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CADMIUM POISONING

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Occurrences and Uses

There has been a pronounced increase in the use of cadmium in industry following its introduction into electroplating materials and alloys (*67*). It is of interest that parallel with this increase in the industrial use of cadmium there has been an increased amount of cadmium poisoning. Cadmium occurs in small quantities in zinc ores (1 to 3 percent) and as the mineral greenockite (cadmium sulfide). It is used little as a metal directly. Its greatest importance is as a constituent of alloys and in the form of its compounds. These are used in electrical conductors, jewelry, plating, pigment, ceramics, cadmium vapor lamps, process engraving, photography, and alkaline storage batteries (*67*, *83*).

Cadmium is used as a substitute for tin in antifriction metals and in solders, its principal use being in bearing metals for automobiles. Its presence in small amounts in copper wire adds strength with but small reduction in the conductivity. Cadmium plating is used to rustproof wires, tools, and other iron and steel articles (*51*).

While there has been on over-all increase in the use of cadmium for plating, there has recently been a tendency in industry to restrict its use somewhat. This is due not only to the high cost of cadmium, but also to a questioning of its efficacy as a protective coating. According to Burns and Schuh (*8*), "Its efficacy as a protective coating is inferior to that of zinc and interest in cadmium as a coating material has waned of late."

Physico-Chemical Properties of Cadmium

Cadmium is ductile, malleable, and capable of taking a high polish. These properties and the fact that it is resistant to corrosion and rust have caused this unusual increase in its use, particularly in the manufacture of marine hardware and in the automobile industry (*67*).

Cadmium, Cd, has an atomic weight of 112.41 and a density of 8.6 gm. per cc. at 20° C. It is a silvery-white metal with a slight bluish tinge. It is not as hard as zinc, and at ordinary temperatures is much more ductile and malleable. Like zinc, however, it becomes very brittle at higher temperatures, the change likewise appearing to be due to a crystalline transition. The electrical conductivity of cadmium is somewhat less than that of zinc. It melts at 320.9° C. and boils at 767° C. The solubility of $Cd(OH)_2$ in water is 2.6×10^{-4} gm. per liter. When heated in air, cadmium volatilizes and burns with a bright flame emitting an abundance of brown oxide (CdO) fume (*51*).

Determination of Cadmium

The analytical separation and means of identification of cadmium of greatest interest in industrial hygiene relate to the evaluation of the cadmium content of dust, or fumes, or to its presence in animal tissues or fluids. One is usually concerned with traces of the metal only, and the problem of separation and determination of these small amounts differs from that usually employed for the analytical evaluation of cadmium in ores, alloys, etc.

With reference to cadmium in animal tissues and biological fluids Fairhall and Prodan (*21*) developed a colorimetric method for the determination of minute amounts of cadmium in which advantage is taken of the intensification of color of the sulfide under ultraviolet rays. A sensitivity of 1:2,500,000 is obtained by this method and an accuracy of 4 percent in the analysis of material containing from 0.40 to 1.00 mg. of cadmium in 100 gm. of organic material. This method may be conveniently adapted to the analysis of cadmium dust and fume in air samples.

A number of organic reagents develop colors with cadmium and are useful also for the colorimetric determination, provided interfering metals are removed. Among these are diphenylcarbazide (*22*), diphenylthiocarbazone (dithizone) (*23*), hydroxyquinoline (*106*),

p-nitrobenzene-diazoaminoazabenzene (cadion) (*17*), and quinaldinic acid (*77*).

For the estimation of the cadmium content of air containing cadmium dust, samples may be obtained by drawing measured volumes through an impinger apparatus, and for the collection of fume an electrostatic precipitator may be used. The details of ashing, separation, and quantitative estimation of cadmium are given in the various references cited above.

Industrial Exposure to Cadmium

Industrial poisonings usually occur from the absorption of vapor, fumes, or dust, through the respiratory system. According to Public Health Bulletin No. 259 (*3*), the estimated number of workers in the United States potentially exposed to cadmium is 30,927.

While the expected number of workers exposed to cadmium poisoning in the United States amounts to 30,927, the known exposure to cadmium poisoning in 15 States listed according to industry is shown in table 1.

TABLE 1.—*Industrial exposure to cadmium*

Industry	Number of workers exposed	Industry	Number of workers exposed
Chemical and allied	191	Paper and printing	19
Clay, glass, and stone	47	Miscellaneous and manufacturing industries	364
Iron and steel	381		
Metal industries, except iron and steel	2,024		
Lumber and furniture	5	Total	3,031

Among the industrial processes in which cadmium poisoning may occur are the smelting of cadmium ores, working up of residues, welding of alloys, spraying of cadmium bearing paints and pigments, manufacture of cadmium compounds, melting the metal, and cadmium processes particularly of marine hardware and other fittings which were formerly zinc coated (*74*).

The following occupations have been listed as offering exposure to cadmium (*15*, *67*): cadmium-alloy makers, cadmium and cadmium compound makers, cadmium platers, cadmium-vapor-lamp makers, calico printers, chargers (zinc smelting), color makers, electroplaters, glass colorers, lithopone makers, solderers, solder makers, storage-battery makers, welders and zinc smelters and refiners, chemical process men, glassblowers, cupola tenders, painters, polishers, grinders, and buffers.

In the reduction of cadmium ore there is a potential exposure to arsine. The fire hazard in connection with the blue powder formed in reduction of cadmium ore and that of cadmium sulfide should also be noted (*74*). Cyanogen may be given off from the open tanks in plating (*37*).

All the known cases of cadmium poisoning which have been reported up to the present time are summarized in table 2.

TABLE 2.—*Cases of cadmium poisoning reported to date*

Date	Name	Number of cases	Type of poisoning			Death	References
			Ingestion	Inhalation	Injection		
1858	Sovet	3	------	3	------	------	Presse med. belge, 10: 69 (1858).
1866	Hinder (W. J. Palmer)	1	1	------	------	1	Indian M. Gaz., 1: 156 (1866).
1876	Wheeler	2	2	------	------	------	Bost. Med. and Surg. J., 95: 434 (1876).
1920	Stephens	9	------	9	------	1	J. Ind. Hyg., 2: 129 (1920).
1921	Teleky and Brezina	1	------	1	------	------	Schrift. a. d. Gesamtgeb. d. Gewerbehyg., No. 9, p. 76, Julius Springer, Berlin, 1921.
1923	Legge	3	------	3	------	1	Ann. Rep. Chief Inspect. Factories for 1923. H. M. Stationery Office, p. 74, 1924.
1928	------	(1)	(1)	------	------	------	Food, Drug and Insect. Rev., 12: 26 (1928).
1929	Dubperriell	(2)	(2)	------	------	------	Metal Ind., 27: 372 (1929).
1930	Schwarz	1	------	1	------	------	Ztschr. f. Gewerbehyg., 36: 190 (1930).
1931	Bridge	2	------	2	------	------	Legge, T. M., Industrial Maladies, London, p. 102, 1934.
1931	Griebel and Weiss	11	11	------	------	------	Pharm. Zentralhalle, 72: 689-90 (1931).
1932	Wahle	1	------	1	------	------	Zentralbl. f. Gewerbehyg., 9: 223-26 (1932).
1934	Führer and Blume	2	------	2	------	------	Arch. Gewerbepath. u. Gewerbehyg., 5: 117-84 (1934).
1934	Hazen	3	3	------	------	------	Food Ind., 6: 628 (1934).
1935	Larson	2	2	------	------	------	Münch. tierärztl. Wschr., 86: 509-11 (1935).
1936	Fairhall	2	------	2	------	1	J. Ind. Hyg., 18: 669-80 (1936).
1936	Gayvoronski, Demidow, and Heller.	8	------	8	------	------	Sovet, vrach. zhur., pp. 1568-1570, 1936.
1937	Gasmaske	1	------	1	------	1	Gasmaske, 9: 37-38 (1937).
1937	Pancheri	1	------	1	------	1	Securitas, 24: 61 (1937).
1938	Bulmer, Rothwell, and Frankish.	15	------	15	------	2	Canad. Pub. Health J., 29: 19-26 (1938).
1939	Richnow	1	------	1	------	------	Samml. Vergift., 10: (A), 77-80 (1939).
1939	Ohio Ind	2	------	2	------	------	Ohio Ind. Hyg. Bull. Vol. 1, No. 2, 1939.
1939-1940	Kamakura	1	------	------	1	1	Jap. J. Med. Sc., Soc. Med. and Hyg. 3, Proc. 206 (1939-1940).
1940	Mancioli	3	------	3	------	------	Rass. Med. App. Lav. Ind., 11: 632-39 (1940).
1940	Pancheri	1	------	1	------	------	Rass. Med. App. Lav. Ind., 11: 623-631 (1940).
1941	Conn. Health Bull	1	------	1	------	------	Conn. Health Bull., 55: 29 (1941).
1941	Cangelosi	218	218	------	------	------	U. S. Nav. Med. Bull., 39: 808-10 (1941).
1941	Frant and Kleeman	50	50	------	------	------	J. Am. Med. Assoc., 117: 86-9 (1941).
1941	Nasatir	1	------	1	1	1	Month. Pub. Div. of Ind. Hyg., Nat. Inst. of Health, Vol. 1, No. 6 (May 1941).
	Total	346	287	58	1	10	

[1] Unknown. [2] Several (?).

Toxicology

INDUSTRIAL CADMIUM POISONING

As early as 1656, Stockhusen (*96*) described what is perhaps the first data on industrial cadmium poisoning in his book on lead colic and arsenic fumes. According to Stockhusen, cadmium fumes cause gastrointestinal disturbances in foundry workers, these disturbances being accompanied by diarrhea and vomiting, in contrast to lead fumes which cause constipation. Later Tracinski (*98*) and

Seiffert (*88*) called attention to the dangers which menace workers from cadmium fumes developing in zinc workers engaged in ore distillation processes. These symptoms were similar to zinc ague and consisted of digestive and metabolic disturbances. In spite of the comparatively few known cases of industrial poisoning due to cadmium, this metal has long been considered dangerous from an industrial hygiene standpoint.

Investigations of poisoning caused by exposure to cadmium have been made and reported by Chajes (*11*), Fisher (*24*), Lewin (*56*), Gadamer (*32*), Kobert (*47*), Schwarz and Otto (*86*), Starkenstein, Rost, and Pohl (*94*), Otto (*68*), and Leschke (*54*).

EXPERIMENTAL CADMIUM POISONING

In 1867, Marmé (*61*) published the first experimental work of importance on the toxic effect of cadmium. Following Marmé's investigations, animal experimentation was carried out by De Simone (*92*), Athanasiu and Langlois (*2*), Paderi (*70*), Severi (*89*), Schwartze and Alsberg (*87*), Johns, Finks, and Alsberg (*44*), Hanzlik and Presho (*38*), Schwarz and Otto (*86*), Otto (*68, 69*), Husemann (*42*), Kochmann and Grouven (*48*), Formenti (*26*), Prodan (*75*), Pühler (*76*), Wilson, De Eds, and Cox (*108, 109*), Capelli (*10*), Briganti (*5*), Kamakura (*46*), Gitzhugh and Meiller (*35*), while Ciriminna (*12*) studied the formation of lipoid cadmium compounds in the organism and Menna (*62*), Lewin (*56*), and Kunkel (*49*) have discussed cadmium poisoning at some length with respect to industrial poisoning.

