factories were concerned their operation involved precisely the same dangers and their employees suffered in quite the same way as those in foreign factories. In the 15 factories studied it was found that 65 per cent of the employees were working under conditions exposing them to the fumes of white phosphorus and the dangers of phosphorus poisoning. An investigation among the employees of 3 factories yielded a total of 82 cases of phosphorus poisoning, a considerable number of them occurring only a short time prior to the investigation.

The inquiries of the Illinois State Commission on Occupational Diseases in 1910,[2] covering a number of the industries in Illinois where industrial poisons are most largely used, found a large number of specific cases of disease and death among wage earners resulting from exposure to some of the poisons in the course of their employment.

Later, in July, 1911, in Bulletin No. 95, the Bureau published the results of investigations of lead poisoning in this country. A study of the white lead and lead oxide industries disclosed 388 specific cases of lead poisoning, of which 16 were fatal, in the 16-months' period from January 1, 1910, to April 30, 1911.[3] An investigation of the deaths from lead poisoning occurring in New York State in 1909 and 1910,[4] limited to those formally reported in the certificates of death, disclosed 60 fatal cases, distributed among various occupations, including painting, lead smelting, printing, and the manufacture of white lead, storage batteries, etc., and served to emphasize the general danger of lead poisoning wherever lead is used.

As a result of the disclosures of these investigations, and because of a realization of the importance of full and accurate knowledge concerning the existence of dangers from industrial poisons in various industries, laws were enacted during 1911 in six States—California, Connecticut; Illinois, Michigan, New York, and Wisconsin—requiring reports by physicians of all cases of certain occupational diseases occurring in their practice.[5] During the legislative sessions of 1912 this list of States has been extended by similar legislation in Maryland and New Jersey.

[1] Phosphorus poisoning in the match industry in the United States, by John B. Andrews, Ph. D.

[2] Report of Commission on Occupational Diseases, Chicago, January, 1911.

[3] White lead industry in the United States, with an appendix on the lead-oxide industry, by Alice Hamilton, M. D.

[4] Deaths from industrial lead poisoning in New York State in 1909 and 1910, by John B. Andrews, Ph. D.

[5] For the text of these laws, see Bulletin of the Bureau of Labor, No. 95, page 283 et seq.

An even more important step in the legislation concerning industrial poisons has been the enactment of a law by Congress, April 9, 1912, largely through the efforts of the American Association for Labor Legislation, providing for the imposition of a tax at the rate of 2 cents per 100 matches upon all white phosphorus matches manufactured in the United States after July 1, 1913. The importation of white phosphorus matches is absolutely prohibited after January 1, 1913, and the export after January 1, 1914.[1] The effect of this law will be the discontinuance of the manufacture and use of white phosphorus matches in the United States and the removal from American match factories of one of the most dangerous industrial poisons. In this action the United States follows the example of the leading European countries.—C. P. N.]

INTRODUCTION.

The International Association for Labor Legislation has from its organization included in its program of undertakings a plan for the protection of workmen exposed to the dangers of industrial poisons, regarding it as one of its most important duties to lay suitable foundations on which might be built effective legislation for the purpose in view. These endeavors have given occasion for comprehensive discussions and thorough investigations of the questions arising in this difficult department. Here, among other things which play a conspicuous part, are the duty of notification of cases of industrial poisonings, as well as of the manufacture and use of industrial poisons, the gathering of statistics of sickness in especially dangerous occupations, the insistent instruction and training of physicians in industrial hygiene, the supervision by technical experts of employments dangerous to health, and the regulation of the hours of labor for workers in poisonous substances. It is self-evident that the treatment of these and similar questions makes the compilation of a list of substances having a distinctively poisonous character appear desirable.

By resolution of the third delegates' meeting of the International Association for Labor Legislation at Basle in 1904, the Bureau of the International Association was accordingly requested to name a committee of experts to be intrusted with the commission of preparing a list of those chemical substances which have the character of industrial poisons, these poisons to be arranged in the relative order of their dangerousness. The bureau was then in a suitable manner to make the list public.

The fourth delegates' meeting at Geneva in 1906 requested the compilation of a comprehensive list of the most important industrial

[1] For the text of the law regulating the manufacture, import, and export of white phosphorus matches in the United States, see page 760.

poisons and intrusted the preparation of such a one to the national sections. By the employment of the materials obtained from the sections a subcommittee was authorized then to prepare the final list.

For the first draft of a list of poisons we are indebted to Prof. Dr. Sommerfeld. He submitted it to the fifth general meeting at Lucerne in 1908. During this session the consideration of this draft was postponed until the next general meeting in order to give the several national sections further opportunity to determine their attitude with reference to it. This action was taken in deference to an explicit request on the part of the German section, at whose solicitation Industrial Inspector Dr. Fischer, in January, 1910, presented a comprehensive opinion accompanied by a list of poisons newly prepared by himself. This gave Prof. Dr. Sommerfeld occasion to elaborate and amplify his draft in accordance with the proposals and suggestions of Dr. Fischer.

This new draft of the list of industrial poisons was laid before the sixth delegates' meeting at Lugano in 1910 for final action. There it was first referred to a special commission of experts, authorized at discretion still further to extend and change it. This commission (on industrial poisons, etc.) thereupon proposed to the delegates' meeting the following resolution, which was adopted:

"The delegates' meeting takes note of the list of industrial poisons drafted by Prof. Sommerfeld and amended by Dr. Fischer and the commission on poisons in the light of practical experience, with the expression of the highest appreciation of the learning of these two authors.

"At the same time the meeting recognizes the impossibility of drawing up a complete list, adapted to the requirements of all countries, as well as to the existing condition of industry, without the cooperation of the several national sections; and requests the bureau to transmit to the several national sections, as well as to the advisory council of hygiene, the list shortly to be submitted to it by the subcommission. The sections shall thereupon, with the assistance of the Governments, revise and supplement the list by April 1, 1911, at the latest. Then, after final editing and approval by the advisory council of hygiene, the list shall be published by the bureau."

The list finally submitted to the bureau of the International Association was transmitted to the national sections and to the advisory council of hygiene for examination, and given publicity after requisite revision on the part of these bodies and approval by the advisory council of hygiene.

Numerous bodies and persons were in this manner consulted whose expressions of opinion and advice concerning the preparation and composition of the list were given consideration. If it still shows

imperfections and deficiencies, the fault lies in the nature of the subject itself, primarily in the difficulty of the unexceptionable determination of what constitute industrial poisons, on account of the continual appearance of new chemical compounds, and new methods of production and of use in modern industry. Hence there could be and actually were admitted into the list only those substances by which workmen engaged in industrial occupations had demonstrably incurred injuries to their health, or by which, through neglect of requisite protective measures, such injuries are in all probability to be anticipated. Industrial poisons, according to Fischer, are to be defined, in general, as those raw materials, end products, by-products, and waste products which in their extraction, manufacture, and use in industrial processes may, notwithstanding the exercise of ordinary precaution, find entrance into the body in such quantities as to endanger by their chemical action the health of the workman employed.

The scheme of exhibiting the substances dangerous to health in the order of their harmfulness was frustrated by the impossibility of accurately measuring the degree of peril in the individual case. Furthermore, out of regard for the contemplated purpose, and with the view of facilitating the handling of the list, the arrangement of the substances according to scientific principles was rejected, and the alphabetical order chosen. In connection with the several substances, there are designated the branches of industry or labor methods in which poisoning occurs, the mode of entrance of the poison into the body, the symptoms of poisoning, and so far as possible the measures of relief to be taken at the first manifestation of poisoning. The preventive regulations against the dangers of poisoning as well as the more technical measures of protection must, of course, be adapted to the conditions of labor according to the circumstances in each case, and hence are, like these, exceedingly multiform and can not be enumerated in detail. However, at the end of the list they are concisely summarized. It is hardly necessary to observe that the poison list, adapted to the existing state of science and technic, will from time to time require renewed revision and expansion.

The International Association for Labor Legislation ventures to entertain the hope that the list of poisons in the form now presented may be a valuable aid to all those who are concerned in or have anything to do with industrial poisonings, the conditions under which they occur, and the means of obviating or overcoming them. Yet it must be expressly emphasized that, on account of the above-mentioned causes, the list can make no claim to completeness. Above all, the International Association believes that the list may be for the physician a guide to the better recognition of obscure occupa-

tional ailments, that it will contribute to an improvement in the statistics of industrial diseases, and that it will, besides, in many ways, stimulate to new investigations in the department of industrial poisonings.

INTERNATIONAL LABOR OFFICE, BASLE,
December 24, 1911.

THE PERMANENT ADVISORY COUNCIL OF HYGIENE OF THE INTERNATIONAL ASSOCIATION FOR LABOR LEGISLATION.

Industrial Councilor Dr. R. Fischer, Berlin.
Institute of Industrial Hygiene, Frankfort-on-the-Main.
Dozent Dr. Ludwig Teleky, Vienna.
Prof. Dr. J. P. Langlois, Paris.
Prof. Sir Thomas Oliver, Newcastle-upon-Tyne.
Prof. Dr. L. Devoto, Clinica del Lavoro, Milan.

LIST OF INDUSTRIAL POISONS.

[Translated by Wm. H. Rand, M. D.]

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
ACETALDEHYDE, ETHYL ALDEHYDE, CH_3COH: A colorless, very volatile fluid, of pungent odor.	Manufacture of vinegar; silver mirror manufacture.	In the form of vapor, through the respiratory organs and mucous membranes.	Irritation of the mucous membranes of the nose, larynx, and bronchi; irritation of the mucous membrane of the eyes; acceleration of the heart's action; profuse night sweats.
ACRIDINE, $C_{13}H_9N$: Crystallizing in colorless needles; contained in anthracene.	Organic dyes industry.	Exerts effect in any state of aggregation on skin and mucous membranes.	Irritation and inflammation of skin and mucous membranes; severe burning and itching of the skin; violent sneezing.
ACROLEIN, C_2H_3COH: A colorless, very pungent smelling fluid, of fiery taste.	In the trying out of fat and fat-containing material, e. g., in bone rendering plants; oilcloth and linoleum factories; varnish-boiling shops; tallow-rendering establishments; soap factories (sulphuric acid process), and stearic-acid factories.	In vaporous form, through the organs of respiration and the mucous membranes.	Itching in the throat; irritation of the eyes, exciting lachrymation, conjunctivitis; irritation of the air passages, bronchial catarrh.
AMMONIA, NH_3: A colorless gas of sharply penetrating odor.	Coke ovens; mirror-silvering industry; coating iron plate with tin or zinc; manufacture of solidified ammonia, sulphate and chloride of ammonium (sal ammoniac) from ammonia water; manufacture of the carbonate of soda and of orselle dyestuffs; dyeing industry; sewer cleaning; manufacture of bone black; gas plants; varnish and lacquer manufacture; tanning; beet-sugar manufacture; manufacture of ice; refrigeration plants.	In gaseous form, through the organs of respiration. Seldom pure, mostly in combination with other gases. Immediate effect on the conjunctiva and the cornea.	A proportion of more than 0.15 per cent of ammonia in the air immediately causes an irritable condition of the mucous membranes. Chronic bronchial catarrhs are especially liable to follow long-continued inhalation of small quantities of the gas diffused in the air. From these are to be discriminated the acute conditions of transient illness: Intense irritation of the respiratory organs; violent sneezing; lachrymation, redness of the eyes, inflammation of the cornea and of the conjunctiva; increased secretion of saliva; burning in the pharynx, and a sense of constriction in the larynx; paroxysmal cough, with secretion of tenacious, viscid, even bloody, mucus; embarrassment of respiration, attacks of suffocation; vomiting of serous masses; ammoniacal odor of the perspiration; retention of urine, which may last many hours and even two or three days; acute inflammation of the respiratory organs, and scattered areas of inflammation in the lungs, in severe cases, a fatal outcome. Protracted breathing of small quantities is apt to cause chronic bronchial catarrh.

Special measures of relief: Immediate removal from the poisonous atmosphere; artificial respiration; inhalation of steam; faradic stimulation of the phrenic nerve; free bloodletting; in case of obstinate spasm of the glottis, tracheotomy.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
AMYL ACETATE, $C_5H_{11}CH_3CO_2$: Zapone, a solution of celluloid in amyl acetate and acetone.	Zapone lacquer used as a lacquering agent in metallic ware and jewelry factories; manufacture of metallic wire for incandescent electric lamps; oilcloth manufacture.	In the form of vapor, through the respiratory organs.	Nervous symptoms; headache; fullness of the head; giddiness; nausea; numbness; disturbances of digestion; palpitations of the heart.
AMYL ALCOHOL, $C_5H_{11}OH$: A colorless, oily fluid, of very sharp taste and penetrating, disagreeable odor.	Manufacture of fruit essences, nitrite of amyl, valeric acid, and aniline dyes; rectification of spirits.	In the form of vapor, through the organs of respiration.	Congestion of the head; headache; oppression of the chest; irritation of the air passages.
ANILINE, $C_6H_5(NH_2)$: A colorless oil which acquires a tint on exposure to air and light. Like aniline, all other amide compounds of benzol and its homologues, as toluol, naphthaline, xylol, etc., are poisons. Especially should be mentioned alpha and beta naphthylamine, benzidine, toluidine, paranitraniline, the diamines (phenylene and tolylene diamine) as well as the alphyl and aryl compounds of aniline, like their homologues (dimethyl and diethyl aniline, diphenylamine, etc.).	Manufacture of aniline and its derivatives, as well as of aniline dyes; manufacture of photographic materials and the like.	Absorption through the skin, by direct contact or by saturation of the clothing; through the digestive organs; absorption through the respiratory organs as volatile particles and impalpable dust.	The toxicity of the separate products is very different in degree; the para compounds are usually more poisonous than the ortho and meta compounds. ACUTE POISONING.—(*a*) *Mild cases:* Pallor of the skin and mucous membranes, with slight cyanosis; a feeling of weariness and weakness; head symptoms—vertigo, reeling, unsteady gait; deficient elasticity of movement; slow, labored speech; irritability (aniline "pip"); condition of slight inebriation, with loquacity, gaiety, and defective power of orientation; loss of appetite, constipation, and tense, rapid pulse. (*b*) *Severe cases:* Dark blue to swarthy cyanosis; formation of methæmoglobin; bounding pulse; "air-hunger," with great frequency of respiration; lowering of sensibility; obliteration of the reflexes; sometimes vomiting, strangury and bloody urine. (*c*) *In the most serious cases:* Sudden prostration; cold, pale skin, blue lips, nose and ears; diminution and even extinction of sensibility; moist, cold skin; small pulse; death in a comatose condition, sometimes after antecedent convulsions. SUBACUTE AND CHRONIC POISONING.—Anæmia; slowing of the pulse; disorders of digestion, such as eructations, loathing of food, vomiting, diarrhea, and eczematous and pustular eruptions on various parts of the body, especially on the scrotum; nervous symptoms, as general debility, headache, ringing in the ears, vertigo, unrestful sleep, disturbances of sensibility, often also of motility; spasmodic muscular pain. Subacute and chronic poisonings are very rare. Anæmia and retarded pulse are early symptoms. The blood is of a brownish hue, but microscopically unchanged; occasionally the urine contains blood.

