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SERUMS, ANTITOXIN, AND DRUGS IN THE TREATMENT OF MENINGOCOCCUS MENINGITIS [1]

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Serum therapy in meningococcus meningitis had its beginning with Jochman in 1906 (*1*). He immunized horses and treated 30 human cases of meningitis with their serum. Results were so encouraging that he expressed the belief that serum might prove a useful means of combating the disease.

In 1913, Flexner (*2*) reported the treatment of 1,300 cases with serum with a mortality less than half as great as that prevalent during that period. The importance of the serum being polyvalent was stressed by Dopter (*3*) and by Wollstein (*4*), who had found that meningococci were not all alike serologically.

The importance of polyvalency was emphasized further by the intensive work done during the World War, when meningococcus meningitis was so prevalent in the army camps of France, England, and the United States. Out of this work grew classifications of meningococci into two broad, main groups. The French (*5*) referred to these as A and B; the British as I and II (*6*). Then Gordon and Murray (*7*) subdivided these two groups, by absorption of agglutinins, into I, II, III, and IV. The Gordon-Murray classification has come into use in practically all English-speaking countries, while the French A and B classification is more commonly used on the continent of Europe. No confusion need arise if it be remembered that the French A represents the Gordon-Murray I and III, and that B represents II. Too little is known of IV to be sure of its relationship, though it is apparently quite distinct in this country.

It was during the World War period that the value of antitoxic as well as antibacterial properties in serum was emphasized by Gordon (*8*).

From 1918 to 1928 there was relatively little meningitis; cases were mostly sporadic. There was a general feeling that serum therapy was on a satisfactory basis.

[1] Read before the Medical Society of the District of Columbia, November 10, 1937.

In 1928, a severe wave of meningococcus meningitis appeared on the West Coast of the United States and moved slowly eastward. Evidence indicated that this wave had its origin in China and that it reached the United States by way of the Philippine Islands. In these outbreaks, serum proved disappointing; mortality remained high; and many physicians felt that serum did no good at all.

To what could be attributed this apparent failure of a method of therapy which had once seemed so promising? In order to find an answer to this question it seemed imperative to find a more satisfactory way of evaluating serum before it was released for distribution. "What constitutes a good serum?" is a question that can be answered only when a good serum can be recognized as such before the therapeutic test is made.

Efforts to determine the value of serum had been made from the very beginning of its use. Jochman (*1*) protected small laboratory animals before he gave serum to human cases. Flexner and Jobling (*9*) did likewise. A general impression developed among workers in this field that laboratory animals, other than the monkey, were not susceptible to infection with meningococci, that death among them was due to endotoxins which gave irregular results, and that, in consequence, a protection test for standardizing serum was not feasible. Bacteriological knowledge has developed rapidly within the last few years, and modern aids to technical skill have made many things easy that were formerly difficult. We know now that very virulent meningococci may often lose their virulence within a few days after isolation, and that stock cultures kept in laboratories may lose specificity and antigenicity as well. These factors were all involved in complicating the problem of satisfactory standardization of antimeningococcic serum upon a protection basis. It was largely due to this situation that the mouse protection test, worked out by Hitchens and Robinson (*10*) in 1916, was not more successful in other hands.

Thus test-tube methods came into use. The agglutination test became generally adopted. Such a standard is arbitrary, but it has served a two-fold purpose: (1) It indicates that the horses responded to injection by producing some kind of antibodies, and (2) it shows polyvalency. Evidently there are other factors involved, and such a test does not tell enough.

During the last decade it has been shown (*11*) that meningococcus infection can be produced in several types of small laboratory animals if cultures of sufficient virulence are used. Intracisternal injection of rabbits and guinea pigs with relatively small doses of very virulent meningococci is followed by a typical acute meningitis. It has been impossible to protect these animals (*12*), because horse serum is very toxic for them when it is given by the intracisternal route and it has thus far proved ineffective by other routes. With mice, however,

intraperitoneal injection is followed by a generalized infection (*13*), and they can be protected against such infection by immune serum. Different lots of serum vary widely in protective action, though the agglutinin content of all may be high.

Virulence in meningococci is transient, so that a frequent change in cultures used in such protection studies has been necessary. Recently, Miller has found that suspending meningococci in a solution of mucin (*14*) emphasizes any virulence which such a culture may possess, so that, with very virulent strains, as few as 2 to 10 meningococci may produce a fatal infection. This technique makes it possible to use a given culture over a long period of time and increases the possibility of standardizing such a method sufficiently to make possible its use in evaluating sera. Such a small m. f. d. makes a more accurate titration of serum possible. With so many variable factors—i. e., mice, virulence of culture, lot of mucin, and variation in serum—reliable standardization of such a protection test is not easy; but until that is done, it is impossible for a comparison of results obtained in different laboratories to be accurate. Nevertheless, the fact that many sera protect mice so well, whereas others do not, may be considered as valuable information, though the relation between mouse protection and human protection is not yet established. Steps toward working out a standardized mouse protection test have been made. Mishulow, Cohen, and Rake (*13*) (*15*) have published preliminary reports in this field.

Within the last few years an antitoxin for the treatment of meningococcic infection has been developed by Ferry (*16*), by immunizing horses with toxic filtrates of broth cultures of meningococci. Some excellent results have been reported to have followed its use (*17*). Various lots of antitoxin undoubtedly vary in efficacy, as do the various lots of the usual antibacterial serum, and this will result in conflicting reports of its value until such time as its standardization becomes more satisfactory. Toxin-antitoxin neutralization has not been demonstrated successfully in laboratory animals, nor do the antitoxins contain sufficient demonstrable antibodies to allow the use of arbitrary test tube methods. On the other hand, many lots of antitoxin protect mice well against meningococcus infection. Thus far, the only method of standardizing the antitoxin is by the partial neutralization of skin tests in human beings. The ideal serum should perhaps be both antibacterial and antitoxic.

After a good serum has been prepared and standardized, how should it be given? There has been much discussion on this question, and it is difficult to observe any rules, as any case may seem to be a law unto itself. This probably accounts for the fact that the person who is most successful in treating meningitis is usually the person who has had most experience with the disease. All are agreed that much

depends on giving it as early as possible. Intraspinal therapy has long been most common. The chief advantage of this method has been that it enables the serum to come into direct contact with the meninges. If, as is commonly thought, the serum acts directly on the meningococci, this would indeed seem to be the most rational mode of administration. Some physicians feel that the serum does not always reach the infection—that with a purulent and viscid spinal fluid the serum remains in the spinal canal where it was injected and is drawn out again when the next spinal tap is made.

A factor often overlooked is the toxicity of horse serum for the meninges. Acute and fatal meningitis is produced in guinea pigs and rabbits by intracisternal injection of very small amounts of many normal horse sera. There are instances on record of "aseptic meningitis" following intraspinal injection in human beings. A really excellent serum may apparently do so much good that the irritation that it causes may be a minor consideration; but if such serum therapy is carried on too long, the continued irritation may delay the patient's recovery. According to some very excellent clinicians it is almost as important to know when to stop giving serum as to know when to start it.

Intravenous serum therapy, both in combination with intraspinal therapy and alone, is being used more and more often. Since meningococcus meningitis usually begins as a septicemia, and a severe toxemia is usually evident, intravenous administration of serum would seem to have a rational basis. The usual procedure is to dilute the serum greatly with physiological saline or glucose solution before injecting it intravenously, and some physicians make it a rule to add adrenalin. Since meningitis patients often become very dehydrated, this large amount of fluid serves an additional purpose. Caution must be exercised in administering serum by this route until it has been determined that the patient is not hypersensitive to horse serum.

It is not entirely certain how much of the serum that is given intravenously reaches the meninges, and so a combination of intravenous with intraspinal therapy is most often employed. But some clinicians are warm advocates of the intravenous method alone (*17*). They believe that, by avoiding the irritating effect of serum on the meninges, lumbar puncture to relieve increased pressure does not have to be done so frequently.

Since sulfanilamide and its related compounds have been shown to be so useful in streptococcus infections, its effects upon other microorganisms have been investigated. Buttle, Gray, and Stephenson (*18*), Proom (*19*), and workers at the National Institute of Health (Rosenthal, Bauer and Branham) (*20*) have found sulfanilamide to exert a marked curative action in mice infected with meningococci.

Disulfanilamide, prepared by Bauer (*20*), has been found to be more effective than sulfanilamide, and less toxic though also less soluble.

A comparison of the curative action in mice of sulfanilamide with that of polyvalent antimeningococcic serum has indicated a marked difference in individual strains of meningococci. With some strains the drug was more effective; with others the serum was more effective; with still others the drug and the serum were equally effective. This led us to investigate the combined action of the drug and serum (*21*). It was found that, with all strains of meningococci that were tested in mice, the combination was far more effective than either alone. The curative action was more than could be accounted for by the sum of the effect of the two agents; there seemed to be some kind of synergistic action. These observations have been confirmed by Brown (*22*).

Several reports of the successful use of the drug alone in clinical cases of meningitis have appeared in recent journals. No reports of cases treated with both drug and serum have yet been published, but such treatment is being used in several places. The author has seen at least 15 cases and has been told of others in which this combined therapy has been employed and the results have been very promising. Among these 15 cases there was one death. This patient was a 50-year-old man with heart complications who was admitted to the hospital in a coma from which he never roused. Before allowing ourselves to become too enthusiastic about the clinical use of this combined drug and serum therapy we must remember that this was not an epidemic period and that relatively mild cases would be expected, and also, that, with the exception of the one fatal case, the patients receiving this treatment were in a decidedly favorable age group, i. e., 12 to 25 years.

DISCUSSION

It is becoming more and more evident that it is necessary to use cultures of meningococci which are good antigens in order to make good serum. The best antigens may not necessarily be the most recent or the most virulent strains. Just how such strains are to be chosen is a subject of much study at the present time.

Some better way of standardizing serum than the commonly used agglutination test is important. Good sera do seem to have a high agglutinin content, but not all good agglutinating sera have an equally useful effect therapeutically.

At the present time a mouse protection test seems promising. There are so many variable factors involved in such a test that standardization of the technique is difficult, but it will be necessary if such tests are to be compared with each other.

The relation between the protective action of any given serum for mice and for man can be known only through the help of the clinician.

Every lot number of serum is different. Each represents a pool of serum in different proportions from several different horses. Each has passed the standardized agglutination test required by the United States Government for its release for distribution. But all do not help the patient equally; sometimes one will be more helpful in one case, and another in other cases; occasionally, one will seem particularly good with all patients. What constitutes this difference? These serums are now all being subjected to intensive laboratory study. If the clinician can require the lot number of every serum used to be recorded on his patient's chart as a matter of record, much useful information about the clinical value of the serums may be obtained, and a comparison with the laboratory findings can be made. Through such a collaboration we may perhaps some day find out just what constitutes a good antimeningococcus serum and how to make it.

At the present time it seems likely that certain drugs may prove to be a useful adjunct to serum in treating meningococcus infections.

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STUDIES ON TRICHINOSIS

V. The Incidence of Trichinosis as Indicated by Post-mortem Examinations of 1,000 Diaphragms [1]

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In the first paper of this series, Hall and Collins (*1*) made a preliminary report on the results obtained from a study of the incidence of trichinae as ascertained from the examinations of diaphragms of 300 necropsy cases. With a view to obtaining further data, possibly of greater statistical significance, on the extent of trichinosis in our sample and in its constituent population groups, the present authors examined 700 additional diaphragms, completing a proposed base series of 1,000 cases. The present paper reports the results obtained from a study of the zoological findings in the base series, and covers the 300 cases of Hall and Collins and our 700 cases, the total of 1,000 cases being considered as a unit. In order to facilitate comparison and to avoid unnecessary repetition, the general outline followed in Hall and Collins' paper is followed in this paper. Correlations of incidences in population groups with the socio-economic and other factors involved, based on the same series of 1,000 cases, will be considered in a later study in this series.

The 700 diaphragms examined in this study, as well as the 300 examined by Hall and Collins, were from unselected routine necropsies, and were obtained from the same hospitals listed by Hall and Collins—10 in Washington, D. C., and 1 in Baltimore, Md.—and, in addition, from 4 United States naval hospitals (Philadelphia, Pa.; Chelsea, Mass.; Brooklyn, N. Y.; and Portsmouth, Va.). Of the 1,000 cases, 824 were from Washington (D. C.) hospitals, 110 from the United States Marine Hospital, Baltimore, and 66 from the United States naval hospitals listed above. As Hall and Collins stated in regard to their cases, these 1,000 cases "represent to an unusual extent a cross section of a rather large number of the population groups of the United States," running "the range of childhood to old age, military and civil life, association with land and sea, sane individuals and mentally deranged hospitalized cases, black and white, male and female, and high and low economic-social status." Magath (*2*) thought that because of the use of the word "cadavers," the 300 diaphragms examined

[1] Following are the preceding articles of this series:

I. The incidence of trichinosis as indicated by post-mortem examinations of 300 diaphragms. By Maurice C. Hall and B. J. Collins. Pub. Health Rep., 52: 468 (1937). (Reprint 1816.)

II. Some correlations and implications in connection with the incidence of trichinae found in 300 diaphragms. By Maurice C. Hall and B. J. Collins. Pub. Health Rep., 52: 512 (1937). (Reprint 1817.)

III. The complex clinical picture of trichinosis, and the diagnosis of the disease. By Maurice C. Hall. Pub. Health Rep., 52: 539 (1937). (Reprint 1819.)

IV. The role of the garbage-fed hog in the production of human trichinosis. By Maurice C. Hall. Pub. Health Rep., 52: 873 (1937). (Reprint 1836.)

by Hall and Collins were from dissecting-room subjects. In correspondence with Dr. Hall, Dr. Magath has requested that attention be called to his misinterpretation of the source of the material.

We wish to acknowledge our indebtedness to the individuals named by Hall and Collins (*1*) for their continued cooperation in supplying diaphragms and data, and also to Dr. Eugene C. Rice, Jr., and Dr. B. Manchester, at Children's Hospital, Washington, D. C., and to the following officers of the United States naval hospitals: Capt. F. E. Sellers, Philadelphia; Capt. R. A. Warner and Capt. E. C. White, Chelsea; Capt. C. M. George and Lt. Tilden I. Moe, Brooklyn; Capt. I. S. K. Reeves and Capt. R. A. Warner, Portsmouth. We are indebted to Dr. Selwyn D. Collins, principal statistician, United States Public Health Service, for his careful consideration of the statistical validity of our data.

METHOD

Both the direct microscopic technique and the digestion-Baermann technique were used by us in examining diaphragms for trichinae.

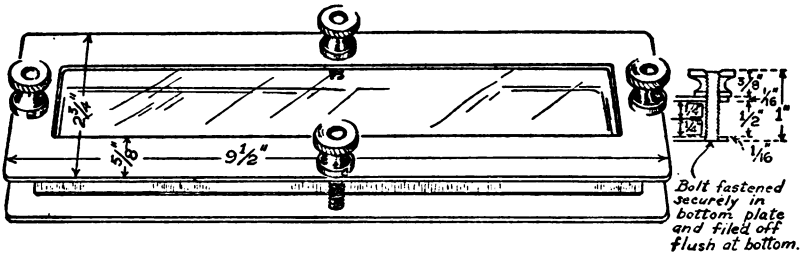

FIGURE 1.—Metal compressor and glass slides used in the direct microscopic examination of muscle for trichinae.

Slight modifications in the two methods, as described by Hall and Collins, were made as the examinations progressed and improvements in technique suggested themselves. For the direct microscopic technique, 1 gram of muscle from various parts around and near the tendinous portions of the diaphragm was cut into small thin pieces, scissors being used for this cutting. These pieces were placed between two glass plates approximately 22 cm (8¾ inches) long by 5 cm (2 inches) wide and 5 mm thick, which were in turn pressed between two metal frames by four bolts and nuts (fig. 1). The 4-bolt-and-nut framework has the advantage over the 2-bolt-and-nut arrangement described by Hall and Collins and used in the examination of (approximately) the first 400 diaphragms, in that a more uniform pressure, with consequently a more uniform transparency of the muscle pieces, is obtained. The press preparation was then examined with the wide-field dissecting microscope, using 12.5 ocular and 1.7 objective. The number of cysts found was recorded in terms of trichinae per

gram, and notation was made of the state of the cysts, whether calcified or not calcified, the degree and localization of calcification, and whether the trichinae were dead or alive.

