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THE ASSOCIATION BETWEEN RHEUMATIC FEVER AND EXOPHTHALMIC GOITER

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Several investigations have indicated that constitutional factors may be of significance in rheumatic fever (*1* to *6*, incl.). The mild character of this disease among diabetics (*7*) [1] and its relatively high incidence in patients with migraine (*8*) and scleroderma (*9, 10, 11, 12*) have been noted. Also the observation has been made frequently, especially in the earlier literature, that rheumatic fever and exophthalmic goiter often occur in the same individuals. The purpose here is to review the latter subject briefly and to describe two illustrative examples.

It is of interest that the first clearly described case of exophthalmic goiter (Parry, 1825) developed in an individual who suffered two attacks of rheumatic fever in the preceding 6 years. Thereafter, a number of observers directed attention to the frequency of this association (*14* to *26*, incl.). For instance, Robinson, analyzing the records of 127 patients treated at Guy's hospital for exophthalmic goiter, found that 24 (18.9 percent) had also suffered from rheumatic fever; in 8 the afflictions were concurrent, in 3 the exophthalmic goiter preceded rheumatic fever, in 12 the order was reversed, while in one instance an attack of rheumatic fever occurred during an interval between two crises of exophthalmic goiter (*27*).

The frequent occurrence of chorea (*28, 29, 30*) and of rheumatoid arthritis (*31*) in patients with exophthalmic goiter has also been observed.

Of late this subject has not been the object of especial attention, but the relationship is apparent in the analyses of thyroid clinic records. Hamilton found than an "unexpected large" number of patients with thyroid toxicity gave a history of rheumatic fever or clear signs of mitral stenosis justifying a diagnosis of rheumatic heart disease. This complication was present in 9 percent of 372 cases of exophthalmic goiter, while the author estimated the incidence in the general population from which these patients were drawn to be less

[1] See also: Steincrohn, P. J.: The blood sugar and cardiac involvement in rheumatic fever. J. Am. Med. Assoc., 111: 1837 (1938).

than 2 percent (*32*). Burnett and Durbin discovered definite signs of rheumatic carditis in 6 of 148 cases of toxic goiter (4 percent) (*33*). A history of "febrile joint illness" was noted by Hoffman in 20 of 460 patients with hyperthyroidism (4 percent) (*34*). Lerman compared the findings in 148 toxic goiter patients with those in 233 nontoxic nodular goiter controls and found that signs of valvular disease were twice as frequent in the former group as in the latter (*35*). In the data presented by King, the frequent association of rheumatic fever and exophthalmic goiter in the same patients was apparent (*36*). Andrus' study of 128 patients under 40 years of age with exophthalmic goiter or toxic adenoma, revealed a definite evidence of rheumatic fever in 6 (4.7 percent) (*37*).

In the Chicago area, Maher, Sitter, and Ellicott observed an incidence of thyreotoxicosis in rheumatic fever patients of 9.5 percent and remarked that undoubtedly a greater number would have been found to present this complication had longer observation been possible (*38*). The statistics collected by Irvine-Jones indicated that among rheumatic subjects the incidence of thyroid disease was double that in a nonrheumatic control group (*39*). Individual cases demonstrating the association of rheumatic fever with exophthalmic goiter in the same patients have been described by Willius (*40*) and Carey (*41*).

Each of the observers quoted on the subject found in patients developing exophthalmic goiter an incidence of rheumatic fever or rheumatic heart disease of 4 percent or more. In unselected groups, on the other hand, a much lower incidence is usually reported. Nichol (*42*) tabulated the figures of 35 investigations made in the United States between 1914 and 1934. The incidence of rheumatic fever reported ranged between 0.1 and 6 percent; but it was below 3 percent in all but four of the studies. He also tabulated the results of six pathological investigations in this country during the same interval of years. The incidence of rheumatic heart disease varied from 0 to 4 percent, but was found to exceed 3 percent by only two observers.

