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HEALTH HAZARDS FROM THE USE OF THE AIR HAMMER IN CUTTING INDIANA LIMESTONE.

By J. P. LEAKE, Passed Assistant Surgeon, United States Public Health Service.

1. The Industry.

Indiana limestone from the vicinity of Bedford, Ind., is at present the most important building stone in America. Beside its architectural qualities, its value is due largely to the ease with which it can be quarried and worked in large quantities. It is of fine texture, of the class called oölitic because of the small egg-like fossils of which it is composed, of even consistency, and comparatively soft to the tool.

The center of the industry is Bedford, a city of 10,000 population, the county seat of Lawrence County; Bloomington, a city of about the same size, the county seat of Monroe County, adjoining Lawrence County on the north, is next in importance as a stone center; Ellettsville and Stinesville, north of Bloomington, are smaller centers. Bedford has railroad shops and other small factories, but it is essentially a town of one industry—stone—while Bloomington is the seat of the State university and enjoys more varied activities.

There are 39 stone companies in the district. Though some of these engage in both branches of the work, a sharp line is drawn between the production of rough or machine-tooled stone and the production of dressed or cut stone. It is only the latter with which this investigation is concerned.

The greater part of the quarrying for Bedford is near Oolitic, a town of about a thousand inhabitants, 4 miles northwest of Bedford. For all but the preliminary squaring off of the blocks (the process called scabbling) the stone is brought to the mills in Bedford. These mills are very large buildings, some operating as many as seven 10 or 15 ton electric cranes and containing tracks for the loading and unloading of freight cars. On account of their size and height, and the wide doors, they are difficult to heat; moreover, they contain no intrinsic source of heat, such as the furnaces of a steel mill.

In general, the blocks of stone from the quarries are first sawed into large slabs by reciprocating gang saws. These are strips of steel without teeth, the abrasion being furnished by a mixture of sand and

water, which is fed from above. Next, the slabs may be sawed by large circular saws with black Brazilian diamond teeth (Fig. 1). This is also a wet process; the spray is largely gathered by the hoods over the circular saws. If the stone is not to be cut by hand, machine dressing follows next; steel cutting instruments are used on the planers, circular planers, and lathes without further moistening of the stone. In the planing machine the block of stone reciprocates on a bed beneath the tool, which takes off one layer after another in a coarse powder, producing fluting and other straight line figures which were formerly cut by hand.

The stonecutting (hand cutting) is usually done at one side of the main craneways (Fig. 2), and, as observed at the time of this investigation, the air hammer was almost entirely employed for this work, except in the case of the apprentices, who are required to use the mallet in the old-fashioned way. This work, whether plain cutting or carving more intricate figures, such as statuary and Corinthian capitals (Fig. 3), is done in two parts, called "roughing out" and "cleaning up." In "roughing out" the block of stone is roughly shaped to the form which it is finally to assume, and the steel hand hammer or wooden mallet is occasionally used to deliver the impacts; this part of the work is less exacting and less time-consuming than the finishing or "cleaning up" for which the pneumatic hammers appear to be used exclusively by the journeyman cutter. But the division between "roughing out" and "cleaning up," as that between plain stonecutting and carving, is not a sharp one.

There are normally 200 or 300 stonecutters in Bedford, 50 to 75 in Bloomington, and smaller numbers in Ellettsville and Stinesville. On account of inactivity in stone construction, much smaller numbers were found employed, and the employment varied from day to day. In general, however, the employment has been fairly steady and permanent; the stonecutters are a superior class of workmen, many owning excellent homes. Their hours of labor are strictly limited to 8 per day and 4 on Saturday, 44 hours a week. The wages at the time of the investigation were 67½ cents an hour. The carvers are not hired directly by the mills, but this work is let to subcontractors, who employ other carvers, by the hour, to help them.

In the stone industry, pneumatic tools were probably first used on granites and the harder stones. The first air hammer was introduced in Bedford about 22 years ago, and use of these hammers became universal in this district about 7 years ago. The air compression is maintained by steam air pumps and tanks at about 85 pounds per square inch, and is piped to the place of carving. Flexible pressure hose connects the air pipes with the hammer; the air is turned on for each hammer by a thumb cock in the rubber hose about 3 feet from the hammer. Various makes and sizes of pneu-

matic hammers were seen. The three parts of each of the two sizes of a hammer frequently used are shown in figure 4. The reciprocating strokes are produced by the piston alternately opening and closing inlet and exhaust openings at various points on the interior of the cylinder (piston valve) and thus responding to the force of the air pressure.

The tool is not attached to the hammer, but must be held in the point of the hammer by the hand. The tools are about 10 inches long, including a butt of about 1½ inches which fits into the hammer. The diameter is variable, frequently about half an inch, giving a weight of about 9 ounces.

The dimensions of the two hammers are approximately as follows:

	Three-quarter inch.	1 inch.
Total length	6.7 inches	8 inches.
Total weight (without tool)	1¾ pounds	3¾ pounds.
Outside diameter	1.2 inches	1.6 inches.
Inside diameter	¾ inch	1 inch.
Inside length (cylinder)	2.6 inches	2.8 inches.
Length of stroke	0.9 inch	1.07 inches.
Diameter of piston	¾ inch	1 inch.
Length of piston proper	1.7 inches	1.73 inches.
Length of piston rod (for impact against tool)	0.9 inch	1.5 inches.
Weight of piston (with rod)	3 ounces	6 ounces.

By means of the tuning-fork mechanism shown in figure 5 and diagrammatically in figure 6, the rate of vibration of various tools was measured.[1] The apparatus consisted simply of a copper platen attached by an adjustable clamp to the tool whose vibration was to be measured. The platen was smoked after being fixed to the tool, by moving it over a bit of ignited camphor. While the tool was being used on a piece of stone, a tuning fork with tracing point attached, was drawn rapidly across the platen. If the tool were not vibrating, the resulting curve would show merely the smooth vibrations of the tuning fork. If the tool vibrated at the same time, the compound curve would show a certain number of the smooth tuning fork vibrations and also the sharp strokes of the tool, giving peaks different in shape, height, and number from those caused by the tuning fork. The ratio of the number of the former peaks to the number of the latter in a given distance on the tracing gives the rate of vibration of the tool when that of the fork is known.

Various hammers, even of the same size and type, and with the same registered air pressure, were found to give rather widely varying rates of vibration, dependent apparently on the pressure exerted by the stonecutter against the stone and on the lubrication and amount of wear of the hammer. It was soon found that with a range of tuning forks the rate of vibration could be gauged fairly accurately

[1] The writer is indebted to Prof. A. L. Foley of the Department of Physics, Indiana University, for suggesting and perfecting the details of this apparatus. It is simple and appeared to be the most accurate of several which were considered.

by comparing the pitch of the main note given by the vibrating tool, with that of the tuning fork corresponding most closely to it. However, especially when forks with low amplitude of vibration were used, it was found that accessory vibrations of the tool, sometimes two or three times as frequent as the main vibrations, were recorded

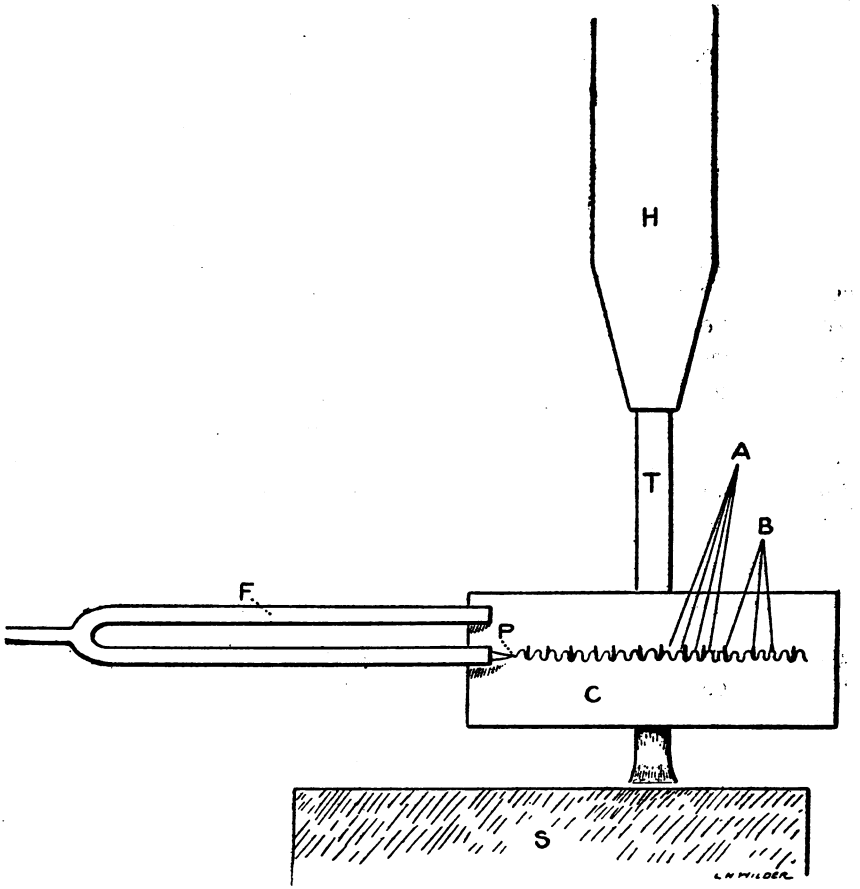

FIG. 6.—Diagram of the method of measuring rapidity of vibration. H, air hammer; T, vibrating tool; F, tuning fork of known vibration frequency (n per second); C, smoked copper platen, firmly fixed to the vibrating tool; P, point attached to tuning fork for tracing vibration curve as the fork is drawn rapidly across the face of the platen; S, stone; A, smooth peaks of the curve, caused by the vibrations of the tuning fork; B, sharp peaks of the curve, caused by the vibrations of the tool. If there are a smooth peaks and b sharp peaks in a given length of the curve traced by the tuning fork, the tool vibrates $\frac{b}{a}$ times as fast as the tuning fork, giving a rate of $\frac{bn}{a}$ vibrations per second.

on the platen; these were presumably caused by the elasticity of the stone and steel, the tool reverberating between the stone and hammer after each stroke of the piston. With 85 pounds pressure, the 1-inch hammer gave a main vibration rate varying between 88 and 136 per second (5,000 to 8,000 per minute), and the three-fourths inch up to 167 per second (10,000 per minute). This is

much more rapid than the figures usually given, and still does not take account of the more rapid accessory vibrations.

The method of using the air hammer may be seen in figures 2 and 3. The hammer itself is held by a right-handed person in the right hand, between the thumb and forefingers in much the same way as a pencil or pen is held. Some of the stonecutters regulate the power of the stroke by holding the thumb or forefinger over the exhaust. This may create a callus or a small area of insensibility at times, but does not appear to be productive of any serious results. The tool is held in the left hand, the most powerful part of the grasp and that controlling the direction of the cutting edge being exerted by the ulnar part of the hand. The direction of the hammer and tool is diagonal to the surface of the stone, and the rotation of the chisel about its own axis as well as the depth of the cut must be controlled very accurately. Since the tool is slender and rotates freely in the hammer, this necessitates a very firm and constant grip with the left hand. These points are important, as will be shown later. Some of the air hammers, presumably those which were considerably worn, were observed to discharge air along the piston rod and tool, against the fingers of the hand which held the tool. This was not observed to cause serious discomfort, but may have interfered with the power of the stroke.

The work is fairly continuous. Frequent changes of position and interruptions to blow away dust, make measurements, and change tools occur, but the hammer is in the hand and operating for the greater part of the time. Competition in speed, in part stimulated by the foremen or subcontractors, in part natural to the stonecutters, is probably keener than in smaller shops under the old conditions of stonecutting; in Bedford, stonecutting has been transformed to a factory occupation.

Heat was furnished in one of three ways: First, by hot air conduits opening in the vicinity of the stonecutters, as shown in Figure 2; second, by steam pipes around the side of the building; third, by coke-burning salamanders. Of these the latter appeared to be the most efficient, and the mills were so open that danger from carbon monoxide poisoning was minimal. However, since cold appears to be a factor in the production of discomfort from the use of the tool, it would be advisable to install radiators or other devices for heating the tools and the hands on cold mornings, in closer proximity to the cutters than the hot-air conduits and the steam pipes. The temperature in the mills is much less severe than in the open sheds where stonecutting has customarily been done. In one mill when the outside temperature was 16° F. at 7.30 a. m., the temperature where the stonecutting took place was observed to be 38° F. at the same time. In another mill the inside temperature was 40° F. when the outside

temperature was 22° F.; in a third the inside temperature was 40° F. when the outside temperature was 26° F. In two metal plants where pneumatic tools were being used the temperatures were 45° F. and 62° F. when the outside temperatures were 19° F. and 21° F., respectively.

As regards lighting, conditions were satisfactory. The stonecutting is usually done at one side of the mill and therefore near windows.

2. Other Uses of Vibrating Pneumatic Tools.

The use of pneumatic tools was also observed and tried in drilling holes in limestone, in cutting granite and other hard stone, in riveting metal plates, in calking boilers, in chipping castings, in cutting metal preparatory to calking, and in cutting grooves on sheet metal.

In the mills and at the quarries, reciprocating pneumatic drills, called "plug drills," are used for drilling holes in the blocks of stone for hoisting and for breaking. These drills are much larger than the air hammers used in stonecutting, especially in length of stroke, and the rate of vibration is much slower. The hammer has a pistol or shovel grip, and the tool, or drill proper, is guided by the left hand only at the first application to the stone; when the hole has been started, both hands grasp the hammer. Moreover, the drill is of larger diameter than the tool in stonecutting, and the grasp does not need to be as rigid or to direct the point as accurately as in the latter work.

In granite and monument cutting, the air hammer and tools are like those used in the Indiana limestone belt. Part of the granite cutting; however, is a pulverization of the stone, with the hammer and tool held perpendicular to the surface. It is apparent that when the work is of this character the grip on the tool is not of necessity as firm as when diagonal cutting is done. The main vibratory rates and the accessory vibrations were found to be similar to those in the limestone mills. The tendency toward vasomotor spasticity in the left hand (to be described later) was observed in the granite cutters, but not as uniformly nor to as marked a degree as in the limestone cutters.

In hot riveting outdoors and in hot and cold riveting in shops and mills the largest hand air hammers are used, those with pistons $1\frac{1}{16}$-inches diameter and a 9-inch stroke being a common size. These give about 20 vibrations per second. Here both hands are on the hammer, which usually has a pistol grip; the cap or "set" which hits the rivet is attached to the hammer by a spring clutch and does not need to be held. Riveting by sledge hammer was also observed; a rivet is headed as quickly by this method as by the use of the pneumatic hammer, but the strain on the men is much more severe. No cases of vasomotor spasticity were discovered among pneumatic rivet men.

In calking metal seams, a smaller hammer is used than in riveting, and the calking tool is held in the hand, but a firm, rigid grasp is not necessary, as the action of the hammer is perpendicular to the surface and the tool guides itself to a large extent.

The chipping preparatory to this calking, on the contrary, is inclined work. A triangular ribbon of steel is cut from the upper plate in order to make a bevel for calking. Grooving a sheet of metal is a somewhat similar process. Not so much attention, however, is directed in these cases to make the finished job smooth in appearance as in stonecutting, and the grasp on the tool is consequently not so rigid or continuous. The vibration rate is about 50 per second.

Chipping rough projections from castings is like the processes just described, but frequently larger hammers are used. Some of the tools used for this purpose have a hexagonal butt which fits into a six-sided opening in the end of the hammer snugly enough to prevent turning, but allowing free up and down motion. With the pistol grip, which is almost universal in pneumatic hammers for metal work, this enables the operator to guide the tool well with the hammer hand, and to relax the grasp on the tool to some extent. None of the metal workers who used air hammers admitted the blanching of the hands which was found so frequently in limestone cutters.

In a search in Pittsburgh through hospital records, interrogation of physicians with large practices among the metal workers, and an examination of several gangs of men chipping shell cases and steel wheels, the only case of pathological blanching of the hands which was found was in a man who had acquired it while cutting granite. This man did not complain of the hand condition but quit stonecutting for more sedentary metal work because of a subdeltoid bursitis with sudden onset 16 years after he began to use the air hammer. The chippers, who had been working with the air hammer for 3 to 12 years, had no complaint; it was noted, however, that these were men of stocky build and that they diminished the amplitude of the vibration by bracing their bodies against the hammers. The hammer used had a piston diameter of $1\frac{1}{16}$ inches and a 3-inch stroke. At 100 pounds pressure about 32 strokes per second or 1,800 per minute were delivered. The very fine secondary vibrations, or "overtones" were much more rapid than in the stone tools, being 20 to 40 times as frequent as the main strokes; but it is probable that these secondary vibrations in either case, on account of their very low amplitude and force, are practically negligible. In chipping the tool does not need to be guided with great accuracy and some of the more skillful chippers do not hold the tool at all except in starting and finishing.

It is thus seen that in these other uses of the pneumatic hammer (except granite cutting, which is somewhat similar to limestone cutting) the rate of vibration is slower and the grasp on the tool less constrained and constant than in the occupation under consideration. We should therefore expect that if the vibration itself had any deleterious effect, this would be at a maximum in the case of the stonecutters.

3. The Pulmonary Hazard.

Though this investigation was primarily directed to ascertain the possible effects of the air hammer in producing nervous disorders, it was deemed worth while to secure some data on the pulmonary hazard, since dust is commonly supposed to be the one great danger in the stonecutting trade. The infiltration of the lung with dust particles is known as pneumokoniosis, in the case of stone dust, as chalicosis; the result is a fibroid phthisis giving rise to dyspnœa, less often to cough and expectoration, at times fatal in itself, but more commonly found at necropsy when the direct cause of death has been tuberculosis. We may therefore consider the dust as predisposing to pulmonary infection with tubercle bacilli—less often with pneumococci or other organisms—and we may expect to find chalicosis expressed in the death records as pulmonary tuberculosis.

All prior statistics based on this assumption class stonecutting as a somewhat hazardous occupation. In this country the census of 1900 [1] recorded 33 per cent of the deaths among marble and stonecutters as due to pulmonary tuberculosis, while for all occupations (males) the percentage was only 14.5. In 1909 [2] 28.6 per cent of marble and stonecutters, 14.8 per cent of all occupied males, and 21 per cent of all occupied females who died, died of pulmonary tuberculosis. Hoffman [3] has reported the experience of the Prudential Life Insurance Co., 1907–1910: 47.8 per cent of the deaths among stone workers 25 to 44 years of age and 32.3 per cent of those 45 to 64 years of age were due to tuberculosis; among all occupied males the percentages for the two age groups were 38.5 and 14.1, respectively.

Through the courtesy of the officers of the Journeymen Stone Cutters' Association of North America, part of the death records of this organization were summarized. Of 343 deaths among stonecutters with assigned cause, 56 per cent were credited to pulmonary tuberculosis, stonecutter's consumption, and fibroid phthisis. On every count, then, stonecutters have suffered severely from chronic pulmonary disease, presumably caused by the stone dust.