For the digestion-Baermann technique, the diaphragm, after removal of the 1-gram sample, was weighed, finely ground, and digested in an incubator room at 37° C., in freshly prepared artificial gastric juice (5 grams commercial pepsin, 7 cc concentrated hydrochloric acid, 1 liter of water). We found that for samples of diaphragm weighing 50 grams or more 3 liters of artificial gastric juice were required for proper digestion. The mixture was thoroughly stirred with a glass rod at intervals of about one-half hour 4 or 5 times, and left in the incubator room for approximately 18 hours or longer. In many instances the entire diaphragm, in others only a very small portion, was received from hospitals. For amounts above 50 grams, multiples of 25 grams were used, as a rule; for amounts below 50 grams, all available material was used. The maximum amount used for digestion was 200 grams; the smallest amount was 5 grams (used in only 3 cases); the average for 1,000 cases was 98 grams.

After digestion, the supernatant fluid was siphoned off to within several inches of the bottom of the container, care being taken not to roil the digested material which had settled on the bottom. The material remaining after the removal of the supernatant fluid was mixed with water at a temperature of 37° to 45° C., and the mixture poured on an 80-mesh screen in a Baermann apparatus, sufficient water being added to cover the screen, and allowed to stand 1 hour or longer. About 200 cc were then drawn off into a conical sedimentation glass. Beginning with the thirty-fifth diaphragm and continuing through the five hundredth, the funnel of the Baermann apparatus was emptied of fluid, the apparatus was again filled with warm water, and after being left to stand 1 hour or longer, 200 cc were again drawn off. Since there was the possibility that, in drawing off the water, cysts or inactive or dead worms, if these were present on the screen, would be carried through the screen mesh and lost with the fluid, this procedure was modified. Beginning with the five-hundred-and-first diaphragm, after the first draw of 200 cc, warm water was added to the fluid already in the funnel, the material on the screen was agitated by shaking the screen gently, and after an hour or so the second 200 cc were drawn off. In the first 500 examinations there were 2 cases in which the first Baermann was negative and the second Baermann was found positive. Both were cases with dead worms, found positive also by the direct microscopic method. In the second 500 examinations there were 6 cases found negative on the first draw and positive on the second draw, and all were very light live infestations missed by the direct microscopic method.

The fluid in the sedimentation glasses was allowed to stand about 2 hours, and the material that settled to the bottom was pipetted into a syracuse dish and examined with the wide field dissecting microscope, using 12.5 ocular and 1.7 objective. In positive findings, the Baermann apparatus was placed in an incubator room overnight, and additional amounts examined the next day until they were negative. The trichinae were counted and the numbers recorded.

In a survey of this kind, in which as many as 12 and 14 diaphragms were handled in a day, great care had to be exercised to avoid contamination. A separate grinder and set of instruments were used for each diaphragm, and the equipment was washed thoroughly and sterilized by dry heat before being used again. It was found that sterilization in an autoclave did not materially alter the appearance of trichina larvae, whereas sterilization by dry heat at a temperature of 180° C., for at least 2 hours, so distorted the larvae that there was no possibility of mistaking them for freshly isolated ones. All of the glassware used, such as beakers, sedimentation glasses, etc., was of pyrex or of other glass of equally high resistance that withstands dry heat at high temperatures, with the exception of the glass funnels of the Baermann apparatus. These funnels were washed thoroughly and immersed overnight in a 10 percent solution of sodium hydroxide that would destroy any trichinae that might be present. The copper screens were washed and scrubbed with a stiff brush, and carefully flamed over a bunsen burner.

FINDINGS BY THE MICROSCOPIC AND THE DIGESTION-BAERMANN METHODS

Hall and Collins (*1*) found that the use of either the direct microscopic technique alone or the digestion-Baermann technique alone has definite limitations in picking up positive cases, and noted that even the use of both techniques will undoubtedly fail to detect trichinae in a small minority of cases, notably in very light infestations with dead trichinae. Our own observations support this view. Our final incidence figure of 17.4 percent for 1,000 cases examined is higher than Hall and Collins' incidence figure of 13.67 percent for the first 300 cases examined, and yet it is probable, judging from the data obtained and presented below, that an incidence of 17.4 percent is a bit below the actual incidence for our series.

From a study of table 1 it will be seen that dead trichinae were found in the majority of cases. Of 174 positive cases, there were 80, or 45.9 percent, with dead trichinae only; 60, or 34.4 percent, with live trichinae only; and 34, or 19.5 percent, with both live and dead trichinae. Comparing the findings by the microscopic and the digestion-Baermann methods, we have the following results:

Microscopic technique.—This technique detected 118 of 174 positives, or 67.8 percent, and failed to detect 56 positives, or 32.2 percent; it failed in slightly less than one-third of the positive cases.

Out of 80 cases in which we found only dead trichinae, the microscopic examination detected 74 cases, or 92.5 percent, and missed 6 cases, or 7.5 percent. Out of 60 cases in which we found only live trichinae, the microscopic examination detected 13 cases, or 21.7 percent, and missed 47 cases, or 78.3 percent. Out of 34 cases in which we found both live and dead trichinae, the microscopic examination detected 31 cases, or 91.2 percent, and missed 3 cases, or 8.8 percent.

Of the 56 positives missed by the microscopic technique, all but one were light infestations of less than one trichina per gram. The one case, of approximately 3 trichinae per gram (37 cysts found in 13 grams digested), missed by this technique was an infestation with dead trichinae which, according to our experience, should have been detected by the microscopic technique and not by the digestion-Baermann technique. The failure of the microscopic method in this case might readily be attributed to uneven distribution of trichinae in the muscle—especially as notable variations in distribution and in intensity of infestation in different parts of the same diaphragm have often been observed by us and by others—in spite of the fact that our 1-gram sample was composed of several small pieces of muscle taken from different parts of the very small amount, only 14 grams, of diaphragm provided. The element of chance plays a role in the sampling, and it is evident that the microscopic method not only will miss light infestations of less than 1 trichina per gram quite often, but also will miss somewhat heavier infestations occasionally.

Digestion-Baermann technique.—This technique detected 114 of 174 positives, or 65.5 percent, and failed to detect 60 positives, or 34.5 percent; it failed in slightly more than one-third of the positive cases.

The digestion-Baermann technique detected all of the live and all of the mixed cases, so that we may reasonably assume that very light infestations in which live worms are present will seldom be missed by this technique.

Out of a total of 80 cases in which we found only dead trichinae, the digestion-Baermann method detected 20 cases, or 25 percent, and missed 60 cases, or 75 percent. In the 60 cases of dead trichinae missed by the digestion method, trichinae were found by the microscopic method in numbers from 1 to 600 per gram, with an average of approximately 15 per gram. All but 3 cases, these having 600, 54, and 36 trichinae per gram, had 14 or less trichinae per gram. Of the 20 cases of dead trichinae detected by the digestion-Baermann method, 6 cases were not detected by the microscopic method. In the 14 dead cases positive by both methods, the numbers of trichinae per gram found by the microscopic technique were 3, 3, 4, 5, 11, 12, 17,

21, 31, 40, 51, 374, 947, 993. It is not surprising that the digestion-Baermann technique is not very efficient in detecting dead infestations, considering that it is entirely by chance that cysts and dead worms fall through the screen and settle with the material that is drawn off for examination. In some instances, cysts, and, less often, dead worms, will float, and these trichinae will be missed; obviously, if all trichinae are lost in this way, the case will be negative by this technique.

The combined microscopic and digestion-Baermann techniques agreed in only 58 cases, or 33.3 percent, failing to agree in two-thirds of the cases. We have seen that either technique alone failed to detect approximately one-third of the positive cases. The total positive findings, then, are approximately of this order: One-third of total positives, especially those with dead trichinae, detected by direct microscopic examination only; one-third of total positives, especially those with live trichinae, detected by digestion-Baermann examination only; one-third of total positives, especially heavy, or mixed infestations, detected by both examinations. Each method supplements the other, and both must be used if a fairly accurate incidence figure is to be obtained.

INCIDENCE

Of a total of 1,000 diaphragms, 174 were found infested with trichinae, an incidence of 17.4 percent. Details of our positive findings are given in table 1.

The first 300 cases of this series, reported by Hall and Collins, included 41 positives, or 13.67 percent. There were 15 positives in the first 100 cases, 14 in the second 100 cases, and 12 in the third 100 cases. The positive findings per 100 cases for consecutive series in the remaining 700 cases were as follows: 24 in the fourth 100 cases, 14 in the fifth, 16 in the sixth, 17 in the seventh, 18 in the eighth, 24 in the ninth, 20 in the tenth. Any discussion of range of variation is postponed until a later date, when a study of several thousand diaphragms will have been completed.

Even with a range of variation from 12 positives in 100 cases to 24 positives in 100 cases, subsequent examinations of a similar series of 1,000 diaphragms from the same hospitals and from the same population groups, similarly represented, using the same techniques, should yield approximately the same percentage of positives. Statistically, the standard deviation of our percentage of positive cases, 17.4 percent, as computed by the formula $\sqrt{\frac{pq}{n}}$, where p is the percentage of positive cases, q the percentage of negative cases, and n the total number of cases examined, is ± 1.2; so that on repeated samples of 1,000 each of the type of autopsy material here sampled, we might

TABLE 1.—*Findings for positive cases*

Positive number	State of trichinae	Findings		Microscopic		Digestion-Baermann			
		Microscopic	Digestion	Number of cysts per gram	State of cysts	Amount of diaphragm digested	Total number of larvae recovered [1]	Number per gram	State of larvae
						Grams			
1	Live	−	+	0		150	28	0.187	Live.
2	Dead	+	−	600	Calcified	100	0	0	
3	Live	−	+	0		150	3	0.02	Do.
4	Dead	+	−	54	Calcified	200	0	0	
5	Live	+	+	5	Live	50	24	0.48	Do.
6	Mixed	+	+	85	83 calcified; 2 live	100	4	0.04	1 dead; 3 live.
7	Dead	+	−	12	Calcified	150	0	0	
8	Live	+	+	1	Live	100	4	0.04	Live.
9	do	−	+	0		50	2	0.04	Do.
10	Dead	+	−	2	Calcified	200	0	0	
11	Live	−	+	0		200	7	0.035	Live.
12	Dead	+	+	21	Calcified	100	1	0.01	Dead.
13	do	−	+	0		150	2	0.013	Do.
14	Mixed	−	+	0		50	4	0.08	1 dead; 3 live.
15	Live	−	+	0		15	2	0.133	Live.
16	Dead	+	−	14	Calcified	100	0	0	
17	do	−	+	0		100	3	0.03	Dead.
18	Live	−	+	0		17	1	0.058	Live.
19	Dead	+	+	3	Calcified	100	2	0.02	Dead.
20	do	+	−	2	do	150	0	0	
21	Mixed	+	+	47	do	50	60	1.2	35 dead; 25 live.
22	Dead	+	+	5	do	50	2	0.04	Dead.
23	do	+	−	1	do	150	0	0	
24	do	+	−	3	do	150	0	0	
25	Mixed	+	+	5	Polar calcification; dead.	100	212	2.12	3 dead; 209 live.
26	Live	−	+	0		100	43	0.43	Live.
27	do	−	+	0		100	3	0.03	Do.
28	Dead	+	+	993	Calcified	100	23 (c)	0.23	Calcified.
29	do	+	−	11	do	100	0	0	
30	Mixed	+	+	16	12 calcified; 4 live	50	39	0.78	2 dead; 37 live.
31	do	+	+	2	Polar calcification	100	6	0.06	5 dead; 1 live.
32	Live	−	+	0		100	8	0.08	Live.
33	Mixed	−	+	0		200	52	0.26	2 dead; 50 live.
34	do	+	+	3	1 calcified; 2 live	100	177	1.77	126 dead; 51 live.
35	Live	−	+	0		200	4	0.02	Live.
36	Dead	+	−	3	Calcified	100	0	0	
37	do	+	−	1	do	50	0	0	
38	do	+	−	12	do	50	0	0	
39	Mixed	+	+	7	do	50	1	0.02	Do.
40	do	+	+	1	do	200	69	0.345	Do.
41	Live	+	+	2	Partially calcified, apparently live.	175	21	0.12	Do.
42	do	−	+	0		150	1	0.006	Do.
43	Dead	+	+	11	8 calcified; 3 not calcified.	100	1 (c)	0.01	Dead.
44	do	+	+	947	Calcified	200	60 (c)	0.3	Calcified.
45	Live	−	+	0		125	1	0.008	Live.
46	Mixed	+	+	5	3 polar calcification; 2 not calcified; live and dead.	150	132	0.88	Do.
47	Dead	−	+	0		125	6	0.048	Dead.
48	do	−	+	0		200	1	0.005	Do.
49	Mixed	+	+	2	1 dead; 1 polar calcification, live.	125	23	0.184	Live.
50	Dead	+	+	40	Calcified	150	1 (c)	0.006	Calcified.
51	Mixed	+	+	18	4 completely calcified; 14 polar calcification, live.	50	279	5.58	Live.
52	do	+	+	1	Periphery calcified; apparently live.	75	11	0.146	10 live; 1 cyst dead.
53	Dead	+	−	2	Calcified	100	0	0	

[1] (c) = cysts.

TABLE 1.—*Findings for positive cases*—Continued

Positive number	State of trichinae	Findings		Microscopic		Digestion-Baermann			
		Microscopic	Digestion	Number of cysts per gram	State of cysts	Amount of diaphragm digested	Total number of larvae recovered	Number per gram	State of larvae
						Grams			
54	Live	−	+	0		75	1	0.013	Live.
55	Dead	+	−	2	Calcified	75	0	0	
56	do	+	−	2	Polar calcification	150	0	0	
57	do	+	−	12	Calcified	100	0	0	
58	Live	−	+	0		75	7	0.093	Live.
59	Mixed	+	+	1	Dead	75	4	0.053	Do.
60	do	+	+	13	Calcified	75	2	0.026	1 live; 1 cyst, larva calcified.
61	do	+	+	1	do	100	1	0.01	Live.
62	do	+	+	2	Not calcified; live	175	7	0.04	6 live; 1 cyst, larva calcified.
63	Dead	+	−	3	2 partially calcified, larvae calcified; 1 polar calcification.	50	0	0	
64	Live	−	+	0		125	2	0.016	Live.
65	Mixed	+	+	1	Polar calcification; dead.	75	56	0.746	Do.
66	Dead	+	+	3	Calcified	150	4 (c)	0.026	Calcified.
67	Mixed	+	+	2	Polar calcification; 1 dead, 1 live.	100	40	0.4	39 live; 1 cyst.
68	Dead	+	−	1	Slightly calcified	75	0	0	
69	Live	−	+	0		75	3	0.04	Live.
70	do	−	+	0		100	27	0.27	Do.
71	Dead	+	−	2	Calcified	50	0	0	
72	do	+	−	1	do	75	0	0	
73	do	+	+	4	Not calcified, larvae degenerated.	18	1 (c)	0.055	Dead.
74	do	+	−	1	Calcified	75	0	0	
75	Live	+	+	6	Not calcified	125	376	3.008	Live.
76	Dead	+	−	3	Not calcified, larvae degenerated.	100	0	0	
77	do	+	−	2	Calcified	75	0	0	
78	Live	−	+	0		200	9	0.045	Live.
79	Dead	+	−	13	Calcified	75	0	0	
80	do	+	−	9	Polar calcification	125	0	0	
81	Live	−	+	0		100	3	0.03	Live.
82	Dead	+	−	1	Only one pole calcified, larva degenerated.	25	0	0	
83	Live	−	+	0		150	1	0.006	Live.
84	Dead	+	−	2	Partially calcified, larvae degenerated.	36	0	0	
85	Live	−	+	0		150	42	0.28	Live.
86	do	−	+	0		100	8	0.08	Do.
87	do	−	+	0		50	31	0.62	Do.
88	do	−	+	0		25	1	0.04	Do.
89	do	−	+	0		75	9	0.12	Do.
90	do	+	+	1	Live	100	1	0.01	Do.
91	Dead	+	−	2	Calcified, degenerated	75	0	0	
92	do	+	−	6	Calcified	25	0	0	
93	do	+	−	6	Degenerated	50	0	0	
94	Mixed	+	+	1	Larva slightly calcified; dead.	35	1	0.028	Do.
95	Dead	+	−	1	Calcified	150	0	0	
96	Live	−	+	0		150	9	0.06	Do.
97	do	−	+	0		125	1	0.008	Do.
98	Mixed	+	+	14	10 calcified, dead; 4 not calcified, live.	125	13	0.104	Do.
99	do	+	+	2	Polar calcification; dead.	11	10	0.909	Do.
100	Dead	+	−	3	Calcified	20	0	0	
101	do	+	−	1	Larva degenerated	125	0	0	
102	do	+	−	3	Calcified	13	0	0	
103	do	+	−	36	do	50	0	0	
104	do	+	−	10	do	75	0	0	
105	Live	−	+	0		100	43	0.43	Do.
106	Dead	+	−	5	Calcified	100	0	0	
107	do	+	−	3	do	100	0	0	