The reports quoted indicate that rheumatic fever and exophthalmic goiter frequently occur in the same individuals and that the sequence in which the two diseases become manifest varies. In the first case to be described the appearance of exophthalmic goiter antedated that of rheumatic fever by 7 years; in the second the former condition developed 5 years after the onset of rheumatic fever.

CASE 1

A female patient aged 29 was admitted to the Central Dispensary and Emergency Hospital, Washington, D. C. (service of Dr. Huffman), on December 14, 1935, with the following history:

In 1928, at the age of 22, there was a gradual onset of exophthalmos, enlargement of the neck, shortness of breath, and loss of weight. After 8 months, although an extreme degree of emaciation developed, a gain in weight became apparent which was associated with swelling of the lower extremities. At that time the patient was admitted to the Cleveland Clinic *in extremis*, and during the succeeding 8 months several abdominal paracenteses were performed, while arterial ligation and partial removal of the thyroid was accomplished in several stages. There was immediate improvement; and although the weight dropped to 75 pounds with loss of edema, there was an actual gain to 120 pounds before discharge from the hospital. Thereafter she remained well until onset of the present illness, although there was occasional edema and some shortness of breath on extreme exertion. Nothing in the history indicated that rheumatic fever had ever been present.

About December 10, 1935, at the age of 29, the patient developed severe tonsillitis, which persisted for several days. On the fourth day she suddenly lost consciousness and was taken to the hospital. During the succeeding 24 hours there were periods of unconsciousness and occasional convulsions involving the face and upper extremities. The pulse was irregular, and at times beats failed to appear for periods of 15–20 seconds; the electrocardiogram indicated the presence of auricular flutter at the rate of 400 per minute. Attacks of unconsciousness were treated with adrenalin, and improvement followed digitalization. From the 3rd to the 11th hospital day partial heart block was present with a P–R interval of 0.24 second. During this period the temperature fell from 103° to 101° F. and the white blood cells from 17,000 to 9,000 per cu. mm. There was moderate cardiac enlargement, and a loud systolic precordial murmur was audible. On the 6th hospital day the shoulders became tender and painful, and on the following day pain and tenderness, with redness and swelling, developed in the knees and ankles. The arthritis, however, was promptly relieved by aspirin, which, in doses not exceeding 2.0 grams per day, was continued during the patient's stay in the hospital.

From the 13th to the 34th day following admission the temperature was higher, ranging between 101° and 104° F., while the white blood cell count rose to 20,000 per cu. mm. On the 21st day tremendous enlargement of the area of precordial dullness and the cardiac shadow became apparent, with signs justifying the diagnosis of pericardial effusion; and on the 34th day, 500 cc. of sterile, slightly turbid, yellow fluid were removed from the pericardium. Thereafter, although a pericardial friction rub persisted for 2 weeks, the temperature gradually fell to normal, leucocytosis disappeared, and the patient gained weight. The P–R interval dropped to 0.20 sec. by the 18th hospital day and to 0.18 sec. on the 60th day. The heart decreased in size, although it remained moderately enlarged when the patient was dis-

charged from the hospital on the 60th day. The precordial systolic murmur became greatly reduced in intensity.

The patient was observed at intervals for a period of 4 months from the onset of illness. The erythrocyte sedimentation rate, which had been very rapid, fell to within normal limits by the end of that time. There was no fever, and, with digitalis medication, no evidences of cardiac decompensation. The formol-gel reaction was strongly positive both with respect to gelation and opacity on the 34th hospital day and remained so for more than 3 months after the onset of illness, becoming negative at 4 months. In the absence of arthritis in adults with rheumatic fever, we have found strongly positive formol-gel reactions indicative of active carditis (*43*).

