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THE POLLEN CONCENTRATION OF THE ATMOSPHERE

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That skin sensitivity and clinical sensitivity in hay fever do not always coincide is a well established fact. Consequently, accurate diagnosis of the cause or causes of hay fever for the individual patient is possible only when reliable data concerning the specific kinds of pollen present in the atmosphere during the period of symptoms are available.

In assembling data concerned with the pollen concentration of the air, two methods have been used. The first and older method, based solely upon field observations of the periods of bloom of the wind pollinated plants in question, supplies information purely presumptive in character. The second method, familiarized as the "pollen count," yields information of a more exact and clinically useful nature. When daily records are made, one can determine, by this method, the precise date on which a particular kind of pollen becomes an important element (i. e., potential irritant) in the atmosphere as well as the duration of the pollen season for the locality in which the observations are made. Obviously, field studies combined with microscopical analyses of the air are definitely desirable (cf. *9*).

Airy (*1*) apparently devised the method of exposing slides or plates coated with a sticky substance to catch particles, including pollen grains, settling out of the atmosphere. In his remarkable studies on hay fever, Blackley (*2*) exposed glycerin coated slides at ground levels and, with the aid of a kite, at levels up to approximately 1,000 feet above the ground. He compared the amount of pollen appearing on the slides during the 24-hour period with his own symptoms and found, in general, that the severity of his symptoms varied directly with the number of grains on the slide. This method of collecting data was

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much neglected from Blackley's time (1873) until it was revived by Scheppegrell (*15*) in 1917.

Essentially the same method of studying the pollen content of the air has been used in the not infrequent studies of recent years. The method consists of the exposure of a horizontally placed microscope slide to the atmosphere for 24 hours. Previous to exposure, the slide is coated with a viscous material such as oil (*7, 13, 14, 15, 17*) or glycerin (*15, 18*).

It seems reasonable to suppose that those periods during which the atmosphere contains appreciable quantities of a given kind of pollen may be considered as clinically important for patients sensitive to that particular pollen. Since Scheppegrell's contribution (*15*) relating to

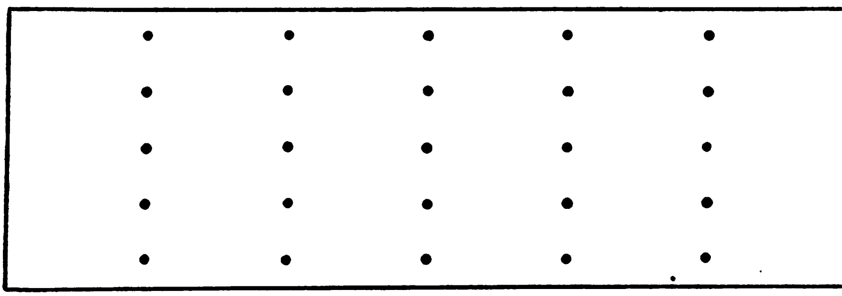

FIGURE 1.—Loci at which pollen grain counts may be made from an exposed slide. Each dot represents a low-power field.

quantitative determinations of atmospheric pollen content, many investigators have preferred to express pollen concentration in approximate number of pollen grains per cubic yard of air. We can see little reason for such preference except that values expressed in terms of volume seem somewhat more tangible, when related to human respiration, than do quantities recorded on the basis of the number of pollen grains per given unit of slide surface. Nevertheless, the latter value constitutes the basis for all calculated amounts of pollen per unit volume of air.

THE UNIT AREA BASIS

The number of pollen grains per square centimeter of surface of the exposed microscope slide may be determined either by direct observation or by derivation from the number of grains counted in 25 systematically distributed (see fig. 1) microscopic fields (low power, 100×) (*14*). The latter calculation may be made as follows:

Area of 1 microscopic field (low power) expressed in sq. mm. ×25 = total area examined (in sq. mm.).

Since 1 sq. cm. = 100 sq. mm., then

$$\frac{100}{\text{total area examined (in sq. mm.)}} = \text{factor (which may be designated } F_A\text{)}.$$

The product of this factor (F_A) and the number of pollen grains observed in 25 fields represents the approximate number of grains per square centimeter of exposed surface. Some workers (*13*) present their data on the basis of number of grains per square centimeter. Feinberg (*10*) has expressed the view that, of the bases available, the unit area basis represents the most practical standard.

THE VOLUMETRIC BASIS

Certain physical factors presented by Scheppegrell (*15*) were designed to enable the computation of the approximate number of pollen grains per cubic yard of air from the number of grains found on one square centimeter of the slide exposed for a 24-hour period. Several reports of recent years have used these factors as the basis for computations. Unfortunately, such reports are incorrect in regard to quantitative atmospheric pollen concentration, since it has been discovered (*5*) that Scheppegrell (*15*) (or, rather, J. H. Clo and C. C. Clark, who wrote the physical treatment for this paper) in applying Stokes' law made the error of using the diameter of pollen grains instead of the radius in calculating the velocity of fall. The

TABLE 1

Diameter of pollen grain, in microns	Velocity of fall (ft. per sec.) [1]			Factor F_B [2]		
	After Scheppegrell (*15*)	After Cocke (*5*)	Present calculation	After Scheppegrell (*15*)	After Cocke (*5*)	Present revision
10	0.040	0.01	0.010	7.3	29.1	29.3
12	.058	.014	.014	5.0	20.8	20.3
14	.079	.02	.019	3.7	16.6	14.9
15	.091	-------	.022	3.2	--------	13.1
16	.103	.026	.025	2.8	11.2	11.4
18	.131	.03	.032	2.2	9.7	9.0
20	.161	.04	.040	1.8	7.3	7.3
22	.195	.049	.048	1.5	5.9	6.0
24	.232	.058	.057	1.3	5.0	5.1
25	.252	-------	.062	1.2	--------	4.7
26	.273	.068	.067	1.1	4.3	4.3
28	.316	.079	.078	.9	3.7	3.7
30	.363	09	.089	.8	3.2	3.2
32	.413	.10	.102	.7	2.9	2.9
34	.466	.11	.115	.6	2.7	2.5
36	.523	.13	.129	.6	2.2	2.3
38	.582	.15	.143	.5	1.9	2.0
39	.613	-------	.151	.5	--------	1.9
40	.645	.16	.159	.5	1.8	1.8
42	.711	.18	.175	.4	1.6	1.7
44	.781	.20	.192	.4	1.5	1.5
46	.853	.21	.210	.3	1.4	1.4
48	.929	.23	.229	.3	1.3	1.3
50	1.008	.25	.248	.3	1.2	1.2
60	1.452	.36	.357	.2	.8	.8
70	1.976	.47	.486	.1	.6	.6
80	2.581	.64	.635	.1	.5	.5
90	3.267	-------	.804	.1	--------	.4
100	4.033	-------	.992	.1	--------	.3

[1] These values were derived from Stokes' formula with the blanket assumption of a specific gravity of unity for all pollen grains (i. e. $d^1 - d^2 =$ ca.1). That this is not the case should be clear from discussion in the text. Scheppegrell's values for V are untenable.

[2] Factor $F_B \times N$ (number of pollen grains per sq. cm.) $= n$ (approximate number of pollen grains per cubic yd. of air). Scheppegrell's values for F_B are incorrect (see reference *5* and text).

incorrect values thus obtained were utilized further to establish a table of widely used factors. Cocke (*5*) reviewed the application of Stokes' law and, in pointing out the errors of the Scheppegrell formulae, has made an important contribution. It appears that quantitative values which have been obtained by the use of the Scheppegrell factors are approximately 25 percent of the values obtained when Cocke's (*5*) corrected factors are utilized.

We agree with Cocke (*5*) that if the practice of reporting the number of pollen grains per cubic yard of air is to continue, a standardized method for calculation is needed. Since Cocke (*5*) has proposed that his formulae be adopted as standard, it is regrettable to note certain errors in his calculations. It should be noted, in passing, that the two values given for v (velocity of fall in cm. per second) on pages 602 and 603 of his paper are in error and should read 4.84 and 1.210, respectively, instead of 0.484 and 0.115. Likewise, the velocity in feet per second (0.04) while reading correctly in itself is not derived, as specified (loc. cit.), from $\frac{0.115}{30}$ but rather from $\frac{1.210}{30}$. In table 1, page 604, there are also values with which we do not agree. For pollen of 14 microns diameter Cocke obtains 16.6 for the factor F_B, whereas we get 14.9 for this factor, indicating either a typographical error or a miscalculation. We find other smaller disagreements which we infer are due to differences in the handling of decimal places. In table 1 are given the factors V and F_B, indicated as follows: (*a*) Calculated according to Scheppegrell (*15*); (*b*) Cocke's (*5*) factors; and (*c*) our factors calculated according to Cocke's (loc. cit.) method. In the last case, the factor V was expressed in values having 6 decimal places, all of which were retained for calculating the F_B factor. The factor designated as F_B was obtained from the equation:

$$n=\frac{6.97\times N}{V\times t}$$

where n is the approximate number of pollen grains per cubic yard of air, N the number of pollen grains per sq. cm. of surface of the exposed slide, V the velocity of fall of the pollen grain in feet per second (derived from Stokes' law), and t is time (24 hours). The derivation of this formula needs no description here since it has been adequately discussed by Cocke (*5*). The component V was converted into values in feet per second by multiplying the figures on a centimeter per second basis by 0.0328 (since 1 cm. = 0.0328 ft.). This is slightly at variance with the procedure of Scheppegrell and Cocke, both of whom regarded the component 6.97 as 7 and derived their velocity data on a foot per second basis by use of the denominator 30. Since the application of the volumetric factors yields only approximate data, it seems desirable in computing the factors to avoid such approximations even though they be of small proportion. As indicated in table 1, the factors F_B, when multiplied by N, give the pollen concentration on the basis of approximate number of smooth pollen grains per cubic yard of air.

DISCUSSION

It may be well to point out that Stokes' formula gives the rate of fall, in centimeters per second, of a small sphere in a fluid medium. Eventually, a sphere attains a constant velocity when it falls under action of gravity through a viscous medium (*11*). Stokes' formula may be expressed as follows:

$$V = \frac{2gr^2(d_1 - d_2)}{9K}$$

where V represents velocity, g the acceleration of gravity (980 cm. per sec.), r the radius of the sphere (i. e. particle), d_1 and d_2 the densities of the sphere and medium, respectively, and K the coefficient of viscosity of the medium which, in this instance, may be taken to be 0.00018, the approximate coefficient of viscosity for air at temperatures of 20° to 23° C. (*11*).

Stokes (*16*) gave expression to his widely used formula in his consideration of the motion of a fluid about a sphere which itself moved uniformly with a small velocity. He illustrated his equation with the determination of the terminal velocity of a globule of water which formed part of a cloud. Burton (*3*), in studying the Brownian movement of silver particles in air, used Stokes' formula for calculating the velocity due to the force of gravitation.

One may question the propriety of omitting the density factors from Stokes' formula as both Scheppegrell and Cocke have done. Cocke (*5*) (p. 602) has said: "In using Stokes' law, Scheppegrell has assumed the density of pollen to be approximately one and, therefore, omitted the density factors (d_1 and d_2) entirely. Although the density for pollen has not been accurately determined, preliminary experiments indicate that it is close to unity. Thus, Scheppegrell's omission of the density factor is permissible." If the specific gravity of pollen (presumed in this case to be 1) were related to a value of 1 for the density of water, the density factor $(d_1 - d_2)$ in the above formula would become 1.0000000−0.0012046 or 0.9987954. The value used for d_2 is the specific gravity of air (as compared with that of water) at 20° C. (*12*). Obviously, on such a basis, the density factor can be considered as approximately 1. For example, the velocity of fall of a sphere 20 microns in diameter would be 1.2084 cm. per second utilizing this factor, and 1.2099 cm. disregarding it. However, there is little published information concerning the actual density of various kinds of pollen. It appears from Thommen's report (*4*) (p. 550) of a weight of 5.323 grains for 1 cubic centimeter of untreated mature giant ragweed pollen as compared to a weight of 9.258 grains for 1 cc. of timothy pollen, that pollen of different species may well possess different densities. This matter receives more graphic demonstration if data from Dyakowska's (*8*) recent observations on the actual velocity of fall, in still air, of pollen from 18 different species of trees are utilized for calculating specific gravity values. Obviously, if the velocity of fall of smooth pollen grains be known, one may readily compute specific gravity from Stokes' formula. Such calculations are given in the fourth column of table 2. It should be noted that the specific gravity figures for these four pollens, all of which are of approximately the same size and contour, vary from 1.2 for yew (*Taxus* L.) to 1.7 for poplar (*Populus* L.).

