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## A STUDY OF THE ECONOMICS OF PNEUMONIA

The Costs of Diagnosis and Treatment of 625 cases in New York City \*

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### INTRODUCTION

Both medically and economically pneumonia is a disease attendant with serious consequences. It accounts for well in excess of 450,000 cases of illness a year in the United States, approximately 25 percent of which are fatal. This toll exceeds that of any other communicable disease. It also contributes to many thousands of deaths annually which are officially attributed to other causes (1), and the extent of this contribution has never been accurately evaluated.

Pneumonia strikes persons of every age, sex, color, and social group. It is the leading cause of death at the extremes of life. The death rate is higher among males than females, and twice as high among the colored as among the white population. There is a much lower death rate among professional and business men than among unskilled workers (2). In large measure this illustrates the general relationship, presented in the National Health Survey (3), between the high incidence of illness and low economic status.

Pneumonia presents many medical problems—of diagnosis, of treatment, of countless complications, and of epidemiology. It is a disease which strikes suddenly, and from the onset is menacing to life and income. It is difficult and expensive to treat; and it is the extended duration (for many of the nonfatal cases) and complexity of treatment that creates the economic problem. Forty percent of the total number of pneumonia deaths are of men and women in the most economically productive period of life, those from 15 to 64 years of age, their deaths robbing families of breadwinners, industry of producers, and communities of consumers. The responsibility for the care of many of the cases falls upon the community, since many individuals find the treatment of pneumonia too expensive for them to bear. These facts call for an inquiry into the amount, nature, and distribution of the costs of pneumonia.

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## PURPOSE OF STUDY

In an effort to determine the amount and nature of the costs of diagnosis and treatment incurred by pneumonia patients, a study of the records of 625 pneumonia cases in New York City was undertaken. Each of the services and procedures recorded in the care of these patients was priced at rates (Appendix C) believed to be equivalent to minimum costs in New York City. The cost for each case and its constituent elements were thus obtained, and are judged to be conservative. It must be understood that the services and procedures are recorded as "costs" whether or not the patient paid for them. The limitations of the data, confined as they are to New York City and largely, though not wholly, to hospitalized cases, should be borne in mind.

It was thought that the information thus secured would serve as a measure of the costs of pneumonia care in the locality studied, that it would assist in planning control programs, and that it might possibly suggest some indices of the adequacy of treatment. The underlying rationale has been expressed in the Special Report of the Pneumonia Advisory Committee to the Surgeon General, United States Public Health Service (4) and by the Special Subcommittee on Public Health Relations of the New York Academy of Medicine (5).

## SOURCES OF MATERIAL

The records of five hospitals<sup>1</sup> and one home nursing service were made available through the kind cooperation of the officials in charge. Additional data on 10 home-treated cases were collected from 4 physicians. Questionnaires<sup>2</sup> containing the same items as those taken from the hospital and nursing records were distributed to these physicians through the cooperation of Dr. J. G. M. Bullowa. Of the total number of 65 home cases (which included the 10 cases collected by private practitioners), all had private physicians. Of the 560 hospital cases, 400 were ward, 66 semi-private, and 94 private. No case was included which had been admitted to the hospital prior to September 1934. During the past 3 years there has been little change in the care of pneumonia patients (with the exception of refinements in serum and the method of administration, the use of sucrose in pulmonary edema, improvements in oxygen equipment, and the introduction of sulfanilamide for pneumococcus type 3 pneumonia). Thus, a homogeneous group was collected which received more or less standard treatment.

<sup>1</sup> One of these was a municipal hospital; the others were voluntary institutions. By agreement, the names of none of the hospitals are mentioned in this report.

<sup>2</sup> See Appendix B.

## PROCEDURE

Within the past year several studies have determined with increasing accuracy the incidence and distribution of pneumococcic pneumonias in the eastern States. One report states (6) that 80 percent of the strains of pneumococci found could be assigned to 10 types. "Types I, II, III, V, VII, and VIII are those most frequently encountered" (7) in this section of the country. On the basis of Bullowa's (8) work, 10 types, which comprise more than 85 percent of the pneumococcic pneumonias, served as the criterion for the selection of our sample. It was felt that not only would they be representative of the pneumococcic pneumonias but that there would be a greater uniformity in the treatment of such an integrated group. The 15 percent of pneumococcic pneumonias, cases of which were not included in the study, are unimportant, since they would comprise a small number of cases and are scattered among the remaining 21 types. Our series of cases excluded pneumonias due to organisms other than the pneumococcus, which constitute a small percentage of all pneumonias. A homogeneous age group was collected by excluding children and persons 60 years of age and over.

Each case was considered separately in terms of those factors in diagnosis and treatment to which a monetary value may be assigned. Aside from age, sex, color, marital status, and number of dependents, the schedule contained the following items: (1) Days hospitalized; (2) duration of illness; onset, admission, discharge; (3) serum (in units); (4) oxygen (in liters, later translated in terms of tanks); (5) X-ray plates; (6) laboratory services; pneumonia,<sup>3</sup> and pathology; <sup>4</sup> (7) surgery; (8) drugs; (9) miscellaneous therapy; <sup>5</sup> (10) consultations.

In order to ascertain the costs of diagnosis and treatment to the patient, these items were priced.<sup>6</sup> The cost figures were conservative and were in all cases lower than those actually charged by the hospitals. Average per diem hospitalization rates were taken (9). Although charges may or may not be made to ward patients, the costs were estimated on a minimum scale, based upon the actual cost of equipment, materials, and maintenance to the hospital. Physicians received no payment for ward services, but in this study the cost of physicians' ward services was estimated on a minimum basis. The New York State Workmen's Compensation Schedule was referred to and several physicians were consulted to establish reasonable general and special fees. As it was impossible to ascertain the exact number

<sup>3</sup> This is a pneumonia typing service where bacteriological examination of sputum and exudate from lungs is made to ascertain the type of pneumococcus present and amount and type of serum to be administered. Neufeld reaction (capsule swelling), detection of pneumococci in mouse brain, heart, and peritoneum, human blood cultures, and agglutination tests are the main functions of this service.

<sup>4</sup> Includes serological and bacteriological examinations, urine and blood analyses.

<sup>5</sup> Includes diathermy, physiotherapy, and the administration of extraordinary drugs, i. e., sulfanilamide.

<sup>6</sup> See Appendix C.

of physicians' visits from the records, they were estimated as to number and were priced on a minimal basis for ward, average for semi-private, and moderate for private cases. The actual fee of the individual physicians was used for the home cases, and since the total bill was rarely based upon a per visit charge, the visits were calculated in the same way as for other types of accommodation. The basis for estimating the number of visits in the various types of accommodations was one visit a day for the first 15 days of illness, one visit every other day for the next 45, and one visit every fourth day thereafter.

Actual charges for the 10 home cases for which information was obtained by questionnaire (Appendix B) were used. These did not differ substantially from the estimated costs of the other home patients.

Detailed information on the various cost units included in this study is given in Appendix C. The range in rates for the principal services in the various types of accommodations is shown in the following table:

	<i>Ward</i>	<i>Semi-Private</i>	<i>Private</i>	<i>Home</i>
Per diem rates for hospital service.....	\$3. 50	\$5. 50	\$8	-----
Physicians' services (per visit in hospital)....	2. 00	3. 00	5	-----
Per visit at home.....	-----	-----	--	\$3-\$5
Serum (per 25,000 units):				
Administered in hospital (hospital charge) -	7. 00	9. 00	12	-----
Administered in home.....	-----	-----	--	15

**RATIONALE FOR SELECTING ITEMS OF DIAGNOSIS AND TREATMENT**

Many of the early symptoms of pneumonia are discovered in routine physical examination. Confirmatory tests are often desirable and, indeed, necessary. Thus, sputum typing is essential for detecting the invading organism and instituting the proper serum therapy. The researches of the Rockefeller Institute at the turn of the century laid the ground work in the typing of the pneumococcus and the administration of serum (10). Repeated examination of blood cultures permits the detection of bacteriemia, often not present at the onset of the disease. Early detection will reduce the amount of serum necessary and the length of the hospital stay. X-ray examination of the chest may establish or confirm the diagnosis of pneumonia and discover or exclude complications. Because of the nature of the disease and the rapid change in physical conditions, several X-rays may be required. As many as 17 were taken on some hospitalized patients in our series.

In recommending early and specific treatment, Bullowa states that it is most effective and least expensive. Of serum, he has said, "When it is administered before the fourth day of illness, a much smaller amount is required to control the pneumonia than when it is

given after the fourth day. Early administration of serum entails less expense to the patient for serum, for nursing care, and for oxygen" (11). Cecil (12) and Bullowa (13) have both demonstrated the disappearance of acute and toxic symptoms on the administration of serum, as well as its effectiveness in lowering hospital stay, and in preventing complications and mortality. In one of his earlier papers Bullowa (14) described symptomatic and specific methods of treatment. These have served as the basic criteria<sup>7</sup> from which costs have been calculated.

#### TOTAL COST OF CARE

The cost of the diagnosis and treatment of 625 pneumonia patients in different accommodations is shown in table 1 in Appendix A. Although the average cost per patient for all cases was \$167.60, the wide range in individual costs, from a low of \$5.50 to \$1,554, obviously makes \$134.16, the median cost, more significant. The average cost in these analyses always exceeded the median. This is accounted for by the fact that the average is weighted by several unusually expensive cases.

Three-fourths of all cases had costs exceeding \$80. In the different accommodations three-fourths of the cases had costs as follows: Ward, over \$76; semi-private, over \$120; private, over \$126; combined semi-private-private, over \$122; home, over \$56.

#### DISTRIBUTION OF TOTAL COST INTO COMPONENT ELEMENTS

As shown in table 1, the cost of hospitalization, for the total number of cases as well as for each type of accommodation, exceeded that of any of the other services. For the total number of cases the cost of physicians' services ranked next. Among the ward cases, however, approximately one-half of which received serum therapy, the cost of serum exceeded that for physicians' services.

There was a substantial shift in the components of the cost of services for home cases, because there was no hospitalization. Hence, a relatively much higher percentage was for physicians' and nurses' services. Since it was impossible to ascertain the possible increase in cost to the patient or his family occasioned by the care of the sick person at home, no estimation of cost, similar to hospitalization, was made for stay in the home. In such cases, there is undoubtedly an increase in housekeeping costs.

It is interesting to note that nursing care comprised the most important element of "other services"<sup>8</sup> among these cases. It accounted for 78.1 percent (\$1,535.25) of the cost of these services.

<sup>7</sup> See section on "Procedure."

<sup>8</sup> "Other services" include oxygen therapy, X-rays, pneumonia and pathological laboratory services, miscellaneous therapy, surgery, consultations, and special nursing care.

TABLE 1.—Percentage distribution of cost according to service and type of accommodation

Service	Percentage of total cost				
	All cases	Ward cases	Semi-private cases	Private cases	Home cases
Hospital.....	41.6	39.9	53.0	50.7	-----
Physicians'.....	28.4	22.0	26.1	34.7	61.9
Serum.....	16.3	23.5	11.0	4.5	10.3
Other services.....	13.7	14.6	9.9	10.1	27.8
Total cost.....	\$104,750.20	\$57,836.70	\$14,636.75	\$25,186.75	\$7,090.00

## HOSPITALIZATION

For the 560 hospital cases there was a wide range in the number of days hospitalized, from a low of 12 hours (1 day) to 151 days. One-half of these cases were in the hospital at least 15 days. (See Appendix A, table 1.) Similarly, a wide range was observed in the various types of accommodations. Of the 400 ward cases, one-half were hospitalized 15 days. Half of the 66 semi-private cases were hospitalized 18 days. Of the 94 private cases, one-half were hospitalized 15 days.

Whereas half of the 400 ward cases had hospitalization costs in excess of \$50, the average cost of hospitalization was \$77.83. The cost of hospitalization for half of the semi-private cases was more than \$98. Half of the private cases had hospitalization costs in excess of \$116.

TABLE 2.—Percentage of total cost of illness incurred for hospitalization in hospitalized pneumonia cases

Percentage of total cost for hospitalization	Number of cases hospitalized	Percentage of cases hospitalized
10 and under.....	29	5.2
11-20.....	46	8.2
21-30.....	78	14.0
31-40.....	96	17.2
41-50.....	123	21.9
51-60.....	137	24.4
61-70.....	48	8.6
71 and over.....	3	.5
Total.....	560	100.0

Three-fourths of the cases treated in institutions had hospitalization costs ranging from 29.3 percent to more than 71 percent of the total cost. In fact, for half of the cases treated in institutions, hospitalization comprised more than 43.5 percent of the total cost. With the exception of those cases having total costs of \$50 and less, more than half of the hospitalized cases had hospital costs ranging from 31 to 60 percent of the total cost.