TABLE 1.—*Findings for positive cases*—Continued

Positive number	State of trichinae	Findings		Microscopic		Digestion-Baermann			
		Microscopic	Digestion	Number of cysts per gram	State of cysts	Amount of diaphragm digested	Total number of larvae recovered	Number per gram	State of larvae
						Grams			
108	Mixed	−	+	0		120	15	0.125	4 dead; 11 live.
109	Dead	+	−	1	Calcified	200	0	0	
110	do	+	−	4	do	100	0	0	
111	do	+	+	31	do	200	43 (c)	0.215	Calcified.
112	do	+	+	51	do	100	32	0.32	Dead.
113	Mixed	+	+	1	Dead	50	1	0.02	Live.
114	Dead	+	−	1	Calcified	75	0	0	
115	do	+	−	2	Degenerated	100	0	0	
116	Mixed	+	+	6	Calcified	175	3	0.017	Do.
117	Live	+	+	251	Bipolar calcification	75	4,860	64.8	Do.
118	Dead	+	−	2	Calcified	75	0	0	
119	do	+	−	5	Calcified, degenerated	150	0	0	
120	Live	+	+	11	Bipolar calcification	200	107	0.535	Do.
121	do	+	+	2	do	50	15	0.3	Do.
122	Dead	−	+	0		50	1	0.02	Dead.
123	Mixed	+	+	7	Some calcified, dead; others live.	100	2	0.02	Live.
124	Live	−	+	0		200	2	0.01	Do.
125	Mixed	+	+	1	Bipolar calcification; live.	150	4	0.026	3 dead; 1 live.
126	do	+	+	2	Bipolar calcification; dead.	50	7	0.14	Live.
127	Live	−	+	0		25	6	0.24	Do.
128	do	−	+	0		100	10	0.1	Do.
129	do	−	+	0		75	15	0.2	Do.
130	do	−	+	0		75	14	0.186	Do.
131	Mixed	+	+	5	Bipolar calcification; 3 live.	125	14	0.112	8 live; 6 cysts dead.
132	Dead	+	−	12	Calcified	125	0	0	
133	Mixed	+	+	57	do	75	3	0.04	1 live; 2 cysts dead.
134	Dead	+	−	6	do	75	0	0	
135	do	+	+	17	do	175	1 (c)	0.005	Calcified.
136	do	+	−	1	Bipolar calcification	125	0	0	
137	Mixed	+	+	1	Not calcified, larva degenerated.	125	8	0.064	Live.
138	Dead	+	+	374	Calcified, some degenerated.	50	19 (c)	0.38	Calcified.
139	Live	+	+	7	Bipolar calcification	150	265	1.766	Live.
140	do	−	+	0		50	1	0.02	Do.
141	Dead	+	−	1	Calcified	125	0	0	
142	Live	+	+	1	Bipolar calcification	125	79	0.632	Do.
143	do	−	+	0		75	5	0.066	Do.
144	Dead	+	−	1	Calcified	25	0	0	
145	Live	−	+	0		50	2	0.04	Do.
146	Dead	+	−	1	Calcified	7	0	0	
147	Live	+	+	1	Not calcified	100	2	0.02	Do.
148	do	+	+	7	6 not calcified; 1 bipolar calcification.	150	594	3.96	Do.
149	Dead	+	−	1	Calcified	50	0	0	
150	do	+	−	4	2 bipolar calcification; 2 degenerated.	18	0	0	
151	do	+	−	1	Calcified, degenerated	50	0	0	
152	do	+	−	1	Calcified	100	0	0	
153	do	+	−	2	do	100	0	0	
154	Live	−	+	0		50	42	0.84	Do.
155	Dead	+	−	5	Slightly calcified, larvae dead, all but one degenerated.	22	0	0	
156	Live	−	+	0		50	5	0.1	Do.
157	Dead	+	−	1	Not calcified	100	0	0	
158	Live	−	+	0		75	1	0.013	Do.
159	Dead	+	−	1	Bipolar calcification, larva degenerated.	75	0	0	
160	Mixed	+	+	11	4 not calcified, live; 7 calcified, dead.	100	277	2.77	267 live; 10 cysts dead.
161	Live	+	+	1	Bipolar calcification	50	2	0.04	Live.
162	do	−	+	0		50	1	0.02	Do.
163	Dead	+	+	12	Calcified	75	1 (c)	0.013	Calcified.

TABLE 1.—*Findings for positive cases*—Continued

Positive number	State of trichinae	Findings		Microscopic		Digestion-Baermann			
		Microscopic	Digestion	Number of cysts per gram	State of cysts	Amount of diaphragm digested	Total number of larvae recovered	Number per gram	State of larvae
						Grams			
164	Live	−	+	0		75	3	0.04	Live.
165	do	−	+	0		125	11	0.088	Do.
166	Dead	+	−	2	Calcified	15	0	0	
167	Live	−	+	0		30	3	0.1	Do.
168	Dead	+	−	13	Calcified	19	0	0	
169	Live	−	+	0		200	24	0.12	Do.
170	Mixed	+	+	16	Slightly calcified; 7 live, 9 dead.	175	14	0.08	11 live; 3 cysts dead.
171	Live	−	+	0		150	2	0.013	Live.
172	do	−	+	0		150	3	0.02	Do.
173	do	−	+	0		28	1	0.035	Do.
174	Dead	−	+	0		13	37 (c)	2.846	Calcified.

Number with dead trichinae only, 80, or 45.9 percent.
Number with live trichinae only, 60, or 34.4 percent.
Number with live and dead trichinae, 34, or 19.5 percent.

expect a range of variation due to chance as high as 19.8 percent and as low as 15.0 percent, this range indicating the range of 2 standard deviations above or below the mean of our sample.

In all previous studies of the incidence of trichinosis in the United States, based on examinations of the diaphragm or other muscles of the body, investigators have used either the microscopic method alone or the digestion-Baermann method alone. Hall and Collins (*1*) have tabulated all the reports on such incidence studies published in the literature, a total of 8 investigations, with a total number of 1,478 examinations and a total number of 181 positive cases.

Since the publication of their paper, another report on the incidence of trichinosis has appeared.[2] Magath (*2*) examined, by the direct microscopic method, 2 grams of muscle, including diaphragm, intercostal muscles, rectus abdominis, and sternocleidomastoid, from 220 patients dying at the Mayo Clinic, and he reported finding trichinae in 17, or an incidence of 8 percent. He also tabulates the results of the earlier examinations made for trichinae. In his list are included 290 cases, referred to Glazier (*3*), over and above those recorded by Hall and Collins, which 290 cases we believe should be omitted from statistical consideration. They are mentioned by Glazier in quotations from letters received from pathologists and anatomists in the United

[2] After the completion of this paper there came to our attention an abstract by Thomas B. Pote, St. Louis, Mo., "Excerpts from a Study of the Incidence of *Trichinella spiralis* in Man," The Bureau Veterinarian, 1937, v. 13 (6), pp. 1–2. Pote examined diaphragm and pectoral, intercostal, and rectus abdominis muscles from 1,060 routine autopsy cases. "More than twelve thousand uncut and unstained sections from these specimens were examined microscopically. One hundred sixty-three, or 15.37 percent, of the one thousand sixty persons studied were found to be infested with *Trichinella spiralis*."

States, and cover necropsies in which no special search for trichinae was made. Incidence figures for more or less accidental findings do not have the validity of those based on definite examinations for trichinae, and only the latter examinations are considered here.

There are, accordingly, 1,698 cases with 198 positives, based on the use of the microscopic technique alone or the digestion-Baermann technique alone, in the available American literature. Combined with our 1,000 cases with 174 positives, based on the use of both techniques, these cases incorporating the figures of Hall and Collins, we have a total of 2,698 cases with 372 positives, or an incidence of 13.8 percent. If both techniques, instead of one alone, had been used in the examinations of the 1,698 cases, judging from our results with the use of both techniques, the incidence figure would be higher and would be closer to the actual incidence of trichinae throughout the populations sampled.

Hall and Collins' table indicates that the microscopic technique alone was used in 676 cases, with 51 positive cases; and combining these with Magath's cases would give a total of 896 cases, with 68 positives. The digestion-Baermann technique alone was used in 802 cases, with 130 positive cases. The findings in our series of 1,000 cases indicate that the microscopic technique detected 118 of 174 positives, or 67.8 percent, and failed to detect 56 positives, or 32.2 percent; the digestion-Baermann technique detected 114 positives, or 65.5 percent, and failed to detect 60 positives, or 34.5 percent. Applying our correction figures to the results obtained by other workers, it appears that with the use of both techniques there would have been approximately 472 positives out of a total of 2,698 cases, or an indicated incidence of 17.5 percent. This figure is identical with the indicated incidence figure estimated by Hall and Collins on the basis of their data, and is practically identical with our figure of 17.4 percent for our base series of 1,000 cases. However, the 2,698 cases on which the incidence is computed is not a weighted sample, the low-incidence South being represented by only 200 cases, the Rocky Mountain States being unrepresented, and the entire sample having an urban basis, with the rural population practically unrepresented. A more precise figure for the United States might be based on a large series selected at random as a probably representative sample, and such a series is now being investigated in this laboratory.

INTENSITY OF INFESTATION

Following a classification presented in a table by Hall and Collins (*1*), we have divided our positive cases into seven arbitrary groups on the basis of number of trichinae found per gram, in order to show the intensity of infestation, and these groups are shown in table 2. The assignment to groups was made on the basis of the microscopic findings

per gram whenever positive, because of their direct and positive character; the digestion-Baermann findings per gram were used for the other cases.

TABLE 2.—*Positive groups on a basis of trichinae per gram*

Group No.	Larvae per gram	Number of cases	Percent	Number in various states		
				Live	Mixed	Dead
1	Less than 1	55	31.6	47	3	5
2	1 to 10, inclusive	87	50	11	22	54
3	11 to 50, inclusive	23	13.2	1	7	15
4	51 to 100, inclusive	4	2.3	0	2	2
5	101 to 500, inclusive	2	1.2	1	0	1
6	501 to 1,000, inclusive	3	1.7	0	0	3
7	Over 1,000	0	0	0	0	0
Total		174	100.0	60	34	80

Our findings, in general, correspond to those of Hall and Collins. The highest percentage of cases is still in group 2, with groups 1 and 3 still following in that order. The number of cases in other groups is still too small to establish a sequence. Hall and Collins found that, in group 1, infestations with less than 1 trichina per gram, the large majority of cases showed only live trichinae, whereas in all other groups, with 1 or more larvae per gram, mixed infestations predominated over those with live larvae, and infestations with dead larvae predominated over both other groups. Live larvae only were found by them in groups 1 and 2, in contrast with the occurrence of cases with dead larvae through group 4 and in group 6. They suggested as a purely theoretical explanation of the apparent correlation of dead larvae with heavy infestations, that the rapidity with which trichinae die and calcify is proportional to the degree of infestation.

Our data sustain their theory, while still leaving the establishment of the theory or its disproof until we have a larger amount of data, including data from experiments on animals, a thing that might be quite conclusive. However, the table shows that we find, as Hall and Collins found, a preponderance of cases with only live trichinae present in only group 1, cases with less than 1 trichina per gram, in which group live trichinae make up 85 percent of cases and dead trichinae make up 9 percent of cases. In our table, mixed infestations still predominate over live ones, and dead infestations over both, in groups 2 and 3, with infestations from 1 to 10 and from 11 to 50 trichinae per gram. Beyond this point the figures become too small to have any significance statistically; but it is still true that mixed and dead infestations predominate over live ones in groups 4 and 6, and the numbers are equal in group 5. Somewhat more significant figures are obtained by taking the total 9 cases for groups 4 to 6, inclusive, covering the range from 51 to 1,000 trichinae per gram, from

which it appears that we have in this total 1 live infestation, 2 mixed infestations, and 6 dead infestations, findings which are in line with the other data and with the theory.

For a total of 119 cases with 1 trichina or more per gram, 63 percent are cases with only dead trichinae, and only 11 percent are cases with only live trichinae. Since there is little likelihood of missing these heavier infestations, the predominance of dead infestations in this group can be accepted on its statistical basis and the evident effect of a time factor. There is still the possibility that infestations with less than 1 dead trichina per gram are being missed, as Hall and Collins (*1*) pointed out; and this possibility, as well as any indicated ratio of such dead infestations to live infestations with less than 1 trichina per gram, could be checked by complete microscopic examinations of an adequate series of entire diaphragms.

Even smaller amounts of diaphragm might be inspected to check the probabilities as to missed light infestations with dead trichinae. There were 56 positive Baermanns with less than 1 trichina per gram, with the direct microscopic examination negative, the 56 Baermann examinations detecting the equivalent of 5.644 trichinae per 56 grams, or an average of 0.102 trichina per gram, or approximately 1 trichina per 10 grams. For all Baermanns with less than 1 trichina per gram, with the direct microscopic examination either positive or negative, a total of 104 examinations, the Baermanns detected the equivalent of 15.127 trichinae per 104 grams, or an average of 0.145 trichina per gram, or approximately 1 trichina per 7 grams. Apparently, an examination of 100 samples of 10 grams each for dead trichinae, in cases negative on microscopic examination of 1 gram, would give a figure on which to consider the probable incidence of light dead infestations, assuming that the chance of detecting such cases in a 10-gram sample was at least approximately a 50-50 chance.

The theory that the larvae in heavy infestations die more rapidly than in light infestations carries as a corollary the postulate that the time during which heavy infestations can be found in a live condition is relatively short and, hence, that the chance of detecting them in this stage is much less than the chance of detecting them during the permanent state of death after they die. It does not eliminate the chance of detecting them alive. From our limited data, it appears that the chances of finding only live trichinae in infestations with from 11 to 1,000 trichinae per gram are 6 chances in 100 (2 live cases out of a total of 32). By contrast, the chances of finding live trichinae in infestations with less than 11 trichinae per gram are 41 chances in 100 (58 live cases out of a total of 142 cases), and in infestations with less than 1 per gram are 85 chances in 100 (47 live cases out of a total of 55 cases). In other words, the chance of finding only live trichinae in infestations with less than 1 trichina per gram is about

seven times as great as the chance of finding only live trichinae in infestations with over 10 trichinae per gram. These differences appear to be significant, and our data still point to the likelihood that in light infestations trichinae live a long time, and that in heavy infestations there is a short period with only live trichinae, a longer period with mixed infestations, and a still longer period with only dead trichinae.

Hall and Collins (1), as already noted, state that the rapidity with which trichinae die and calcify is apparently proportional to the intensity of infestation. We have already shown that our data still sustain the idea that the rapidity with which they die is proportional to intensity of infestation; but since death may be unaccompanied by calcification, and calcification unaccompanied by death, the question as to whether rapidity of calcification also is proportional to intensity of infestation is here given separate consideration. The point is judged entirely on the existence of any degree of calcification whatever, without reference to the degree of partial, up to complete, calcification.

From table 3 it appears that in 55 cases of very light infestation, with less than 1 trichina per gram, calcification is present in 0 percent of cases; in 87 cases of what appears to be an intermediate group of infestations, with 1 to 10 trichinae per gram, calcification is present in 83 percent of the cases; and in 32 cases of the heavier infestations, with from 11 to 1,000 trichinae per gram, calcification is present in 100 percent of the cases. The percentages for calcification rise definitely as the infestations become heavier. The intensity of infestation at which calcification is hastened appears to lie in the range from 1 to 10 trichinae per gram.