TABLE 2

Pollen	Diameter [1] of pollen grain	V^1 in cm. per sec.	Specific gravity [2]	V in ft. per sec.	F_B	n [3]
Populus	25.4μ	3.39	1.741	0.111	2.616	523.2
Betula verrucosa	24.5μ	2.94	1.632	.096	3.025	605.0
Alnus glutinosa	24.6μ	2.77	1.517	.091	3.191	638.2
Taxus baccata	25.2μ	2.30	1.197	.075	3.872	774.4
Average	24.9μ	2.85	1.522	.093	3.176	635.2
Calculated	25μ	1.89	1.003	.062	4.691	938.2

[1] From Dyakowska (*8*), average and calculated values excepted.
[2] Calculated from Stokes' (*16*) formula.
[3] When N=200.

In addition, there are other factors which may be responsible for variations in the recorded results of different investigators. As Scheppegrell (*15*) and Cocke (*5*) have noted, the formulae derived from Stokes' law apply to smooth spheres only and cannot be accurately applied to echinate, winged, and otherwise irregular pollen grains, which obviously offer greater air resistance, unless some correctional factor is introduced. Certainly there is no tangible basis, at present, from which such a correctional factor can be derived. With respect to ragweed pollen, an important example of the echinate type, Cocke (*5*) remarks: "Since ragweed is spiculated, it would seem conservative to add 25 percent to this figure." However, no basis for this 25 percent (33⅓ percent in a later (*6*) communication) increase is given.

It must be admitted that we have, as yet, no means of calculating the velocity of fall of echinate pollen, such as that of ragweed. In this connection, we may again refer to Dyakowska's (*8*) researches. Amplification of such studies would directly yield the velocity of fall of various kinds of grains, including those with spiny surfaces, and there would, then, be a far more adequate basis upon which to devise factors for calculating the approximate number of pollen grains per cubic yard of air. This seems entirely evident if Miss Dyakowska's velocity data are utilized in calculating the F_B factor. There are listed in her table 3 (loc. cit.) four different plants (oplar (*Populus*), birch (*Betula verrucosa* Ehrh.), alder (*Alnus* L.), and yew (*Taxus*)) having pollen grains approximately 25μ in diameter. For these, the velocity of fall, as observed by Miss Dyakowska, varies from 0.075 to 0.111 ft. per second (see table 2) whereas the calculated velocity for a sphere 25μ in diameter is 0.062 ft. per second (see table 1). Further, the F_B factors now vary from 2.6 for poplar to 3.9 for yew, whereas the calculated F_B factor is 4.7 for a grain of this size. The last column in table 2 indicates what the pollen concentration (in pollen grains per cubic yard of air) would be if 200 grains of each kind were found in 1 square centimeter of surface of an exposed slide. The use of the calculated F_B factor would give approximately 938 pollen grains per cubic yard of air, which is 17.5 percent in excess of the value for yew (774) and 44.2 percent in excess of the value for poplar (523). It is of interest, also, to note that the winged pollen grain of pine (*Pinus montana* Mill), with a diameter of 66.6μ, falls at approximately one-half the velocity recorded for the unwinged pollen (diameter 35.4μ) of European hornbeam (*Carpinus betulus* L.). Such comparisons indicate that adequate velocity and specific gravity data must be available before accurate volumetric factors can be devised.

Another factor which may give rise to variability in quantitative results in applying the above formulae is that of pollen grain size. Pollen grains of a given species vary within certain limits and measurements recorded in the literature consequently show some variability. The use of different mounting media, as well as the utilization of both living and dried pollens for specimen slides, likewise may contribute to disparate measurements. Suppose, for example, that on the same day two independent investigators obtain a count of 200 grains of ragweed pollen per square centimeter of surface. If investigator A chooses 16μ (*5*) as the diameter for this pollen, he would by calculation (200$\times$11.2) obtain 2,240 grains per cubic yard of air. If investigator B considers 20μ as the diameter, he would record 1,460 (200$\times$7.3) grains per cubic yard of air, which is about one-third less than A obtained, although the number of pollen grains per unit of area was the same in each case. If the region of observation were one in which common, giant, and western ragweeds occurred (e. g., Minnesota), the record of investigator B would be the more accurate, since the average pollen grain diameter for the group would be approximately 19.7μ. The pollen grain size (diameter) for ragweeds (*Ambrosia* (Tourn.) L.) as derived from Wodehouse's (*18*) observations on ten different species varies from approximately 16.5μ

to 28.5μ with an average of 20.3μ. Obviously, for the sake of uniformity, agreement upon the size of pollen grains for the purpose of such volumetric computations is necessary.

It seems evident from the foregoing considerations that data concerning atmospheric pollen concentration can be most accurately expressed on the basis of number of pollen grains per unit of surface. Further, it should be emphasized that the revised values for the factors V and F_B given in table 1 are primarily intended to supplant those which are in error in published communications. The lack of exact values for the specific gravity of various pollens, as well as the existence of such complicating factors as variable air currents, lead us to favor the unit area basis for expression of pollen data.

SUMMARY

It seems evident from a review of the available methods of computing pollen concentration of the atmosphere that those which utilize volumetric factors derived from Stokes' law are less accurate than those methods which employ a unit area basis.

The less desirable character of the volumetric method is, in part, due to the fact that data concerning specific gravity and velocity of fall of pollen grains, of both smooth and echinate types, are at present inadequate.

Certain minor errors in published factors devised for purposes of calculating the number of pollen grains per cubic yard of air are pointed out.

It is to be desired that reports should include a record of the amount of pollen per unit of area of the exposed slide, whether volumetric data are computed or not.

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THE INCIDENCE OF CANCER IN BIRMINGHAM AND JEFFERSON COUNTY, ALABAMA, 1938 [1]

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Previous studies in this series have reported cancer incidence and prevalence in various selected communities of different geographic and economic characteristics in the United States (*1–6*). This paper presents the results of an investigation into the nature and amount of cancer in a highly industrialized southern area during the calendar year 1938. The area surveyed [2] consisted of the city of Birmingham, Ala., and the remainder of Jefferson County.

The first paper of the series (*1*) discussed in detail the general purpose of these cancer incidence studies, the nature of the data sought, and the technique employed in collecting the data. It is sufficient to state here that all physicians, hospitals, and clinics in the survey area were requested to furnish records of all patients treated or observed for any malignant growth during the calendar year 1938. The information obtained permitted the identification of cases which had been reported by more than one source, and the separation of resident and nonresident cases.

The survey attempted to locate and obtain records from 425 physicians, listed by various sources as practicing in Jefferson County, but 61 of these had died, retired, or moved away. Of the 364 who were located, none refused to submit a report. Twenty-seven submitted joint reports with other physicians, and 156 reported that they had neither seen nor treated any cancer cases during the study year.

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[1] From the Division of Public Health Methods, National Institute of Health. Data for this study were collected under the supervision of Bernard A. Koteen. Miss Bess A. Cheney was in immediate charge of the tabulation of the data, which was done as a project, No. 65-2-23-356, of the Work Projects Administration. The entire survey was directed by Harold F. Dorn.

[2] Throughout this paper the entire survey area will be referred to as either Birmingham or Jefferson County.

Hence, cases were reported by 181 of the physicians. Nineteen hospitals returned schedules.

A very small proportion of the doctors and hospitals had treated most of the cancer patients in Birmingham, indicating that the treatment of cancer is a highly specialized field (table 1). Most of the cancer patients in a community are usually referred to dermatologists, radiologists, roentgenologists, and surgeons. Very few cases are treated by pediatricians, obstetricians, etc. The nature of a doctor's specialty will thus usually determine whether or not he will see many cancer cases. Three doctors, only 0.9 percent of the total number of doctors reporting, accounted for 728 cases, or 52.3 percent of the total number of cases reported by doctors. On the other hand, 156 doctors, almost half of the total doctors reporting, had neither seen nor treated any cancer cases in 1938. Three of the hospitals reported a total of 483 cases, or 65.1 percent of all cases reported by hospitals.

TABLE 1.—*Numbers and percentages of doctors and hospitals reporting cases of cancer and numbers and percentages of cases so submitted, Birmingham, Ala., 1938*

Number of cases reported by each	Number reporting		Percent reporting		Actual number of cases reported [2]			Percentage of cases reported		
	Doctors	Hospitals	Doctors	Hospitals	Doctors	Hospitals	All sources	Doctors	Hospitals	All sources
0	156	7	46.3	36.8	0	0	0	------	------	------
1-5	148	2	43.9	10.5	309	4	313	22.2	0.5	14.7
6-10	19	2	5.6	10.5	140	20	160	10.1	2.7	7.5
11-20	8	2	2.4	10.5	117	26	143	8.4	3.5	6.7
21-40	3	0	.9	------	97	0	97	7.0	------	4.5
41-100	0	3	------	15.8	0	209	209	------	28.2	9.8
Over 100	3	3	.9	15.8	728	483	1,211	52.3	65.1	56.8
Total reporting	[1] 337	19	100.0	100.0	1,391	742	2,133	100.0	100.0	100.0

[1] This figure excludes 27 doctors who submitted joint reports with other doctors.
[2] This is the actual number of cases reported, before duplicate reports of the same case had been identified and eliminated.

After the patients for whom more than one report had been received were identified, all cases were tabulated according to the nature and the number of reporting sources. Table 2 shows that 82 percent of the cases had been seen by one source only, and the remaining 18 percent had been seen by two or more respondents. Females were seen by two or more sources more frequently than males. Of the female cases, 21 percent were seen by two or more sources, whereas only 14 percent of the male cases were seen by more than one source. Colored patients, limited for the most part to clinic treatment, were seen by only one reporting source in a greater percentage of cases than were white. The percentages of cases reported from hospitals only were 24 and 25 for white males and females, respectively, and 65 and 57 for colored males and females, respectively.

Obviously, a case treated by a physician in a hospital may have been reported both on the hospital's and physician's schedules. Thus the group in table 2, "Both hospitals and doctors", includes some cases of this sort, as well as cases that were treated by a physician in private practice and subsequently referred by him to a hospital. The group "Doctor(s) only" includes only cases not reported by hospitals. It was assumed that these cases were treated by the physician in his private office or home.

TABLE 2.—*Percentage of all cancer cases, by sex and color, reported by various sources, according to nature and number of reporting agencies, Birmingham, Ala., 1938*

Reported by—	Percentage of cases reported						
	Total	Total by sex		White		Colored	
		Male	Female	Male	Female	Male	Female
Hospital(s) only	29	27	30	24	25	65	57
Doctor(s) only	59	64	56	67	61	23	28
Both hospital(s) and doctor(s)	12	9	14	9	14	12	15
Total	100	100	100	100	100	100	100
1 source only	82	86	79	86	78	89	83
2 sources only	14	10	16	10	17	9	12
3 or more sources	4	4	5	4	5	2	5
Total	100	100	100	100	100	100	100

Fifty-nine percent of all the cases (both sexes, both colors) were seen only by doctors; 29 percent were seen only by hospitals, and 12 percent were seen by both doctors and hospitals.[3] There was a smaller proportion of cases reported by hospitals only in this area than in the cities previously studied (table 3).

In these cities the percentages seen by hospitals only ranged from 40 in Pittsburgh to 68 in New Orleans. Patients who had not been seen by hospitals at any time in the course of their treatment formed 59 percent of the cases in Birmingham, 37 percent in Pittsburgh, and only 22 percent in New Orleans (fig. 1).

TABLE 3.—*Distribution of cancer cases according to nature of reporting source: Birmingham, Ala., 1938; Pittsburgh, Pa.; Atlanta, Ga.; Chicago, Ill.; and New Orleans, La.; 1937*

Reported by—	Percentage				
	Birmingham	Pittsburgh	Atlanta	Chicago	New Orleans
Physicians only	59	37	36	30	22
Hospitals only	29	40	52	59	68
Both hospitals and physicians	12	23	12	11	10
Total	100	100	100	100	100

[3] Since 87 percent of the cases reported were white, the distribution according to reporting source of the total cases is heavily weighted by the preponderance of white cases seen by doctors only.