[1] Twelfth Census of the United States. Vital Statistics, Part 1, Table 8, p. 151. Washington: United States Census Office, 1902.

[2] Mortality Statistics, 1909. Tenth Annual Report. Table VIII, pp. 402, 388. Washington: Government Printing Office, 1912.

[3] Hoffman, F. E. Exhibits of the Prudential Insurance Co. of America. International Congress on Hygiene and Demography. Pp. 29, 24. Washington, 1912.

I am indebted to Dr. Harvey Voyles, registrar of Bedford, for access to the original mortality records of that city, which are in good shape for the past 10 years, except for some uncertainty (as is common in death records) as to stillbirths; on this latter account only persons over 1 year of age were considered. To secure a basis for comparison, the United States Mortality Records were similarly summarized for 1910–1915, the middle six years of the past decade, since the records for 1916 and 1917 are not available. For the registration area, 11.3 per cent of all deaths in this age-group (11.9 per cent in males, 10.5 per cent in females) were due to tuberculosis of the lungs, for Indiana 11.5 per cent. For Lawrence County, Ind., 12.6 per cent of deaths at all ages were due to pulmonary tuberculosis; for the registration area 9.4 per cent at all ages, and for Indiana either as a whole or disregarding cities of over 10,000 population in 1910, 9.9 per cent. The population of Bedford was 8,716 at the last census. The tuberculosis proportional rate in Lawrence County is thus seen to be above normal. But beside Bedford and the limestone mills, Lawrence County contains the town of Mitchell, near which are large cement factories. Many cement works are notoriously dusty, and both locally and generally have a reputation for high consumptive rates. The death rate per thousand from pulmonary tuberculosis in the registration area for the six-year period was 1.31, in Indiana 1.29, in rural Indiana including all of Lawrence County 1.24, in Lawrence County 1.60.

Among stonecutters in Bedford 15 per cent of the deaths during the 10 years were due to pulmonary tuberculosis. Among all the workers in the stone mills, including the planer men, 12 per cent of the deaths were assigned to this cause. No disproportionately high number of deaths was assigned to other respiratory or heart disease, under which titles might be found fatalities really due to chalicosis. Among all other males of the same age group (23 to 72 years) the proportional rate was 13 per cent; among all females 21 per cent; among all persons over 1 year of age the proportional rate (from tuberculosis of the lungs) was 13.3 per cent, corresponding to 11.3 per cent for the registration area.

Objections might be justly raised to absolute conclusions from these statistics alone in that for some items there were only a small number of deaths—only two deaths from phthisis were recorded for Belfast stonecutters during the 10 years; also that the age groups were very broad and that proportionate percentages instead of actual death rates were compared. In regard to the small size of the items, it is to be noted that the classes are not subject to the allowances made for samples, but that they represent the total number of deaths. The age distribution was not strikingly dissimilar in the different classes. The possibility of consumptive stonecutters

having left the trade or sought other climates is to be considered, but the higher percentage of tuberculosis in Bedford among females than among males would argue against the assumption; for if the affected stonecutters had left the trade, while still remaining in Bedford, we should expect a disproportionately high rate among the males of that age-group as compared with the sex which is not subject to the hazard.

It accordingly appears that while Bedford has a proportional death percentage from phthisis slightly above normal, it has been no higher for stoneworkers than for other classes of the population, including females.

This agrees with what could be learned from a canvass of the physicians of Bedford and from the stonecutters themselves. The only case of consumption in stonecutters about which information could be obtained in this way was in a man who developed the disease nursing his wife through a fatal tuberculosis. No X-ray chest plates were made, but in examining the men no symptom or sign which could be attributed to pneumokoniosis was found.

The mills were not as dusty as several granite monument shops which were visited, but the difference was not striking, except for the fact that in the monument shops the dust was in the air, while in the limestone mills the dust was almost entirely on surfaces. There are at least four conceivable explanations for the comparative immunity of the Bedford stonecutters: (1) The particles may be larger and heavier than in the cutting of other stones; as one looked down the stonecutting aisles of these mills the visible cloud of dust from each tool stopped far below the face of the worker. In general the exhaust from the pneumatic tool blows what dust is formed away from the breathing zone. In limestone cutting the action of the tool is chipping at an acute angle with the surface of the stone; as explained before, in granite cutting the action is frequently perpendicular to the surface and possibly more pulverizing. (2) The blocks of stone as they reach the cutter in the mills, though not visibly wet, retain some of the moisture from the sawing processes. This reduces the dustiness of the cutting. (3) It is possible that the particles from the oolitic limestone are rounder and smoother than those from other stones; an accurate microscopical comparison was not made. (4) By some theories, calcium salts have a beneficial action in tuberculosis, aiding in walling off chance lesions from further activity. In general, the cutting of limestone has been held to be less perilous than the cutting of sandstone or granite. In any case, stonecutters appear to suffer less in Bedford than elsewhere from the dust hazard.

Associated with the dust hazard is the hazard from flying chips, largely an ocular one. Only a small proportion of the men were observed to wear protecting goggles. But on account of the inclina-

tion of the hammer the direction of the chipping is away from the worker's eyes. The physicians and oculists in Bedford state that while eye injuries occur in the stone mills, the most numerous and severe are not among the workmen who handle the stone, but among the metal workers, machinists and tool sharpeners; stone particles rarely cause more than temporary injury.

4. The Nervous Hazard.

At the outset of the investigation it was observed that the stone-cutters on cold mornings were likely to have the fingers and ulnar side of the left hand white, cold, and numb. The investigation was primarily directed toward ascertaining the seriousness of this condition and whether other nervous troubles might be attributable to the use of the air hammer. The general findings and conclusions in this regard are given in Prof. Edsall's report. The writer is deeply indebted to Dr. Edsall for advice and collaboration, and for making by far the greater part of the more thorough examinations.

Many have considered the action of pneumatic tools to be unduly fatiguing or to subject the nervous system to some mysterious injury, but no data have been available sufficient for drawing conclusions in the matter. Southard and Solomon[1] have reported a case of pain and numbness in the hand of a granite cutter, in whom they found a slight anesthesia demonstrable only by Martin's electrical sensory test. This cutter had used a pneumatic tool for 15 years; the Wassermann reaction was positive. In this investigation it was felt that changes in sensation perceptible to the examiner only by use of a faradic current and not by any of the ordinary tests or by functional ability, in the first place must be very slight, and in the second place, especially in the question of occupational neurosis, might be rather dubious.

The following form was used to record the histories obtained at the time of examination:

Name..... Residence..... Age.....
Years with air hammer.... Years with mallet.... Type hammer used....Stone....
Character of work (roughing, finishing, carving)..... Where.....
Finger complaint..... Location..... When first noticed.....
(Underline condition observed at examination.)
Other complaints:
Sleep..... Pain..... Numbness..... Cold..... Breath.....
Exhaust control..... Along tool.....
Opinion as to best form of hammer and character of work.....
Date examined..... Hour..... Location.....
Temperature outside..... Temperature where examined.....

[1] Southard, E. E. and Solomon, H. C.: Occupation Neurosis, p. 288 in Kober & Hanson's Diseases of Occupation and Vocational Hygiene. Philadelphia: 1916.

Beside the 19 men examined by Dr. Edsall, three other cases were examined in detail because they were commonly reported to be among the most severe sufferers from the use of the air hammer. Two were said to have stopped stonecutting on this account, and had left the Bedford district. In none of the three was there evidence of any organic change of consequence which could be attributed to the hammer. On the right forefinger of one man there was an area of diminished temperature sense; this was the finger used in controlling the exhaust. Callouses interfered with pain and touch sensitiveness over part of the hands, and when the parts were cold all sensibility was obtunded, but not more in any of the three cases than was the case with the hands of the examiner.

Of those who had changed their employment supposedly on account of objections to the air hammer, one stated that he quit because he had a disagreement with the foreman about another matter, a second had sought easier and steadier work, but found that two years of indoor occupation made him more nervous than cutting stone with the air hammer. A third had been badly frightened by hearing a severe prognosis made as to the possible effects of the hammer; he was habitually nervous and apprehensive in using the pneumatic tool, but stated voluntarily that he would like to go back if it were improved so as to relieve the strain.

When the stone mills were visited soon after work started in the morning the greater part of the cutters and carvers showed a blanching of the ulnar part of the hand which held the tool, with numbness and lowered temperature. They stated that this occurred commonly, but not uniformly in any one subject, in winter and on cold, damp, spring mornings. It also occurred frequently when the hands were subjected to cold in any way. It could be brought out in many of the men weeks or months after they had stopped work by plunging the hands for a few moments into snow or cold water. The hands of the examiner, used as a control, would under those circumstances show the normal hyperemic reaction, as did also the right hands of the stonecutters usually. On the left hand, typically, the little finger and hyperthenar eminence, the ring finger, and the tip of the middle finger became white and nearly bloodless. This might involve other fingers and the palm of the hand. If the person were left-handed, the right hand would show the phenomenon.

Designating the digits as 1, 2, 3, 4, 5, in order from the thumb to the little finger, the following table indicates the distribution of this vasomotor hypertonicity as to the fingers affected:

TABLE 1.—*Distribution of blanching, by fingers.*

Case.	Tool hand.	Hammer hand.	Case.	Tool hand.	Hammer hand.
1	5	.....	22	3,4,5	.....
2	5	.....	23	3,4,5	.....
3	5	.....	24	3,4,5	2
4	5	.....	25	3,4,5	2
5	4,5	.....	26	3,4,5	3
6	4,5	.....	27	[1] 2,3,4	.....
7	4,5	.....	28	3,4,5	2,3
8	4,5	.....	29	2,3,4,5	.....
9	4,5	2,3,4	30	2,3,4,5	.....
10	3,4,5	.....	31	2,3,4,5	.....
11	3,4,5	.....	32	2,3,4,5	.....
12	3,4,5	.....	33	2,3,4,5	.....
13	3,4,5	.....	34	2,3,4,5	.....
14	3,4,5	.....	35	2,3,4,5	.....
15	3,4,5	.....	36	2,3,4,5	.....
16	3,4,5	.....	37	2,3,4,5	2
17	3,4,5	.....	38	2,3,4,5	2
18	3,4,5	.....	39	1,2,3,4,5	.....
19	3,4,5	.....	40	1,2,3,4,5	.....
20	3,4,5	.....	41	1,2,3,4,5	.....
21	3,4,5	.....	42	1,2,3,4,5	1,2

[1] Little finger held under tool.

The greater number of the cutters showed the condition on the cold winter mornings during which the investigation was in progress: In one mill 5 out 6, in other mills 6 out of 7, 2 out of 4, 4 out of 7, 8 out of 11, and 5 out of 7. Usually, decided discomfort was experienced when the blood returned to the hand, but the work was not seriously interfered with. The apprentices, who did not use the air hammer, had colder left hands than right, but no clear history was obtained of the typical reaction in its marked form in men who used the mallet exclusively. A former boiler builder, now one of the sales force for a boiler factory, who never used a penumatic tool and had not heard of the above condition, described the same phenomenon as occurring in his left hand, following the use of hand tools in the boiler shop.

It is noteworthy that many of the older stonecutters state that they formerly had trouble of this sort, but do not have it at present. It is their belief that the younger workmen grip the tool too tightly. This spastic anemia, however, was sluggish in onset, taking months or more than a year for full development, and lasting equally long after the cause was removed; it occurred only in cold weather, and not continuously then. In spite of thorough search for the worst cases in and out of Bedford, no suggestion of any more severe changes than those described was obtained. There seemed no tendency for the anemia to go on to frostbite or necrosis. The use of gloves did not prevent the blanching.

Other nervous symptoms encountered bore more or less relation to the hand phenomenon. Sleep was disturbed in some cases by the hands and arms becoming numb very readily. Pains, particularly confined to the left side and extremities, were occasionally described, but did not appear to be more severe than would be encountered among groups of workmen of the same age and habits who did not use pneumatic tools. Those unaccustomed to the air hammer unquestionably suffered more severely from these functional nervous symptoms. A few minutes' early morning use of the hammer in cutting stone (longer than a momentary trial) gave the writer an unpleasant, cramped, slightly painful sensation in the 5th digit and ulnar side of the left hand, during the entire evening, with observable redness and swelling. The phenomenon was noticed before the use of the hammer was recalled. Recovery was complete over night. The factors concerned were evidently similar to the ordinary local fatigue and strain such as are commonly experienced from an unaccustomed employment. This is in agreement with the frequent statement of the stonecutters that their chief difficulty as regards nervousness and sleeplessness was when they began to use the tool, but that as they became used to cutting stone with the air hammer, these symptoms wore off. The development of the white fingers, however, is said to be more gradual, coming on in the winter after the pneumatic tool had been in use for some months.

It appears, then, that the continued use of the air hammer in cutting limestone leads to a disorder shown by a blanching of parts of the left hand, with cold and numbness; that this is not a serious disease, but in some cases decidedly disagreeable, and that measures should be instituted to prevent it. Of the three assigned causes, cold would appear to be merely the exciting cause. It would nevertheless be advisable to provide radiators or other means of heating the hands and tools of the stonecutters, giving a source of heat nearer to the working places than the present pipes and hot air conduits. Of the two other factors, the strain caused by the cramped position of the hand in grasping the narrow tool, and the vibration, the former would appear to be dominant but the vibration can not be eliminated as a cause since the phenomenon apparently does not occur in metal workers who use hammers with much lower vibratory rates, but who nevertheless guide the tool in somewhat the same way as do the stonecutters. The sensation imparted to the hand by the slower vibration is very different from that felt in the use of the air hammer in the stone works.

It has been suggested that changes along one or more of the four lines indicated below might be effective, but the problem is essentially a mechanical one, the object being to make the grasp of the left hand more comfortable and less straining, and also if possible to

relieve some of the vibration received by that hand. Until an effective method is in use, it is advised that there be periods of rest from the use of the hammer and narrow tool, to enable the muscles of the left hand to relax and change their position.

1. A tool of larger diameter would permit a more hygienic grasp. It is possible that due to the softness of the stone and the necessary accurateness of the work, the impact of a light tool is preferable to that of a heavy one, but it would appear that if pressed against the stone, it is the construction of the hammer and the air pressure which determine the impact rather than the weight of the tool. A heavy tool, moreover, would reduce the vibratory effect felt by the left hand.

2. The shank of the tool might be provided with a tight fitting cover of asbestos or other similar material. This would need to be very rigid in order to permit proper guiding of the tool.

3. Instead of a tight handle, as above, a handle permitting reciprocal but no rotary motion could be used.

4. The end of the hammer might be prolonged over the tool so that the left hand in guiding grasps this instead of the tool. The tool should then have a square or triangular shank or be provided with grooves to prevent any rotary motion, and should also have a spring catch such as the rivet set in a pneumatic riveter.

5. Conclusions.

1. The pulmonary hazard is much less in stonecutting in the Bedford plants than in stonecutting in general. This is unquestionably the great hazard in the trade and its relative absence in this center makes the occupation of a stonecutter here more healthful than elsewhere. The workmen are not exposed to severe weather, the workrooms are large and well ventilated. In some of the mills the sanitary conveniences and guards against the spread of intestinal infection are satisfactory, but in others improvements should be made.

2. There exists in the hands of stonecutters who use pneumatic hammers a hypertonicity of the blood vessels which shows itself as an exaggerated reaction to low temperatures.

This is not serious as to life or function, but is uncomfortable at times, and should be remedied. It is believed that this can be done without eliminating the tool, and suggestions are made to that end.

SUPPOSED PHYSICAL EFFECTS OF THE PNEUMATIC HAMMER ON WORKERS IN INDIANA LIMESTONE.

By DAVID L. EDSALL, M. D., Consultant in Industrial Hygiene, United States Public Health Service.

The following report is based upon a visit to Bedford, Ind., made by the writer for the purpose of consulting with Dr. Leake in regard to the effect of the pneumatic hammer on the health of stonecutters. In very considerable part the statements concern points which Dr. Leake had elicited. The mills were inspected in company with Dr. Leake, and the men were observed while at work, talked to, and examined. A visit was also made to Bloomington, Ind., for the purpose of examining additional stonecutters.

We requested Mr. Griggs, president of the Journeymen Stonecutters' Association of North America, the local officers of the stonecutters' association, and many of the men in both Bedford and Bloomington to bring to us those who complained most, or we got their addresses and went to their homes. None of the men that we examined were sent to us through the employers, and none were examined in the presence of the employers or their representatives. In Bedford we reached them chiefly in their homes. This had the advantage of making them and their households feel quite free to talk in regard to their condition. In Bloomington, Mr. Walters, the secretary of the local branch of the stonecutters' association, brought the men to us. In both places the men seemed extremely frank and open in what they said. They are, as a class, superior men in personality, education, and manner of living. It rapidly became apparent that because the symptoms that I shall describe occur frequently, and fear had been aroused in various ways that they might grow worse, the anxiety of the men was due more to this fear of further and more serious results than to anything known to have occurred. In fact, several of those with the most pronounced manifestations said that if that was all, they thought it of comparatively slight consequence. Their fears of bad results had apparently been largely aroused within two years by their interpretation of the opinions of some physicians who had seen some affected men, but who, so far as we could learn, had not actually studied the cases or the men's work carefully, but had somewhat naturally based their advice upon the men's own apprehensions.

The symptoms seemed, from the statements of these men, as well as from statements of men who use the air hammer in other trades, to be confined almost exclusively, if not entirely, to stoneworkers, and among the stoneworkers they occur almost entirely in those who work with soft stone, such as the Indiana limestone. The reason for this becomes apparently clear when one observes accurately the manner in which these latter workmen use the air hammer, and especially the

manner in which they use the stonecutting or stonecarving tools, and compares this with the details of the work of others who use the air hammer. At the same time, this offers a clear reason for the location of the symptoms and to a considerable extent at least for their character, and it furthermore suggests some very apparent expedients that may be expected to reduce the discomfort, and that if properly developed through experimentation would probably entirely or almost entirely do away with the effects which now, while apparently never serious, are easily demonstrated, uncomfortable, and justify a demand for a definite effort to overcome them.