TABLE 3.—*Infestations on the basis of intensity and calcification as found in all decades of age*

Age group	Less than 1 trichina per gram		1–10 trichinae per gram		11–50 trichinae per gram		51–100 trichinae per gram		101–500 trichinae per gram		501–1,000 trichinae per gram		Total cases	Total calcified
	Total cases	Calcified	Total cases	Calcified	Total cases	Calcified	Total cases	Calcified	Total cases	Calcified	Total cases	Calcified		
0–10	1	0	0	----	0	----	0	----	0	----	0	----	1	0
11–20	2	0	0	----	0	----	0	----	0	----	0	----	2	0
21–30	5	0	7	5	2	2	0	----	0	----	0	----	14	7
31–40	9	0	11	8	1	1	0	----	0	----	0	----	21	9
41–50	18	0	26	23	5	5	0	----	1	1	0	----	50	29
51–60	7	0	10	7	6	6	1	1	0	----	1	1	25	15
61–70	9	0	20	18	5	5	0	----	1	1	2	2	37	26
71–80	2	0	10	9	3	3	2	2	0	----	0	----	17	14
81–90	0	----	3	3	0	----	1	1	0	----	0	----	4	4
91–100	1	0	0	----	1	1	0	----	0	----	0	----	2	1
Age unknown	1	0	0	----	0	----	0	----	0	----	0	----	1	0
Total	55	0	87	73	23	23	4	4	2	2	3	3	174	105

Calcified: In 55 cases of less than 1 trichina per gram, 0 percent; in 87 cases of 1 to 10 trichinae per gram, 83 percent; in 32 cases of 11 to 1,000 trichinae per gram, 100 percent.

Since it is evident that increasing age increases the time factor which operates in the production of calcification, as opposed to the factor of intensity of infestation, the possibility that the age factor might be the explanation for the total lack of calcification in light infestations and for the constant presence of calcification in heavy infestations, must be considered. From table 3 it appears that infestations with less than 1 trichina per gram occur in all the 10 decades except the ninth, and never show calcification; infestations with 1 to 10 trichinae per gram occur in every decade from the third through the ninth, with 83 percent calcified, and with at least 70 percent calcified in every decade in which they are present; infestations with 11 to 1,000 trichinae per gram occur in all decades from the third through the tenth, with 100 percent of cases calcified. Of the 87 cases in the intermediate group, with 1 to 10 trichinae per gram, the 14 uncalcified cases are distributed as follows: Third decade, 2; fourth decade, 3; fifth decade, 3; sixth decade, 3; seventh decade, 2; eighth decade, 1. Apparently calcification can be more definitely correlated with intensity of infestation than with age, since light cases, always found uncalcified, occur in almost all decades, heavy cases, always found calcified, in almost all decades, and intermediate infestations, both calcified and uncalcified, in almost all decades, precisely the results to be expected from the operation of an intensity factor. On the other hand, light infestations are never calcified in any decade, or heavy infestations uncalcified in any decade, whereas light ones should be calcified in later decades, and heavy ones uncalcified in earlier decades, if the age factor were the determinant for calcification regardless of intensity of infestation.

The possibility that there is a group of cases of the intensity of less than 1 trichina per gram, with the trichinae calcified, which would not be detected with our routine technique, is still evident, and is one that we are investigating by a suitable technique. However, if we assume that we shall find as many cases of this intensity that are calcified as we have found uncalcified, the percentages from light through intermediate to heavy infestations will be of the order of 50, 83, and 100 percent, or still of the order of increasing calcification proportional to increasing intensity of infestation. The theory and the data are still in line with the known findings of pathology, to the effect that the mobilization of defense and healing processes are usually roughly proportional to the intensity of attack on and injury to a host organism. At this time we conclude only that our data still sustain the theory, leaving it to further findings to establish or disprove the theory.

With rather complete clinical records for all of our 174 positive cases, we had hoped to be able to correlate our findings on intensity of infestation with clinical symptoms. However, not one of our cases had a clinical history of trichinosis, and this is true also for all of the

198 positive cases recorded in incidence studies in the literature which we have already mentioned. That some of our cases with heavy infestations developed more or less typical clinical trichinosis can not be doubted, and probably there was clinical trichinosis, perhaps atypical, in those with more moderate infestations. There is a large body of published data relating to cases of trichinosis that have come to necropsy, but unfortunately there is almost a complete lack of quantitative data as to the numbers of trichinae found in specified amounts of muscle examined. The few that have come to our attention are as follows:

Smith (*4*) records 9 cases of trichinosis, with 5 deaths. In one case almost 200,000 trichinae per cubic inch were found at necropsy (i. e., approximately 12,800 per gram).

Wislizenus (*5*) records 5 cases, a mother, 3 children of 8, 10, and 12 years, and a hired man. An 8-year old child died, and at necropsy the gastrocnemius showed as many as 100 trichinae in a piece the size of a pinhead.

Coupland (*6*) mentions finding many trichinae in the muscles of a case at necropsy. In 1 grain of thigh muscle there were 180 cysts (i. e., approximayely 2,700 per gram). He makes a rough estimate of 75,000,000 worms in the entire body.

Partridge (*7*) records 14 cases, with 2 deaths. The necropsies were positive, with as many as 13 trichinae in one-tenth grain of flesh (i. e., approximately 1,950 per gram).

Rau (*8*) records 4 cases in one family, with 2 deaths, those of the mother and a 13-year old daughter. Large numbers of trichinae were found in both at necropsy. He estimates that the daughter had 30,000 to 100,000 trichinae per cubic inch (i. e., approximately 1,918 to 6,393 per gram), and the mother 3,000 to 26,000 trichinae per cubic inch (i. e., approximately 192 to 1,665 per gram). The method of estimating the number per cubic inch is not given. He states that the deltoid muscle of the daughter was examined microscopically, and was found heavily infested, showing 12 to 18, and, in some parts, 42 trichinae to a field view. In the mother, the deltoid showed 3 to 9, the rectus femoris 2 to 6, and the diaphragm 1 to 3 trichinae to a microscope field. The field of the microscope, using an A eyepiece and an 8/10 objective, is specified as 0.5 mm.

Sears (*9*) mentions finding on biopsy 13 trichinae in the gastrocnemius in one field.

Bloch (*10*) states that, in the biopsy of a case that recovered, the biceps showed up to 10 trichinae per low power field; in another case (*11*), there were as many as 12 unencapsulated trichinae in a piece of muscle about 2 mm square examined with low power.

Chandler (*12*), as noted by Hall and Collins (*1*), reports a fatal case in which the number present was "even greater" than a little over 900 trichinae per gram.

These data are too incomplete and unsatisfactory to permit of statistical treatment leading to any valid conclusions. Even if we had more specific data covering the numbers of trichinae in muscles, our conclusions necessarily would have to be conditioned by a number of variable factors. It is clear that any single figure, based on intensity of infestation in any one set of muscles, has only limited application, and in the cases cited different muscles are involved. It is also clear that there must be a fairly wide range in the tolerance of different individuals to infestations with trichinae. However, by disregarding these considerations and reducing the above estimates wherever possible to number of trichinae per gram of muscle, it would appear that in the fatal cases there have been from approximately 1,000 larvae per gram of muscle (*12*) or 192 to 1,665 per gram (*8*), up to 12,800 per gram (*4*). Our own results indicate that an infestation with nearly 1,000 larvae per gram may not be fatal.

It is unsafe to draw conclusions from so few data, especially with so many variables in muscles involved, resistance of patient, the possibility that some cases represent repeated infections rather than 1 infection, and other factors, but the possibility that 1,000 larvae per gram of diaphragm might be near the upper limit of infestations which can be survived is tentatively suggested for consideration as relevant data become available in the future. This suggestion is based on our findings of 2 cases surviving infestations with almost 1,000 per gram and the above data on fatal cases showing from approximately 1,000 per gram (*12*), less than 2,000 per gram (*8*), less than 3,000 per gram (*6*), less than 7,000 per gram (*8*), and over 12,000 per gram (*4*). On these meager data we initiate a search for some approximate upper limit of infestation that may be survived, and for the lower limit of infestation which is always, or almost always, fatal. Tentatively, and as a basis for more critical consideration of the subject in the future, we suggest the following designations for our groupings in table 2: Less than 1 trichina per gram of diaphragm muscle, "very light;" 1 to 10, "light;" 11 to 50, "very moderate;" 51 to 100, "moderate;" 101 to 500, "heavy;" 501 to 1,000, "severe;" and over 1,000, "critical." It is not intended to mean that 1 trichina more or less shifts a case from one bracket to another, but to outline tangibly groups that may be used as a basis for further study, and to invite attention to the possible clinical implications of the quantitative data.

Slightly more than a fifth of our diaphragms (205) came from St. Elizabeths Hospital in Washington. The patients of this hospital are all mental cases, and the period of hospitalization is commonly much longer than in the other hospitals from which we received material. In addition, there is available a considerable body of data regarding the patients. The results we have obtained from these cases appear to be significant in several respects. We shall consider here only their bearing on the incidence of trichinae in the population as a whole and, incidentally, on the longevity of the worms.

Of the 205 cases, 27, or 13.2 percent, were positive. This is lower than the 17.4 percent found for the entire series. The patients appear to represent, proportionally, the same racial and economic groups as the remainder of the series.

The data regarding length of hospitalization as correlated with incidence may be summarized as follows:

Length of hospitalization	Less than 1 year	1 to 5 years	Over 5 years
Total number of cases examined	59	66	80
Percentage positive for trichinae	16.9	13.6	10.0

Although the numbers are too small to be statistically significant, the consistency of the drop in the percentage of positive cases as the length of hospitalization increases, 16.9, 13.6, and 10.0, suggests that there is reality in the relationship to the time in the hospital, and that the low incidence in patients hospitalized for more than 5 years may be correlated with hospitalization under conditions limiting the consumption of pork to pork which is adequately cooked. Moreover, the incidence in patients hospitalized for less than one year is close to that found for the series as a whole, suggesting strongly that the mental condition of the patients is of little or no significance as regards any low incidence. Insanity is usually associated with increased parasitism.

The inclusion of hospitalized mentally deranged, to the extent of over 20 percent of our cases, overloads our sample far beyond the proportion in which this group is present in the general population. The removal of this low-incidence group from our total results in showing an incidence of 18.6 percent for our group of persons not hospitalized for mental conditions. However, a true incidence figure would cover these hospitalized cases in their proportion to the total population, and our general incidence for 1,000 cases could evidently be shifted by increasing or decreasing its content of high- or low-incidence groups. As it stands, this low-incidence group is more or less balanced by some high-incidence groups.

The distribution of the 27 positive cases according to the nature of the infestations, whether with live, mixed, or dead trichinae, yields also data bearing on the subject of longevity of trichinae. Using the same time groupings as above, we have the following:

Length of hospitalization	Less than 1 year	1 to 5 years	Over 5 years	Totals for all cases
Live infestations	3	3	0	6
Mixed infestations	2	3	2	7
Dead infestations	5	3	6	14

Infestations with live trichinae only are present in patients with relatively short periods of hospitalization; and, although there are 6 such cases in those hospitalized up to 5 years, there are no such cases after 5 years. A similar finding is obtained when the average hospitalization of patients with the 3 types of infestation is considered, the data showing the following:

Average hospitalization, with live infestations: 1 year, 10 months. Average hospitalization, with mixed infestations: 4 years, 11 months. Average hospitalization, with dead infestations: 7 years, 6 months.

Although the number of our positive cases is still too small to warrant any positive conclusions, some further speculations on longevity of the organism are suggested by our data in connection with the fact that the chance of infection during the period of hospitalization is very slight. Although infestations with only live trichinae present in the diaphragm occur in our series only during the first 5 years of hospitalization, live worms are present in mixed infestations with live and dead trichinae for a longer period. Of the two such cases in our series, one is in a patient hospitalized for 7 years, and the other in a patient hospitalized for 19 years and with 6 trichinae per gram. As this latter case appears to indicate that trichinae may survive for 19 years, the possibility of infection from outside sources during the period of hospitalization was investigated for this case. Dr. S. A. Silk, clinical director of the hospital, was kind enough to check the records for this patient, and he has written us as follows:

"This patient during his entire residence here was restricted to a ward, never having had ground parole, nor was he ever away from the institution on visits. At various times he performed light work in the dairy and other hospital establishments, but it is unlikely that he ate any food other than that furnished by the institution, since he had no funds to his credit here which he could have used for the purchase of any luxuries; nor did any relatives or friends ever visit him here. As he always worked under supervision he could not have wandered away from the hospital for even a few minutes."

This case may be interpreted in at least two possible ways, as follows: (1) It represents an infestation acquired before entering hos-

pital, and correctly indicates that trichinae may live for at least 19 years; or (2) it represents an infestation acquired before entering hospital and still present as dead trichinae, plus a superimposed second infestation acquired since entering hospital and still present as live trichinae, and hence throws no light on the matter of longevity. It might be urged against the first interpretation that it runs somewhat counter to our other findings to the effect that the rapidity with which trichinae die and calcify is somewhat proportional to the degree of infestation, and that even with what we have termed a "light" infestation of this order we might expect death and calcification of trichinae to occur in less than 19 years; on the other hand, death and calcification are conditioned, in part, by such factors as food, calcium, vitamins, and tissue reactions, quite aside from a simple time factor, and this patient may have had unusual conditions in these respects. It might be urged against the second interpretation that it presupposes a flaw in the cooking of pork at the hospital or in the matter of the patient's access to food not cooked at the hospital, which seems unlikely; on the other hand, individual failures in the preparation of food, and improbable conduct and achievements on the part of insane patients, cannot be ruled out entirely. A longevity of 19 years for trichinae is in line with much that we find in the literature, but the evidence for such longevity, so far as we have seen it, is definitely unconvincing; it is based on such things as the finding of live trichinae at necropsy, with a history of clinical trichinosis many years previously, in a patient whose food habits were unsupervised and who was known to have eaten raw or undercooked pork in acquiring trichinosis, and such findings do not eliminate the possibility of later superimposed infections. As an isolated observation, our case is presented as a matter of record, with no selection of the alternative interpretations at this time.

SUMMARY

In the examination of diaphragms of 1,000 necropsy cases, 174 were found infested with trichinae, an incidence of 17.4 percent.

A preliminary report on the first 300 of our series of 1,000 diaphragms was made by Hall and Collins (*1*). The present study is based on the total of the 300 diaphragms reported by Hall and Collins and 700 additional diaphragms examined by the present authors.

Of the 1,000 cases, 824 cases, with 137 positive for trichinae, were from 10 hospitals in Washington, D. C.; 110 cases, with 24 positive for trichinae, were from the United States Marine Hospital, Baltimore, Md.; 66 cases, with 13 positive for trichinae, were from the United States naval hospitals at Philadelphia, Pa., Chelsea, Mass., Brooklyn, N. Y., and Portsmouth, Va.

Both the direct microscopic method and the digestion-Baermann method were used in the examinations of the diaphragms, and the results are recorded in number of trichinae per gram of muscle. Of 174 positive cases, there were 80 cases with dead trichinae only, 60 cases with live trichinae only, and 34 cases with both live and dead trichinae. Light infestations, up to 10 trichinae per gram, predominated over heavier infestations, the largest group, 50 percent of the total, being in the range from 1 to 10 trichinae per gram, and the next largest, 31.6 percent of the total being in the range of less than 1 per gram. Infestations with over 10 per gram made up 18.4 percent of the total positive cases.

The theory that the rapidity of the death and calcification of trichinae is more or less proportional to the intensity of infestation is still sustained by our data, without yet being conclusively established.

The incidence of trichinae in the mentally deranged shows that the incidence in patients hospitalized for less than 1 year is close to that found for the total series of 1,000 cases, and as length of hospitalization increases, the percentage of positive cases decreases. Apparently the mental condition of the patients is of little significance as regards a low incidence with trichinae, and apparently the average incidence is below that of our series of 1,000 cases because of the long periods of hospitalization with food properly cooked, thereby shortening the period of exposure to trichinae and diminishing the chance of infection.

The findings from the present study provide confirmation of the findings in the earlier study of Hall and Collins (*1*). The higher incidence obtained is probably more accurate for the groups involved, as it rests on a much broader statistical basis; but any incidence obtained would vary more or less with an increase or decrease in the size of population groups of relatively high or relatively low incidence in our total sample. The general incidence for the United States will have to be ascertained in other ways, and we are carrying out a study that will give more precise information, but the known facts clearly indicate that the problem of trichinosis and its control is one of national concern.