Acute cadmium poisoning by ingestion.—According to Kobert (*47*) the fatal dose for dogs by mouth amounts to 0.15–0.30 gm. per kg. of body weight. Lewin (*56*) states that dogs die after an intravenous injection of 0.03 gm. or after 0.3–0.6 gm. *per os*. Kunkel (*49*) noted that dogs die after an intravenous injection of 0.03 gm., cats after 0.015 gm., and rabbits after 0.01–0.02 gm., and that the fatal dose for the rabbit (weight 1.5–1.8 kg.) *per os* amounted to 0.3–0.5 gm.

Blume (*4*) states that the minimum lethal dose of cadmium for man is not known. However, according to Lewin (*56*), 0.03 gm. of cadmium sulfate by mouth causes increased salivation, choking attacks, persistent vomiting, abdominal pain, diarrhea, and tenesmus. These are the symptoms, according to most investigators, which occur most frequently in cases of poisoning due to cadmium. Sigel (*90*), however, reported that respiration is retarded, and attacks of vertigo and loss of consciousness also occur. According to Athanasiu and Langlois (*2*) cadmium paralyzes the central nervous system.

Van Hasselt (*100*) cites the case of Burdach (*7*) who produced nausea and vomiting in himself with one-half grain (33 mg.) of cadmium sulfate. Griebel and Weiss (*36*) noted that even 10 times the amount

given by Burdach, when administered *per os*, was tolerated without permanent injury.

Hinder (W. J. Palmer) (*41*) in 1866 reported the death of a 14-year-old boy in India who was given cadmium chloride in place of epsom salts as a purgative. The total amount administered was approximately 8.9 gm. Death occurred within about one hour and a half after taking the cadmium chloride.

ACUTE CADMIUM POISONING IN MAN BY INHALATION

The great increase in the use of cadmium not only for coating marine hardware but also for many fittings that were formerly zinc coated has presented a new problem in industrial hygiene (*20*). Heretofore, exposure to cadmium had been very slight and was confined to the relatively small amount of metal reduced annually and to the small amount of cadmium yellow manufactured. The various cases of cadmium poisoning in man which have resulted from the inhalation of cadmium dust or fume to date are indicated in table 2.

Symptoms of cadmium poisoning following inhalation.—The first symptoms of industrial cadmium poisoning are usually dryness of the throat, cough, headache, vomiting, and a sense of constriction of the chest. Later symptoms are predominantly referable to the respiratory system and are characterized by cough, pain in the chest, severe dyspnea, and prostration. These symptoms result from a pneumonitis which in many instances is followed by bronchopneumonia. A few cases have complaints referable to the gastrointestinal tract.

There is a similarity in the symptomatology of cadmium poisoning from its fumes and dust and poisoning with other industrial fumes such as nitrous fumes and methyl bromide. All these cause severe lung damage which usually manifests itself hours after exposure, and these substances can be breathed in fatal concentrations without enough discomfort to drive the worker away from the exposure.

Pathology of acute cadmium poisoning in man.—The pathological changes associated with cadmium poisoning reported in the literature are referable in man only to acute poisoning and may be summarized as follows:

Two fatal cases of cadmium poisoning reported by Bulmer, Rothwell, and Frankish (*6*) revealed on post-mortem examination edema, congestion, hemorrhage, and partial collapse of the lungs. Cloudy swelling of cells of the liver and kidney was noted. In one case, there was also congestion of spleen, fatty infiltration of pancreas, and slight chronic gastritis.

Legge (*52*) in the fatal case reported by him found congestion of the larynx, trachea, and bronchi, and congestion of the stomach and intestine; the heart and liver showed fatty metamorphosis, and acute inflammatory changes were found in the kidneys.

Esser (*19*) quoting Petri (*73*) states that in acute poisoning with soluble salts, congestion and pulmonary infarcts, subdural hemorrhages, catarrhal and ulcerative gastroenteritis are seen. The kidneys show degenerative changes sometimes leading to necrosis and followed by repair.

Kamakura (*46*) reports the case of a young man, 18 years of age, who received an intravenous injection of 10 cc. of a 2-percent cadmium chloride solution mistaken for calcium bromide. On autopsy, gross findings were cyanosis and marked edema of the face. Hemorrhages in the viscera, particularly the heart and lungs, edema of the pharynx and larynx, and a decreased blood viscosity were also observed.

The hematological changes associated with cadmium poisoning have been investigated by Athanasiu and Langlois (*2*), Otto (*68*), Moog and Pelling (*63*), Kobert (*47*), Kochmann and Grouven (*48*), Briganti (*5*), Prodan (*75*), Gitzhugh and Meiller (*35*), Blume (*4*), Waterman (*105*), Simon (*91*), and Pancheri (*72*). Very little work has been reported, however, with reference to blood changes in man following cadmium poisoning.

Therapeutic Uses of Cadmium

Cadmium salts have been advocated for the treatment of syphilis (*29, 48, 55, 57*), malaria (*79*), pulmonary tuberculosis (*14, 40, 58, 59, 80, 82, 99, 101, 103, 104*), and dementia praecox (*78*). However, the therapeutic use of cadmium is not particularly germane to this discussion of the toxicity of cadmium, and therefore further reference to its use has been omitted.

Acute Cadmium Poisoning in Man by Ingestion

Cadmium may occur in food products that have been produced or processed in cadmium-plated vessels or molds. It is considered poisonous in small amounts (*43*).

Cadmium is also of importance from the public health standpoint because of its solubility in acids. The metallic cadmium coating on utensils used for food dissolves when in contact with solutions containing as little as 0.5 to 2.5 percent of acetic acid. Cadmium is also soluble in other organic acids commonly found in foods, such as citric, tartaric, malic, and lactic acids, even though the concentrations of these may be small. With all these, organic cadmium salts are formed. It has been stated that these salts, when taken internally, combine with the hydrochloric acid of the gastric juice to produce poisonous cadmium chloride (*28*).

Cadmium is readily detected in food and vomitus. The wet-ashed solution should be neutralized and made slightly acid, and then hydrogen sulfide should be passed in. Yellow cadmium sulfide is pre-

cipitated (*28, 43*). Small amounts can be determined by the colorimetric-sulfide method referred to above (*21*).

Comparatively few cases of poisoning by ingestion of cadmium and its compounds were reported in the older literature. Table 2 summarizes the cases of cadmium poisoning by ingestion that have been reported to date.

It is important that the plating industry, in its search for substitutes for tin and other valuable war materials, be cautioned that cadmium is not a suitable substitute in the plating of utensils for food. New York City has already taken these steps. Representatives of the plating industry were called into conference and advised to discontinue the use of cadmium in utensils and dispensers for food. As a result the sanitary code of the City of New York, which deals with all measures concerning the health of the citizens of New York, was amended to prohibit the use of cadmium in articles used in the preparation of food and drink (*28, 65, 84*).

Prior to 1941 a total of 20 cases of cadmium poisoning, due to the ingestion of cadmium, have been reported in the literature. Since January 1941, 315 cases have been definitely caused by cadmium poisoning.

Owing to the greatly increased technical use of cadmium in the manufacture or repair of various types of containers and the increasing use of cadmium for plating, the possibility of such containers being used for food purposes is apparent. Several instances have occurred where food utensils which have been repaired and unsuspectingly plated with cadmium have later caused acute illness.

It is also possible that cases of cadmium poisoning have been mistaken for food poisoning owing to the similarity of the symptomatology of cadmium poisoning to ordinary so-called "food poisoning."

For these reasons it is advisable to warn the public against the use of cadmium-plated utensils for food purposes and especially to caution against having utensils cadmium plated where repairs are necessary.

Maximal Permissible Concentration of Cadmium

No extensive study of the permissible concentration of cadmium has been made with respect to exposure of human beings. As far as animal experimentation is concerned, the concentration necessary to produce direct toxic action has usually been far in excess of what would be permitted in industry except in case of an accident. However, in view of the fatalities which have arisen from a number of cases of exposure in industry, the maximum allowable concentration of cadmium or of its compounds in air has been accepted as 1 milligram of cadmium per 10 cubic meters of air [1] (*18*).

[1] This figure for the maximal permissible concentration of cadmium has been accepted and published by the American Standards Association in its American Allowable Concentrations of Cadmium. Copies of the standard may be obtained from the American Standards Association, 29 West Thirty-ninth Street, New York, N. Y.

Measures for the Prevention of Industrial Cadmium Poisoning

Prevention of industrial cadmium exposure depends upon the type of process involved in which cadmium fumes are generated. Where cadmium plating is done, prevention may be obtained by the use of specially designed exhaust ventilation systems, which are similar to those used in clearing the air of chromium vapors in the process of chrome plating. For some processes, a positive pressure mask is necessary for protection of exposed workmen. An approved type of respirator is recommended where the concentration of cadmium is low; a soda lime cartridge may be attached to the respirator when acid fume is also present in the atmosphere. The positive pressure mask should be used in all cases where the cadmium content is high (*75*).

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AN EPIDEMIC OF BOILS IN A GROUP OF TUNNEL WORKERS[1]

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Since February 1941 there has been an epidemic of boils among the workers of the Carlton Tunnel, Cripple Creek, Colo. This tunnel has

[1] From the Dermatoses Investigations Section, Division of Industrial Hygiene, National Institute of Health.

been of unusual interest to the engineering profession, as it was here that the world's record for hard rock tunneling was achieved.

The Colorado State Board of Health, lacking an industrial dermatologist, asked the United States Public Health Service to make a study of the outbreak.

It was found upon investigation that the boils began to appear shortly after underground water was encountered in February 1941. A force of 85 men, divided into three shifts, was employed on the job. Approximately four hundred men have been employed in the past year. The large turn-over was due in part to the fact that over 50 percent of the men were discharged because they were unable to produce the required amount of work. But a considerable number of workers left because of health complaints, the majority complaining of recurring furunculosis. A small percentage became afraid of tunnel work and gave up their jobs.

From February 26 to June 20, 1941, a period of about 5 months, 22 workmen were forced to give up work because of boils; taking into account the labor turn-over, this amounts to about 40 percent of the workers per year who are being forced to give up their jobs. Even this does not give a complete picture of the frequency of occurrence of boils because many of the workmen with boils did not leave the job and are either now free of lesions or still have an occasional boil. At the time the investigation was made, ten men were found working who were suffering from boils; one man, with dermatitis of both feet, was not working because of his skin condition.

The majority of the lesions were on the wrist and neck. They were, as a rule, deep-seated nodules with a fluctuant central mass and an area of erythema in the adjacent skin. Many of the lesions had broken down, or had been incised by the company physician, and were exuding thick, yellow pus. Several of the lesions were typical carbuncles with numerous openings discharging purulent material.