Measures of relief: At the first symptoms o. poisoning, immediate removal from the workroom to a cool shady spot; change of clothing; cool affusions; administration of oxygen in connection with artificial respiration; in severe cases, bloodletting with subsequent infusion of physiological salt solution; copious ingestion of milk; in case of weak action of the heart, stimulants (black coffee, camphor, ether, but no alcohol); caution against the use of alcohol during and immediately after labor; abstinence is advisable.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
ANILINE DYESTUFFS: The majority of the very numerous aniline dyes are nonpoisonous. Generally the basic dyes are more dangerous than the acid dyes. Regarded as suspicious or injurious to health are—			
(*a*) The various phenol nitrates, dinitrophenol, dinitrocresol (saffron yellow, aniline orange), picric acid (trinitrophenol).	Aniline dye factories; dyehouses; also manufacture of explosives.	Action on the skin; in the form of dust, through the respiratory organs; the digestive organs.	Itching, dermatitis, efflorescent eruption, yellow discoloration of the cuticle and conjunctiva; sneezing and nasal catarrh; inflammation of the buccal mucous membrane; bitter taste; disturbances of digestion; irritation of the central nervous system and of the kidneys. Picric acid is a feeble former of methæmoglobin; industrial poisonings by it are extremely rare.
(*b*) The many naphthol nitrates, dinitronaphthol, Manchester yellow, dinitro and naphthol calcium; tetranitronaphthol.	Aniline dye manufactories; dyehouses.	Action on the skin; in the form of dust, through the respiratory organs; the digestive organs.	Blood poisons, forming methæmoglobin. The morbid symptoms resemble those in poisoning by amido compounds; ailments of the central nervous system in great variety; paralyses.
(*c*) The nitroso dyes.	Aniline dye manufactories; dyehouses.	In the form of dust on the skin.	Intense irritation of the skin, caused, it is asserted, partly by using excessive quantities of chloride of lime in cleansing the skin.
(*d*) The aurantia—hexanitrodiphenylamine; imperial yellow, its sodium salt.	Aniline dye manufactories; dyehouses.	In the form of dust on the skin.	Intense irritation of the skin, caused, it is asserted, partly by using excessive quantities of chloride of lime in cleansing the skin.
(*e*) Ethyl and methyl violet.	Aniline dye manufactories; dyehouses; manufacture of colored pencils.	As dust or fine particles in the eyes.	Inflammation of the conjunctiva or the cornea.
(*f*) The Meldola dyes, corvulin, indulin, fast black.	Aniline dye manufactories; dyehouses.	As dust or atomized solution (in dyeing by the spraying process); action on the skin and respiratory organs.	Eruptions; severe irritation of the mucous membranes; uncontrollable sternutation.
(*g*) Chrysoidin, fast black.	Aniline dye manufactories; dyehouses.	In the form of dust; effect on the skin.	Eruptions (probably superinduced by the use of excessive quantities of the chloride of lime in washing the hands).
(*h*) Bismarck blue....	Aniline dye manufactories; dyehouses.		
ANTIMONY COMPOUNDS: **Trioxide of antimony,** Sb_2O_3; **Antimony trichloride,** $SbCl_3$ (antimonious chloride, butter of antimony, antimonial ore butter); **Tartar emetic** (tartrate of antimony and potassium), $2(C_4H_4K[SbO]O_6)H_2O$; **Golden sulphide,** Sb_2S_5 (antimony pentasulphide), antimony colors.	Extraction of antimony and its compounds; burnishing of rifle barrels and steel ware; manufacture of antimony alloys, type and stereotype metal, hard lead [ammunition factories], britannia, and white metal; remelting of old and scrap metal; manufacture of aniline dyes, fireworks; vulcanizing and red-dyeing of india rubber (antimony pentasulphide); mordants and fixing materials in cotton dyeing and textile printing.	In the form of vapor (trioxide of antimony, antimonious acid, sulphide of antimony), through the organs of respiration; irritation of the skin; in the form of dust, in the manipulation of britannia and type metal.	Intensely itching eruptions of the skin, caused by local irritation and aggravated in the case of a perspiring skin; inflammation of the mouth, throat, and stomach; constipation and intestinal colic; in acute cases, diarrhea, albumin in the urine, loss of strength, weakness of the heart, vertigo, and faintness. It appears to be somewhat doubtful, however, whether all of the enumerated compounds of antimony are detrimental to the health of the workers in them.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
ARSENIC COMPOUNDS: Arsenic trioxide, As_2O_3 (arsenic, white arsenic, smelting dust); arsenous chloride, $AsCl_3$; arsenic colors, e. g.— **Scheele's green** (Swedish green), arsenite of copper. **Schweinfurt green** (patent, original, new, moss, mountain, parrot, May, Kaiser, Cassel, Paris, Vienna, Kirchberg, Leipsic, Würzburg, Swiss green), compound of the arsenite and the sulphide of copper. **Brunswick green**, oxychloride of copper with copper oxide and sulphate of lime. **Neuwied green.** (Similar, only a larger proportion of arsenic trioxide). **Cochineal** (Vienna red), arsenic acid with extract of Pernambuco wood.	Arsenic mining; roasting of arsenic-bearing ores; manufacture of glass, colored chalk, chloride of arsenic for etching on brass; shot manufacture; metal working; manufacture of arsenic colors; preparation of organic dyestuffs, colored lights, textile printing, and dyeing; manufacture of wall paper and colored paper; tanning; manufacture of oilcloth and artificial flowers; taxidermy painting (outside and decorative); pyrotechnics (Indian white-fire). It is to be observed that zinc, silver, lead, bismuth, copper, and the commercial acids often contain more or less arsenic.	In the forms of gas and dust, through the respiratory organs and mucous membranes, the stomach, and intestinal canal.	ACUTE POISONING.—The first symptoms usually appear after half an hour or an hour, viz, constriction of the esophagus, pains in the stomach and bowels, vomiting, diarrhea, debility, cold, bluish skin, sural cramp, lowering of heart's energy, vertigo, headache, faintness, illusions, loss of consciousness, convulsions; death, sometimes choleraic symptoms. In mild cases, burning in the pharynx, vomiting, salivation, difficult deglutition and indigestion. CHRONIC POISONING.—Constant and persistent headache combined with melancholia, disinclination to labor, and sleeplessness, which are sometimes the only symptoms; further, gastric disturbances, such as vomiting and diarrhea, which result in emaciation and decline of strength; persistent symptoms of catarrh of the mucous membranes, such as coryza, pharyngitis and bronchitis; frequently skin diseases in varying form: Erythematous, papular, and pustular cutaneous eruptions, which also produce abscesses with infiltrated and indurated borders; falling out of the hair and nails; melanosis—that is, the deposition of a brownish pigment, not containing arsenic, on the neck, trunk, and extremities. In severe cases, disturbances of the central nervous system; intense, lightninglike, lancinating pains; formication; furriness of the skin; impairment of the sensibility; chilliness; weakness of the muscles, also unilateral or bilateral paralysis, and often loss of the tendon reflexes; sometimes fever; albuminuria. The paralyses are transient, or they may last for years, leaving not infrequently permanent disturbances.
Special measures of relief: If arsenic has been ingested, thorough gastric lavage is necessary; then administer at once by the mouth five tablespoonfuls of a solution of calcined magnesia (70 g. to 500 g. of distilled water); afterwards give a tablespoonful every five minutes until a movement of the bowels occurs; the internal use of lime water also is recommended for rinsing out the stomach and as an antidote; to counteract the exhaustion, cold affusions, rubbing, hypodermic injections of ether and camphor.[1] *In case of chronic arsenical poisoning:* Electric vapor baths and electrical treatment are in order; the disturbances of the stomach are to be treated with calcined magnesia and unirritating liquid nourishment (milk, milk porridge, rice porridge, salep); the cachexia, by fresh air and nutritious diet; in paralyses, use iodine preparations and electricity.			
ARSENIURETED HYDROGEN, AsH_3: A colorless, extremely offensive gas with the odor of garlic.	This gas is formed everywhere when, in the use of arsenical acids and metals, hydrogen is generated for technical purposes (e. g., the filling of children's toy balloons); in soldering and etching with arsenic-containing metals or acids, e. g., enamel ware factories, tin, zinc, and lead plating works; impure iron silicate, by the absorption of water, develops arseniureted hydrogen.	In the form of a gas, through the organs of respiration (generally mixed with hydrogen).	At first no disturbances, or only slight indisposition; after some hours, chilliness, vomiting (food, bile, then blood), pain in the back, giddiness, ringing in the ears, faintness, small pulse, bluish discoloration of the mucous membranes; labored respiration; urine at times dark or even black, containing blood or hæmoglobin. After 24 hours, yellow hue of the skin and mucous membranes, from absorption of biliary fluids, fetor of the mouth (resembling garlic), swelling and sensitiveness of the liver and spleen, headache, delirium, mortal anguish; death or slow convalescence.
Special measures of relief: Fresh air and oxygen; later bloodletting; use of an alkaline solution of common salt; mild alkaline drink; analeptics (coffee, camphor).			

[1] Hydrated sesquioxide of iron is not mentioned.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
BENZINE: A mixture of low-ebullition portions of petroleum, known commercially under various names, e. g., petroleum, benzine, ligroine, gasoline.	Benzine distillation; chemical cleansing plants, glove cleaning; removal of fat from bones, fat solvent; lacquer, varnish, and india rubber industries; manufacture of waterproof materials (application of the rubber mass dissolved in benzine); ornamental feather factories; used as a source of power.	In the form of vapor, through the respiratory organs; to a less extent, probably, through the skin also.	Headache, vertigo, nausea, vomiting, cough, irregular respiration, weakness of the heart, drowsiness, and deep sleep with cyanosis of the countenance, coldness of the skin and complete insensibility; on awaking, headache, vertigo and depression, fibrillar twitching of the muscles, trembling, especially of the musculature, as if from chilliness. Benzoic acid is found in the urine. CHRONIC POISONING.—Headache, flashes before the eyes, ringing in the ears, psychosis with excitement and a state resembling inebriation, sensory disturbances and hallucinations (but the prodromata of chronic benzine poisoning will also appear). The occurrence of chronic poisoning by benzine has been contested. The symptoms vary greatly because the benzine used technically is a complex mixture and not always of the same composition.
Special measures of relief: Removal of the patient into fresh air; in severe cases, stimulants, like coffee, camphor; then cold affusions.			
BENZOL, C_6H_6: A very unstable, colorless fluid, burning with a bright, very sooty flame; extremely volatile; its homologues, e. g., toluol xylol, and cumol.	Manufacture of benzol, its homologues and numerous derivates; technical use of these products in the manufacture of colors, in carburizing illuminating and water gas, in refining and dissolving of caoutchouc, resins, fats, alkaloids, iodine, phosphorus, and sulphur; in the removal of grease from materials; dye works, laundries; lacquer and varnish factories; the rubber industry.	In the form of vapor, through the respiratory organs; reabsorption through the skin.	Benzol, its homologues and the rest of the hydrocarbons of coal tar, have a specific affinity for the central nervous system and a general action on the protoplasm of the organic cells (fatty degeneration). Female workers, particularly in their developmental years, especially at the time of menstruation, are more susceptible than men to the poisoning, and in an extraordinary degree to the subacute and chronic forms of it. ACUTE POISONING.—(*a*) *In mild cases:* Cerebral disturbances, humming in the ears, giddiness, somnolence, a condition resembling inebriation, vomiting and irritant cough, slight flushing of the face. There is often euphoria. (*b*) *In severe cases:* Symptoms on the part of the central nervous system, muscular tremor, like chilliness from exposure to cold; trembling of the whole extremities; finally, tonic and clonic spasms; euphoria; pale, livid skin; lips remarkably scarlet hued; blood bright red, thin. Discolorations of the skin, like those in aniline and nitrobenzol poisoning, are wanting in benzol poisoning. (*c*) *In the most violent cases:* Hallucinations, delirium, protracted unconsciousness, and death in tonic convulsions. SUBACUTE AND CHRONIC POISONING.—Numerous spots of extravasated blood in the skin [petechiæ] similar to those of morbus maculosus, together with severe anæmia; hemorrhage from the mucous membranes—in women, from the genitals; fatty degeneration of the internal organs (heart, liver, kidneys).
Special measures of relief: Prompt removal of the patient into the fresh air; inhalation of oxygen; exclusion of female workers from every employment in which benzol is used.			