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DEATHS DURING WEEK ENDED APRIL 9, 1938

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

	Week ended Apr. 9, 1938	Corresponding week, 1937
Data from 86 large cities in the United States:		
Total deaths	8,518	9,381
Average for 3 prior years	9,098	
Total deaths, first 14 weeks of year	124,328	142,237
Deaths under 1 year of age	511	601
Average for 3 prior years	612	
Deaths under 1 year of age, first 14 weeks of year	7,583	8,777
Data from industrial insurance companies:		
Policies in force	69,667,038	69,637,091
Number of death claims	13,403	14,956
Death claims per 1,000 policies in force, annual rate	10.0	11.2
Death claims per 1,000 policies, first 14 weeks of year, annual rate	10.1	11.5

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

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers.

In these and the following tables a zero (0) is to be interpreted to mean that no cases or deaths occurred, while leaders (------) indicate that cases or deaths may have occurred, although none was reported.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 16, 1938, and Apr. 17, 1937

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937
New England States:								
Maine	2	0	19	10	114	9	0	0
New Hampshire	0	0	-------	-------	18	73	0	0
Vermont	0	3	-------	-------	67	1	0	0
Massachusetts	6	2	-------	-------	317	714	2	9
Rhode Island	0	2	1	-------	-------	211	0	1
Connecticut	5	1	4	9	46	517	0	0
Middle Atlantic States:								
New York	34	45	[1] 5	[1] 23	3,769	1,073	10	16
New Jersey	15	14	11	5	977	2,582	2	5
Pennsylvania	33	33	-------	-------	5,932	737	7	15
East North Central States:								
Ohio	12	21	-------	147	2,994	900	3	14
Indiana	15	9	5	24	1,090	203	0	5
Illinois	23	30	23	33	3,412	209	3	8
Michigan [2]	7	11	2	7	4,027	84	4	4
Wisconsin	7	3	29	60	2,521	24	0	1
West North Central States:								
Minnesota	2	8	1	-------	121	20	1	1
Iowa	2	10	-------	2	196	9	2	0
Missouri	15	20	48	103	711	31	0	1
North Dakota	0	0	13	22	42	-------	0	1
South Dakota	1	1	-------	-------	-------	-------	1	1
Nebraska	0	1	-------	-------	100	70	1	0
Kansas	8	3	18	6	662	42	1	0
South Atlantic States:								
Delaware	2	2	-------	-------	31	60	0	0
Maryland [2]	11	7	5	15	56	737	1	4
District of Columbia	2	4	2	-------	19	94	1	3
Virginia	11	10	-------	-------	835	668	4	19
West Virginia	7	17	28	51	507	53	6	9
North Carolina	11	19	7	77	2,582	248	2	2
South Carolina	3	2	181	429	253	41	0	0
Georgia [3]	6	9	-------	247	305	-------	1	4
Florida	4	9	2	-------	364	-------	3	18

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 16, 1938, and Apr. 17, 1937—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937
East South Central States:								
Kentucky	16	5	12	34	526	315	5	13
Tennessee	6	6	41	154	309	18	1	2
Alabama [2]	10	11	80	365	693	11	3	15
Mississippi [2]	6	5	----	----	----	----	2	1
West South Central States:								
Arkansas	11	1	69	82	205	----	0	1
Louisiana	5	13	7	26	15	7	0	2
Oklahoma [4]	7	8	127	133	146	61	0	3
Texas	83	42	358	763	535	1,011	1	6
Mountain States:								
Montana	1	2	----	7	16	----	0	1
Idaho	1	3	7	38	16	24	0	2
Wyoming	0	0	----	----	46	2	0	0
Colorado	9	10	----	----	435	7	0	1
New Mexico	4	1	4	1	100	80	0	1
Arizona	2	1	53	30	40	186	0	1
Utah [3]	6	0	----	----	374	23	1	0
Pacific States:								
Washington	4	0	----	1	18	54	0	1
Oregon [5]	3	0	55	39	43	7	0	0
California	30	15	40	258	541	214	1	1
Total	398	419	1,257	3,201	36,126	11,430	69	192
First 15 weeks of year	8,547	7,637	37,297	262,793	488,032	104,153	1,295	2,539

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fever		Whooping cough
	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938
New England States:									
Maine	0	1	15	25	0	0	3	1	57
New Hampshire	0	0	7	14	0	0	0	0	6
Vermont	0	0	13	9	0	1	0	0	8
Massachusetts	0	0	428	308	0	0	0	1	86
Rhode Island	0	0	18	56	0	0	0	0	0
Connecticut	0	0	133	177	0	0	0	0	46
Middle Atlantic States:									
New York	0	3	1,065	1,034	0	1	5	8	418
New Jersey	0	0	100	214	0	0	1	2	88
Pennsylvania	0	1	625	1,077	0	0	7	8	305
East North Central States:									
Ohio	0	1	389	419	13	2	0	7	235
Indiana	0	0	117	218	61	14	3	1	28
Illinois	2	1	565	835	33	60	4	4	96
Michigan [3]	0	2	481	720	13	13	1	6	253
Wisconsin	1	0	164	289	7	12	1	4	192
West North Central States:									
Minnesota	0	2	113	163	12	13	0	0	27
Iowa	1	0	204	287	46	48	2	3	27
Missouri	0	0	178	478	23	47	3	3	22
North Dakota	0	0	17	16	16	13	0	0	21
South Dakota	0	0	10	63	9	2	0	1	16
Nebraska	0	0	36	62	3	8	1	1	4
Kansas	0	1	153	401	45	37	1	0	92
South Atlantic States:									
Delaware	0	0	12	11	0	0	0	1	12
Maryland [2]	0	0	63	50	0	0	1	0	44
District of Columbia	0	1	26	21	0	0	2	2	7
Virginia	0	0	41	19	0	0	2	2	122

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended Apr. 16, 1938, and Apr. 17, 1937—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid and paratyphoid fever		Whooping cough
	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938	Week ended Apr. 17, 1937	Week ended Apr. 16, 1938
South Atlantic States—Con.									
West Virginia	0	3	24	56	0	0	1	4	65
North Carolina	0	0	33	28	1	0	2	3	415
South Carolina	0	1	6	3	0	0	0	4	55
Georgia [3]	0	0	8	6	1	0	3	3	76
Florida	0	0	6	15	4	0	3	5	2
East South Central States:									
Kentucky	0	1	45	57	16	2	2	4	47
Tennessee	2	1	24	25	2	0	2	6	36
Alabama [3]	1	1	15	7	0	0	0	2	60
Mississippi [2]	1	2	1	7	1	0	5	5	----
West South Central States:									
Arkansas	1	0	3	3	4	0	7	0	25
Louisiana	1	0	6	12	0	0	6	13	9
Oklahoma [4]	1	0	19	33	17	7	1	1	90
Texas	1	2	118	208	32	11	7	15	303
Mountain States:									
Montana	0	0	18	39	10	9	0	1	37
Idaho	0	0	8	21	21	7	0	1	18
Wyoming	0	0	7	14	2	4	0	0	6
Colorado	0	0	43	33	6	15	1	0	35
New Mexico	0	0	14	29	0	0	0	1	20
Arizona	0	0	11	16	2	0	1	0	69
Utah [2]	0	0	40	18	0	0	0	0	27
Pacific States:									
Washington	0	0	34	15	27	6	0	2	128
Oregon [5]	0	1	53	35	20	15	0	1	11
California	2	4	181	213	85	18	5	4	446
Total	14	29	5,690	7,859	532	365	83	130	4,192
First 15 weeks of year	307	323	90,774	103,233	8,171	4,698	1,777	1,644	62,360

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Apr. 16, 1938, 7 cases as follows: Georgia, 5; Alabama, 2.
[4] Figures for 1937 are exclusive of Oklahoma City and Tulsa.
Rocky Mountain spotted fever, week ended Apr. 16, 1938, Oregon, 1 case.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
March 1938										
Alabama	31	49	659	59	4,367	19	4	54	4	12
Arkansas	6	36	555	107	1,423	31	2	34	31	19
Colorado	2	58	169	----	2,922	----	1	274	39	6
Idaho	0	3	39	----	6	----	2	87	48	5
Indiana	8	135	74	----	4,245	----	2	668	173	8
Iowa	6	17	43	----	678	----	2	1,144	171	4
Maine	0	17	28	----	879	----	0	72	0	6
Massachusetts	9	17	----	----	1,258	----	0	1,712	0	3
Michigan	5	49	5	1	22,151	----	2	2,822	53	26
Minnesota	1	10	16	2	481	----	2	716	93	6
Missouri	7	76	393	38	4,045	----	0	924	205	13
New Jersey	3	60	97	1	5,745	----	1	672	0	8
New Mexico	0	26	32	----	423	5	0	103	1	6
Vermont	0	4	----	----	678	----	2	80	0	0

Summary of monthly reports from States—Continued

March 1938

	Cases
Chickenpox:	
Alabama	245
Arkansas	64
Colorado	382
Idaho	70
Indiana	389
Iowa	455
Maine	282
Massachusetts	1,943
Michigan	2,726
Minnesota	862
Missouri	340
New Jersey	3,600
New Mexico	178
Vermont	165
Colorado tick fever:	
Colorado	1
Conjunctivitis:	
Idaho	11
Dengue:	
Alabama	1
Dysentery:	
Arkansas (bacillary)	1
Colorado (amoebic)	2
Michigan (amoebic)	3
Michigan (bacillary)	2
Minnesota (bacillary)	1
Missouri	5
NewJersey (amoebic)	1
Encephalitis, epidemic or lethargic:	
Alabama	1
Arkansas	1
Colorado	1
Michigan	2
Missouri	4
New Jersey	3
German measles:	
Alabama	40
Idaho	4
Iowa	8
Maine	10
Massachusetts	92
Michigan	305
New Jersey	121
New Mexico	1
Vermont	21
Hookworm disease:	
Arkansas	1
Jaundice, infectious:	
Michigan	1

March 1938—Continued

	Cases
Mumps:	
Alabama	187
Arkansas	43
Colorado	79
Idaho	185
Indiana	88
Iowa	126
Maine	94
Massachusetts	1,321
Michigan	1,654
Missouri	376
New Jersey	1,492
New Mexico	41
Vermont	634
Ophthalmia neonatorum:	
Alabama	2
Arkansas	4
Colorado	1
Massachusetts	74
New Jersey	30
New Mexico	1
Paratyphoid fever:	
Colorado	2
Massachusetts	8
Puerperal septicemia:	
New Mexico	1
Rabies in animals:	
Alabama	85
Arkansas	23
Indiana	51
Massachusetts	8
Michigan	4
Missouri	9
New Jersey	20
New Mexico	3
Rocky Mountain spotted fever:	
Colorado	1
Septic sore throat:	
Arkansas	1
Colorado	15
Idaho	19
Iowa	16
Massachusetts	28
Michigan	33
Minnesota	14
Missouri	53
New Jersey	27
New Mexico	12

March 1938—Continued

	Cases
Tetanus:	
Alabama	6
Massachusetts	1
Michigan	1
Trachoma:	
Arkansas	10
Idaho	2
Indiana	1
Michigan	2
Missouri	59
New Jersey	1
Trichinosis:	
Massachusetts	5
Michigan	4
Minnesota	3
Tularaemia:	
Alabama	1
Arkansas	6
Michigan	1
Minnesota	1
Missouri	1
Typhus fever:	
Alabama	3
Undulant fever:	
Alabama	1
Indiana	2
Iowa	14
Maine	2
Massachusetts	4
Michigan	20
Minnesota	4
New Jersey	5
New Mexico	1
Vermont	3
Vincent's infection:	
Idaho	2
Maine	12
Michigan	13
Whooping cough:	
Alabama	127
Arkansas	144
Colorado	90
Idaho	78
Indiana	94
Iowa	115
Maine	246
Massachusetts	572
Michigan	1,067
Minnesota	140
Missouri	197
New Jersey	818
New Mexico	199
Vermont	123

CASES OF VENEREAL DISEASES REPORTED FOR FEBRUARY 1938

These reports are published monthly for the information of health officers in order to furnish current data as to the prevalence of the venereal diseases. The figures are taken from reports received from State and city health officers. They are preliminary and are therefore subject to correction. It is hoped that the publication of these reports will stimulate more complete reporting of these diseases.

Reports from States

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Alabama	1,790	6.18	287	0.99
Arizona [1]				
Arkansas	958	4.68	325	1.59
California	1,755	2.85	1,185	1.93
Colorado	23	.21	14	.13
Connecticut	194	1.12	97	.56
Delaware	289	11.07	46	1.76
District of Columbia	222	3.54	144	2.30
Florida [2]	2,189	13.11	285	1 71
Georgia	2,104	6.82	347	1.12
Idaho	42	.85	31	.63
Illinois	1,757	2.23	1,041	1.32

See footnotes at end of table.

Reports from States—Continued

	Syphilis		Gonorrhea	
	Cases reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Indiana	357	1.03	118	0.34
Iowa	280	1.10	252	.99
Kansas	230	1.23	102	.55
Kentucky	776	2.66	342	1.17
Louisiana	636	2.98	88	.41
Maine	61	.71	40	.47
Maryland	977	5.82	239	1.42
Massachusetts	461	1.04	445	1.01
Michigan	1,290	2.67	593	1.23
Minnesota	263	.99	190	.72
Mississippi	2,266	11.20	2,447	12.10
Missouri	573	1.44	121	.30
Montana [3]	70	1.30	13	.24
Nebraska	67	.49	86	.63
Nevada	26	2.57	2	.02
New Hampshire	40	.78	40	.78
New Jersey	891	2.05	266	.61
New Mexico	115	2.73	26	.62
New York	3,597	2.78	1,793	1.38
North Carolina	3,803	1.09	583	1.67
North Dakota	37	.52	31	.44
Ohio	1,484	2.20	419	.62
Oklahoma	429	1.68	287	1.13
Oregon	84	.82	114	1.11
Pennsylvania [3]	1,606	1.58	337	.33
Rhode Island	105	1.54	37	.54
South Carolina [1]				
South Dakota	38	.55	21	.30
Tennessee	1,199	4.14	422	1.46
Texas [1]				
Utah	27	.52	30	.58
Vermont	10	.26	17	.44
Virginia	1,055	3.90	324	1.20
Washington	321	1.94	240	1.45
West Virginia [3]	452	2.42	145	.78
Wisconsin	41	.14	161	.55
Wyoming [4]	12	.51	3	.13
Total	35,002	2.90	14,176	1.17

Reports from cities of 200,000 population or over

Akron, Ohio [1]				
Atlanta, Ga	355	12.37	130	4.53
Baltimore, Md	555	6.73	144	1.75
Birmingham, Ala	247	8.75	62	2.20
Boston, Mass	166	2.10	166	2.10
Buffalo, N. Y	191	3.23	63	1.06
Chicago, Ill	971	2.72	712	2.00
Cincinnati, Ohio [1]				
Cleveland, Ohio [1]				
Columbus, Ohio	90	2.94	24	.79
Dallas, Tex	349	12.05	72	2.49
Dayton, Ohio	63	3.00	16	.76
Denver, Colo	8	.27	3	.10
Detroit, Mich	591	3.41	278	1.61
Houston, Tex. [5]	174	5.20	55	1.64
Indianapolis, Ind	24	.64	35	.93
Jersey City, N. J	11	.34	0	
Kansas City, Mo	106	2.52	8	.19
Los Angeles, Calif	618	4.32	381	2.66
Louisville, Ky	398	12.28	123	3.80
Memphis, Tenn	357	13.37	56	2.10
Milwaukee, Wis. [6]				
Minneapolis, Minn	87	1.79	57	1.17
Newark, N. J	342	7.38	148	3.19
New Orleans, La	45	.94	25	.52
New York, N. Y	2,262	3.10	1,324	1.81
Oakland, Calif	32	1.06	28	.92

See footnotes at end of table.

Reports from cities of 200,000 population or over—Continued

	Syphilis		Gonorrhea	
	Case reported during month	Monthly case rates per 10,000 population	Cases reported during month	Monthly case rates per 10,000 population
Omaha, Nebr	29	1.32	15	0.68
Philadelphia, Pa	473	2.38	----	----
Pittsburgh, Pa	205	3.00	26	.38
Portland, Oreg	55	1.75	73	2.33
Providence, R. I	56	2.16	20	.77
Rochester, N. Y	43	1.28	39	1.16
St. Louis, Mo	253	3.03	98	1.17
St. Paul, Minn	20	.71	15	.53
San Antonio, Tex	117	4.65	66	2.63
San Francisco, Calif	148	2.21	152	2.27
Seattle, Wash	175	4.61	155	4.08
Syracuse, N. Y	57	2.62	37	1.70
Toledo, Ohio [1]	----	----	----	----
Washington, D. C.[2]	222	3.54	144	2.30

[1] No report for current month.
[2] Incomplete.
[3] Only cases of syphilis in the infectious stage are reported.
[4] From report submitted to medical director of epidemiological studies.
[5] Reported by Jefferson Davis Hospital.
[6] No report during present fiscal year.
[7] Reported by social hygiene clinic.