The tunneling consists of blasting the hard rock through which the bore is being driven, and the removal of the rock debris. Although there are 14 different jobs involved in tunneling, the large majority of boils have occurred among the seven classes of workers named below, in the order of frequency of occurrence. These seven jobs entail the greatest contact with water, rock dust, perspiration, and friction from working clothes:

Drillers	Operate the drilling machines.
Nippers	Assist the drillers and help load the drill holes with the blasting charge.
Muckers	Operate the mucking machine, which removes the rock debris from the tunnel floor and deposits it in the mine cars.
Chuck tenders	Carry supplies from the train to the working face and assist where needed.

Motormen	Run the storage battery electric mine trains, shift cars, and dump the rock debris at the portal of the tunnel.
Trackmen	Repair and extend the railroad track and road bed.
Foreman or shifter	Assists and directs the drilling, blasting, and mucking of his work gang.

The detailed work is directed by the tunnel engineers and the tunnel superintendent.

A typical work day may be summarized as follows: The workmen change to their work clothes, rubber boots, raincoats, and safety hats, which are equipped with electric battery lights. They then travel through the tunnel on an electric man-car to the working face. Arriving near the face, the men leave the car and wade through water, which is knee-deep, to their place of work and start their specific jobs. At the end of 8 hours at the face, they are brought to the portal of the tunnel on the man-car. At the "change house" they remove their wet working clothes and change to street clothes.

At the time of the study, the tunnel was 6 miles long and the time of transit was three quarters of an hour each way. During the journey through the tunnel the men were exposed to ceiling water, rock dust, and also to the gases resulting from the detonation of the blasting powder, which was concentrated in pockets to such an extent that a respirator was used about three times during a trip in or out of the tunnel.

While working at the face, the workmen are exposed to rock dust resulting from drilling and also powder fumes, smoke, the oxides of nitrogen, and carbon monoxide. Since the temperature is about 76° F. (wet and dry bulb), and the ventilation only fair, the men perspire profusely while they work.

The floor water is 2½ to 3 feet deep and flows from the portal at an estimated rate of 20,000 gallons per minute. The water is contaminated, because of lack of toilet facilities in the tunnel. The men urinate and defecate in the tunnel water, there being no privy or receptacle for body discharges. A portion of this tunnel water is piped to the air condenser machines through which it is circulated to cool them. The water thus heated is used for bathing purposes.

The men change clothing in the "change house," hanging their wet clothes on a wooden cross piece which is pulled to the ceiling by means of a rope and pulley. Here the clothes dry without having been washed and remain until the next day. Each workman owns his own clothes. The work clothes are rarely washed and, as a rule, are worn until they are so torn that they are no longer serviceable.

At the time of the survey, there was an adequate number of shower baths in the change house but these were rarely used because there was no means of furnishing uncontaminated cold water, and the heated water was too hot to use on the skin. Consequently, most of

the men did not use the showers, but wore their street clothes over their uncleansed bodies to their homes.

It was first thought that the contaminated tunnel water or the chemicals it contained were the chief factors in causing the outbreak of boils. But the insanitary conditions, plus the macerating action on the skin of the warm tunnel water and the perspiration, plus the abrasive action of the tunnel dust, clothes, and rubber coats, are sufficient to account for the presence of boils, even without considering bacterial or chemical content of the tunnel water. These facts are substantiated by the literature (*1*).

Nevertheless, bacteriological examination and patch tests were made with the underground water and rock dust to determine the possible presence of pathogenic bacteria and skin irritants. The pH of the water ranged from 7.1 to 7.3 and the possibility of irritating chemical substances in the tunnel water was ruled out by negative reactions when 12 men were patch tested with it. The men tested had just recovered or were still suffering from boils, hence were susceptible subjects who would have developed positive patch tests if the skin condition had been caused by the irritants in the water.

The material used for the patch tests consisted of water from the ceiling of the tunnel, rock dust from the face of the workings, and a mixture of both. A small amount of each of these substances was placed on the skin of the flexor surface of the arm above the elbow; the area was covered with cellophane, and sealed with adhesive tape. The patch tests were removed at the end of 24 hours, and read at that time and again in 48 hours and 96 hours after removal of the patches to observe delayed reactions. All tests were negative.

Bacteriological examination of the boils and tunnel water was done. On culturing the ceiling water, no growth was obtained at the end of 48 hours. However, the floor water contained abundant *Bacillus aerogenes*.

Cultures from boils were predominantly *Staphylococcus aureus* and *albus*, the ordinary bacteria found in boils. It is therefore evident that the bacterial content of the tunnel water is not the etiological factor in the outbreak of boils.

The one man suffering from dermatitis of both feet, and as a result, not working, was patch tested with tunnel water, rock dust, and rubber boot lining. He did not react to any of these substances. The presence of a moderately severe interdigital dermatophytosis suggested a fungous infection of the dorsum of his feet. Unfortunately, scrapings from the lesions for microscopic and cultural examinations were lost in transit to the laboratory.

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CONCLUSIONS

The study reveals that the cause of the outbreak of boils was a combination of factors which bring about a lowering of skin resistance to pyogenic bacteria. The humid atmosphere, the perspiration, the warm tunnel water, friction from clothes and rubber coats which are infiltrated with rock dust, together with the unhygienic conditions of the tunnel, and the insanitary and dirty condition of the working clothes are the causes of the outbreak.

The bacteria found in the boils did not come from the water.

The lack of response to the patch tests leads to the conclusion that the chemicals in the concentration in which they occur in the tunnel water and rock dust do not produce pustular reactions and are not skin irritants or sensitizers.

RECOMMENDATIONS

The prime requisite in the prevention of boils among tunnel workers is personal cleanliness. This can be obtained by having—

1. Adequate, usable bathing facilities, the showers having controllable hot and cold, uncontaminated water.
2. The workmen to be furnished a toilet soap and clean towels each time they use the shower.
3. The foreman of the work gang should supervise and enforce adequate bathing after work.
4. Daily change to clean work clothes, with clean neck towels to be provided for the workmen. Each workman should have three changes of work clothes.[2]
5. Individual raincoats, rubber boots, safety hats, respirators, and neck towels.
6. Daily washing of the rubber clothing worn by the men.
7. Sanitary toilet facilities in the tunnel. If permanent ones are impractical, portable sanitary pails for toilet use are suggested.
8. The workers should be taught that if occasional boils appear in spite of these protective measures, they should seek early medical aid and not treat themselves.
9. The men should be advised not to use adhesive tape on the skin because its removal pulls out the hairs, the open hair follicles becoming new portals for infection.
10. A series of health talks should be instituted to give a background to the workmen for a practical and workable personal hygiene program.

[2] Clean clothes and towels may be had by contracting with a laundry for this service at approximately fifteen cents a day per man.

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SANITATION ACTIVITIES IN THE SOUTHEASTERN STATES IN CONNECTION WITH NATIONAL DEFENSE [1]

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THE PRESENT NATIONAL EMERGENCY

Within the past year and a half, the protection of health has become an important item in the activities relating to the Nation's defense. One of the principal duties of a responsible health officer in a time such as this is the conservation of the health of the military and naval forces. The military and naval authorities are responsible for safeguarding the health of their personnel in the limited areas over which they have jurisdiction. However, part of a soldier's time is spent away from his post and in the surrounding civil communities and other areas, either on training or on leave. Even if this time were very brief, it could be significant, since infection with disease in some circumstances can be acquired very quickly. It therefore rests with public health officials to protect the health of the fighting personnel not only when "off duty" but also when they are on duty. It also follows that, if the forces for the defense of the country are to be trained, equipped, and maintained, the health of the workers in numerous defense industries also must be safeguarded in order that material will be produced for the armed forces as rapidly as desired. Last, but not least, the health of the public at large must be protected and controlled for the good of the people and to keep the morale of the Nation at a high level.

With the establishment of a great many new Army and Navy training centers and with the development in industrial undertakings connected with national defense have come large increases both in military and civilian population. In reviewing the list of these training camps, one is impressed with the large number of them located in the South. For example, about 110,000 military and

[1] Presented at the sixth annual meeting of the Mississippi Public Health Association, Jackson, Miss., November 6, 1941.

naval personnel have moved into the State of Florida alone. When one considers that in many areas a camp of 30,000 or more has been located near a small town, and, in some cases, more than 50 miles from any sizable city, the problems resulting in these extra-cantonment towns, not only for health control but also for the provision of facilities for the great influx of people, are enormous.

EXTRA-CANTONMENT ACTIVITIES

One of the first steps in the development of a national defense sanitation program was the assignment in November 1940 of nine senior Public Health Service medical officers as liaison officers to the nine Army Corps area headquarters to facilitate the relationship between the civil and military health authorities. This was done at the request of the Secretary of War. The main duty of these officers is to carry on an appropriate liaison whereby the civil authorities are constantly informed as to the public health needs of the military forces, and the military authorities in turn are apprised of health and sanitary conditions in areas where troops are stationed or go for recreation or maneuvers. These liaison officers are charged also with the duty of stimulating the further development, as well as the full utilization, of existing facilities in areas where armed forces or national defense employees are concentrated.

As compared with the 1917–18 defense work, better local health service facilities and experienced personnel are available at the present time than during the period of the previous World War. It is of interest to note that one of the first recommendations which the Public Health Service usually makes, after conducting a reconnaissance survey of a new extra-cantonment area, is that a local health unit be provided in that area if one does not already exist. It has not been necessary in quite a number of cases to make this recommendation, since either a county or a district health department was found to be functioning. For example, there is a county health unit in every county in Alabama, and, as a result, each of the 14 defense areas is provided with local health service. Likewise, 13 defense areas in Florida are provided with health services, 16 in Georgia, 9 in Mississippi, 11 in South Carolina, and 8 in Tennessee.

Federal funds allotted by the Public Health Service in accordance with Title VI of the Social Security Act and the Venereal Disease Acts have contributed in a large measure to the development of State and local health services in recent years.

Even with this Federal assistance in many cases the local health unit facilities were hardly great enough to meet the health needs prior to the national defense program. It has been necessary to enlarge and expand these units to care for large increases in population.

In addition to the Social Security Act, title VI, and Venereal Disease funds, the Public Health Service has obtained funds for a certain amount of emergency health and sanitation activities in defense areas. Out of this appropriation, personnel and other assistance have been furnished to various State and local health departments in defense areas where critical needs exist. Medical, public health engineering, and nursing personnel not already in the employ of official health agencies have been placed on duty for this purpose. They have been given courses in public health orientation at the National Institute of Health, Bethesda, Md., and on mosquito control at Norfolk, Va., and have been assigned to the various States and defense areas to work under the direction of State and local health authorities and not as Federal agents.

MOSQUITO CONTROL

Because of the importance of controlling mosquitoes in the vicinity of Army and Navy camps, the Public Health Service in May and June 1941, initiated an oiling program in the extra-cantonment areas in the South. Trucks, spray cans, Diesel or fuel oil for use as larvicide, and oil and gasoline for operation of the trucks were secured in connection with this program, which was operated by the State health departments with the assistance of the Public Health Service and local health units.