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
CARBON DIOXIDE, CO_2: A specifically dense, odorless, colorless gas, collecting near the ground or floor.	Generated in mines by the process of breathing, by the burning of miners' lamps, and by blasting; in lime and brickkilns and dolomite calcining kilns; in decomposition and putrefaction gases; in tanneries (tan pits); in sugar mills (saturation vessels); manufacture of carbonic acid and of mineral waters; spirit distilleries, compressed yeast factories, breweries, fermenting rooms and wine cellars; in sewer and well gases; in firing and heating establishments; in the lighting of workrooms; by the exhaled air in closed workrooms and caissons.	In the form of gas, by inhalation.	Large quantities occasion sudden death by suffocation. With the inhalation of smaller quantities the symptoms of illness begin with pressure in the head, vertigo, ringing in the ears and sparks before the eyes, disturbances of respiration, such as hurried breathing and pain in the chest, sometimes psychic excitement and convulsions. Usually in case of more protracted effect there is loss of consciousness and of the power of motion (or even death by suffocation), with gradual decline of the pulse and respiration, and often with the occurrence of delirium. On prompt removal from the poisonous atmosphere there is a restoration of consciousness with subsidence of the symptoms of illness and recovery in a few days. The occurrence of chronic poisoning by carbon dioxide is doubtful.

Special measures of relief: Examination of the air of the suspected places before entering them; immediate removal from the poisonous atmosphere; artificial respiration to be persevered in for a long time; finally inflation of the lungs with oxygen; cold affusions; stimulation of the skin; restoratives.

CARBON DISULPHIDE (carbon sulphurate), CS_2: In a pure state it is a limpid, highly refractive, extraordinarily volatile fluid, having an odor like that of chloroform; imperfectly refined, its hue is pale yellow and its odor offensive.	Manufacture of CS_2; an agent for extraction of sulphur from the mass in the process of gas purification; disinfection; a solvent for caoutchouc, gums, fats, oils, etc.; in vulcanizing caoutchouc and rubber (patent-rubber factories); for the extraction of lanolin, the refining of tallow, stearin, paraffin, and wax; production of carbon chloride; assembling and setting up carriage-wheel rims and rubber tires; imitation-silk factories.	In the form of vapor, through respiration; in fluid form, through the skin, e. g., at the dipping of the hands in the fluid.	It causes heavy damage to the red blood corpuscles and to the central nervous system. ACUTE POISONING.—In mild cases, marked stupefaction and a sense of intoxication; in more intense poisoning, pallor of the countenance, flaccidity of the arms and legs, even complete insensibility, obliteration of all reflexes, loss of consciousness, due to paralysis of the central nervous system. With the inhalation of concentrated vapor there is a fatal result in a few minutes. CHRONIC POISONING.—The earliest symptoms (first becoming manifest, sometimes after employment for a few weeks, but, for the most part, after months or even years) are headache, extending from the root of the nose to the temples, a sensation of giddiness and stupefaction, particularly at evening after the close of labor; later, pain in the extremities, muscular weakness with trembling, spasms or fibrillar twitching, also contractures, transient and permanent paralyses, with atrophy of the muscles; deafness; itching and formication on the skin, reduction of the reflexes, circumscribed and more extensive areas of anæsthesia and analgesia; acceleration of the heart's action, nausea, vomiting, colic, alternate diarrhea and constipation, the latter condition prevailing in the later stages of the disease; emaciation, disturbance of the sense of vision, sometimes transient, but rare in the initial stage; retrobulbar neuritis, choroiditis, central scotoma, disturbances of the senses of smell and taste. In respect to the central nervous system there is at first a condition of excitement, followed by depression; subsequently, very irritable, violent, and explosive temper, with hyperstimulation of the sexual instinct; later, its abnormal decline. After several weeks or months, relaxation, melancholy, a dreamy manner, weakness of memory, puerile enunciation, obtuseness. According to Charcot, psychic disturbances occur in 87.5 per cent of the cases. Mental diseases under the semblance of acute mania and dementia occur with good prospect of recovery; the severer forms appear in cases where there is hereditary predisposition. There have been observed also local evidences of the paralyzing effect of the carbon disulphide upon the parts brought into contact with it, especially in the fingers. The prognosis, so far as the preservation of life is concerned, is favorable; as to the full restoration of health, it is unfavorable.

Special measures o, relief: In acute poisoning, removal into the fresh air, warm baths, cold affusions; when there are symptoms of paralysis, electrical treatment; in disturbance of vision, potassium iodide and vapor baths; interdiction of the practice of dipping the unprotected hands into carbon disulphide.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
CARBON MONOXIDE, CO: A colorless, tasteless gas, and, when in a state of diffusion, odorless, burning with a blue flame in the air. **Coal vapor** has from 0.5 to 5 per cent of CO. **Illuminating gas,** 6 to 10 per cent of CO and 33 to 40 per cent of mine gas. **Water gas,** a mixture of 41 per cent CO, 50 per cent hydrogen, 4 per cent CO_2, and 5 per cent N. **Producer gas** contains 34 per cent CO, and 60 per cent hydrogen gas.	In industrial plants with defectively planned or ill-tended firing and heating arrangements; plants for the production of industrial gas; mining (mine gases); coal mines; blast furnaces (furnace gas); Cowper apparatus; gas purification; coke ovens, smelting furnaces; gas machines; lime and brick kilns, dolomite calcining kilns; iron and metal foundries (drying of the molds); soldering in tin shops; charcoal burning; resin distillation; ironing; heating with open coal brasiers or coke stoves (drying the plaster and walls of new buildings); drying chambers.	In the form of gas, through the respiratory organs.	ACUTE POISONING.—Increased blood pressure at first, with slowing of the pulse and pounding heartbeat; later, lowering of the pressure, with rapid but small pulse, and, not infrequently, with discrete spots of dilation in the superficial blood vessels. Remarkably pale-red discoloration of the blood and of the dilated spots; formation of carbon-monoxide hæmoglobin is demonstrable by the spectrum.[1] (*a*) *Disturbances of the general health:* In mild cases, dull headache, flashes before the eyes, giddiness, ringing in the ears, nausea and fullness in the gastric region. (*b*) *In severe cases:* Bluish discoloration of the skin; spasmodic, wheezing respiration; sometimes tonic and clonic convulsions, more often paralytic symptoms, either with weakness of all the extremities or of the lower only, or, indeed, of only single groups of muscles, including also the facial muscles. The convulsive stage, which may be altogether absent, is succeeded by the stage of asphyxia, with sensory and motor disturbances, involuntary voiding of urine, semen, and feces; subnormal temperature; weak, slow and intermittent pulse; loss of consciousness. As sequels there have been observed pneumonias, inflammations of the skin, paralyses and psychoses, the last two often pursuing an unfavorable course. CHRONIC POISONING (among ironers, firemen, cooks, etc.)—Frequent headaches, dizziness, nausea, vomiting, coated tongue, weakness of memory; anæmia without chlorosis; "hot flushes," formication, palpitation of the heart, insomnia, general debility and feebleness of the psychic functions.

Special measures of relief: Removal from the poisonous atmosphere; admission of fresh air; artificial respiration, with inflation of the lungs by oxygen for hours, if necessary; keep head of the injured person slightly elevated; subcutaneous injection of ether; camphor; cold affusions; rubbing; mustard poultice; electrical treatment; insufflation of ammonia vapor; administration of black coffee; alkaline salt infusion; entering where CO may be generated only when protected by safety masks and by a constant supply of air.

[1] An elementary knowledge of the function of the hæmoglobin is indispensable to an understanding of the deadly effect of the transformation of hæmoglobin into "carbon-monoxide hæmoglobin." When so changed, it is useless in the body, for it can no longer carry and distribute oxygen to the tissues. Hence all of the blood charged with this poison is virtually destroyed—lost to the system as surely as if it had escaped from a severed artery. So, if a considerable proportion of the blood becomes saturated with this gas, death is inevitable, not by suffocation, as commonly imagined, but by carbon-monoxide poisoning.—W. H. R.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
CHLORIDE OF LIME, $CaOCl_2$: A white granular, somewhat desiccative, powder, having the odor of hypochlorous acid, and containing 35 to 40 per cent of chlorine.	Manufacture of the chloride of lime; use of the chloride of lime as an oxidizing and chlorinating agent in the chemical industry (for example, dyestuffs); disinfection; manufacture of chloroform, chlorine, oxygen; bleaching of linen, cotton, paper; cotton print works.	In the form of vapor or dust, through the respiratory organs (inhalation of chlorine gas); direct action on the skin.	More or less severe, irritating cough, symptoms of inflammation in the upper air passages; difficulty of breathing, bronchitis, asthma, sometimes hæmoptysis, irritation of the conjunctiva, lachrymation; skin hot from action of chlorine; hyperhidrosis; intensely itching and burning eruption on the skin, eczema, burns from the dust of lime and its chloride.
Special measures of relief: Admission to the employment of such, and only such, workmen as are sound and strong, and free from any predisposition to catarrhal affections; technical arrangements which permit the charging and emptying of the chambers from the outside.			
CHLORINE, Cl: A yellowish green, suffocating gas, of penetrating odor, which forms a solution of a greenish yellow color when dissolved in water.	Manufacture of chlorine, chloride of lime, and of organic chlorine products; bleacheries; paper mills; laundries; ironing; tinning works; manufacture and use of disinfecting agents containing chlorine.	In the form of gas, through the respiratory organs.	The smallest quantities excite severe suffocative sensations and necessitate leaving the room, so that acute chlorine poisoning seldom occurs. SYMPTOMS OF CUTANEOUS DISEASE.—Burning, stinging, formation of nodules, blebs, and even open wounds of the skin. EFFECT ON THE MUCOUS MEMBRANES.—Lachrymation, coryza, cough, oppression of the chest and intense dyspnœa; bronchial catarrh with hemorrhage; sometimes, lobular pneumonia. The concentrated vapor causes uncontrollable cough, spasm of the glottis, dyspnœa, cold sweats, cyanosis and small pulse; death occurs within a few minutes (sudden collapse). IN ITS CHRONIC EFFECT.—Distress in the gastric region; chronic catarrh of the stomach; pyrosis; pallid countenance; catarrh of the respiratory tract; lobular pneumonia; headache, vertigo, insomnia; gradual emaciation and premature senescence. CHLORINE ACNE.—(Occasioned in the electrolytic production of chlorine by chlorinated carbureted hydrogen.) Inflammatory processes in the dermal glands; the occurrence of unusually diffuse, confluent comedones with indurated, dark-green heads; solid infiltration of the sebaceous follicles, their inflammation and suppuration causing pustules and boils.
Special measures of relief: Removal of the patient into the fresh air; inhalation of amyl nitrite; artificial respiration; on account of the paralyzing effect of the chlorine on the heart, stimulants are required (black coffee, subcutaneous injection of camphorated oil); to control the irritating cough, hypodermics of morphine or cautious inhalation of steam. *For the prevention of chlorine acne:* Substitution of anodes made of molten metallic oxides for the carbon anodes.			
CHLORODINITROBENZOL, $C_6H_3(NO_2)_2Cl$: Forming yellow crystals. (*See* Nitrobenzol.) **CHLORONITROBENZOL,** $C_6H_4NO_2Cl$: Forming yellowish crystals of aromatic odor. (*See* Nitrobenzol.)			

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
CHROMIUM COMPOUNDS: Chromic acid, anhydrous, CrO_3; chromates and bichromates, e. g., sodium chromate, Na_2CrO_4; sodium bichromate, $Na_2Cr_2O_7$; lead chromate, $PbCrO_4$. **Chromium colors:** Chrome yellow (acid chromate of lead); chrome orange (basic and neutral chromate of lead); chrome red (chrome-cinnabar); acid chromate of lead oxide and lead hydrate; chrome green, poisonous only as a mixture of chrome yellow and paris blue. (*See also under* Lead.)	Manufacture of chromium preparations, chrome colors, and hectograph composition; photography (color and carbon printing); oxydizing agent in the tar-color industry; manufacture of matches; wet batteries; bleaching fats, oils, and wax; mordant in Turkish red dyeing, textile printing (for neutralizing colors and for dyeing); chrome tanning (two-vat process); staining of wood.	Absorption by the skin and mucous membranes; in the form of dust, through the respiratory organs.	The chromates act very much like chromic acid itself; pitlike, phagedenic ulcers, burrowing deep and spreading wide, very difficult to heal and very painful, occur almost exclusively on the skin of the hands, more rarely on the arms, thighs, scrotum, and penis, resembling syphilitic ulcers; they also appear, though seldom, on the mucous membrane of the tonsils and of the hard and the soft palate. With rare exceptions is there extension of the inflammation to, and perforation of, the nasal septum at the cartilaginous portion; eczematous eruptions. Irritation of the conjunctiva. IRRITATION OF THE BRONCHIOLES.—Chronic bronchial catarrh, and small areas of inflammation in the lungs. In recent years the last-mentioned symptoms are hardly ever encountered in a remarkably wide field of observation. It is at least extremely doubtful if disease of the kidneys is ever caused by chromium. In handling chromium dyes containing lead there is danger of chronic lead poisoning.

Special measures of relief: Chromium ulcers are successfully overcome by careful treatment of the slightest injuries to the skin, and by the immediate, complete, and skillful closure of the lesions.

CYANOGEN COMPOUNDS: Dicyanogen, C_2N_2; Prussic acid, HCN: Hydrocyanic acid, a colorless, highly volatile fluid, of penetrating, pungent, and irritating odor. **Natrium cyanide** (NaCN), Cyanide of potassium, potassium cyanide, (KCN): A colorless salt, forming crystals which, after fusion, recrystallize, but readily decomposes on exposure to the air, setting free hydrocyanic acid. **Rhodanic** (sulphocyanic, SCN) **compounds:** Poisonous dose of the dilute hydrocyanic acid, 0.06 g.	Extraction of gold; silver and gold plating, galvanoplasty, electroplating; manufacture of cyanogen compounds and inorganic processes (when organic residua are heated with alkalies); reduction of residuum to gas; blast furnaces; gas works (purification proces.), dye works and printeries; photographic establishments; manufacture of celluloid.	In the form of gas, through the respiratory organs; prussic acid also through the epidermis.	Generally speaking, industrial poisonings by cyanogen are rare. ACUTE POISONING.—Moderate quantities of the gas cause vertigo, headache, rush of blood to the head, oppression of the chest, palpitation of the heart, a sensation of constriction at the throat with pharyngeal irritation and dryness, nausea and vomiting, difficult, gasping respiration, with retention of consciousness. To the stage of dyspnœa succeeds that of spasm with cold, perspiring skin, convulsions and involuntary micturition, with loss of consciousness. In the stage of asphyxiation there are temporary suspension of respiration, retardation of the heart's action, lividity of the skin and mucous memoranes, lowering of the body temperature; with inhalation of large quantities, the stage of asphyxia supervenes immediately. Dilation of the pupils; loss of consciousness; a few gasping inspirations; cyanosis of the skin and mucous membranes; collapse; death. CHRONIC POISONING (Very doubtful).—Headache, vertigo, unsteadiness of gait; nausea, loss of appetite, disturbances of the gastric and intestinal functions; slowing of the pulse; albuminuria.