WEEKLY REPORTS FROM CITIES

City reports for week ended Apr. 9, 1938

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	188	327	92	7,311	846	2,582	26	415	23	1,413	----
Current week [1]	123	89	30	11,595	625	1,966	22	393	18	1,202	----
Maine:											
Portland	0	----	0	11	1	0	0	0	1	10	21
New Hampshire:											
Concord	0	----	0	0	2	3	0	0	0	0	8
Manchester	0	----	0	0	4	5	0	0	0	0	20
Nashua	0	----	0	0	1	0	0	0	0	0	7
Vermont:											
Barre	0	----	0	0	0	0	0	1	0	0	2
Burlington	0	----	0	4	0	0	0	0	0	0	10
Rutland	0	----	0	0	2	0	0	0	0	0	10
Massachusetts:											
Boston	0	----	1	216	20	131	0	10	0	25	206
Fall River	0	----	0	2	1	1	0	2	0	4	23
Springfield	0	----	0	7	0	9	0	2	0	6	46
Worcester	0	----	0	2	7	25	0	2	0	6	51
Rhode Island:											
Pawtucket	0	----	0	1	0	0	0	0	0	0	16
Providence	0	----	0	0	11	19	0	2	0	19	65
Connecticut:											
Bridgeport	0	----	0	0	1	18	0	0	0	0	36
Hartford	0	----	0	3	3	23	0	3	1	0	48
New Haven	0	1	0	3	1	3	0	4	0	13	34
New York:											
Buffalo	----	0	1	7	16	74	0	7	0	8	143
New York	31	13	3	1,993	150	447	0	87	3	218	1,552
Rochester	0	----	0	3	7	16	0	4	1	4	73
Syracuse	1	----	0	32	2	11	0	1	0	0	34

[1] Figures for Springfield, Illinois, estimated; report not received.

City reports for week ended Apr. 9, 1938—Continued

State and city	Diphtheria cases	Influenza cases	Influenza deaths	Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
New Jersey:											
Camden	2	1	1	28	1	6	0	0	1	0	41
Newark	1	----	1	17	10	17	0	7	0	35	126
Trenton	0	----	0	2	1	2	0	2	0	2	42
Pennsylvania:											
Philadelphia	2	1	2	832	43	148	0	29	0	28	489
Pittsburgh	6	1	0	119	12	28	0	5	0	22	137
Reading	0	----	2	16	1	2	0	0	0	7	43
Scranton	0	----	----	44	----	1	0	----	0	0	----
Ohio:											
Cincinnati	0	----	1	8	12	12	0	5	0	7	140
Cleveland	3	12	1	242	15	60	0	11	0	55	184
Columbus	2	----	0	151	7	5	2	0	0	2	87
Toledo	0	----	0	114	4	5	5	2	0	10	61
Indiana:											
Anderson	0	----	0	131	0	3	1	0	0	0	10
Fort Wayne	0	----	0	70	4	7	0	0	0	2	30
Indianapolis	5	----	0	253	12	24	2	5	0	2	107
South Bend	0	----	0	28	4	6	0	0	0	0	20
Terre Haute	1	----	0	8	0	2	0	0	0	0	18
Illinois:											
Alton	0	----	0	0	1	6	0	0	0	0	15
Chicago	11	7	0	1,669	34	257	2	39	1	48	690
Elgin	0	----	0	0	0	4	0	0	0	1	7
Moline	0	----	0	22	2	5	0	0	0	0	9
Springfield	----	----	----	----	----	----	----	----	----	----	----
Michigan:											
Detroit	4	2	0	2,266	18	150	0	18	0	98	270
Flint	2	----	0	53	3	45	0	0	0	23	18
Grand Rapids	0	----	0	129	4	7	0	0	0	2	32
Wisconsin:											
Kenosha	0	----	0	28	0	3	0	0	1	1	10
Madison	0	----	0	50	1	3	0	0	0	7	13
Milwaukee	0	----	0	700	5	18	0	5	0	56	108
Racine	0	----	0	245	1	7	0	1	0	13	14
Superior	0	----	0	7	0	7	0	0	0	0	8
Minnesota:											
Duluth	0	----	0	2	0	1	0	0	0	8	20
Minneapolis	1	----	1	160	6	36	8	0	0	0	91
St. Paul	0	----	0	4	0	9	0	4	0	0	62
Iowa:											
Cedar Rapids	0	----	----	2	----	0	0	----	0	1	----
Davenport	0	----	----	3	----	0	0	----	0	0	----
Des Moines	0	----	0	12	0	33	0	0	0	2	21
Sioux City	0	----	----	0	----	2	0	----	0	4	----
Waterloo	2	----	----	100	----	6	0	----	0	0	----
Missouri:											
Kansas City	2	----	0	94	14	26	0	4	0	5	119
St. Joseph	0	----	0	33	3	1	0	1	0	0	32
St. Louis	9	----	0	5	9	86	2	5	0	2	220
North Dakota:											
Fargo	0	----	0	0	2	5	0	0	0	0	5
Grand Forks	0	----	----	67	----	0	0	----	0	0	----
Minot	0	----	0	0	0	0	2	0	0	1	4
South Dakota:											
Aberdeen	0	----	----	0	----	0	0	----	0	3	----
Nebraska:											
Omaha	0	----	0	49	6	2	0	0	0	0	46
Kansas:											
Lawrence	0	2	0	8	0	1	0	0	0	1	1
Topeka	0	----	0	182	1	4	0	0	0	9	22
Wichita	0	----	0	9	2	4	0	1	0	3	23
Delaware:											
Wilmington	0	----	0	16	5	2	0	0	0	4	35
Maryland:											
Baltimore	2	2	0	19	15	34	0	9	2	36	192
Cumberland	0	----	0	2	1	1	0	0	0	0	10
Frederick	0	----	0	0	0	3	0	0	0	0	4
District of Columbia:											
Washington	3	1	0	27	13	23	0	10	1	13	152
Virginia:											
Lynchburg	1	----	0	0	1	0	0	0	0	2	6
Norfolk	0	----	0	40	3	6	0	1	0	0	24
Richmond	1	----	0	94	3	3	0	2	0	0	51
Roanoke	0	----	0	0	1	0	0	0	0	8	10

City reports for week ended Apr. 9, 1938—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
West Virginia:											
Charleston	0	------	0	8	2	0	0	1	0	0	23
Huntington	1	------	--------	3	-------	3	0	-------	0	0	--------
Wheeling	0	------	0	234	2	1	0	1	0	14	22
North Carolina:											
Gastonia	0	------	--------	74	-------	1	0	-------	0	1	--------
Raleigh	0	------	0	118	0	0	0	0	0	25	12
Wilmington	0	------	0	196	2	1	0	0	0	23	12
Winston-Salem	0	------	0	9	0	0	0	2	0	37	14
South Carolina:											
Charleston	0	8	0	16	3	1	0	1	0	0	17
Florence	0	------	0	11	0	0	0	0	0	0	8
Greenville	1	------	1	1	0	0	0	0	0	4	7
Georgia:											
Atlanta	0	5	0	27	9	3	0	6	0	5	88
Brunswick	0	------	0	16	0	0	0	0	0	0	5
Savannah	0	3	2	38	2	0	0	4	0	0	29
Florida:											
Miami	3	1	1	80	5	0	0	5	0	0	47
Tampa	4	1	1	17	1	2	0	2	0	0	20
Kentucky:											
Ashland	1	------	0	2	1	0	0	0	0	3	4
Covington	0	------	0	0	2	0	0	0	0	0	11
Lexington	0	------	0	3	1	0	0	2	0	0	18
Louisville	9	2	0	406	8	57	0	1	0	12	72
Tennessee:											
Knoxville	1	1	0	26	3	2	0	2	1	4	29
Memphis	2	------	1	57	4	2	0	3	1	2	66
Nashville	0	------	1	66	4	6	0	0	0	4	52
Alabama:											
Birmingham	0	5	0	121	4	3	0	4	0	0	69
Mobile	0	------	0	9	3	0	0	1	0	0	22
Montgomery	2	------	--------	81	-------	0	0	-------	0	3	--------
Arkansas:											
Fort Smith	1	------	--------	3	-------	1	0	-------	1	1	--------
Little Rock	0	------	0	14	5	0	0	1	0	5	7
Louisiana:											
Lake Charles	0	------	0	0	1	0	0	0	0	0	5
New Orleans	3	6	4	3	12	2	0	12	4	18	179
Shreveport	0	------	0	1	5	0	0	3	0	0	42
Oklahoma:											
Oklahoma City	0	------	2	2	2	2	0	0	0	0	33
Tulsa	1	------	--------	92	-------	2	6	-------	0	7	--------
Texas:											
Dallas	1	1	1	7	4	9	0	4	0	8	60
Fort Worth	0	------	0	2	4	4	1	3	0	3	46
Galveston	1	------	0	0	1	0	0	0	0	0	8
Houston	4	1	0	0	7	5	0	11	0	0	64
San Antonio	0	------	1	0	6	0	0	7	0	1	63
Montana:											
Billings	0	------	0	0	1	2	0	0	0	4	9
Great Falls	0	------	0	2	2	3	0	0	0	12	8
Helena	0	------	0	0	0	2	0	0	0	2	1
Missoula	0	1	1	0	1	0	0	0	0	0	6
Idaho:											
Boise	0	------	0	0	1	1	2	1	0	0	6
Colorado:											
Colorado Springs	0	------	0	1	2	0	0	1	0	1	16
Denver	4	------	0	226	9	12	0	7	0	4	90
Pueblo	0	------	0	0	1	1	0	0	0	4	7
New Mexico:											
Albuquerque	0	------	0	3	3	2	0	1	0	1	12
Utah:											
Salt Lake City	0	------	0	181	1	10	2	1	0	8	34
Washington:											
Seattle	0	------	1	0	4	3	1	6	0	59	92
Spokane	0	2	2	2	3	1	0	1	0	17	35
Tacoma	0	------	0	0	1	4	1	1	0	7	34
Oregon:											
Portland	1	1	0	19	7	20	0	1	1	3	76
Salem	0	1	--------	0	-------	0	0	-------	0	0	--------
California:											
Los Angeles	14	13	1	32	21	53	0	16	1	34	363
Sacramento	0	------	0	13	0	4	0	2	0	50	31
San Francisco	0	2	0	1	10	7	0	7	0	53	177

City reports for week ended Apr. 9, 1938—Continued

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Connecticut:			
New Haven	2	0	0
New York:			
Buffalo	1	0	0
New York	1	0	4
Pennsylvania:			
Philadelphia	1	0	0
Ohio:			
Cleveland	2	3	0
Toledo	0	0	1
Indiana:			
Indianapolis	1	0	0
Illinois:			
Chicago	2	0	0
Michigan:			
Detroit	1	0	0
Maryland:			
Baltimore	1	0	0
Virginia:			
Richmond	1	1	0
Florida:			
Miami	1	0	0
Alabama:			
Birmingham	3	2	0
Louisiana:			
New Orleans	1	0	1
Shreveport	0	3	0
California:			
Los Angeles	1	1	0

Encephalitis, epidemic or lethargic.—Cases: New York, 3; Kansas City, Mo., 1.
Pellagra.—Cases: Baltimore, 3; Washington, 1; Atlanta, 3; Savannah, 2; Montgomery, 1.
Typhus fever.—Cases: Atlanta, 1; Tampa, 1; Mobile, 1; Montgomery, 1.

FOREIGN AND INSULAR

CUBA

Habana—Communicable diseases—4 weeks ended April 9, 1938.—During the 4 weeks ended April 9, 1938, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	24	3	Scarlet fever	3	----
Lethargic encephalitis	1	----	Tuberculosis	11	3
Malaria	[1] 15	----	Typhoid fever	[1] 83	11

[1] Includes imported cases.

CZECHOSLOVAKIA

Communicable diseases—January 1938.—During the month of January 1938, certain communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	1	----	Paratyphoid fever	7	2
Cerebrospinal meningitis	35	11	Poliomyelitis	6	1
Chickenpox	312	1	Puerperal fever	25	9
Diphtheria	3,093	154	Scarlet fever	1,827	18
Dysentery	16	1	Trachoma	56	----
Influenza	1,455	3	Tularaemia	2	----
Lethargic encephalitis	2	2	Typhoid fever	397	30
Malaria	40	----			

IRISH FREE STATE

Vital statistics—Fourth quarter ended December 31, 1937.—The following vital statistics for the Irish Free State for the quarter ended December 31, 1937, are taken from the Quarterly Return of Marriages, Births, and Deaths, issued by the Registrar General, and are provisional:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	3,620	4.9	Deaths from—Continued.		
Births	12,868	17.5	Influenza	126	0.17
Total deaths	9,920	13.5	Measles	20	----
Deaths under 1 year of age	889	[1] 69	Puerperal sepsis	8	[1] 62
Deaths from—			Scarlet fever	27	----
Cancer	910	1.24	Tuberculosis (all forms)	733	1.00
Diarrhea and enteritis (under 2 years)	143	----	Typhoid fever	21	----
Diphtheria	79	----	Whooping cough	35	----

[1] Per 1,000 births.

Vital statistics—Year 1937.—The following vital statistics for the Irish Free State for the year 1937 are taken from the Quarterly Return of Marriages, Births, and Deaths, issued by the Registrar General, and are provisional:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages	14,896	5.1	Deaths from—Continued.		
Births	56,564	19.2	Influenza	2,698	0.92
Total deaths	45,115	15.3	Measles	120	----------
Deaths under 1 year of age	4,057	[1] 72	Puerperal sepsis	44	[1] .78
Deaths from—			Scarlet fever	127	----------
Cancer	3,558	1.21	Tuberculosis (all forms)	3,582	1.22
Diarrhea and enteritis (under 2 years)	601	----------	Typhoid fever	65	----------
			Typhus fever	4	----------
Diphtheria	289	----------	Whooping cough	276	----------

[1] Per 1,000 births.

VIRGIN ISLANDS

Notifiable diseases—January–March 1938.—During the months of January, February, and March 1938, cases of certain notifiable diseases were reported in the Virgin Islands as follows:

Disease	January	February	March	Disease	January	February	March
Chickenpox	1	--------	20	Pellagra	--------	2	1
Filariasis	--------	--------	1	Pneumonia, broncho	--------	2	1
Gonorrhea	5	6	6	Sprue	--------	--------	1
Hookworm disease	5	1	8	Syphilis	12	22	9
Lymphogranuloma	1	--------	----------	Trachoma	--------	--------	1
Malaria	5	3	----------	Tuberculosis	1	2	1
Mumps	1	--------	----------	Typhoid fever	--------	2	1

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

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

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Nov. 28–Dec. 25, 1937	Week ended— January 1938					February 1938				March 1938			
						1	8	15	22	29	5	12	19	26	5	12	19	26
China:																		
Canton	C	102	14															
Hangchow	C	12	[1] 41															
Hong Kong	C	580	84	7		1		1										
	D	344	63	7				1										
Kwangchow Wan	C		62	12														
	D		26	10														
Macao	C	190	27	2														
Manchuria:																		
Dairen	C		6															
Kwantung Leased Territory	C	3																
Mukden	C		2															
Nanking	C		120															
	D		14															
Shanghai	C	1,804	1,414	237	22	3												
Swatow	C	24	44	101	2													
Tientsin	C		8															
Chosen: **Fusan**	C	1																
Dutch East Indies:																		
Celebes	C	[2] 6																
Macassar	C							1										
India	C	12,203	11,344	6,802	5,326	1,807	1,718	1,490	2,110	2,205	1,772	1,783						
	D	5,768	5,787	3,737	2,644	906	766	769	1,065	1,096	920	933						
Allahabad	C														1		1	
Assam	C	44	59	87	139	35	45	88	53	41	34	44	36	29	61	57	77	103
	D	16	25	53	56	22	22	40	34	23	15	23	23	14	23	32	38	40
Bassein	C															1		

[1] For 2 weeks.
[2] El Tor strain.