Limited hospital and clinic facilities may account for this atypical distribution in Birmingham, and, if this is so, it follows that rates computed on the basis of diagnosed cases are more inaccurate as indices of cancer prevalence in this area than in the areas previously surveyed. If medical facilities designed to reach persons on every economic level are not present or are inadequate in a community, a

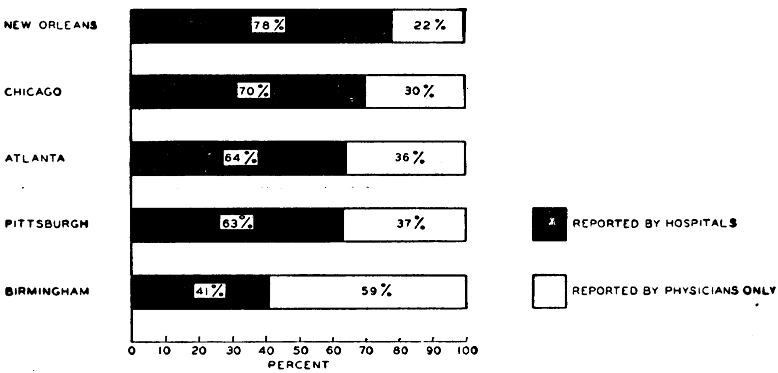

FIGURE 1.—Distribution of cancer cases according to nature of reporting source in five surveyed areas, Cancer Incidence Survey, 1937, 1938, and 1939.

large proportion of the cases of cancer will remain undiagnosed throughout the course of the disease.

In evaluating cancer incidence data, it is also important to consider the accuracy of the diagnosis of the reported cases. The method of confirmation of diagnosis was obtained for each case in this survey, and all cases reported are listed in tables 4 and 5 according to whether the confirmation was by microscopic examination of tissue.

TABLE 4.—*Number and percentage of cases with a microscopically confirmed diagnosis, and whether or not reported by a hospital, Birmingham, Ala., 1938*

Agency	Total number of cases	Cases with microscopic diagnosis	Percentage
Hospital	709	403	56.8
Physicians only	1,016	309	30.4
Total	1,725	712	41.3

It will be observed that of the 1,016 cases seen only by physicians (in their private practice), 309, or 30.4 percent, received microscopic confirmation of diagnosis, while a much larger proportion of hospital cases, 403 out of 709,[4] or 56.8 percent, received microscopic confirmation. The comparative infrequency of microscopic confirmation of diagnoses by physicians is of considerable importance in view of the

[4] Of these 709 cases seen by hospitals 207 were also reported by physicians. The two groups are, therefore, not strictly comparable.

fact that three-fifths of all cases were reported by physicians only.

The diagnosis of 41.3 percent of all cases reported in Birmingham was confirmed microscopically. In the preceding studies, the percentages found were as follows: New Orleans, 51.7; Atlanta, 52.2; Pittsburgh, 62.0; Chicago, 69.7; and Detroit, 78.0. The very low percentage for Birmingham can be accounted for partly by the high proportion of cases seen only by physicians, as pointed out above, and partly by the high incidence in the South of cancers of the skin and buccal cavity. Malignancies of the skin and buccal cavity, while easily accessible for biopsy purposes, usually have a very small proportion of diagnoses confirmed by tissue examination. Many dermatologists feel that microscopic diagnosis of skin cancers is superfluous and that, where surgical treatment is not indicated, the removal of the tissue specimen might cause unnecessary disfiguration.

TABLE 5.—*Number and percentage of cases of cancer with a microscopically confirmed diagnosis, by primary site and whether or not reported by a hospital, Birmingham, Ala., 1938*

Primary site	Cases reported by hospitals		Cases reported only by a doctor		All cases reported		Percentage reported by microscopic diagnosis		
	Microscopic	Total	Microscopic	Total	Microscopic	Total	Hospital	Doctor only	All cases
Buccal cavity	17	38	24	104	41	142	44.7	23.1	28.9
Digestive tract	61	111	49	109	110	220	55.0	45.0	50.0
Respiratory system	9	14	7	13	16	27	64.3	53.8	59.3
Genito-urinary system	181	281	103	185	284	466	64.4	55.7	60.9
Breast	69	97	75	128	144	225	71.1	58.6	64.0
Skin	26	109	31	413	57	522	23.9	7.5	10.9
Brain	5	7	--------	--------	5	7	71.4	--------	71.4
Bones	5	8	3	14	8	2	62.5	21.4	36.4
All others	30	44	17	50	47	94	68.2	34.0	50.0
All sites	403	709	309	1,016	712	1,725	56.8	30.4	41.3

More than one-third of all the cases reported in Birmingham were skin cancers, and of these only 11 percent were microscopically diagnosed (table 5). The diagnoses of cancers of sites other than skin were confirmed microscopically in 54 percent of the cases. In the two other southern cities studied, Atlanta and New Orleans, the proportion of confirmed diagnoses was higher both for skin and nonskin cases. The percentages in Atlanta were 21 for skin cancers and 64 for all other cancers; in New Orleans the percentages were 39 and 55.

The population of Jefferson County was estimated to be 454,150 [5] as of June 30, 1938. Hospitals and physicians in this area reported 1,725 cases of cancer for the year 1938. Of these, 1,057 were resident cases and 668 were nonresident. There were 354 death certificates listing cancer as a cause of death filed in the area during 1938, of

[5] This figure was arrived at by interpolation between the figure of 458,956, obtained from a preliminary population report released by the Bureau of the Census on September 4, 1940, and the 1930 census population of 431,493.

which 318 were residents. In this latter number there were death certificates for 46 residents who had not been reported by hospitals or physicians. These 46, added to the above 1,057, make the total number of resident cases 1,103. The total number of cases, resident and nonresident, obtained by the survey thus becomes 1,771. The resident case rate was 242.9 per 100,000, and the death rate 70.0 per 100,000. The case rate will be considered in detail in a later section of the paper.

TABLE 6.—*Total number of cancer cases reported, including death certificates not reported as a case, and total number of death certificates showing cancer as a cause of death, by residence, Birmingham, Ala., 1938*

	Cases reported by hospitals and physicians	Death certificates not reported as a case	All cases	Total death certificates
Resident	[1] 1,057	46	1,103	318
Nonresident	668		668	36
Total	1,725	46	1,771	354

[1] Includes 8 cases of unknown residence.

In Birmingham, as in the other areas surveyed, the hospitals and physicians were requested to report the age of each patient. Unfortunately, the age of a great number of the patients in this area (29 percent) was reported as unknown (table 7). In view of this, any detailed discussion of age distributions is precluded. However, it can be stated that the relative frequency of cancer at each age follows the same pattern as that found in other survey areas.

TABLE 7.—*Number and percentage distribution by age and sex of all cancer cases, Birmingham, Ala., 1938*

Age group	Percentage			Number of cases		
	Total	Male	Female	Total	Male	Female
Under 10	0.2	0.3	0.2	4	2	2
10–19	1.1	1.3	1.0	19	9	10
20–29	2.1	2.0	2.3	37	14	23
30–39	7.6	3.4	10.5	131	24	107
40–49	15.0	10.2	18.3	259	72	187
50–59	17.0	13.5	19.4	293	95	198
60–69	17.0	18.4	16.1	294	130	164
70–79	8.9	10.9	7.5	153	77	76
80 and over	2.1	2.8	1.6	36	20	16
Unknown	29.0	37.2	23.1	499	262	237
Total	100.0	100.0	100.0	1,725	705	1,020

Table 8 shows the relative frequency with which malignancies of certain primary sites occurred among the reported cases. In order of importance, these sites were: Skin, buccal cavity, digestive tract, and genito-urinary system. An extremely high proportion of cancers among white males (46.1) were primary in the skin. This percentage is greater than the corresponding percentages for Atlanta and New Orleans, 38.5 and 29.2 percent, respectively. With this exception, there were no significant differences among the site distributions in white males in Birmingham, Atlanta, and New Orleans.

In view of the small number of cases among colored males reported in Jefferson County, the site distribution for these cases is probably not very reliable as an indication of the distribution of cases actually existing in the population.

TABLE 8.—*Percentage distribution of the total reported cancer cases, by primary site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity, pharynx	15.0	3.5	16.0	4.0	3.7	1.2
Lip	9.8	1.6	10.4	1.9	1.9	
Tongue	1.4	.4	1.5	.4		.6
Mouth	.3	.2	.3	.1		.6
Jaw	.6		.5		1.9	
Pharynx	.1	.2	.2	.2		
Others	2.8	1.2	3.1	1.4		
Digestive tract	15.5	10.9	13.2	10.6	42.6	12.2
Esophagus	.4	.1	.3		1.9	.6
Stomach, duodenum	5.2	2.5	4.0	2.2	20.4	4.1
Intestines	3.4	3.6	3.4	4.0	3.7	1.7
Rectum, anus	3.3	2.5	2.6	2.6	11.1	2.3
Liver, biliary passages	2.3	1.2	2.0	.9	5.6	2.3
Pancreas	.7	.7	.8	.6		1.2
Mesentery, peritoneum	.1	.2	.2	.2		
Respiratory system	2.6	.9	2.5	.8	3.7	1.2
Larynx	.7	.2	.8	.2		
Lungs, pleura	1.6	.6	1.5	.5	1.9	1.2
Others	.3	.1	.2	.1	1.9	
Genito-urinary system	12.8	36.9	12.3	32.4	18.5	58.7
Uterus		31.5		26.4		56.4
Kidneys	1.1	.8	.9	.9	3.7	
Bladder	1.3	.7	1.4	.7		.6
Prostate	8.8		8.6		11.1	
Others	1.6	3.9	1.4	4.4	3.7	1.7
Breast	.7	21.6	.5	21.6	3.7	21.5
Skin	43.3	21.3	46.1	24.9	9.3	3.5
Brain	.7	.2	.8	.2		
Bones (except jaw)	1.7	1.0	1.7	.9	1.9	1.2
Others	7.8	3.8	7.1	4.5	16.7	.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Four primary sites accounted for 90 percent of the cases among white females in Birmingham: Genito-urinary system, 32.4 percent; skin, 24.9 percent; breast, 21.6 percent; digestive tract, 10.6 percent. These frequencies closely approximate those found for white females in Atlanta and New Orleans.

The distribution of cases among colored females in Birmingham is similar to that among white females except that a much smaller proportion of skin cancers and a correspondingly greater percentage of genito-urinary cancers are found among the former group (fig. 2).

From the incidence data collected by these surveys, it has been possible to compute three different indices of cancer prevalence. These indices, in the order in which they are presented in table 9, are the prevalence rate, the prevalence rate for treated cases, and the incidence rate.[6]

The prevalence rate is based on all cancer cases existing in the

[6] Of course, only the resident cases were considered in computing these three rates.

population during a given period of time, regardless of the date of onset (or first diagnosis). All cases, whether diagnosed, treated, or observed for cancer during 1938, were included in the computation of this rate for Birmingham.

The prevalence rate for treated cases only is based on only those cases which actually received treatment during 1938. The advantage

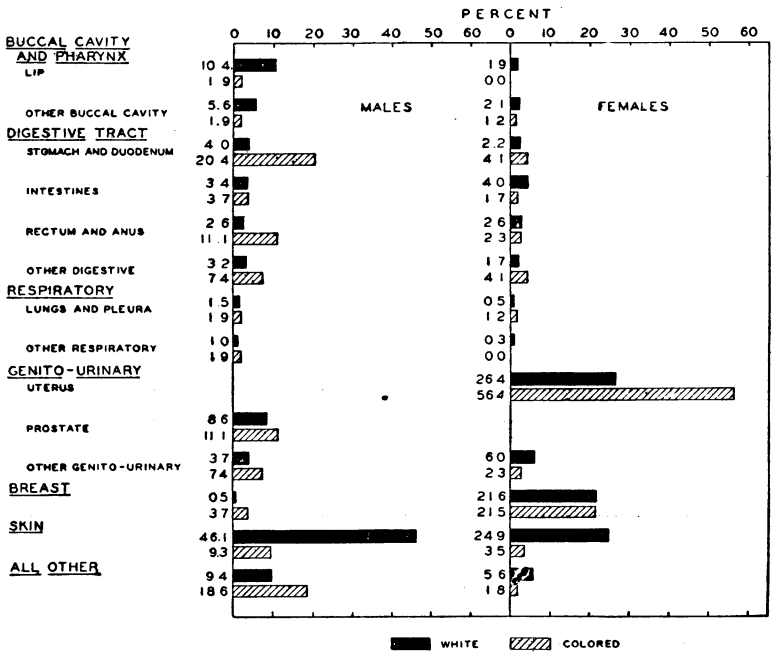

FIGURE 2.—Percentage distribution of cases of cancer by primary site, sex, and color, Birmingham, Ala. 1938.

of this rate over the prevalence rate of all reported cases is that it excludes cases that were only observed during 1938, and consequently is not affected by the varying thoroughness with which cases of cancer of different sites are observed after they are considered cured, and with which cured cases are kept under medical observation in different areas.