The program was terminated June 30, 1941, because funds for its continuance in the fiscal year 1942 were not available. Arrangements were made for a similar program to be operated by the Work Projects Administration commencing July 1, 1941. It was agreed that the Public Health Service would provide supervisory personnel to assist the State health departments and the Work Projects Administration in mosquito control work as rapidly as such personnel could be obtained through the United States Civil Service Commission and trained. In addition, the equipment formerly used in the Public Health Service program was made available through the State health departments for the operation of the program under the Work Projects Administration.

Some delays were, and still are, encountered in the present program because of lack of Work Projects Administration labor (which is scarce in the defense areas particularly) and other causes. It is necessary to have certification for each individual project as a national defense project by either the Army or Navy, as the case may be, and the Public Health Service in order that it may have some priority in obtaining Work Projects Administration labor and release from the usual sponsor's contribution requirements. The liaison officers of the Public Health Service certify those projects involving Army cantonments while the district directors of the Public Health Service certify those projects involving naval establishments.

As of November 1, 1941, the status of this program may be summarized for the States of South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana, as follows:

National defense Work Projects Administration mosquito control projects

Drainage projects submitted to Work Projects Administration	34
Drainage projects certified as defense-connected	12
Drainage projects operating	8
Drainage projects completed	1
Larvicidal projects operating or operated since July 1, 1941, State-wide projects certified	46

RECONNAISSANCE SURVEYS OF DEFENSE AREAS

Brief mention has already been made of the reconnaissance surveys made by the Public Health Service. Since the fall of 1940, the Public Health Service has been making reconnaissance or sanitary surveys of municipal and rural areas within 25 miles of each major cantonment. A number of camps had already been completed or were under construction at that time; but since then it has been the policy to conduct surveys prior to the completion of new camps in order to be able to anticipate the needs in the extra-cantonment areas before existing facilities and services are too greatly overtaxed. The surveys are conducted usually by a team consisting of a public health engineer and a medical officer. The following number of surveys have been completed by States in Public Health Service District No. 4 to date: Alabama, 7; Florida, 12; Georgia, 6; Louisiana, 5; Mississippi, 5; South Carolina, 4; and Tennessee, 3—a total of 42.

Although there are many more defense areas than those which have been surveyed, the ones involving the largest cantonments and the so-called "hot spots" have been largely covered. However, with the proposed construction of additional camps, the need for additional surveys will develop.

The data obtained by these reconnaissance surveys have served a useful purpose in determining the immediate needs for the strengthening of the health services in the various defense areas. The information thus obtained regarding the community facility needs of various kinds, such as water supply, sewers, and hospitals, has been consulted by many of the governmental defense agencies in Washington in connection with their varied activities as being a reliable source from which factual knowledge of the environmental conditions in the defense areas can be obtained.

COMMUNITY FACILITIES LAW

In July 1941 the Community Facilities Act was approved by the President and became a law. Under this authorization the sum of

$150,000,000 was provided for construction, maintenance, and operation, by grants or loans, of facilities in communities where the national defense activities, military or industrial, have definitely caused the need for such facilities. The Public Works Administration of the Federal Works Agency was delegated to receive project applications, determine the justification for projects, determine, with the aid of various other governmental agencies, the priorities of the various projects, and to supervise construction. Among the projects which have been considered as justified under the terms of the law are those having a public health or sanitary significance, such as water plants and systems, sewer systems and treatment plants, health centers, comfort stations, venereal disease clinics, hospitals, and incinerators. In all cases it has been necessary for the applicant to demonstrate that the proposed project is an acute need which has developed because of the defense situation and does not relate to some long-standing community need.

The Public Health Service district offices have been called upon by the Regional Coordinator of the Federal Security Agency to review project applications and make recommendations regarding the public health and sanitation projects. The primary purpose has been to assist the Public Works Administration to secure urgently needed public health and sanitation facilities resulting from defense activities and to eliminate those projects which have little or no defense-connected need or justification. The State health departments have been relied upon to a great extent in this matter for recommendations.

It is believed that no worth while public health and sanitation project for which a defense-connected need has been definitely demonstrated in the application has failed to receive adequate consideration in the allocations of expenditures to be made under this Act. Funds are not allotted to any project until it has been approved by the President.

MILK SANITATION CONTROL

In the fall of 1941 Public Health Service milk sanitation personnel started special surveys of milksheds and pasteurization plants in the extra-cantonment areas. The cooperation of the State and local health departments has been obtained in an effort to provide adequate milk control in defense areas, especially of those milk plants supplying the military personnel in the cantonments. The personnel of the Army employed on milk sanitation have cooperated also in the concentrated effort to provide safe milk supplies for the military forces.

In some communities where defense projects are located a sufficient quantity of milk has not been available locally to supply the

demand; therefore, it has been necessary to go outside of the local milkshed to provide the additional milk required by the defense project. When this has been done, only milk produced on milksheds operating under the provisions of the Public Health Service Milk Ordinance has been acceptable in most instances. It is considered that the emphasis being placed on the provision of safe pasteurized milk supplies for the military and naval establishments will have a beneficial influence in bringing about improvements in milk supplies generally.

ARMY RECREATIONAL CAMPS

The War Department has placed Army recreational camps along the Gulf and Atlantic coasts, a few being located inland adjacent to lakes. The majority of these camps consist of 6-man pyramid tents with concrete floors, wooden sides to a height of 2 feet and screens to a height of about 4 feet with a screen door. At some of the camps the tents are provided with wooden floors raised distances of 6 to 18 inches above the ground level. A large tent is usually provided for the mess hall which is generally operated under contract by a local concern in a manner similar to any other food concession. For this reason and because these camps primarily provide sleeping accommodations for the men when they are on leave for the purpose of recreation in the neighboring community, they are of particular importance to the health authorities of the locality.

All of the camps, with two exceptions, are located on either the Gulf or Atlantic coasts and, as a result, swimming is a major item in the recreational program. This has necessitated investigations of the beach waters. One of the justifications advanced for sewerage systems and sewage treatment plants in some of the cities along the Gulf coast under the Public Works Administration Community Facilities program has been that the beach waters desired for use by military personnel visiting the Army recreational camps are so subject to pollution that bathing must or will be prohibited unless sewage disposal facilities are provided which will improve conditions.

WATER SUPPLY AND SEWERAGE

The War and Navy Departments have cooperated to a great extent with the State health departments and the Public Health Service in connection with the provision of water supply and sewerage facilities for cantonment areas. In most cases plans have been submitted for the approval of the State health department before construction is undertaken. Facilities provided for Army camps, exclusive of certain airfields, are under the control of the Quartermaster Corps. Plans have usually been prepared by consulting engineering firms and construction has been completed by contractors.

In the case of certain Army airfields, construction of facilities was originally under the jurisdiction of the Quartermaster Corps but this was later changed to the Corps of Engineers. It has been the policy of the Corps of Engineers to obtain the recommendations of the Public Health Service with respect to the proposed water supply and sewerage facilities for the airfields. In making recommendations regarding these proposed facilities, the Public Health Service has followed the procedure of first obtaining the views of the State health department in the matter. It is believed that in the majority of cases, final plans have been submitted for approval by the State health department, especially with reference to sewage treatment.

While at a few of the camps sewage is discharged into the sewers of a nearby municipality, in the majority of cases a sewage treatment plant is provided to serve only the camp. In contrast to the 1918 septic tank, the present-day sewage treatment plants at military cantonments are of the most modern types. For example, a single-stage biofiltration plant has been installed at Camp Polk, La.; two-stage biofiltration plants have been installed at Camp Livingston, La., and Camp Stewart, Ga. Activated sludge plants have been constructed at Camp Shelby, Miss., and Camp Claiborne, La.; and aerofilters are provided at Camp Forrest (Peay), Tenn. The majority of treatment plants include chlorination.

The Cincinnati Stream Pollution Investigations Station of the Public Health Service has prepared a pamphlet entitled "Notes on Basic Design Data for Emergency Water and Sewage Treatment Plants in Areas Affected by National Defense Program." In this pamphlet certain types of design for sewage and water-treatment plants are suggested which can be made up on a unit basis and enlarged within reasonable limits by adding units. The designs are simplified, made more or less standard, and the units may be cheaply constructed.

GENERAL SANITATION

In May 1941 the Public Health Service prepared a "Sanitation Code for State or Local Adoption," at the request of the conference of State and Territorial health officers. This code was prepared with particular reference to defense areas and it was suggested that a similar code or ordinance be adopted locally in these areas. The code covers sanitary control of water supplies, sewage, industrial wastes, excreta, garbage and refuse, swimming pools and bathing places, milk and milk products, frozen desserts, eating and drinking establishments, habitable buildings, tourist camps, trailer camps, cabin camps, construction camps, and similar establishments.

Usually one of the first activities of a new local health organization in a defense area is to determine the enforcement powers that are

available to carry its recommendations into effect. This frequently results in the conclusion that local ordinances are necessary particularly to avoid insanitary fringe or "mushroom" developments. Time does not permit the more desirable method of securing good general sanitation by educational methods. It is necessary to have laws or ordinances with effective enforcement provisions in them to control "boom town" growths. The Sanitation Code prepared by the Public Health Service was intended to furnish the basic information needed for this purpose.

The Work Projects Administration Community Sanitation program, sponsored by State health departments, has received technical supervision and assistance from the Public Health Service. Prior to the defense activity many projects were operating and numerous Work Projects Administration workers were employed in the construction of sanitary privies. With the advent of the national emergency, such labor became scarce, particularly in defense areas, and it also became necessary to utilize existing labor for national defense projects such as military roads and access highways, airport construction, mosquito control, and the like. It became necessary, as was the case in malaria control drainage projects, to have the community sanitation projects certified as national defense projects by the Army or Navy and by the Public Health Service in order to continue or start operation of projects in defense areas. In some nondefense counties, where Work Projects Administration labor was not scarce, operation of existing projects was continued and in a few cases it has been possible to continue operation of projects which happened to be previously operating in what later became defense counties. It is hoped that this important sanitation program may be continued in operation in spite of the limitations imposed by the defense situation.

MILITARY MANEUVERS

In the 1940 Army maneuvers in Texas and Louisiana, the State health departments and the Public Health Service were very active. In those parts of the maneuver area where local health services were not already provided, special military-area health units were set up in advance of the maneuvers. Inspections were made of milk plants, food establishments, water supplies, and other facilities before and during the maneuver period. Prostitutes were removed, and venereal disease clinics established. By the demonstration of health work afforded by these special units, some success was achieved in having full-time health units established in some of the counties involved.

During June 1941 moderate scale maneuvers were held in Tennessee by the Second Army. By this time the Public Health Service liaison officers were active in coordinating the health work of the Army, State health departments, and Public Health Service. Prior to these

maneuvers the Governor of Tennessee called a meeting which resulted in the creation of a Coordinating Unit to handle the problems of vice control, sanitation of food and food handling establishments, milk sanitation, and general communicable disease control. A unit headquarters was established and was kept open 24 hours daily. The office was connected by telephone with the Army headquarters. Appropriate personnel were provided. Meetings were held with mayors, health officers, and police chiefs from the cities in the area for cooperating in handling vice control.