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

CHOLERA—Continued

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Nov. 28–Dec. 25, 1937	Week ended— January 1938					February 1938				March 1938			
						1	8	15	22	29	5	12	19	26	5	12	19	26
India—Continued.																		
Bombay Presidency	C	3,366	1,375	363	191	7	2	------	1	------	------	4	------	------	2	4	8	------
	D	1,571	686	171	117	6	1	------	------	------	------	2	------	------	1	2	6	------
Bombay	C	[3] 1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Calcutta	C	56	83	80	69	6	23	24	36	33	45	60	72	49	68	118	184	204
Central Provinces and Berar	C	286	860	356	113	18	4	6	12	------	3	14	14	25	10	10	61	132
Chittagong	C	------	------	------	------	------	------	------	------	------	------	------	1	------	1	------	------	------
Delhi	C	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Madras Presidency	C	1,844	826	1,204	2,654	890	910	727	569	818	------	452	236	------	139	137	56	------
	D	771	389	431	1,178	412	338	352	281	421	------	236	111	------	64	61	33	------
Madras	C	70	106	233	160	38	32	24	10	16	4	3	4	5	------	2	1	------
	D	18	43	34	40	6	7	3	8	5	2	2	------	2	------	2	------	------
Negapatam	C	3	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
	D	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Northwest Frontier Province	C	32	19	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Orissa Province	C	111	147	91	39	12	12	12	21	20	3	23	19	37	29	20	31	22
Punjab	C	29	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Rangoon	C	------	------	1	------	1	------	------	------	1	------	------	------	------	------	------	------	1
Sind State	C	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Vizagapatam	C	------	------	------	------	------	------	------	------	------	------	------	------	1	------	------	------	------
India (French):																		
Chandernagor Territory	C	------	4	4	1	------	------	1	2	4	6	4	------	------	------	------	------	------
Karikal Province	C	1	------	------	------	------	1	------	------	------	2	2	------	------	------	------	------	------
Pondichery Province	C	1	1	------	1	------	1	1	------	1	------	------	------	------	------	------	------	------
Indochina (French): [4]																		
Annam Province	C	------	37	364	94	5	20	12	7	19	61	151	72	54	1	2	4	6
Tonkin Province	C	320	4,179	2,342	509	15	26	7	2	9	12	27	2	14	1	8	29	17
Haiphong	C	56	577	44	1	------	------	------	------	------	------	------	------	------	------	------	------	------
	D	30	159	27	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Hanoi	C	------	284	361	39	------	3	------	------	------	------	------	------	------	------	------	10	7

Japan: [3]																			
Hiroshima	C	32	5																
Kobe	C		1																
Okayama Prefecture	C		5																
Sasebo	C																1		
Taku	C	1	3																
Tokuyama	C		10																
Tokyo	C		1																
Siam:																			
Bangkok	C		2																
Provinces	C	16	7									3							

[3] Imported.
[4] For reports prior to Aug. 29, 1937, see previous issues of PUBLIC HEALTH REPORTS.
[5] A report states that up to Sept. 30, cholera was reported in Japan, as follows: Hiogo Prefecture, 1 case, 1 death; Hiroshima Prefecture, 40 cases, 14 deaths; Yamaguchi Prefecture 2 cases, 1 death.

On vessels:
S. S. *Manila Maru* at Moji from Hong Kong---------- 1 case------ Aug 31, 1937
S. S. *Anking* at Singapore from Hong Kong---------- 1 case------ Sept. 10, 1937
S. S. *Sphinx* at Singapore from Hong Kong---------- 1 case------ Sept. 15, 1937

On vessels—Continued.
S. S. *Kiungchow* at Hong Kong from Shanghai---------- 3 cases------ Oct. 8, 1937
S. S. *Ranee* at Calcutta from Port Said and Blyth------ 1 case------ Dec. 13, 1937

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

PLAGUE[1]

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Nov. 28–Dec. 25, 1937	Week ended— January 1938					February 1938				March 1938			
						1	8	15	22	29	5	12	19	26	5	12	19	26
Argentina. (See table below.)																		
Belgian Congo	C		[2]2		2												4	
Bolivia:																		
Chuquisaca Department	C						2							35				
Sucre	C						[3]1											
Santa Cruz Department	C												[3]1					
Tarija Department	C						1	[4]53					3					
Brazil. (See table below.)																		
British East Africa:																		
Kenya	C	11	15	10							1		1	2				
Uganda	C	50	51	67	38	5	6	5	12	11	2	7	4	11				
	D	48	40	56	30	5	6	4	12	12	2	7	4	11				
Ceylon:																		
Colombo	C		1	1	1	1						1		1		1		
	D		1	1	1		1					1		1				
Plague-infected rats		2	3												2	3		
China:[5]																		
Dutch East Indies:																		
Java and Madura	C	213	223	311	247	67	63											
	D	212	220	311	247	67	63											
Pasoeroean (vicinity of)	C			5	2	2							1					
Ecuador:																		
Chimborazo Province—Chimbo	C														10			
Colimes	C						1											
Guayaquil	C		2		2		1	1	1	1	2			3	2	1	2	
	D		2		1			1	1		2				3		1	
Plague-infected rats		1	2	3	2							3				1		1
Parroquia Eloy Alfaro	C			1														
Egypt:																		
Asyut Province	C			1		1												
Beheira Province	C				1													
Gharbiya Province	C								1									
Girga Province	C		1															

Hawaii Territory: [6] Plague-infected rats:																		
Hawaii Island—Hamakua District:																		
Hamakua Mill Sector		4	3	4	8	1					1		1					
Kukaiau. [6]																		
Paauhau Sector [6]		1	1	5	2		1	2	3	2		2	1		1	2		
Paauilo					18													
Pohakea Sector. [6]																		
Maui Island:																		
Makawao District—Plague-infected rats					6													
Omaopio [6]		1																
Walluku District—Puunene	D						1											
India	C	1,697	1,996	1,874	446	185	510	298	432	513	545	707						
	D	747	821	742	658	99	237	187	229	213	202	322						
Allahabad	C									1					1			
Bassein	C	2				1				[7] 1	1			1				1
Bombay Presidency	C	62	82	59	51	8			2	14		7			13	11	8	
	D	42	48	36	37	4			2	7		2			6	9	2	
Central Provinces and Berar	C	285	582	592	390	36	91	58	113	188	232	190	156	260	98	413	225	570
Cochin	C	2		1														
Karachi	C	12																
Madras Presidency	C	111	80	175	160	67	65	81	63	54		54	64		7		9	
	D	59	41	84	84	38	35	53	27	21		30	24		5		2	
Mandalay	C									43						79		
	D									41						73		
Punjab	C																1	
Rangoon	C										1	[7] 1		1	2			2
Sind State	C	8																
Indochina (French) (see also table below): Sadec	C	1																
Madagascar. (See table below.)																		
Niger Territory. (See table below.)																		
Peru. (See table below.)																		
Senegal: Dakar	C	1																
Tunisia: Tunis: Plague-infected rats					1								1		1			
Union of South Africa	C	[8] 1	[8] 1							[8] 1		[8] 6		[8] 7				

[1] Including plague in the United States and its possessions.
[2] Includes 1 case of pneumonic plague.
[3] Pneumonic plague.
[4] Corrected reports.
[5] According to information dated Sept. 2, 115 cases of plague with 105 deaths occurred in Manchuria, China.
[6] Plague has also been reported in Hawaii Territory as follows: Week ended Nov. 20, 1937, 10 rats by mass inoculation in Omaopio, Makawao District, Maui Island; week ended Apr. 2, 1938, 2 rats in Kukaiau, and 1 rat in Paauhau Sector; week ended Apr. 9, 1 rat in Paauhau Sector, and 1 rat in Pohakea Sector.
[7] Imported.
[8] For 2 weeks.

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

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place	Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Nov. 28–Dec. 25, 1937	Week ended— January 1938: 1	8	15	22	29	February 1938: 5	12	19	26	March 1938: 5	12	19	26
United States: [9]																	
California: [9] [10] [11]																	
Eldorado County—Plague-infected fleas.																	
Fresno County [10] C	1																
Plague-infected fleas.																	
Plague-infected ground squirrels	3																
Placer County [11]—Plague-infected fleas.																	
San Bernardino County—Plague-infected fleas.																	
Santa Cruz County—Plague-infected fleas.																	
Washington: [9]																	
Adams County—																	
Plague-infected fleas and lice.																	
Plague-infected ground squirrels															1		
Lincoln County—Plague-infected ground squirrels. [12]																	

Place	September 1937	October 1937	November 1937	December 1937	January 1938	February 1938
Argentina:						
Cordoba Province C	1					
Brazil: [13] Pernambuco State C			5			
Indochina (French) (see also table above): Cochinchina C	1					
Madagascar (central region) C	48	59	67	57	69	70
D	47	59	65	56	65	56
Niger Territory C						
Peru C			85	60		
Ancash Department C	5	9	12	6	7	10
Lambayeque Department C			3			
Libertad Department C	2	1			1	2
Lima Department C		2	1			1
	3	6	8	6	6	7

[9] Plague infection proved in insect hosts as follows: *California*—Eldorado County, Aug. 31; Fresno County, Oct. 7–Nov. 5; San Bernardino County, July 12–Sept. 8; Santa Cruz County, Feb. 3, 1938. *Washington*—Adams County, Mar. 7–30, 1938.

[10] For 5 weeks ended Nov. 6, plague infection proved in pooled tissue from squirrels, chipmunks, and mice in Fresno County, Calif.

[11] For week ended Oct. 9, plague infection proved in pooled tissue from squirrels, chipmunks, and rats, and week ended Oct. 30, pooled tissue from squirrels, in Placer County, Calif.

[12] Week ended Apr. 9, 1938, 2 plague-infected ground squirrels were reported in Lincoln County, Wash.

[13] For the year 1937, 35 cases of plague with 15 deaths were reported in Brazil as follows: Bahia State, 5 cases, 5 deaths; Ceara State, 2 cases; Parahyba State, 5 cases, 1 death; Pernambuco State, 23 cases, 9 deaths.

SMALLPOX

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Nov. 28–Dec. 25, 1937	Week ended—											
						January 1938					February 1938				March 1938			
						1	8	15	22	29	5	12	19	26	5	12	19	26
Algeria:																		
Algiers Department	C	-------	1	-------	-------	------	------	------	------	------	------	------	------	------	------	------	------	------
Constantine Department	C	-------	-------	-------	-------	------	------	------	------	------	------	1	------	------	------	------	------	------
Angola. (See table below.)																		
Argentina. (See table below.)																		
Belgian Congo. (See table below.)																		
Bolivia. (See table below.)																		
Brazil. (See also table below):																		
Bahia (alastrim)	C	6	11	6	9	------	------	------	------	------	------	------	------	------	------	------	------	------
Recife (alastrim)	C	1	-------	-------	-------	------	------	------	------	------	------	------	------	------	------	------	------	------
Santos	C	-------	-------	1	-------	------	------	------	------	------	------	------	------	------	------	------	------	------
British East Africa: Tanganyika	C	121	-------	223	-------	------	------	------	------	1	127	10	------	53	------	------	------	------
Canada:																		
Alberta	C	-------	-------	-------	-------	------	------	[1] 1	------	[1] 1	------	------	------	[1] 3	------	------	------	------
British Columbia	C	-------	-------	-------	-------	------	------	------	------	[1] 1	------	[1] 1	------	------	------	------	------	------
Nova Scotia—Halifax	C	-------	-------	-------	-------	------	------	------	------	------	------	------	------	------	------	------	1	------
Quebec	C	-------	-------	[1] 1	-------	------	------	------	------	------	------	------	------	------	------	------	------	------
Saskatchewan	C	-------	-------	-------	-------	------	------	[1] 1	------	------	------	[1] 6	------	[1] 7	------	------	------	------
China:																		
Canton [2]	C	-------	-------	1	2	------	------	2	6	25	16	23	19	21	------	------	------	------
Dairen	C	-------	-------	1	-------	------	------	------	------	------	------	------	1	------	------	------	------	------
Foochow	C	P	P	P	P	------	------	------	------	------	------	------	------	------	------	------	------	------
Hankow	C	-------	-------	-------	-------	------	------	------	------	2	1	2	------	------	------	------	------	------
Hong Kong	C	-------	1	6	13	8	30	26	75	116	101	156	222	162	185	214	236	131
	D	-------	-------	-------	-------	------	15	22	------	70	88	83	199	132	188	128	192	131
Macao	C	-------	-------	-------	-------	------	------	------	------	------	------	2	------	------	------	------	------	------
Shanghai	C	1	-------	-------	1	------	------	2	3	2	1	------	6	3	4	1	------	2
Tientsin	C	-------	-------	-------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
Colombia (see also table below): Barranquilla	D	-------	2	-------	-------	------	------	------	------	------	------	------	------	1	------	------	------	------
Ecuador: Guayaquil	C	3	13	4	3	2	1	------	1	------	------	------	------	1	------	------	------	------
Egypt: Port Said	C	-------	-------	-------	-------	------	------	------	------	------	------	------	------	3	1	5	------	------
Eritrea	C	28	52	16	-------	------	------	7	1	------	4	3	------	------	------	------	------	------

[1] For 2 weeks.
[2] A report dated Feb. 12, 1938, states that for the 3 weeks ended Feb. 12, 1938, 100 cases of smallpox were admitted to hospitals in Canton, China.

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

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Nov. 28–Dec. 25, 1937	Week ended— January 1938 1	8	15	22	29	February 1938 5	12	19	26	March 1938 5	12	19	26
France. (See table below.)																		
Great Britain: England and Wales—																		
Chester County	C			1														
Kent County—Gravesend	C																2	1
Leighton Buzzard	C														2			
Port of London	C																	1
Greece. (See table below.)																		
Guatemala. (See table below.)																		
India	C	1,738	1,756	1,804	3,930	1,587	1,662	1,744	2,305	1,950	2,328	2,312						
	D	461	429	408	958	507	506	541	574	517	570	547						
Assam	C	58	45	37	56	21	13	13	19	29	18	19	15	38	38	34	57	18
Baseein	C									1								
Bombay Presidency	C	181	154	130	570	229	208		292	401	523	607	531	731	834	842	753	
	D	38	33	41	165	57	60		91	108	150	161	173	190	177	169	185	
Bombay	C	47	41	73	269	82	92	164	163	189	222	248	233	246	264	234	212	164
	D	23	23	30	119	47	49	86	81	87	125	132	146	142	129	135	127	100
Calcutta	C	28	20	24	69	43	46	46	52	48	56	106	120	149	194	185	261	208
	D	17	14	13	43	31	35	34	31	46	27	77	76	93	132	106	166	161
Cawnpore	C						9		2	3	5	4	4	5	2	1	4	6
Central Provinces and Berar	C	44	26	7	15	2	9	11	22	7	39	46	55	90	53	83	38	75
Chittagong	C						1		2				1			2		[3] 2
Delhi	C		1		6	2	[3] 4		1	2	6	1	5	1	[3]		[3]	5
Karachi	C	[3] 2		2	4	3	[3] 3	6	3	3		4	6	2	2	4	6	5
Madras Presidency	C	318	304	213	245	111	137	149	256	246		245	221		87	93	77	
	D	62	51	26	51	25	21	31	44	51		50	41		15	24	22	
Madras	C	76	74	50	88	58	50	64	107	80	76	71	58	43	52	64	69	64
Negapatam	C											6				2	4	2
Northwest Frontier Province	C	27	154	380	417	277	106	88	202	75	32	39	46	43	29	31	34	61
Orissa Province	C	117	153	206	353	102	147	93	287	202	198	188	248	306	224	303	318	446
Punjab	C	69	162	404	1,035	310	332	380	337	282	250	181	281	240	249	149	201	237
Rangoon	C		3	5	6	7	9	17	19	14	12	16	5	9	21	23	24	9
Sind State	C	26	78	164	436	97	67	119	201	159	127	64	124	167	79	180	159	104
Vizagapatam	C														1		1	
Indochina (French) (see also table below):																		
Tonkin Province	C				26		75	60			135	130	160	282	116	195	227	137
Haiphong	C			2	36	14	41	32	31	51	45	52	27	24	12	9	19	5

Hanoi	C				1	1		2	1	1	3	8		4	2	3	8	3
Saigon-Cholon	C									1			1					1
Iran	C			2					4		6							
Iraq	C					5		6	1	1				8				
Baghdad	C											1						
Mexico (see also table below):																		
Chihuahua	C	1														1		
Durango	D		1								1			1	2			
Mexico, D. F	C	6	5	11	2			2				3				1		
Monterrey	C	2		1	1		1	1	2	1			1					
San Luis Potosi	D		1															
Torreon	C	1			2		1		5	1								
	D	3	5	4	7		2		1	1	1		1					
Vera Cruz	C				1													
Morocco. (See table below.)																		
Nigeria	C	11	156	29	136		104					57						
Nyasaland	C		31	11	3	3												
Panama Canal Zone: Colon	C		2															
Portugal (see also table below):																		
Lisbon	C	5	3	3	2			4			1		1	2	5	5	1	1
Oporto	C	2																
Portuguese East Africa. (See table below.)																		
Salvador. (See table below.)																		
Siam	C					35	12	12	16	1				26	67		8	9
Sierra Leone	C		10											4				
Southern Rhodesia	C		4	121	114		10		3		2	16	3					
Straits Settlements: Singapore	C									1								
Sudan (Anglo-Egyptian)	C	27	64	88	64	44	28	2	81	127	22	25	9	7	34	2	18	4
Union of South Africa. (See table below.)																		
Venezuela: Puerto Cabello.[4]																		

[3] Imported.