The last of these rates, the incidence rate, relates only to those cases which were reported as having been first diagnosed during 1938, i. e., cases which originated during the study year. It excludes all others, even though they may have received treatment during this period.

The Birmingham cancer prevalence rate, as found in the present survey, was 242.9 per 100,000 persons. It is the lowest rate reported for the cities studied, which is surprising in view of the high prevalence rates generally reported for the South as compared with the North.[7]

[7] In stating that cancer prevalence rates for the South are higher than for the North, we have not lost sight of the fact that there is considerable variation in the rates within these two geographic areas. (See table 9.)

TABLE 9.—*Crude resident rates of cancer per 100,000 persons, Cancer Incidence Survey, 1937, 1938, and 1939* [1]

Area surveyed	Resident prevalence rate [2]	Area surveyed	Resident prevalence rate for treated cases only	Area surveyed	Resident incidence rate
San Francisco	525.9	Denver	428.9	New Orleans	312.6
Denver	518.2	San Francisco	410.2	Denver	286.6
Philadelphia	474.2	New Orleans	387.1	San Francisco	283.4
New Orleans	427.1	Philadelphia	359.6	Dallas-Fort Worth	255.4
Dallas-Fort Worth	394.0	Dallas-Fort Worth	352.1	Philadelphia	233.8
Atlanta	389.7	Atlanta	273.7	Atlanta	196.7
Chicago	344.9	Chicago	272.6	Chicago	195.8
Pittsburgh	332.4	Pittsburgh	249.9	Pittsburgh	179.3
Detroit	282.6	Detroit	215.5	Birmingham	139.4
Birmingham	242.9	Birmingham	205.7	Detroit	138.9

[1] Atlanta, Chicago, Pittsburgh, Detroit, and New Orleans were surveyed in 1937, San Francisco, Birmingham, Dallas-Fort Worth, and Philadelphia in 1938, and Denver in 1939.
[2] While the prevalence rates were computed on the basis of reported resident cases plus recorded resident deaths not reported as cases, the treated case rates and incidence rates were computed only for reported cases. Obviously, no data as to treatment or date of first diagnosis could be obtained from death certificates alone.

However, the low prevalence rate in Birmingham can be accounted for in part by the relatively small percentage of cases kept under observation, as indicated by the data in column A of table 10. The rate of prevalence of treated cases only, computed to eliminate the influence of the cases under observation, is also lower in Birmingham than in the other cities (table 9).

The proportion of the total resident cases that were first diagnosed as cancerous in the study year is presented in column B, table 10. This proportion for Birmingham ranks very high among the areas. In other words, a very small proportion of the total cases reported in Birmingham had been carried over from preceding years.

TABLE 10.—*Percentages of total reported resident cases that were under observation only during study year, and percentages that were first diagnosed as cancerous during the study year, Cancer Incidence Survey, 1937, 1938, 1939*

Area	Percentage		Area	Percentage	
	(A) Under observation only during study year	(B) First diagnosis during study year		(A) Under observation only during study year	(B) First diagnosis during study year
Birmingham	11.6	59.9	Dallas and Fort Worth	9.8	65.4
Detroit	20.6	51.1	San Francisco and Alameda Counties	19.6	55.5
Pittsburgh	14.8	61.1	Denver	15.3	56.6
Chicago	5.8	67.6	New Orleans	5.4	76.4
Atlanta	26.6	52.8			
Philadelphia	17.9	53.4			

It is possible that the cancer incidence rate in Birmingham as reported (139.4) is unduly low. However, inasmuch as the data are necessarily limited to diagnosed cases, there is no way of determining how many cases never came to medical attention. In addition to this, the very low rate for Birmingham may be attributed to one or more of the following factors, but the relative weight which should be given to each must remain in doubt.

The population of Birmingham may be a relatively young one,[9] with a consequent low incidence of cancer. Low incidence may also

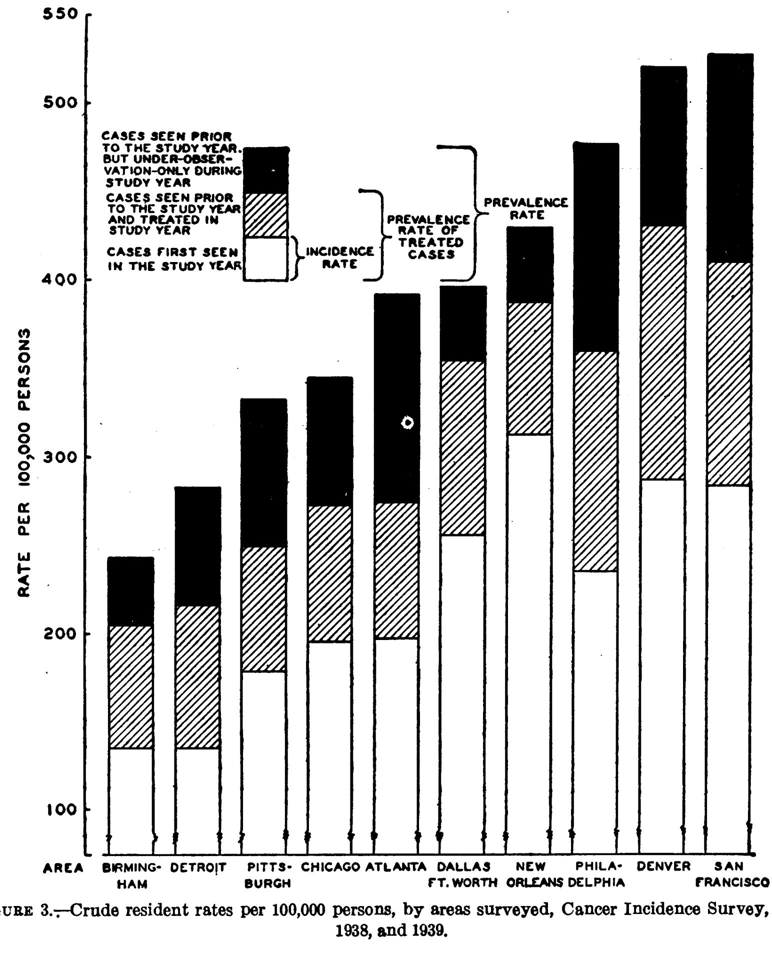

FIGURE 3.—Crude resident rates per 100,000 persons, by areas surveyed, Cancer Incidence Survey, 1937, 1938, and 1939.

result from special climatic conditions prevailing in Birmingham. Furthermore, the proportion of the total cases in Birmingham which had been treated by hospitals and clinics was very small (tables 2 and 3), indicating the possibility of a shortage in institutional facilities.

[9] The Bureau of the Census has not yet released 1940 populations by age. This will be done in the near future, and the point can then be either verified or disproved.

TABLE 11.—*Number of resident cancer cases per 100,000 persons, by primary site, sex, and color, Birmingham, Ala., 1938*

	Total[1]			White			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Buccal cavity	17.0	25.5	8.7	26.3	39.5	13.5	2.3	3.4	1.1
Digestive tract	39.0	39.3	38.6	47.6	47.6	47.6	25.5	26.4	24.5
Respiratory system	5.3	6.7	3.9	7.2	9.5	5.0	2.3	2.3	2.2
Genito-urinary system	72.2	22.3	120.7	81.8	30.7	131.5	57.1	9.2	103.7
Breast	35.0	1.8	67.3	45.1	2.2	86.7	19.2	1.1	36.8
Skin	56.1	65.7	46.9	88.3	103.9	73.2	5.7	5.7	5.6
Brain	.4	.4	.4	.7	.7	.7			
Bones	1.5	.9	2.2	2.2	1.5	2.8	.6		1.1
All others	14.5	16.5	12.6	20.2	20.5	19.9	5.7	10.3	1.1
All sites	241.1	179.2	301.2	319.5	256.1	381.0	118.2	58.5	176.2

[1] Excludes 7 cases of unknown residence; previously these were included.

Table 11 presents the crude prevalence rates per 100,000 persons in Birmingham, by primary site, sex, and color. It is apparent that the rates for white persons are much higher at each site, as well as for all sites combined. The most striking differences are to be found between the case rates of skin and buccal cavity cancer for the white and colored populations. However, even though the prevalence of skin and buccal cavity cancer is very much greater among whites than colored, it cannot be said that the higher prevalence rate for whites generally is to be ascribed to the difference in the numbers of cases of these sites reported. When all sites exclusive of skin and buccal cavity are considered, the rate for white males is 113 per 100,000, for colored males only 50 per 100,000; the rate for white females is 304 per 100,000, for colored females only 170 per 100,000. The extent to which these differences result from more actual cancer or from more diagnosed cancer among whites is unknown. Both possibilities, however, must be taken into account in considering racial differences in the prevalence of cancer (fig. 4).

The most important sites among white males were skin (103.9 per 100,000), digestive tract (47.6 per 100,000), and buccal cavity (39.5 per 100,000). Cancer prevalence among white females was much higher than among white males. The highest rate among females was for genito-urinary cancer (131.5 per 100,000), and the next highest was for breast cancer (86.7 per 100,000). Skin cancer, the most common type of cancer among white males, was the third most frequent among white females (73.2 per 100,000).

The incidence rates for Birmingham, by site, sex, and color, are shown in table 12. Comparison of these rates with the corresponding prevalence rates reveals that, while the incidence rates are lower (as they must be), they are not lower in equal proportions for each site.

TABLE 12.—*Number of resident cancer cases first seen in 1938, per 100,000 persons by primary site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total			White			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Buccal cavity	9.5	14.3	5.2	14.8	22.7	7.8	1.1	1.1	1.1
Digestive tract	26.0	26.8	25.2	30.3	32.2	28.4	19.2	18.4	20.1
Respiratory system	4.0	5.8	2.2	5.0	8.0	2.1	2.3	2.3	2.2
Genito-urinary system	42.9	14.7	70.3	46.5	19.8	72.5	37.3	6.9	66.9
Breast	14.8	.9	28.2	15.5	1.5	29.1	13.6	--------	26.8
Skin	31.7	34.9	28.6	48.7	54.2	43.4	5.1	4.6	5.6
Brain	.4	.4	.4	.7	.7	.7	--------	--------	--------
Bones	.9	.9	.9	1.1	1.5	.7	.6	--------	1.1
All others	9.2	12.1	6.1	13.3	16.1	10.0	2.8	5.7	--------
All sites	139.4	110.8	167.1	176.0	156.6	194.7	82.0	39.0	123.8

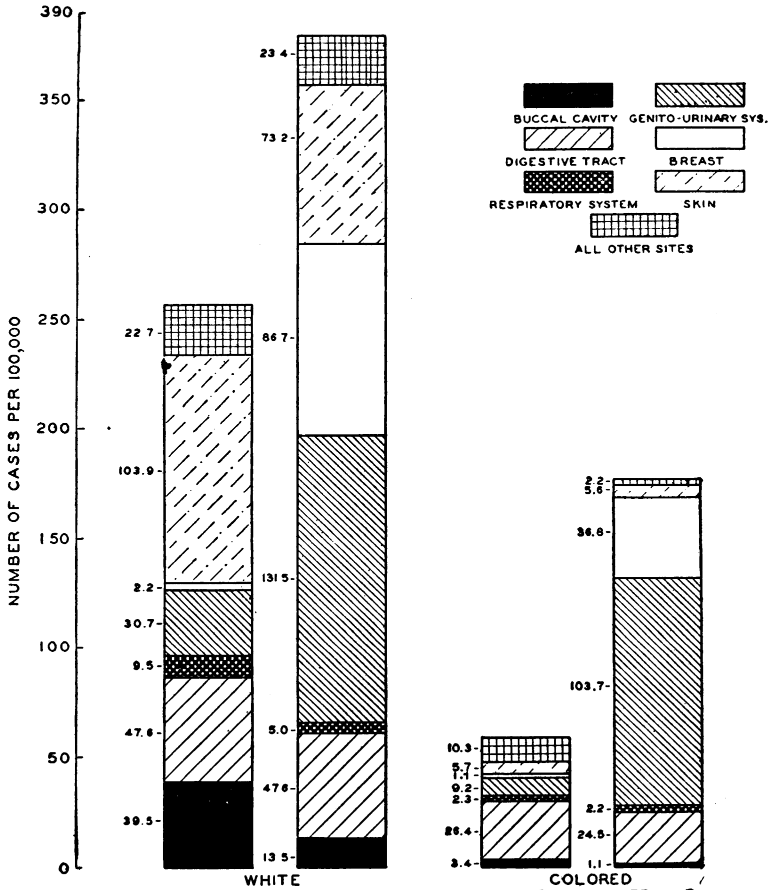

FIGURE 4.—Number of cancer cases of each primary site per 100,000 persons, by sex and color, Birmingham, Ala., 1938.