At the two extremes in total cost a perceptible bunching was observed. Whereas 70 percent of the cases in the low total cost group (\$50 and less) had hospital costs ranging up to 30 percent of the total cost, the majority (71 percent) of the cases in the high-cost group (\$451 and over) had hospital costs ranging from 51 to over 71 percent of the total cost.

#### PHYSICIANS' SERVICES

The average cost per patient for physicians' services was \$47.68. This average has, however, little significance. Thus, the cost of physicians' services for half of the ward cases was more than \$34 and was exceeded by hospital as well as serum costs. (See table 1.) For semi-private and private patients, however, the cost of physicians' services was relatively higher in relation to all other services, being exceeded by hospital costs only. Thus, half of the semi-private patients had physicians' costs above \$123. The cost of physicians' services for half of the private cases was more than \$141. The cost of physicians' services for half of the home-treated cases was more than \$94.

TABLE 3.—Percentage of total cost of illness incurred for physicians' services<sup>1</sup>

Percentage of total cost for physicians' services	Number of cases receiving physicians' services <sup>1</sup>	Percentage of cases
10 and under.....	16	2.6
11-20.....	133 (1)	21.9
21-30.....	171 (2)	27.4
31-40.....	191 (7)	30.7
41-50.....	36 (3)	5.9
51-60.....	19 (3)	3.3
61-70.....	10 (5)	.7
71 and over.....	46 (44)	7.5
Total.....	625 (65)	100.0

<sup>1</sup> Exclusive of specialists' fees.

<sup>2</sup> Figures in parentheses indicate home cases.

As shown in table 3 the cost of physicians' services for three-fourths of the cases was less than 38.6 percent of the total costs. It was generally observed that in the more expensive cases a progressively smaller proportion went for physicians' services. Of the more expensive cases (\$251 to over \$1,550) only two had physician service costs in excess of 40 percent of the total cost. In general, the cost of physicians' services for high-cost cases ranged between 20 and 25 percent. This is equally true of the low-cost cases, despite the fact that a concentration of high costs for physicians' services occurs. This bunching results from the fact that the costs of physicians' services for the home cases were concentrated within the narrow range of 61 to over 71 percent of the total costs.

## SERUM

There are wide differences in the proportion of cases receiving serum in the various types of accommodations. Hence, the average serum cost per patient is of little significance when computed on the basis of the total number of cases. On the ward services almost half of the cases received serum treatment. The average cost for these cases was \$69.81; the median cost was \$59. Serum comprised the second largest item in the total cost.

Only 27 percent, or 18, of the semi-private cases received serum therapy. The average cost computed was \$88.72; the median cost was \$85. For some 16 percent (15 cases) of the cases in private accommodation receiving serum therapy the average cost was \$76.46; the median cost was \$50.40. The average cost of serum for 14 percent, or 9, of the home-treated cases was \$81.22; the median cost was \$37.50.

TABLE 4.—Percentage of total cost of illness incurred for serum in 237 pneumonia cases

Percentage of total cost for serum	Number of cases receiving serum	Percentage of cases
10 and under.....	16	6.8
11-20.....	33	13.9
21-30.....	44	18.5
31-40.....	48	20.2
41-50.....	39	16.5
51-60.....	30	12.6
61-70.....	10	4.4
71 and over.....	17	7.1
Total.....	237	100.0

Three-fourths of the cases receiving serum had serum costs up to 50.35 percent of the total cost of illness. At the two extreme cost levels widely divergent pictures exist. The proportionate cost of serum was higher in the low-cost than in the high-cost cases. From 40 to over 50 percent of those cases falling in the cost groups between less than \$50 and \$250 had serum costs comprising over 41 percent of the total cost. For a majority of the cases in the high-cost groups (over \$250), the cost of serum constituted less than 20 percent of the total.

Half (118) of the cases receiving serum had more than 201,700 units<sup>a</sup> administered. The median number of serum units administered was: ward, 211,833; semi-private, 234,333; private, 103,500; home, 113,500. (See Appendix A, table 1.)

<sup>a</sup> There was a discrepancy of varying degree, in a great many cases, between (a) the number of units printed on the labels of the vials and (b) the number actually contained in the serum. In calculating serum costs, wherever possible (b) was used. See "Comment."

## "OTHER SERVICES"

The cost of "other services" for three-fourths of the cases constituted less than 20 percent of the total cost. Progressively less was allocated for "other services" as the cost increased.

## MORTALITY

For the entire series of cases there was a mortality of 22.4 percent. In general, this compares favorably with the commonly accepted pneumonia mortality rate of 25 percent for the country as a whole. On the ward service the mortality rate was a fraction over 25 percent; in semi-private accommodations, 16.6 percent; in private, 22.2 percent; in home cases, 10.7 percent; and for the combined semi-private and private cases, 20 percent.

Table 3 in Appendix A shows that the greatest number of deaths occurred after short periods of hospitalization. Of the 133 deaths among the hospitalized cases, 127, or 95.5 percent, occurred within the first fifteen days in the hospital. In fact, 101, or 76 percent, of the total number of deaths in the hospitals occurred within the first five days of illness. The deaths in the home cases also occurred early in the course of the disease.

Striking is the fact that in 71.4 percent of the deaths the total cost was \$100 or less. (See Appendix A, table 4.) Since death ensued after comparatively short periods of hospitalization, the costs of care were obviously limited. In a measure the large number of deaths, 45.6 percent (100 out of 219) of the cases with total costs ranging up to \$100, accounted for such a large low-cost group. (See Appendix A, table 2.)

## OTHER BASES FOR COMPUTING COSTS

The preceding data were based on estimated costs at minimum rates for various services and materials. In order to show what the costs would be at higher rates, a series of costs were computed accordingly, which are closer to the actual charges incurred by many of the patients whose records were surveyed in this report. The following table shows the changes made.

TABLE 5.—*Increased rates computed for various services in the different accommodations*

Services	Ward	Semi-private	Private	Home
Hospital (per diem).....	\$3. 50 to \$4. 50	\$5. 50 to \$7. 50	\$8 to \$11	-----
Physicians (per visit).....	\$2 to \$3	\$3 to \$5	\$5 to \$8	\$3. 50 to \$5
Serum (per 25,000 units).....	\$7 to \$9	\$9 to \$12	\$12 to \$17	\$15 to \$18

Lump sums added for other services increase the total costs as follows: \$1,000 for ward, \$2,000 for semi-private, \$3,000 for private, and \$2,000 for home.

Table 6 compares the average costs at these higher rates with the averages utilized in the study.

TABLE 6.—*Comparison of estimated minimum average costs with computed increased average costs, according to type of accommodation*

	Minimum average costs (per patient)	Increased average costs (per patient)
All cases.....	\$167. 60	\$236. 97
Ward.....	144. 59	189. 18
Semi-private.....	221. 75	342. 68
Private.....	286. 77	411. 59
Home.....	109. 07	171. 06

Table 7 shows the effect on total costs resulting from the use of the higher rates.

TABLE 7.—*Comparison of total costs at minimum rates with costs at the higher rates*

	Estimated cost at minimum rates	Estimated cost at higher rates
All patients (625).....	\$104, 750. 20	\$148, 111. 04
Ward patients (400).....	57, 836. 70	75, 675. 48
Semi-private patients (66).....	14, 636. 75	22, 616. 91
Private patients (94).....	25, 186. 75	38, 699. 76
Home patients (65).....	7, 090. 00	11, 118. 89

Another and a different basis for estimating costs should be considered, namely, to secure reports from families as to their actual expenditures in cases of pneumonia. The results of two small series of cases, for which data were secured by this method, are described below. It is obvious that studies by such a method are essential in securing estimates of the financial burden which has actually been incurred by families as the result of paying for the diagnosis and treatment of pneumonia. The method followed in the present study estimated *costs* and not expenditures. For example, many of our patients were cared for on a charitable basis and actually paid nothing for their care. These costs were paid in part by the taxpayers and in part by those physicians who gave their services free in the wards of these hospitals. Again, some of our patients were in the wards of voluntary hospitals and paid part of their costs to the hospital in the form of "ward rates," but nothing to the attending physicians. From the standpoint of pneumonia as a community problem it is desirable to know both costs and expenditures. If we have estimated costs, considerable knowledge is at once obtained regarding family expenditures, and as to the degree to which costs are carried by the families themselves or by the community, through governmental funds, voluntary organized charity, and the unpaid services of phy-

sicians. It is not within the scope of this report to do more than suggest the possibility of these analyses.

#### OTHER COST STUDIES

In 1929-31 the Committee on the Costs of Medical Care<sup>10</sup> (15) studied the incidence of sickness in and the expenditures of nearly 9,000 families, who were visited at regular intervals by a trained worker for a twelve months' period. Three hundred and seventy cases of pneumonia were reported. The average family expenditure for these cases was \$58.72. It will be noted that this is more than \$100 less than the average cost per case in the present study.

There are several reasons for the disparity. The 370 cases investigated by the Committee on the Costs of Medical Care were from all parts of the United States, including rural areas and small towns as well as large cities. Approximately one-third of the cases were from towns of less than 5,000 population, one-third were from towns with populations of from 5,000 to 100,000, and one-third from cities of 100,000 and over. The costs were generally much lower in the smaller than in the larger communities.

Another reason for the difference is the small proportion of hospitalized cases in this series, only 54 out of 370, or 15 percent, as compared with 90 percent in our study. This would make a great difference in the comparison.

A third reason for the difference in costs is the fact that the Committee on the Costs of Medical Care reported family expenditures, not estimated costs of service. Where patients did not pay, or where, for instance, they received free service from their physicians in hospitals or in their homes, or free hospital care, these items do not appear as expenditures and thus reduce the average.

Finally, the methods of treatment of pneumonia during the period 1929-31 did not include the use of serum, an important element in the cost of treatment in New York City at the present time.

In the series investigated by the Committee on the Costs of Medical Care, 21 cases reporting costs in cities of 100,000 and over received hospitalization. The costs of these 21 cases run up to \$933, 10 cases having a cost of over \$100. The average for these 10 cases is \$465.10, and for the 21 cases is \$238.90.

A study was conducted by the Metropolitan Life Insurance Company (16) of sickness among the employees of the company and their families during the period 1930-31, the method followed being similar to that used in the study of the Committee on the Costs of Medical Care. In this study the average expenditure per case of pneumonia was \$98.03. Here again it must be remembered that the figures are

<sup>10</sup> Acknowledgment is made to Dr. Selwyn D. Collins, Principal Statistician, U. S. Public Health Service, for the use of the original work sheets.

family expenditures and not costs. The Metropolitan group was almost entirely urban, with individuals mostly in the middle or upper middle income brackets, more than 50 percent of the families having incomes of from \$3,000 to \$5,000. Only 20 percent of the Metropolitan cases were hospitalized and none was reported to have received serum treatment. These two factors alone would account for more than the observed difference in the average between this series of cases and ours.

It is of interest that 30 percent of all of the Metropolitan cases reported expenditures under \$25. Whether this was due to high mortality early in the disease, as cited in our series, or to the inclusion of non-virulent pneumonias, incorrectly classified as pneumonia (i. e., "grippe"), or to other reasons, has not been reported.

#### SUMMARY

1. The median total cost of pneumonia treatment for our whole group of patients was \$134.16. Hospitalization constituted 42 percent of the total cost for all cases; physicians' services, 28 percent; serum therapy, 16 percent; and other services, 14 percent.

2. The following median costs illustrate the wide range between different types of accommodation: Ward, \$123.64; semi-private, \$183.14; private, \$224.08; home, \$93.04.

3. If the total cost is divided according to the type of services rendered, we find that for ward cases, hospital care constituted 40 percent of the total; for semi-private, 53 percent; for private, 50 percent. Physicians' services comprised 22 percent of the total ward cost; 26 percent of the semi-private; 35 percent of the private; 62 percent of the home. Serum therapy comprised 24 percent of the total ward cost; 11 percent of the semi-private; 5 percent of the private; and 10 percent of the home. The cost of other services constituted 15 percent of the total for ward cases; 10 percent for semi-private; 10 percent for private; and 28 percent for home.

4. The median cost of hospital care for ward patients was \$50.75; for semi-private patients, \$98.45; for private patients, \$116.

5. The median cost of physicians' services in the different accommodations was as follows: Ward, \$34.60; semi-private, \$123.75; private, \$141.28; home, \$94.18.

6. The median cost of serum for those cases receiving it was: Ward, \$59; semi-private, \$85; private, \$50.40; home, \$37.50.

7. Approximately one-third of the cases studied had total costs less than \$100; another third between \$101 and \$200; one-third from \$201 to over \$451. This last group included several unusually high-cost cases, mounting to over \$1,550 in one case.