Hemolytic streptococci were cultivated from the throat early during the course of illness. An antistreptolysin titer in the blood serum of 250 units when the patient was acutely ill rose to 333 units on the 44th day, and to 500 at the time of the last observation. Agglutinins for hemolytic streptococcus strain N. Y. 5 rose from 1:160 early in the course of the illness to 1:640 on the 80th day and then remained at 1:320 during the subsequent period of observation.

Upon admission the patient was in a fairly good state of nutrition and gained weight rapidly during the course of convalescence. Definite exophthalmos was present, which did not alter in degree during the period of observation. With this illness no evidence of thyroid hyperactivity appeared, no enlargement of the gland, no cervical thrill or murmur, and no tremor.

Summary.—This patient gave a definite history of severe hyperthyroidism at the age of 22, with disappearance of signs of activity after subtotal thyroidectomy. Seven years later, following a severe hemolytic streptococcus tonsillitis, she developed rheumatic fever with definite arthritis, myocarditis, and pericarditis. There were no clinical evidences of thyroid hyperactivity associated with the second illness. An increase in hemolytic streptococcus antibodies in the blood serum developed during the height of the illness.

CASE 2

In April 1934, this patient, a boy 8 years of age, was admitted to the cardiac clinic of the Children's Hospital, Washington, D. C., with a history of chorea at 3 years and frequent muscle and joint pains thereafter. The heart was enlarged, a precordial bulge was evident, and a loud systolic murmur was audible at the apex. A diagnosis of active rheumatic carditis was made. After drainage of a gingival abscess in June, there was definite improvement; the patient became afebrile and gained weight.

In November 1935 he suffered earache, a discharge appeared in the left external meatus, and he was admitted to the Gallinger Hospital.

At that time only a few mastoid cells were visualized on the left side and a diagnosis of otitis media and mastoiditis was made. The patient remained in the hospital for 1 month. During that time there was occasional mild joint pain, and high fever persisted after signs of mastoiditis and otitis had disappeared, although repeated blood cultures remained sterile. A loud systolic murmur was audible over the precordium upon admission and later signs of aortic insufficiency were transiently present. The left border of cardiac dullness reached the midaxillary line during the period of acute illness but receded to the anterior axillary line before discharge. A diagnosis of active rheumatic carditis was made.

Early in February 1936 the patient was admitted to the Christ Child Convalescent Home under the care of Dr. R. A. Bier; for although signs of active rheumatic fever had disappeared, there had been no gain in weight. At that time, except for slight enlargement, the heart was negative. Despite bed rest and a high caloric intake, there was no increase in weight, and signs of exophthalmic goiter became apparent. The pulse was very rapid, a fine tremor appeared, and exophthalmos became pronounced. A thrill and bruit were discernible over the thyroid gland, which was soft and definitely enlarged. The child became very excitable and emotionally unstable. Early in March 1936 he was transferred to the Central Dispensary and Emergency Hospital (service of Dr. Montgomery Blair). The child's nervous state was such that acceptable estimations of the basal metabolic rate could not be obtained upon admission. He was given 24 minims of Lugol's solution daily, and on the 8th hospital day the basal metabolic rate was found to be +24 percent; with this medication continued, it became +30 percent in mid-April. There had been a gain in weight from 57 to 62 pounds, and the pulse rate, which formerly exceeded 150 per minute, was rarely over 125.

The patient was then transferred to the Children's Hospital (service of Dr. Horgan). The daily dose of Lugol's solution was increased to 60 minims and several X-ray treatments of the thyroid were given in June. The basal metabolic rate was +30 percent on admission and +55 percent late in August 1936. During October the thyroid arteries were ligated, and in November the basal metabolic rate was +31 percent. Partial thyroidectomy was performed December 12, 1936, and the patient was discharged on December 24. At the time of operation his weight had risen to 64 pounds, but was at the admission level of 60 pounds upon discharge. Microscopically the thyroid tissue removed showed some irregularity of acini, with small well-defined areas of much distorted structure. Here the epithelial cells were small, the walls irregular, and the matrix was almost colorless. The pathological diagnosis: Fetal adenoma of the thyroid.