In order to determine what segment of the cancer prevalence in Birmingham was composed of cases first seen during the study year, the ratio of the new cases to the total resident cases was computed (table 13). Obviously, this ratio also indicates the proportion of the cases receiving medical care or observation which had been carried over into the study year from previous years.

Of the 1,095 resident cases of cancer seen or treated in Birmingham during the study year, 633, or 58 percent, were first diagnosed during that year. Sixty-two percent of the total cases among males originated during the study year, as against only 56 percent of the total cases among females.

TABLE 13.—*Percentage of total reported cancer cases which were first seen in 1938, resident cases only, by site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total			White			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Buccal cavity	55.8	56.1	60.0	56.2	57.4	57.9	50.0	33.3	100.0
Digestive tract	66.7	68.2	65.2	63.6	67.7	59.7	75.6	69.6	81.8
Respiratory system	75.0	86.7	55.6	70.0	84.6	42.9	100.0	100.0	100.0
Genito-urinary system	59.5	66.0	58.3	56.8	64.3	55.1	65.3	75.0	64.5
Breast	42.1	50.0	41.9	34.4	66.7	33.6	70.6		72.7
Skin	56.5	53.1	61.1	55.1	52.1	59.2	90.0	80.0	100.0
Brain	100.0	100.0	100.0	100.0	100.0	100.0			
Bones	57.2	100.0	40.0	50.0	100.0	25.0	100.0		100.0
All others	63.6	73.0	48.3	66.1	78.6	50.0	50.0	55.6	
All sites	57.8	61.8	55.5	55.1	61.1	51.1	69.4	66.7	70.3

There were 173 cases which had received no treatment during 1938, and of these 125, or 72 percent, were females. When these 173 cases are excluded, leaving only cases which received treatment in the study year, the proportion of the treated cases among males originating in the study year is 70 percent, and the proportion of those among females is 68 percent. Thus, while there is a difference between the proportions of male and female cases carried over into the study year, the difference arises largely from the fact that the female cases generally remain under observation longer after treatment has been concluded.

Distinct differences are to be observed among the proportions of cases originating in the study year for each primary site. Eighty-seven percent of the male respiratory system cases, 68 percent of the male digestive tract cases, and 65 percent of the female digestive tract cases were first diagnosed during the study year, in contrast to the 53 percent of the male skin cases[10] and 42 percent of the female breast cases which were first diagnosed during that period. These

[10] The very small number of male cases that were observed only in 1938 makes it doubtful if all cured and arrested male skin cancer had been kept under observation for any extended period of time. Had they been, the percentage of male skin cases first seen in 1938 would probably have been much smaller.

proportions indicate clearly that in cancer of sites less susceptible to successful treatment the cases reported are largely new cases.

Female breast cases provided the greatest difference between white and colored cases (where any significant number of cases was involved) in proportions carried over from preceding years. Only 34 percent of the white female breast cases were first seen during 1938, while 73 percent of the colored female breast cases were new cases. It is not very likely that this disparity arises from any difference in the malignancy of white and colored female breast cancer. The more probable explanation is that the colored cases were diagnosed later in the course of the disease, thus resulting in less effective treatment.

The earlier papers in this series (*1–6*) employed the case-death ratio as a crude measure of incidence because the unreliability of intercensal population estimates made it inadvisable to compute prevalence rates in the usual manner. This is now unnecessary, and the case-death ratio, never a satisfactory measure of incidence, will be employed here simply as an index of cancer mortality.

TABLE 14.—*Number of reported cases, number of recorded deaths, and the ratio of cases to deaths from cancer, by sex, and color,*[1] *Birmingham, Ala., 1938*

	Total[2]			White			Colored		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Cases[3]	1,103	405	698	886	352	534	210	51	159
Deaths	318	116	202	221	89	132	97	27	70
Cases per death	3.5	3.5	3.5	4.0	4.0	4.0	2.2	1.9	2.3

[1] Resident cases and deaths only. Includes 8 cases of unknown residence.
[2] Includes cases and deaths of unknown color.
[3] Includes deaths not reported as a case.

There were 3.5 resident cases of cancer in Birmingham for every resident cancer death. This is considerably higher than the ratio of cases to deaths in Chicago (2.6 to 1) and in Pittsburgh (2.9 to 1), but is lower than in the other southern cities surveyed, New Orleans (3.9 to 1) and Atlanta (5.3 to 1).

To a large extent, the case-death ratio reflects the site distribution of cancer cases in a population. A great many cases of comparatively nonfatal cancer, such as skin cancer, in a given population, will produce a high case-death ratio, whereas a great many cases of cancer of the digestive tract, which is far more fatal, will produce a low case-death ratio. Since the white population of Birmingham had many cases of skin cancer, and the colored population very few, it is not surprising that the white case-death ratio should be so much higher than that of the colored (4.0 to 1 and 2.2 to 1, respectively). This low ratio for the colored cases, indicating high mortality, can also be accounted for in part by delayed treatment, which is probably more common among Negroes than whites.

Inasmuch as some types of cancer are more malignant than others, and some sites of cancer less susceptible to early diagnosis and treatment, it is to be expected that there would be considerable variation in the frequency with which cancers of different sites are found among living and dead cases. The site distributions of reported cases and recorded deaths, set forth in table 15, clearly bear out this expectation for all groups except the colored males. Reported cases and recorded deaths of cancer were so few for colored males in Birmingham that one cannot accept them as presenting a valid picture of cancer incidence for this group.

Cancers of the buccal cavity, breast, and skin were found in greater numbers among the white cases reported as alive than among those recorded as dead. Cancers of the digestive tract and respiratory system were far more frequent among the dead cases. The fatality of genito-urinary cancer differed considerably between the sexes. Cancer of this site was much more frequent among white male dead cases, and only slightly more frequent among white female dead cases than among the living.

TABLE 15.—*Percentage distribution by primary site, sex, and color of resident reported cases and recorded deaths of cancer, Birmingham, Ala., 1938*

Primary site	White				Colored			
	Cases		Deaths		Cases		Deaths	
	Male	Female	Male	Female	Male	Female	Male	Female
Buccal cavity, pharynx	15.4	3.5	5.6	2.3	5.9	0.6	3.7	
Digestive tract	18.6	12.5	43.8	29.5	45.1	13.9	44.4	21.4
Respiratory system	3.7	1.3	11.2	3.8	3.9	1.3	3.7	2.9
Genito-urinary system	12.0	34.5	22.5	37.9	15.7	58.9	18.5	54.3
Breast	.9	22.8		15.9	2.0	20.9	3.7	11.4
Skin	40.6	19.2	4.5	4.5	9.8	3.2	3.7	1.4
Brain	.3	.2		.8				
Bones	.6	.7				.6		
All others	8.0	5.2	12.4	5.3	17.6	.6	22.2	8.6
All sites	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

In table 15 the category "All others" contains all cases for which vague, ill-defined, or nonspecific primary sites were reported. It will be observed that this category is somewhat more prominent among white dead cases than living, and far more prominent among colored dead cases. The reason for this is that a great number of cases are diagnosed late in their history, when metastases and extensions have made it extremely difficult to determine the primary site of the malignancy. This occurs more commonly among colored cases than among white.

The difference in fatality of the various sites is also revealed by the duration of cases for each primary site. Duration, for live cases, refers to the period from the date of first diagnosis to the end of the study year, and for dead cases from the date of first diagnosis to the date of death. Table 16 presents the duration of all cases by primary site and vital status.

TABLE 16.—*Percentage of cases of cancer which had been diagnosed for less than a specified number of months, classified by primary site and vital condition at the end of the year, Birmingham, Ala., 1938*

Duration since diagnosis of less than—	Buccal cavity		Digestive tract		Respiratory system		Genito-urinary system		Breast		Skin		All sites	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
6 months	40	39	41	72	63	77	45	52	26	42	33	13	37	57
12 months	63	62	68	86	75	100	69	74	45	52	57	50	60	76
18 months	74	62	76	93	75	100	77	85	56	65	65	75	69	86
24 months	78	69	82	95	75	100	82	89	66	83	71	81	75	91
30 months	83	77	86	97	75	100	84	94	72	85	77	88	80	94
36 months	84	85	89	98	75	100	86	95	78	88	80	94	83	95
42 months	92	100	91	99	75	100	89	97	82	90	83	94	86	97
48 months	92	100	91	100	75	100	90	97	85	90	86	94	88	97
54 months	95	100	92	100	88	100	91	98	88	94	89	94	91	98
60 months	96	100	92	100	88	100	93	99	89	96	90	94	92	99

Sixty-three percent of all cases which were alive at the end of the study year had had a duration of over 6 months, and 40 percent of them had had a duration of over a year. As contrasted to this, only 43 percent of the dead cases had lived 6 months after first diagnosis, and only 24 percent, a year. Even greater differences between the durations of living and dead cases would be found were it possible to include the living and apparently cured cases not reported in the study because they had received no treatment and were not observed in the study year.

Also, from table 16, it is seen that the duration of dead cases was much shorter than that of living cases within every site. Fifty-nine percent of the living cases with cancer of the digestive tract had had a duration of over 6 months, as against only 28 percent of the dead cases that had survived this period. This difference can be explained on the ground that a much larger proportion of the fatal than of the surviving cases had received late or inaccurate diagnosis and treatment.

It is, of course, true that the composition of the living and dead groups according to primary site of the cancer shows considerable difference. Cancer of the digestive tract, respiratory system, and genito-urinary system composed 69 percent of all cases dead at the end of the study year (table 17) and only 34 percent of the cases which survived this date. On the other hand, 61 percent of the surviving cases were cancers of the buccal cavity, breast, and skin, while only 20 percent of the fatal cases were primary in these sites.

TABLE 17.—*Percentage distribution according to site of resident cases of cancer, by vital status, Birmingham, Ala., 1938*

	Buccal cavity	Digestive tract	Respiratory system	Genito-urinary system	Breast	Skin	Brain	Bones	All others	Total
Cases alive at end of study year	8.7	8.4	0.8	24.9	15.7	36.2	------	1.0	4.3	100.0
Cases dead at end of study year	3.3	26.6	4.3	38.2	12.2	4.1	1.8	1.8	7.8	100.0

Cancer of certain sites, then, whether because of difficulty of diagnosis or relative lack of response to treatment, is fatal in a far greater proportion of cases than cancer of other sites. At the same time it is established that even in cases of the more fatal sites, early diagnosis will result in much longer duration and a far better chance of survival.

SUMMARY

The number of cancer cases reported under medical care in Jefferson County, Ala., during 1938 was 1,771, of which 1,103 were residents and 668 were nonresidents of the county. There were 354 death certificates listing cancer as a cause of death filed in the area, of which 318 were residents. The cancer case rate was found to be 242.9 per 100,000 residents, and the death rate 70.0 per 100,000. The ratio of cases to deaths was 3.5 to 1. The ratio of cases to deaths was almost twice as high for white as for colored cases, 4.0 to 1 and 2.2 to 1.

The skin was the most frequent primary site, followed by the buccal cavity, digestive tract, and genito-urinary system. Forty-six percent of the white male cases were skin cancer, a much higher proportion than in any other city yet reported in this series.

Four primary sites accounted for 90 percent of the white female cases: Genito-urinary system 32.4 percent, skin 24.9 percent, breast 21.6 percent, digestive tract 10.6 percent.