This program was very effective and a similar unit was set up for the large-scale maneuvers in Arkansas, Texas, and Louisiana in August and September 1941. Similar control was established for the extensive maneuvers in North and South Carolina. Special assistance was made available to State and local health authorities by the Public Health Service during these maneuvers by placing in the field several mobile trailer laboratory units equipped for the bacteriological examination of water and milk.

CONCLUSION

Many health workers are familiar in varying degrees with the information which has been given concerning the public health and sanitation activities of the Federal Government during the present national defense period. It has been noted, no doubt, that other health subjects such as venereal disease control, typhus fever control, and similar important undertakings of the Federal Government relating to communicable diseases are not covered. Neither is the need for nursing and nutritional programs in the defense areas discussed. It may be mentioned, however, that these subjects, as well as those relating to increased health center and hospital facilities, are among the health programs to which the Federal Government has given much attention, or for which the Government is formulating plans and programs which may be undertaken in the near future or in the years immediately subsequent to the present national defense period.

FREQUENCY AND DURATION OF DISABILITIES CAUSING ABSENCE FROM WORK AMONG THE EMPLOYEES OF A PUBLIC UTILITY, 1938–41 [1]

By W. M. GAFAFER, *Senior Statistician, United States Public Health Service*

This, the sixth report of a series (*1–5*) on disability among employees of the Boston Edison Company, is based on recorded absences due to disability lasting 1 calendar day or longer which ended during the 4 years 1938–41, and is presented at this time principally because of

[1] From the Division of Industrial Hygiene, National Institute of Health.

the unprecedented interest in time lost shown by industry, war and health agencies, and others engaged in the war effort. Furthermore, recent and pertinent data are not available in the literature.

A detailed description of the sick leave plan of the company may be found in the earlier papers of the series. For present purposes all cases of continuous disability extending over 372 calendar days were arbitrarily closed at the end of the 372d day.

With regard to the age distribution of the employees it is sufficient to say that as of 1940 approximately 50 percent of the males were under 40 years of age while the corresponding percentage for the females was 60.

Among other things, table 1 shows for each of the 4 years, 1938–41, the number of male and female person-years of membership in the sickness plan, and four morbidity indexes. The causes of disability are broadly grouped into industrial injuries, nonindustrial injuries, respiratory diseases, and nonrespiratory diseases, respectively.

The total years of exposure for males amount to 10,926 and for females to 2,460. For male employees the number of absences lasting 1 calendar day or longer from all disabilities is 10,045 with 88,478 days of disability, and for female employees the corresponding magnitudes are 4,533 and 27,594, respectively.

The four morbidity indexes.—Interest in the table centers around the following: (1) With the exception of index III which gives the average number of days per absence, all indexes for each year show for all disabilities and each cause group (industrial injuries excepted) excesses for the females when compared with the males. Particularly noteworthy is the average annual number of absences on account of the respiratory diseases among the females for the 4-year period (946.8) which is higher than the male rate for all disabilities for the same period of time (919.4). (2) For each sex and for all disabilities the year 1939 shows in general the highest indexes, the respiratory diseases, so far as number of absences is concerned, being chiefly responsible. (3) For each year and each sex the respiratory group of diseases is the principal controlling factor of index I covering all disabilities while the corresponding factor of indexes II and IV is the nonrespiratory group of diseases. (4) With regard to index III, industrial injuries for the males and in general nonindustrial injuries for the females show for each year absences of longest average duration.

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(4) Gafafer, W. M., and Frasier, Elizabeth S.: Frequency and duration of disabilities causing absence from work among the employees of a public utility, 1933–1937. Pub. Health Rep., 53: 1273–1288 (1938). (Reprint No. 1963.)

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TABLE 1.—*Indexes of morbidity for different years according to sex and broad cause group, employees of a public utility, absences ending during 1938–41, inclusive*

Cause group	Males					Females				
	1938–41	1938	1939	1940	1941	1938–41	1938	1939	1940	1941
	Index I: Annual number of absences per 1,000 employees									
All disabilities	919.4	897.5	1,025.6	858.8	894.9	1,842.7	1,929.0	2,157.6	1,679.8	1,561.2
Industrial injuries	22.3	19.4	16.8	26.6	26.6	4.5	7.4	1.6	5.1	3.5
Nonindustrial injuries	42.8	49.7	51.5	35.1	34.8	78.0	94.7	93.7	53.1	61.2
Respiratory diseases	541.8	503.2	626.8	477.4	559.6	946.8	943.8	1,130.6	864.7	832.2
Nonrespiratory diseases [1]	312.5	325.2	330.5	319.7	273.9	813.4	883.1	926.7	756.9	664.3
	Index II: Annual number of days per employee									
All disabilities	8.098	8.004	8.260	8.055	8.074	11.217	9.223	15.490	10.608	9.503
Industrial injuries	.644	.544	.540	.801	.694	.039	.086	.016	.029	.019
Nonindustrial injuries	.465	.710	.362	.398	.383	1.070	.788	1.235	1.099	1.138
Respiratory diseases	2.936	2.731	3.230	2.507	3.280	4.444	3.793	5.946	3.935	4.082
Nonrespiratory diseases [1]	4.053	4.019	4.128	4.349	3.717	5.664	4.556	8.243	5.545	4.264
	Index III: Average number of days per absence									
All disabilities	8.81	8.92	8.05	9.38	9.02	6.09	4.78	7.13	6.31	6.09
Industrial injuries	28.83	28.02	32.15	30.08	26.06	8.73	11.60	10.00	5.67	5.50
Nonindustrial injuries	10.85	14.30	7.03	11.34	11.01	13.71	8.33	13.02	20.71	18.60
Respiratory diseases	5.42	5.43	5.15	5.25	5.86	4.69	4.11	5.25	4.55	4.91
Nonrespiratory diseases [1]	12.97	12.36	12.49	13.60	13.57	6.96	5.16	8.90	7.33	6.42
	Index IV: Average daily percentage of employees disabled [2]									
All disabilities	2.22	2.19	2.26	2.21	2.21	3.07	2.53	4.24	2.91	2.60
Industrial injuries	.18	.15	.15	.22	.19	.01	.02	[3].00	.01	[3].00
Nonindustrial injuries	.13	.19	.10	.11	.10	.29	.22	.35	.30	.31
Respiratory diseases	.80	.75	.88	.69	.90	1.22	1.04	1.63	1.08	1.12
Nonrespiratory diseases [1]	1.11	1.10	1.13	1.19	1.02	1.55	1.25	2.26	1.52	1.17
	Number of absences									
All disabilities	10,045	2,495	2,808	2,324	2,418	4,533	1,304	1,355	981	893
Industrial injuries	244	54	46	72	72	11	5	1	3	2
Nonindustrial injuries	468	138	141	95	94	192	64	62	31	35
Respiratory diseases	5,919	1,399	1,716	1,292	1,512	2,329	638	710	505	476
Nonrespiratory diseases [1]	3,414	904	905	865	740	2,001	597	582	442	380
	Number of calendar days of disability [4]									
All disabilities	88,478	22,250	22,617	21,796	21,815	27,594	6,235	9,728	6,195	5,436
Industrial injuries	7,034	1,513	1,479	2,166	1,876	96	58	10	17	11
Nonindustrial injuries	5,076	1,973	991	1,077	1,035	2,633	533	807	642	651
Respiratory diseases	32,082	7,593	8,843	6,785	8,861	10,931	2,564	3,734	2,298	2,335
Nonrespiratory diseases [1]	44,286	11,171	11,304	11,768	10,043	13,934	3,080	5,177	3,238	2,439
Number of person-years of membership	10,926	2,780	2,738	2,706	2,702	2,460	676	628	584	572

[1] Including disability from ill-defined and unknown causes.

[2] The average daily percentage of employees disabled is obtained by dividing the number of days of disability by the person-*days* of membership.

[3] Less than .01 percent.

[4] The number of days of disability is the number of calendar days from the date disability began to the date disability ended, or to the 372d day, inclusive.

INCIDENCE OF HOSPITALIZATION, MARCH 1942

[Reported for nonprofit Blue Cross Hospital Service Plans by the Hospital Service Plan Commission of the American Hospital Association]

The following table inaugurates a new current index of illness. Through the cooperation of the Hospital Service Plan Commission of the American Hospital Association, data on hospital admissions among about 8,000,000 members of Blue Cross Hospital Service Plans will be presented monthly. These plans provide prepaid hospital service and it is believed that the admission rate per 1,000 will reflect rather accurately the prevalence of serious illness among the members. The data cover about 60 hospital service plans scattered throughout the country, mostly in large cities.

Item	March	
	1942	1941
1. Number of Plans supplying data	62	45
2. Number of persons eligible for hospital care	8,265,831	4,858,368
3. Number of persons admitted for hospital care	73,069	41,443
4. Incidence per 1,000 persons, annual rate, during current month	104.0	100.4
5. Incidence per 1,000 persons, annual rate, for the 12 months ended March 31	106.0	----------

DEATHS DURING WEEK ENDED APRIL 11, 1942

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Apr. 11, 1942	Corresponding week, 1941
Data from 87 large cities of the United States:		
Total deaths	8,610	8,447
Average for 3 prior years	8,629	----------
Total deaths, first 14 weeks of year	123,985	130,430
Deaths per 1,000 population, first 14 weeks of year, annual rate	12.8	13.1
Deaths under 1 year of age	536	462
Average for 3 prior years	488	----------
Deaths under 1 year of age, first 14 weeks of year	7,867	7,389
Data from industrial insurance companies:		
Policies in force	64,963,030	64,566,401
Number of death claims	11,810	11,620
Death claims per 1,000 policies in force, annual rate	9.5	9.4
Death claims per 1,000 policies, first 14 weeks of year, annual rate	10.2	10.8

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 18, 1942

Summary

General health conditions in the United States continue favorable according to current State morbidity reports and urban mortality.

Of the 9 common communicable diseases for which weekly comparative data for earlier years are available, the current incidence of only two—measles and meningoccocus meningitis—is above the 5-year (1937–41) median.

The incidence of meningitis declined sharply, dropping from 112 cases for the preceding week [1] to 88 cases for the current week. A seasonal decline is expected about this time of year. The current incidence, however, is still above the 5-year median (55 cases) and higher than that for any corresponding week since 1937 (192 cases). The incidence of measles continues rather high, following a season of maximum incidence so far as indicated by reports to the Public Health Service. The number of cases currently reported is a little less than half that reported for the corresponding week last year and about 60 percent above the 5-year (1937–41) median.

Of 45 cases of amebic dysentery, 29 occurred in Louisiana, and of 62 cases of bacillary dysentery, 41 cases were reported in Texas. One case of anthrax was reported in Pennsylvania.

The seasonal rise in the incidence of Rocky Mountain spotted fever is indicated with reports of 7 cases for the week, of which 6 occurred in the northwestern States and 1 case in Illinois. The incidence of smallpox and typhoid fever continues low, with 21 and 82 cases, respectively. Of 23 cases of endemic typhus fever, 5 cases each were reported in South Carolina, Georgia, and Texas.