Special measures of relief: Fresh air; artificial respiration; administration of oxygen; cold affusions and friction; hypodermatic injection of ether, camphor; if the poison has been taken into the stomach, give emetics, then immediately rinse out that viscus with water, with the addition of one-quarter to one-half of 1 per cent of potassium permanganate. Kobert recommends a 3 per cent solution of hydrogen binoxide for subcutaneous injection, in doses of 1 cubic centimeter, at different points in the body. But on the other hand H_2O_2 is deemed unsuitable, and an alkaline solution of ferric sulphate, or an antidote for arsenic with some ferric salt, is indicated as the best remedy. To control the convulsions give morphia hypodermically.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
DIAZOMETHANE, CH_2NH_2: A very volatile yellow gas.	In methylizing of every kind.	As gas, through the lungs; effect on the skin.	ACUTE POISONING.—Severe headache; great physical depression; grave lesions of the lungs; other effects like those of dimethyl sulphate.
DIMETHYL SULPHATE, $(CH_3)_2SO_4$: A colorless oily fluid.	Production of methyl ethers, methyl esters and methyl amines; manufacture of artificial perfumes.	In the form of gas, through the respiratory organs; direct action on the skin.	Strongly corrosive effect on the skin and mucous membranes; burns; pains in the nape of the neck and in the thoracic cavity; hoarseness; destruction of the mucous membrane and aspiration of the broken-down products into the lungs; lachrymation, conjunctivitis, formation of erosion-eschars, and œdema, photophobia and parenchymatous clouding of the cornea; even coma, convulsions, paralysis, and a fatal outcome.
DINITROBENZOL or **BINITROBENZOL,** $C_6H_4(NO_2)_2$: When pure, crystallizing as slender, colorless, rhombic needles; when impure, in yellow, crystalline cakes. (*See* Nitrobenzol.)			
FORMALDEHYDE, CH_2O: A liquid, volatilizing as a gaseous vapor of penetrating odor; 10 per cent formaldehyde, formalin.	Disinfection; manufacture of many organic preparations, especially in the coal-tar color industry; preserving and hardening of human and zoological preparations.	In the form of vapor, through the respiratory organs and mucous membranes.	Intense irritation of the skin and mucous membranes.

Special measures of relief: Do not enter the disinfection chamber until after the introduction of ammonia and thorough ventilation.

HYDROCHLORIC ACID, HCl: Pure HCl is a colorless gas that fumes when open to the air, forming a dense, acid, white mist. The crude commercial hydrochloric acid is, for the most part, impure, containing arsenic, among other admixtures.	Treatment with chlorine of previously roasted ores; potteries (glazing), enameling works, glass factories, soldering; in the chemical industry, manufacture of chloride and sulphate of soda, of muriatic acid, stannic acetate, etc.; manufacture of artificial fertilizers; bleaching, shoddy industry, cotton-print works; carbonizing of materials; india rubber industry.	Action on the skin and nasal mucous membrane; seldom in vaporous form, affecting the respiratory organs.	As a rule the rarefaction of the hydrochloric acid gas is so considerable in the industries where it is used to any extent worth mentioning that only in exceptional cases do injurious effects occur, such as irritation of the respiratory organs. A proportion of 0.05 per mille of hydrochloric acid in the air is well borne, but only for a short time. A greater concentration (as well as the often-repeated inhalation even of moderate quantities in manufacturing industries) causes chronic irritation of the mucous membranes to which the vapor has access. There result also catarrh of the conjunctiva, coryza, pharyngeal, laryngeal, and bronchial catarrh, together with dental caries. Concentrated HCl vapor may cause unconsciousness and death.

Special measures of relief: Removal of the patient from the dangerous atmosphere; inhalation of a finely nebulized solution of sodium bicarbonate.[1]

[1] In addition, for acute poisoning, give atropine ($\frac{1}{50}$ grain) subcutaneously to stimulate the pneumogastric.—W. H. R.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
HYDROFLUORIC ACID or FLUORIC ACID, HF: A colorless gas, of pungent odor and forming a dense mist in the air.	Production in chemical works; glass factories, etching on glass; laboratories of the pottery industry; extraction of the fluorides of antimony (substitute for tartar emetic in dyeworks); fertilizer factories (extraction of phosphorites); bleaching of cane for chair seats and extraction of its silicates.	In the form of gas, through the respiratory organs. In a fluid state it has an immediate action on the skin and mucous membranes.	Intense irritation of the eyelids and conjunctiva, coryza, bronchial catarrh with spasmodic cough, ulceration of the nostrils, gums, and oral mucous membrane; also painful ulcers of the cuticle, erosions and formation of vesicles; suppuration under the finger nails.
LEAD, Pb: A bluish white, highly lustrous metal, which on exposure to the air acquires a gray tarnish. **Lead alloys.** **Lead colors; other lead compounds.** **Lead sulphuret** (galena) is held to be nonpoisonous, and some lead polysilicates are regarded as nearly so.	Smelting of lead and lead-bearing ores; manufacture and use of articles made of metallic lead (sheets, plates, boxes, pipes, wire, cans, flasks, pails, kettles, faucets, retorts); manufacture and use of lead alloys, as type metal, shot (tin foil), for example, in type foundries, tin shops, bottle-cap factories, composing rooms, file-cutting works; manufacture and use of lead colors and other lead compounds, as litharge, white lead, Krems white, red lead, lead chromates, acetate of lead, lead chloride in lead color works and storage-battery factories, in the trade of painter, house painter and varnisher; plants for installation of gas and water; in the ceramic industry, the textile industry, etc. It is to be observed that materials containing lead may occasionally be employed in every industry, and that lead colors and other lead compounds are often met with in trade under fanciful names.	Absorption of lead and lead compounds occurs—(1) In isolated cases through the skin; whether through the uninjured skin is doubtful; (2) in the form of vapor (very finely divided oxide of lead), and as dust, through the respiratory organs; (3) by way of the digestive tract by means of contaminated food and drinks (for example, cigars, cigarettes, chewing tobacco). By inhalation the dust, laden with lead, finds lodgment in the upper respiratory tract, and, mixed with saliva, may reach the stomach.	Industrial lead poisoning appears as a rule in the chronic form and arises from continuous absorption of the most infinitesimal quantities of lead during a protracted period of time (weeks, months, and even years). The beginning is insidious, with disturbances of the general health, a sense of weakness, decline of bodily strength; sallow, pale-yellowish hue of the skin. Distress in the region of the stomach, eructations, lack of appetite, metallic taste in the mouth and fetid breath. The blue line (blue-gray discoloration of the gums) which, however, may be absent, even in the course of a severe attack; lead colic with most obstinate constipation, retention of urine; plumbic arthralgia (lacerating, boring), occurring for the most part paroxysmally, chiefly in the lower extremities, more rarely in the upper, often interpreted as a symptom of rheumatism of the joints; frequently, fibrillar trembling of the fingers. Typical are the lead paralyses, of which disturbances of sensation (paræsthesia and anæsthesia) take the precedence. Paralysis generally affects the extensor muscles of the arm and hand, with atrophic manifestations; more rarely, the flexor muscles. Sometimes also there are paralyses of the extensors and flexors of the lower extremities or muscles of the shoulder. From experience it is known that those groups of muscles are especially affected which are most used in the occupational activity. Transient blindness, but also gradually progressive atrophy of the optic nerve; temporary loss of the special senses of smell and taste; violent, often fatally ending disease of the brain (saturnine encephalopathy), sometimes preceded only by slight premonitory symptoms, as irritability and headache, ringing in the ears, insomnia; more often, slowly increasing mental disturbances precede; epileptiform convulsions, hallucinations; morbid changes in the blood vessels and of the heart and kidneys (contracted kidney); increase of blood pressure and granular degeneration of the red blood corpuscles. Disturbances in the sexual sphere in women; abortion, premature birth, low vitality of the children.

Measures of relief: Discontinuance of work in lead at the slightest symptoms of lead poisoning. In lead colic, give first, by the mouth or subcutaneously, morphia, opium, or atropine; afterwards, cathartics (castor oil or podophyllin); in paralysis, electrical treatment, massage and baths; in every case, strengthening diet, iodide of potassium, and sudorifics.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
MANGANESE DIOXIDE, MnO_2: Brown mineral (occurring chiefly as pyrolusite).	Breaking and grinding of manganese ore; sifting out of the refuse.	In the form of dust, through the respiratory organs.	MnO_2 produces cumulative effects. After protracted action of the toxin the symptoms begin with disturbances of the general sensibility, general debility, languor, lancinating pains in the extremities, in the small of the back and nape of the neck, creeping sensations in the legs and numbness in the feet; salivation; tremor of the head, tongue, and hands; later, locomotor disturbances with uncertain, stamping gait, and, ultimately, the impossibility of safe and sure progression. Affections of the voice (low, whispering) and of speech (indistinct, scanning) combined with flatness of tone; forced laughter and weeping and lowering of intelligence. Sometimes dropsical effusion into the cellular tissue of the lower extremities.
MERCURY, Hg: A silver-white, shining metal, unchangeable in the air, but evaporating at house temperature. **Mercury compounds, amalgams** (alloys with metals). **Cinnabar** (HgS) is nonpoisonous.	Mining and smelting of quicksilver; occupation of mirror plater, amalgam gilding and silvering; manufacture of thermometers, barometers, and manometers, incandescent electric lamps, Roentgen and Hittorf tubes, mercurial vapor lamps; manufacture of the salts of mercury, amalgams, and colors, pharmaceutic products, antiseptic dyes, inflammable materials, and explosives; employment of the salts of mercury, especially in the hare's fur business and felt-hat manufacture; photography and steel engraving.	Absorption through the uninjured skin; absorbed in the form of vapor and as dust (amalgam dust, dust of the compounds of mercury).	Industrial mercurial poisoning is a chronic poisoning occasioned by work in this metal for a long period, commonly weeks, months, years, or decades. The first symptom is generally increased ptyalism, with swelling and inflammation of the gums and of the buccal mucous membrane, often with the formation of rodent ulcers, besides, there are, frequently, disturbances of digestion, lassitude, and pallor. Associated with the further absorption of mercury, "erethism" supervenes—a peculiar psychic excitability (timorousness, bewilderment, irritability) aside from the characteristic mercurial tremor. In a state of complete repose this tremor is not noticeable, and manifests itself only on voluntary movement, causing a quite distinctive, irregular tremulousness of the fingers, hands, arms, and finally, also, of the legs and head. In strictly chronic cases the stomatitis and erethism are absent, and only the tremor is observable. Death may result in the worst cases in consequence of the violent tremor and spasms affecting the entire body; in other cases, increasing weakness. Cachexia.
Special measures of relief. Relinquishment of the employment; nutritious diet; vapor baths; potassium iodide.			
METHYL ALCOHOL (wood spirit), CH_3OH: A colorless fluid, of faint odor.	Produced by the dry distillation of wood; used in the preparation of varnish, lacquer, polish, and perfumes; for the denaturing of spirits; for the production of coal-tar colors and pharmaceutical preparations; a solvent for aniline dyes in cotton print manufacture; used in combination with shellac for coating the interior of casks; in cabinet-making and furniture polishing.	Absorption through the digestive organs, also through the skin; in the form of vapor, through the organs of respiration.	The effect is very persistent; nausea, headache, ringing in the ears, weakness of the muscles, insomnia, delirium, difficulty of breathing, and sometimes deafness; inflammation of the throat and the mucous membrane of the air passages extending to the finest ramifications of the bronchial tubes; finally, death by paralysis of the respiratory apparatus. Conjunctivitis; also serious affections of the retina and the optic nerve, resulting in blindness, even, from atrophy of this nerve.[1] In chronic cases, fatty degeneration of the liver.
Special measures of relief. The substitution of innocuous media for methyl alcohol in the denaturing of spirits.			