The distribution of colored female cases was similar to that of the white except that there was a much smaller proportion of skin cancer and a correspondingly greater percentage of genito-urinary cancer among the former group.

The cancer prevalence rate for Jefferson County (242.9 per 100,000) was the lowest rate reported for any of the cities studied. The incidence rate, based on cases first seen in the study year, was 139.4 per 100,000.

For all sites, the prevalence rates for the white population were much higher than for the colored. The most striking differences were found between the case rates of skin and buccal cavity cancer for the white and colored populations.

The most important sites among white males were skin (103.9 per 100,000), digestive tract (47.6 per 100,000), and buccal cavity (39.5 per 100,000). Cancer prevalence among white females was much higher than among white males. Among females, the highest rate was for genito-urinary cancer (131.5 per 100,000) and the next highest was for breast cancer (86.7 per 100,000). Skin cancer was the third most frequent (73.2 per 100,000).

The proportion of cases receiving medical care or observation which had been carried over into the study year from previous years differed between the sexes. Sixty-two percent of the total male cases originated during the study year, as against only 56 percent of the female cases.

Similar differences were observed among the various primary sites. In cancer of sites less susceptible to successful treatment, such as the respiratory system and digestive tract, the cases reported were largely new ones. Much larger proportions of skin and female breast cases were first seen prior to the study year.

Sixty-three percent of all cases alive at the end of the study year had been under medical care for over 6 months, while only 43 percent of the cases reported as dead at the end of the year had lived 6 months after first diagnosis. The duration of dead cases was much shorter than that of living cases within every site. Fifty-nine percent of the living cases of the digestive tract had a duration of over 6 months, while only 28 percent of the dead cases survived this period.

The composition of the living and dead groups according to primary site of the cancer showed considerable difference, reflecting the different fatality of the various sites. Cancer of the digestive tract, respiratory system, and genito-urinary system composed 69 percent of all cases dead at the end of the study year, and only 34 percent of the surviving cases. On the other hand, 61 percent of the surviving cases were cancers of the buccal cavity, breast, and skin, while only 20 percent of the total cases were primary in these sites.

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APPENDIX

TABLE 1.—*Number of all cancer cases, by sex and color, reported by various sources, according to nature and number of reporting agencies, Birmingham, Ala., 1938*

Reported by—	Number of cases reported						
	Total	Total by sex		White		Colored	
		Male	Female	Male	Female	Male	Female
Hospital(s) only	502	191	311	154	212	37	99
Doctor(s) only	1,016	449	567	436	518	13	49
Both hospitals and doctors	207	65	142	61	118	4	24
Total	1,725	705	1,020	651	848	54	172
One source only	1,414	608	806	560	663	48	143
Two sources only	233	72	161	67	141	5	20
Three or more sources	78	25	53	24	44	1	9
Total	1,725	705	1,020	651	848	54	172

TABLE 2.—*Total number of reported cancer cases, by primary site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity	106	36	104	34	2	2
Lip	69	16	68	16	1	
Tongue	10	4	10	3		1
Mouth	2	2	2	1		1
Jaw	4		3		1	
Pharynx	1	2	1	2		
Others	20	12	20	12		
Digestive tract	109	111	86	90	23	21
Esophagus	3	1	2		1	1
Stomach, duodenum	37	26	26	19	11	7
Intestines	24	37	22	34	2	3
Rectum, anus	23	26	17	22	6	4
Liver, biliary passage	16	12	13	8	3	4
Pancreas	5	7	5	5		2
Mesentery, peritoneum	1	2	1	2		
Respiratory system	18	9	16	7	2	2
Larynx	5	2	5	2		
Lungs, pleura	11	6	10	4	1	2
Others	2	1	1	1	1	
Genito-urinary system	90	376	80	275	10	101
Uterus		321		224		97
Kidneys	8	8	6	8	2	
Bladder	9	7	9	6		1
Prostate	62		56		6	
Others	11	40	9	37	2	3
Breast	5	220	3	183	2	37
Skin	305	217	300	211	5	6
Brain	5	2	5	2		
Bones (except jaw)	12	10	11	8	1	2
Others	55	39	46	38	9	1
All sites	705	1,020	651	848	54	172

TABLE 3.—*Number of resident cases of cancer reported,*[1] *by primary site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity	57	20	54	19	3	1
Digestive tract	88	89	65	67	23	22
Respiratory system	15	9	13	7	2	2
Genito-urinary system	50	278	42	185	8	93
Breast	4	155	3	122	1	33
Skin	147	108	142	103	5	5
Brain	1	1	1	1	----	----
Bones	2	5	2	4	----	1
All others	37	29	28	28	9	1
All sites	401	694	350	536	51	158

[1] Includes cases obtained from death certificates.

TABLE 4.—*Number of resident cancer cases first seen in 1938, by primary site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity	32	12	31	11	1	1
Digestive tract	60	58	44	40	16	18
Respiratory system	13	5	11	3	2	2
Genito-urinary system	33	162	27	102	6	60
Breast	2	65	2	41	----	24
Skin	78	66	74	61	4	5
Brain	1	1	1	1	----	----
Bones	2	2	2	1	----	1
All others	27	14	22	14	5	----
All sites	248	385	214	274	34	111

TABLE 5.—*Number of resident deaths of cancer recorded, by primary site, sex, and color, Birmingham, Ala., 1938*

Primary site	Total		White		Colored	
	Male	Female	Male	Female	Male	Female
Buccal cavity	6	3	5	3	1	----
Digestive tract	51	54	39	39	12	15
Respiratory system	11	7	10	5	1	2
Genito-urinary system	25	88	20	50	5	38
Breast	1	29	----	21	1	8
Skin	5	7	4	6	1	1
Brain	----	1	----	1	----	----
Bones	----	----	----	----	----	----
All others	17	13	11	7	6	6
All sites	116	202	89	132	27	70

TABLE 6.—*Number of reported cases of cancer of known vital status which had been diagnosed for less than a specified number of months, classified by primary site and vital condition at the end of the year, Birmingham, Ala., 1938*

Duration since diagnosis of less than	All sites [1]		Buccal cavity		Digestive tract		Respiratory system		Genito-urinary system		Breast		Skin	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
6 months	349	224	33	5	32	76	5	13	105	78	38	20	113	2
12 months	563	299	52	8	54	90	6	17	161	111	66	25	193	8
18 months	652	339	61	8	60	98	6	17	182	128	83	31	223	12
24 months	708	358	64	9	65	100	6	17	193	134	98	40	241	13
30 months	758	371	68	10	68	102	6	17	198	142	107	41	264	14
36 months	782	376	69	11	70	103	6	17	203	143	115	42	272	15
42 months	815	383	75	13	72	104	6	17	209	146	122	43	282	15
48 months	832	384	75	13	72	105	6	17	211	146	125	43	294	15
54 months	853	388	78	13	73	105	7	17	213	148	130	45	303	15
60 months	867	390	79	13	73	105	7	17	219	149	132	46	308	15
All cases	943	395	82	13	79	105	8	17	235	151	148	48	341	16

[1] Includes cases of brain, bones, and "all other" sites, as well as those sites presented above.

DEATHS DURING WEEK ENDED FEBRUARY 28, 1942

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

	Week ended Feb. 28, 1942	Corresponding week, 1941
Data from 88 large cities of the United States:		
Total deaths	9,095	9,286
Average for 3 prior years	9,547	
Total deaths, first 8 weeks of year	74,171	78,396
Deaths per 1,000 population, first 8 weeks of year, annual rate	12.9	13.7
Deaths under 1 year of age	521	587
Average for 3 prior years	554	
Deaths under 1 year of age, first 8 weeks of year	4,489	4,355
Data from industrial insurance companies:		
Policies in force	64,928,623	64,657,311
Number of death claims	11,930	14,562
Death claims per 1,000 policies in force, annual rate	9.6	11.7
Death claims per 1,000 policies, first 8 weeks of year, annual rate	10.1	11.3

PREVALENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 7, 1942

Summary

General health conditions in the United States continue favorable, as indicated by reports of communicable disease and urban mortality. Of the 9 important communicable diseases included in the following weekly table, the current incidence of measles, meningococcus meningitis, and poliomyelitis is slightly above the 5-year (1937–41) median, while the cumulative figures for the first 9 weeks of the current year are above the median for meningococcus meningitis, poliomyelitis, and whooping cough.

A total of 5,457 cases of influenza was reported for the current week, as compared with 5,984 for the preceding week and a 5-year median of 9,590 cases. The highest incidence is in Texas (1,734 cases), South Carolina (1,028), and Virginia (652). Only 4 other States reported more than 200 cases. The current and cumulative figures for meningococcus meningitis are slightly above the 5-year median, but the cases are scattered. Only 2 States (Massachusetts 11, California 6) reported more than 5 cases for the current week. Although only 23 cases of poliomyelitis were reported for the current week, this is above the figure for the corresponding week of each of the preceding 5 years, but the total to date is below that for the corresponding period in both 1940 and 1941.

Of 20 cases of smallpox, 6 occurred in Texas and 4 in Illinois, and of 76 cases of typhoid fever, 14 were reported in Georgia, 9 in Florida, and 7 in New York.

Other reports for the week include 6 cases of anthrax (3 in Pennsylvania and 1 each in Massachusetts, New Jersey, and Louisiana), 13 cases of amebic dysentery, 106 cases of bacillary dysentery (70 in Texas, 17 in Georgia), 30 cases of unspecified dysentery (20 in Arizona, 9 in Virginia), and 35 cases of typhus fever (12 in Florida, 8 in Georgia).

The crude death rate for the current week for 88 large cities in the United States is 12.9 per 1,000 population as compared with 12.7 for the preceding week and with 13.1 for the 3-year (1939–41) average for the corresponding week.

Telegraphic morbidity reports from State health officers for the week ended March 7, 1942, and comparison with corresponding week of 1941 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1937-41	Week ended—		Median 1937-41	Week ended—		Median 1937-41	Week ended—		Median 1937-41
	Mar. 7, 1942	Mar. 8, 1941		Mar. 7, 1942	Mar. 8, 1941		Mar. 7, 1942	Mar. 8, 1941		Mar. 7, 1942	Mar. 8, 1941	
NEW ENG.												
Maine	1	0	1	-----	6	6	129	208	165	2	0	0
New Hampshire	0	0	0	20	8	-----	6	81	33	0	0	0
Vermont	0	0	0	-----	-----	-----	4	17	17	0	0	0
Massachusetts	8	2	3	-----	-----	-----	593	594	594	11	1	2
Rhode Island	3	0	0	-----	-----	-----	169	0	14	0	0	0
Connecticut	1	1	1	1	26	21	375	52	238	4	1	1
MID. ATL.												
New York	30	26	26	[1] 17	[1] 59	[1] 56	678	6,415	1,224	5	2	6
New Jersey	6	6	10	11	123	29	322	2,071	1,437	5	1	1
Pennsylvania	11	14	35	-----	-----	-----	11	3,995	388	4	8	6
E. NO. CEN.												
Ohio	16	17	22	18	273	36	261	4,742	34	3	2	2
Indiana	9	12	12	35	52	86	50	450	23	0	1	1
Illinois	14	17	32	16	34	56	493	3,266	58	1	2	2
Michigan [2]	4	7	12	1	28	12	241	3,159	320	0	3	1
Wisconsin	1	0	4	52	175	175	647	873	873	0	0	1
W. NO. CEN.												
Minnesota	5	1	3	7	26	5	775	5	63	0	1	1
Iowa	2	3	4	1	247	28	325	183	183	0	0	0
Missouri	1	7	13	3	22	146	255	86	14	1	0	1
North Dakota	0	1	1	5	30	31	77	9	8	0	0	0
South Dakota	2	0	0	-----	4	4	14	11	3	0	0	0
Nebraska	3	1	2	38	14	7	121	6	33	0	1	1
Kansas	2	3	11	8	20	29	319	564	382	1	3	1
SO. ATL.												
Delaware	0	1	1	-----	-----	-----	7	431	26	0	0	0
Maryland [2]	5	2	5	29	57	57	584	104	104	2	2	2
Dist. of Col.	2	0	6	3	46	3	46	89	19	2	1	1
Virginia	13	9	16	652	1,016	1,016	128	1,537	252	3	3	3
West Virginia	5	10	10	52	125	271	[3] 229	338	38	0	1	2
North Carolina	12	20	19	52	135	116	1,356	649	649	3	1	2
South Carolina	4	5	7	1,028	958	958	192	194	33	3	1	1
Georgia	8	6	3	144	267	267	365	341	156	1	0	0
Florida	3	2	5	5	154	26	165	438	188	0	2	1
E. SO. CEN.												
Kentucky	8	9	9	4	80	83	71	657	121	1	1	3
Tennessee	2	9	8	187	275	261	79	364	117	1	0	1
Alabama	2	8	11	233	401	501	148	279	228	1	5	2
Mississippi [2]	6	1	4	-----	-----	-----	-----	-----	-----	0	3	0
W. SO. CEN.												
Arkansas	4	4	5	236	665	501	243	152	76	0	1	0
Louisiana	5	4	8	4	42	42	85	21	7	3	2	0
Oklahoma	4	5	6	176	253	334	293	5	34	1	3	0
Texas	37	29	40	1,734	1,167	1,167	2,222	767	594	4	0	4
MOUNTAIN												
Montana	0	0	0	25	19	19	10	1	49	0	0	0
Idaho	0	0	1	-----	-----	2	26	3	28	0	0	0
Wyoming	2	0	0	227	5	1	77	48	39	1	0	0
Colorado	7	15	8	73	61	30	207	213	98	0	0	0
New Mexico	3	0	1	8	51	51	111	220	60	0	0	0
Arizona	1	2	4	218	157	157	214	203	42	0	0	0
Utah [2]	0	1	1	5	8	8	93	35	130	0	0	0
Nevada	0	1	-----	-----	172	-----	16	0	-----	0	0	-----
PACIFIC												
Washington	0	4	4	3	18	4	150	96	96	1	0	0
Oregon	1	1	1	25	40	68	142	418	60	0	0	0
California	17	9	20	101	406	406	3,987	209	398	6	3	5
Total	270	275	456	5,457	7,725	9,590	17,111	34,599	15,922	70	55	55
9 weeks	2,909	2,649	4,939	44,521	440,532	124,134	[3] 114,639	172,249	162,124	573	437	481

