

LEAD INDUSTRIES ASSOCIATION

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July 1, 1943

LEAD HYGIENE AND SAFETY BULLETIN NO. 29

To Members of the Lead Industries Association:

Attached please find:

- A. Notes on Industrial Hygiene Foundation of America, Inc. Bulletin -- "Proceedings of Seventh Annual Meeting of Members." (1 page)
- B. Abstracts of Recent Literature on Lead Poisoning. (9 pages)

Very truly yours,

F E Horner

Secretary.



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NOTES ON INDUSTRIAL HYGIENE FOUNDATION OF AMERICA,
INC. BULLETIN

The Industrial Hygiene Foundation of America, Inc., has published its "Proceedings of the Seventh Annual Meeting of Members" in bulletin form. Included are panels on the following subjects:

"More Manpower Through Reduction of Absences"

"Putting Women, Older Men and Physically Handicapped to Work"

"Fatigue in Wartime Industry -- Hours of Work, Rotation of Shifts"

Copies are available at \$2.00 each, plus postage.

The Foundation has also issued a reprint of the panel on "More Manpower Through Reduction of Absences" which can be obtained at cost to us, plus postage.

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ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

LEAD POISONING CAUSING DEATH OF PAINTER. LIABILITY OF EMPLOYER FOR AGGRAVATION OF DECEASED'S PRIOR DORMANT CONDITION AS VICTIM OF LEAD POISONING. Deceased had been a house painter for defendant about eighteen months when he became suddenly ill with abdominal pains, nausea and fever, all symptoms of lead poisoning. He consulted a physician near his place of employment and after a few days he called in a local doctor who treated him a short time and then sent him to the Anderson County Hospital. There he lingered hopelessly for weeks and despite diagnosis and treatment by several physicians developed further typical symptoms, neuritis and mental deterioration until his death. All of the physicians agreed upon the basic diagnosis of lead poisoning. The case resolves itself into whether the deceased was exposed in his employment to the taking of lead into his system, and whether he did so take it, in such quantity and under such circumstances as to constitute an accident, causing his acute illness and subsequent death. The Commission so found. As a part of his work, deceased scraped and brushed off old paint, subjecting him to the inhalation of the resulting dust containing lead. If the inhalation of lead in unusual quantities occurred during the period of employment of the deceased by Mathews Mill by accidental means, then it matters not that such unusual and accidental inhalation merely aggravated deceased's prior dormant condition as a victim (if he was) of lead poisoning, for such aggravation, resulting in death, would make the latter componsable. Judgement of the lower court is affirmed. Strawhorn v. J.A. Chapman Construction Company, et al. So. Car. Sup. Ct. Decided January 22, 1943. (CCH).

OCCUPATIONAL HAZARDS IN THE AIRCRAFT INDUSTRY. K. Kay. Occup. Hazards, 5, 10-11, 24-26 (February, 1943). The various health hazards in the aircraft industry are discussed briefly. They include: (1) painting operations; (2) solvents; (3) degreasing; (4) sandblasting; (5) welding operations, and (6) aircraft dermatitis.

CONCENTRATION OF ATMOSPHERIC METAL FUMES IN NON-FERROUS FOUNDRIES. WISCONSIN STATE BOARD OF HEALTH, INDUSTRIAL HYGIENE UNIT. XEROGRAPHED 16 pp. A study of a representative group of 15 non-ferrous foundries in Wisconsin was made from the fall of 1940 to the next summer. Samples totaling 752 for lead and 381 for zinc were taken with electrostatic precipitators. Lead and zinc were determined by dithizone methods. Samples were usually taken at a central point near the molding and pouring floor and one point near the furnace, often simultaneously. An average of summer and winter results showed concentrations of atmospheric lead of over 1.5 mg. per 10 cu. m. of air in 11 of 15 furnace sections and in 11 of 14 pouring sections. Seven of each averaged over 3.0 mg. per 10 cu. m. The average winter concentration was about 3 times as high as in summer, but even in summer 4 furnace sections and 6 pouring sections had average lead concentrations above the toxic limit. In only one case was the zinc concentration above the toxic limit of 150 mg. zinc per 10 cu. m. of air. A large share of atmospheric lead and zinc is liberated during pouring. Even when alloys are as low as 0.1 or 0.2% lead the toxic limit for lead can easily be exceeded. Lead tends to be carried out of the metal along with zinc fumes. The following recommendations are made: (1) hoods for all furnaces; (2) an exhaust hood for fumes liberated during skimming; (3) crucibles or ladles should be pulled rather than pushed; (4) a conveyor line with pouring done at one spot which can be well exhausted; (5) if the last is not practicable, positive ventilation should be provided; (6) vacuum cleaners for dust removal; and (7) complete periodical physical examinations. A number of charts and tables present the data.