8. In the hospitalized cases, with the exception of the ward cases, the two major items of cost are hospitalization and physicians' serv-

ices. The cost of the latter, however, is much less than the cost of hospitalization.

9. For the ward cases, serum therapy constituted a larger portion of the total cost than physicians' services.

10. Two major items comprise almost the total cost for home cases—physicians' services and nursing care. The reasons for this are (1) that there are no hospitalization charges, and (2) that the treatment is usually symptomatic, with the result that the expenditures for serum and other special therapies have been practically nil.

11. The large low-cost group is principally the result of the great proportion of fatalities early in the course of the disease. Seventy-six percent of the total number of deaths in the hospitals occurred within the first 5 days.

#### ABILITY TO PAY FOR CARE (17)

The costs of the diagnosis and treatment of pneumonia reported in this study display figures which are substantial in themselves. If our average of \$167.60 per case were applied to the 22,000 cases of pneumococcal pneumonia which were estimated (5) to occur annually in New York City, a total cost of \$3,687,200 would result.

The figures must be considered from the standpoint of the individual patient as well as the community, in relation to the loss of income to wage-earners because of illness and to the ability of families to pay such costs.

A full discussion of these relationships cannot be given here. It may be mentioned, however, that if the figures of the National Health Survey are representative, more than half of the families in New York City have annual incomes of under \$1,500, or \$125 and less per month. It is obvious that a disease, the average cost of which when hospitalized is more than a family's monthly income, can rarely be paid for out of the current family earnings, especially when, as in the case of pneumonia, the illness comes unexpectedly. Even when there is home instead of hospital treatment, the loss of income, if a wage-earner is affected, may bring the total burden on the family up to a point which approaches the cost of a hospitalized case.

It is no less obvious that the cost of semi-private or private service in home or hospital would be a serious burden upon families whose incomes are between \$1,500 and \$2,500 a year and would usually be out of the question for families with incomes of \$1,500 or less.

It is evident that the present costs of the diagnosis and treatment of pneumonia have already necessitated action by physicians, voluntary agencies, and by government to make it possible for a large proportion of the population to receive adequate medical care for this disease.

## COMMENT.

In a report on the "Community Provision for the Serum Treatment of Pneumococcic Pneumonias," (5) the average cost of serum per patient was computed to be \$35. For the 237 cases in our series, the average cost of serum was almost twice this amount. In part this can be attributed to the fact that massive serum therapy is now generally practiced in the hospitals in New York City and vicinity. This is probably by no means typical of the country as a whole.

For the specific types of pneumonia the value of serum has been clearly demonstrated statistically (18) and has received wide clinical acceptance as a therapeutic adjunct. An investigation is being made (19) of its economic value to the patient and the community. It seems probable that, when serum is used early and in quantity, the cost of all other services is greatly reduced.

The limitations of the data presented in this study are numerous. There are too few cases, and especially too few home cases, to give a statistically accurate picture of pneumonia costs, distribution of services, and mortality rates for hospitalized cases in semi-private and private rooms, and for home cases. The distribution of the types of pneumonia and the quantitative methods of treatment, although typical of the northeastern States, are not representative of the country as a whole. The serum units for the different types of pneumonia are not the same; hence the cost of the different sera will vary. As far as was possible, an attempt was made to calibrate the units in the various types, in order to reduce this difficulty to a minimum.

The cost estimates presented in this study are, none the less, striking in themselves, and when considered in conjunction with the loss in income because of the illness and the average ability to pay for medical care, they assume impressive proportions.

It was recently reported (7) that 10 State health departments had begun pneumonia control programs; that 13 States had projected definite plans; and that 11 others were beginning to make plans. Concomitant with this activity a national program is under consideration, and the United States Public Health Service has undertaken nation-wide epidemiological studies. The planning and the execution of programs require knowledge of the economic aspects of the disease as it affects individuals and communities. It is these aspects which this study has endeavored to bring into the foreground.

## RECOMMENDATIONS FOR FURTHER STUDIES

1. Studies similar to this should be made in several other cities and States.
2. More complete studies should be made of the cost of serum treatment. It will be important to ascertain (a) the cost of serum

per case for each of the etiologic types, (b) the percentage this constitutes of the total cost of the illness, (c) the effectiveness of serum in reducing the use and need of other treatments, and in shortening the hospital stay and therefore reducing total cost. These studies should compare serum and non-serum groups in terms of the same etiologic types.

3. Studies should be made of symptomatic treatment as compared with specific treatment of the pneumonias, to determine (a) the cost to the individual, and (b) the cost to the community of different etiologic types. The comparative adequacy of symptomatic and specific treatment might also be investigated in terms of extent of illness and mortality rates.

4. The development of local and State pneumonia programs and the planning of national programs require periodical surveys of the prevalent types of pneumonia, their distribution according to age, sex, civil status, occupation, and race, the amount and types of sera used, and the hospital and institutional facilities available to the different income groups in the population.

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APPENDIX A

TABLE 1.—Distribution of 625 pneumonia cases, by type of service, amount of certain services, hospital accommodation, and costs

Services	Ward			Semi-private			Private			Home			Total	Per- cent
	Cases	Cost	Per- cent	Cases	Cost	Per- cent	Cases	Cost	Per- cent	Cases	Cost	Per- cent		
<i>Days hospitalized</i>														
0-10.....	143	\$2,025.50	.....	15	\$406.00	.....	35	\$1,432.00	.....	.....	.....	.....	.....	.....
11-20.....	164	8,097.00	.....	26	2,315.50	.....	34	4,146.00	.....	.....	.....	.....	.....	.....
21-30.....	56	4,069.50	.....	12	1,871.50	.....	13	2,424.00	.....	.....	.....	.....	.....	.....
31-40.....	11	1,354.00	.....	8	1,501.50	.....	8	2,272.00	.....	.....	.....	.....	.....	.....
41-50.....	10	1,599.50	.....	.....	.....	.....	1	376.00	.....	.....	.....	.....	.....	.....
51-60.....	7	1,301.00	.....	3	933.50	.....	1	440.00	.....	.....	.....	.....	.....	.....
61-70.....	4	924.00	.....	1	346.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
71-80.....	2	539.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
81 and over.....	3	1,309.00	.....	1	610.50	.....	2	1,672.00	.....	.....	.....	.....	.....	.....
Total.....	400	23,038.50	39.9	66	7,785.00	53.0	94	12,762.00	50.7	.....	.....	.....	\$43,595.50	41.6
<i>Physicians' visits</i>														
0-10.....	93	1,188.00	.....	10	204.00	.....	27	910.00	.....	.....	.....	.....	.....	.....
11-20.....	170	4,971.00	.....	20	937.50	.....	30	2,347.50	.....	.....	.....	.....	.....	.....
21-30.....	90	3,532.00	.....	20	1,210.50	.....	20	2,095.00	.....	.....	.....	.....	.....	.....
31-40.....	18	901.00	.....	7	511.50	.....	8	1,200.00	.....	.....	.....	.....	.....	.....
41-50.....	10	606.00	.....	2	168.00	.....	6	1,024.00	.....	.....	.....	.....	.....	.....
51-60.....	7	498.00	.....	3	372.50	.....	2	212.25	.....	.....	.....	.....	.....	.....
61-70.....	6	463.50	.....	3	367.00	.....	4	460.50	.....	.....	.....	.....	.....	.....
71-80.....	3	248.50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
81 and over.....	3	334.00	.....	1	184.50	.....	3	1,172.50	.....	.....	.....	.....	.....	.....
Total.....	400	12,732.00	22.0	66	3,925.50	23.1	94	8,749.00	34.7	.....	.....	.....	4,393.25	61.9
<i>Serum (units) (in thousands)</i>														
100 and under.....	25	393.00	.....	1	36.00	.....	7	252.00	.....	.....	.....	.....	.....	.....
101-150.....	32	1,121.00	.....	3	143.50	.....	1	53.00	.....	.....	.....	.....	.....	.....
151-200.....	34	1,743.75	.....	3	206.50	.....	4	338.00	.....	.....	.....	.....	.....	.....
201-250.....	30	1,019.25	.....	3	241.00	.....	2	240.00	.....	.....	.....	.....	.....	.....
251-300.....	14	1,103.50	.....	4	411.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
301-350.....	18	1,646.00	.....	1	117.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
351-400.....	13	1,192.50	.....	1	140.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
401-450.....	7	806.50	.....	2	302.00	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 1.—Distribution of 625 pneumonia cases, by type of service, amount of certain services, hospital accommodation, and costs—Continued

Services	Ward			Semiprivate			Private			Home			Total	Per-cent
	Cases	Cost	Per-cent	Cases	Cost	Per-cent	Cases	Cost	Per-cent	Cases	Cost	Per-cent		
<i>Serum (writs)—Continued</i>														
451-500.....	12	\$1,627.00												
501-550.....	3	433.00					1	\$264.00						
551 and over.....	9	1,694.50												
Total.....	195	13,613.00	23.5	18	\$1,697.00	11.0	15	1,147.00	4.5	9	\$731.00	10.3	\$17,038.00	16.3
<i>Other services</i>														
Oxygen.....	215	1,177.70		27	151.25		21	245.75		4	238.00			
X-rays.....	354	1,255.50		49	351.00		52	505.00		2	13.00			
Laboratory services.....	128	1,986.00		9	347.00		6	520.00		2	44.50			
Surgery.....	158	3,147.00		5	320.00		6	319.00		3	20.00			
Miscellaneous therapy.....	35	367.00		6	15.00		22	64.00		3	115.00			
Consultations.....	35	520.00		6	135.00			875.00		65	1,535.25			
Special nurses' visits.....														
Total.....		8,453.20	14.6		1,329.25	9.9		2,528.75	10.1		1,968.75	27.8	14,276.95	13.7
Grand total.....		57,836.70	100.0		14,838.75	100.0		25,186.75	100.0		7,090.00	100.0	104,750.20	100.0

TABLE 2.—Distribution of 625 pneumonia cases according to cost, type of accommodation, and deaths <sup>1</sup>

Cost	Number of cases				
	Ward	Semi-private	Private	Home	Total
\$50 and under.....	47 (43)	3 (2)	4 (4)	14 (4)	68 (53)
\$51-\$100.....	105 (32)	9 (4)	15 (10)	22 (1)	151 (47)
\$101-\$150.....	106 (11)	12 (3)	9 (4)	14 (1)	141 (19)
\$151-\$200.....	63 (7)	14	13 (2)	9	99 (9)
\$201-\$250.....	36 (6)	6	13 (1)	2	57 (7)
\$251-\$300.....	21 (1)	8	10	1 (1)	40 (2)
\$301-\$350.....	4 (1)	5	12	2	23 (1)
\$351-\$400.....	4	2 (1)	5	0	11 (1)
\$401-\$450.....	4	1	1	0	6
\$451 and over.....	10	6 (1)	12	1	29 (1)
Total.....	400 (101)	66 (11)	94 (21)	65 (7)	625 (140)

<sup>1</sup> Figures in parentheses indicate deaths.