The matter will be most evident if I first describe the symptoms and then the character of the work. As to the symptoms: We examined very carefully 19 men, and in going through the mills and upon other occasions we examined casually and talked with as many more. Dr. Leake, before and after my visit, saw many others. Nearly all of these men stated that they had then or had previously had, in very slight degree, up to a decided degree, the condition that we were there to study. This consists of temporary blanching and numbness of the fingers when the hands are chilled. It occurs almost entirely when the weather is cold or at least quite cool and when the workers are exposed to the cold—not when they are in well-heated buildings. One or two however believed that they sometimes felt it in summer, and several said that it annoyed them when "in swimming" in summer. It occurs chiefly when they start work in the morning before they get "warmed up" and lasts from a few minutes up to one and a half or two hours. A few men said it tended to recur during the day when at work. It also tends to occur when they walk or drive in cold weather, and when the hands are plunged into cold water or snow it can be brought out in a few moments. Indeed, any exposure to cold causes it to recur. In appearance and in sensation they say it is precisely like over-chilling the fingers in winter so that they "go dead," the first stage of frost bite of the fingers. As in the condition just mentioned, there may be some tingling or actual pain when it comes on and there is usually tingling when the blanching passes off, at which time it is succeeded by a flush and congestion for a little time, and at this time there may be a good deal of discomfort or actual pain which is such as most people have experienced with chilled fingers, and may extend up the arms. Occasionally this is described as severe, but usually they say "annoying" is a sufficiently descriptive term. The numbness usually does not interfere appreciably with the use of their hands. Occasionally they state that it makes them clumsy, slower and less accurate in their work while it lasts. Its distribution is striking and important in relation to its causation. In the great majority of the cases it is

noticed first in the ends of the ring and little fingers of the left hand; later it is felt predominantly—in many cases solely—in the fingers of the left hand. In most instances, when definitely developed, it is felt chiefly, and is often even later confined to, an area on the ulnar side, extending back to include the two distal phalanges of the little finger or the whole finger, and running diagonally across to the index finger, where it involves only the last phalanx or a little more. It gradually increases in some cases until it involves the whole of all the fingers of the left hand, occasionally going back along the ulnar side to the wrist or over the whole hand to the wrist. The right hand is less frequently affected than the left, and then usually less markedly. When it occurs at all in the right hand, it is noticed chiefly in the thumb and index and middle fingers. In a very few cases it appears to involve the whole of both hands. The only instance of that extent that I actually saw was, however, in a man with whom questioning brought out the fact that it had not appeared, as is usual, toward the tips of the fingers and slowly increased in area, but had come suddenly over the whole area when he had "frozen" his hands during a long drive in cold weather and had subsequently, upon exposure to cold, been always of that same extent, slowly diminishing in intensity. In this case, therefore, while work with the air hammer brought out the symptoms after they had once appeared, it did not seem to have excited them in the beginning.

The distribution of the symptoms seems to be explained by the manner in which these men hold the tool in the left hand and the hammer in the right, and in the right hand a factor of importance seems to be the practice of some of the men of controlling the exhaust from the hammer by pressing the thumb, index, or sometimes the middle finger over the exhaust hole, a practice which the more skillful men say is unnecessary and undesirable.

Sometimes after prolonged work the men have flexor contraction of the fingers of the left hand for a few moments as they cease work—evidently because of the prolonged constrained grip on the tool. This is significant chiefly in suggesting the origin of their trouble.

The men sometimes complain of lameness in the arms, shoulders, or chest. Two said they slept badly and twitched and turned in their sleep after working hard with the hammer. These two, however, were in poor general condition. Various other symptoms of vague character and significance were elicited in some of the men. I may, however, for brevity's sake state here that neither questioning the men nor careful physical examination showed evidence that the symptoms mentioned or any others outside those in the hands were of any particular significance. They were rather such symptoms as some members of any group of men will always show when doing work, of whatever kind, that is at times hard work and often carried

out in constrained positions. In making this last statement I exclude any consideration of the effects of dust upon the lungs. I was not asked to study that and did not do so. I would say, however, that I was not impressed with any noteworthy need of studying the dust hazard, which in working with this particular stone seems surprisingly mild.

Some excitement had been caused by the fact that one stonecutter had died insane. This case the men themselves now dismiss, however, as having been due to general paresis. One man we saw had had an ordinary acute facial paralysis. Quite naturally, in the apprehension that had been aroused, such occurrences and various vague rumors and suggestions had led to fears of "paralysis," Raynaud's disease, and a variety of other grave results. We could find absolutely nothing to justify such fears, even in the stories we were told. It is entirely conceivable that a neurotic subject might grow decidedly neurasthenic from dwelling on the disagreeable sensation that these small pneumatic hammers produce. Some of the men said that the sensation was exceedingly disagreeable to them at first, but all except the nervously over-sensitive soon get so accustomed to it that they pay no attention to it. It is in this respect like many other accompaniments of industry, as for instance the noise in many forms of work.

The symptoms in the hands, then, seem to constitute all the recognizable effects of the stonecutting and carving with the air hammer and in describing the results of physical examination and in considering the cause and nature of the condition and the possible remedies, I should be understood as referring solely to these hand symptoms.

Physical examination: When the men were at work in the mills in the early part of the day, many of them showed in mild form and extent the blanching described above. The fingernails and the affected fingers were sometimes cyanosed instead of blanched. When seen in houses or in our rooms just after they had come in from the cold the same conditions existed. It was severe cold weather during my stay there. After a short period in the warmth the affected area became flushed and then after a further period looked, and the men said felt, normal. As I said, except for occasional other symptoms that seemed to have no distinctive relation to the work, nothing else was observed and the men almost all stated that this was the whole trouble. One man showed fibrillation of the muscles of the left hand, but it was so slight as to be scarcely observable and such as is occasionally seen without definite cause and since no one else showed it, it was probably of no significance. None showed tremor except one who admitted the rather generous use of alcohol, and in him it was of the usual alcoholic character. When cold and blanched the finger movements were somewhat

clumsy. When warm the motor power was normal. There was no muscle atrophy observable. The hand grip was normal, as were the wrist and elbow reflexes, in all instances. Sensation was tested to touch, to pain and to heat and cold. When blanched, the sensation to pain and to heat and cold was of course often moderately blunted over the affected area but became normal in the warmth. In two instances there was apparently very slight persistent reduction of sensation in the last phalanges of the third and fourth fingers of the left hand. Three men showed much reduced pain sense in entirely irregular and changing areas over the hands and forearms, but one of these was mildly alcoholized at the time and the other two were of distinctly neurotic character, and since the sensory disturbance was quite as marked over the forehead, face and neck on both sides, it appeared to be unrelated to the vasomotor disturbance in the hands and of no significance in relation to the actual effects of the air hammer except that a study of the hands and arms alone might easily have led to the decision that there were organic nerve changes.

It is to be noted also that most of these men, owing to the grit from the stone and the use of the tool and hammer, develop a very remarkable degree of callous on the palmar surface, and naturally this is found particularly in the areas especially likely to be involved by the phenomenon under study. The thickening of the skin frequently extends up the sides of the fingers, so as to leave soft skin on only the back surface of the fingers, approximately three-fourths the finger surface being often somewhat calloused and also much of the palm and the outer ulnar surface. Naturally, over calloused skin the sensation, especially to pain, is somewhat lessened, but this was of course equally the case in those men who had symptoms and those who had none. It is important only in showing that one might easily think, mistakenly, that there were persistent changes in sensation even when the hands were warm and normal-looking.

In the 19 examined the stereognostic sense was normal. It was examined especially because Mr. Griggs stated that the men sometimes could not distinguish coins by their feeling. In the 19 men I examined carefully the heart and blood pressure were normal in all but one, who showed a moderately high pressure. He told me, however, that he had had syphilis. In all the 19 the blood vessels felt normal, and in all, pulsation of normal characters could be felt in both radial and ulnar arteries.

Aside from the callous there was no observable persistent change in the skin. It was interesting that there was, even in the men who had had symptoms for years, none of the redness and desquamation that one sees after mild frostbite, and they had no persistent itching or burning.

The condition seems, then, to be purely a local vasomotor irritability and there seems to be no evidence of any nervous or other organic changes, except possibly, in one or two cases, extremely slight and very localized sensory peripheral nerve changes. These were, however, doubtful; they seemed insignificant at most, and may occasionally be noticed in any workingmen who bring to bear as much and as prolonged local pressure as these men do. In view of the fact that the men who get symptoms usually do so within six months to two years of the time when they begin the use of the air hammer and that a large proportion of the men we examined, as well as very many others, have used the air hammer for many years, and nevertheless no worse results could be discovered, it is wholly reasonable to conclude that this comprises the sum of the results and no organic changes or more disturbing functional changes are likely to occur.[1]

We were unable to see or to learn of any cases in which the condition described actually interfered with the men's occupation as stoneworkers, though we were told of two or three cases in which they gave up this work, either because of the discomfort it caused in cold weather or because of apprehension that it might grow worse. There does seem some possibility of its being a distinct disadvantage if the man wishes to go into certain other forms of work that cause exposure to cold. One man told me he had originally been a car builder, and after using the air hammer in stonework he tried to go back to his old trade because he had had difficulties with the foreman in the stone mill, but had to give it up because he could not hold a cold chisel firmly with his numb fingers in cold weather.

We were told of several young stonecutters who had been drafted into the National Army and who were said to be having a very uncomfortable time in the cold weather, especially in carrying a rifle. Gloves do not suffice to prevent the effect of very cold weather.

However, skilled stonecutters usually stick to their trade and, as stated, I found none whose stonework was either prevented or seriously interfered with. One man of those seen had given up working on limestone and was using the hammer with comfort in working on granite, perhaps because both tool and hammer are used differently on granite. Five men stated that they had earlier had the trouble decidedly, but that it had gradually lessened until it had almost entirely disappeared. They attribute this to having learned to use the tool with greater skill and especially with an easier and less cramped

[1] It is of some interest to note that one, and I think also a second, man said that when seen a few days before by Dr. Leake he had tried to bring out the phenomenon by plunging his hands into snow, but was surprised to find it would not appear, though usually marked. He said that he remembered afterward that he "had had a couple of drinks of whisky just before." This is of interest and some importance in that it indicates both the mild character of the disturbance and its apparently purely vasomotor origin, since it was entirely overcome by the mild vasodilator action of the moderate amount of alcohol.

grip. Other experienced workmen told me the older and more skillful men have less bother than the younger and less skilled and attributed this to the same cause and to the fact that the young men use the mallet little in "roughing out," while the older have more familiarity with the mallet and use it a good deal. Mr. Griggs stated also that it is more common in the young men than in the older. He believed this due to the more common use recently of the larger hammer, but the older men state that they use the larger hammers as much as do the younger.

In considering the cause, the precise character of the work must be appreciated. It is easy to see, when one tries personally some of the various uses of the pneumatic hammer, why peculiar results may occur with soft-stone workers. In the first place they use hammers of very rapid action. We were unable to get a reliable and definite statement as to the number of blows delivered by these and other air hammers. Dr. Leake is endeavoring to determine the number accurately. It is said to be, with the smaller of these hammers, approximately 3,000 to 3,500 a minute, with the larger, 2,000 to 3,000. Whatever the exact figures, the blows are so frequent that they can not be appreciated individually by the ear, but make a continuous note, whereas the hammers used in riveting and most other metal work act much more slowly and the individual blows can be heard. The vibrations are therefore much finer and more frequent in the hammers used by the stonecutters. The difference one appreciates at once when holding the hammers at work.

Probably much more important in explaining the special occurrence of these symptoms in the soft-stone workers is the manner in which they hold the hammer, and more especially the fact that they work with a tool held by the left hand in a peculiar manner. The riveter simply grasps his larger hammer with both hands in a manner convenient to reach the rivet with it. There is no loose tool to be held. The granite worker holds the hammer perpendicularly grasped in his right hand, and while he does use a tool in the left hand it does not need to be gripped firmly or guided forcibly except in doing lettering or other fine work. These workers in limestone, however, hold the hammer in the right hand as one uses a pen, whatever force is exerted upon it being exercised by the thumb, fore, and middle fingers; the tool, like the hammer, is held obliquely, but of course in the left hand, is gripped firmly, held closely against the stone, and guided, by a pressure exerted especially by the last two fingers and running along a line which is practically that which I described as delimiting the extent, toward the hand, of the vasomotor phenomenon as usually seen in the left hand. The use of the left hand in calking and chipping seems superficially to be much the same, but when one

tries it, it is at once apparent that in these operations the tool needs relatively little guiding or pressure, and for this reason and because the tool is larger (the shank of the stonecutting tool is only half an inch or often less), the grip of the left hand is very much less forceful and constrained than the soft-stone workers.

It will, I think, be apparent that the symptoms in the latter correspond in area closely to those areas of the fingers that are forcefully used and extend from there peripherally. It is to be remembered that these men use their hands continually for most of their working days in this manner, unless they get frequent change by using the mallet. But most of them nowadays use the mallet little. It is interesting that some of the men state that they had the same symptoms when working in earlier years with the mallet, but apparently this was unusual and the symptoms then ordinarily were, they said, slight.

There are three chief factors that evidently may play a part in producing the symptoms: Cold, constriction, and vibration. Cold is evidently the chief factor that temporarily excites the symptoms, as few of the men have any trouble except in the cold. But in the many other trades in which the hands are equally exposed to cold this phenomenon appears to be unusual. In fact, the stonecutters were, in earlier years, when they used the mallet, more exposed to cold than now. I am inclined to believe that cold elicits the symptoms rather than produces them, but it nevertheless gives the men discomfort. The factors more peculiar to this trade are the constriction of the grip exercised and the vibration. The vibration occurs almost equally, if not equally, in other work in which the air hammer is used, with relatively little or no such effect; also, if the vibration were the chief cause, the affection would be expected to occur more diffusely over the hands (since the whole hand feels the vibration), and in more irregular distribution, and particularly it would be expected to spread radially from the source of vibration, instead of being, as it is, observed peripherally only, in most cases, and usually first in the finger tips. It seems probable that the most important factor and hence the one to be especially obviated is the continuous constriction. Much the same phenomenon may be temporarily brought out easily in most persons in cold weather by a similarly strained continued grip. It can not, however, be either denied or affirmed with the evidence at hand that the vibration is a factor of importance.

It is obvious that certain simple things may be done to attempt to eliminate the trouble. First of all, the shank of the tool, where it is held, could be made larger, so that the grip need not be so strained. In doing this it would be well to use some substance that would conduct cold or heat poorly, instead of, as at present, intensifying the

effect of cold by holding the cold metal. Asbestos suggests itself, and its practicability could be tried. Some of the men have tried rubber hose drawn over the tool, but said it tended to work upward on the tool and choke the action of the hammer. One man, however, said that he soaked the hose in oil, drew it on his tools, and allowed the softened rubber to adhere to the tool in drying and thereby was able to use it successfully. He said that he had earlier had "dead fingers" but is no longer troubled by them. Asbestos, if practical, would have evident advantages. Some such handle would perhaps serve also to some extent as a shock absorber and thus reduce the possible effects of the vibration. It is possible, too, that practicable methods of keeping the tools warm in cold weather could be easily devised and would reduce the discomfort. It is also to be noted that the practice of controlling the exhaust with the thumb or fingers of the right hand should be discontinued. In the same connection it is to be observed that in some hammers, due either to their construction or to wear, the exhaust leaks out downward along the tool—which it should not do—giving a slight constant blast of cold air on the left hand. This should be obviated. Heating the compressed air has, I believe, been tried, but meets with difficulties, and I do not believe it would be of much value if successfully done.

Reducing the time spent at any disadvantageous work and shifting to other forms of work is in many kinds of industrial disorders sufficient largely to overcome the trouble. In this instance there is an obvious way of accomplishing this—by requiring the men to use the mallet in suitable parts of the work, especially in "roughing out." The operators say they have always preferred that this should be done, especially because compressed air is expensive, but that the men will not do it. The men admit they use the hammer in such work when they do not need to, partly because they get more done, but they say that unless they do the foremen look unfavorably upon them and are likely to drop them because they do not work so fast. Evident adjustments and understandings are needed on both sides here. Both the men and the operators and their foremen should recognize that the frequent shift to the mallet may go far to obviate the trouble. While the tool is held in much the same way when employing the mallet, there is a slight, almost automatic, relaxation of the grip on both the tool and the mallet handle after each blow, and this alternating relaxation and contraction is just the desirable offset to the constant constriction exercised when using the air hammer.

Mr. Griggs stated that he believed the 1-inch hammer should be done away with in this work and only the ¾-inch hammer used. The men differ very much on this point. Many think the smaller hammer gives them more discomfort. Certainly the immediate sensation one

gets in using it is more disagreeable than with the larger hammer, owing to the more frequent and finer vibrations. I do not believe that with the evidence at hand it is possible to say whether limiting them to the smaller hammer would help directly, but it would perhaps lead the men to use the air hammer less in "roughing out," and if that were the case it would probably indirectly do good.

Besides these obvious measures, there is little doubt that having in mind the above-mentioned factors that are probably active in producing the trouble, an ingenious person of mechanical training and familar with the practical needs in the work could by some study and experiment devise changes in the tools or the hammer, or other changes, that would improve upon the above suggestions; and if the latter were not of the character needed, he could devise means that would be successful. While the disorder is not, under present conditions, such as to justify any fear of more serious results, it is uncomfortable and possibly of some economic disadvantage to the men, and it is due to them that such studies as the above be made by the manufacturers of the hammer, or more especially by the soft-stone operators, since of those who use the pneumatic hammer it is their interests that are particularly involved.

PHYSICAL FATIGUE AS A FACTOR IN INCREASING SUSCEPTIBILITY TO COMMUNICABLE DISEASE.

Fatigue in its relation to health has been the subject of many investigations. With the beginning of the present world war and the immediate need for soldiers, sailors, and munitions, the question became one of great importance. The effects of fatigue in the making of soldiers, sailors, and munitions should be very carefully watched with a view to maintaining the output of training camps and munition factories at its highest level during the war. No necessary sacrifice of men should be questioned at this time, but when methods employed for speeding up this output are liable to "invite disaster," such methods should be carefully revised.

In the investigations made into the prevalence of communicable diseases by the Division of Sanitation, Bureau of Medicine and Surgery, Navy Department, the conclusion was reached that fatigue was a factor in their spread, and that "the attempt to make a sailor too rapidly is to invite disaster."

In view of these findings and their apparent relation to the civil population, and especially the industrial army, the reports are published here in full:

Notes on Preventive Medicine for Medical Officers, United States Navy.

Bulletin No. 12, Division of Sanitation.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., February 15, 1918.

Epidemiological study of cerebrospinal fever under conditions obtaining in the Navy indicates that the incidence of carriers and the incidence of the disease must be considered separately. Where carriers are found it does not necessarily follow that cases of cerebrospinal fever will occur.

The dissemination of meningococci resulting in multiplication of carriers is due to causes which have been pointed out many times—overcrowding, close contact, bad ventilation, the prevalence of catarrhal infections with coughing and sneezing, mess gear or similar articles contaminated with fresh moist discharges from the nose and throat, etc.

Without the meningococcus cerebrospinal fever could not occur. On the other hand, it is now well known that although many persons in a camp may harbor the meningococcus in the nasopharynx, relatively few of the men exposed contract the disease, although many of them become meningococcus carriers. All meningococci may not be and probably are not virulent. Individuals vary in susceptibility, and indeed susceptibility seems to vary from time to time in the same individual. Other infections, age, exposure, fatigue, mental depression, digestive disturbances, lack of food, and unsuitable clothing, individually or collectively, undoubtedly play an important rôle.

Recent epidemiological study at the naval training stations at Great Lakes, Hampton Roads, and Norfolk, Va., has resulted in the accumulation of some interesting data relative to the factors which are concerned in causing an outbreak of this disease.