INDUSTRIAL HYGIENE PROBLEMS IN RECOVERY OF NON-FERROUS METALS FROM SCRAP. Illinois Labor Bull., 3, 4-6, 9 (November 30, 1942). This article, written primarily for factory operators and smelters is a thorough review of the hazards involved in handling non-ferrous scrap metals. The lead hazard is considered and methods of control are outlined. The need for good housekeeping is emphasized and effective exhaust ventilation is recommended rather than the use of filter respirators, whose proper use is difficult.

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ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

INDUSTRIAL POISONING ASSOCIATED WITH DROSSES. Queries & Minor Notes, J.A.M.A. 120, 1079 (November 28, 1942). Two men employed in a plant reclaiming drosses showed mild symptoms of multiple transient joint pains, neuritis, bleeding gums, a general malaise, and anorexia. Results of examination are negative except for slight drop in hemoglobin and red cell count. The men are in contact with tellurium, antimony, sulfur and chlorine. Lead, arsenic, and zinc are common impurities in many metals, and the type and amount of these impurities may vary daily in a metal dross reclaiming plant. Antimony poisoning is suggested by the symptoms, but there are too few cases in this country to warrant a definite diagnosis as such. Good ventilation and the wearing of respirators are essential for dross workers. References for antimony poisoning in the literature are given.

A CASE OF LEAD ARSENATE POISONING WITH RECOVERY. H.H. Kilgore and P.S. Rhoads. J. A.M.A., Clin. Notes. 27, 1125 (December, 1942). A careful enumeration is made of the history and symptoms of a fruit farmer who had developed lead arsenate poisoning from using the substance as a spray. The results of determinations of the lead and arsenic content of the hair, fingernails, and urine are given. The treatment, which comprised chiefly tri weekly intravenous injections of sodium thiosulfate and extensive vitamin therapy is described. After seven weeks of the treatment the patient, who had been exposed to the poison for 30 years, was convalescing rapidly.

ENCEPHALOPATHY FROM INHALING FUELS FROM BURNING STORAGE BATTERY BOXES. W.D. McNally. J. Ind. Hyg. & Tox., 25, 29-30 (January, 1943). The careless disposal of battery boxes which results in their being used as a source of fuel has too frequently caused illness and death from lead poisoning. One such instance is described, in which a colored woman burned battery boxes in her range, became ill with numerous symptoms of lead encephalopathy, and died in less than two months after the first exposure. Numerous blood and tissue changes were found in autopsy. Industrial physicians who are consultants to industries engaged in smelting battery plates should inform their employers of the danger involved in discarding used battery boxes in public dumping grounds where the indigent class may acquire them for fuel. Health departments of the various states should enforce a rule prohibiting the discarding of used battery boxes in public places.

EXPERIMENTAL INVESTIGATIONS IN LEAD POISONING. H. Waniok. Arch. Gewerbepath. Gowerbchyg., 11, 58-76 (1941). Oral doses of white lead were administered daily to rabbits until 0.25 g. per kg. body weight had been given. The animals died between the 8th and 16th days. The administration of 2 g. of glucose and 0.5 unit of insulin increased slightly the number of red cells, hemoglobin and body weight as compared with the control group, but did not affect the duration of life. In another group 1 cc. of campolon (liver extract) was injected daily along with the oral doses of white lead. Such treatment increased the duration of life of the animals as well as the erythrocyte count hemoglobin volumes. The number of rabbits used for each experiment was small (mostly 3 to 5).

THE EFFECT OF CHRONIC LEAD POISONING ON ARTERIAL PRESSURE IN DOGS. P.J. Fouts and I.H. Page. Am. Heart J. 24, 329-331 (September, 1942). The belief that chronic lead poisoning leads to arterial hypertension was tested by experiments on dogs. No hypertension was produced by administration of lead to dogs, even when over long periods of time and in large amounts.