The crude death rate for the current week for 88 large cities in the United States is 12.2 per 1,000 population, as compared with 12.1 for the preceding week and 12.4 for the 3-year (1939–41) average for the corresponding week. The accumulated rate to date is 12.7, as compared with 13.1 for the corresponding period of 1941.

[1] A corrected report from Texas shows only 7 cases for the week ended April 11, 1942, instead of 23 cases as originally reported.

Telegraphic morbidity reports from State health officers for the week ended April 18, 1942, and comparison with corresponding week of 1941 and 5-year median

In these tables a zero indicates a definite report while leaders imply that, although none were reported cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41
	Apr. 18, 1942	Apr. 19, 1941		Apr. 18, 1942	Apr. 19, 1941		Apr. 18, 1942	Apr. 19, 1941		Apr. 18, 1942	Apr. 19, 1941	
NEW ENG.												
Maine	0	2	2	2	------	10	135	135	114	5	0	0
New Hampshire	0	0	0	------	------	------	34	72	30	0	0	0
Vermont	2	2	1	------	------	------	100	73	48	0	0	0
Massachusetts	4	2	2	------	------	------	1,314	746	714	2	1	1
Rhode Island	0	0	0	------	1	------	264	5	51	0	0	0
Connecticut	0	0	1	3	2	4	565	276	276	0	0	0
MID. ATL.												
New York	19	13	30	[1] 14	[1] 16	[1] 16	784	6,971	1,839	16	3	4
New Jersey	3	12	12	6	19	11	829	4,269	977	4	1	1
Pennsylvania	12	11	23	------	------	------	1,264	5,928	737	9	6	11
E. NO. CEN.												
Ohio	3	7	12	9	16	16	538	4,746	900	0	2	2
Indiana	5	10	9	22	11	24	143	1,487	203	1	0	0
Illinois	17	21	23	6	21	26	665	3,451	209	0	2	2
Michigan [2]	8	0	7	3	7	7	437	4,503	671	3	6	4
Wisconsin	1	0	0	56	104	62	953	2,017	581	0	2	1
W. NO. CEN.												
Minnesota	2	0	1	1	2	2	887	24	121	0	0	1
Iowa	7	3	4	------	8	8	328	290	196	1	0	0
Missouri	7	3	7	5	5	18	721	518	45	6	1	1
North Dakota	1	2	0	6	6	13	55	32	26	0	1	1
South Dakota	2	0	1	------	------	------	17	7	6	0	0	0
Nebraska	2	3	1	66	------	------	349	8	67	0	0	0
Kansas	5	7	7	4	11	11	583	1,084	638	1	1	0
SO. ATL.												
Delaware	0	0	0	------	------	------	13	208	31	1	0	0
Maryland [3]	4	2	4	9	9	9	521	378	378	8	4	1
Dist. of Col.	0	0	2	2	3	2	82	346	94	2	1	1
Virginia	10	7	9	313	324	224	322	2,589	668	7	4	4
West Virginia	2	2	5	5	13	44	159	889	53	0	1	2
North Carolina	11	5	12	21	4	7	1,130	1,776	538	1	0	2
South Carolina	3	4	4	411	448	429	211	1,365	48	1	1	0
Georgia	7	5	6	48	76	76	203	697	155	1	0	1
Florida	2	0	4	3	117	8	297	1,145	107	0	0	0
E. SO. CEN.												
Kentucky	4	3	8	------	27	27	126	1,639	315	0	2	2
Tennessee	3	9	6	49	69	147	114	790	154	1	4	1
Alabama	7	5	10	136	148	148	137	622	134	6	0	3
Mississippi [3]	8	4	4	------	------	------	------	------	------	2	2	1
W. SO. CEN.												
Arkansas	4	5	5	51	103	95	168	467	62	1	0	0
Louisiana	9	3	5	7	14	14	251	70	15	0	0	1
Oklahoma	8	7	7	137	156	156	331	106	106	0	0	0
Texas	28	22	22	690	530	555	2,194	1,160	1,011	[3] 7	5	5
MOUNTAIN												
Montana	0	0	1	3	2	7	106	32	25	0	0	0
Idaho	0	0	1	------	1	2	92	54	42	0	0	0
Wyoming	1	0	0	138	------	------	79	74	46	0	0	0
Colorado	1	10	10	42	42	6	279	522	435	0	0	0
New Mexico	4	2	1	10	2	2	65	264	80	0	0	1
Arizona	0	4	2	100	84	84	155	104	104	0	0	0
Utah [3]	0	0	0	------	10	10	519	57	110	0	0	0
Nevada	0	0	------	------	------	------	130	0	------	0	0	------
PACIFIC												
Washington	0	1	1	------	------	------	209	159	159	0	0	0
Oregon	0	5	3	21	15	39	203	365	70	1	0	0
California	8	16	16	267	315	145	6,930	247	504	1	5	1
Total	224	219	335	2,666	2,741	2,741	25,991	52,767	15,056	88	55	55
15 weeks	4,486	4,288	7,242	67,226	469,577	157,526	254,949	482,945	196,334	[3] 1,153	766	766

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 18, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41
	Apr. 18, 1942	Apr. 19, 1941		Apr. 18, 1942	Apr. 19, 1941		Apr. 18, 1942	Apr. 19, 1941		Apr. 18, 1942	Apr. 19, 1941	
NEW ENG.												
Maine	0	0	0	6	5	15	0	0	0	1	2	2
New Hampshire	0	0	0	12	4	4	0	0	0	0	0	0
Vermont	0	0	0	5	7	13	0	0	0	0	0	0
Massachusetts	0	1	0	462	152	200	0	0	0	2	0	0
Rhode Island	1	0	0	8	3	18	0	0	0	0	0	0
Connecticut	0	0	0	37	75	102	0	0	0	2	1	0
MID. ATL.												
New York	3	0	0	457	531	918	0	0	0	9	1	5
New Jersey	0	0	0	167	443	214	0	0	0	0	1	2
Pennsylvania	0	0	0	290	401	401	0	0	0	3	8	8
E. NO. CEN.												
Ohio	1	2	1	311	258	389	0	0	2	3	1	1
Indiana	0	0	0	115	154	172	1	0	14	1	0	1
Illinois	0	0	1	281	413	565	1	2	10	7	3	4
Michigan [2]	0	0	0	122	326	474	2	7	7	0	2	2
Wisconsin	1	0	0	148	156	164	0	6	6	1	0	1
W. NO. CEN.												
Minnesota	0	1	1	76	41	80	0	3	4	0	0	0
Iowa	0	0	0	51	52	186	0	1	46	1	1	1
Missouri	0	0	0	116	130	130	3	1	23	1	1	2
North Dakota	0	0	0	22	5	13	1	1	5	0	0	0
South Dakota	0	0	0	22	11	19	0	0	4	0	0	0
Nebraska	0	0	0	36	13	27	0	0	3	0	0	0
Kansas	0	1	1	90	47	81	0	1	3	0	0	1
SO. ATL.												
Delaware	0	0	0	53	8	11	0	0	0	0	0	0
Maryland [2]	0	0	0	63	50	50	0	0	0	2	0	1
Dist. of Col	0	0	0	15	14	19	0	0	0	0	1	1
Virginia	1	1	0	39	20	29	0	0	0	0	3	2
West Virginia	0	0	1	29	34	29	0	0	0	3	4	1
North Carolina	0	0	0	22	17	20	0	0	0	2	0	2
South Carolina	1	0	1	4	11	6	0	1	0	1	0	1
Georgia	0	0	0	17	15	10	0	0	0	2	2	2
Florida	0	1	0	5	9	9	0	0	0	6	6	5
E. SO. CEN.												
Kentucky	1	1	0	73	112	80	0	0	2	4	2	4
Tennessee	1	0	1	44	92	66	4	0	0	2	6	2
Alabama	0	0	1	26	6	12	0	0	0	4	0	2
Mississippi [2]	0	0	0	7	1	2	1	0	0	3	1	3
W. SO. CEN.												
Arkansas	0	0	0	6	10	3	3	0	1	3	6	1
Louisiana	0	0	0	8	5	6	0	0	0	6	4	6
Oklahoma	0	2	0	17	22	22	4	1	7	0	6	1
Texas	0	1	1	56	102	102	0	3	11	6	6	10
MOUNTAIN												
Montana	0	0	0	20	28	28	0	0	1	0	0	0
Idaho	0	0	0	0	4	8	0	0	3	1	1	0
Wyoming	0	0	0	15	11	7	1	0	0	0	0	0
Colorado	0	0	0	26	36	34	0	0	6	0	0	0
New Mexico	1	0	0	10	8	12	0	0	0	0	0	1
Arizona	0	0	0	3	5	8	0	0	0	0	0	1
Utah [2]	0	0	0	16	8	18	0	0	0	0	0	0
Nevada	0	0	------	5	0	------	0	0	------	0	0	------
PACIFIC												
Washington	1	1	0	34	24	34	0	1	4	3	2	1
Oregon	0	0	0	2	5	26	0	8	8	0	0	0
California	2	1	2	82	102	181	0	0	18	3	2	4
Total	14	13	14	3,531	3,986	4,881	21	36	306	82	73	90
15 weeks	326	347	323	59,424	57,095	77,735	342	669	4,698	1,125	1,134	1,644

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended April 18, 1942—Continued