TABLE 3.—Deaths among 560 hospitalized pneumonia cases according to (1) days following onset of illness, and (2) duration of hospital stay

Number of days	Deaths during illness	Deaths during hospital stay	Number of days	Deaths during illness	Deaths during hospital stay
1-5.....	39	101	51-55.....		
6-10.....	64	17	56-60.....		
11-15.....	21	9	61-65.....		
16-20.....	3	1	66-70.....		
21-25.....	1		71-75.....		
26-30.....	2	2	76-80.....		
31-35.....		1	81 and over.....	1	1
36-40.....			Total deaths.....	133	133
41-45.....	1				
46-50.....	1	1			

TABLE 4.—Deaths in 625 pneumonia cases—distribution according to total cost

Total cost	Number of deaths	Total cost	Number of deaths
\$50 and under.....	53	\$301-\$350.....	1
\$51-\$100.....	47	\$351-\$400.....	1
\$101-\$150.....	19	\$401-\$450.....	0
\$151-\$200.....	9	\$451 and over.....	1
\$201-\$250.....	7	Total.....	140
\$251-\$300.....	2		

## APPENDIX B

Questionnaire used in pneumonia case study (adult cases only)

General information concerning the patient:

- (1) Age?----- (2) Sex?-----
- (3) Color? ----- (4) Occupation? ----- (5) Number of dependents? -----
- (6) How many days was the patient ill (From onset to discharge)? -----
- (7) What was the condition of the patient upon discharge? -----  
How long afterwards was he/she able to return to work? -----
- (8) Were you called in at the onset of symptoms? -----  
If not, how many days elapsed between onset and the time you came in? -----
- (9) Was any other physician called on the case before you? -----  
If so, how many calls did he make? -----  
What was his charge? -----
- (10) What was the total number of visits you made during the illness? -----  
What was your charge? -----  
What is your usual charge for home visits? -----
- (11) Was a consulting specialist called on this case? -----  
For what reason? -----  
How many visits did he make? -----  
What was his charge? -----
- (12) Did the patient have graduate nursing care? -----  
How many days was the nurse in attendance? -----
- (13) Did the patient have practical nursing care? -----  
How many days was the practical nurse in attendance? -----
- (14) Check laboratory services: pneumonia (sputum typing) -----; Blood cultures -----
- (15) Was serum administered in this case? -----  
If so, what was the total unitage? -----  
What type? -----  
Who paid for it? -----  
Was there serum sickness? -----
- (16) Was oxygen administered? -----  
If so, for how many days? ----- At what flow rate? ----- How many tanks were consumed? -----  
Check method of administration: catheter -----; cannula -----; tent -----  
What was the charge? -----
- (17) Were X-rays taken? -----  
How many? -----  
What was the charge? -----
- (18) Were there any surgical complications? -----  
What kind? -----  
What was the charge? -----
- (19) Was there any symptomatic treatment given? -----  
What kind? -----  
What was the charge? -----

## APPENDIX C

*Pneumonia price schedule used in this study compared with New York Workmen's Compensation Schedule <sup>1</sup>*

Item	Pneumonia study	Workmen's compensation <sup>2</sup>
Days hospitalized (per diem):		
Ward.....	\$3. 50	
Semi-private.....	5. 50	
Private.....	8. 00	
Physicians' services (per visit):		
Minimum.....	2. 00	\$3 (first).
Average.....	3. 00	\$3 (home-day).
Moderate.....	5. 00	\$5 (home-night).
Special nursing care (per diem).....	7. 00	\$2 (hospital call).
Practical nursing care (per diem).....	4. 00	
Serum (per 25,000 U.):		
Ward.....	7. 00	
Semi-private.....	9. 00	
Private.....	12. 00	
Oxygen (per tank, 6,300 liters):		
Ward.....	2. 00	
Semi-private.....	3. 00	
Private.....	5. 00	
X-rays (chest, lungs, and heart):		
Ward.....	1. 50	\$7.50.
Semi-private.....	3. 00	\$11.
Private.....	5. 00	\$15.
Laboratories:		
Pneumonia (pneumococcus typing).....		\$5.
Ward.....	3. 00	
Semi-private.....	3. 50	
Private.....	4. 00	
Pathology.....		\$23.
Blood:		
Wassermann.....		\$5.
Kahn.....		\$3.
Full B. C.....		\$5.
W. B. C. and differential.....		\$2.
Icteric index.....		\$2.
Urine:		
Routine—chemical qualitative without microscopic.....		\$1.
Routine—chemical qualitative with microscopic.....		\$2.
Routine—chemical and microscopic, including quantitative.....		\$3.
Ward.....	\$2. 00	
Semi-private.....	2. 50	
Private.....	3. 00	
Surgery:		
Chest tap.....	10. 00	
Lung suction.....	10. 00	
Spinal puncture.....	10. 00	
Blood transfusions (per 300 cc).....		\$50 (direct); \$25 (indirect, citrate).
Ward.....	25. 00	
Semi-private.....	35. 00	
Private.....	40. 00	
Laparotomy.....		\$100.
Lung decortication, osteotomy, rib resection, thoracotomy, thoracostomy:		
Ward.....	50. 00	
Semi-private.....	75. 00	
Private.....	100. 00	
Pneumothorax:		
Ward.....	35. 00	
Semi-private.....	50. 00	
Private.....	75. 00	
Appendectomy (pneumonitic).....		By arrangement.
Ward.....	50. 00	Do.
Semi-private.....	75. 00	
Private.....	100. 00	
Hysterectomy.....	100. 00	
Incision for abscess, carbuncle with multiple pockets.....		\$5.
Incision for deep abscess or infection, i. e., arm, buttock, anorectal.....	10. 00	\$25.
Parotid repair.....	50. 00	

<sup>1</sup> Minimum medical fee schedule for medical treatment and care of injured employees—established by the Industrial Commissioner of the State of New York in accordance with Chapters 258 and 930 of the Laws of 1935 amending the Workmen's Compensation Law.

<sup>2</sup> This is the equivalent of semi-private service costs. In order to ascertain ward and private equivalents a two-way interpolation is suggested.

*Pneumonia price schedule used in this study compared with New York Workmen's Compensation Schedule*—Continued

Item	Pneumonia study	Workmen's compensation
<b>Surgery—Continued.</b>		
Bronchoscopy.....		\$50.
Ward.....	25. 00	
Semi-private.....	35. 00	
Private.....	50. 00	
Biopsy.....	25. 00	
In hospital (pathologist at operation).....		\$15.
Outside.....		By arrangement.
Myringotomy.....	10. 00	\$10.
Bilateral mastoidectomy.....	100. 00	\$225 (3 weeks aftercare).
Physiotherapy (inclusive of any or all modalities).....		\$2.
Ward.....	1. 00	
Semi-private.....	1. 50	
Private.....	2. 00	
Special drug therapy (prontosil, prontosil—median dose).....		
Ward.....	2. 00	
Semi-private.....	3. 00	
Private.....	4. 00	
Consultations (per visit).....		\$10.
Ward.....	10. 00	
Semi-private.....	15. 00	
Private.....	25. 00	

## ***Ixodes marmotae*—A NEW SPECIES OF TICK FROM MARMOTS<sup>1</sup>**

(ACARINA: Ixodidae)

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*Rocky Mountain Laboratory, United States Public Health Service*

Incident to studies of the tick genus *Ixodes*, it has been found that the common species on marmots in the Northwest is undescribed, and that it is not *I. cookei* as it has usually been identified heretofore.

The species *cookei*, described by Packard in 1869 from a woodchuck (Salem, Mass.), is fairly common on marmots in the Northeastern and North Central States and in eastern Canada. Banks (1908) listed as the known hosts of *cookei* the following: Fox, mink, weasel, skunk, pocket gopher, striped gopher, porcupine, woodchuck, raccoon, dog, cat, and robin.

It is evident that *I. cookei* also sometimes attacks man. Fitch (1872), in writing of *cookei* as *I. cruciarius*, gives two records of recovery from human beings. In a collection from New York State kindly sent to us for examination by Dr. Robert Matheson, of Cornell University, there are two records of single specimens taken from children.

The records from Cornell University add also the pig to the Banks list of hosts.

<sup>1</sup> Contribution from the Division of Infectious Diseases, National Institute of Health, Rocky Mountain Laboratory, Hamilton, Montana.

The new species here described has been taken in Idaho, Montana, Oregon, Wyoming, and Washington. It is not known to attack man. The known data on hosts and distribution are given below.

The taxonomy of the genus *Ixodes* is difficult, owing in part to a lack of known dependable characters in the various species as well as to the scant knowledge regarding limits of variation. There has been some tendency among earlier writers to attempt to show relationships by describing new forms as varieties of recognized species or by reducing previously described species to varietal rank. Thus Nuttall treated *cookei* as a variety of the European *hexagonus*, and yet *cookei* is apparently not more closely related to *hexagonus* than *hexagonus* is to some other species. We regard both *cookei* and *marmotae* as having specific rank.

*Ixodes marmotae* n. sp.

MALE (HOLOTYPE)

Length,<sup>2</sup> 2.76 mm; width, 1.98 mm. Average of measurements of 5 specimens, length, 2.67 mm; width, 1.95 mm. Shape, ellipsoidal. Scutum and basis capituli, dark yellow-brown;<sup>3</sup> palpi and legs, yellow-brown; marginal fold outside of the lateral groove, light yellow-brown.

DORSAL VIEW

*Capitulum*.—Basis capituli flattened, with the sides straight, converging posteriorly (sometimes nearly parallel) and with the posterior boundary a nearly straight, salient edge. Cornua absent. Surface punctate and without hairs.

*Palpi*.—Combined length of articles 2 and 3, 0.33 mm. Tumescents and with the surface irregular (not smooth); profile curved on both lateral and median sides; article 2 slightly longer than article 3; a few hairs of various lengths are present.

*Scutum*.—Convex, shining, and evenly punctate. Scapulae rounded. Punctations larger in the peripheral areas. A few fine hairs present. While true cervical grooves are absent, there are paired longitudinal depressed areas in the pseudo-scutum and, posterior to the pseudo-scutum, similar longitudinal depressed areas all parallel with the lateral grooves. Lateral groove pronounced; lateral fold elevated, punctate and with fine, short hairs present.

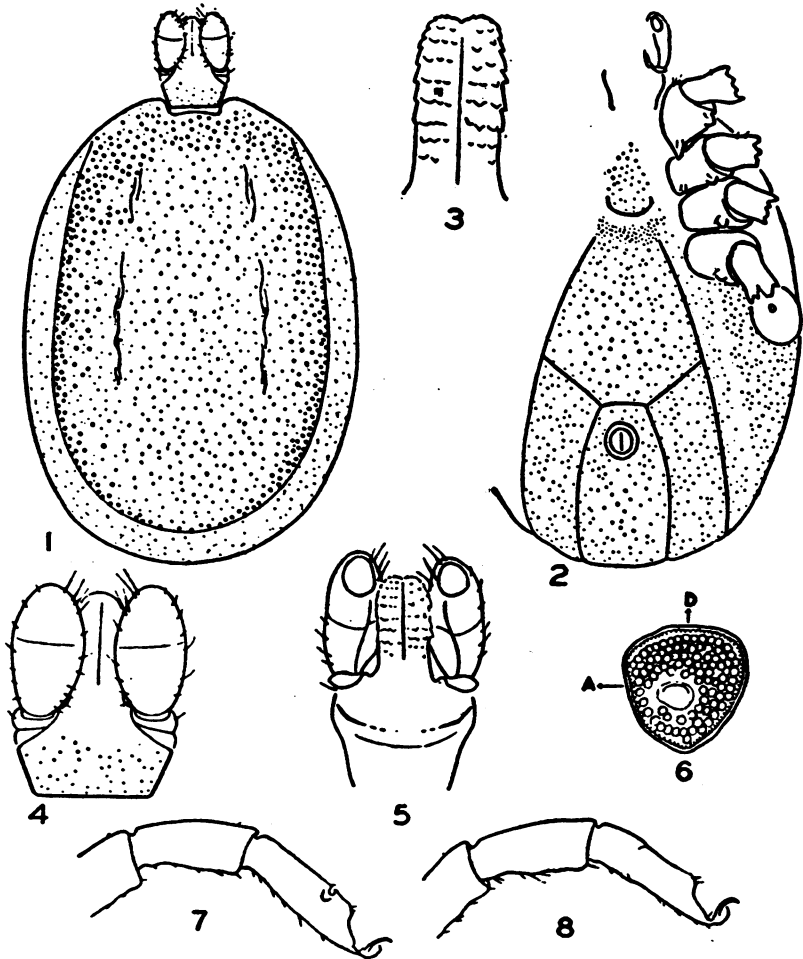
*Legs*.—Length of tarsus I, about 0.54 mm; metatarsus, 0.45 mm. Length of tarsus IV, about 0.51 mm; metatarsus, 0.435 mm (measurements from a paratype specimen). All tarsi humped and terminating abruptly.

<sup>1</sup> Systematists in describing ticks now generally accept the practice of some earlier writers in measuring specimens from a transverse line connecting the tips of the scapulae to the posterior margin of the body.

<sup>2</sup> Described from alcoholic specimens. The colors of ticks of the genus *Ixodes* are affected by the alcohol. In living *I. marmotae* the well sclerotized parts are black-brown in color.

VENTRAL SURFACE

*Capitulum*.—Basis capituli convex, greatest width at the insertions of the palpi, basis narrowing posteriorly. Surface impunctate and without hairs. Posterior to the insertion of the palpi are mild,



MALE

1. Dorsal view. 2. Ventral view. 3. Hypostome. 4. Dorsal view of capitulum, enlarged. 5. Ventral view of capitulum, enlarged. 6. Spiracular plate (A and D indicate anterior and dorsal directions). 7. Metatarsus and tarsus of leg I. 8. Metatarsus and tarsus of leg IV.

transverse ridges; and posterior to these elevations is a curved, transverse, elevated ridge.

*Hypostome*.—Length about 0.24 mm. Sides about parallel, with the lateral edges serrate (when mounted in balsam and viewed in a compound microscope); teeth in transverse rows of faint elevations. Mildly bi-lobed apically.

*Coxae*.—Coxa I with the internal spur short. External spurs present on all coxae, each about as long as wide, rounded apically. Coxae II, III, and IV salient on their posterior edges. A few hairs present on all coxae.

*Ventral plates*.—Median and anal plates of about equal length. All plates punctate, and all excepting the median one have very fine, short hairs.