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ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

IDENTIFICATION OF LEAD IN BONE TISSUE. L.T. Fairhall. Pub. Health Repts., 58, 209-216 (February 5, 1943). A method for positive identification of lead in bone tissue has been evolved which permits detailed investigation of the lead deposit. The process consists of decalcification of the bone section (preferably sawed lengthwise) by a saturated solution of sulfur dioxide. No lead is lost in the process. Sections cut in paraffin are treated with xylene, alcohols and water and are finally immersed in an acetic acid solution of potassium chromate, slowly developing a deposit of lead chromate crystals. These are best studied under a polarizing microscope. Quantities of lead much too small for x-ray detection are revealed by the method. Examination of bone prepared by this method shows that while the epiphyseal portion of bone is rich in lead, particularly in the early stages of lead absorption, deposition occurs throughout the compact tissue on all surfaces over which blood passes. X-ray studies of the bones of lead-poisoned animals indicate that the amount of lead, whether segregated or diffused, even in the absence of calcium, is insufficient to be revealed by ordinary x-ray photography. Deposition of lead was shown to occur in the fat cells of the red marrow. Lead storage in the bone tissue occurs first as colloiddally dispersed and finally as segregated crystalline masses.

MICRODETERMINATION OF LEAD BY DITHIZONE. K. Bambach and R.E. Burkey. Ind. & Eng. Chem., Anal. Ed., 14, 904-907 (November, 1942). A method for the determination of lead is given in detail. In it are incorporated the latest refinements in the use of dithizone as well as an improved method of eliminating bismuth. Separation of lead from bismuth both of which combine with dithizone in the first extraction from alkaline solution, is accomplished by stripping the lead from the dithizone extract with a potassium acid phthalate-hydrochloric acid buffer solution at pH 3.4. The bismuth remaining in the chloroform-dithizone extract is discarded. The method effects a 25% saving in the working time. Ten references are given.

WOMEN IN INDUSTRY. Safe Practice Bull., No. 107. National Safety Council. 8 pp. The general headings of the pamphlet are: (1) selection and placement of workers; (2) training; (3) supervision; (4) accident prevention; (5) occupational disease, and (6) mental and physical health. In connection with selection and placement, pre-placement physical examinations should always be given. The examining physician should have full information regarding the duties to be performed and should consider fitness in connection with the examination. In the section on accident prevention, suitable adjustments of machines and safety clothing are considered as factors in safety. Limits for heavy lifting, set by various industries and states are discussed. The question of fatigue is also to be considered. There is no authoritative information on greater sensitivity of women to occupational diseases than men, but both women and men should be protected from unsafe quantities of toxic materials. Exposure of pregnant women to lead, carbon monoxide, carbon disulfide, nitrobenzene, mercury, benzene and carbon tetrachloride should especially be avoided. Factors in mental and physical health are morale, sanitation, and good housekeeping. Women personnel advisors are of assistance in some companies, and in any case frequent interviews are helpful.

LEAD HAZARD IN MILK CAN MANUFACTURE. The Industrial Hygiene Unit of the Wisconsin State Board of Health has published a 31 page bulletin entitled, "The Lead Hazard in the Milk Canning Industry." The study is based upon surveys made in the can-making plants and the filling departments of 5 Wisconsin milk canning companies. Atmospheric lead concentrations above the maximum permissible concentration of 1.5 mg. per 10 cubic meters of air were found in the general atmosphere of 4 can plants. Sources of lead contamination were the body scan-soldering machines, the on-seam or floater machines and the loading and remelt kettles. A lead hazard was not associated with the operation of casting solder pigs, or by the mechanical soldering operation of the filler machines. Recommended control measures include local exhaust ventilation, vacuum cleaning and process changes in the solder recovery operation. What's New in Industrial Hygiene, 1, 13 (March, 1943).