[1] Permanent blindness and even a fatal issue may be caused by the ingestion of small quantities of wood spirit; hence the risk incurred in using cheap essences of vanilla and other flavoring extracts which contain methyl alcohol.—W. H. R.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
METHYL BROMIDE, CH_3Br: A colorless, gaseous body of aromatic odor. **Methyl iodide, iodine methylate,** CH_3I: An ethereal, colorless fluid, of somewhat penetrating odor, soon becoming yellow on exposure to the air.	Employed in aniline dye factories.	In the form of gas, through the respiratory organs and the mucous membranes.	In mild cases, vertigo, headache, and transient stupor, with diplopia and a sensation of rigidity in the muscles of the eyes. In a severe case there was observed loss of consciousness continuing eight weeks, with staring look, pallor of the skin, retarded pulse, and obstinate constipation. During brief intervals of wakefulness there was unrest with increasing excitability. (Grandhomme.)
NITRANILINE, $C_6H_4NH_2NO_2$: Forming long, yellow crystals. *See* Aniline.			
NITROBENZOL (mirbane oil, imitation bitter-almond oil), $C_6H_5NO_2$: A colorless, highly refractive fluid, having an odor like that of bitter almonds; and all nitro compounds of benzol and its homologues, e. g., dinitrobenzol, dinitrochlorobenzol, nitrotoluol, nitrophenol, nitronaphthalene, etc. The most of the nitro and chloro compounds are the more poisonous.	Coal-tar color industry and those establishments in which its intermediate products are manufactured, as in explosives works, perfumery and soap factories, pharmaceutical laboratories, etc.	(1) Absorption takes place, first of all, through the skin, both the uninjured and especially the pathologically altered skin, particularly in the case of profuse perspiration; (2) through the respiratory organs; (3) through the digestive organs.	Poisoning by all of the designated substances is pretty nearly the same, qualitatively; quantitatively, however, differences exist, so that the larger proportion they contain of the nitro (NO_2) groups the more virulent they are likely to be. The nitrochloro compounds are very much more dangerous than the simple nitro compounds. The first toxic symptoms may appear within a few hours (8 to 24) after absorption of the poison. ACUTE POISONING.—(*a*) *In mild cases:* Malaise, headache, giddiness, nausea, loss of appetite, costiveness, burning sensation of the skin and mucous membrane. (*b*) *In severe cases:* A feeling of anxiety, disturbances of sensation, like formication on the legs and furriness of the soles of the feet, ringing in the ears; disturbances of coordination (reeling gait, stammering speech), increased excitability of the reflexes, convulsions and a state of general spasm; later, with decline of sensibility, symptoms of paralysis; vomiting; odor of the vomitus and of the exhaled breath like that of bitter-almond oil; icterus of the skin; at first increased, afterwards diminished activity of the heart, with lowered tension of the pulse; visual derangements (amblyopia, optic neuritis); blood viscid, brown to deep dun color; diminution of the red corpuscles and alterations in their form; in the advanced cases, formation of methæmoglobin. The course of severe cases is exceptionally varied; after intermissions, exacerbations may occur with a finally fatal result. Death may occur also in connection with deep insensibility, without other symptoms. The symptoms which point to blood changes predominate, in severe poisoning, over the nervous symptoms. SUBACUTE AND CHRONIC POISONING.—Icterical skin, which gradually becomes cyanotic; methæmoglobin formation; symptoms of degeneration and regeneration of the red-blood corpuscles; general debility, anæmia. The clinical picture is similar to that of pernicious anæmia. In the urine the poisoned corpuscles are sometimes demonstrable, and finally the presence of hæmatophorphyrin and of albumen.

Measures of relief: Immediate removal from the workroom; inhalation of oxygen; artificial respiration; eventually bloodletting; stimulants, nonalcoholic; prohibition of the use of alcoholic drinks during working hours; avoidance of the same, also, outside of employment.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
NITROGLYCERIN, $C_3H_5O_3(NO_2)_3$, glycerin trinitrate: An oily, vaporable, colorless fluid, without odor.	Manufacture of explosives (dynamite, nitro-cellulose); in the use of dynamite.	Inhalation of the vapor; absorption through the uninjured skin, mucous membranes, and wounds of the skin. In the explosion of dynamite the action of carbon dioxide and nitrous monoxide, as well as that of undecomposed nitroglycerin is present.	Extraordinary toxicity, somewhat like effects of prussic acid; just a few drops are deadly, and even mere contact with products containing nytroglycerin may cause poisoning; severe headache, disturbance of the intellect, facile syncope, vertigo; burning in the throat and stomach; nausea, vomiting, colic; symptoms of paralysis in the muscles of the head and eyes, as well as in the lower extremities; bradycardia and retarded respiration, stertorous breathing and dyspnœa; cyanosis; coldness of the extremities; injection of the conjunctiva; reddening of the countenance. *In the mixing and sifting of dynamite:* Obstinate ulcers under the nails and on the finger tips, eruption on the plantar aspect of the feet and interdigital spaces of both hands, with extreme dryness and formation of fissures. *Explosion of nitroglycerin with little gas:* Trembling, determination of blood to the head, vomiting, headache. *Explosion of nitroglycerin with much gas:* Vertigo, asphyxia, cyanosis, motor paralysis and loss of consciousness; intermittent, stertorous respiration, coldness of the skin, small pulse; after recovery of consciousness, debility, nausea, vomiting, headache, intermittent pulse, and finally death. CHRONIC POISONING.—Disturbances of digestion, trembling, neuralgia.
Special measures of relief: Absolute avoidance of contact.			
NITRONAPHTHALENE, $C_{10}H_7(NO_2)$: A yellow, friable, crystalline mass of strongly aromatic odor. (*See* Nitrobenzol.)			

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
NITROUS GASES (low degrees of oxidation of nitrogen, which appear simultaneously): Nitrogen protoxide, NO; nitrogen deutoxide, NO_2; nitrogen trioxide, N_2O_3; anhydrous nitrous acid (HNO_3). Red fuming nitric acid is a saturated solution of N_2O_4 in crude NHO_3. NO is a colorless gas which under the influence of atmospheric oxygen, is readily transformed into brown nitrogen dioxide. Below −20°C. N_2O_3 is a blue fluid; at the ordinary temperature it separates into NO and NO_2.	Nitrous gases are produced by the action of nitric acid on deoxidating substances of various kinds, principally on metals (iron, lead, zinc, etc.), on organic substances (coal dust, wood, straw, paper, textile fabrics, woolen refuse, etc.) as well as many other substances (pyrites, sulphurous acid and its salts, soda sediment, hydrochloric acid, iron chlorides, sulphate of iron, etc.); in the preparation of nitric acid, its combinations and salts, among which the nitrous salts also are to be included; metal etching and metal refining; stamp mills and mints; galvanotechnics; nitrification in chemical works and manufactories of explosives; celluloid manufacture; sulphuric acid manufacture; production of picric acid, aniline colors, nitrocellulose (gun cotton, collodion cotton), xyloidine, nitrostarch, nitro-jute dynamite, abelite, nitromannite, nitrosaccharose, viscosine, etc.; nitric acid manufacture and storage; preparations of thorium and cerium; bleaching materials (oils, etc.); hat making (maceration of the hair); etching and engraving on copper (etching of the plate); dyeing and printing (fixer and mordant).	In gaseous form, through the respiratory organs.	Susceptibility to the effects of nitrous gases fluctuates considerably. Persons who suffer from diseases of the respiratory organs are especially susceptible; not infrequently the continual inhalation of small quantities, for many consecutive years even, occasions no serious disturbances of the health. A pale, sallow complexion and chronic bronchial catarrh may be deemed, nevertheless, the usual consequences of occupational inhalation of very moderate quantities of nitrous gases. Often, however, larger quantities of the poisonous gases are borne for hours together (6 to 8 hours) without discomfort; when suddenly, after a long interval without disturbance, ominous symptoms appear. Symptoms of irritation in the air passages are manifest, as a feeling of constriction of the larynx, spasmodic cough, oppression in the chest, labored respiration, anxiety, cold perspiration on the face, protrusion of the eyes, gasping speech, paroxysms of coughing, bluish discoloration of the countenance, coldness of the extremities. Consciousness is at first unimpaired, but with increasing difficulty of breathing it becomes dimmed; injury to the teeth. The urine is scanty, brown in color, containing hæmoglobin and albumen. Death results from œdema of the lungs. In very severe cases methæmoglobin is observed, and then a general systemic poisoning may result.

Special measures of relief. Immediate removal from the noxious atmosphere; inhalation of oxygen; finally, bloodletting and infusion of normal salt solution.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
OXALIC ACID, $C_2H_2O_4$: It forms large, pellucid crystals.	Manufacture of oxalic acid; polishing of metals, especially of copper and brass utensils; used in dye works, chemical cleansing plants (rust and ink stains); straw hat manufacture and straw braiding.	In the form of dust, through the respiratory organs.	Opalescent or bluish discolorations (with brittleness) of the nails; blood stasis in the hands; corrosive action on the mucous membrane of the œsophagus, of the stomach and bowel; weakness of the heart; convulsions and spasms. However, industrial poisonings by oxalic acid are exceedingly rare.
PETROLEUM: A mixture of various hydrocarbons of the methane, ethyl, and aromatic series.	Production of oil; refining of the crude oil; furniture polishing by use of so-called polishing oil.	In the form of vapor, through the respiratory organs. As a fluid it has a direct action on the skin.	The vapors of petroleum cause a profound acute poisoning with a condition of inebriation; shouting, reeling, and prolonged sleep without any recollection of what has happened; in severe cases, loss of consciousness, lividity of the countenance, staring look and contracted pupils, almost imperceptible pulse, asphyxia. The chronic effect of petroleum vapor causes numbness and irritation of the Schneiderian membrane. In general, the symptoms of the action of petroleum resemble those resulting from the action of benzine. By reason of the high boiling point of petroleum there are produced, in the extraction of paraffin butter, in the handling of crude paraffin, in the emptying of retorts, and in the filling of casks with petroleum, obstinate inflammations of the hand in the form of acne (nodules, pustules, and boils).
Special measures of relief: Removal into the fresh air; in collapse, a tepid bath with cold affusions; subcutaneous injections of camphorated oil.			
PHENOL, C_6H_5OH (carbolic acid): A white crystalline mass, and its homologues, e. g., cresol, lysol, and their derivatives.	Anthracite coal tar distillation; production of picric acid and of many organic aromatic compounds; used in dyeing, calico printing; manufacture of lampblack, in photogen factories; impregnating wood with tar and oil of tar; surgical dressing industry.	Action on the epidermis and the digestive tract.	Erosion of the skin, which by great extension may lead to severe internal injuries; symptoms of degeneration in the blood and in the internal organs (nephritis); gangrene, icterus, collapse.
PHENYLHYDRAZINE, $C_6H_5NH \cdot NH_2$: A yellowish, oily fluid, shading into brown, of pungent odor.	A by-product in the manufacture of antipyrine from aniline; manufacture of organic compounds.	Absorption by the skin; action on the skin.	Obstinate vesicular eruption on the skin, with itching and burning; diarrhea, loss of appetite; granular degeneration of the blood corpuscles; formation of methæmoglobin; a sense of general malaise.

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
PHOSGENE, $COCl_2$ (carbon oxychloride): A colorless gas, of suffocating odor.	In the manufacture of phosgene and its use for the production of organic compounds.	In the form of vapor, through the respiratory organs.	Until the present time only the acute form of poisoning has been recognized. The first symptoms of illness sometimes appear only after many hours. By means of the hydrochloric acid arising from the decomposition of the gases in the lungs, destruction of lung tissue results, with difficulty of breathing, paralysis of the lungs, and pulmonary œdema. A fatal outcome is often observed.
Special measures of relief: Inhalation of oxygen and medical attendance immediately after breathing the phosgene gas.			
PHOSPHORUS, P: A colorless, transparent substance; on exposure to the light, translucent and of a yellowish, waxy luster. In the air it is luminous, and when heated in closed iron crucibles to a temperature ranging from 250° to 300° C. it is converted into red or amorphous phosphorus, which is unaffected by the air. The yellow or white phosphorus is very poisonous; the red, nonpoisonous.	Extraction of phosphorus from phosphorites and coprolites, bone-black (refuse of sugar mills), bone-ash (refuse of meat extract manufacture); production of phosphor-bronze, of phosphorus compounds, igniting agents, matches, and tar colors.	In the form of vapor, through the respiratory organs; into the digestive canal by means of food contaminated by the fingers; action on the skin.	As industrial poisoning it occurs only in the chronic form, occasioned by the absorption of very minute particles of the poison for a period of months, generally, indeed, of years. Symptoms of the disease sometimes first appear long after relinquishment of the occupation. It is doubtful whether chronic phosphorism occurs (that is, general systematic poisoning by phosphorus). Chronic phosphorus poisoning uniformly affects the bones of the face, beginning with inflammation and sclerosis of the bones and of the periosteum; then, by extension of the suppurative process, necrosis results. This most frequently attacks that portion of the alveolar process of the jawbone which is least protected against infection. Swelling and ulcerations on the gums and the buccal mucous membrane, pain even in the sound teeth, loosening and falling out of the teeth, infiltration of board-like hardness occurs in the soft parts surrounding the jaw; suppuration and destruction of the jawbone (necrosis) with numerous fistulous channels which here and there burrow through the cheek. Hand in hand with the ulcerative processes go osteoplastic formations, so that, while suppurative destruction of tissue takes place at one point, at another the formation of new bone is going on. The under jaw is more often affected than the upper; here the process goes on insidiously without formation of new bone but with local destruction of the part. The palatal and orbital bones may be attacked with ulceration and shrinking of the eyeball. By extension of the inflammation along the sheaths of the vessels there result meningeal inflammation and cerebral abscess. There is remarkable brittleness of the bones, decline of appetite, pallid complexion, diarrhea, emaciation. Sometimes there is amyloid degeneration of the abdominal organs. Death by sepsis.
Special measures of relief: To the utmost possible extent the prohibition of the use of white or yellow phosphorus; exclusion of laborers that have dental caries, after extraction of a tooth at least two weeks' exclusion from the employment; change of occupation; improvement of the general health; there is no specific medical treatment; in appropriate cases, operative intervention.			