*Spiracular plate*.—Sub-triangular or sub-circular; greatest dimension about 0.27 mm. Macula placed a little ventrad of the center; goblets moderate in number.

Genital aperture about on the level of the intervals between coxae II and III.

Anus within an oval pattern.

#### FEMALE (ALLOTYPE)

Length, 2.73 mm; width, 1.86 mm. Average of measurements of 5 specimens—length, 2.62 mm; width, 1.85 mm. Oval in shape and yellow-brown in color.

#### DORSAL VIEW

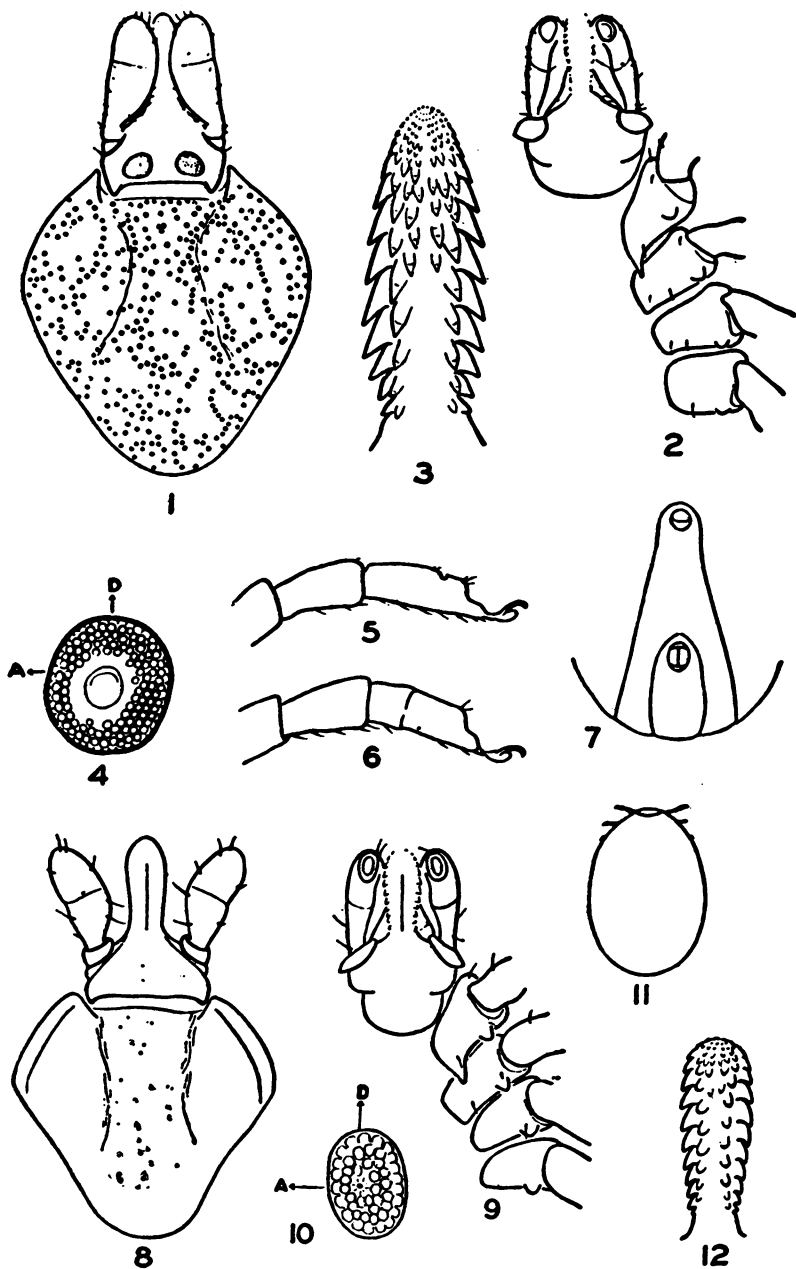
*Capitulum*.—Length, 0.87 mm. Width of basis capituli (greatest width), 0.57 mm. Basis with the surface smooth, impunctate and without hairs; with the sides moderately converging behind, posteriorly to the insertion of the palpi; more than twice as wide as long. Posterior margin a depressed, straight or curved, projecting edge between the cornua. Latter moderate in size and rounded apically. Porose areas oval or subcircular, depressed, variable in size.

*Palpi*.—Combined length of articles 2 and 3, 0.54 mm. Article 2 longer than 3. Surface irregular (not smooth). Lateral profiles nearly straight; median profiles convex; apically broad and rounded. Article 1 indefinite.

*Scutum*.—Length, 1.50 mm; width, 1.38 mm. Sub-oval, widest a little before the middle, rounded behind, and narrower behind than in *cookei*. Surface shining and with distinct punctations numerous and evenly distributed throughout. Hairs absent or insignificant. Lateral carinae absent. Cervical grooves shallow, variable in extent, but visible from near the emargination to near the postero-lateral sides.

*Post-scutal area*.—Marginal grooves distinct, continuous. Hairs numerous and of moderate size (about as on the legs).

*Legs*.—Length of tarsus I, 0.54 mm; metatarsus, 0.435 mm. Length of tarsus IV, 0.54 mm; metatarsus, 0.42 mm (measurements from a paratype specimen). All tarsi humped subapically and terminating abruptly.



FEMALE, 1, 2, 3, 4, 5, 6, 7, and 11. NYMPH 8, 9, 10, and 12

1. Dorsal view of capitulum and scutum. 2. Ventral view of capitulum and coxae I to IV. 3. Hypostome. 4. Spiracular plate (A and D indicate anterior and dorsal directions). 5. Metatarsus and tarsus of leg I. 6. Metatarsus and tarsus of leg IV. 7. Ventral view of female showing the genital and anal grooves, the vaginal opening above and the anus below. 8. Dorsal view of the capitulum and scutum of the nymph. 9. Ventral view of the capitulum and coxae of the nymph. 10. Spiracular plate of the nymph. 11. Dorsal view of a fully engorged female showing the shape (from an alcoholic specimen). 12. Hypostome of nymph.

## VENTRAL VIEW

*Capitulum*.—Shining and impunctate. Faint elevations present posterior to the insertions of the palpi. Posterior border a shelving edge which is broadly rounded posteriorly.

*Palpi*.—Article 1 with a flat, sub-oval, lateral extension.

*Hypostome*.—Length about 0.45 mm; greatest width about 0.165 mm. Largest teeth in the lateral files, smaller teeth in the median files. Teeth in two principal files on each side of the median line and mesad of these are other smaller ones in shorter, irregular rows which extend through about two-fifths of the apical portion. Apex rounded.

*Coxae*.—Essentially as in the male, but with the internal spur on coxa I longer and usually slightly curved.

*Spiracular plate*.—Sub-circular. Greatest length, 0.3 mm; greatest width, 0.225 mm. Goblets moderate in number. Macula located near the center.

Anal groove forming an elongated U-shaped arch which may or may not be connected on the median line anterior to the anus. Anal ring in the shape of a short ellipse.

Vaginal opening between coxae III and IV.

*Engorged female*.—Viewed dorsally the profile is elliptical. Length about 6.5 mm; width, about 4.6 mm.

## NYMPH

The unengorged specimens are ellipsoidal in shape and light yellow-brown in color. Length, 1.08 mm; width, 0.87 mm.

## DORSAL VIEW

*Capitulum*.—Greatest width, 0.285 mm. Surface of the basis capituli smooth, with a few distinct punctations and without hairs. Posterior margin a nearly straight, salient edge. Cornua distinct, moderate in length and sub-acute apically. Palpi with their surfaces irregular (not smooth); with their lateral sides nearly straight and their median sides convex. Sutural line between articles 2 and 3 faint or absent. A few hairs are present on the palpi.

*Scutum*.—Length, 0.66 mm; width, 0.69 mm. About as wide as long, narrowed posteriorly, rounded apically. Cervical grooves broad and shallow, crescentic in shape, with their convex sides toward each other, and their posterior ends not reaching the postero-lateral sides of the scutum. Lateral carinae usually visible as moderate elevations, near to and parallel with the antero-lateral margins, not sharp on top. Scutum with distinct punctations present in the median longitudinal area and absent in the lateral areas.

*Post-scutal area*.—Impunctate and with a few short, fine hairs present.

## VENTRAL VIEW

*Capitulum*.—Smooth, impunctate, and without hairs. Posterior to the insertions of the palpi are elevated shelving edges; the basis capituli is narrowed and rounded behind, with the posterior edge salient. Palpal article 1 a diagonal oval plate which extends both anteriorly and posteriorly.

*Hypostome*.—Length, about 0.27 mm. Teeth in two principal, complete files on each side of the median line and in addition to these a few teeth in the middle area near the apex. Apex rounded.

*Coxae*.—Coxa I with the internal spur definite, but short. Coxae I, II, III, and IV with external spurs short and rounded.

*Spiracular plate*.—Greatest length about 0.112 mm; greatest width, about 0.075 mm. Ellipsoidal in shape and with the goblets moderate in number.

There are numerous points of morphological difference between this species and *I. cookei*. *I. marmotae* is a smaller tick.

The male scutum of *marmotae* is distinctly broader in proportion to the length than in *cookei*. It has large punctations only in the peripheral areas and has fine punctations in the median areas, while in *cookei* the punctations are notably large over the entire surface.

The females are not as readily distinguished, but can be differentiated by the absence of lateral carinae on the scutum in *marmotae* and their presence in *cookei*, though in the latter the carinae vary in prominence. The cornua are elevated over the level of the posterior margin of the basis capituli, while in *cookei* the cornua and posterior margin are in the same plane. The palpi have their proximal edges evenly convex, while in *cookei* the proximal edges are more convex toward the bases of the palpi.

The nymphs of the two species are easily separable by the following characters:

In *marmotae*: Scutum about as broad as long; cornua comparatively long and acute; hypostome shorter and relatively broader.

In *cookei*: Scutum much broader than long; cornua shorter; hypostome longer and relatively narrower.

*Holotype* male and *allotype* female (8636A) reared from 23 larvae and 187 nymphs collected from a woodchuck, *Marmota* sp., Mayfield, Idaho, June 30, 1932, deposited in the collections of the Rocky Mountain Laboratory. *Paratypes*, 15 males and 22 females also reared from same lot. Paratype male and female have been deposited in the U. S. National Museum.

Other collection records follow. In each instance the host was *Marmota* sp. unless otherwise specified.

*Idaho*: 8635A, Mayfield, June 28, 1932, 2 females, 20 nymphs, and 16 larvae; 9032B, Mayfield, April 24, 1933, 4 females, 6 nymphs, and

6 larvae; 13176, Arco County, May 7, 1937, 4 females, 4 nymphs; 13280, Spencer, May 24, 1937, 3 females: From *Erethizon epixanthum*, 8638A, Mayfield, July 1, 1932, 1 female.

*Montana*: 6149, Ravalli County, May 24, 1930, 1 female; 6175, May 27, 1930, 1 female; 10039, March 29, 1934, 1 female; 10040, March 3, 1934, 1 female; 14036, April 28, 1938, 1 male, 2 females and 2 nymphs; 12643, Beaverhead County, July 10, 1936, 1 female.

*Oregon*: 8236A, Burns, July 18, 1932, 1 female.

*Wyoming*: 10707, Casper, June 21, 1934, 1 female; 13774, Johnson County, May 12, 1937, 1 female; 13781, Johnson County, May 18, 1937, 2 females.

*Washington*: Host unknown, Olympia, specimen labeled "*I. cruciarius*." Nathan Banks collection.

## REFERENCES

- Banks, Nathan: A revision of the Ixodoidea, or ticks, of the United States. U. S. Dept. of Agri. Bur. of Ent. Tech. Ser. 15, p. 28 (1908).  
 Fitch, A.: Fourteenth report on the noxious, beneficial, and other insects of the State of New York. Ann. Rep. Trans. N. Y. State Agri. Soc., pp. 366-369 (1870) 1872.

## DEATHS DURING WEEK ENDED NOVEMBER 19, 1938

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

	Week ended Nov. 19, 1938	Correspond- ing week, 1937
<b>Data from 88 large cities of the United States:</b>		
Total deaths.....	8,290	18,093
Average for 3 prior years.....	17,992	
Total deaths, first 46 weeks of year.....	372,233	397,298
Deaths under 1 year of age.....	487	1,498
Average for 3 prior years.....	1,519	
Deaths under 1 year of age, first 46 weeks of year.....	24,059	25,539
<b>Data from industrial insurance companies:</b>		
Policies in force.....	68,305,603	69,958,169
Number of death claims.....	13,082	13,583
Death claims per 1,000 policies in force annual rate.....	10.0	10.1
Death claims per 1,000 policies, first 46 weeks of year, annual rate.....	9.2	9.7

•1 Data for 86 cities.