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ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

OCCUPATIONAL DISEASE. BRONCHIECTASIS AS AN INCIDENT OF OCCUPATION DISEASE. FUMES AS CAUSAL CONNECTION. This was a proceeding before the Industrial Board under the Indiana Workmen's Occupation Diseases Act. Appellee, then a well and healthy man who had never suffered from influenza or any infectious disease, commenced work in the Appellant's factory, after having been physically examined by the Appellant's physician who found the appellee to be in a healthy physical condition at the time. He started work in the Heat Treat Department where there were cyanide pots, lead pots, oil baths, a shot blast machine, gas ovens and annealing furnaces, and where caked cyanide and oil were drilled and the residue blown by an air house into the atmosphere. Fumes from cyanide pots, lead pots and furnaces and dust from the machines permeated the air and settled everywhere they worked. The temperature in that Department was hot in some places and cool in others. About six months after he commenced employment there, he was coughing up blood and went to his physician who advised him that if he did not get out of the Heat Treat Department it would kill him. He stopped work for good and since that time has been unable to engage in any gainful occupation and is at the present time wholly disabled for work. Several doctors testified in the case to the effect that the Appellee is afflicted with bronchiectasis, and that in their opinion his condition was caused by breathing some kind of dust or irritating matter while at his work, and that in their opinion there is a definite causal connection between Appellee's condition and his employment. Bronchiectasis is a disease common to the public and one to which the public generally is exposed outside of employment. It is a disease which sometimes follows as an incident to diseases which provoke severe and prolonged coughing such as inflammation of the lungs and bronchial tubes. The question to be decided therefore is whether bronchiectasis is an incident of an occupational disease as defined in the Statute. Ordinary diseases of life to which the general public is exposed outside the employment may not under proper circumstances be compensable, but that such shall be compensable when they follow as an incident of an occupational disease as defined by the Statute. The disease of bronchiectasis followed as an incident of an inflammation of the lungs and bronchial tubes which itself arose out of and in the course of Appellee's employment by the Appellant under circumstances consistent with the requirements of the Act. The award of the Industrial Board is affirmed. Chevrolet Luncie Division of General Motors Corporation v. Hirst. Ind. Sup. Ct. Decided February 1, 1943 (CCH).

UNEXPECTED OCCUPATIONAL DISEASE EXPOSURES DURING WARTIME. J.J. Prendergast. Am. J. Pub. Health, 33, 330-335 (April, 1943). Some materials new to industry and a larger number which have new applications are considered and solutions are given for problems arising in their uses. Recently, benzene was used in a new operation involving the polishing of reflectors. The hazard involved was removed when a satisfactory substitute was found in a hydrogenated naphtha. Carbone tetrachloride, not previously used by the Chrysler Corporation, was found in use in a certain operation. Conditions of use were unsatisfactory from the health standpoint but were improved when a smaller amount of trichlorethylene was substituted, with even better results in production. Much of the gasoline now sold contains lead tetraethyl. Warning should be given that leaded gasoline should be used only for motor fuel and not for washing and cleaning purposes. In areas where high leaded gasolines are used, increased ventilation must be provided. An entirely new hazard is found in a new secret adhesive operation. The cement which has been found to be the causative factor must be investigated by patch tests. A new type of solvent used in dyeing canvas cloth and without proper aging caused some trouble related to dermatitis. A new formula was put into use, with satisfactory results. Cases of itching in women workers were found due to the use of insufficiently dried resins used in coating wires. Bathing in sodium bicarbonate solution gave relief. A group of men working on bronze gun parts complained of itching, the remedy for which was found in personal hygiene and a personal protective coating. An entirely different kind of exposure has developed with the increase of horsepower of airplane motors. In testing motors, the noise levels have been raised

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from 90 to 140 decibels even though scientific methods of sound deadening rooms have been used. Men exposed to high levels of sound are given physical examinations which include audiometer tests, complete clinical laboratory tests, basal metabolism, and electrocardiography. The release by the War Production Board of metals to be used as substitutes for scarcer materials gave rise to unexpected occupational disease exposures. Little is known of the acute and chronic toxicities of some of these elements, particularly indium and osmium. The determination of hazards which might result from their use is important.