Division and State	Whooping cough		Week ended Apr. 18, 1942								
	Week ended—		Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Apr. 18, 1942	Apr. 19, 1941		Amebic	Bacillary	Unspecified					
NEW ENG.											
Maine	15	45	0	0	0	0	0	0	0	0	0
New Hampshire	17	14	0	0	0	0	0	0	0	0	0
Vermont	56	22	0	0	0	0	0	0	0	0	0
Massachusetts	243	151	0	0	0	0	0	0	0	0	0
Rhode Island	26	10	0	0	0	0	0	0	0	0	0
Connecticut	87	44	0	0	0	0	0	0	0	0	0
MID. ATL.											
New York	433	230	0	4	11	0	0	0	0	0	0
New Jersey	282	102	0	2	0	0	0	0	0	0	0
Pennsylvania	163	318	1	0	0	0	0	0	0	0	0
E. NO. CEN.											
Ohio	187	284	0	0	0	0	0	0	0	0	0
Indiana	67	45	0	0	0	0	0	0	0	0	0
Illinois	176	84	0	1	4	0	2	0	1	0	0
Michigan [1]	135	336	0	0	0	0	0	0	0	0	0
Wisconsin	168	100	0	0	0	0	1	0	0	0	0
W. NO. CEN.											
Minnesota	30	119	0	0	0	0	0	0	0	0	0
Iowa	16	25	0	0	0	0	0	0	0	0	0
Missouri	18	42	0	0	0	0	0	0	0	0	0
North Dakota	17	23	0	2	0	0	0	0	0	0	0
South Dakota	2	50	0	0	0	0	0	0	0	0	0
Nebraska	11	33	0	0	0	0	0	0	0	0	0
Kansas	63	105	0	0	0	0	0	0	0	0	0
SO. ATL.											
Delaware	4	2	0	0	0	0	0	0	0	0	0
Maryland [2]	45	81	0	0	0	0	0	0	0	0	0
Dist. of Col	19	13	0	0	0	0	0	0	0	0	0
Virginia	43	110	0	0	0	18	0	0	0	0	0
West Virginia	26	54	0	0	0	0	0	0	0	0	0
North Carolina	95	223	0	0	0	0	0	0	0	0	1
South Carolina	89	246	0	0	0	0	0	0	0	0	5
Georgia	20	39	0	1	1	0	0	0	0	3	5
Florida	12	19	0	0	0	0	0	0	0	0	0
E. SO. CEN.											
Kentucky	91	110	0	1	1	0	0	0	0	0	0
Tennessee	26	62	0	0	0	0	0	0	0	2	0
Alabama	101	34	0	0	0	0	0	0	0	0	3
Mississippi [2]	------	------	0	0	0	0	0	0	0	2	0
W. SO. CEN.											
Arkansas	7	13	0	0	0	0	0	0	0	1	0
Louisiana	8	10	0	29	4	0	0	0	0	3	4
Oklahoma	16	45	0	0	0	0	0	0	0	0	0
Texas	201	229	0	4	41	0	0	0	0	0	5
MOUNTAIN											
Montana	12	5	0	0	0	0	0	0	1	1	0
Idaho	2	1	0	0	0	0	0	0	1	0	0
Wyoming	15	1	0	0	0	0	0	0	1	0	0
Colorado	46	201	0	0	0	0	0	0	2	0	0
New Mexico	44	8	0	0	0	0	0	0	0	0	0
Arizona	54	26	0	0	0	10	0	0	0	0	0
Utah [3]	58	73	0	0	0	0	0	0	0	0	0
Nevada	14	0	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	50	120	0	0	0	0	0	0	1	0	0
Oregon	26	21	0	0	0	0	0	0	0	0	0
California	309	612	0	1	0	0	1	1	0	0	0
Total	3,645	4,540	1	45	62	28	4	1	7	12	23
15 weeks	57,746	66,380									

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Correction: Meningococcus meningitis, week ended Apr. 11, 1942, Texas, 7 cases.

WEEKLY REPORTS FROM CITIES

City reports for week ended April 4, 1942

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga.	0	0	5	2	3	0	3	0	2	0	0	0
Baltimore, Md.	0	0	1	1	408	4	17	0	27	0	0	23
Barre, Vt.	0	0	------	0	0	0	0	0	0	0	0	1
Billings, Mont.	0	0	------	0	12	0	1	0	1	0	0	0
Birmingham, Ala.	0	0	9	3	3	0	2	0	2	0	0	7
Boston, Mass.	0	0	------	0	176	6	16	0	107	0	1	52
Bridgeport, Conn.	0	1	------	0	20	0	0	0	2	0	0	1
Brunswick, Ga.	0	0	------	0	28	0	0	0	0	0	0	0
Buffalo, N. Y.	0	0	------	0	30	0	6	0	17	0	0	0
Camden, N. J.	0	0	------	0	3	0	3	0	8	0	0	1
Charleston, S. C.	0	0	21	0	3	0	0	1	0	0	0	0
Charleston, W. Va.	0	0	------	0	0	0	0	0	0	0	0	0
Chicago, Ill.	6	0	3	2	129	1	29	0	89	1	0	105
Cincinnati, Ohio.	0	0	------	1	0	0	5	0	22	0	1	0
Cleveland, Ohio.	1	0	11	0	6	1	8	0	78	0	0	15
Columbus, Ohio.	1	0	------	0	18	0	3	0	12	0	0	5
Concord, N. H.	0	0	------	0	0	0	3	0	3	0	0	0
Cumberland, Md.	0	0	------	0	2	0	0	0	2	0	0	0
Dallas, Tex.	1	0	1	1	222	0	0	0	7	0	0	3
Denver, Colo.	5	0	14	0	99	1	8	0	5	0	0	7
Detroit, Mich.	3	0	------	0	52	0	22	0	134	0	0	45
Duluth, Minn.	0	0	------	0	4	0	0	0	6	0	0	2
Fall River, Mass.	0	0	------	0	28	0	0	0	55	0	0	0
Fargo, N. Dak.	0	0	------	0	0	0	1	0	0	0	0	0
Flint, Mich.	0	0	------	0	2	0	1	0	7	0	0	4
Fort Wayne, Ind.	0	0	------	0	0	0	1	0	1	0	0	0
Frederick, Md.	0	0	------	0	1	0	0	0	0	0	0	0
Galveston, Tex.	0	0	------	0	12	1	2	0	0	0	1	0
Grand Rapids, Mich.	0	0	------	0	3	0	2	0	0	0	0	4
Great Falls, Mont.	0	0	------	0	45	0	1	0	0	0	0	0
Hartford, Conn.	0	0	------	0	20	0	1	0	1	0	0	2
Helena, Mont.	0	0	------	0	1	0	0	0	0	0	0	1
Houston, Tex.	2	0	------	0	73	0	9	0	1	0	0	7
Indianapolis, Ind.	0	0	------	0	35	0	9	0	20	0	0	14
Kansas City, Mo.	2	0	1	1	106	0	2	0	38	0	0	1
Kenosha, Wis.	0	0	------	0	3	0	0	0	2	0	0	5
Little Rock, Ark.	0	0	6	0	87	0	5	0	0	0	0	1
Los Angeles, Calif.	6	0	14	3	569	1	13	0	24	0	2	27
Lynchburg, Va.	0	0	------	1	1	0	3	0	0	0	0	14
Memphis, Tenn.	0	0	6	0	10	0	11	0	4	4	1	8
Milwaukee, Wis.	0	0	3	3	129	0	5	0	40	0	0	38
Minneapolis, Minn.	0	0	------	1	156	0	5	0	20	0	0	1
Missoula, Mont.	0	0	------	0	0	0	2	0	1	0	0	1
Mobile, Ala.	0	0	1	1	0	0	3	0	0	0	0	0
Nashville, Tenn.	0	0	------	0	0	0	4	0	2	0	0	2
Newark, N. J.	0	0	------	0	177	1	6	0	25	0	0	22
New Haven, Conn.	0	0	------	0	184	0	2	0	2	0	0	11
New Orleans, La.	0	0	1	1	18	0	6	0	3	0	1	3
New York, N. Y.	26	0	15	1	52	26	66	1	304	0	1	235
Omaha, Nebr.	1	0	------	0	69	0	2	0	5	0	0	0
Philadelphia, Pa.	1	0	3	2	17	1	15	0	189	0	0	46
Pittsburgh, Pa.	2	0	2	0	9	1	7	1	15	0	0	23
Portland, Maine.	0	0	------	0	3	2	4	0	4	0	0	0
Providence, R. I.	0	0	------	0	175	0	4	0	8	0	1	37
Pueblo, Colo.	0	0	------	0	6	0	0	0	1	0	0	1
Reading, Pa.	0	0	------	0	3	0	1	0	1	0	0	3
Richmond, Va.	0	0	6	2	0	0	2	0	0	0	0	0
Roanoke, Va.	0	0	------	0	0	0	0	0	0	0	0	1
Rochester, N. Y.	0	0	------	0	12	0	4	0	5	0	1	3

See footnotes at end of table.

City reports for week ended April 4, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Sacramento, Calif.	1	0	1	0	95	0	4	0	2	0	0	17
St. Joseph, Mo.	0	0	------	0	2	0	2	0	1	0	0	0
St. Louis, Mo.	0	0	------	0	238	0	21	0	26	0	1	7
St. Paul, Minn.	0	0	------	0	347	0	5	0	4	0	0	17
Salt Lake City, Utah	0	0	------	0	13	0	2	0	7	0	0	19
San Antonio, Tex.	1	0	------	0	22	0	4	0	6	0	1	0
San Francisco, Calif.	1	0	1	0	210	1	10	0	5	0	0	3
Savannah, Ga.	0	0	16	2	15	0	2	0	1	0	0	0
Seattle, Wash.	0	0	------	0	21	0	3	0	3	0	0	19
South Bend, Ind.	0	0	------	0	2	0	3	0	14	0	0	0
Spokane, Wash.	0	0	------	0	33	0	0	0	5	0	0	7
Springfield, Ill.	0	0	------	0	238	0	2	0	0	0	0	0
Springfield, Mass.	0	0	------	0	26	0	5	0	12	0	0	6
Superior, Wis.	0	0	------	0	0	0	0	0	1	0	0	0
Syracuse, N. Y.	0	0	------	0	48	0	1	0	4	0	0	17
Tacoma, Wash.	0	0	------	0	0	0	3	0	2	0	0	5
Tampa, Fla.	0	0	1	1	7	0	0	0	1	0	4	2
Terre Haute, Ind.	0	0	------	0	8	0	2	0	0	0	0	0
Topeka, Kans.	0	0	------	0	8	0	8	0	5	0	0	4
Trenton, N. J.	0	0	------	0	1	0	2	0	3	0	0	2
Washington, D. C.	1	0	3	2	91	2	9	0	8	0	1	15
Wheeling, W. Va.	0	0	------	0	11	0	4	0	2	0	0	0
Wichita, Kans.	0	0	2	0	50	0	3	0	2	0	0	5
Wilmington, Del.	0	0	------	0	1	0	4	0	3	0	0	0
Wilmington, N. C.	0	0	------	0	29	0	2	0	0	0	0	0
Winston-Salem, N. C.	0	0	------	0	69	0	0	0	0	0	0	0
Worcester, Mass.	1	0	------	0	5	0	6	0	8	0	0	28

Dysentery, amebic.—Cases: Baltimore, 1; Boston, 1; Chicago, 1; Detroit, 1; Little Rock, 1; Los Angeles, 1; Newark, 1; New York, 3; Omaha, 1.
Dysentery, bacillary.—Cases: Baltimore, 1.
Leprosy.—Cases: New York, 1.
Tularemia.—Cases: Atlanta, 1; Cleveland, 1.
Typhus fever.—Cases: New York, 1; Sacramento, 1; Savannah, 1.

Rates (annual basis) per 100,000 population for a group of 86 selected cities (population, 1942, 33,845,414)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
		Cases	Deaths						
Week ended April 4, 1942	9.55	22.65	4.78	742.42	66.55	219.85	0.77	2.62	147.13
Average for week 1937-41	15.39	54.73	10.88	1,301.13	99.19	295.08	3.42	3.11	180.66

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (rodent).—A rat found on March 23, 1942, in Paauhau, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 21, 1942.—During the week ended March 21, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		2	1	3	9	1			2	18
Chickenpox		10	1	219	276	40	45	21	295	907
Diphtheria	1	19		40	4	4			1	69
German measles		1		23	105	2	17	32	55	235
Influenza		22			8	4			22	56
Measles		4	3	447	183	204	34	26	29	930
Mumps	1	31	1	719	469	123	184	81	530	2,139
Pneumonia		8			16	7			24	55
Scarlet fever	3	14	11	81	378	55	29	109	41	721
Smallpox							1			1
Trachoma									2	2
Tuberculosis	4	3	17	90	51	[1] 52	19	1	5	242
Typhoid and paratyphoid fever			3	8	1		1		1	14
Undulant fever				1	1				1	3
Whooping cough		12		178	52	3	1	5	53	304
Other communicable diseases	1	32		7	230	45	1		8	324

[1] For the period Feb. 26 to Mar. 25, 1942.