# 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) indicates a positive report and has the same significance as any other figure, while leaders (.....) represent no report, with the implication that cases or deaths may have occurred but were not reported to the State health officer.

*Cases of certain diseases reported by telegraph by State health officers for the week ended November 26, 1938, rates per 100,000 population (annual basis), and comparison with corresponding week of 1937 and 5-year median*

Division and State	Diphtheria				Influenza				Measles			
	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median
<b>NEW ENG.</b>												
Maine.....	61	10	0	1	6	1	2	.....	49	8	37	26
New Hampshire.....	20	2	0	0	.....	.....	.....	.....	.....	.....	28	5
Vermont.....	14	1	1	1	.....	.....	.....	.....	41	3	64	41
Massachusetts.....	5	4	1	7	.....	.....	.....	.....	163	143	63	75
Rhode Island.....	8	1	0	0	.....	.....	.....	.....	8	1	4	4
Connecticut.....	6	2	12	6	30	10	5	4	90	30	3	55
<b>MID. ATL.</b>												
New York.....	8	20	30	32	1 10	1 14	1 14	1 14	140	348	85	370
New Jersey.....	7	6	9	24	7	6	7	17	10	8	183	30
Pennsylvania.....	23	45	38	56	.....	.....	.....	.....	32	62	1, 351	231
<b>E. NO. CEN.</b>												
Ohio.....	36	46	36	90	.....	.....	26	6	14	18	230	101
Indiana.....	60	40	25	53	12	8	14	15	8	5	46	28
Illinois.....	28	42	64	64	8	12	12	14	12	18	340	23
Michigan.....	17	16	18	23	1	1	1	2	25	23	93	37
Wisconsin.....	2	1	5	5	45	25	41	23	162	91	34	56
<b>W. NO. CEN.</b>												
Minnesota.....	20	10	4	7	.....	.....	1	1	277	141	7	23
Iowa.....	63	31	2	4	20	10	2	.....	102	50	7	7
Missouri.....	29	22	47	60	18	14	25	41	7	5	604	42
North Dakota.....	15	2	0	2	59	8	.....	1	1, 625	220	5	8
South Dakota.....	60	8	1	1	8	1	.....	.....	316	42	.....	9
Nebraska.....	15	4	7	7	.....	.....	.....	.....	19	5	2	3
Kansas.....	39	14	6	16	28	10	2	1	8	3	17	11

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 26, 1938, rates per 100,000 population (annual basis), and comparison with corresponding week of 1937 and 5-year median—Continued

Division and State	Diphtheria				Influenza				Measles			
	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 27, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median
<b>SO. ATL.</b>												
Delaware.....	0	0	0	0					60	3	1	2
Maryland <sup>1</sup> .....	28	9	23	16	6	2	5	8	127	41	6	6
Dist. of Col.....	58	7	6	14			1		8	1	1	2
Virginia.....	150	78	35	92	202	105			21	11	63	24
West Virginia.....	36	13	13	48	31	11	23	25	50	18	40	18
North Carolina <sup>1</sup> .....	88	59	69	78	1	1	6	10	197	132	221	107
South Carolina <sup>1</sup> .....	33	12	9	10	762	274	238	267	17	6	11	6
Georgia <sup>1</sup> .....	35	21	20	52	25	15			39	23		
Florida <sup>1</sup> .....	22	7	44	14			7	2	44	14	15	1
<b>E. SO. CEN.</b>												
Kentucky.....	45	25	15	61	46	26	9	16	18	10	73	11
Tennessee <sup>1</sup> .....	32	18	21	60	49	27	66	63	14	8	110	22
Alabama <sup>1</sup> .....	68	38	29	37	86	48	81	40	38	21	8	12
Mississippi <sup>1</sup> .....	54	21	11	25								
<b>W. SO. CEN.</b>												
Arkansas.....	38	15	18	18	206	81	46	23	15	6	8	
Louisiana.....	49	20	23	27	12	5	6	6	100	41		8
Oklahoma.....	27	13	13	16	141	69	47	47	12	6	1	3
Texas <sup>1</sup> .....	46	54	49	93	177	209	250	146	3	3	23	9
<b>MOUNTAIN</b>												
Montana.....	0	0	0	2	58	6		3	1,703	176	14	14
Idaho.....	0	0	1	0			3	3	370	35	2	11
Wyoming.....	22	1	0	0					22	1		3
Colorado.....	34	7	17	9	175	36			15	3	39	5
New Mexico.....	12	1	7	7			1	4	37	3	86	30
Arizona.....	101	8	8	5	1,101	87	101	27			13	6
Utah <sup>1</sup> .....	111	11	9	0	70				121	12	15	15
<b>PACIFIC</b>												
Washington.....	6	2	7	0					151	48	9	31
Oregon.....	5	1	10	1	36	7	21	25	46	9	9	9
California.....	34	40	26	42	21	25	33	44	310	366	40	126
<b>Total</b> .....	<b>33</b>	<b>808</b>	<b>789</b>	<b>1,316</b>	<b>57</b>	<b>1,161</b>	<b>1,096</b>	<b>913</b>	<b>91</b>	<b>2,221</b>	<b>4,016</b>	<b>3,193</b>
<b>47 weeks</b> .....	<b>23</b>	<b>26,256</b>	<b>24,507</b>	<b>33,031</b>	<b>60</b>	<b>57,179</b>	<b>283,149</b>	<b>148,788</b>	<b>679</b>	<b>777,583</b>	<b>264,309</b>	<b>356,493</b>

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median
<b>NEW ENG.</b>												
Maine.....	0	0	0	0	0	0	1	1	79	13	19	19
New Hampshire.....	0	0	0	0	0	0	0	0	72	7	5	6
Vermont.....	0	0	0	0	0	0	0	0	123	9	10	6
Massachusetts.....	1.2	1	1	2	0	0	0	1	112	95	163	182
Rhode Island.....	0	0	1	0	0	0	0	0	54	7	28	17
Connecticut.....	0	0	1	0	0	0	0	0	141	47	39	45
<b>MID. ATL.</b>												
New York.....	2	5	3	5	0.4	1	7	6	99	246	259	361
New Jersey <sup>1</sup> .....	0	0	1	0	1.2	1	0	0	92	77	39	79
Pennsylvania.....	1	2	1	4	4	7	2	4	108	210	349	397

Cases of certain diseases reported by telegraph by State health officers for the week ended November 26, 1938, rates per 100,000 population (annual basis), and comparison with corresponding week of 1937 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median
<b>E. NO. CEN.</b>												
Ohio.....	1.5	2	1	1	1.5	2	1	1	227	293	375	375
Indiana.....	0	0	3	1	0	0	0	0	213	142	141	172
Illinois.....	0.7	1	1	5	0	0	2	3	151	274	411	426
Michigan <sup>2</sup> .....	0	0	3	2	0	0	3	3	296	274	340	286
Wisconsin.....	0	0	0	0	0	(	1	1	312	175	165	225
<b>W. NO. CEN.</b>												
Minnesota.....	2	1	1	0	2	1	2	2	161	82	102	102
Iowa.....	2	1	0	1	0	0	0	1	121	59	203	80
Missouri.....	2.6	2	0	3	2.6	2	5	1	112	86	169	150
North Dakota.....	0	0	1	0	0	0	0	0	170	23	20	35
South Dakota.....	0	0	0	0	0	0	1	0	181	24	26	26
Nebraska.....	0	0	0	0	0	0	0	0	76	20	15	23
Kansas.....	2.8	1	1	1	0	0	1	1	333	119	125	127
<b>SO. ATL.</b>												
Delaware.....	0	0	0	0	0	0	0	0	140	7	9	9
Maryland <sup>2</sup> .....	0	0	2	2	0	0	0	1	84	27	50	71
Dist. of Col.....	0	0	0	0	0	0	0	0	116	14	11	12
Virginia.....	4	2	6	4	0	0	1	81	42	35	75	75
West Virginia.....	3	3	1	1	0	0	1	1	246	88	104	119
North Carolina <sup>4</sup> .....	1.5	1	2	1	1.5	1	1	1	108	72	54	105
South Carolina <sup>4</sup> .....	6	2	1	0	0	0	0	1	39	14	4	6
Georgia <sup>4</sup> .....	1.7	1	4	2	1.7	1	0	0	46	27	18	23
Florida <sup>4</sup> .....	0	0	2	0	0	0	0	0	19	6	10	7
<b>E. SO. CEN.</b>												
Kentucky.....	5	3	1	1	0	0	0	3	168	94	69	75
Tennessee <sup>4</sup> .....	1.8	1	6	3	1.8	1	2	2	94	52	54	74
Alabama <sup>4</sup> .....	4	2	7	1	1.8	1	2	2	61	34	21	28
Mississippi <sup>2</sup> .....	0	0	1	1	0	0	6	1	39	15	17	23
<b>W. SO. CEN.</b>												
Arkansas.....	5	2	0	0	2.5	1	3	2	33	13	38	13
Louisiana.....	0	0	0	1	0	0	2	1	46	19	8	17
Oklahoma.....	2	1	3	1	0	0	0	1	55	27	56	22
Texas <sup>4</sup> .....	0	0	2	0	0.8	1	2	2	86	102	91	66
<b>MOUNTAIN</b>												
Montana.....	0	0	0	0	0	0	0	0	300	31	29	29
Idaho.....	0	0	1	1	0	0	0	0	159	15	24	24
Wyoming.....	0	0	0	0	0	0	0	0	67	3	10	12
Colorado.....	5	1	1	1	0	0	2	0	136	28	43	43
New Mexico.....	0	0	0	0	0	0	1	222	18	26	25	25
Arizona.....	13	1	0	0	0	0	1	1	63	5	10	17
Utah <sup>2</sup> .....	0	0	0	0	0	0	1	0	181	18	52	39
<b>PACIFIC</b>												
Washington.....	0	0	2	1	0	0	2	2	142	45	32	59
Oregon.....	5	1	0	0	0	0	0	2	223	44	34	49
California.....	0	0	7	4	0	0	11	11	180	212	136	245
Total.....	1.5	37	68	68	0.8	20	61	74	135	3,354	4,048	4,952
47 weeks.....	2.3	2,626	4,998	4,998	1.4	1,616	9,248	7,021	144	167,502	199,748	199,748

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended November 26, 1938, rates per 100,000 population (annual basis), and comparison with corresponding week of 1937 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases	1933-37 median	Nov. 26, 1938, rate	Nov. 26, 1938, cases	Nov. 27, 1937, cases
<b>NEW ENG.</b>											
Maine.....	0	0	0	0	6	1	1	2	177	29	39
New Hampshire.....	0	0	0	0	0	0	0	0	0	0	1
Vermont.....	0	0	0	0	0	0	0	1	681	50	72
Massachusetts.....	0	0	0	0	1	4	9	1	211	179	125
Rhode Island.....	0	0	0	0	15	2	0	0	138	18	51
Connecticut.....	0	0	0	0	6	2	1	1	234	78	31
<b>MID. ATL.</b>											
New York.....	0	0	0	0	4	10	6	12	233	578	346
New Jersey <sup>1</sup> .....	0	0	0	0	2	2	1	5	328	273	82
Pennsylvania.....	0	0	0	0	5	9	16	16	193	376	-----
<b>E. NO. CEN.</b>											
Ohio.....	2	2	0	0	2	2	9	5	146	189	122
Indiana.....	33	22	21	2	8	5	3	3	17	11	34
Illinois.....	0	0	6	1	4	6	6	12	296	447	71
Michigan <sup>2</sup> .....	3	3	0	0	6	6	3	4	230	213	138
Wisconsin.....	20	11	1	14	4	2	2	2	663	372	163
<b>W. NO. CEN.</b>											
Minnesota.....	16	8	11	5	2	1	0	0	45	23	77
Iowa.....	33	16	58	2	67	33	1	3	59	29	33
Missouri.....	5	4	5	3	1	1	13	13	13	10	32
North Dakota.....	118	16	19	6	0	0	2	0	133	18	22
South Dakota.....	0	0	1	6	0	0	0	0	23	3	13
Nebraska.....	4	1	0	0	0	0	0	0	19	5	7
Kansas.....	3	1	1	1	3	1	8	5	56	20	47
<b>SO. ATL.</b>											
Delaware.....	0	0	0	0	0	0	0	0	20	1	3
Maryland <sup>3</sup> .....	0	0	0	0	9	3	7	10	96	31	68
Dist. of Col.....	0	0	0	0	17	2	0	0	109	12	5
Virginia.....	0	0	0	0	6	3	4	13	25	13	40
West Virginia.....	0	0	0	1	14	5	5	5	95	34	60
North Carolina <sup>4</sup> .....	0	0	0	0	3	2	11	7	320	214	167
South Carolina <sup>4</sup> .....	0	0	0	0	6	2	0	3	53	19	27
Georgia <sup>4</sup> .....	2	1	2	0	5	3	9	9	8	5	4
Florida <sup>4</sup> .....	0	0	1	0	0	0	1	1	28	9	1
<b>E. SO. CEN.</b>											
Kentucky.....	4	2	4	0	27	15	3	11	16	9	61
Tennessee <sup>4</sup> .....	0	0	3	3	9	5	4	11	49	27	45
Alabama <sup>4</sup> .....	0	0	1	0	14	8	6	6	119	66	17
Mississippi <sup>3</sup> .....	0	0	2	1	5	2	8	4	-----	-----	-----
<b>W. SO. CEN.</b>											
Arkansas.....	5	2	17	0	18	7	3	4	66	26	13
Louisiana.....	0	0	0	0	10	4	0	12	39	16	3
Oklahoma.....	10	5	4	0	16	8	9	19	0	0	28
Texas <sup>4</sup> .....	3	3	0	0	17	20	31	31	35	41	163
<b>MOUNTAIN</b>											
Montana.....	10	1	35	23	0	0	3	1	445	46	19
Idaho.....	32	3	13	1	53	5	0	1	11	1	16
Wyoming.....	0	0	4	2	0	0	0	0	22	1	6
Colorado.....	58	12	8	2	19	4	1	2	49	10	9
New Mexico.....	0	0	0	0	12	1	5	11	25	2	61
Arizona.....	51	4	0	0	25	2	0	1	25	2	-----
Utah <sup>4</sup> .....	0	0	0	0	0	0	1	0	141	14	18
<b>PACIFIC</b>											
Washington.....	9	3	31	24	13	4	2	2	38	12	73
Oregon.....	26	4	3	2	5	1	0	1	81	16	18
California.....	3	3	4	4	3	4	6	7	104	123	279
Total.....	5	127	255	109	8	194	200	263	151	3,671	2,700
47 weeks.....	12	13,522	9,571	6,495	12	13,602	14,321	16,501	167	190,807	-----