TETRYL. Industrial Data Sheet No. D-Chem. 43. National Safety Council. Nat. Safety Council, 17, 14, 45 (April, 1943). Tetryl is the commercial name of trinitro-phenyl-methyl-triazine and is used as a booster charge in shells, between the fulminate of mercury of lead azide detonator and the high explosive charge. Its hazards are: (a) explosion and fire; (b) dermatitis; (c) discoloration of the skin and hair; and (d) possible systemic poisoning. It is more sensitive to shock or friction than TNT and may detonate if burned in large quantities. It must be kept away from detonators, blasting fuses, dynamite, and from possible sources of static electricity. The health hazards arise mostly from the dust, which may cause dermatitis, discoloration of skin and hair, and possibly systemic poisoning. A number of other substances used in the manufacture of tetryl are also toxic. As a cause of dermatitis, tetryl is a sensitizer rather than a primary irritant. Workers with severe primary dermatitis should be permanently removed from contact with tetryl. Discoloration of the skin and hair is not pathologic and the true color reappears after cessation of exposure. Opinion is divided on the presence and symptoms of systemic poisoning. Direct contact is not necessary for systemic poisoning. Control measures include a maximum temperature of 72°F, humidity between 40 and 60%; hoods for exhaust systems enclosing as much of the process as possible, cleaning of places where the dust may accumulate and personal protection, including clothing, respirators and skin creams. Education of workers and strict supervision are necessary.

MEASUREMENT OF INDUSTRIAL LEAD EXPOSURE BY DETERMINATION OF STIPPLING OF THE ERYTHROCYTES. L.W. Sanders. J. Ind. Hyg. & Tox., 25, 38-45 (February, 1943). Ever since the discovery that stippled erythrocytes occur in cases of lead poisoning, their presence or absence has often been considered positive evidence of the presence or absence of lead in the blood, although that view has never been justified by experimental evidence. It is known that these altered cells occur in other pathologic states than those produced by the absorption of lead. One question is the presence of stippled cells in the blood of normal, unexposed individuals. The author examined the blood of 2,231 petroleum refinery employees without lead exposure and found stippled cells absent in 67.5%, but in 9.5% more than the 500 per million frequently cited as the upper limit of normal occurrence. A study of a smaller group of medical students gave similar results. In the few individuals studied from day to day, the stippled cell count showed an irregular daily variation. Another question is whether lead absorption can occur without producing changes in the erythrocytes. The author's results show that the condition is often present in the early stages of exposure, but that the number of stippled cells increases with prolonged exposure. It is apparent from these results that neither negative nor positive qualitative results are diagnostic. Positive results are diagnostic in the individual only in extremely high numbers - for instance over 1000 stippled cells per million in group findings, or 2000 per million in individuals. The size of the basophilic granules contributes nothing to the knowledge of the causative factor in the production of the stippling.

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EXPERIMENTAL STUDIES ON LEAD ABSORPTION AND EXCRETION AND THEIR RELATION TO THE DIAGNOSIS AND TREATMENT OF LEAD POISONING. R.A. Kehoe and others. J. Ind. Hyg. & Tox., 25, 71-79 (February, 1943). Two human subjects were given lead orally in the form of soluble salts, one 2 mg. per day for 23 months and the other 1 mg. daily for 50 months (of 28 days), in addition to the lead normally ingested with food. The lead in urine and blood increased rather irregularly but with an unmistakable trend, finally reaching a value associated with lead poisoning in the subject receiving 2 mg. daily, although there were no symptoms or stippled erythrocytes. After discontinuance of the lead ingestion, the blood and urinary lead concentrations fell back nearly to their normal values in 16 months. Calculation of urinary lead output gave similar relations, complicated by the effect of seasonal volume changes. Determination of fecal lead showed that 1.94 mg. out of a total intake of 2.31 mg. was excreted leaving less than 20% of the total to enter the blood stream. This quantity increased during periods of constipation. During a two months period after discontinuance the output exceeded the intake slightly and thereafter they were equal. Therefore there was no appreciable elimination from the tissues through the alimentary canal. Similar results were obtained with the subject taking 1 mg. of lead daily, but the amount retained was slightly less in proportion. Intake and output were nearly balanced for a control subject on a normal diet. Toward the end of the lead administration for the second subject, various dietary changes were tried for a month each: (1) addition of large quantities of milk; (2) large quantities of pectin; (3) large doses of ascorbic acid; (4) a diet low in calcium and phosphorus; (5) a diet low in calcium and high in phosphorus, plus sodium phosphate; (6) a diet high in calcium and low in phosphorus, plus calcium lactate, and (7) a normal diet with a dose of calcium lactate in the morning and sodium phosphate in the evening. These factors had little or no effect on the retention of lead, and the variations in urinary lead output were but little greater than those that occurred spontaneously. Administration of large doses of ammonium chloride for a period during elimination of lead likewise had not significant effect. Several practical conclusions are evident from the results reported. First, the importance of the duration of lead exposure is obvious. Progressive accumulation occurs during exposure, at a rate depending on the degree of exposure. When exposure ceases, the lead begins to leave the body, but elimination requires a longer time than absorption. In the absence of adequate control of lead exposure, rotation of jobs is desirable. Second good alimentation is necessary in order to limit the absorption of lead from the gastro-enteric tract. Third, plenty of water should be taken. Fourth, a well-balanced diet is desirable, but special additions do not appear to be of value. Finally, it is apparent that the elimination of the toxic agent from the body is accomplished spontaneously over a considerable period of time. There is grave doubt that this elimination can be materially accelerated by artificial means; not that some form of de-leading may not be practical, but that lead metabolism is exceedingly stable and not greatly influenced by gross changes in the acid-base equilibrium or by the calcium and phosphorus metabolism.