[4] A report dated Feb. 10, 1938, states that 16 cases of smallpox were reported in Puerto Cabello; information dated Feb. 21, states that 4,000 cases of smallpox (alastrim) were reported in Barquisimeto, Lara State, Venezuela, and that smallpox is present from Barquisimeto to Valencia and Marcay.

On vessels:

S. S. *Empress of Asia* at Honolulu	1 case	Sept. 5, 1937
S. S. *Castalia* at Suez from Karachi and Bombay	1 case	Oct. 5, 1937
S. S. *Egra* at Rangoon from Calcutta	1 case	Nov. 16, 1937
S. S. *Anhui* at Singapore from Hong Kong	1 case	Jan. 19, 1938
S. S. *Rizwani* at Kamaran	1 case	Jan. 19, 1938
S. S. *Tai Seun Hong* at Sandakan from Hong Kong	1 case	Jan. 23, 1938
S. S. *Suisang* at Penang from Hong Kong and Singapore	1 case	Jan. 26, 1938
S. S. *Hong Siang* at Singapore from Amoy, Swatow, and Hong Kong	1 case	Jan. 26, 1938
S. S. *Trave* at Singapore from Hong Kong	1 case	Jan. 27, 1938
S. S. *Muinam* at Singapore from Hong Kong	1 case	Jan. 29, 1938
S. S. *Tatsuta Maru* at Honolulu	1 case	Feb. 4, 1938
S. S. *Circassia* at Aden from Bombay	1 case	Feb. 16, 1938
S. S. *Chantala* at Akyab from Chittagong	1 case	Feb. 18, 1938
S. S. *Empress of Japan* at Honolulu	1 case	Feb. 21, 1938
S. S. *Tilawa* at Singapore from Hong Kong	1 case	Feb. 21, 1938

On vessels—Continued.

S. S. *Seringa* at Calcutta from Port Said	1 case	Feb. 24, 1938
S. S. *Yuen Sang* at Singapore from Hong Kong	1 case	Feb. 28, 1938
S. S. *Cathay* at London	1 case	Mar. 4, 1938
S. S. *City of Auckland* at Halifax from Calcutta	1 case	Mar. 5, 1938
S. S. *Kaisar-I-Hind* at Yokohama from Hong Kong	3 cases	Mar. 6–7, 1938
S. S. *Van Heutsz* at Singapore from Amoy, Swatow, and Hong Kong	1 case	Mar. 9, 1938
S. S. *Hai Hing* at Singapore from Amoy, Swatow, and Holhow	1 case	Mar. 9, 1938
S. S. *Netuka Maru* at Moji from Dairen	1 case	Mar. 11, 1938
S. S. *Norriken* at Singapore from Hong Kong and Swatow	1 case	Mar. 13, 1938
S. S. *Kum Sang* at Singapore from Kobe, Amoy, and Hong Kong	1 case	Mar. 16, 1938
S. S. *Haruna Maru* at Kobe from Hong Kong	1 case	Mar. 16, 1938
S. S. *Hinsang* at Sandakan from Hong Kong	1 case	Mar. 24, 1938

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

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		September 1937	October 1937	November 1937	December 1937	January 1938	February 1938
Angola	C	18			7	19	
Argentina	C		3	1			
Belgian Congo	C	391	352	166	292	251	
Bolivia:							
Cochabamba Department	C						[1]4
La Paz Department	C						[1]11
La Paz	C	30					
Potosi Department	C						[1]5
Santa Cruz Department	C						[1]5
Brazil: Puerto Alegre	C	13	4	2			
France	C			2			
Greece: Salonika	C			3	7	10	1
Indochina (French) (see also table above)	C	96	147	197	319	694	864
	D	12	28	43	91	188	189
Mexico (see also table above):							
Aguascalientes State	C	5					
Campeche State	C	1					
Chihuahua State	C	4		21			
Coahuila State	C	2		17			
Durango State	C	15		17			
Guanajuato State	C	7		88			
Hidalgo State	C	1					

Place		September 1937	October 1937	November 1937	December 1937	January 1938	February 1938
Mexico—Continued.							
Jalisco State	C	5					
Mexico State	C	3		3			
Mexico, D. F	C	11	5	17		8	
Mexico City	D	2					
Michoacan State	C	37		59			
Nayarit State	C	1					
Nuevo Leon State	C	2		6			
Queretaro State	C	5	1	2			
Sinaloa State	C	3					
Tabasco State	C	1		1			
Tlaxcala State	C	3		3			
Vera Cruz State	C	2	1	25			
Yucatan State	C			1			
Zacatecas State	C	1		7			
Morocco	C	1	1	2			
Portugal (see also table above)	C	61	53	52	18	62	
	D	8	4	4	3	2	
Portuguese East Africa	C			8			
Salvador	C					16	2
Union of South Africa:							
Cape Province	C				42		
Transvaal	C				41		

[1]For January and February.

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Week ended— December 1937 4	11	18	25	January 1938 1	8	15	22	29	February 1938 5	12	19	26	March 1938 5	12	19
Algeria:																				
Algiers Department	C	7	38	89	------	6	------	7	------	------	------	13	11	8	5	5	11	15	36	13
Algiers	C	------	15	------	------	------	------	------	------	------	------	------	------	2	------	1	6	1	2	------
Constantine Department	C	26	47	23	29	37	------	15	21	------	[1] 26	50	20	13	46	15	24	12	59	26
Bone	C	------	1	------	------	1	------	------	------	------	------	------	2	------	1	------	1	------	------	------
Constantine	C	2	7	------	------	------	------	------	------	------	------	1	------	4	20	------	14	4	------	------
Philippeville	C	------	2	1	------	------	------	------	------	------	------	------	------	1	1	------	------	------	------	------
Oran Department	C	4	------	16	2	------	------	20	1	------	[1] 3	------	1	6	2	3	2	2	------	1
Southern Territories	C	------	------	2	------	1	------	------	------	------	------	------	1	13	1	1	2	------	13	------
Australia: Brisbane	C	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------
Basutoland	C	6	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Bolivia. (See table below.)																				
British East Africa: Kenya	C	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------
Bulgaria	C	------	13	------	------	------	5	------	------	14	1	3	6	------	2	------	------	------	------	------
Chile	C	176	305	286	57	32	64	43	------	------	------	------	------	------	------	------	------	------	------	------
Antofagasta Province	C	1	------	4	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Concepcion Province	C	7	4	2	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Iquique	C	------	------	1	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
Linares Province	C	5	2	12	2	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Malleco Province	C	6	4	3	------	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Nuble Province	C	14	24	19	5	7	5	2	------	------	------	------	------	------	------	------	------	------	------	------
Santiago Province	C	114	230	223	44	20	57	36	------	------	------	------	------	------	------	------	------	------	------	------
Valparaiso	C	14	16	5	1	------	------	------	------	1	2	1	2	------	1	------	1	2	------	1
China (see also table below):																				
Canton	C	------	3	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Dairen	C	------	1	2	------	------	1	------	------	------	------	------	------	------	------	------	------	------	------	------
Hankow	C	------	2	------	------	------	------	------	------	------	------	------	1	1	------	------	------	------	------	------
Harbin	C	------	------	------	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------
Shanghai	C	2	------	------	------	------	------	------	------	1	------	------	------	------	------	------	------	------	------	------
Swatow	C	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------
Tientsin	C	3	1	7	4	------	------	------	1	------	------	------	------	------	------	------	------	------	------	------
Chosen. (See table below.)																				

[1] For 2 weeks.

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

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Week ended— December 1937 4	11	18	25	January 1938 1	8	15	22	29	February 1938 5	12	19	26	March 1938 5	12	19
Egypt:																				
Alexandria	C	4	4	7	2			1	1							1	1	1	4	
Aswan Province	C																3			16
Asyut Province	C		1								1									
Beheira Province	C										6	3				1	9		12	21
Beni-Suef Province	C			1																
Cairo	C	1				1			3						1	1			7	3
Dakahliya Province	C										1					30	19		17	10
Gharbiya Province	C										3					12	2		4	1
Minufiya Province	C											3					13		2	2
Minya Province	C																5		8	3
Qena Province	C										1								5	20
Sharkiya Province	C															7			7	5
Suez	C	2																		
Provinces	C	10	3	7	1		4	2	6	11	12	6	26	24	40	54	59	35	61	84
Eritrea: Asmara	C			2																
Germany: Frankfort-on-Main	C		1																	
Great Britain—England and Wales—																				
Gloucester County	C			1																
Greece. (See table below.)																				
Guatemala. (See table below.)																				
Hawaii Territory: Honolulu	C	2	4	1			1		1	1					1				1	
Iran	C	1					4									1				
Latvia. (See table below.)																				
Lithuania. (See table below.)																				
Mexico (see also table below:																				
Chihuahua	C			2																
Mexico, D. F	C	22	17	18	13	3	3	1		12	1				4	3	5	3	5	
Saltillo	D														1					
San Luis Potosi	D													1						
Tecamachalco	C								7											
Torreon	C			1									1							
Morocco (see also table below)	C	16	38	29	18	58	102	137	198	80	139	142	184	131	204	208	240	299	411	372
Casablanca	C		4				4	20		16	6		57	44	45	67	17	29	70	78
Netherlands: Rotterdam	C						[1]1													

Nigeria	C		2																		
Palestine:																					
Haifa	C	11	16	5	3	3	2		2			1	1								
Jaffa	C	9	13	17			2	1			3	2		1	1	1		1	1	1	
Panama Canal Zone. (See table below.)																					
Poland	C	26	53	68	37	40	35	29	54	98	78	87	79	112	76	93	150	145	161		
	D		1	5		1	1	1	1	6	7	9	7	6	6	6	5	7	11		
Portugal. (See table below.)																					
Rumania. (See table below.)																					
Sierra Leone: Freetown	C				1																
Straits Settlements: Singapore	C	1	1								1		1			1					
Switzerland	C		1																		
Syria: Deir-ez-Zor	C																10				
Trans-Jordan	C			1										2							
Tunisia:																					
Tunis	C	7	3	3	1			1	2					2		1	1	3	1		
Provinces	C	76	132	161	11	34		12	12	26	80	62	104	37	32	83	59	100	41	75	
Turkey. (See table below.)																					
Union of South Africa. (See table below.)																					
Yugoslavia: Belgrade	C			1											1						
On vessel: S. S. *Blackhill* at Philippeville	C											1									

[1] Suspected.

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

TYPHUS FEVER—Continued

Place		September 1937	October 1937	November 1937	December 1937	January 1938	February 1938
Bolivia:							
La Paz Department	C						[3] 18
Oruro Department	C						[3] 9
Potosi Department	C						[3] 5
China: Manchuria—Harbin	C	2				3	1
Chosen	C		19				
Greece	C	6	18	7	7		
Guatemala	C	6	2			3	
Latvia	C	1					
Lithuania	C	2	6	7	2	12	
Mexico (see also table above):							
Aguascalientes State	C	1		1		13	
Campeche State	C	2					
Coahuila State	C			3			
Durango State	C	1		8			
Guanajuato State	C	19		22			
Guerrero State	C			2			
Hidalgo State	C	4	2	19			
Jalisco State	C	2		2			
Mexico State	C	29	19	42		8	
Mexico D. F	C	29	14	20		27	
Mexico City	D	4				5	4
Mexico—Continued.							
Michoacan State	C	5		11			
Oaxaca State	C			3		1	
Puebla State	C	55		9			
Queretaro State	C	3	2	2			
San Luis Potosi State	C	6	4			5	
Tamaulipas State	C	2					
Tlaxcala State	C	3					
Vera Cruz State	C	9					
Zacatecas State	C	2		6			
Morocco (see also table above)	C	16	39	47	914	638	1,118
Panama Canal Zone	C	1					
Portugal	C	1	26	28	7	2	
Rumania	C	31	33	110	246	470	
Turkey	C	27	100	34	45	96	
Istanbul	C	4		4	2	3	10
Union of South Africa:							
Cape Province	C		162	75	100	37	
Natal	C			9	1		
Orange Free State	C		3	3	3	30	
Transvaal	C		5	1	1	12	

[3] For January and February.

YELLOW FEVER

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Week ended— December 1937				January 1938					February 1938				March 1938		
					4	11	18	25	1	8	15	22	29	5	12	19	26	5	12	19
Belgian Congo:																				
Saratumba	C																	[1] 1		
Zongo	C														[1] 7			[1] 4		
	D														4			1		
Brazil: [2]																				
Federal District	D															1		1		
Minas Geraes State [3]	D									1	2	7	6	16	9	24	17	26	10	9
Para State	D	1										1								
Rio de Janeiro State [3]	D											1	5	3	3	2	1	3	10	7
Santa Catharina State	D				1									1				1		2
Sao Paulo State	C														P					
	D								1							1				
Colombia:																				
Boyaca Department	D		1				1													
Caldas Department	D	1																		
Cundinamarca Department	D	2									1					1				
Intendencia of Meta—Villavicencio	D	1																		
Santander Department	C	2																		
	D	6	3			1	[1] 5	2												
Dahomey: Cotonou	C																			
French Equatorial Africa:																				
Bangui	D	1									1									
Fort Archambault	C	[1] 2																		
Gambia: Georgetown	C										[1] 1									
Gold Coast	C	3	4	[4] 8			2		5	[4] 4										
	D	2	1	3			2													
Accra	C	[1] 1																		
Keta	C								1											

[1] Suspected.
[2] See also reports of yellow fever in Brazil on pp. 216, 280, 361, 404, 437, 517, and 585 of the PUBLIC HEALTH REPORTS for 1938, and in various issues for 1937.
[3] Week ended Mar. 26, 1938, 1 death from yellow fever was reported in Minas Geraes State, and 1 death in Rio de Janeiro State, Brazil.
[4] Includes 2 suspected cases.
[5] Includes 1 suspected case.

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

YELLOW FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		Aug. 29–Sept. 25, 1937	Sept. 26–Oct. 30, 1937	Oct. 31–Nov. 27, 1937	Week ended— December 1937 4	11	18	25	January 1938 1	8	15	22	29	February 1938 5	12	19	26	March 1938 5	12	19
Ivory Coast:																				
Abidjan	C													1		[1]1				
Agboville	C																		[1]1	
Anyama	C									1										
Gaoua	C	[5]3			[1]1															
	D	1																		
Grand Bassam	C																		2	
Spao Plantations (near Bingerville)	C																		2	
Touba	C	[1]1	[1]1																	
Nigeria	C	2	5	2				[1]1	1		1		[1]1							
	D			1							1		[1]1							
Paraguay: Asuncion	C			1																
Senegal	C	2	12	[6]12	1		1	1								[1]1				
	D			2																
Dakar	C		[7]1	[7]2												[1]1				
Rufisque	C		2	2																
Thies	C		4	1																
Sudan (French)	C								1											
San	C							1	1											
Toukoto	C			[1]1																

[1] Suspected.
[5] Includes 1 suspected case.
[6] Includes 3 suspected cases.
[7] Imported.