<sup>1</sup> New York City only.

<sup>2</sup> Rocky Mountain spotted fever, week ended Nov. 26, 1938, New Jersey, 1 case.

<sup>3</sup> Period ended earlier than Saturday.

<sup>4</sup> Typhus fever, week ended Nov. 26, 1938, 52 cases as follows: North Carolina, 4; South Carolina, 1; Georgia, 19; Florida, 1; Tennessee, 1; Alabama, 5; Texas, 21.

**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	Menin- gitis, menin- gococ- cus	Diph- theria	Influ- enza	Ma- laria	Mea- sles	Pel- lagra	Polio- mye- litis	Scarlet fever	Small- pox	Ty- phoid and paraty- phoid fever
<i>October 1933</i>										
Arizona.....	0	23	207	3	19	2	1	18	8	12
Colorado.....	1	53	53	1	18	-----	6	101	17	25
Illinois.....	11	153	36	25	62	-----	7	914	3	59
Kansas.....	1	32	11	2	10	-----	-----	435	2	12
Mississippi.....	3	101	2,526	4,689	188	309	5	68	1	17
Montana.....	0	6	44	-----	384	-----	0	96	28	10
North Dakota.....	1	28	24	-----	435	-----	0	102	0	25
Oklahoma.....	4	105	190	283	35	11	1	126	6	47
Oregon.....	1	16	50	2	31	-----	1	153	18	2
South Dakota.....	0	7	24	-----	78	-----	4	114	6	1
Washington.....	1	4	6	2	86	-----	4	95	4	25

<i>October 1933</i>		<i>October 1933—Continued</i>		<i>October 1933—Continued</i>	
	Cases		Cases		Cases
<b>Chickenpox:</b>		<b>Impetigo contagiosa:</b>		<b>Tetanus:</b>	
Arizona.....	28	Montana.....	10	Illinois.....	5
Colorado.....	100	Oklahoma.....	6	Kansas.....	1
Illinois.....	409	Oregon.....	182	Washington.....	1
Kansas.....	84	South Dakota.....	26	<b>Trachoma:</b>	
Mississippi.....	213	Washington.....	1	Arizona.....	52
Montana.....	217	<b>Leprosy:</b>		Illinois.....	69
North Dakota.....	89	Arizona.....	1	Kansas.....	1
Oklahoma.....	25	<b>Mumps:</b>		Mississippi.....	5
Oregon.....	112	Arizona.....	15	Montana.....	5
South Dakota.....	84	Colorado.....	7	North Dakota.....	2
Washington.....	309	Illinois.....	113	Oklahoma.....	4
<b>Conjunctivitis:</b>		Kansas.....	68	South Dakota.....	1
Washington.....	12	Mississippi.....	62	Washington.....	5
<b>Dengue:</b>		Montana.....	4	<b>Tularaemia:</b>	
Mississippi.....	2	North Dakota.....	10	Illinois.....	5
<b>Dysentery:</b>		Oklahoma.....	3	Washington.....	1
Arizona.....	44	Oregon.....	41	<b>Typhus fever:</b>	
Colorado (amoebic).....	9	South Dakota.....	26	Mississippi.....	3
Colorado (bacillary).....	2	Washington.....	114	<b>Undulant fever:</b>	
Illinois (amoebic).....	3	<b>Ophthalmia neonatorum:</b>		Arizona.....	10
Illinois (amoebic car- riers).....	29	Illinois.....	3	Colorado.....	5
Illinois (bacillary).....	43	Mississippi.....	15	Illinois.....	17
Mississippi (amoebic).....	138	Mississippi.....	33	Kansas.....	6
Mississippi (bacillary).....	229	<b>Rabies in animals:</b>		Mississippi.....	3
Montana (bacillary).....	1	Illinois.....	34	Montana.....	2
North Dakota (bacil- lary).....	1	Mississippi.....	9	North Dakota.....	2
North Dakota (unspeci- fied).....	2	Oregon.....	8	Oklahoma.....	245
Oklahoma (bacillary).....	17	Washington.....	49	Oregon.....	4
Washington (amoebic).....	1	<b>Rabies in man:</b>		South Dakota.....	1
Washington (bacillary).....	5	Illinois.....	1	Washington.....	1
<b>Encephalitis, epidemic or lethargic:</b>		Rocky Mountain spotted fever:		<b>Vincent's infection:</b>	
Arizona.....	1	Illinois.....	1	Illinois.....	12
Colorado.....	6	Oregon.....	1	Kansas.....	6
Illinois.....	4	<b>Scabies:</b>		Montana.....	1
Montana.....	4	Kansas.....	21	North Dakota.....	4
North Dakota.....	13	Montana.....	3	Oregon.....	20
Washington.....	3	Oklahoma.....	3	Washington.....	4
<b>German measles:</b>		Oregon.....	74	<b>Whooping cough:</b>	
Arizona.....	4	Washington.....	3	Arizona.....	59
Illinois.....	20	<b>Septic sore throat:</b>		Colorado.....	90
Kansas.....	7	Colorado.....	1	Illinois.....	1,862
Montana.....	1	Illinois.....	2	Kansas.....	98
North Dakota.....	1	Kansas.....	3	Mississippi.....	495
Washington.....	11	Montana.....	2	Montana.....	81
<b>Hookworm disease:</b>		Oklahoma.....	47	North Dakota.....	91
Mississippi.....	617	Oregon.....	12	Oklahoma.....	25
		South Dakota.....	2	Oregon.....	25
		Washington.....	4	South Dakota.....	34
				Washington.....	146

## WEEKLY REPORTS FROM CITIES

City reports for week ended November 19, 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	Small pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	274	149	42	614	556	1,158	7	346	38	962	-----
Current week <sup>1</sup>	168	106	33	917	424	869	9	300	25	1,650	-----
Maine:											
Portland	0	2	0	0	0	2	0	0	0	2	20
New Hampshire:											
Concord	0	0	0	0	1	0	0	0	0	0	11
Manchester	0	0	0	0	2	1	0	0	0	0	7
Nashua	0	0	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	0	0	0	1	0	2	0	1	0	1	8
Burlington	0	0	0	0	0	0	0	0	0	6	13
Rutland	0	0	0	0	1	0	0	0	0	0	7
Massachusetts:											
Boston	0	0	0	10	10	16	0	3	0	37	178
Fall River	1	0	2	1	1	0	0	0	0	0	30
Springfield	0	0	0	20	0	0	0	0	0	8	23
Worcester	0	0	0	1	3	5	0	1	0	6	46
Rhode Island:											
Pawtucket	0	0	0	0	1	0	0	0	0	2	21
Providence	0	0	0	0	4	1	0	3	1	37	62
Connecticut:											
Bridgeport	1	1	0	0	2	0	0	4	0	2	37
Hartford	1	0	0	1	3	5	0	1	0	3	44
New Haven	0	1	0	1	2	0	0	1	0	8	32
New York:											
Buffalo	0	0	3	19	3	14	0	3	0	25	115
New York	21	11	3	21	61	48	0	75	5	223	1,360
Rochester	0	0	0	7	0	3	0	0	0	5	60
Syracuse	0	0	3	2	3	3	0	0	0	39	46
New Jersey:											
Camden	1	0	0	0	2	2	0	1	0	0	29
Newark	1	3	2	2	7	10	0	3	0	51	87
Trenton	0	0	0	0	4	10	0	1	0	3	38
Pennsylvania:											
Philadelphia	5	4	3	12	18	38	0	22	3	140	483
Pittsburgh	7	0	0	3	19	21	0	5	0	14	164
Reading	3	0	0	1	0	0	0	1	1	0	20
Scranton	0	0	0	1	0	3	0	0	0	8	-----
Ohio:											
Cincinnati	12	0	2	0	13	17	0	6	0	6	152
Cleveland	1	4	1	6	9	41	0	6	0	63	210
Columbus	5	1	1	1	4	3	0	0	0	5	96
Toledo	0	0	0	1	3	15	0	3	0	10	71
Indiana:											
Anderson	0	0	0	1	0	5	0	0	0	0	11
Fort Wayne	1	0	0	2	3	3	0	1	0	0	26
Indianapolis	1	1	5	12	36	6	4	0	0	3	105
South Bend	0	0	0	0	3	3	0	0	0	0	19
Terre Haute	5	0	1	0	4	0	0	0	0	0	24
Illinois:											
Alton	1	0	0	1	2	2	0	0	0	2	13
Chicago	15	11	3	10	31	112	0	30	2	371	641
Elgin	0	0	1	3	2	2	0	0	1	0	15
Moline	0	1	1	0	1	0	0	0	0	1	13
Springfield	0	0	1	2	0	0	0	1	3	27	-----
Michigan:											
Detroit	13	3	0	8	6	111	0	14	1	144	270
Flint	2	0	0	6	1	19	0	1	0	3	24
Grand Rapids	1	0	2	2	2	12	0	0	0	3	41
Wisconsin:											
Kenosha	0	0	0	0	0	3	0	0	0	16	13
Madison	0	0	0	1	2	1	0	1	2	4	18
Milwaukee	0	0	2	7	35	0	0	0	0	211	95
Racine	0	0	0	0	0	3	0	0	0	4	14
Superior	0	0	0	0	0	5	0	0	0	2	8

<sup>1</sup> Figures for Richmond, Va., and Tacoma, Wash., estimated; reports not received.