THE PLASMA-CELL PARTITION OF BLOOD LEAD. K. Bambach, R.A. Kehoe and M.A. Logan. J. Pharmacol., 76, 326-337 (1942). Adult rabbits were given lead acetate in their diet. At least 90% of the total blood lead is found in the cell fraction, and there is no significant difference between arterial and venous blood in this report. The use of heparin, potassium oxalate or sodium citrate does not cause any significant change in the lead plasma-cell partition. When lead chloride solution is added to heparinized whole blood from normal rabbits, most of the lead is quickly taken up by the cells, but when lead chloride is added to heparinized normal plasma, the reactivity of the lead is changed, so that when the cells are returned to the plasma the removal of the lead is retarded and 24 hours are required for the cells to take up 75% of the added lead. These facts indicate that there is a rapid reaction between lead and some constituent of the cells which takes precedence over the reaction that occurs in plasma in the absence of cells.

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HEALTH OF LEAD-EXPOSED STORAGE BATTERY WORKERS. W.C. Dreessen. J. Ind. Hyg. & Tox., 25, 60-70 (February, 1943). Following a preliminary survey of 26 storage battery manufacturing establishments, the U.S. Public Health Service made environmental studies in 13 plants and medical studies in 6 plants, all representative of those in the industry. Of the 766 storage battery workers, 177 were found to be affected with "early plumbism," including 168 cases of lead absorption and 9 of incipient plumbism. The percentage with early plumbism increased with the extent of exposure, from 4% to a concentration of 0.75 mg. lead per 10 cu.m. to 54% to more than 3 mg. per 10 cu.m. Blood lead and urinary lead were higher on the average in the lead-affected workers, and increased with increased exposure. Albuminuria was twice as frequent among the lead-affected as among the normal workers. Arterial hypertension and arterio-sclerotic-hypertensive heart disease were not significantly more frequent. Wide ranges of lead exposure were found in the workrooms of the plants. Actual exposure of workmen is variable and may be reduced by good engineering practices.

INDUSTRIAL LEAD POISONING AS A CLINICAL SYNDROME. W.F. Asho. J. Ind. Hyg. & Tox., 25, 55-59 (February, 1943). The author discusses the signs and symptoms of lead poisoning and presents a table showing their relative occurrence. In 30 cases of lead poisoning studied before subsidence of an acute episode, weakness occurred in all 30, weight loss in 27, followed by constipation, colic, anorexia, abdominal pain, arthralgia and a number of other symptoms. The most frequent physical signs were lead line and pyorrhea (in 20) followed by extensor weakness of wrists, malnutrition, and abdominal tenderness (in 11), and several others. The most useful sign was the contrast between the general strong appearance of the men and their weaker performance. The condition was not generally indicated definitely by erythrocyte counts, hemoglobin content or leucocyte counts. Stippled erythrocytes varied from 720 to 16,000 per million. The lead content of the blood, urine and feces were well above normal. Such findings are not in themselves diagnostic, but show that abnormal concentrations are uniformly found in the presence of symptoms and signs of intoxication.