COSTA RICA

Communicable diseases—February 1942.—During the month of February 1942, certain communicable diseases were reported in Costa Rica as follows:

Disease	Cases	Deaths
Diphtheria	17	
Measles	54	
Typhoid and paratyphoid fever	22	1
Whooping cough	12	

IRAQ

Cerebrospinal meningitis.—During the period January 1 to March 22, 1942, 190 new cases of cerebrospinal meningitis, with 43 deaths, were reported among the civilian population of Iraq. During the same period of 1941, 31 cases of the same disease with 5 deaths were reported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, International Office of Public Health, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; P, present]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place		January–December 1941	January–February 1942	March 1942—week ended—			
				7	14	21	28
ASIA							
Afghanistan: Southern Province	C	P					
Ceylon	C	3					
China:							
Canton	C	464					
Hong Kong	C	1,667					
Macao	C	1,375					
Shanghai	C	834					
India	C	97,925	4,828				
Bombay	C	15					
Calcutta	C	2,160	98				
Rangoon	C	116	1				
India (French)	C	34					
Japan: Taiwan	C	2					

PLAGUE

[C indicates cases; P, present]

AFRICA							
Belgian Congo	C	[1] 39					
British East Africa:							
Kenya	C	783	[2] 170				
Nairobi	C	264	61				
Tanganyika Territory	C	17					
Uganda	C	216	[2] 59				
Egypt: **Port Said**	C	10					
Madagascar	C	285	41				[2] 23
Morocco	C	2,210	38	9	11	41	14
Casablanca [4]	C	4					
Tunisia: **Tunis**	C	2					
Union of South Africa	C	74	2				
ASIA							
China:							
Chekiang	C	[3] 125					
Fukien Province: [6]							
Foochow	C	3					
Hunan Province	C	[7] 7					
Dutch East Indies:							
Java and Madura	C	618					
West Java	C	429					
India	C	4,212	313				
Calcutta	C	3					
Rangoon	C	9					
Indochina (French)	C	26	[8] 17				[8] 37
Palestine: **Haifa**	C	10	4				
Plague-infected rats		72					
Thailand: Lampang Province	C	3					
EUROPE							
Portugal: Azores Islands	C	8					

[1] Includes 21 cases of pneumonic plague.
[2] For the month of January.
[3] For the month of March.
[4] A report dated June 23, 1941, stated that an outbreak of plague had occurred in Casablanca, Morocco, where several deaths had been reported.
[5] October 2 to December 6, 1941.
[6] A report dated Nov. 22, 1941, stated that bubonic plague had appeared in epidemic form in Shaowu and Yangkow, Fukien Province, China.
[7] For November and December 1941.
[8] For the month of February.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER—Continued

PLAGUE—Continued

Place		January–December 1941	January–February 1942	March 1942—week ended— 7	14	21	28
NORTH AMERICA							
Canada—Alberta—Plague-infected ground squirrel		1					
SOUTH AMERICA							
Argentina:							
Buenos Aires Province	C	3					
Cordoba Province	C	[9] 50	7				
Mendoza Province	C	3					
Santa Fe Province—Plague-infected rats		67					
Santiago del Estero Province	C	2					
Brazil:							
Alagoas State	C	45					
Bahia State	C	12					
Pernambuco State	C	96					
Rio de Janeiro State	C	2					
Chile:							
Santiago	C	[10] 1					
Valparaiso	C	2	[8] 1				
Ecuador	C	[11] 33					
Peru:							
Ancash Department	C	10	6				
Lambayeque Department	C	3					
Libertad Department	C	12	2				
Salaverry—Plague-infected rats			P				
Lima Department	C	24	14				
Moquegua Department—Ilo	C	7					
Piura Department	C	11	3				
OCEANIA							
Hawaii Territory: [12] Plague-infected rats		75	10				
New Caledonia	C	11					

[8] For the month of February.
[9] Includes 3 cases of pneumonic plague.
[10] Imported.
[11] January to April inclusive.
[12] During April and May 1941, 4 lots of plague-infected fleas were also reported in Hawaii Territory.

SMALLPOX

[C indicates cases]

AFRICA							
Algeria	C	935	245				
Angola	C	192					
Belgian Congo	C	682	32				
British East Africa	C	72					
Dahomey	C	467	23				
French Guinea	C	45	58				
French West Africa	C	3					
Gold Coast	C	1,016					
Ivory Coast	C	40	29				
Morocco [1]	C	648	726	47	52	53	
Nigeria	C	1,026	206	29			
Niger Territory	C	273	113				
Portuguese East Africa	C	9					
Portuguese Guinea	C	20					
Rhodesia: Southern	C	86					
Senegal	C	65	9				
Sierra Leone	C	15					
Sudan (Anglo-Egyptian)	C	7					
Sudan (French)	C	19					
Tunisia: Tunis	C	1					
Union of South Africa	C	888		8			

[1] A report dated Dec. 31, 1941, stated that an epidemic of smallpox had occurred near Casablanca, Morocco, where about 100 cases per week were reported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases]

Place		January–December 1941	January–February 1942	March 1942—week ended— 7	14	21	28
ASIA							
Ceylon	C	114	2				
China	C	259					
Chosen	C	606					
Dutch East Indies—Bali Island	C	3					
India	C	25,079	3,340				
India (French)	C	9					
India (Portuguese)	C	70					
Indochina (French)	C	1,298	679				[1] 613
Iran	C	8	20				
Iraq	C	1,593	94				
Japan	C	200					
Palestine	C		1				
Straits Settlements	C	1					
Syria	C	1					
Thailand	C	315					
EUROPE							
France:							
Seine Department	C		41	3	6	4	4
Unoccupied zone	C		13				
Portugal	C	53	17		4		
Spain	C	457	27	6			
Switzerland	C	1					
NORTH AMERICA							
Canada	C	25				1	
Dominican Republic	C	2					
Guatemala	C	6					
Mexico	C	321					
Panama Canal Zone (alastrim)	C	11					
SOUTH AMERICA							
Bolivia	C	324					
Brazil	C	1					
Colombia	C	1,086	3				
Paraguay	C	8					
Peru	C	1,841					
Uruguay	C	7					
Venezuela (alastrim)	C	254	45				

[1] For the month of March.

TYPHUS FEVER

[C indicates cases; D, deaths]

AFRICA							
Algeria	C	12,827	9,196				
Basutoland	C	69	3				
British East Africa: Kenya	C	12	4				
Egypt	C	9,324	3,417	675			
French West Africa	C		7				
Morocco [1]	C	1,471	4,384	983	988	1,280	1,544
Sierra Leone	C	7					
Tunisia	C	7,078	4,165	874	582	811	
Union of South Africa	C	787					
ASIA							
China	C	225					
Chosen	C	425					
Dutch East Indies: Sumatra	C	136					
India	C	4	3				
Iran	C	115	19				
Iraq	C	53	3				
Japan	C	864					
Malaya: Unfederated States	C	1					
Palestine	C	284	12	1	2		
Straits Settlements	C	8					
Syria	C		10				
Trans-Jordan	C	9					

[1] Information dated Dec. 31, 1941, reports typhus fever in epidemic form in Casablanca, Morocco.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths]

Place		January–December 1941	January–February 1942	March 1942—week ended—			
				7	14	21	28
EUROPE							
Bulgaria	C	289	94				
Czechoslovakia	C	28					
France:							
Seine Department	C			1			
Unoccupied zone [1]	C	2	4		6		35
Germany	C	2,158	[2] 85				
Gibraltar	C	2					
Greece	C	7					
Hungary	C	652	228	32	23	41	34
Irish Free State	C	26			2		
Poland	C	3,786					
Portugal	C	50					
Rumania	C	1,827	1,382	154	161	171	200
Spain	C	9,560	1,975	230			
Switzerland	C	5					
Turkey	C	704	[3] 86	49	14	26	18
Union of Soviet Socialist Republics [4]	C		[3] 16				
Yugoslavia	C	86					
NORTH AMERICA							
Guatemala	C	191	28				
Jamaica	C		9				
Mexico	C	222	37				
Panama Canal Zone	C	5	1				
Puerto Rico	C	12	3				
Salvador	D	[5] 19					
SOUTH AMERICA							
Bolivia	C	493					
Brazil	C	1					
Chile	C	337					
Colombia	C	11					
Ecuador	C	127	14				
Peru	C	1,435					
Venezuela	C	59					
OCEANIA							
Australia	C	15	4				
Hawaii Territory	C	60	14	1	2		

[1] The following additional cases have been reported: Feb. 27–Apr. 7, Marseille, 125 (almost all convicts); Toulouse, 1; Drome Department, 1; Gard, 5; Isere, 1.
[2] For the week ended Jan. 3, 1942.
[3] For the month of February.
[4] See also PUBLIC HEALTH REPORTS of Mar. 13, 1942, p. 407.
[5] October to December, inclusive.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER AND YELLOW FEVER—Continued

YELLOW FEVER

[C indicates cases; D, deaths]

Place		January–December 1941	January–February 1942	March 1942—week ended—			
				7	14	21	28
AFRICA							
Belgian Congo:							
Aba	C	[1] 2					
Kimvulu	C	1					
Libenge [2]	C	1					
Stanleyville	D	[1] 1					
British East Africa: Uganda	C	1					
Dahomey: Grand Popo	C	[1] 2					
French Equatorial Africa:							
Gabon	C	2					
Mayumba	C	[3] 4					
French Guinea	C	3					
French West Africa	C	5	1				
Gold Coast	C	4					
Accra	C	2					
Ivory Coast	C	[4] 8	1				
Nigeria	C	[1] 1					
Senegal [5]							
Sierra Leone: Freetown	C		2				
Spanish Guinea	D	4					
Sudan (French)	C	[6] 11	1				
Togo: Hohoe	C		1				
SOUTH AMERICA [7]							
Brazil:							
Acre Territory	D	1					
Amazonas State	D	4					
Bahia State	D	3					
Para State	D	8					
Colombia:							
Antioquia Department	D	3					
Boyaca Department	D	8	2				
Intendencia of Meta	D	15	1				
Santander Department	D	20	1				
Tolima Department	D	1					
Peru: Junin Department	C	5					
Venezuela: Bolivar State	C	1					

[1] Suspected.
[2] On Apr. 4, 1942, 1 death from suspected yellow fever was reported in Libenge, Belgian Congo.
[3] Includes 1 suspected case.
[4] Includes 4 suspected cases.
[5] According to information dated Feb. 9, 1942, 15 deaths from yellow fever among Europeans have occurred in Senegal.
[6] Includes 5 suspected cases.
[7] All yellow fever in South America is of the jungle type unless otherwise specified.

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