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 7, 1942, and comparison with corresponding week of 1941 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41	Week ended—		Median 1937–41
	Mar. 7, 1942	Mar. 8, 1941		Mar. 7, 1942	Mar. 8, 1941		Mar. 7, 1942	Mar. 8, 1941		Mar. 7, 1942	Mar. 8, 1941	
NEW ENG.												
Maine	0	0	0	6	12	13	0	0	0	0	0	1
New Hampshire	0	0	0	8	7	7	0	0	0	0	0	0
Vermont	0	0	0	7	4	11	0	0	0	1	0	0
Massachusetts	0	0	0	272	124	224	0	0	0	0	2	1
Rhode Island	0	0	0	17	5	16	0	0	0	0	0	0
Connecticut	1	6	0	42	55	90	0	0	0	0	1	0
MID. ATL.												
New York	0	0	1	475	467	905	0	0	0	7	4	3
New Jersey	1	0	0	199	309	206	0	0	0	2	3	2
Pennsylvania	1	0	1	563	290	430	0	0	0	2	5	4
E. NO. CEN.												
Ohio	2	0	0	399	397	313	1	0	3	4	4	2
Indiana	0	0	1	166	161	204	0	2	4	1	2	2
Illinois	0	1	1	333	448	655	4	0	12	2	2	2
Michigan [2]	0	0	0	261	211	469	0	0	1	1	8	6
Wisconsin	0	0	0	176	137	170	0	2	5	0	2	1
W. NO. CEN.												
Minnesota	2	0	0	131	66	111	1	6	12	3	0	0
Iowa	0	1	0	48	65	126	0	5	18	0	1	0
Missouri	0	0	0	75	126	126	2	2	8	1	2	2
North Dakota	0	0	0	20	12	25	0	0	3	0	0	0
South Dakota	0	1	0	40	16	23	0	0	2	0	0	0
Nebraska	0	0	0	57	30	41	0	0	5	0	0	0
Kansas	0	1	0	102	53	154	0	6	6	0	1	0
SO. ATL.												
Delaware	0	0	0	63	10	10	0	0	0	0	0	0
Maryland [2]	0	0	0	91	51	51	0	0	0	1	1	1
Dist. of Col.	0	0	0	13	26	25	0	0	0	1	1	0
Virginia	1	1	1	31	31	40	0	0	0	0	3	3
West Virginia	0	1	1	35	47	47	0	0	0	0	2	3
North Carolina	2	0	0	35	62	58	0	0	0	0	0	1
South Carolina	0	0	0	3	13	5	0	0	0	0	9	1
Georgia	0	0	0	38	23	13	0	0	1	14	3	3
Florida	0	3	0	7	8	8	0	0	0	9	3	3
E. SO. CEN.												
Kentucky	1	1	0	100	185	69	0	0	0	2	12	5
Tennessee	1	0	0	73	155	53	2	0	0	3	8	0
Alabama	1	1	1	18	19	15	0	0	0	1	0	1
Mississippi [2]	0	0	0	10	9	7	1	0	0	0	2	-----
W. SO. CEN.												
Arkansas	1	1	0	6	13	9	1	2	4	1	1	1
Louisiana	2	0	0	6	4	6	0	0	0	5	3	6
Oklahoma	1	1	0	11	22	31	2	4	30	1	3	3
Texas	1	0	0	79	58	89	6	2	2	6	2	7
MOUNTAIN												
Montana	2	0	0	35	40	40	0	0	3	1	0	0
Idaho	0	0	1	3	8	16	0	0	3	0	0	0
Wyoming	0	0	0	19	9	9	0	0	0	0	0	1
Colorado	0	0	0	36	23	43	0	2	2	2	1	1
New Mexico	0	0	0	10	5	26	0	0	0	0	0	2
Arizona	0	0	0	16	4	6	0	0	0	0	2	0
Utah [2]	0	0	0	23	5	17	0	0	0	0	2	0
Nevada	0	0	-----	2	8	------	0	1	------	0	2	-----
PACIFIC												
Washington	0	1	0	66	20	41	0	8	8	0	1	1
Oregon	1	2	0	9	12	25	0	2	9	1	0	0
California	2	1	2	122	102	212	0	0	12	4	6	3
Total	23	17	17	4,357	3,967	5,398	20	44	293	76	104	100
9 weeks	232	239	195	34,622	31,699	48,148	215	419	2,657	721	658	985

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended March 7, 1942—Continued

Division and State	Whooping cough		Week ended March 7, 1942								
	Week ended—		Anthrax	Dysentery			Encephalitis	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	Mar. 7, 1942	Mar. 8, 1941		Amebic	Bacillary	Unspecified					
NEW ENG.											
Maine	26	56	0	0	0	0	0	0	0	0	0
New Hampshire	15	3	0	0	0	0	0	0	0	0	0
Vermont	63	10	0	0	0	0	0	0	0	0	0
Massachusetts	183	269	1	2	0	0	1	0	0	0	0
Rhode Island	52	12	0	0	0	0	0	0	0	0	0
Connecticut	122	68	0	0	2	0	0	0	0	0	0
MID. ATL.											
New York [1]	536	361	0	4	6	0	6	0	0	0	0
New Jersey	286	72	1	0	0	0	0	0	0	0	0
Pennsylvania	227	320	3	0	0	0	1	0	0	4	0
E. NO. CEN.											
Ohio	170	358	0	0	0	0	0	0	0	0	0
Indiana	40	9	0	0	1	0	0	0	0	0	0
Illinois	170	98	0	0	3	0	1	0	0	0	0
Michigan [2]	130	274	0	0	0	0	0	0	0	0	0
Wisconsin	273	145	0	0	0	0	0	0	0	0	0
W. NO. CEN.											
Minnesota	43	103	0	0	0	0	0	0	0	0	0
Iowa	18	61	0	0	0	0	0	0	0	0	0
Missouri	12	57	0	0	0	1	0	0	0	0	0
North Dakota	30	30	0	0	0	0	0	0	0	0	0
South Dakota	1	21	0	0	0	0	0	0	0	0	0
Nebraska	6	14	0	0	0	0	0	0	0	0	0
Kansas	58	171	0	0	0	0	0	0	0	0	0
SO. ATL.											
Delaware	0	9	0	0	0	0	0	0	0	0	0
Maryland [2]	54	59	0	0	0	0	0	0	0	0	0
Dist. of Col.	31	6	0	0	0	0	0	0	0	0	0
Virginia	51	143	0	0	0	9	0	0	0	2	0
West Virginia	[3] 60	55	0	0	0	0	0	0	0	0	0
North Carolina	77	272	0	0	0	0	0	0	0	0	0
South Carolina	94	124	0	0	0	0	0	0	0	0	1
Georgia	38	17	0	0	17	0	0	0	0	3	8
Florida	23	13	0	0	1	0	0	0	0	0	12
E. SO. CEN.											
Kentucky	98	42	0	1	0	0	0	0	0	0	0
Tennessee	26	89	0	0	0	0	0	0	0	1	1
Alabama	4	10	0	0	0	0	0	0	0	0	2
Mississippi [2]	------	------	0	0	0	0	0	0	0	1	0
W. SO. CEN.											
Arkansas	16	16	0	2	5	0	0	0	0	1	0
Louisiana	6	3	1	1	0	0	0	1	0	0	4
Oklahoma	9	26	0	0	0	0	0	0	0	0	0
Texas	167	256	0	3	70	0	1	0	0	1	7
MOUNTAIN											
Montana	6	40	0	0	0	0	0	0	0	0	0
Idaho	9	5	0	0	0	0	0	0	0	0	0
Wyoming	1	0	0	0	0	0	0	0	0	0	0
Colorado	61	45	0	0	0	0	0	0	0	0	0
New Mexico	19	24	0	0	0	0	0	0	0	0	0
Arizona	62	17	0	0	0	20	0	0	0	0	0
Utah [2]	23	84	0	0	0	0	0	0	0	0	0
Nevada	37	9	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	130	78	0	0	0	0	0	0	0	0	0
Oregon	35	10	0	0	0	0	0	0	0	0	0
California	309	400	0	0	1	0	1	0	0	0	0
Total	3,907	4,364	6	13	106	30	11	1	0	13	35
9 weeks	[3] 36,162	38,937									

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Corrected reports from West Virginia: Week ended Feb. 14, 1942, whooping cough, 46; week ended Feb. 28, 1942, whooping cough, 25; measles, 352.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 21, 1942