In the first place the normal 21-day period of detention was broken. This period of detention is the most important single factor in preventing the introduction of communicable disease and its spread on the station. This detention is necessary not only to detect carriers of such organisms as the diphtheria bacillus and the meningococcus, and to detect such diseases as measles and scarlet fever in their incubative stages, but also in order that sufficient time may be devoted to the preparation of recruits for the rigorous course of training to come. The recruit upon entering a naval training station, particularly in the wintertime, must adapt himself to a complete change in habits and environment. He must become accustomed to naval discipline,

learn to take care of himself, become accustomed to a radical change in apparel, and to a change in diet; learn to sleep in a hammock in barracks, make new acquaintances, and possibly overcome a certain amount of homesickness.

Experience at the larger stations shows that these changes must be brought about gradually, because all these things have a decided influence in tending to lower resistance to infectious diseases. While the recruit is in detention it is necessary that he be immunized against smallpox, typhoid, and paratyphoid infections. It would be folly not to recognize that so potent an influence for good did not also have a certain degree of resistance-lowering influence, a further and important reason for avoiding strenuous training activities during the detention period. All in all, these views may be summarized in the statement that "the attempt to make a sailor too rapidly is to invite disaster."

The carrier problem is of the greatest importance, and, as already stated, overcrowding either in barracks, at moving-picture entertainments, or in other places of assembly, such as the Y. M. C. A. building, is an important factor in the dissemination of pathogenic organisms through the method of the droplet infection.

The great technical difficulties in the laboratory procedures for the detection of meningococcus and pneumococcus carriers, as well as the recognized intermissions of the carrier state, render it practically impossible to prevent the introduction of carriers into the training camp proper. Much of the success in eliminating carriers from the training station will depend upon the percentage of carriers in the civil population and the season of the year. The multiplication of carriers in the training camp proper will be restricted by limiting the number of men quartered in any one compartment, providing a proper amount of floor area for each man, and by the elimination of unnecessary points of contact.

There has been a striking parallelism in the incidence of cerebrospinal fever and lobar pneumonia at the naval training stations. It has also been noted that epidemics of bronchitis and coryza have preceded outbreaks of both of these diseases. Certain factors concerned in the development of either lobar pneumonia or cerebrospinal fever must be considered in contradistinction to the factors involved in the spread of the organisms. Experience seems to show that one of the most important of these is the fatigue factor. It is a well-recognized axiom that the prevalence of communicable disease is at a minimum among thoroughly seasoned and disciplined forces. In connection with the recent outbreak of communicable diseases at Great Lakes it may be observed that incoming detention was broken, and then for several thousand recruits the excellent but intensive system of training in vogue at that station was begun too early and

too precipitately. About the same time two severe blizzards occurred and it was necessary to employ several thousand apprentice seamen to clear the roads and walks of snow, 3 to 6 feet deep. There was thus involved an unusual amount of hard work combined with exposure, which brought about a degree of fatigue and lowering of resistance to infection in many instances. Shortly thereafter there was a wide prevalence of bronchitis and coryza, followed by an outbreak of various communicable diseases of the respiratory type, including lobar pneumonia and cerebrospinal fever. The same sequence of events without the extra amount of work necessitated by the heavy fall of snow was noted at the Norfolk Training Station, where by reason of unprecedented weather the exposure was even greater because of poorer housing facilities and lack of heat and ventilation.

At Great Lakes the regiments which suffered most from the incidence of disease were three which were recruited in December and transferred to the training camp proper after only a few days in detention. The men of two of these regiments were subjected to the same kind of hard manual labor as that performed by older regiments. By the time that the last of these new regiments was recruited it was already recognized that new recruits could not be subjected to the same amount of exposure and work as the more seasoned men, and this regiment suffered less than the other two new regiments. During this period only a few cases of cerebrospinal fever occurred in the older regiments on the station.

In respect to the length of time which those who became ill with the disease had been on the station it may be said that no cases developed until the third week and that the outbreak reached its height between the sixth and seventh weeks, after which it rapidly declined.

The lack of an outgoing detention camp, equal in capacity to that used for incoming detention, contributed to the introduction of disease into other stations. Without a full period of outgoing detention the transference of infection from one station to another is almost certain to occur.

In conclusion it will do no harm to repeat that from the standpoint of preventive medicine "the attempt to make a sailor too rapidly is to invite disaster."

Bulletin No. 13, Division of Sanitation.

DEPARTMENT OF THE NAVY,
BUREAU OF MEDICINE AND SURGERY,
Washington, D. C., February 22, 1918.

Physical fatigue, from the standpoint of preventive medicine, must be given careful consideration as one of the important etiological factors tending to lower blood and tissue resistance to infectious diseases, with special reference to cerebrospinal fever, lobar pneumonia, and other coccus infections.

Epidemiological investigations indicate that body fatigue plays an important rôle, potentially, in an outbreak of communicable disease in a closely housed military organization when the source of infection is present. In fact, in the training of recruits it may be the most prominent factor in determining the number of individuals who will become ill following exposure, if immediate steps are not taken, after early detection of disease and prompt isolation of patients, to interdict physical exertion and to place those not already ill under the best possible circumstances favorable to physical well-being. Mental depression or nerve fatigue, which is not to be differentiated altogether, either from the secretory state of the thyroid and other ductless glands or from muscle fatigue, deserves consideration as a subject unto itself, and is not to be touched upon here except in so far as nerve fatigue is associated with muscle fatigue.

In a previous number attention was directed to some of the untoward results which follow unwise attempts to hasten the early training of naval recruits. Competitive athletics have for years played a very prominent part in the national life, and it is perhaps natural for college experience and college methods of training to influence, more or less, those engaged in the training of recruits, especially now when it is necessary to expand the Navy quickly.

It must be borne in mind, however, that in the training for competitive athletics ordinarily everything in the system of training is subordinated to the object of winning the big final event of the year, and usually, too, the system is calculated to eliminate all but the most fit and to develop, with scant regard to the danger of causing some permanent physical damage, the few remaining to the desired point where a temporary and not to be maintained state of physical power is reached. Such methods obviously are not to be considered in fitting men for arduous manual occupations. They are not used even in training teams for professional baseball, a seasonal occupation which begins each year with easy work for previously trained athletes. Somewhere between the natural hardening of the laborer and the systematic training for the baseball season lies the happy medium which should guide in the training of recruits. It may be taken for granted that the training should begin gently, particularly as a large majority of the recruits are young and physically immature.

There are certain principles which may be laid down as the result of practical experience in training men physically, and in preparing them for athletic contests. Where men are trained in groups, physical strain should be regulated so that the weaker members will not suffer. The speed of the whole group should be governed to protect the weaker physiques. If it is considered necessary to train the older and stronger recruits expeditiously, the younger and less developed should be placed in a separate group and a more moderate applica-

tion of training methods should be made, thus gradually bringing them up to the point of maximum efficiency. If the potentially strong are developed at the expense of the less fit, an unnecessarily large number of the latter must be lost to the service through medical survey for physical disability of one kind or another. Of course, it is recognized that military training is calculated quite properly, to eliminate men who are constitutionally unfit, mentally or physically, but for economic reasons undue prodigality with the excellent recruit material now available for training will serve no good purpose.

Some college trainers have developed winning teams by a system under which the weaker physiques are quickly eliminated, leaving only the most fit to be coached into final form. These trainers have had an abundance of material to work with, of course, and they have had no consideration for the harm done to those eliminated during the period of training. There have been other very successful trainers, who, forced, perhaps, by a comparative scarcity of material, have preferred to give careful consideration to men less perfect in physique; to conserve vitality always, and to develop gradually those of weaker physique. These men in the end generally obtain even better results than those who use the more forceful method. The conservation method was consistently carried out for years by a famous varsity crew coach. Quite frequently he would take under his observation a freshman who to the average trainer would have offered little promise of developing into varsity material. By a system of carefully graduated exercises and constant supervision he would bring such an individual to a state where after three years he would make the first crew in a boat which was accustomed to win the big event year after year. It is needless to say that many of his athletes would not only have failed to make the crew under forced training but some of them would doubtless have suffered irreparable physical damage.

In many instances the accumulation of fatigue substances incident to excessive metabolism taking place during the course of a single long race, where fatigue has occurred before reaching the goal, has made it necessary to put an athlete to bed for several days in order to enable him to recuperate sufficiently to enter another event a week or 10 days later. Had such students been brought into contact with sources of infection, it is not to be doubted that they would have contracted in severe form communicable diseases to which they were at other times comparatively immune. It is a common experience to observe a lessened immunity to staphylococcus infection among athletes undergoing hard training, especially as they approach the point of becoming overtrained or "stale."

Applied physical exercises in ordinary drills, continued day after day, even in comparatively small dosage, without proper periods of

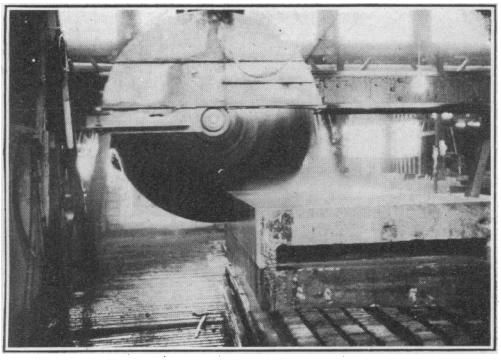

Fig. 1.—Circular diamond saw. The teeth of the saw consist of black Brazilian diamond, and the wet saw cuts through thick blocks at the rate of several inches per minute. The stone as it reaches the cutter is not visibly moist, but has not completely dried out from the sawing.

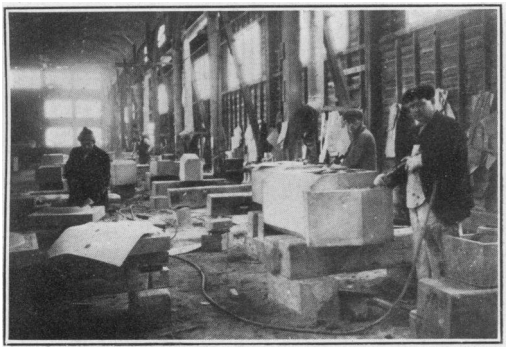

Fig. 2.—Cutting stone with the air hammer. The cutter in the right foreground is left-handed.

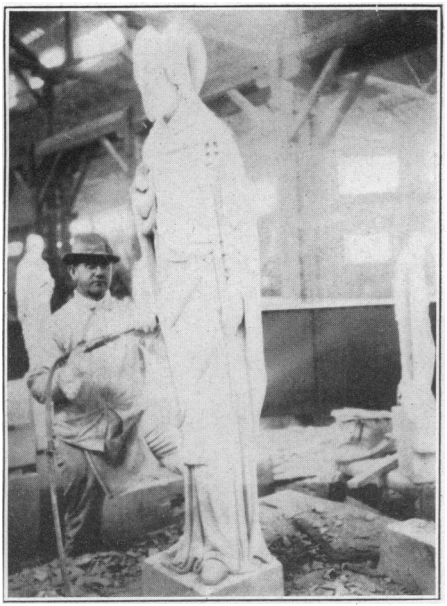

Fig. 3.—Carving with the air hammer.

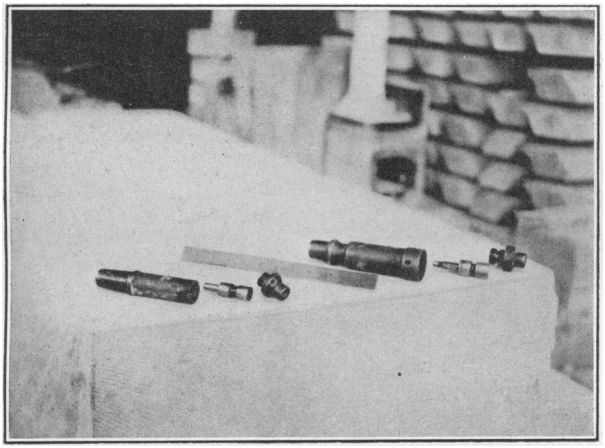

Fig. 4.—The three parts of the air hammer. The cylinder, piston, and head of the three-quarter inch hammer are shown to the left of the foot rule, and those of the 1-inch hammer to the right of the foot rule. The hose is coupled to the head, the tool being inserted in the other end of the cylinder. In the three-quarter inch hammer the exhaust is in the head; in the 1-inch it is in the cylinder near the head.

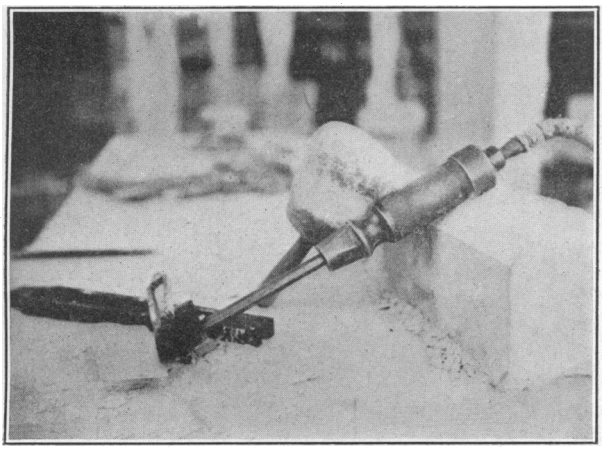

Fig. 5.—Platen for measuring vibration frequency attached to the tool in an air hammer. One tuning fork is in position for recording. This is more clearly shown in figure 6.

rest, will have the same effect as a short period of physical strain carried to the limit of endurance. Many men in training for athletic contests never reach the point of making the first team. They drop out finally because of damage done to their hearts and nervous systems. Too close an analogy should not be drawn between systems of training for athletic events and the daily drills and setting-up exercises incident to the training of naval recruits, but, after all, the effect on the individual is very similar and the same bad results occur if the training is forced. The cumulative effects of fatigue, caused by smaller doses of physical exercise improperly prolonged, and without suitable rest periods, produce in the end the same kind of physical damage. In fact, the development of the individual may be retarded or actually prevented.

It may be laid down as a general principle that for men under training no drill or physical exercise should cause such a degree of fatigue that reaction fails to follow quickly after a brief rest. To quote Medical Inspector J. A. Murphy, United States Navy:

> Strenuous effort should be approached slowly, as the exercises are not used to test the limit of power. Prolonged effort is to be avoided in order that a condition of stimulation will occur rather than exhaustion. Exercise should produce the simple symptoms of physical activity, such as a general sense of warmth and well-being, animation, sparkling eyes, cheerfulness, and mental exhilaration, instead of the opposite effect of overactivity, such as a vague sensation of discomfort about the heart, with constricting girdle sense, obscuration of vision, confused ideas, blunted sensation, and air hunger.

Drills should stop at the point where the men will look forward to subsequent drills with pleasure rather than to regard them as laborious tasks. Certainly after a short rest and a shower all men should emerge clear of eye and physically alert.

The old saying, "haste makes waste," can be substantiated by scientific investigation. Training methods which take into consideration different degrees of physical development and endurance will result not only in reduced admission rates for disease but will develop from the men who begin the course of training the maximum number capable of maintaining a high standard of physical fitness. In connection with speeding-up methods, investigations in munition factories have shown that the output in a working day of eight hours—two four-hour periods—was materially increased by taking 10 minutes for rest out of each four-hour period. It was also shown that the night shift which was required to work nine hours—divided into a four and a five hour period—gave results in the four-hour period which did not differ materially from those given in the first day period, but during the five-hour period very little output was secured in the last hour. By eliminating an hour from this period the total output for the night shift was actually increased.

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.

EXTRA-CANTONMENT ZONES—CASES REPORTED WEEK ENDED MARCH 19.

CAMP BEAUREGARD ZONE, LA.

	Cases.
Measles:	
Alexandria	3
Boyce	1
Mumps:	
Alexandria	3
Pneumonia:	
Boyce	1
Pneumonia, lobar:	
Alexandria	1
Smallpox:	
Pineville	1

CAMP BOWIE ZONE, TEX.

Fort Worth:	
Chicken pox	1
Gonorrhea	3
Pneumonia, lobar	1
Smallpox	2
Syphilis	3
Typhoid fever	2

CAMP DEVENS ZONE, MASS.

Chicken pox:	
Shirley	1
German measles:	
Ayer	1
Lancaster	13
Lunenburg	3
Measles:	
Ayer	13
Shirley	1
Mumps:	
Lancaster	3
Pneumonia, lobar:	
Lancaster	1
Shirley	1

CAMP DODGE ZONE, IOWA.

Des Moines:	
Cerebrospinal meningitis	2
Chancroid	2
Diphtheria	1
Gonorrhea	1

CAMP DODGE ZONE, IOWA—continued.

	Cases.
Des Moines—Continued.	
Scarlet fever	2
Smallpox	25
Syphilis	5
Grimes:	
Measles	2

CAMP EBERTS ZONE, ARK.

Cerebrospinal meningitis:	
Kerr	1
Erysipelas:	
England (R. D. 2)	1
German measles:	
Lonoke	1
Lonoke (R. D. 1)	1
Cabot	1
Ward	4
Malaria:	
England	2
Cabot	2
Ward	1
Measles:	
Lonoke	1
Lonoke (R. D. 1)	3
Lonoke (R. D. 4)	11
England	4
England (R. D. 3)	1
Coy	3
Mumps:	
Lonoke (R. D. 1)	1
England	3
Austin	2
Coy	1
Ward	5
Pneumonia:	
Lonoke (R. D. 1)	5
Lonoke (R. D. 4)	1
England	2
England (R. D. 2)	2
Austin	1
Kerr	2

CAMP EBERTS ZONE, ARK.—continued.

	Cases.
Smallpox:	
Lonoke	1
Lonoke (R. D. 1)	3
England	1
Austin (R. D. 1)	1
Coy	2
Kerr	1
Pettus	1
Syphilis:	
Lonoke	1
Tuberculosis:	
England	1
Austin (R. D. 1)	2
Typhoid fever:	
Cabot	1
Whooping cough:	
Lonoke (R. D. 1)	2
England	2

CAMP FUNSTON ZONE, KANS.

Chicken pox:	
Junction City	1
Measles:	
Junction City	5
Cleburne	2
Leonardville	3
Manhattan	21
Mumps:	
Junction City	3
Manhattan	12
Milford	1
Pneumonia:	
Manhattan	2
Scarlet fever:	
Junction City	2
Manhattan	6
Smallpox:	
Manhattan	1
Stockdale	2
Whooping cough:	
Junction City	1

CAMP GORDON ZONE, GA.

Atlanta:	
Chicken pox	8
Diphtheria	1
German measles	8
Gonorrhea	2
Measles	10
Mumps	30
Pneumonia	17
Scarlet fever	2
Septic sore throat	2
Smallpox	1
Syphilis	4
Tuberculosis	11
Whooping cough	2
Chamblee:	
Mumps	1

CAMP GREENE ZONE, N. C.

Charlotte Township:	
Chancroid	2
Chicken pox	1
Diphtheria	3
Gonorrhea	5

CAMP GREENE ZONE, N. C.—continued.

	Cases.
Charlotte Township—Continued.	
Gonorrhea and chancroid	2
Gonorrhea and syphilis	3
Measles	3
Mumps	2
Ophthalmia neonatorum	1
Syphilis	4
Tuberculosis	5
Typhoid fever	3
Whooping cough	5

GULFPORT HEALTH DISTRICT, MISS.