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
PHOSPHORUS SESQUISULPHIDE, P_2S_3: A grayish yellow, odorless and tasteless substance.	In chemical factories.	Inhalation of sulphureted hydrogen in the fusion of phosphorus and sulphur as well as in the drawing off of the molten mass from the kettles; dust in the grinding and sifting of the paste; bicarburet of sulphur vapors in the extraction of yellow phosphorus and regeneration of CS_2.	Irritation of the mucous membranes, especially obstinate conjunctivitis. Through the influence of dust in the grinding and sifting of the composition there appear symptoms of CS_2 poisoning. To be noticed also is the danger of poisoning by sulphureted hydrogen (*See under* Sulphureted hydrogen.)
Special measures of relief: Prevention of the contamination of phosphorus sesquisulphide with yellow phosphorus; precautions against injury from the effects of sulphureted hydrogen.			
PHOSPHURETED HYDROGEN, PH_3: A colorless gas of nauseating odor.	In the extraction of phosphorus; in the preparation of red phosphorus and the sesquisulphide of phosphorus; in the reduction of iron silicate containing phosphorus by the action of moisture; in the production of acetylene with calcium carbide that contains an admixture of calcium phosphate.	In the form of gas, through the respiratory organs.	An anxious, oppressd feeling in the chest, changing to a burning, lancinating pain; affections of the head, vertigo, tinnitus aurium; general debility; loss of appetite; great thirst. Death occurs without convulsions, through the effect of the poison on the blood.
PICRIC ACID, $C_6H_2(OH)(NO_2)_3$: Trinitrophenol in a pure state forms pale-yellow, bitter tasting, foliate, metallic crystals.	Chemical works, dyehouses; manufacture of explosives and powder (lyddite, melinite); projectile factories, filling shops.	In the form of dust, through the respiratory passages; direct action on the skin.	Poisonings with piric acid are rare; when they occur there are itching, inflammation of the skin, vesicular eruption, yellow pigmentation of the epidermis and of the conjunctiva, inflammation of the buccal mucous membrane, bitter taste, disturbances of digestion, epigastric pain, nausea, vertigo, diarrhea, and jaundice; picric acid decomposes the constituents of the blood. By the penetration of dust into the nostrils, sneezing and nasal catarrh are occasioned.
PYRIDINE, C_5H_5N: A colorless fluid of pungent and characteristic odor. Its homologues, pyridine bases.	In its manufacture out of coal tar and bone tar; in the use of denaturing spirits (shops for woodworking, gilding, and hat manufacture).	In the form of vapor, through the respiratory organs. In a fluid state it acts on the skin of the hands and arms.	Catarrh of the mucous membranes; hoarseness, irritation, and choking sensation in the throat; headache, vertigo, flaccidity and trembling of the extremities; difficulty of breathing and clonic convulsions; eczema of the hands. Industrial poisoning by pyridine is very rare.
SULPHUR CHLORIDE, S_2Cl_2: A thickish fluid, of brownish color and suffocating odor, fuming on exposure to the air.	Solvent for sulphur and fats; caoutchouc and patent rubber industry.	In the form of vapor, through the respiratory organs.	In contact with water and atmospheric moisture, it is resolved into hydrochloric acid vapor. The vapor of sulphur chloride is suffocating; if ingested, it excites vomiting.
Special measures of relief: Wearing of rubber gloves; instant removal of the patient from the poisonous atmosphere.			

LIST OF INDUSTRIAL POISONS—Continued.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
SULPHUR DIOXIDE, SULPHUROUS ACID, (H_2SO_3): Its anhydride is SO_2, in the form of gas; condensed, it becomes fluid. The gas is of pungent odor and suffocating effect.	Roasting of sulphur-bearing ores; brick works, ceramic industry; manufacture of sulphuric acid, of ultramarine; extraction of bones, manufacture of glue and gelatine from bones; disinfection; refining of petroleum; manufacture of candles; bleaching of wax, silk, and wool; chromium tanning (two-vat process); bleaching of straw hats and bristles; preserving wine and fruits; fumigating hops and casks with sulphur; ice machines; heating plants (burning of pyrite-bearing coal).	In the form of gas, through the respiratory organs.	In moderate concentration sulphurous acid is borne without inconvenience or injury; persons accustomed to the gas bear very well a proportion of 0.003 to 0.004 per cent of SO_2 in the air. Susceptible persons, at the beginning of their employment in an atmosphere containing sulphurous acid, manifest a transient irritation of the mucous membrane of the respiratory organs and of the eyes. In its severe action there is spasmodic cough with secretion of tenacious, often blood-tinged, mucus. The protracted effect of a high degree of concentration is livid discoloration of the mucous membranes, bronchial catarrh, croupous angina of the bronchi and their branches, and inflammatory areas in the lungs; disturbances of digestion.

Special measures of relief: Removal from the noxious atmosphere; admission of fresh air; artificial respiration; infusion of weak alkaline solutions (0.05 to 0.1 per cent liquor natrii caustici [*solution of caustic soda*]).

SULPHURETED HYDROGEN, or HYDRIC SULPHIDE, H_2S: A colorless gas, having the fetid odor of rotten eggs.	Blast furnace plants, in granulating the slag; distillation of sulphur waters; ultramarine works; Leblanc soda and chemical factories; in the manufacture of the compounds of sulphur and phosphorus; sulphur metals (manufacture and use); sulphide of soda and sulphide of barium industry (manufacture of sulphide colors and dyeing with these); the extraction of cellulose (straw and wood); in the waste waters of industries which make use of organic substances; sedimentation tanks of sugar works; precipitation of soda residua containing calcium sulphide; work in sewers, latrines, and dung pits; illuminating gas plants; flax retteries; tanneries.	In the form of gas, through the respiratory organs, as pure hydric sulphide gas; often found in admixture with other gases (with CO_2, N, NH_4, and carbureted hydrogen); direct action on the conjunctiva.	In the less violent cases there are gastric distress, nausea, fetid eructations, irritation and inflammation of the conjunctiva; rarely, erosion of the cornea, formation of vesicles on the lips, irritating cough, headache, and a sensation of giddiness. In long continued inhalation convulsions and paralyses occur. In severe cases there are contraction of the pupils, slowing of the pulse, Cheyne-Stokes respiration, nystagmus, trismus, and tetanus. With a very high proportion of sulphureted hydrogen in the air a man suddenly falls, becomes unconscious, and dies without convulsions (apoplectic form). CHRONIC POISONING.—Conjunctival catarrh; a sense of pressure in the head and on the chest; headache, debility, vertigo, nausea, disturbances of digestion; sallow complexion and emaciation; slowing of the pulse; tendency to the formation of boils.

Special measures of relief: Before emptying of dung pits and the like, their contents should be thoroughly mixed with iron sulphate (5 kg pro 1 cbm); the emptying should be effected by mechanical apparatus; safety ropes to be attached to the workmen; prompt hoisting out of the unconscious workmen; removal of the soiled clothing; artificial respiration; administration of oxygen; hypodermics of ether or camphor.

LIST OF INDUSTRIAL POISONS—Concluded.

Designation of the substance.	Branches of industry in which poisoning occurs.	Mode of entrance into the body.	Symptoms of poisoning.
SULPHURIC ACID, H_2SO_4: A colorless, odorless, thick, oily fluid.	Manufacture of sulphuric acid; accumulator factories (mold and charging rooms); burnishing of iron, steel, etc.; textile industry, hat factories; petroleum distillation; factories for the manufacture of powdered fertilizers.	In the form of vapor, through the respiratory organs.	Inflammatory diseases of the respiratory organs (acute and chronic catarrh), inflammation of the lungs; anorexia; decalcification of the bones (according to Lewin); injury to the teeth through softening of the dentine. As a result of the bespattering of the skin with concentrated H_2SO_4 there is severe pain, a whitish discoloration of the skin, becoming brownish, with reddening and swelling of the surrounding tissues; in cases of extensive scalds there are, ultimately, decomposition of the blood, formation of ulcers of the duodenum, somnolence, and even death.
TAR: A product obtained by dry distillation, particularly of anthracite coal and lignite.	Manufacture of illuminating gas; coke ovens; tar works; tar product factories; plants for wood preserving; manufacture of roofing paper; use for concrete paving; painting of metals; as a fuel; briquet factories.	It acts on the skin; in the form of vapor, on the respiratory organs.	Tar itch under the form of diffuse acne, eczema or psoriasis, primarily on the upper extremities, later, also, on the other parts of the body; not infrequently on the irritated portions of the skin there appear cancroid ulcers, especially of the scrotum (among chimney sweepers, paraffin and soot workers and briquet makers). Together with the effect on the greater portion of the skin, there are also general symptoms: Loss of appetite, nausea, diarrhea, headache, numbness, vertigo, besides disturbances of the urinary bladder (ischuria, strangury), also albuminuria and œdema.
TURPENTINE OIL: A mixture of various terebinthine hydrocarbons, $C_{10}H_{16}$, differing in odor and in composition according to the botanical species from which they are severally derived.	Manufacture of varnish, cement, lacquer, sealing wax, colors; tapestry printing; trade of decorator, lacquerer, and house painter; as a cleansing agent in various industries.	In the form of vapor, it acts upon the mucous membranes; in a fluid state, it acts on the epidermis.	Irritation of the mucous membrane of the eyes, of the nose (coryza), and of the upper air passages (hemming, cough, bronchial inflammation); salivation; besides, there are insensitiveness, giddiness, headache. Prolonged action of the oil causes irritation of the kidneys, and then these organs excrete urine having the odor of violets. Severe irritation of the skin is excited, especially by the so-called pine oil (Russian oil of turpentine).

MEASURES FOR THE PROTECTION OF INDUSTRIAL WORKERS AGAINST THE DANGERS OF POISON.

COMPILED BY INDUSTRIAL COUNCILOR DR. FISCHER, BERLIN.

1. Properly adapted buildings, thick walls of separation for dangerous rooms, good lighting, facilities for keeping the workshops clean and for effective ventilation.

2. Apparatus adapted to its special purpose, whenever possible, closing tight in every part.

3. Appliances for accomplishing the arrest of gases and dust at their place of origin, their removal (by exhaust fans) and in a suit-

able manner rendering them innocuous or collecting them, thus preventing them from entering the nose and mouth.

4. So far as possible, avoidance of direct contact with poisonous materials or substances injurious to health in working with, transporting, or packing them.

5. The displacement of particularly dangerous labor methods and materials by the introduction of less dangerous labor processes and materials, as well as by the employment of materials satisfactorily pure chemically.

6. Instruction of workmen just entering upon an occupation concerning the properties of the poisonous substances extracted, manufactured, used, or otherwise evolved, and, whenever possible, cautionary leaflets should be put into the hands of the workers.

7. The repetition of this instruction at frequent intervals.

8. Posting of precautionary regulations and warning placards containing admonitions for the exercise of special caution, and enjoining the observance of measures for insuring safety. Constant supervision of all dangerous employments by expert and responsible persons.

9. Employment of appropriate means for personal protection, as work clothes, caps, gloves, goggles, and, as necessary adjuncts, mouth and nose shields, respiratory masks and the like, in case the appliances named in rule 3 are inapplicable.

10. Practice of bodily cleanliness by the use of wash, bath, and dressing rooms, the use of special rooms for eating, separate wardrobes for street and work clothes, and frequent, nonhazardous cleansing of the clothing.

11. Immediate report of symptoms of indisposition, attention to wounds of the skin caused by the handling of corrosive materials, the speediest employment of an unexceptionable antidote giving promise of success at the very first symptoms of poisoning, with the simultaneous summoning of a physician.

12. The installation of a healthy working force capable of withstanding exposure to the poison. Temporary or permanent exclusion of sick workmen from the dangerous departments of the industry. Medical examination of the workers in dangerous employments at suitable intervals. Under certain circumstances there should be a change of work in occupations giving rise to chronic poisoning.

13. The utmost possible reduction of the hours of labor in dangerous employments.

ACT PROVIDING FOR A TAX ON WHITE PHOSPHORUS MATCHES AND FOR PROHIBITING THEIR IMPORT OR EXPORT.

SECTION 1. That for the purposes of this act the words "white phosphorus" shall be understood to mean the common poisonous white or yellow phosphorus used in the manufacture of matches and not to include the nonpoisonous forms or the nonpoisonous compounds of white or yellow phosphorus.

SEC. 2. That every manufacturer of white phosphorus matches shall register with the collector of internal revenue of the district his name or style, place of manufactory, and the place where such business is to be carried on; and a failure to register as herein provided and required shall subject such person to a penalty of not more than five hundred dollars. Every manufacturer of white phosphorus matches shall file with the collector of internal revenue of the district in which his manufactory is located such notices, inventories, and bonds, shall keep such books and render such returns in relation to the business, shall put up such signs and affix such number to his factory, and conduct his business under such surveillance of officers and agents as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may, by regulation, require. The bond required of such manufacturer shall be with sureties satisfactory to the collector of internal revenue and in the penal sum of not less than one thousand dollars; and the sum of said bond may be increased from time to time and additional sureties required at the discretion of the collector or under instructions of the Commissioner of Internal Revenue.

SEC. 3. That all white phosphorus matches shall be packed by the manufacturer thereof in packages containing one hundred, two hundred, five hundred, one thousand, or one thousand five hundred matches each, which shall then be packed by the manufacturer in packages containing not less than fourteen thousand four hundred matches, and upon white phosphorus matches manufactured, sold, or removed there shall be levied and collected a tax at the rate of two cents per one hundred matches, which shall be represented by adhesive stamps, and this tax shall be paid by the manufacturer thereof, who shall affix to every package containing one hundred, two hundred, five hundred, one thousand, or one thousand five hundred matches such stamp of the required value and shall place thereon the initials of his name and the date on which such stamp is affixed, so that the same may not again be used. Every person who fraudulently makes use of an adhesive stamp to denote any tax imposed by this section without so effectually canceling such stamp shall forfeit the sum of fifty dollars for every stamp in respect to which such offense is committed.

SEC. 4. That every manufacturer of matches who manufactures, sells, removes distributes, or offers to sell or distribute white phosphorus matches without there being affixed thereto an adhesive stamp, denoting the tax required by this act effectually canceled as provided by the preceding section, shall for each offense be fined not more than one thousand dollars and be imprisoned not more than two years. Every manufacturer of matches who, to evade the tax chargeable thereon or any part thereof, hides or conceals, or causes to be hidden or concealed, or removes or conveys away, or deposits or causes to be removed or conveyed away from or deposited in any place any white phosphorus matches, shall for each offense be fined not more than one thousand dollars and be imprisoned not more than two years, or both, and all such matches shall be forfeited.

SEC. 5. That every person who affixes a stamp on any package of white phosphorus matches denoting a less amount of tax than that required by law shall for each offense be fined not more than one thousand dollars or be imprisoned not more than two years, or both.

SEC. 6. That every person who removes, defaces, or causes or permits or suffers the removal or defacement of any such stamp, or who uses any stamp or any package to which any stamp is affixed to cover any other white phosphorus matches than those originally contained in such package with such stamp when first used, to evade the tax imposed by this act, shall for every such package in respect to which any such offense is committed be fined fifty dollars, and all such matches shall also be forfeited.