## City reports for week ended November 19, 1938—Continued

State and city	Influenza		Meas-les cases	Pneu-monia deaths	Scar-let fever cases	Small-pox cases	Tuber-culosis deaths	Ty-phoid fever cases	Whoop-ing cough cases	Deaths, all causes	
	Cases	Deaths									
<b>Minnesota:</b>											
Duluth.....	0	0	0	0	3	0	2	0	2	35	
Minneapolis.....	0	1	88	6	21	1	0	0	4	117	
St. Paul.....	0	0	37	5	12	0	1	0	20	56	
<b>Iowa:</b>											
Cedar Rapids.....	0	0	0	0	0	0	0	1	3	-----	
Davenport.....	6	0	0	0	1	0	0	0	0	-----	
Des Moines.....	0	0	0	0	14	0	0	0	0	29	
Sioux City.....	1	0	41	6	0	0	0	0	0	-----	
Waterloo.....	5	0	2	0	0	0	0	0	4	-----	
<b>Missouri:</b>											
Kansas City.....	3	0	0	11	24	0	2	0	4	92	
St. Joseph.....	0	0	0	3	2	0	0	0	1	16	
St. Louis.....	7	1	2	3	21	0	8	1	9	202	
<b>North Dakota:</b>											
Fargo.....	0	0	284	0	2	0	1	0	0	9	
Grand Forks.....	1	0	0	0	0	0	0	0	0	-----	
Minot.....	0	0	1	0	1	0	0	0	1	8	
<b>South Dakota:</b>											
Aberdeen.....	3	0	0	0	0	0	0	0	0	-----	
Sioux Falls.....	0	0	21	0	8	0	0	0	0	12	
<b>Nebraska:</b>											
Lincoln.....	1	0	0	0	5	0	0	0	1	-----	
Omaha.....	1	0	0	6	2	0	1	0	0	73	
<b>Kansas:</b>											
Lawrence.....	0	1	0	1	1	0	0	0	0	4	
Topeka.....	0	0	0	1	7	0	0	0	2	18	
Wichita.....	3	0	0	2	2	0	1	0	4	26	
<b>Delaware:</b>											
Wilmington.....	0	0	0	0	6	0	1	0	2	33	
<b>Maryland:</b>											
Baltimore.....	2	5	0	46	13	13	0	16	1	206	
Cumberland.....	0	0	0	0	0	0	1	0	0	10	
Frederick.....	1	0	0	0	0	0	0	0	0	1	
<b>Dist. of Col.:</b>											
Washington.....	10	2	0	2	6	10	0	6	1	9	130
<b>Virginia:</b>											
Lynchburg.....	2	0	0	0	3	0	1	0	1	11	
Norfolk.....	0	0	2	4	1	0	1	0	0	24	
Roanoke.....	0	0	0	0	1	0	2	0	0	11	
<b>West Virginia:</b>											
Charleston.....	0	1	0	0	4	1	0	1	0	16	
Huntington.....	1	0	0	0	0	0	0	0	0	-----	
Wheeling.....	1	0	1	1	0	0	0	0	3	25	
<b>North Carolina:</b>											
Gastonia.....	3	0	0	0	0	0	0	0	0	-----	
Raleigh.....	0	0	0	0	2	0	0	0	0	19	
Wilmington.....	2	0	2	1	1	0	1	0	0	9	
Winston-Salem.....	0	0	5	1	2	0	1	0	0	10	
<b>South Carolina:</b>											
Charleston.....	0	16	0	0	5	2	0	1	3	20	
Florence.....	0	0	0	2	0	0	0	0	0	8	
<b>Georgia:</b>											
Atlanta.....	3	11	1	0	7	7	0	2	0	1	73
Brunswick.....	0	0	0	0	0	0	0	0	0	2	
Savannah.....	3	1	2	0	3	0	1	0	0	33	
<b>Florida:</b>											
Miami.....	0	2	0	0	1	1	0	2	2	4	23
Tampa.....	2	0	0	0	2	0	0	0	0	21	
<b>Kentucky:</b>											
Ashland.....	8	0	0	0	0	0	1	0	0	15	
Covington.....	0	0	0	0	5	0	1	0	2	16	
Lexington.....	0	0	0	3	3	0	1	0	1	19	
Louisville.....	1	1	0	4	7	4	0	5	0	3	75
<b>Tennessee:</b>											
Knoxville.....	2	1	0	2	2	0	0	0	0	23	
Memphis.....	0	2	3	5	8	0	5	0	4	65	
Nashville.....	0	0	0	2	1	0	0	0	2	49	
<b>Alabama:</b>											
Birmingham.....	2	5	3	1	5	6	0	3	0	0	63
Mobile.....	1	0	0	0	6	2	0	0	1	0	22
Montgomery.....	0	0	0	0	1	0	0	0	0	-----	

\*Including 1 September case; delayed report.

## City reports for week ended November 19, 1938—Continued

State and city	Diphtheria cases		Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Small pox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
	Cases	Deaths	Cases	Deaths								
Arkansas:												
Fort Smith.....	3	3	0	0	0	0	2	0	0	0	0	0
Little Rock.....	0	0	0	0	0	0	0	0	2	0	0	3
Louisiana:												
Lake Charles.....	1	0	1	0	1	0	0	0	0	0	0	2
New Orleans.....	2	1	2	1	10	2	14	0	10	3	6	153
Shreveport.....	0	0	0	0	0	2	2	0	1	0	3	41
Oklahoma:												
Oklahoma City.....	0	0	0	0	0	1	9	0	1	0	0	52
Tulsa.....	0	0	0	0	0	0	5	0	0	0	0	0
Texas:												
Dallas.....	3	1	1	0	0	6	5	0	4	0	1	60
Fort Worth.....	1	0	0	0	2	2	5	0	1	0	0	42
Galveston.....	0	0	0	0	1	1	3	0	0	0	0	10
Houston.....	6	0	1	0	8	2	2	0	4	0	0	89
San Antonio.....	1	0	0	0	0	9	4	0	3	0	1	62
Montana:												
Billings.....	0	0	0	0	0	1	3	0	0	0	0	12
Great Falls.....	0	0	0	0	0	1	2	0	0	0	0	7
Helena.....	0	0	4	0	0	0	0	0	0	0	0	2
Missoula.....	0	2	0	0	0	2	1	0	0	0	1	10
Idaho:												
Boise.....	0	0	0	0	0	2	0	0	0	0	0	8
Colorado:												
Colorado Springs.....	0	0	0	0	0	2	0	0	0	0	3	12
Denver.....	7	0	0	3	9	5	1	3	0	0	27	85
Pueblo.....	0	0	0	0	2	3	0	0	0	0	2	13
New Mexico:												
Albuquerque.....	0	0	0	0	0	0	1	0	0	0	0	5
Utah:												
Salt Lake City.....	0	0	0	1	3	3	5	0	0	0	1	47
Washington:												
Seattle.....	0	0	0	0	5	10	0	1	0	2	2	104
Spokane.....	0	0	3	3	3	4	0	0	0	0	0	28
Oregon:												
Portland.....	0	2	0	2	5	9	0	2	1	0	0	84
Salem.....	0	2	0	0	0	1	0	0	0	0	0	0
California:												
Los Angeles.....	6	19	1	5	16	39	0	20	1	12	388	
Sacramento.....	1	0	0	2	0	1	1	1	0	3	31	
San Francisco.....	1	1	0	280	7	9	0	4	2	40	161	

State and city	Meningitis, meningococcus		Polio-myelitis cases	State and city	Meningitis, meningococcus		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Rhode Island:				Georgia:			
Providence.....	1	0	0	Atlanta.....	1	1	1
New York:				Florida:			
New York.....	1	0	0	Miami.....	0	0	1
Pennsylvania:				Alabama:			
Philadelphia.....	1	1	4	Birmingham.....	2	0	0
Pittsburgh.....	0	0	1	Arkansas:			
South Carolina:				Fort Smith.....	1	0	0
Charleston.....	0	0	2				

*Encephalitis, epidemic or lethargic.*—Cases: New York, 1; Philadelphia, 1; Pittsburgh, 1; Birmingham, 1.  
*Pellagra.*—Cases: Baltimore, 1; Wilmington, N. C., 1; Atlanta, 5; Memphis, 1; San Antonio, 1.  
*Typhus fever.*—Cases: New York, 1; Charleston, S. C., 1; Atlanta, 2; Savannah, 1; Houston, 1.

## FOREIGN AND INSULAR

### DENMARK

*Notifiable diseases—July–September 1938.*—During the months of July, August, and September 1938, cases of certain notifiable diseases were reported in Denmark as follows:

Disease	July	August	September	Disease	July	August	September
Cerebrospinal meningitis.....	6	5	5	Mumps.....	224	125	112
Chickenpox.....	329	269	320	Paratyphoid fever.....	33	60	61
Diphtheria.....	59	51	104	Paratyphoid fever.....	14	25	16
Epidemic encephalitis.....	4	2	1	Poliomyelitis.....	23	109	191
Erysipelas.....	184	271	298	Puerperal fever.....	17	22	18
Gastroenteritis, acute.....	2,299	6,854	4,247	Scarlet fever.....	431	554	1,088
German measles.....	247	154	174	Syphilis.....	43	35	41
Gonorrhoea.....	852	902	891	Tetanus, neonatorum.....	1	4	1
Influenza.....	3,549	3,123	4,516	Typhoid fever.....	4	7	4
Lymphogranuloma.....	-----	2	4	Undulant fever.....	41	56	60
Malaria.....	-----	1	3	Weil's disease.....	2	-----	-----
Measles.....	2,603	1,243	1,048	Whooping cough.....	971	1,064	1,153

### LATVIA

*Notifiable diseases—July–September 1938.*—During the months of July, August, and September 1938, cases of certain notifiable diseases were reported in Latvia as follows:

Disease	July	August	September	Disease	July	August	September
Botulism.....	1	9	3	Mumps.....	155	66	48
Cerebrospinal meningitis.....	-----	10	7	Paratyphoid fever.....	28	33	24
Diphtheria.....	107	73	70	Poliomyelitis.....	18	110	274
Erysipelas.....	44	42	42	Puerperal septicemia.....	12	4	9
Influenza.....	47	34	54	Scarlet fever.....	274	237	260
Lead poisoning.....	2	1	1	Tetanus.....	1	3	1
Leprosy.....	2	1	-----	Trachoma.....	47	28	59
Lethargic encephalitis.....	3	-----	-----	Tuberculosis.....	324	274	243
Malaria.....	1	-----	-----	Typhoid fever.....	87	118	107
Measles.....	14	7	5	Typhus fever.....	1	-----	-----
				Whooping cough.....	108	61	43

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

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for November 25, 1938, pages 2107-2119. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

**Cholera**

*China*.—During the week ended November 19, 1938, cases of cholera were reported in China as follows: Hong Kong, 7; Macao, 1; Shanghai, 5.

*India—Allahabad*.—During the week ended November 19, 1938, 2 cases of cholera were reported in Allahabad, India.

*India (Portuguese)—Damao*.—For the week ended September 24, 1938, 7 cases of cholera with 3 deaths were reported in Damao, Portuguese India.

**Plague**

*Bolivia*.—During the period September 8 to October 7, 1938, plague was reported in Bolivia as follows: Sucre, Chuquisaca Department, 2 pneumonic cases; Cochabamba Department, 6 cases; La Paz Department, 10 cases including 8 cases of pneumonic; 1 case of bubonic plague occurred in La Paz; Oruro Department, 1 case; Potosi Department, 1 case; Santa Cruz Department, 39 cases including 1 case of pneumonic plague; Tarija Department, 44 cases.

*Hawaii Territory—Island of Hawaii—Hamakua District*.—Rats proved positive for plague have been found in Hamakua District, Island of Hawaii, Hawaii Territory, as follows: 1 rat on November 12, 1 on November 15, and 1 on November 17, in Hamakua Mill Sector; 2 rats found on November 16, and 1 rat found on November 17, in Paaahu Sector.

**Smallpox**

*Bolivia*.—For the period September 8 to October 7, 1938, cases of smallpox were reported in Bolivia as follows: Cochabamba Department, 1; La Paz Department, 16, including 6 cases in La Paz; Oruro Department, 4; Santa Cruz Department, 7.

*Ecuador—Guayaquil*.—During the month of October 1938, 3 cases of smallpox with 1 death were reported in Guayaquil and vicinity, Ecuador.

*Mexico*.—During the week ended November 19, 1938, 1 case of smallpox was reported in Tampico, Mexico. During the month of August 1938, smallpox was reported in Mexico as follows: Mexico, D. F., 1 case; Monterrey, 1 case; Naco, Sonora State, 1 case; Queretaro, Queretaro State, 16 cases, 6 deaths.

*Venezuela*.—Smallpox (alastrim) has been reported in Venezuela as follows: September 16-30, 1938, Acarigua, 1 death; Merida, 1 death; Trujillo, 1 death. October 1-15, 1938, Valencia, 1 death.

**Typhus Fever**

*Bolivia.*—For the period September 8 to October 7, 1938, cases of typhus fever were reported in Bolivia as follows: La Paz Department, 6, including 3 cases in La Paz; Oruro Department, 1.

*Guatemala.*—During the month of October 1938, 3 cases of typhus fever with 1 death were reported in Guatemala.

*Mexico.*—During the month of August 1938, typhus fever was reported in Mexico as follows: Mexico, D. F., 5 cases, 3 deaths; Matamoros, Tamaulipas State, 1 case; Pachuca, Hidalgo State, 4 cases; Queretaro, Queretaro State, 1 case.

**Yellow Fever**

*Ivory Coast—Dedougou.*—Yellow fever has been reported in Dedougou, Ivory Coast, as follows: November 19, 1938, 1 suspected case; November 20, 2 cases, including 1 suspected case.

*Nigeria.*—Yellow fever has been reported in Nigeria as follows: Abeokuta, November 11, 1938, 1 case; Bukuru, November 7, 1 case; Katexwgi, November 14, 1 case.

*Sudan (French)—Kona.*—On November 23, 1938, 1 suspected case of yellow fever was reported in Kona, French Sudan.

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