Cerebrospinal meningitis:	
Gulfport	1
Chicken pox:	
Lyman	6
Diphtheria:	
Biloxi	1
Malaria:	
Gulfport	1
Measles:	
Gulfport	3
Whooping cough:	
Lyman	1

CAMP HANCOCK ZONE, GA.

Chicken pox:	
Augusta	1
German measles:	
Augusta	11
North Augusta	2
Measles:	
Augusta	20
Wrightsboro Road	1
Pneumonia, lobar:	
Augusta	1
Scarlet fever:	
North Augusta	1
Syphilis:	
Augusta	1
Tuberculosis, pulmonary:	
Augusta	3

CAMP JACKSON ZONE, S. C.

Columbia:	
Cerebrospinal meningitis	1
Diphtheria	1
Measles	7
Mumps	9
Pneumonia	1
Scarlet fever	1
Tuberculosis	1
Typhoid fever	3
Whooping cough	1

CAMP JOSEPH E. JOHNSTON ZONE, FLA.

Chicken pox:	
Jacksonville	3
German measles:	
Murray Hill	1
Gonorrhea:	
Jacksonville	1
Measles:	
Jacksonville	18
East Port	1
Mumps:	
Jacksonville	5

CAMP JOSEPH E. JOHNSTON ZONE, FLA.—contd.

	Cases.
Pneumonia:	
Jacksonville	3
Smallpox:	
Jacksonville	1
Trachoma:	
Jacksonville	5
Tuberculosis:	
Jacksonville	5
Typhoid fever:	
Jacksonville	5
Fishers Corner	1
Whooping cough:	
Jacksonville	1

FORT LEAVENWORTH ZONE, KANS.

Chicken pox:	
Leavenworth	3
Diphtheria:	
Leavenworth	1
Erysipelas:	
Leavenworth County	1
Gonorrhea:	
Leavenworth	6
Measles:	
Leavenworth	7
Pneumonia:	
Leavenworth	1
Leavenworth County	1
Scarlet fever:	
Leavenworth County	1
Smallpox:	
Leavenworth	3
Leavenworth County	2
Typhoid fever:	
Leavenworth County	1

CAMP LEE ZONE, VA.

Chicken pox:	
Ettricks	1
Prince George County	2
German measles:	
Ettricks	14
Chesterfield County	1
Prince George County	3
Measles:	
Ettricks	3
Hopewell	21
Petersburg	3
Meningitis, tubercular:	
Prince George County	1
Mumps:	
Ettricks	6
Hopewell	11
Prince George County	4
Septic sore throat:	
Dinwiddie County	1
Ettricks	3
Petersburg	11
Tuberculosis:	
Petersburg	1
Typhoid fever:	
Petersburg	2
Whooping cough:	
Ettricks	1

CAMP LEWIS ZONE, WASH.

	Cases.
Chicken pox:	
Spanaway	2
German measles:	
Loveland	2
Parkland	4
Spanaway	9
Measles:	
Dupont	2
Whooping cough:	
Steilacoom Lake	6
Gravelly Lake	1

CAMP LOGAN ZONE, TEX.

Houston:	
Chicken pox	3
Gonorrhea	51
Measles	31
Mumps	8
Pneumonia	2
Smallpox	2
Syphilis	46

CAMP MACARTHUR ZONE, TEX.

Waco:	
Chicken pox	4
German measles	1
Gonorrhea	1
Measles	10
Mumps	62
Pneumonia, lobar	4
Smallpox	2
Whooping cough	1

CAMP M'CLELLAN ZONE, ALA.

Cerebrospinal meningitis:	
Anniston	1
Chicken pox:	
Anniston	5
Diphtheria:	
Anniston	2
German measles:	
Precinct Two	1
Measles:	
Anniston	3
Precinct Two	14
Meningitis, tubercular:	
Anniston	1
Mumps:	
Anniston	4
Precinct Two	3
Pneumonia:	
Precinct Two	1
Scarlet fever:	
Anniston	1
Smallpox:	
Anniston	14
Blue Mountain	1
Precinct Two	2
Precinct Twenty	1
Typhoid fever:	
Anniston	1
Whooping cough:	
Anniston	3

NORFOLK COUNTY NAVAL DISTRICT, VA

Cerebrospinal meningitis:	Cases.
Brighton	1
Ocean View	1
Portsmouth	3
South Norfolk	1
Diphtheria:	
Portsmouth	1
Influenza:	
Churchland	1
Malaria:	
Prentis Park	1
Measles:	
Portsmouth	7
Rodmans Heights	1
South Norfolk	1
Meningitis, tubercular:	
Titustown	1
Mumps:	
Portsmouth	7
Pellagra:	
Titustown	1
Pneumonia:	
Portsmouth	1
South Norfolk	1
Scarlet fever:	
Portsmouth	1
Smallpox:	
Pinners Point	1
Syphilis:	
Portsmouth	1
Tuberculosis:	
Hickory	1
Portsmouth	4

FORT OGLETHORPE ZONE, GA.

Chicken pox:	
Chattanooga	1
German measles:	
Chattanooga	1
Gonorrhea:	
Chattanooga	9
East Chattanooga	1
Measles:	
Chattanooga	3
East Chattanooga	1
Rossville	8
Mumps:	
Chattanooga	46
East Chattanooga	4
East Lake	1
Fort Cheatham	2
Rossville	2
Pneumonia:	
East Chattanooga	1
Smallpox:	
Chattanooga	1
Syphilis:	
Chattanooga	3
Tuberculosis:	
St. Elmo	1
Whooping cough:	
Chattanooga	10
East Lake	1
Rossville	1

CAMP PIKE ZONE, ARK.

Cerebrospinal meningitis:	Cases.
Little Rock	1
North Little Rock	2
Chancroid:	
Little Rock	3
Chicken pox:	
Little Rock	5
North Little Rock	2
Diphtheria:	
Little Rock	2
German measles:	
Little Rock	3
Gonorrhea:	
Little Rock	12
North Little Rock	1
Scotts	3
Malaria:	
Little Rock	3
North Little Rock	3
Measles:	
Little Rock	5
Mumps:	
Little Rock	20
North Little Rock	8
Pellagra:	
Kerr	1
England	2
Pneumonia:	
Little Rock	7
Scarlet fever:	
Little Rock	4
North Little Rock	2
Smallpox:	
Little Rock	17
North Little Rock	1
Scotts	1
Levy	1
Syphilis:	
Little Rock	3
North Little Rock	2
Scotts	4
Trachoma:	
Little Rock	1
Tuberculosis:	
Little Rock	5
North Little Rock	2
Kerr	1
Typhoid fever:	
Little Rock	2

CAMP SEVIER ZONE, S. C.

Measles:	
Chick Springs Township	8
Greenville Township	1
Mumps:	
Greenville Township	1

CAMP SHELBY ZONE, MISS.

Chicken pox:	
Hattiesburg	4
Gonorrhea:	
Hattiesburg	11
Malaria:	
Hattiesburg	1
Measles:	
Hattiesburg	1

CAMP SHELBY ZONE, MISS.—continued.

	Cases.
Mumps:	
Hattiesburg	10
Smallpox:	
Hattiesburg	3
Lucedale	1
Pinola	1
Purvis	1
Syphilis:	
Hattiesburg	7
Tuberculosis:	
Hattiesburg	2

CAMP SHERIDAN ZONE, ALA.

Chicken pox:	
Montgomery	2
Diphtheria:	
Montgomery	1
Measles:	
Montgomery	9
Chisholm	1
Rural district	1
Mumps:	
Montgomery	5
Septic sore throat:	
Montgomery	1
Smallpox:	
Montgomery	5
Rural district	2

CAMP SHERMAN ZONE, OHIO.

Chicken pox:	
Scioto Township	2
Diphtheria:	
Chillicothe	4
Measles:	
Chilicothe	3
Liberty Township	3
Pneumonia:	
Liberty Township	1
Scarlet fever:	
Chillicothe	5

CAMP ZACHARY TAYLOR ZONE, KY.

Cerebrospinal meningitis:	
Louisville	1
Chicken pox:	
Louisville	3
Diphtheria:	
Jefferson County	3
Louisville	2
German measles:	
Jefferson County	1
Measles:	
Jefferson County	1
Louisville	24
Mumps:	
Louisville	4
Scarlet fever:	
Louisville	1
Smallpox:	
Louisville	3
Trachoma:	
Jefferson County	1
Louisville	1

CAMP ZACHARY TAYLOR ZONE, KY.—continued.

	Cases.
Tuberculosis, pulmonary:	
Louisville	19
Whooping cough:	
Louisville	2

TIDEWATER HEALTH DISTRICT, VA.

Cerebrospinal meningitis:	
Newport News	2
Diphtheria:	
Newport News	1
German measles:	
Newport News	4
Phoebus	4
Measles:	
Newport News	18
Hampton	1
Phoebus	12
Mumps:	
Newport News	2
Pneumonia:	
Newport News	3
Hampton	1
Phoebus	1
Scarlet fever:	
Newport News	1
Tuberculosis:	
Newport News	4
Phoebus	1

CAMP TRAVIS ZONE, TEX.

San Antonio:	
Chicken pox	1
Gonorrhea	1
Malaria	1
Mumps	1
Pneumonia	2
Syphilis	2
Tuberculosis	5

CAMP WADSWORTH ZONE, S. C.

Diphtheria:	
Spartanburg	1
German measles:	
Spartanburg	3
Pauline	1
Measles:	
Spartanburg	13
Pauline	3
Mumps:	
Spartanburg	6
Pauline	1
Pneumonia:	
Pauline	1
Smallpox:	
Spartanburg	2
Tuberculosis:	
Spartanburg	3
Typhoid fever:	
Pauline	4
Whooping cough:	
Spartanburg	16
Moores	2
Pauline	1

CAMP WHEELER ZONE, GA.

	Cases.
Chicken pox:	
Macon	1
Gonorrhea:	
Macon	1
East Macon	1
Itch:	
Macon	1
Measles:	
Macon	1
Mumps:	
Macon	27
East Macon	2

CAMP WHEELER ZONE, GA.—continued.

	Cases.
Pneumonia:	
Macon	2
Scarlet fever:	
Macon	1
Smallpox:	
Macon	1
East Macon	2
Tuberculosis:	
Macon	4
Typhoid fever:	
Macon	1
East Macon	1

DISEASE CONDITIONS AMONG TROOPS IN THE UNITED STATES.

The following data are taken from telegraphic reports received in the office of the Surgeon General, United States Army, for the week ended March 8, 1918:

Annual admission rate per 1,000 (disease only):	
All troops	1,412.8
National Guard camps	1,103.6
National Army camps	1,731.2
Regular Army	1,221.8
Noneffective rate per 1,000 on day of report:	
All troops	47.5
National Guard camps	42.1
Noneffective rate per 1,000 on day of report—Con.	
National Army camps	51.2
Regular Army	42
Annual death rate per 1,000 (disease only):	
All troops	6.6
National Guard camps	6.2
National Army camps	6
Regular Army	7.5

New cases of special diseases reported during the week ended Mar. 8, 1918.

Camps.	Pneumonia.	Dysentery.	Malaria.	Venereal.	Measles.	Meningitis.	Scarlet fever.	Deaths.	Annual admission rate per 1,000 (disease only).	Noneffective per 1,000 on day of report.
Wadsworth	10	.....	.....	17	4	.....	.....	1	537.1	23.7
Hancock	4	.....	1	15	9	.....	2	3	437.7	25.1
McClellan	.....	.....	.....	23	10	.....	2	3	728	30.3
Sevier	14	.....	1	23	1	3	2	2	1,756.1	70.5
Wheeler	13	1	3	35	.....	1	.....	4	1,280.2	42.2
Logan	4	.....	2	146	22	2	1	3	1,586	44
Cody	11	.....	.....	2	1	.....	.....	6	578.5	35.2
Doniphan	5	.....	.....	18	.....	.....	3	5	1,702.3	46.9
Bowie	15	.....	1	52	.....	2	.....	6	1,717.4	58
Sheridan	2	.....	.....	7	1	.....	2	.....	544.7	34.2
Shelby	4	1	.....	24	1	1	.....	5	1,286.1	52.9
Beauregard	3	.....	2	18	1	3	.....	3	1,299.4	54.5
Kearney	2	.....	.....	2	2	.....	7	1	1,160.6	46.7
Devens	12	.....	.....	63	10	.....	.....	4	1,377.1	39.4
Upton	21	.....	.....	40	1	.....	3	6	1,140.8	28.7
Dix	5	.....	.....	82	5	1	10	1	2,365.4	51.4
Meade	8	.....	.....	23	19	1	13	3	860.7	35.8
Lee	15	.....	1	116	9	1	.....	4	1,523.5	56.7
Jackson	6	.....	.....	302	6	.....	.....	3	2,005	59.3
Gordon	6	.....	.....	178	8	2	.....	2	1,626.2	37.6
Sherman	12	.....	.....	47	90	1	29	4	1,745	61.5
Taylor	15	.....	.....	41	23	.....	.....	1	1,725.7	68.2
Custer	.....	.....	.....	14	6	2	4	3	990.9	45.7
Grant	11	.....	.....	28	20	.....	5	2	1,029.3	30.1
Pike	24	.....	1	127	19	.....	9	4	3,084.1	84.1
Dodge	19	.....	.....	121	52	.....	7	4	1,744.1	48.1
Funston	10	1	.....	45	.....	3	4	5	2,017.2	82.8
Travis	29	1	3	52	23	1	2	2	2,975.7	68.9
Lewis	9	.....	.....	17	44	.....	35	6	1,502.2	78.6
Northeastern Department	.....	.....	.....	14	7	.....	.....	1	1,177.6	30.3
Eastern Department	11	.....	.....	29	18	1	1	3	843.6	26.6
Southeastern Department	9	.....	4	25	17	2	4	6	1,015.2	48.7
Southern Department	16	.....	.....	71	55	2	14	10	1,066.6	39.9
Central Department	6	.....	.....	22	21	.....	7	4	1,487.9	43.2
Western Department	9	.....	.....	30	39	.....	5	9	1,136.2	32.4

New cases of special diseases reported during the week ended Mar. 8, 1918—Continued

Camps.	Pneumonia.	Dysentery.	Malaria.	Venereal.	Measles.	Meningitis.	Scarlet fever.	Deaths.	Annual admission rate per 1,000 (disease only).	Noneffective per 1,000 on day of report.
Aviation, S. C.	21	.....	.....	91	133	3	12	17	1,381.2	45.4
Camp Greene	8	.....	1	36	15	4	6	2	864.7	33.5
Camp Fremont	6	.....	1	39	15	.....	.....	.....	1,099.1	43.3
El Paso	.....	.....	.....	5	12	.....	1	.....	1,012.3	6.5
Fort Slocum	2	.....	.....	11	8	.....	.....	.....	1,840	39.1
Columbus Barracks	1	.....	.....	16	1	.....	3	.....	1,876.5	51.3
Fort Thomas	.....	.....	.....	1	.....	.....	.....	.....	1,108.8	53
Jefferson Barracks	1	.....	.....	10	5	.....	13	5	2,272.3	117.2
Fort Logan	1	.....	.....	1	22	.....	5	1	2,496.6	70.8
Fort McDowell	.....	.....	.....	5	5	.....	1	.....	1,132.1	53.7
Disciplinary Barracks, Fort Leavenworth	.....	.....	.....	.....	.....	.....	.....	.....	1,692.4	35.2
Disciplinary Barracks, Alcatraz	.....	.....	.....	.....	.....	.....	.....	.....	852.5	13.1
Aberdeen, P. G.	.....	.....	.....	.....	1	.....	1	1	1,368.4	29.2
A. A. Humphreys	.....	.....	.....	9	.....	.....	.....	.....	1,273.5	12.2
J. E. Johnston	.....	.....	.....	27	4	1	1	1	940.1	33.5
Edgewood	.....	.....	.....	.....	.....	1	.....	.....	1,642.1	140.3
Camp Merritt	16	.....	.....	65	16	1	26	5	1,944.8	74.2
Camp Stuart	9	.....	.....	11	6	.....	1	4	1,694.7	54.2
West Point, N. Y.	1	.....	.....	1	7	.....	.....	.....	1,053.8	17.4
General Hospital No. 1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
National Guard departments	4	.....	.....	12	33	.....	1	2	.....	.....
National Army departments	25	4	1	181	50	.....	14	3	.....	.....
Total	435	8	22	2,390	877	39	256	171	[1]1,412.8	[1]47.5

[1] All troops.

Annual rate per 1,000 for special diseases.

Diseases.	All troops in United States.[1]	Regulars in United States.[1]	National Guard, all camps.[1]	National Army, all camps.[1]	Expeditionary forces.[2]
Pneumonia	18.2	15.1	13.5	22.8	26
Dysentery	.3	.....	.3	.2	.2
Malaria	.9	.7	1.5	.5	.....
Venereal	100.2	67.2	59.1	146.3	44.2
Typhoid	.....	.....	.....	.....	.4
Measles	36.7	52.7	8	37.8	13.7
Meningitis	1.6	1.9	1.8	1.3	3
Scarlet fever	10.7	13.1	2.9	13.6	13.4

[1] Week ended Mar. 8, 1918. [2] Week ended Feb. 28, 1918.

CURRENT STATE SUMMARIES.

Alabama.

From Collaborating Epidemiologist Perry, by telegraph, for week ended March 16, 1918:

Smallpox: By counties, Autauga 1, Butler 13, Cullman 15, Jefferson 104, Marengo 4, Sumter 1, Tuscaloosa 2, Winston 1. Meningitis: By counties, Jefferson 6, Talladega 1, Tuscaloosa 1.

California.

From the State Board of Health of California, by telegraph, for week ended March 16, 1918:

Sixteen hundred cases measles in California, making total of 12,500 since January 1. Twenty cases smallpox, more prevalent than at any time since 1914. Five cases cerebrospinal meningitis. Other reportable diseases stationary.

Connecticut.

From Collaborating Epidemiologist Black, by telegraph, for week ended March 16, 1918:

Trachoma: New Britain 1. Meningitis: Fairfield 1, Greenwich 1. Smallpox: East Windsor 1.

Illinois.

From the State Department of Health of Illinois, by telegraph, for week ended March 16, 1918:

Smallpox, very mild type: Prevalent southern portion of State, Herrin, Odin, Virden, Chester, Harrisburg, Peoria, Chicago. Diphtheria: Much less than usual prevalence. Scarlet fever: Much less than usual, but showing tendency to increase some points. Measles increasing. Meningitis: Total 9 cases; Chicago 3, Springfield 2, one each Lake Forest, Virden, Gillespie, near Quincy. Poliomyelitis: Total 6 cases; Chicago 3, Taylorville 1, Christian County 1, Henry County 1.

Indiana.