SEC. 7. That every manufacturer of white phosphorus matches who defrauds or attempts to defraud the United States of the tax imposed by this act, or any part

thereof, shall forfeit the factory and manufacturing apparatus used by him and all the white phosphorus matches and all raw material for the production of white phosphorus matches found in the factory and on the factory premises, or owned by him, and shall be fined not more than five thousand dollars or be imprisoned not more than three years, or both. All packages of white phosphorus matches subject to tax under this act that shall be found without stamps as herein provided shall be forfeited to the United States.

SEC. 8. That the Commissioner of Internal Revenue shall cause to be prepared suitable and special stamps for payment of the tax on white phosphorus matches provided for by this act. Such stamps shall be furnished to collectors, who shall sell the same only to duly qualified manufacturers. Every collector shall keep an account of the number and denominate values of the stamps sold by him to each manufacturer. All the provisions and penalties of existing laws governing the engraving, issuing, sale, affixing, cancellation, accountability, effacement, destruction, and forgery of stamps provided for internal revenue are hereby made to apply to stamps provided for by this act.

SEC. 9. That whenever any manufacturer of white phosphorus matches sells or removes any white phosphorus matches without the use of the stamps required by this act, it shall be the duty of the Commissioner of Internal Revenue, within a period of not more than two years after such sale or removal, upon satisfactory proof, to estimate the amount of tax which has been omitted to be paid, and to make an assessment therefor and certify the same to the collector, who shall collect the same according to law. The tax so assessed shall be in addition to the penalties imposed by law for such sale or removal.

SEC. 10. That on and after January first, nineteen hundred and thirteen, white phosphorus matches, manufactured wholly or in part in any foreign country, shall not be entitled to entry at any of the ports of the United States, and the importation thereof is hereby prohibited. All matches imported into the United States shall be accompanied by such certificate of official inspection by the government of the country in which such matches were manufactured as shall satisfy the Secretary of the Treasury that they are not white phosphorus matches. The Secretary of the Treasury is authorized and directed to prescribe such regulations as may be necessary for the enforcement of the provisions of this section.

SEC. 11. That after January first, nineteen hundred and fourteen, it shall be unlawful to export from the United States any white phosphorus matches. Any person guilty of violation of this section shall be fined not less than one thousand dollars and not more than five thousand dollars, and any white phosphorus matches exported or attempted to be exported shall be confiscated to the United States and destroyed in such manner as may be prescribed by the Secretary of the Treasury, who shall have power to issue such regulations to customs officers as are necessary to the enforcement of this section.

SEC. 12. That every manufacturer of matches shall mark, brand, affix, stamp, or print, in such manner as the Commissioner of Internal Revenue shall prescribe, on every package of white phosphorus matches manufactured, sold, or removed by him, the factory number required under section two of this act. Every such manufacturer who omits to mark, brand, affix, stamp, or print such factory number on such package shall be fined not more than fifty dollars for each package in respect of which such offense is committed. Every manufacturer of white phosphorus matches shall securely affix by pasting on each original package containing stamped packages of white phosphorus matches manufactured by him a label, on which shall be printed, besides the number of the manufactory and the district in which it is situated, these words: "Notice.—The manufacturer of the white phosphorus matches herein contained has complied with all the requirements of law. Every person is cautioned not to use again the stamps on the packages herein contained under the penalty provided by law in such cases." Every manufacturer of white phosphorus matches who neglects to affix such label to any original package containing stamped packages of white phosphorus matches made by him or sold or removed by or for him, and every person who removes any such label so affixed from any such original package, shall be fined not more than fifty dollars for each package in respect of which such offense is committeed.

SEC. 13. That if any manufacturer of white phosphorus matches, or any importer or exporter of matches, shall omit, neglect, or refuse to do or cause to be done any of the things required by law in carrying on or conducting his business, or shall do anything by this act prohibited, if there be no specific penalty or punishment imposed by any other section of this act for the neglecting, omitting, or refusing to do, or for the doing or causing to be done, the thing required or prohibited, he shall be fined one thousand dollars for each offense, and all the white phosphorus matches owned by him or in which he has any interest as owner shall be forfeited to the United States.

SEC. 14. That all fines, penalties, and forfeitures imposed by this act may be recovered in any court of competent jurisdiction.

SEC. 15. That the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may make all needful regulations for the carrying into effect of this act.

SEC. 16. That sections thirty-one hundred and sixty-four to thirty-one hundred and seventy-seven, thirty-one hundred and seventy-nine to thirty-two hundred and forty-three, thirty-three hundred and forty-six as amended, thirty-four hundred and twenty-nine as amended, thirty-four hundred and forty-five to thirty-four hundred and forty-eight, thirty-four hundred and fifty to thirty-four hundred and sixty-three, all inclusive, of the Revised Statutes of the United States, and all other provisions and penalties of existing law relating to internal revenue so far as applicable, are hereby made to extend to and include and apply to the taxes imposed by this act and to the articles upon which and to the persons upon whom they are imposed.

SEC. 17. That this act shall take effect on July first, nineteen hundred and thirteen, except as previously provided in this act; and except as to its application to the sale or removal of white phosphorus matches by the manufacturers, as to which it shall take effect on January first, nineteen hundred and fifteen.

Approved April 9, 1912.

INDEX TO VOLUME 24.

A.

B.

C.

D.

E.

Prices, wholesale, in United States, of specified commodities, 1890 to 1911—Continued. Page.

R.

S.

DIRECTORY OF BUREAUS OF LABOR IN THE UNITED STATES AND IN FOREIGN COUNTRIES.

State.	Name of bureau.	Title of chief officer.	Location of bureau.
UNITED STATES.			
United States....	United States Bureau of Labor.....	Commissioner.....	Washington, D. C.
California.....	Bureau of Labor Statistics.....	Commissioner.....	San Francisco.
Colorado.....	Bureau of Labor Statistics.....	Deputy Commissioner.	Denver.
Connecticut.....	Bureau of Labor Statistics.....	Commissioner.....	Hartford.
Georgia.....	Department of Commerce and Labor..	Commissioner.....	Atlanta.
Hawaii.....	Department of Immigration, Labor, and Statistics.	Commissioner.....	Honolulu.
Idaho.....	Bureau of Immigration, Labor, and Statistics.	Commissioner.....	Boise.
Illinois.....	Bureau of Labor Statistics.....	Secretary.....	Springfield.
Indiana.....	Bureau of Statistics.....	Chief.....	Indianapolis.
Iowa.....	Bureau of Labor Statistics.....	Commissioner.....	Des Moines.
Kansas.....	Bureau of Labor and Industry.....	Commissioner.....	Topeka.
Kentucky.....	Department of Agriculture, Labor, and Statistics.	Commissioner.....	Frankfort.
Louisiana.....	Bureau of Statistics of Labor.....	Commissioner.....	Baton Rouge.
Maine.....	Department of Labor and Industry...	Commissioner.....	Augusta.
Maryland.....	Bureau of Industrial Statistics.....	Chief.....	Baltimore.
Massachusetts....	Bureau of Statistics.....	Director.....	Boston.
Michigan.....	Bureau of Labor and Industrial Statistics.	Commissioner.....	Lansing.
Minnesota.....	Bureau of Labor.....	Commissioner.....	St. Paul.
Missouri.....	Bureau of Labor Statistics and Inspection.	Commissioner.....	Jefferson City.
Montana.....	Bureau of Agriculture, Labor, and Industry.	Commissioner.....	Helena.
Nebraska.....	Bureau of Labor and Industrial Statistics.	Deputy Commissioner.	Lincoln.
New Hampshire..	Bureau of Labor.....	Commissioner.....	Concord.
New Jersey.....	Bureau of Statistics of Labor and Industries.	Chief.....	Trenton.
New York.....	Department of Labor.....	Commissioner.....	Albany.
North Carolina...	Bureau of Labor and Printing.....	Commissioner.....	Raleigh.
North Dakota....	Department of Agriculture and Labor.	Commissioner.....	Bismarck.
Ohio.....	Bureau of Labor Statistics.....	Commissioner.....	Columbus.
Oklahoma.....	Department of Labor.....	Commissioner.....	Guthrie.
Oregon.....	Bureau of Labor Statistics and Inspection of Factories and Workshops.	Commissioner.....	Salem.
Pennsylvania.....	Bureau of Industrial Statistics.....	Chief.....	Harrisburg.
Philippine Islands	Bureau of Labor.....	Director.....	Manila.
Rhode Island.....	Bureau of Industrial Statistics.....	Commissioner.....	Providence.
South Carolina...	Department of Agriculture, Commerce, and Industries.	Commissioner.....	Columbia.
Texas.....	Bureau of Labor Statistics.....	Commissioner.....	Austin.
Utah.....	Bureau of Immigration, Labor, and Statistics.	Commissioner.....	Salt Lake City.
Virginia.....	Bureau of Labor and Industrial Statistics.	Commissioner.....	Richmond.
Washington.....	Bureau of Labor.....	Commissioner.....	Olympia.
West Virginia....	Bureau of Labor.....	Commissioner.....	Wheeling.
Wisconsin:.....	Industrial Commission.....	Chairman.....	Madison.
FOREIGN COUNTRIES.			
Argentina.....	Departamento Nacional del Trabajo[1]..	Presidente.....	Buenos Aires.
Austria.....	K. K. Arbeitsstatistisches Amt im Handelsministerium.	Vorstand.....	Wien.
Belgium.....	Office du Travail (Ministère de l'Industrie et du Travail).	Directeur Général.....	Bruxelles.
Canada.....	Department of Labor.....	Minister of Labor.....	Ottawa.
Canada: Ontario..	Bureau of Labor (Department of Public Works).	Secretary.....	Toronto.
Chile.....	Oficina de Estadística del Trabajo...	Jefe.....	Santiago.
Finland.....	Industristyrelsen[1].....	.....	Helsingfors.
France.....	Office du Travail (Ministère du Travail et de la Prévoyance Sociale).	Directeur.....	Paris.

[1] Issues a bulletin of labor.

Directory of Bureaus of Labor in the United States and in foreign countries—Concluded.

State.	Name of bureau.	Title of chief officer.	Location of bureau.
FOREIGN COUNTRIES—concld.			
Germany	Abteilung für Arbeiterstatistik, Kaiserliches Statistisches Amt.	Präsident	Berlin.
Great Britain and Ireland.	Labor Department (Board of Trade)	Commissioner of Labor.	London.
Italy	Ufficio del Lavoro (Ministero di Agricoltura, Industria e Commercio).	Direttore Generale	Roma.
Netherlands	Directie van den Arbeid [1]	Directeur General	's Gravenhage.
New South Wales.	State Labor Bureau	Director of Labor	Sydney.
New Zealand	Department of Labor	Minister of Labor	Wellington.
Spain	Instituto de Reformas Sociales	Secretario General	Madrid.
Sweden	Afdelning för Arbetsstatistik (Kgl. Kommerskollegii).	Direktör	Stockholm.
Switzerland	Secrétariat Ouvrier Suisse (semiofficial).	Secrétaire	Zürich.
Uruguay	Oficina del Trabajo (Ministero de Industrias, Trabajo é Instrucción Pública).		Montevideo.
International	International Labor Office	Director	Basle, Switzerland.

[1] Issues a bulletin of labor.

LEADING ARTICLES IN PAST NUMBERS OF THE BULLETIN.

No. 1. Private and public debt in the United States, by George K. Holmes.[1]
Employer and employee under the common law, by V. H. Olmsted and S. D. Fessenden.[1]
No. 2. The poor colonies of Holland, by J. Howard Gore, Ph. D.[1]
The industrial revolution in Japan, by William Eleroy Curtis.[1]
Notes concerning the money of the United States and other countries, by W. C. Hunt.[1]
The wealth and receipts and expenses of the United States, by W. M. Steuart.[1]
No. 3. Industrial communities: Coal Mining Co. of Anzin, by W. F. Willoughby.[1]
No. 4. Industrial communities: Coal Mining Co. of Blanzy, by W. F. Willoughby.[1]
The sweating system, by Henry White.[1]
No. 5. Convict labor.[1]
Industrial communities: Krupp Iron and Steel Works, by W. F. Willoughby.[1]
No. 6. Industrial communities: Familistère Society of Guise, by W. F. Willoughby.[1]
Cooperative distribution, by Edward W. Bemis, Ph. D.[1]
No. 7. Industrial communities: Various communities, by W. F. Willoughby.[1]
Rates of wages under public and private contract, by Ethelbert Stewart.[1]
No. 8. Conciliation and arbitration in the boot and shoe industry, by T. A. Carroll.[1]
Railway relief departments, by Emory R. Johnson, Ph. D.[1]
No. 9. The padrone system and padrone banks, by John Koren.[1]
The Dutch Society for General Welfare, by J. Howard Gore, Ph. D.[1]
No. 10. Condition of the Negro in various cities.[1]
Building and loan associations.[1]
No. 11. Workers at gainful occupations at censuses of 1870, 1880, and 1890, by W. C. Hunt.
Public baths in Europe, by Edward Mussey Hartwell, Ph. D., M. D.
No. 12. The inspection of factories and workshops in the United States, by W. F. Willoughby.[1]
Mutual rights and duties of parents and children, guardianship, etc., under the law, by F. J. Stimson.[1]
The municipal or cooperative restaurant of Grenoble, France, by C. O. Ward.[1]
No. 13. The anthracite-mine laborers, by G. O. Virtue, Ph. D.[1]
No. 14. The Negroes of Farmville, Va.: A social study, by W. E. B. Du Bois, Ph. D.[1]
Incomes, wages, and rents in Montreal, by Herbert Brown Ames, B. A.[1]
No. 15. Boarding homes and clubs for working women, by Mary S. Fergusson.[1]
The trade-union label, by John Graham Brooks.[1]
No. 16. Alaskan gold fields and opportunities for capital and labor, by S. C. Dunham.[1]
No. 17. Brotherhood relief and insurance of railway employees, by E. R. Johnson, Ph. D.[1]
The nations of Antwerp, by J. Howard Gore, Ph. D.[1]
No. 18. Wages in the United States and Europe, 1870 to 1898.[1]
No. 19. Alaskan gold fields and opportunities for capital and labor, by S. C. Dunham.[1]
Mutual relief and benefit associations in the printing trade, by W. S. Waudby.[1]
No. 20. Condition of railway labor in Europe, by Walter E. Weyl, Ph. D.[1]
No. 21. Pawnbroking in Europe and the United States, by W. R. Patterson, Ph. D[1].
No. 22. Benefit features of American trade unions, by Edward W. Bemis, Ph. D.[1]
The Negro in the black belt: Some social sketches, by W. E. B. Du Bois, Ph. D.[1]
Wages in Lyon, France, 1870 to 1896.[1]
No. 23. Attitude of women's clubs, etc., toward social economics, by Ellen M. Henrotin.[1]
The production of paper and pulp in the United States, from January 1 to June 30, 1898.[1]

[1] Bulletin out of print.