This table lists the reports from 88 cities of more than 10,000 population, distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Atlanta, Ga	0	0	3	3	0	0	3	0	6	0	0	0
Baltimore, Md	0	0	2	2	278	3	22	0	25	0	0	31
Billings, Mont	0	0	------	0	0	0	0	0	0	0	0	0
Birmingham, Ala	2	0	31	1	10	0	10	0	2	0	0	3
Boise, Idaho	0	0	------	0	1	0	1	0	0	0	0	0
Boston, Mass	0	0	------	2	57	3	17	0	78	0	3	38
Bridgeport, Conn	0	0	------	1	14	0	2	0	4	0	0	1
Brunswick, Ga	0	0	------	0	18	0	0	0	0	0	0	0
Buffalo, N. Y	0	0	------	0	10	0	8	0	29	0	0	12
Camden, N. J	0	0	1	1	8	0	2	0	12	0	0	1
Charleston, S. C	0	0	107	1	0	0	0	0	3	0	0	0
Chicago, Ill	11	0	5	2	87	0	29	0	110	0	0	48
Cincinnati, Ohio	0	0	1	1	1	1	7	1	36	0	0	25
Cleveland, Ohio	0	0	15	0	8	1	9	0	83	0	1	18
Columbus, Ohio	0	0	1	1	19	0	1	0	8	0	0	2
Concord, N. H	0	0	------	0	0	0	0	0	4	0	0	1
Cumberland, Md	0	0	1	0	7	0	1	0	3	0	0	0
Dallas, Tex	2	0	2	2	118	0	3	0	4	0	0	2
Denver, Colo	2	0	35	0	87	0	6	0	6	0	0	18
Detroit, Mich	7	0	1	1	104	0	17	1	153	0	0	51
Duluth, Minn	0	0	------	0	0	0	1	0	5	0	0	0
Fall River, Mass	0	0	------	0	1	0	0	0	36	0	0	0
Fargo, N. Dak	0	0	------	0	0	0	1	0	2	0	0	2
Flint, Mich	0	0	------	0	0	0	4	0	6	0	0	8
Fort Wayne, Ind	0	0	------	0	0	0	0	0	1	0	2	2
Frederick, Md	0	0	------	0	6	0	0	0	0	0	0	0
Galveston, Tex	0	0	------	0	1	0	3	0	1	0	0	0
Grand Rapids, Mich	0	0	------	0	16	0	3	0	4	0	0	13
Great Falls, Mont	0	0	------	0	119	0	0	0	0	0	0	11
Hartford, Conn	0	0	------	0	11	0	0	0	2	0	0	1
Helena, Mont	0	0	------	0	1	0	0	0	0	0	0	0
Houston, Tex	3	0	------	0	29	0	6	0	5	0	0	0
Indianapolis, Ind	1	0	------	2	7	0	1	0	28	0	0	26
Kansas City, Mo	0	0	------	1	10	1	10	0	24	0	0	5
Kenosha, Wis	0	0	------	0	2	0	0	0	3	0	0	8
Little Rock, Ark	0	0	26	0	122	1	3	0	0	0	0	0
Los Angeles, Calif	3	0	22	0	287	0	16	1	38	0	0	34
Lynchburg, Va	0	0	------	0	0	0	0	0	1	0	0	4
Memphis, Tenn	0	0	------	1	12	1	7	0	7	0	1	8
Milwaukee, Wis	0	0	1	1	23	0	16	0	44	0	0	100
Minneapolis, Minn	1	0	------	0	59	0	7	0	19	0	0	10
Missoula, Mont	0	0	------	0	0	0	3	0	0	0	0	0
Mobile, Ala	0	0	2	2	1	0	2	0	0	0	0	0
Nashville, Tenn	0	0	------	0	2	0	4	0	2	0	0	3
Newark, N. J	0	0	4	0	38	1	8	0	32	0	0	31
New Haven, Conn	0	0	------	0	122	0	0	0	5	0	0	5
New Orleans, La	1	0	------	0	8	1	2	1	2	0	1	2
New York, N. Y	27	3	17	3	33	6	81	2	228	0	1	218
Omaha, Nebr	0	0	------	0	19	0	8	0	4	0	0	1
Philadelphia, Pa	0	0	5	1	26	2	29	0	170	0	0	36
Pittsburgh, Pa	3	1	5	2	11	1	14	0	13	0	1	15
Portland, Maine	0	0	------	0	1	0	3	0	8	0	0	1
Providence, R. I	1	0	------	0	61	0	5	0	6	0	0	50
Pueblo, Colo	0	0	------	0	36	0	0	0	1	0	0	1
Racine, Wis	0	0	------	0	5	0	0	0	0	0	0	9
Raleigh, N. C	0	0	------	0	3	0	0	0	0	0	0	0
Reading, Pa	0	0	------	0	1	0	3	0	0	0	0	1
Richmond, Va	0	0	1	1	0	0	4	0	3	0	0	1
Roanoke, Va	0	0	------	0	2	0	2	0	1	0	0	0

See footnotes at end of table.

City reports for week ended February 21, 1942—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
Rochester, N. Y.	0	0	------	0	10	0	2	0	5	0	0	3
Sacramento, Calif.	0	0	1	0	173	0	2	0	1	0	0	8
St. Joseph, Mo.	0	0	------	0	1	0	7	0	2	0	0	0
St. Louis, Mo.	2	0	1	0	81	0	11	0	21	0	0	3
St. Paul, Minn.	0	0	------	1	429	0	2	0	6	0	0	15
Salt Lake City, Utah	0	0	------	0	10	0	2	0	2	0	0	3
San Antonio, Tex.	0	0	9	1	5	0	10	0	4	0	0	1
San Francisco, Calif.	0	0	------	0	53	1	6	0	10	0	0	1
Savannah, Ga.	1	0	24	0	53	0	2	0	0	0	0	1
Seattle, Wash.	0	0	------	2	1	0	7	0	2	0	0	24
Shreveport, La.	0	0	------	0	7	0	4	0	0	0	0	0
South Bend, Ind.	0	0	------	0	0	0	3	0	23	0	0	0
Spokane, Wash.	0	0	------	0	2	0	5	0	7	0	0	13
Springfield, Ill.	0	0	------	0	47	0	2	0	3	0	0	0
Springfield, Mass.	0	0	1	1	9	0	0	0	10	0	0	25
Superior, Wis.	0	0	------	0	1	0	0	0	3	0	0	4
Syracuse, N. Y.	0	0	------	0	5	0	0	0	8	0	0	45
Tacoma, Wash.	0	0	------	0	0	0	2	0	2	0	0	0
Tampa, Fla.	0	0	1	1	11	0	5	0	0	0	1	1
Terre Haute, Ind.	0	0	------	0	0	0	1	0	1	0	0	0
Topeka, Kans.	0	0	------	0	4	0	2	0	1	0	0	4
Trenton, N. J.	0	0	1	1	3	0	5	0	1	0	0	7
Washington, D. C.	2	0	1	0	34	1	12	0	13	0	0	32
Wheeling, W. Va.	0	0	------	0	28	0	4	0	2	0	0	1
Wichita, Kans.	0	0	2	0	11	0	4	0	1	0	0	6
Wilmington, Del.	1	0	------	0	0	0	4	1	20	0	0	1
Wilmington, N. C.	0	0	------	0	283	0	1	0	0	0	0	0
Winston-Salem, N. C.	1	0	------	0	168	0	1	0	2	0	0	2
Worcester, Mass.	1	0	------	0	6	0	6	0	14	0	0	43

Dysentery, amebic.—Cases: San Francisco, 1.
Dysentery, bacillary.—Cases: Los Angeles, 3; Rochester, 2; Syracuse, 1.
Tularemia.—Cases: Milwaukee, 1; St. Louis, 3.
Typhus fever.—Cases: Mobile, 1; San Antonio, 3; Tampa, 2.

Rates (annual basis) per 100,000 population for the group of 88 cities included in the preceding table (estimated population, 1942, 34,011,305)

Period	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
		Cases	Deaths						
Week ended Feb. 21, 1942	11.04	50.44	5.98	511.60	75.28	219.39	0.00	1.69	168.64
Average for week 1937–41	19.19	215.87	22.28	862.08	129.83	252.70	4.95	2.01	171.46

TERRITORIES AND POSSESSIONS

HAWAII TERRITORY

Plague (rodent).—A rat found on January 23, 1942, and another rat found on January 24, both in Paauhau, Hamakua District, Island of Hawaii, T. H., have been found positive for plague.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 7, 1942.—During the week ended February 7, 1942, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis		5		2	7	3	1	1	2	21
Chickenpox		5	1	190	335	81	50	31	150	843
Diphtheria		29	4	17	8	9			2	69
Dysentery				19						19
German measles		3		25	64	29	42	10	37	210
Influenza					7	44			22	73
Lethargic encephalitis							1			1
Measles		27	6	497	107	164	51	12	38	902
Mumps		14	2	468	390	127	443	121	373	1,938
Pneumonia	3	2			9			1	46	61
Scarlet fever		15	12	78	278	49	44	56	35	567
Trachoma					1					1
Tuberculosis			15	70	54		24	2		165
Typhoid and paratyphoid fever				20	2	1		2		25
Whooping cough	1	1	1	144	98	2	8	14	26	295
Other communicable diseases	2	1		6	279	39		2	1	330

CUBA

Provinces—Notifiable diseases—4 weeks ended January 3, 1942.—During the 4 weeks ended January 3, 1942, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	1	1	2	7		18	29
Chickenpox		2		1		1	4
Diphtheria		28		1	2	2	33
Hookworm disease		24					24
Leprosy	1			2	1	2	6
Malaria	294	39	1	16	3	1,339	1,692
Measles		7					7
Poliomyelitis		2				2	4
Rabies		1					1
Scarlet fever		1					1
Tuberculosis	20	39	13	57	22	39	190
Typhoid fever	15	29	5	24	6	11	90
Undulant fever					1		1
Whooping cough						1	1

[1] Includes the city of Habana.

JAMAICA

Communicable diseases—4 weeks ended February 14, 1942.—During the 4 weeks ended February 14, 1942, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1		Leprosy		3
Chickenpox	6	17	Puerperal sepsis	1	3
Diphtheria		3	Tuberculosis	21	64
Dysentery	3	3	Typhoid fever	12	46
Erysipelas	1		Typhus fever	3	1

MALTA

Notifiable diseases—October 1941.—During the month of October 1941, certain notifiable diseases were reported in the island of Malta, including the island of Gozo, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cancer		22	Measles	4	
Chickenpox	3		Nephritis		22
Diabetes mellitus		13	Pneumonia		16
Diarrhea and enteritis (under 2 years of age)		99	Scarlet fever	2	
			Tetanus		1
Diphtheria	29	6	Trachoma	51	
Erysipelas	13		Tuberculosis (respiratory system)	26	12
Gastroenteritis		105	Typhoid fever	45	5
Influenza	8		Undulant fever	54	3
Leprosy		1	Whooping cough	49	2

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Brazil—Bahia.—Fragmentary reports indicate the presence of plague in the interior of the State of Bahia, Brazil, during the latter part of 1941.

China.—The following report on plague in China during the winter of 1941 has been received from the American Embassy at Chungking:

For many years plague has been more or less a local problem in a few semi-isolated areas. Owing to the blockade of maritime traffic and to improvement of means of communications in the interior, in 1940 and 1941 the disease began to show a tendency to migrate toward the hinterland. From Fukien it has spread to Chekiang and Kiangsi; and more recently, in November 1941, an outbreak occurred in Hunan.

The report of the occurrence of plague in Changteh, Hunan, was received on November 11. From that date to November 25, 6 cases were confirmed by bacteriological examination and animal inoculation test. Efforts were made immediately to control this outbreak by means of isolation, quarantine measures, preventive inoculations, disinfection and disinfestation, rat eradication, and house cleaning under the joint auspices of the National Health Administration, the Chinese Red Cross Medical Relief Corps, and the Army Medical Administration. No cases occurred from November 25 to December 13; but a new case was reported on December 14. In view of the possibility of the further spread of the disease inland, it was requested that the drug sulfathiazole be reserved for plague treatment as far as possible.

In Chekiang, plague broke out for the first time this winter in I-wu, about 200 kilometers northeast of Chuhsien. From October 2 to the end of November there were 113 cases, with 94 deaths. From December 1 to 6, 10 cases were reported. Control measures were initiated and are being carried on by the provincial health authorities.

Toward the end of November plague was found to be enzootic among rats in Kinhwa, an important town situated between I-wu and Chuhsien, and the Kinhwa Plague Control Committee was organized to take precautionary measures against the spread of the disease to Kinhwa.

Two additional plague cases occurred in Chuhsien, Chekiang, during November, where plague had occurred for the first time last winter. A special unit was detailed by the National Health Administration to that locality to take effective control measures. No new human or rat cases were found from December 1 to 8.

In Fukien, plague has been endemic since 1894. In 1940, plague occurred in 15 localities with a total of 257 cases. About the middle of December 1941, there was an outbreak of the disease in Lungchi and Loyüen.

Smallpox

France—Seine Department.—For the period February 1–10, 1942, 17 cases of smallpox were reported in Seine Department, France.

Typhus Fever

Denmark.—According to information received under date of February 25, 1942, typhus fever was reported in Denmark, believed to be caused by lice brought into the country by German soldiers. The presence of lice was stated to be an alarming problem in two areas of Denmark with large German troop concentrations.

Morocco.—During the week ended February 14, 1942, 646 cases of typhus fever were reported in Morocco. During the preceding week 634 cases were reported.

Rumania.—For the week ended February 21, 1942, 237 cases of typhus fever were reported in Rumania.

Spain.—During the week ended January 31, 1942, 276 cases of typhus fever were reported in Spain (131 cases in Madrid and 27 in Barcelona). Recent information shows an outbreak of the disease in Bilbao, Vizcaya Province.

Union of Soviet Socialist Republics.—Under date of February 28, 1942, an epidemic of typhus fever was reported among Polish troops and civilians in the southeastern part of the Union of Soviet Socialist Republics, causing approximately 30 deaths a day among the native population of Bokhara.

Yellow Fever

Colombia.—Yellow fever has been reported in Colombia as follows: Boyaca Department, February 1, 1 death, February 4, 1 death; Intendencia of Meta, January 23, 1 death; Santander Department, January 29, 1 death.