From the State Board of Health of Indiana, by telegraph, for week ended March 16, 1918:

Scarlet fever: Epidemic Morocco, 1 death each Jamestown and South Bend. Measles: Epidemic Shiloh, Americus, Rensselaer, Princeton, Remington, Kokomo. Smallpox: Epidemic Ingalls. Diphtheria: One death each Wabash and Acton. Infantile paralysis: One case Gosport, 1 death Bringhurst. Epidemic meningitis: 1 case Madison, 2 cases Indianapolis. Rabies: Epidemic dogs, Troy; 1 case each Terre Haute, Cannelton, Corydon, Hazleton, Montezuma, Mount Vernon. Botulinis poisoning: Four deaths Decatur. Typhoid: Three cases Whiting and Huntington.

Kansas.

From Collaborating Epidemiologist Crumbine, by telegraph, for week ended March 16, 1918:

Poliomyelitis: Elwood 1, Hutchinson 1. Meningitis: Chereokee 1, Corona 1, Eldorado 1, Hoisington 1, Horton 1, Kansas City 6, Osawatomie 1, Otego 1, Parsons 3, Towanda 1, Topeka 1. Smallpox, more than 10 cases: In counties, Allen 21, Butler 14, Cowley 11, Crawford 12, Miami 20, Sedgwick—not including Wichita—17; in cities, Kansas City 80, Wichita 19.

Louisiana.

From Collaborating Epidemiologist Dowling, by telegraph, for week ended March 16, 1918:

Meningitis, excluding Rapides Parish: By parishes, Caddo 1, Calcasieu 1, East Carroll 1, Morehouse 1, Orleans 1, Ouachita 1.

Massachusetts.

From Collaborating Epidemiologist Kelley, by telegraph, for week ended March 16, 1918:

Unusual prevalence. German measles: Danvers 20, Framingham 29, Newton 55. Measles: Ashland 36, Ayer 17, Beverly 50, Hudson 15, Quincy 88. Smallpox: Marlboro 1.

Minnesota.

From Collaborating Epidemiologist Bracken, by telegraph, for week ended March 16, 1918:

Smallpox, new foci: Anoka County, Columbia Heights village 2, Cass County, Backus village 1, Chisago County, Rush City village 2, Houston County, Wilmington Township 8. One cerebrospinal meningitis, 1 poliomyelitis, reported since March 11.

Nebraska.

From the State Board of Health of Nebraska, by telegraph, for week ended March 16, 1918:

Smallpox: Roseland, Kearney, Plattsmouth, Cherry County, Brock, Steinauer. Scarlet fever: Bigspring.

Ohio.

From Collaborating Epidemiologist Freeman, by telegraph, for week ended March 16, 1918:

Typhoid fever: Niles, 10 cases. Poliomyelitis: Norwood, 1 case. Meningitis: Entire State 4 cases.

South Carolina.

From Collaborating Epidemiologist Hayne, by telegraph, for week ended March 16, 1918:

Eighteen cases meningitis; 4 additional suspected cases.

Vermont.

From Collaborating Epidemiologist Dalton, by telegraph, for week ended March 16, 1918:

Smallpox: Rochester 1, Barton 2, Fairfax 1. No other outbreak or unusual prevalence.

Virginia.

From Collaborating Epidemiologist Traynham, by telegraph, for week ended March 16, 1918:

Five cases smallpox Prince William County, 1 Craig, 6 Alleghany. One case cerebrospinal meningitis Newport News, 1 Caroline County. One case poliomyelitis Norfolk County, 1 Lynchburg City.

Washington.

From Collaborating Epidemiologist Tuttle, by telegraph, for week ended March 16, 1918:

German measles still prevalent throughout State. Scarlet fever epidemic Tacoma remains unabated; 55 cases reported.

CEREBROSPINAL MENINGITIS.

Kentucky—Glasgow and Tracy.

During the period from March 3 to 15, 1918, 4 cases of cerebrospinal meningitis, with 3 deaths, were notified at Glasgow, Ky., and 1 case was notified at Tracy, 20 miles from Glasgow.

CEREBROSPINAL MENINGITIS—Continued.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Anniston, Ala	1		Milwaukee, Wis	1	
Atlanta, Ga	3	1	Montgomery, Ala	2	
Augusta, Ga	6	1	New Albany, Ind	1	1
Baltimore, Md	7		Newark, N. J	4	
Birmingham, Ala	1		New Haven, Conn	1	1
Boston, Mass	8	3	New Orleans, La	2	1
Bridgeport, Conn	1	1	Newport, Ky	1	1
Buffalo, N. Y	1		New York, N. Y	5	9
Cambridge, Mass	1		Niagara Falls, N. Y	1	1
Charleston, S. C	2	2	Norfolk, Va	1	
Charleston, W. Va	1		Passaic, N. J	1	1
Charlotte, N. C	2		Petersburg, Va	1	
Chattanooga, Tenn	1	1	Philadelphia, Pa	6	3
Chicago, Ill	6	1	Pittsburgh, Pa	4	
Cincinnati, Ohio	1	1	Pittsfield, Mass	2	1
Cleveland, Ohio	2		Pontiac, Mich	1	
Colorado Springs, Colo	1		Portsmouth, Va	1	
Columbia, S. C	1		Providence, R. I	2	1
Davenport, Iowa	1		Richmond, Va	1	
Dayton, Ohio		3	Roanoke, Va		1
Detroit, Mich	4		Rock Island, Ill	1	
Durham, N. C	1	1	St. Louis, Mo	1	1
Evansville, Ind		1	San Francisco, Cal	1	
Greenville, S. C	1		Savannah, Ga	3	
Hartford, Conn	1		Spartanburg, S. C		1
Houston, Tex	3	2	Springfield, Ohio	1	
Indianapolis, Ind	1	1	Troy, N. Y	1	
Kansas City, Kans	2	1	Waco, Tex	1	
Little Rock, Ark	5	2	Washington, D. C	6	2
Louisville, Ky	1	1	Wichita, Kans	1	
Lowell, Mass	2		Wilkes-Barre, Pa		1
Macon, Ga	2	1	Worcester, Mass	1	
Memphis, Tenn	3	2	York, Pa	1	1

DIPHTHERIA.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 423.

ERYSIPELAS.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Allentown, Pa	2		Memphis, Tenn		2
Boston, Mass		2	Milwaukee, Wis	2	
Bridgeport, Conn	1		Montclair, N. J	1	
Brockton, Mass	2		Newark, N. J	7	
Buffalo, N. Y	3		New York, N. Y		7
Chicago, Ill	17	3	Norristown, Pa	1	
Cleveland, Ohio	14		Omaha, Nebr	1	2
Cumberland, Md	1		Philadelphia, Pa	7	1
Dayton, Ohio	1		Pittsburgh, Pa	6	
Denver, Colo	4		Pontiac, Mich	2	
Detroit, Mich	2	1	Portland, Me	1	
Duluth, Minn	1		Providence, R. I		1
Erie, Pa	1		Reading, Pa	1	
Evansville, Ind		1	Rochester, N. Y	1	
Harrisburg, Pa	1		Sacramento, Cal	1	
Jackson, Mich	1		St. Louis, Mo	6	3
Johnstown, Pa	1		San Francisco, Cal	1	
Lancaster, Pa	1		Springfield, Ill	1	
Lawrence, Mass		1	Toledo, Ohio		1
Lincoln, Nebr	1		Troy, N. Y	1	
Little Rock, Ark	2		Wheeling, W. Va	1	
Long Beach, Cal	1		Wichita, Kans	3	
Los Angeles, Cal	4	1	Winston-Salem, N. C	2	
Louisville, Ky	4	1			

LEPROSY.

Massachusetts—Cambridge—Correction.

The report of a case of leprosy at Cambridge, Mass., during the week ended December 22, 1917, published in the Public Health Reports of January 11, 1918, page 42, was an error, information to that effect having been received from the city health officer of Cambridge.

City Reports for Week Ended Mar. 2, 1918.

During the week ended March 2, 1918, one case of leprosy was reported at Galveston, Tex., and one case at Oakland, Cal.

MALARIA.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Birmingham, Ala.	1	.....	Macon, Ga.	1	.....
Charlotte, N. C.	2	.....	Savannah, Ga.	.....	1
Hattiesburg, Miss.	5	.....	Stockton, Cal.	1	.....
Little Rock, Ark.	1	.....	Wilmington, N. C.	2	.....

MEASLES.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 423.

PELLAGRA.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Charleston, S. C.	.....	2	Petersburg, Va.	.....	1
Houston, Tex.	.....	1	Providence, R. I.	.....	1
Lexington, Ky.	.....	1	Richmond, Va.	.....	2
Memphis, Tenn.	1	.....	Savannah, Ga.	.....	1
Mobile, Ala.	.....	1	Wilmington, N. C.	.....	1
New Orleans, La.	3	2	Winston-Salem, N. C.	1	.....

PNEUMONIA.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Alameda, Cal.	1	1	Haverhill, Mass.	4	1
Allentown, Pa.	6	.....	Holyoke, Mass.	1	1
Anniston, Ala.	8	.....	Houston, Tex.	4	9
Auburn, N. Y.	2	1	Jackson, Mich.	2	2
Baltimore, Md.	74	36	Jamestown, N. Y.	1	2
Berkeley, Cal.	2	2	Kalamazoo, Mich.	3	3
Boston, Mass.	68	46	Kansas City, Kans.	3	.....
Braddock, Pa.	1	.....	Lancaster, Pa.	1	.....
Bridgeport, Conn.	1	11	Lawrence, Mass.	4	2
Brockton, Mass.	9	1	Leavenworth, Kans.	1	.....
Cambridge, Mass.	4	1	Lincoln, Nebr.	4	1
Chattanooga, Tenn.	2	1	Little Rock, Ark.	17	.....
Chelsea, Mass.	6	2	Long Beach, Cal.	1	1
Chicago, Ill.	300	104	Los Angeles, Cal.	19	7
Cleveland, Ohio	19	23	Lowell, Mass.	3	6
Cranston, R. I.	1	.....	Lynn, Mass.	5	.....
Cumberland, Md.	1	1	Malden, Mass.	1	.....
Dayton, Ohio	1	6	Manchester, N. H.	2	2
Detroit, Mich.	13	29	McKeesport, Pa.	3	.....
Fall River, Mass.	6	1	Melrose, Mass.	3	.....
Flint, Mich.	9	.....	Newark, N. J.	59	13
Galesburg, Ill.	2	.....	New Bedford, Mass.	3	2
Grand Rapids, Mich.	4	2	New Britain, Conn.	4	12
Harrisburg, Pa.	2	8	Newburyport, Mass.	2	.....
Hattiesburg, Miss.	2	.....	Newport, Ky.	1	1

PNEUMONIA—Continued.

City Reports for Week Ended Mar. 2, 1918—Continued.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Newton, Mass	1	3	Salem, Mass	7	4
Norristown, Pa	1	.....	San Diego, Cal	9	.....
Norwalk, Conn	1	.....	San Francisco, Cal	13	17
Oakland, Cal	1	7	Schenectady, N. Y	4	2
Oak Park, Ill	1	1	Somerville, Mass	9	2
Orange, N. J	1	2	Spartanburg, S. C	4	.....
Pasadena, Cal	3	3	Springfield, Mass	15	6
Philadelphia, Pa	150	82	Steubenville, Ohio	1	.....
Pittsburgh, Pa	31	38	Stockton, Cal	3	.....
Pittsfield, Mass	3	.....	Taunton, Mass	1	3
Pontiac, Mich	4	2	Toledo, Ohio	2	2
Poughkeepsie, N. Y	1	.....	Waco, Tex	3	.....
Quincy, Mass	4	2	Washington, Pa	1	.....
Reading, Pa	1	.....	Wichita, Kans	7	1
Rochester, N. Y	24	5	Worcester, Mass	7	5
Rutland, Vt	1	.....	York, Pa	1	.....
Sacramento, Cal	4	2			

POLIOMYELITIS (INFANTILE PARALYSIS).

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Chicago, Ill	2	.....	Milwaukee, Wis	3	.....
Columbus, Ohio	1	.....	New York, N. Y	1	.....
Everett, Mass	1	.....	Pittsburgh, Pa	2	.....
Hoboken, N. J	1	.....			

RABIES IN ANIMALS.

City Reports for Week Ended Mar. 2, 1918.

During the week ended March 2, 1918, one case of rabies in animals was reported at Detroit, Mich., and two cases were reported at Troy, N. Y.

RABIES IN MAN.

City Report for Week Ended Mar. 2, 1918.

During the week ended March 2, 1918, one death from rabies was reported at Pittsburgh, Pa.

SCARLET FEVER.

See Diphtheria, measles, scarlet fever, and tuberculosis, page 423.

SMALLPOX.

Illinois—Pekin.

On March 16, 1918, smallpox was reported prevalent in Pekin, Ill.

SMALLPOX—Continued.

Missouri—Kansas City.

During the period from March 11 to 18, 1918, 102 cases of smallpox were notified in Kansas City, Mo.

Texas—Eagle Pass—Virulent Smallpox.

During the period from March 12 to 18, 1918, 7 new cases of smallpox were notified at Eagle Pass, Tex., making a total of 115 cases of the disease reported at that place since January 1, 1918. Eighteen deaths from smallpox have been reported in Eagle Pass during the period from January 1 to March 18, 1918.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Akron, Ohio	38		Lexington, Ky	1	
Alexandria, La	3		Lima, Ohio	18	
Alton, Ill	7		Lincoln, Nebr	5	
Anniston, Ala	24		Little Rock, Ark	24	
Atlanta, Ga	3		Lorain, Ohio	2	
Augusta, Ga	1		Los Angeles, Cal	2	
Baltimore, Md	4		Louisville, Ky	4	
Birmingham, Ala	120		Madison, Wis	6	
Boston, Mass	1		Memphis, Tenn	28	
Butte, Mont	7		Milwaukee, Wis	7	
Cairo, Ill	1		Minneapolis, Minn	30	
Canton, Ohio	3		Mobile, Ala	10	
Charleston, W. Va	2		Montgomery, Ala	10	
Charlotte, N. C	1		Morristown, N. J	2	
Chattanooga, Tenn	10		Muskegon, Mich	2	
Chicago, Ill	11		Muskogee, Okla	2	
Cincinnati, Ohio	14		Nashville, Tenn	4	
Cleveland, Ohio	42		New Orleans, La	17	
Coffeyville, Kans	6		New York N. Y	2	
Columbus, Ga	7		Norfolk, Va	1	
Columbus, Ohio	15		Oakland, Cal	1	
Council Bluffs, Iowa	28		Oklahoma City, Okla	18	
Covington, Ky	4		Omaha, Nebr	40	
Cumberland, Md	1		Pittsburgh, Pa	3	
Danville, Ill	1		Pontiac, Mich	5	
Davenport, Iowa	2		Portland, Oreg	4	
Dayton, Ohio	11		Quincy, Ill	11	
Denver, Colo	21	1	Racine, Wis	1	
Des Moines, Iowa	25		Roanoke, Va	1	
Detroit, Mich	45		Sacramento, Cal	1	
Dubuque, Iowa	1		St. Louis, Mo	22	
Erie, Pa	5		San Diego, Cal	1	
Evanston, Ill	13		Sandusky, Ohio	4	
Everett, Wash	4		San Francisco, Cal	4	
Flint, Mich	7	1	Schenectady, N. Y	1	
Fort Smith, Ark	4		Seattle, Wash	4	
Fort Wayne, Ind	10		Sioux City, Iowa	15	
Grand Rapids, Mich	8		South Bend, Ind	1	
Green Bay, Wis	1		Spartanburg, S. C	4	
Hartford, Conn	2		Springfield, Ill	1	
Harrisburg, Pa	1		Superior, Wis	1	
Houston, Tex	7	1	Tacoma, Wash	2	
Indianapolis, Ind	81		Terre Haute, Ind	2	
Johnstown, Pa	1		Toledo, Ohio	6	1
Kansas City, Kans	29		Topeka, Kans	10	
Knoxville, Tenn	7	1	Waco, Tex	6	
Kokomo, Ind	2		Washington, D. C	2	
La Crosse, Wis	8		Wichita, Kans	15	
Leavenworth, Kans	2		Winston-Salem, N. C	2	

TETANUS.

City Reports for Week Ended Mar. 2, 1918.

During the week ended March 2, 1918, one death from tetanus was reported at each of the following-named cities: Los Angeles, Cal., New Orleans, La., New York, N. Y., and Trenton, N. J.

TUBERCULOSIS.

See Diphtheria, measles, scarlet fever, and tuberculosis, below.

TYPHOID FEVER.

City Reports for Week Ended Mar. 2, 1918.

Place.	Cases.	Deaths.	Place.	Cases.	Deaths.
Allentown, Pa.	1		La Crosse, Wis.	1	
Altoona, Pa.	2		Lancaster, Pa.	1	
Atlanta, Ga.	1	1	Lawrence, Mass.	2	
Baltimore, Md.		1	Los Angeles, Cal.	2	1
Birmingham, Ala.	1	1	Louisville, Ky.	2	
Boston, Mass.	1	1	Minneapolis, Minn.	5	1
Buffalo, N. Y.	2		Moline, Ill.	1	
Charlotte, N. C.	1		Nashville, Tenn.	3	
Chicago, Ill.	3	2	New Castle, Pa.	1	
Cincinnati, Ohio.	2	1	New Orleans, La.	1	
Cleveland, Ohio.	3	1	New York, N. Y.	14	4
Colorado Springs, Colo.	1		North Adams, Mass.	1	
Columbus, Ohio.		1	Oakland, Cal.	1	
Detroit, Mich.	4	1	Orange, N. J.	1	
Duluth, Minn.	1		Philadelphia, Pa.	8	2
Easton, Pa.		1	Pittsburgh, Pa.	5	2
Elizabeth, N. J.	2		Providence, R. I.	1	2
Evansville, Ind.		1	Racine, Wis.		1
Everett, Mass.		1	Reading, Pa.		1
Fall River, Mass.	3		Roanoke, Va.	1	1
Fitchburg, Mass.		1	Rochester, N. Y.	1	
Flint, Mich.	9	1	Rockford, Ill.	1	
Galesburg, Ill.	1		St. Louis, Mo.	4	1
Grand Rapids, Mich.	1	1	San Francisco, Cal.	2	1
Green Bay, Wis.		1	Saratoga Springs, N. Y.	1	
Hammond, Ind.	2	2	Topeka, Kans.	1	
Harrisburg, Pa.		1	Troy, N. Y.	1	1
Hartford, Conn.	1		Wilkinsburg, Pa.	3	
Haverhill, Mass.	1		Wilmington, N. C.	1	1
Houston, Tex.	1		Winston-Salem, N. C.	1	
Indianapolis, Ind.	1	1	Zanesville, Ohio	8	
Kokomo, Ind.		1			

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS.

City Reports for Week Ended Mar. 2, 1918.