LIVER INJURY, ESPECIALLY CIRRHOSIS, IN ARSENIC POISONING. P. Roessing. Arch. f. Gewerbepath. u. Gewerbehyg., 11, 131-142 (December 31, 1941 (German)). A review of the literature on arsenic poisoning with special reference to liver injury leads to the conclusion that the liver is frequently affected, but that the nature of the injury varies. Clinical, pathological and histological investigations have shown great variability in acute poisoning, injury of the reticulo-endothelial system, desquamation and necrosis of the liver cells, various stages of acute yellow atrophy; in chronic poisoning, disappearance of glycogen, fatty infiltration, cell necrosis, reparative and regenerative changes, congestion of the bile ducts, periportal hyperplasia. From these findings it seems unlikely that true cirrhosis is a result of pure arsenic poisonings. In most of the cases reported, arsenic has not been the sole toxic agent; also involved are alcohol, nicotine, lead, copper, caffeine, metabolic and intestinal disturbances. Animal experiments are not entirely reliable, since in many animals latent liver injury, such as coccidiosis in rabbits, causes a predisposition to experimental lesions by toxic agents. Cirrhosis of the liver is considered essentially a chronic progressive hepatitis, affecting the liver cells and produced by toxic agents, in small doses over long periods. A typical case of cirrhosis, caused by a combination of factors, with arsenic and lead predominating, is that of a worker engaged in the manufacture of lead and calcium arsenate, with some exposure also to dinitro-ortho-cresol. He developed symptoms which were first diagnosed as lead poisoning, later as cirrhosis with ascites. The opinion that arsenic was the chief toxic agent was based on the presence of melanosis, hyperkeratosis, intestinal symptoms and a greatly increased content of arsenic in the hair. Lead, and to a slighter degree, dinitro-ortho-cresol were considered contributory factors. The author believes that the combined cumulative effect of several toxic agents on the liver is greater than that of any single agent and that arsenic alone, especially in the cirrhosis often found in wine dressers, cannot be considered a primary cirrhosis-producing agent.

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THE POSSIBLE TOXICITY OF LEAD ALLOYS. I. EXPERIMENTS ON THE RAT WITH SOLDER. G.R. Cowgill and K. Salomon. J. Ind. Hyg. & Tox., 25, 81-89 (March, 1943). The investigation reported was concerned with the effects of metallic lead and its alloys on animals, on which very little is known. Young rats received 300 parts of lead per million of diet in the form of solder pellets containing 55.57% of lead. They proved to be quite similar to the control group fed an identical diet but no lead, with respect to growth, concentration of blood hemoglobin and the appearance of stippled cells, and amount of lead stored in their bodies. Rats fed an identical amount of lead in the form of lead acetate exhibited all the usual signs of lead poisoning, and their carcasses contained large amounts of lead. It is therefore concluded that ingested solder of the composition used is non-toxic for the young rat.

THE POSSIBLE TOXICITY OF LEAD ALLOYS. II. EXPERIMENTS ON THE DOG WITH SOLDER. K. Salomon and G.R. Cowgill. J. Ind. Hyg. & Tox., 25, 91-97 (March 1943). Solder in pellet form had been found non-toxic to rats, (see preceding abstract), but since rodents are known to be relatively resistant to lead it was desirable to work with animals whose sensitivity to lead is more nearly comparable to that of man. Accordingly puppies were used in this study. They were fed an artificial diet with a low calcium content, favoring the absorption of lead. One group of puppies was housed in stainless steel cages and the intake of the diet was equalized. The animals were compared with respect to gains in body weight, concentrations of hemoglobin and lead in the blood, number of stippled cells, and polychromatic staining erythrocytes, and amount of lead present in the entire body as well as in a representative bone. On the basis of the data obtained the authors conclude that the lead present in the form of solder is only moderately absorbed by the puppy, although to a greater extent than in rats. No signs of lead poisoning could be elicited in the animals receiving such pellets.

LEAD POISONING IN SCRAP RECOVERY PLANTS. Ill. Lab. Bull., 3, 8-9 (December 31, 1942). Mishandling of lead scrap in recovery plants has caused a number of lead poisoning cases. Causes are carelessness, lack of local exhaust, and poor housekeeping. Air analysis often show concentrations ranging from 2.5 to 760 mgs. per 10 cu. m. With adequate control these concentrations are brought within safe limits. The ineffectiveness of respirators and biological preventive measures is emphasized.