No. 24. Statistics of cities.[1]
No. 25. Foreign labor laws: Great Britain and France, by W. F. Willoughby.[1]
No. 26. Protection of workmen in their employment, by S. D. Fessenden.[1]
Foreign labor laws: Belgium and Switzerland, by W. F. Willoughby.[1]
No. 27. Wholesale prices: 1890 to 1899, by Roland P. Falkner, Ph. D.[1]
Foreign labor laws: Germany, by W. F. Willoughby.[1]
No. 28. Voluntary conciliation and arbitration in Great Britain, by J. B. McPherson.[1]
System of adjusting wages, etc., in certain rolling mills, by J. H. Nutt.[1]
Foreign labor laws: Austria, by W. F. Willoughby.[1]
No. 29. Trusts and industrial combinations, by J. W. Jenks, Ph. D.
The Yukon and Nome gold regions, by S. C. Dunham.
Labor Day, by Miss M. C. de Graffenried.
No. 30. Trend of wages from 1891 to 1900.
Statistics of cities.
Foreign labor laws: Various European countries, by W. F. Willoughby.
No. 31. Betterment of industrial conditions, by V. H. Olmsted.[1]
Present status of employers' liability in the United States, by S. D. Fessenden.[1]
Condition of railway labor in Italy, by Dr. Luigi Einaudi.[1]
No. 32. Accidents to labor as regulated by law in the United States, by W. F. Willoughby.[1]
Prices of commodities and rates of wages in Manila.[1]
The Negroes of Sandy Spring, Md.: A social study, by W. T. Thom, Ph. D.[1]
The British workmen's compensation act and its operation, by A. M. Low.[1]
No. 33. Foreign labor laws: Australasia and Canada, by W. F. Willoughby.
The British conspiracy and protection of property act and its operation, by A. M. Low.
No. 34. Labor conditions in Porto Rico, by Azel Ames, M. D.
Social economics at the Paris Exposition, by Prof. N. P. Gilman.
The workmen's compensation act of Holland.
No. 35. Cooperative communities in the United States, by Rev. Alexander Kent.
The Negro landholder of Georgia, by W. E. B. Du Bois, Ph. D.
No. 36. Statistics of cities.
Statistics of Honolulu, Hawaii.
No. 37. Railway employees in the United States, by Samuel McCune Lindsay, Ph. D.[1]
The Negroes of Litwalton, Va.: A social study of the "Oyster Negro," by William Taylor Thom, Ph. D [1]
No. 38. Labor conditions in Mexico, by Walter E. Weyl, Ph. D.
The Negroes of Cinclare Central Factory and Calumet Plantation, Louisiana, by J. Bradford Laws.
No. 39. Course of wholesale prices, 1890 to 1901.
No. 40. Present condition of the hand-working and domestic industries of Germany, by Henry J. Harris, Ph. D.
Workmen's compensation acts of foreign countries, by Adna F. Weber.
No. 41. Labor conditions in Cuba, by Victor S. Clark, Ph. D.
Beef prices, by Fred C. Croxton.
No. 42. Statistics of cities.[1]
Labor conditions of Cuba.[1]
No. 43. Report to the President on anthracite coal strike, by Carroll D. Wright.[1]
No. 44. Factory sanitation and labor protection, by C. F. W. Doehring, Ph. D.
No. 45. Course of wholesale prices, 1890 to 1902.
No. 46. Report of Anthracite Coal Strike Commission.[1]
No. 47. Report of the Commissioner of Labor on Hawaii.
No. 48. Farm colonies of the Salvation Army, by Commander Booth Tucker.
The Negroes of Xenia, Ohio, by Richard R. Wright, jr., B. D.
No. 49. Cost of living.[1]
Labor conditions in New Zealand, by Victor S. Clark, Ph. D.[1]
No. 50. Labor unions and British industry, by A. Maurice Low.[1]
Land values and ownership in Philadelphia, by A. F. Davies.[1]
No. 51. Course of wholesale prices, 1890 to 1903.[1]
The union movement among coal-mine workers, by Frank J. Warne, Ph. D.[1]
No. 52. Child labor in the United States, by Hannah R. Sewall, Ph. D.[1]
No. 53. Wages and cost of living.

[1] Bulletin out of print.

No. 54. The working of the United States Bureau of Labor, by Carroll D. Wright.
Bureaus of statistics of labor in the United States, by G. W. W. Hanger.
Bureaus of statistics of labor in foreign countries, by G. W. W. Hanger.
The value and influence of labor statistics, by Carroll D. Wright.
Strikes and lockouts in the United States, 1881 to 1900, by G. W. W. Hanger.
Wages in the United States and Europe, 1890 to 1903, by G. W. W. Hanger.
Cost of living and retail prices in the United States, 1890 to 1903, by G. W. W. Hanger.
Wholesale prices in the United States, 1890 to 1903, by G. W. W. Hanger.
Housing of the working people in the United States by employers, by G. W. W. Hanger.
Public baths in the United States, by G. W. W. Hanger.
Trade and technical education in the United States.
Hand and machine labor in the United States.
Labor legislation in the United States, by G. A. Weber.
Labor conditions in Hawaii.

No. 55. Building and loan associations in the United States, by G. W. W. Hanger.[1]
Revival of handicrafts in America, by Max West, Ph. D.[1]

No. 56. Influence of trade unions on immigrants, by Carroll D. Wright.[1]
Labor conditions in Australia, by Victor S. Clark, Ph. D.[1]

No. 57. Course of wholesale prices, 1890 to 1904.
Street-railway employment in the United States, by Walter E. Weyl, Ph. D.
State cooperative accident insurance fund of Maryland.

No. 58. Labor conditions in the Philippines, by Victor S. Clark, Ph. D.
Labor conditions in Java, by Victor S. Clark, Ph. D.
The new Russian workingmen's compensation act, by I. M. Rubinow.

No. 59. Wages and hours of labor in manufacturing industries, 1890 to 1904.
Retail prices of food, 1890 to 1904.
Laws relating to child labor in European countries.

No. 60. Government industrial arbitration, by Leonard W. Hatch, A. M.[1]

No. 61. Labor conditions in Porto Rico, by Walter E. Weyl, Ph. D.[1]
Early organizations of printers, by Ethelbert Stewart.[1]

No. 62. Municipal ownership in Great Britain, by Frederic C. Howe, Ph. D.[1]
Conciliation in the stove industry, by John P. Frey and John R. Commons.[1]
Laws relating to the employment of children in the United States.[1]

No. 63. Course of wholesale prices, 1890 to 1905.[1]

No. 64. Conditions of living among the poor, by S. E. Forman.
Benefit features of British trade unions, by Walter E. Weyl, Ph. D.

No. 65. Wages and hours of labor in manufacturing industries, 1890 to 1905.[1]
Retail prices of food, 1890 to 1905.[1]

No. 66. Third report of the Commissioner of Labor on Hawaii.[1]

No. 67. Conditions of entrance to the principal trades, by Walter E. Weyl, Ph. D., and A. M. Sakolski, Ph. D.[1]
Cost of industrial insurance in the District of Columbia, by S. E. Forman.[1]

No. 68. Free public employment offices in the United States, by J. E. Connor, Ph. D.[1]
Laws of foreign countries relating to employees on railroads, by Lindley D. Clark, A. M., LL. M.[1]

No. 69. Wholesale prices, 1890 to 1906.

No. 70. The Italian on the land: A study in immigration, by Emily Fogg Meade.[1]
A short history of labor legislation in Great Britain, by A. Maurice Low.[1]
The British workmen's compensation acts, by Launcelot Packer, B. L.[1]

No. 71. Wages and hours of labor in manufacturing industries, 1890 to 1906.[1]
Retail prices of food, 1890 to 1906.[1]

No. 72. Italian, Slavic, and Hungarian unskilled immigrant laborers in the United States, by Frank J. Sheridan.[1]
Economic condition of the Jews in Russia, by I. M. Rubinow.[1]

No. 73. Laws relating to the employment of women and children.[1]
Laws relating to factory inspection and the health and safety of employees.[1]

No. 74. The legal liability of employers for injuries to their employees in the United States, by Lindley D. Clark, A. M., LL. M.[1]
Workmen's compensation acts of foreign countries.[1]

No. 75. Wholesale prices, 1890 to 1907.
Industrial hygiene, by George M. Kober, M. D.

[1] Bulletin out of print.

No. 76. The Canadian Industrial Disputes Investigation Act of 1907, by Victor S. Clark, Ph. D.
What is done for the unemployed in European countries, by W. D. P. Bliss.
No. 77. Wages and hours of labor in manufacturing industries, 1890 to 1907.[1]
Retail prices of food, 1890 to 1907.[1]
Cost of living of the working classes in the principal industrial towns of Great Britain.[1]
No. 78. Industrial accidents, by Frederick L. Hoffman.[1]
Mexican labor in the United States, by Victor S. Clark, Ph. D.[1]
Cost of living of the working classes in the principal industrial towns of Germany.[1]
No. 79. Mortality from consumption in dusty trades, by Frederick L. Hoffman.[1]
Charity relief and wage earnings, by S. E. Forman.[1]
No. 80. Woman and child wage earners in Great Britain, by Victor S. Clark, Ph. D.
No. 81. Wholesale prices, 1890 to 1908.
No. 82. Mortality from comsumption in occupations exposing to municipal and general organic dust, by Frederick L. Hoffman.
No. 83. The women's trade-union movement in Great Britain, by Katherine Graves Busbey, A. B.
Cost of living of the working classes in the principal industrial towns of France.
No. 84. Accidents to railroad employees in New Jersey, 1888 to 1907, by F. S. Crum.
The Minnesota iron ranges, by G. O. Virtue, Ph. D.
No. 85. Review of labor legislation of 1908 and 1909, by Lindley D. Clark, A. M., LL. M.
Laws of various States relating to labor, enacted since January 1, 1908.
No. 86. Canadian Industrial Disputes Investigation Act of 1907, by Victor S. Clark, Ph. D.
Phosphorus poisoning in the match industry in the United States, by John B. Andrews, Ph. D.
List of industrial poisons.
Publications of International Association for Labor Legislation.
No. 87. Wholesale prices, 1890 to March, 1910.
No. 88. Cost of living of families of moderate income in Germany in 1907–8.
No. 89. Child-labor legislation in Europe, by C. W. A. Veditz, Ph. D.
No. 90. Fatal accidents in coal mining, by Frederick L. Hoffman.
Recent action concerning accident compensation, by Lindley D. Clark, A. M., LL. M.
Foreign workmen's compensation acts.
Cost of industrial accident insurance, by Miles M. Dawson.
No. 91. Working hours of wage-earning women in Chicago, by Marie L. Obenauer.
Labor laws declared unconstitutional, by Lindley D. Clark, A. M., LL. M.
Review of labor legislation of 1910, by Lindley D. Clark, A. M., LL. M.
Laws of various States relating to labor, enacted since January 1, 1910.
No. 92. Industrial accidents and loss of earning power: German experience, by Henry J. Harris, Ph. D.
Workmen's compensation insurance: Laws and bills, 1911, by Lindley D. Clark, A. M., LL. M.
No. 93. Wholesale prices, 1890 to 1910.[1]
Report of British Board of Trade on cost of living in the principal industrial towns in the United States.[1]
Reports of British Board of Trade on cost of living in England and Wales, Germany, France, Belgium, and the United States.[1]
Hours of labor of men, women, and children in factories in Austria.[1]
No. 94. Fourth report of the Commissioner of Labor on Hawaii.
No. 95. Industrial lead poisoning in Great Britain and the western States of Europe, by Sir Thomas Oliver, M. D., F. R. C. P.
White lead industry in the United States, by Alice Hamilton, M. A., M. D.
Deaths from industrial lead poisoning in New York State in 1909 and 1910, by John B. Andrews, Ph. D.
No. 96. Working hours, earnings, and duration of employment of women workers in selected industries of Maryland and of California, by Marie L. Obenauer.
Employment of children in Maryland industries, by Marie L. Obenauer and Mary Conyngton.
Attitude of Massachusetts manufacturers toward the health of their employees, by Wm. C. Hanson, M. D.
Workmen's insurance code of July 19, 1911, of Germany, translated by Henry J. Harris, Ph. D.

[1] Bulletin out of print.

No. 97. Review of labor legislation of 1911, by Lindley D. Clark, A. M., LL. M.
Laws of various States relating to labor enacted since January 1, 1911.
No. 98. Mediation and arbitration of railway labor disputes in the United States, by Chas. P. Neill.
Canadian Industrial Disputes Investigation Act of 1907.
Conciliation and arbitration of railway disputes in Great Britain.
Attitude of employing interests toward conciliation and arbitration in Great Britain, by A. Maurice Low.
Attitude of labor toward conciliation and arbitration in Great Britain, by Arthur E. Holder.
Conciliation, arbitration, and sanitation in the cloak, suit, and skirt industry in New York City, by Charles H. Winslow.
Industrial courts in France, Germany, and Switzerland, by Helen L. Sumner, Ph. D.
No. 99. Wholesale prices, 1890 to 1911.