City.	Population as of July 1, 1916 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Over 500,000 inhabitants:										
Baltimore, Md.	589,621		13		197	1	15		22	29
Boston, Mass.	756,476	345	96	5	190	2	36	1	80	37
Chicago, Ill.	2,497,722	754	117	11	74		50	1	279	74
Cleveland, Ohio.	674,073	210	92	5	29		10		23	43
Detroit, Mich.	571,784	251	50	10	33	10	42	2	38	32
Los Angeles, Cal.	503,812	163	14	3	309		8		57	28
New York, N. Y.	5,602,841	1,787	213	33	1,303	27	161	8	298	193
Philadelphia, Pa.	1,709,518	673	75	12	309	2	49	3	129	82
Pittsburgh, Pa.	579,090	222	17	4	177	2	8		33	21
St. Louis, Mo.	757,309	264	47	3	95		27	1	67	26

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Con.

City Reports for Week Ended Mar. 2, 1918—Continued.

City.	Population as of July 1, 1916 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
From 300,000 to 500,000 inhabitants:										
Buffalo, N. Y.	468,558	156	13	2	67	1	11	.....	36	14
Cincinnati, Ohio	410,476	154	9	.....	28	1	5	.....	28	17
Jersey City, N. J.	306,345	95	13	.....	54	.....	11	1	38	8
Milwaukee, Wis.	436,535	124	4	.....	260	2	44	.....	17	10
Minneapolis, Minn.	363,454	.....	11	4	37	.....	43	.....	.....	6
Newark, N. J.	408,894	159	31	2	262	2	8	.....	71	27
New Orleans, La.	371,747	144	27	1	54	.....	.....	.....	24	23
San Francisco, Cal.	463,516	173	19	1	40	.....	13	.....	45	21
Seattle, Wash.	348,639	.....	2	.....	69	.....	3	.....	7	4
Washington, D. C.	363,980	143	10	2	349	1	41	.....	26	12
From 200,000 to 300,000 inhabitants:										
Columbus, Ohio	214,878	65	5	1	32	.....	39	.....	8	6
Denver, Colo.	260,800	72	6	.....	237	.....	29	.....	.....	12
Indianapolis, Ind.	271,708	102	32	3	107	.....	25	.....	25	12
Louisville, Ky.	238,910	117	5	.....	38	1	6	.....	29	10
Portland, Oreg.	295,463	53	3	1	158	.....	6	.....	14	1
Providence, R. I.	254,960	86	14	.....	12	.....	11	1	.....	9
Rochester, N. Y.	256,417	84	7	1	69	.....	17	.....	27	5
From 100,000 to 200,000 inhabitants:										
Atlanta, Ga.	190,558	74	5	1	4	.....	2	.....	2	7
Birmingham, Ala.	181,762	58	1	.....	73	.....	1	.....	9	5
Bridgeport, Conn.	121,579	45	7	2	3	.....	.....	.....	1	5
Cambridge, Mass.	112,981	.....	5	.....	53	2	1	.....	8	14
Camden, N. J.	106,233	.....	4	.....	34	.....	6	.....	4	.....
Dayton, Ohio	127,224	41	2	.....	45	.....	10	.....	9	1
Des Moines, Iowa	101,598	.....	1	.....	4	.....	6	.....	.....	.....
Fall River, Mass.	128,366	39	9	.....	8	.....	7	.....	13	6
Grand Rapids, Mich.	128,291	.....	2	1	11	.....	5	.....	4	1
Hartford, Conn.	110,900	64	1	.....	2	.....	8	1	4	2
Houston, Tex.	112,307	45	.....	.....	31	.....	2	.....	3	2
Lawrence, Mass.	100,560	35	2	.....	5	.....	2	.....	5	4
Lowell, Mass.	113,245	42	2	.....	1	.....	.....	.....	14	2
Lynn, Mass.	102,425	22	2	.....	15	.....	6	1	4	2
Memphis, Tenn.	148,995	77	7	.....	12	.....	3	1	18	8
Nashville, Tenn.	117,057	49	1	1	8	.....	1	.....	4	5
New Bedford, Mass.	118,158	51	2	.....	27	.....	.....	.....	16	8
New Haven, Conn.	149,685	65	2	.....	5	.....	3	.....	4	2
Oakland, Cal.	198,604	41	1	.....	48	.....	6	.....	17	3
Omaha, Nebr.	165,470	43	6	1	45	.....	13	.....	.....	6
Reading, Pa.	109,381	44	3	1	11	.....	4	.....	1	5
Richmond, Va.	156,687	76	3	.....	61	1	7	.....	6	8
Scranton, Pa.	146,811	50	1	.....	1	.....	1	.....	.....	2
Springfield, Mass.	105,942	60	2	2	64	2	6	.....	10	6
Syracuse, N. Y.	155,624	50	6	.....	85	1	12	.....	6	5
Tacoma, Wash.	112,770	.....	2	.....	7	.....	22	.....	.....	.....
Toledo, Ohio	191,554	57	1	.....	15	.....	8	.....	.....	6
Trenton, N. J.	111,593	50	4	.....	10	.....	4	.....	9	4
Worcester, Mass.	163,314	53	1	.....	3	.....	3	.....	11	6
From 50,000 to 100,000 inhabitants:										
Akron, Ohio	85,625	.....	14	.....	14	.....	17	.....	3	.....
Allentown, Pa.	63,505	20	3	1	9	.....	1	.....	4	.....
Altoona, Pa.	58,659	.....	4	.....	21	.....	1	.....	.....	.....
Atlantic City, N. J.	57,660	.....	.....	.....	13	.....	.....	.....	5	1
Augusta, Ga.	50,245	19	.....	.....	20	.....	2	.....	1	1
Bayonne, N. J.	69,893	.....	2	.....	97	.....	.....	.....	2	.....
Berkeley, Cal.	57,653	17	.....	.....	16	.....	1	.....	1	.....
Binghamton, N. Y.	53,973	30	3	.....	16	.....	2	.....	.....	1
Brockton, Mass.	67,449	19	2	.....	6	.....	2	.....	3	2
Canton, Ohio	60,852	12	1	.....	3	.....	4	.....	.....	.....
Charleston, S. C.	60,734	33	2	.....	1	.....	3	.....	1	4
Chattanooga, Tenn.	60,075	3	1	.....	3	.....	.....	.....	3	1
Covington, Ky.	57,144	24	1	.....	6	.....	2	.....	2	2
Duluth, Minn.	94,495	22	6	.....	37	.....	.....	.....	3	2
Elizabeth, N. J.	86,690	35	4	.....	81	1	72	.....	4	3
El Paso, Tex.	63,705	40	3	.....	16	.....	3	.....	.....	9
Erie, Pa.	75,195	24	8	1	4	.....	4	.....	7	1
Evansville, Ind.	76,078	23	3	.....	22	.....	1	.....	15	1
Flint, Mich.	54,772	21	1	.....	7	.....	9	1	.....	2
Fort Wayne, Ind.	76,183	24	6	.....	.....	.....	5	.....	2	.....

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Con.

City Reports for Week Ended Mar. 2, 1918—Continued.

City.	Population as of July 1, 1916 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
From 50,000 to 100,000 inhabitants—Continued.										
Harrisburg, Pa.	72,015	37	1		11		3		1	
Hoboken, N. J.	77,214	20			4	1	2		6	3
Holyoke, Mass.	65,286		1		2		1		3	1
Johnstown, Pa.	68,529	20	2				11			
Kansas City, Kans.	99,437		4		28		3			
Lancaster, Pa.	50,853		2		23		11		1	
Little Rock, Ark.	57,343	7			8		2		3	1
Malden, Mass.	51,155	10	1		5		4		3	1
Manchester, N. H.	78,283	18	1		28		1		4	1
Mobile, Ala.	58,221	28	1		1					2
New Britain, Conn.	53,794	16	2		12				10	
Norfolk, Va.	89,612		3	1	11		1			6
Oklahoma City, Okla.	92,943	17	2		15					2
Passaic, N. J.	71,744	24	5	1	1			2	1	
Portland, Me.	63,867	17	4		27					2
Rockford, Ill.	55,185	10	1	1	19		5		2	
Sacramento, Cal.	66,895	19	1		94		2		7	2
Saginaw, Mich.	55,642	21	3				4			1
San Diego, Cal.	53,330	10	1		218	2	8		4	7
Savannah, Ga.	68,805	27			7		1		2	6
Schenectady, N. Y.	99,519	19	4		9				4	1
Sioux City, Iowa.	57,078	1					24			
Somerville, Mass.	87,039	30	2		26		1		6	3
South Bend, Ind.	68,946	13	2		12		3		1	1
Springfield, Ill.	61,120	18	1		20					3
Springfield, Ohio.	51,550		1		3					3
Terre Haute, Ind.	66,083	24	5		1		1		1	2
Troy, N. Y.	77,916	36	1		4		6	1	6	5
Wichita, Kans.	70,722		1		102		1		1	
Wilkes-Barre, Pa.	76,776	15	2		56		5		7	1
Wilmington, Del.	94,265	43	3		12		1			3
Yonkers, N. Y.	99,838		7		9		4		7	2
York, Pa.	51,656	1	2		14		2		2	
From 25,000 to 50,000 inhabitants:										
Alameda, Cal.	27,732	5	3		7		1		1	1
Auburn, N. Y.	37,385	14			15					
Battle Creek, Mich.	29,480		6		14		3			
Brookline, Mass.	32,730	7			12		1			2
Butler, Pa.	27,632	9	3	1	26					
Butte, Mont.	43,425		1		1		7			
Cedar Rapids, Iowa.	37,308						5			
Charleston, W. Va.	29,941	9	1		3		1			5
Charlotte, N. C.	39,823		1		16		2		4	
Chelsea, Mass.	46,192	14	1		9		1		1	2
Chicopee, Mass.	29,319	7	2						1	
Clinton, Iowa.	27,386	1					31	1		
Colorado Springs, Colo.	32,971	7			20				4	2
Columbia, S. C.	34,611	12			5				1	
Columbus, Ga.	25,950	4								
Council Bluffs, Iowa.	31,484				1		3			
Cranston, R. I.	25,987	4	1		1					
Cumberland, Md.	26,074	9			2		10			1
Danville, Ill.	32,261	17			87		1		3	2
Davenport, Iowa.	48,811		1		4		8			
Decatur, Ill.	39,631	11			2					3
Dubuque, Iowa.	39,873				3					1
Durham, N. C.	25,061	10			31					
East Chicago, Ind.	28,743	9	1							
Easton, Pa.	30,530	19	3		13					2
East Orange, N. J.	42,458	8	1		23		6		1	
Elgin, Ill.	28,203	6	1		1		3		1	
Elmira, N. Y.	38,120	6	2	1	58				3	2
Evanston, Ill.	28,591	5			10		1			
Everett, Mass.	39,233	10	5		9		2		5	
Everett, Wash.	35,486	4		1						1
Fitchburg, Mass.	41,781	11								2
Fort Smith, Ark.	28,638				3		1			
Galveston, Tex.	41,863	1			1					2
Green Bay, Wis.	29,353	14			9		8		1	
Hammond, Ind.	26,171	18								2
Haverhill, Mass.	48,477	9	3	1	26		5		6	1

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Con.

City Reports for Week Ended Mar. 2, 1918—Continued.

City.	Population as of July 1, 1916 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
From 25,000 to 50,000 inhabitants—Continued.										
Jackson, Miss.	35,363	16	1		4		24		2	1
Jamestown, N. Y.	36,580	12							2	3
Kalamazoo, Mich.	48,886	35	2		7				1	2
Kingston, N. Y.	26,771	7								2
Knoxville, Tenn.	38,676				7		7		2	2
La Crosse, Wis.	31,677	13	2				2			2
Lexington, Ky.	41,097	30			20					6
Lima, Ohio.	35,384	12	1		5		2			1
Lincoln, Nebr.	46,515	11	1		6		6		1	2
Long Beach, Cal.	27,587	8			35		1		2	1
Lorain, Ohio.	36,964						1		1	
Lynchburg, Va.	32,940	10			6				5	1
Macon, Ga.	45,757	10			11		3		5	1
Madison, Wis.	30,699	7			8		1			1
McKeesport, Pa.	47,521		1		20					
Medford, Mass.	26,234	9	4	1	10		3			
Moline, Ill.	27,451	20			16		4	1		
Montclair, N. J.	26,318	5			76		1			1
Montgomery, Ala.	43,285	16			15				2	
Mount Vernon, N. Y.	37,009	8	3	1	11					
Muskegon, Mich.	26,100	9			1					
Muskogee, Okla.	44,218				7					
Nashua, N. H.	27,327	8	3		1					2
Newburgh, N. Y.	29,603	11	1		7				3	1
New Castle, Pa.	41,133				20					
Newport, Ky.	31,927	12					1		2	2
Newport, R. I.	30,108	7	2	1			1			1
Newton, Mass.	43,715	21			33		3		2	
Niagara Falls, N. Y.	37,353	23			3		2		1	2
Norristown, Pa.	31,401	11			3		2			
Norwalk, Conn.	26,899								1	
Oak Park, Ill.	26,654	14	4	1	16		2	1		
Orange, N. J.	33,080	13	1		31		1		5	1
Pasadena, Cal.	46,450	14			83				2	3
Perth Amboy, N. J.	41,185	9			4				8	2
Petersburg, Va.	25,582		3		6				2	
Pittsfield, Mass.	38,629	13	1		6		3		1	1
Portsmouth, Va.	39,651	15			8		3			1
Poughkeepsie, N. Y.	30,390				22		1		10	
Quincy, Ill.	36,798	10	1		8	1	2		1	1
Quincy, Mass.	38,136		2		70		1			
Racine, Wis.	46,486	14			40		5			1
Roanoke, Va.	43,284	19	1		33	1				1
Rock Island, Ill.	28,926		3		16		3			
Salem, Mass.	48,562				34				2	1
San Jose, Cal.	38,902				17				1	
Steubenville, Ohio.	27,445	12			4		2		2	
Stockton, Cal.	35,358	11			78					
Superior, Wis.	46,226	14			11					
Taunton, Mass.	36,283	20					1		4	1
Topeka, Kans.	48,726				3		15			
Waco, Tex.	33,385		1		13				1	
Waltham, Mass.	30,570	9			1	1	1		1	2
Watertown, N. Y.	29,894	2			16				1	
West Hoboken, N. J.	43,139	5							2	1
Wheeling, W. Va.	43,377	15	2		4				4	
Williamsport, Pa.	33,809	7	2						7	
Wilmington, N. C.	29,892	7			10					1
Winston-Salem, N. C.	31,155	19			28		1		16	8
Zanesville, Ohio.	30,863	9							1	
From 10,000 to 25,000 inhabitants:										
Alexandria, La.	15,333	4			2					
Alton, Ill.	22,874	13		1	5		2			2
Ann Arbor, Mich.	15,010	11	2		31		3			
Anniston, Ala.	14,112				10					
Braddock, Pa.	21,685	9	2		1				2	
Cairo, Ill.	15,794	2	2							
Chillicothe, Ohio.	15,470	6	2		1		1		1	
Clinton, Mass.	[1]13,070	6								1

[1] Population Apr. 15, 1910; no estimate made.

DIPHTHERIA, MEASLES, SCARLET FEVER, AND TUBERCULOSIS—Con.

City Reports for Week Ended Mar. 2, 1918—Continued.

City.	Population as of July 1, 1916 (estimated by U. S. Census Bureau).	Total deaths from all causes.	Diphtheria.		Measles.		Scarlet fever.		Tuberculosis.	
			Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
From 10,000 to 25,000 inhabitants—Continued.										
Coffeyville, Kans	17,540				13		1			
Concord, N. H	22,669	13								
Dover, N. H	13,272	4								
Galesburg, Ill	24,276	5	1	1	6					
Greenville, S. C	18,181	10			3					
Hattiesburg, Miss	16,482	9			2				1	
Kearny, N. J	23,539	7			26		2		1	
Kokomo, Ind	20,930	8			5		1		1	
La Fayette, Ind	21,286	3			2					
Leavenworth, Kans	[1] 19,363	4			2		1			
Long Branch, N. J	15,395	1			1					
Marinette, Wis	[1] 14,610	2	2							1
Melrose, Mass	17,445	7	1		1					1
Morristown, N. J	13,284	9		1	1					
Muscatine, Iowa	17,500				11					
Nanticoke, Pa	23,126	7			1		2			
New Albany, Ind	23,629	8	1		1		1			
Newburyport, Mass	15,243	6			1				1	
North Adams, Mass	[1] 22,019	11							1	1
Northampton, Mass	19,926	10					1		3	1
Pontiac, Mich	17,524	9	4		2		3		2	
Portsmouth, N. H	11,666						5			
Rocky Mount, N. C	12,067	3			3				1	
Rutland, Vt	14,831								1	
Sandusky, Ohio	20,193	8								
Saratoga Springs, N. Y	13,821	2			1				2	
Spartanburg, S. C	21,365	16	1		34	1			7	1
Washington, Pa	21,618				108		1			
Wilkinsburg, Pa	23,228	13			12		1			

[1] Population Apr. 15, 1910; no estimate made.

FOREIGN.

CHINA.

Further Relative to Cerebrospinal Meningitis—Hongkong.[1]

During the two weeks ended March 16, 1918, 215 cases of cerebrospinal menginitis were notified at Hongkong.

CUBA.

Communicable Diseases—Habana.

Communicable diseases have been notified at Habana as follows:

Disease.	Feb. 11–20, 1918.		Cases remaining under treatment Feb. 20, 1918.	Disease.	Feb. 11–20, 1918.		Cases remaining under treatment Feb. 20, 1918.
	New cases.	Deaths.			New cases.	Deaths.	
Diphtheria	6	1	2	Scarlet fever	1	.....	2
Leprosy	.....	.....	11	Smallpox	.....	.....	2
Malaria	34	.....	[1] 34	Typhoid fever	23	4	[2] 74
Measles	40	.....	44	Varicella	47	.....	85

[1] From the interior, 33.

[2] From the interior, 32.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER.

Reports Received During Week Ended Mar. 22, 1918.[2]

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
Philippine Islands:				
Provinces				Jan. 20–26, 1918: Cases, 116; deaths, 84.
Bohol	Jan. 20–26	34	29	
Capiz	do	23	16	
Cebu	do	15	6	
Iloilo	do	25	15	
Mindanao	do	19	15	
Occidental Negros	do	.....	3	
Provinces				Jan. 27–Feb. 2, 1918: Cases, 103; deaths, 84.
Bohol	Jan. 27–Feb. 2	60	44	
Capiz	do	22	19	
Cebu	do	9	9	
Iloilo	do	8	6	
Occidental Negros	do	4	6	

PLAGUE.

India				Dec. 2–8, 1917: Cases, 19,441; deaths, 15,436. Dec. 23–29, 1917: Cases, 18,753; deaths, 15,162.
Indo-China:				
Cochin-China—				
Saigon	Jan. 7–27	22	7	

[1] Public Health Reports, Mar. 8, 1918, p. 340.

[2] From medical officers of the Public Health Service, American consuls, and other sources.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received During Week Ended Mar. 22, 1918—Continued.

SMALLPOX.