DANGER OF LEAD POISONING THROUGH THE ADDITION OF LEAD TETRAETHYL TO MOTOR FUEL. H. Wanek. Arch. f. Gewerbepath. u. Gewerbehyg., 11, 165-169 (December 31, 1941). (German) The purpose of the article is to differentiate between lead poisoning due to tetraethyl and classical lead poisoning, though the author admits that the toxic action of tetraethyl is a function of its lead content. Neurological symptoms, due to the fat-soluble effect of tetraethyl on central nervous tissue may be accompanied and even obscured by the more usual symptoms of lead poisoning in workers exposed to the carbonized residue of lead tetraethyl, which has lost its fat solvent capacity. The case is described of a worker exposed not only to tetraethyl lead added to benzine but also to the carbonized residue. Symptoms, called subjective, and including headache, weakness, loss of sleep, etc. were regarded as evidence of chronic tetraethyl lead poisoning; others, such as a blue line on the gums, punctate basophilia, coproporphyrinuria, and colic as evidence of true lead poisoning caused by inhalation of the lead containing dust of the carbonized residue.

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ABSTRACTS OF RECENT LITERATURE ON LEAD POISONING

DANGER OF LEAD BENZINE. H. Kraut and G. Lehmann. Arch. f. Gewerbepath. u. Gewerbehyg., 11, 256-295 (December 31, 1941). (German). A series of animal experiments was undertaken in order to estimate how far and under what conditions danger to health is to be apprehended from the use of benzine containing lead tetraethyl. Previous investigation by Kehoe have shown that 1 cc. of pure lead tetraethyl applied to the shaven skin of a rabbit is lethal. In the present investigation, dilute solutions in gasoline were applied to the skin of rabbits and guinea pigs. Some loss in body weight was obtained with rabbits as the subjects; the results with guinea pigs were inconclusive. In all experiments, in which the animals inhaled lead tetraethyl vapor and exhaust gases, the results were completely negative, in spontaneous death rate, blood picture, nervous reactions and muscle chronaxia. Chemical analysis of the ashed animals showed a measurable accumulation only with the application to the skin of the 1% solution and no sign of true lead poisoning. The author concludes that there is in man no danger of lead poisoning to be apprehended from exposure to exhaust gases; that the danger to persons employed in normal garages and tank factories is inconsiderable (the cleaning of tanks is not dealt with); and that it is doubtful if any practical danger to health from lowered resistance is likely with the relatively low concentrations actually in use.

THE EFFECTS OF ASCORBIC ACID IN RELATION TO LEAD ABSORPTION. E.E. Evans, W.D. Norwood, R.A. Kehoe and W. Machle. J.A.M.A., 121, 501-504 (February 13, 1943). Ascorbic acid nutrition in workers in a large plant was found to be poor in general, but mostly, so in lead workers. Careful study of a large group of lead workers to whose diet 100 mg. of ascorbic acid was added daily revealed no effect on the lead concentration in the blood, elimination in feces or urine, physical condition of the men, number and severity of complaints, numbers of erythrocytes or stippled erythrocytes, or in the hemoglobin. Therefore no reason has been found for recommending the use of ascorbic acid to counteract the effects of lead absorption.

POLARIGRAPHIC DETERMINATION OF LEAD IN BONES. E. Weinig. Z. Physiol. Chem., 273, 158-162 (1942). (German). The polarigraphic method, which is fully described, has the advantages of use of smaller amounts of material, simpler preliminary treatment of the bone ash, and the automatic action of the polarigraph.

LIST OF RESPIRATORY PROTECTIVE DEVICES APPROVED BY THE BUREAU OF MINES. H.H. Schrenk. U.S. Bur. of Mines Inf. Circ., No. 7237, (March, 1943). One of the most valuable services to industry in the protection of health by respiratory devices is the U. S. Bureau of Mines Approval system. The latest list of approved equipment has been revised and contains 10 pages of illustrations. (Copies available from the Information Division, Bureau of Mines, Washington, D.C.)

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