Place.	Date.	Cases.	Deaths.	Remarks.
Canada:				
New Brunswick—				
St. John	Mar. 3–9	2		
Nova Scotia—				
Halifax	Feb. 24–Mar. 2	1		
Sydney	do	1		
Ontario—				
Ottawa	Mar. 4–10	1		
Quebec—				
Montreal	Feb. 24–Mar. 9	6		
China:				
Chungking	Jan. 13–19			Present.
Dairen	Jan. 27–Feb. 16	11	4	
Nanking	Feb. 3–9			Epidemic.
Shanghai	Jan. 25–Feb. 10	8	17	
Swatow	Jan. 18			Unusually prevalent.
Tientsin	Jan. 27–Feb. 9	5		
France:				
Marseille	Jan. 1–31		2	
Paris	Jan. 27–Feb. 2	1		
Great Britain:				
Cardiff	Feb. 3–9	4		
Honduras:				
Santa Barbara Department	Jan. 1–7			Present in interior.
Indo-China:				
Cochin-China—				
Saigon	Jan. 7–27	111	36	
Italy:				
Genoa	Dec. 2–31	11	3	
Do	Jan. 2–31	30	2	
Leghorn	Jan. 28–Feb. 3	7		
Japan:				
Taihoku	Jan. 15–Feb. 11	4	2	
Tokyo	Feb. 11–18	8		City and suburbs.
Yokohama	Jan. 28–Feb. 3	2		
Mexico:				
Mexico City	Feb. 3–16	15		
Vera Cruz	Feb. 24–Mar. 2	1		
Newfoundland:				
St. Johns	Feb. 23–Mar. 1	4		
Philippine Islands:				
Manila	Jan. 20–Feb. 2	5		
Siam:				
Bangkok	Jan. 6–12	1		

TYPHUS FEVER.

France:				
Marseille	Dec. 1–31		1	
Great Britain:				
Glasgow	Feb. 3–9	2		
Japan:				
Nagasaki	Feb. 11–17	1		
Mexico:				
Mexico City	Feb. 3–16	115		
Portugal:				
Oporto				Dec. 24, 1917–Mar. 9, 1918: About 250 cases reported.
Sweden:				
Goteborg	Dec. 9–15	1		
Switzerland:				
Basel	Jan. 13–19	1		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 29, 1917, to Mar. 15, 1918.

CHOLERA.

Place.	Date.	Cases.	Deaths.	Remarks.
China:				
Antung	Nov. 26–Dec. 2	3	1	
India:				
Bombay	Oct. 28–Nov. 24	17	12	
Calcutta	Sept. 16–Dec. 8		81	
Madras	Nov. 25–Dec. 1	1	1	
Rangoon	Nov. 4–Dec. 1	3	3	
Indo-China:				
Provinces				Sept. 1–Oct. 31, 1917: Cases, 113; deaths, 57.
Anam	Sept. 1–Oct. 31	17	13	
Cambodia	do	41	25	
Cochin-China	do	43	17	
Saigon	Nov. 22–Dec. 9	4	3	
Kwang-Chow-Wan	Sept. 1–30	10	2	
Java:				
East Java	Oct. 28–Nov. 3	1	1	
West Java				Oct. 19–Dec. 20, 1917: Cases, 100; deaths, 57.
Batavia	Oct. 19–Dec. 20	55	21	
Persia:				
Mazanderan Province				July 30–Sept. 3, 1917: Cases, 384; deaths, 276.
Achraf	July 30–Aug. 16	90	88	
Astrabad	July 31			Present.
Barfrush	July 1–Aug. 16	39	25	
Chahmirzad				25 cases reported July 31, 1917.
Chahrastagh	June 15–July 25	10	8	
Charoud	Aug. 26–Sept. 3	4	2	
Damghan	Aug. 26			Present.
Kharek	May 28–June 11	21	13	
Mached	Aug. 18–Sept. 2	174	82	
Ouzoun Dare	Aug. 8			Do.
Sabzevar	Aug. 24			Do.
Sari	July 3–29	273	144	
Semnan	Aug. 31–Sept. 2	14	5	
Yekchambe-Bazar	June 3	6		
Philippine Islands:				
Provinces				Nov. 18–Dec. 29, 1917: Cases, 1,053; deaths, 693. Dec. 30, 1917–Jan. 19, 1918: Cases, 447; deaths, 192.
Antique	Nov. 18–Dec. 1	48	32	
Bohol	Nov. 18–Dec. 29	169	111	
Do	Dec. 30–Jan. 19	57	52	
Capiz	Nov. 25–Dec. 29	27	21	
Do	Dec. 30–Jan. 19	41	35	
Cebu	Dec. 23–29	3		
Do	Dec. 30–Jan. 19	36	17	
Iloilo	Nov. 25–Dec. 29	179	135	
Do	Dec. 30–Jan. 19	42	27	
Leyte	Nov. 25–Dec. 22	13	12	
Mindanao	Nov. 25—Dec. 29	337	196	
Do	Dec. 30–Jan. 19	224	135	
Occidental Negros	Nov. 25–Dec. 22	177	123	
Do	Jan. 13–19	45	15	
Oriental Negros	Nov. 25–Dec. 29	99	62	
Do	Dec. 30–Jan. 19	12	11	
Romblon	Nov. 25–Dec. 1	1	1	
Siam:				
Bangkok	Sept. 16–22	1	1	
Turkey in Asia:				
Bagdad	Nov. 1–15		40	

PLAGUE.

Brazil:				
Bahia	Nov. 4–Dec. 15	4	4	
Do	Dec. 30–Jan. 12	3	2	
Rio de Janeiro	Dec. 23–29	1		
Do	Jan. 6–12	1	1	
British Gold Coast:				
Axim	Jan. 8			Present.
Ceylon:				
Colombo	Oct. 14–Dec. 1	14	13	
Ecuador				Sept. 1–Nov. 30, 1917: Cases, 68; deaths, 24.
Guayaquil	Sept. 1–30	3	1	
Do	Oct. 1–31	20	8	
Do	Nov. 1–30	45	15	
Egypt				Jan. 1–Nov. 15, 1917: Cases, 728; deaths, 398.
Port Said	July 23–29	1	2	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 29, 1917, to Mar. 15, 1918—Continued.

PLAGUE—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
India				Sept. 16–Dec. 1, 1917: Cases, 151,751; deaths, 113,434.
Bombay	Oct. 28–Dec. 1	103	85	
Calcutta	Sept. 16–29		2	
Henzada	Oct. 21–27		1	
Karachi	Oct. 21–Dec. 1	11	9	
Madras Presidency	Oct. 31–Nov. 17	3,294	2,560	
Mandalay	Oct. 14–Nov. 17		89	
Rangoon	Oct. 21–Dec. 1	32	38	
Indo-China:				
Provinces				Sept. 1–Oct. 31, 1917: Cases, 70; deaths, 64.
Anam	Sept. 1–Oct. 31	25	24	
Cambodia	do	30	19	
Cochin-China	do	15	11	
Saigon	Oct. 31–Dec. 23	17	6	
Do	Dec. 31–Jan. 6	2		
Java:				
East Java				Oct. 27–Nov. 25, 1917: Cases, 75; deaths, 73.
Surabaya	Nov. 11–25	2	2	
West Java				Nov. 25–Dec. 9, 1917: Cases, 45; deaths, 45.
Peru				Dec. 1, 1917–Jan. 15, 1918: Cases, 106.
Ancachs Department—				
Casma	Dec. 1–Jan. 15	2		
Lambayeque Department	do	22		At Chiclayo, Ferrenafe, Jayanca, Lambayeque.
Libertad Department	do	72		At Guadalupe, Mansiche, Pacasmayo, Salaverry, San Jose, San Pedro, and country district of Trujillo.
Lima Department	do	9		City and country.
Piura Department—				
Catacaos	do	1		
Senegal:				
St. Louis	Feb. 2			Present.
Siam:				
Bangkok	Sept. 16–Dec. 23	13	9	
Straits Settlements:				
Singapore	Oct. 28–Dec. 29	5	7	

SMALLPOX.

Algeria:				
Algiers	Nov. 1–Dec. 31	3	1	
Do	Jan. 1–31	2		
Australia:				
New South Wales				July 12–Dec. 20, 1917: Cases, 36. Jan. 4–17, 1918: Cases, 1.
Abermain	Oct. 25–Nov. 29	3		Newcastle district.
Cessnock	July 12–Oct. 11	7		
Eumangla	Aug. 15	1		
Kurri Kurri	Dec. 5–20	2		
Mungindi	Aug. 13	1		
Warren	July 12–Oct. 25	22		
Do	Jan. 1–17	1		
Brazil:				
Bahia	Nov. 10–Dec. 8	3		
Pernambuco	Nov. 1–15	1		
Rio de Janeiro	Sept. 30–Dec. 29	703	190	
Do	Dec. 30–Jan. 26	158	42	
Sao Paulo	Oct. 29–Nov. 4		2	
Canada:				
British Columbia—				
Vancouver	Jan. 13–Feb. 16	4		
Victoria	Jan. 7–Feb. 2	2		
Winnipeg	Dec. 30–Jan. 5	1		
New Brunswick—				
Kent County	Dec. 4			Outbreak. On main line Canadian Ry., 25 miles north of Moncton.
Do	Jan. 22	40		In 7 localities.
Northumberland County.	do	41		In 5 localities.
Restigouche County	Jan. 18	60		
Victoria County	Jan. 22	10		At Limestone and a lumber camp.
Westmoreland County, Moncton.	Jan. 20–Feb. 23	8		
York County	Jan. 22	8		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 29, 1917, to Mar. 15, 1918—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Canada—Continued.				
Nova Scotia—				
Sydney	Feb. 3-23	3		
Ontario—				
Hamilton	Dec. 16-22	1		
Do	Jan. 13-19	2		
Sarnia	Dec. 9-15	1		
Do	Jan. 6-Mar. 2	28		
Toronto	Feb. 10-16	1		
Windsor	Dec. 30-Jan. 5	1		
Prince Edward Island—				
Charlottetown	Feb. 7-13	1		
Quebec—				
Montreal	Dec. 16-Jan. 5	5		
Do	Jan. 6-12	1		
China:				
Amoy	Oct. 22-Dec. 30			Present.
Antung	Dec. 3-23	13	2	
Do	Jan. 7-27	4	2	
Chungking	Nov. 11-Dec. 29			Do.
Do	Dec. 30-Jan. 12			Do.
Dairen	Nov. 18-Dec. 22	3	1	
Do	Dec. 30-Jan. 26	4		
Harbin	May 14-June 30	20		Chinese Eastern Ry.
Do	July 1-Dec. 2	7		Do.
Hongkong	Dec. 23-29	1		
Hungtahotze Station	Oct. 28-Nov. 4	1		Do.
Manchuria Station	May 14-June 30	6		Do.
Do	July 1-Dec. 2	3		Do.
Mukden	Nov. 11-24			Present.
Shanghai	Nov. 18-Dec. 23	41	91	Cases, foreign; deaths among natives.
Do	Dec. 31-Jan. 27	25	75	Do.
Tientsin	Nov. 11-Dec. 22	13		
Do	Dec. 30-Jan. 26	9		
Cuba:				
Habana	Jan. 7	1		Nov. 8, 1917: 1 case from Coruna; Dec. 5, 1917, 1 case.
Marianao	Jan. 8	1		6 miles distant from Habana.
Ecuador				Sept. 1-Nov. 30, 1917: Cases, 26; deaths, 2.
Guayaquil	Sept. 1-30	8		
Do	Oct. 1-31	14	1	
Do	Nov. 1-30	4	1	
Egypt:				
Alexandria	Nov. 12-18	1		
Do	Jan. 8-14	3		
Cairo	July 23-Nov. 12-18	6	1	
France:				
Lyon	Nov. 18-Dec. 16	6	3	
Do	Jan. 7-20	5		
India:				
Bombay	Oct. 21-Dec. 1	16	4	
Karachi	Nov. 18-24		1	Nov. 11-17, 1917: 10 cases with 4 deaths; imported on s. s. Menesa from Basreh.
Madras	Oct. 31-Dec. 8	9	3	
Rangoon	Oct. 28-Nov. 24	4	1	
Indo-China:				
Provinces				Sept. 1-Oct. 31, 1917: Cases, 345; deaths, 98.
Anam	Sept. 1-Oct. 31	103	15	
Cambodia	do	10	3	
Cochin-China	do	222	76	
Saigon	Oct. 20-Dec. 30	120	26	
Do	Dec. 31-Jan. 6	17	10	
Laos	Oct. 1-31	1		
Tonkin	Sept. 1-Oct. 31	9	4	
Italy:				
Castellamare	Dec. 10	2		Among refugees.
Florence	Dec. 1-15	17	4	
Leghorn	Jan. 7-27	17	5	
Messina	Jan. 3-19	1		
Milan				Oct. 1-Nov. 30, 1917: Cases, 17.
Naples	To Dec. 10	2		Among refugees.
Turin	Oct. 29-Dec. 29	123	120	
Do	Jan. 21-Feb. 3	24	3	
Japan:				
Nagasaki	Jan. 14-27	3	1	
Taihoku	Dec. 15-21	1		Island of Taiwan (Formosa).
Do	Jan. 8-14	1		Do.
Yokohama	Jan. 17-23	2		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 29, 1917, to Mar. 15, 1918—Continued.

SMALLPOX—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Java:				
East Java	Oct. 7-Dec. 9	25		
Mid-Java	Oct. 10-Nov. 21	55		Oct. 10-Dec. 12, 1917: Cases, 63; death, 1.
Samarang	Dec. 6-12	1	1	
West Java				Oct. 19-Dec. 20, 1917: Cases, 217; deaths, 33.
Batavia	Nov. 2-8	1		
Mexico:				
Aguascalientes	Feb. 4-17		2	
Mazatlan	Dec. 5-11		1	
Do	Jan. 29-Feb. 19	4	1	
Mexico City	Nov. 11-Dec. 29	16		
Do	Dec. 30-Feb. 2	30		
Piedras Negras	Jan. 11	200		
Vera Cruz	Jan. 20-Feb. 16	6	3	
Newfoundland:				
St. Johns	Dec. 8-Jan. 4	29		
Do	Jan. 5-Feb. 22	29		
Trepassey	Jan. 4			Outbreak with 11 cases reported.
Philippine Islands:				
Manila	Oct. 28-Dec. 8	5		
Do	Jan. 13-19	3		
Porto Rico:				
San Juan	Jan. 28-Feb. 17	2		
Portugal:				
Lisbon	Nov. 4-Dec. 15	2		
Do	Dec. 30-Jan. 19	2		
Portuguese East Africa:				
Lourenço Marques	Aug. 1-Nov. 30		9	
Russia:				
Archangel	Sept. 1-Oct. 31	7		
Moscow	Aug. 26-Oct. 6	22	2	
Petrograd	Aug. 31-Nov. 18	76	3	
Siam:				
Bangkok	Nov. 25-Dec. 1	1	1	
Spain:				
Coruna	Dec. 2-15		4	
Madrid				Jan. 1-Dec. 31, 1917: Deaths, 77.
Seville	Oct. 1-Dec. 30		66	
Straits Settlements:				
Singapore	Nov. 25-Dec. 1	1	1	
Do	Dec. 30-Jan. 5	1		
Tunisia:				
Tunis	Dec. 14-20		1	
Turkey in Asia:				
Bagdad				Present in November, 1917.
Venezuela:				
Maracaibo	Dec. 2-8		1	

TYPHUS FEVER.

Algeria:				
Algiers	Nov. 1-Dec. 31	2	1	
Argentina:				
Rosario	Dec. 1-31		1	
Australia:				
South Australia				Nov. 11-17, 1917: Cases, 1.
Brazil:				
Rio de Janeiro	Oct. 28-Dec. 1	7		
Canada:				
Ontario—				
Kingston	Dec. 2-8	3		
Quebec—				
Montreal	Dec. 16-22	2	1	
China:				
Antung	Dec. 3-30	13	1	
Do	Dec. 31-Jan. 27	2	2	
Chosen (Formosa):				
Seoul	Nov. 1-30	1		
Egypt:				
Alexandria	Nov. 8-Dec. 28	57	15	
Do	Jan. 8-14	20	7	
Cairo	July 23-Dec. 16	137	70	
Port Said	July 30-Nov. 11	5	5	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued.

Reports Received from Dec. 29, 1917, to Mar. 15, 1918—Continued.

TYPHUS FEVER—Continued.

Place.	Date.	Cases.	Deaths.	Remarks.
Great Britain:				
Belfast	Feb. 10–16	4	1	
Glasgow	Dec. 21	1	.....	
Do	Jan. 20–26	1	.....	
Manchester	Dec. 2–8	1	.....	
Greece:				
Saloniki	Nov. 11–Dec. 29	.....	72	
Do	Dec. 30–Jan. 19	.....	11	
Japan:				
Nagasaki	Nov. 26–Dec. 16	5	5	
Do	Jan. 7–Feb. 3	5	.....	
Java:				
East Java	.....	.....	.....	Oct. 15–Dec. 9, 1917: Cases, 24; deaths, 3.
Mid-Java	.....	.....	.....	Oct. 10–Dec. 12, 1917: Cases, 54; deaths, 2.
Samarang	Oct. 17–Dec. 5	15	2	
West Java	.....	.....	.....	Oct. 19–Dec. 20, 1917: Cases, 73; deaths, 15.
Batavia	Oct. 19–Dec. 20	73	17	
Mexico:				
Aguascalientes	Dec. 15	.....	2	
Do	Jan. 21–Feb. 10	.....	14	
Durango, State—				
Guanacevi	Feb. 11	.....	.....	Epidemic.
Mexico City	Nov. 11–Dec. 29	476	.....	
Do	Dec. 30–Feb. 2	237	.....	
Portugal:				
Lisbon	Feb. 21	.....	.....	Present.
Oporto	....do	.....	.....	Epidemic.
Russia:				
Archangel	Sept. 1–14	7	2	
Moscow	Aug. 26–Oct. 6	49	2	
Petrograd	Aug. 31–Nov. 18	32	.....	
Do	Feb. 2	.....	.....	Present.
Vladivostok	Oct. 29–Nov. 4	12	1	
Sweden:				
Goteborg	Nov. 18–24	1	.....	
Switzerland:				
Basel	Jan. 6–12	.....	1	
Zurich	Nov. 9–15	2	.....	
Do	Jan. 13–19	2	.....	
Tunisia:				
Tunis	Nov. 30–Dec. 6	.....	1	
Turkey:				
Albania—				
Janina	Jan. 27	.....	.....	Epidemic.
Union of South Africa:				
Cape of Good Hope State	.....	.....	.....	Sept. 10–Nov. 25, 1917: Cases, 3,724 (European, 31; native, 3,693); deaths, 761 (European, 5; native, 756).

YELLOW FEVER.

Ecuador	.....	.....	.....	Sept. 1–Nov. 30, 1917: Cases, 5; deaths, 3.
Guayaquil	Sept. 1–30	1	1	
Do	Oct. 1–31	1	.....	
Do	Nov. 1–30	2	2	
Yaguachi	....do	1	.....	
Honduras:				
Tegucigalpa	Dec. 16–22	.....	1	
Do	Jan. 6–19	.....	1	