In April 1937 the child was readmitted to the Children's Hospital. He had not gained weight and the pulse continued to exceed 100. The basal metabolic rate was +24 percent, and more thyroid tissue was removed at operation on April 24, 1937. Before operation 30 minims of Lugol's solution were given daily, and the dose was reduced to 20 minims thereafter. The tissue removed showed pathological changes similar to those seen in the earlier specimen.[2]

Following the first operation, the heart became smaller. During the last admission to the hospital, its size was within normal limits and no murmurs were audible except a faint systolic murmur at the apex. After the second operation, the pulse did not exceed 100 and the weight rose to 63 pounds before discharge from the hospital.

Summary.—This child apparently suffered rheumatic fever intermittently beginning at the age of 3. He was found to have active carditis associated with a gingival abscess at the age of 8, and a definite relapse was observed at 9 following mastoiditis and otitis media. At 10 years of age, unequivocable evidences of exophthalmic goiter appeared, which were relieved by partial ablation of the thyroid gland.

DISCUSSION

Among other factors, various infections, including rheumatic fever, have been observed to incite the development of exophthalmic goiter. The relationship of the latter disease to rheumatic fever, however, appears to be more intimate than would be indicated by this general statement. Long intervals of time may separate the development of the two diseases in the same individual and, as exemplified by the first case reported here, exophthalmic goiter may precede rheumatic fever. In such instances, of course, the latter disease does not act as an incitant of the metabolic disturbance. The frequent association of these two diseases in the same individual may be due to the presence of an underlying constitutional anomaly contributing to the development of both.

SUMMARY

Two cases are described in which rheumatic fever and exophthalmic goiter developed in the same individuals, and the literature dealing with the association of these two conditions is briefly reviewed.

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BREAST AND LUNG CARCINOMA IN "A" STOCK MICE[1]

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For accurate work on neoplasia in mice, inbred or "pure" stocks are as necessary as are pure chemicals for the chemist. The results with homozygous individuals are as accurate as may be expected, considering that mice are living material. For example, 5,575 grafts of breast tumors which developed spontaneously in "A" stock mice and "A" strain hybrids have been made in expected susceptible hosts with an observed negative ratio of less than 0.5 percent (*4*).

Because mice are living material, it is necessary to maintain control animals at all times to determine whether changes are taking place in the various tumor ratios resulting from intrinsic and extrinsic factors. Also by this method it is possible to compare lines of the same stock maintained in separate laboratories under different environmental conditions.

In this communication we wish to describe in more detail the tumor data obtained in an inbred strain of mice established by Strong in 1918 (*11*). Representatives were obtained from Strong in 1927, and this line has been termed the "A" stock in publications since 1931 (*1*). These animals were descended from female No. 13623, a member of the 28th inbred generation of the Strong "A" strain (*11*). Strong has also carried on a line descended from female No. 13622, which he has called the Strong "A_2" stock. Thus, three lines have as their common ancestor female No. 13371, a member of the 27th generation of brother-to-sister breeding.

The "A" stock mice tabulated in this report were all born after July 1932; all received the same commercial diet and were raised under

[1] This work has been assisted by a grant-in-aid from the National Cancer Institute.

the same conditions during the entire period. The stock had been inbred for at least 37 generations, and 15 additional generations were observed during the study.

Comparisons in tumor ratios are made between breeding and virgin females and breeding males. The cancer ratios are based on the percentage of animals living to each age period or longer which developed the type of tumor described. Individuals with multiple tumors had both primary breast and primary lung carcinoma. Animals with other types of tumors were tabulated as noncancerous mice. The breeding females were mated when they were approximately 1 month old and, except those which developed spontaneous tumors at an earlier age, were permitted to breed through the reproduction period.

The number of mice in each group and the average age at death for all the mice in each class are as follows: Breeding females, 1,093, average age at death, 11.3 months; virgin females, 223, average age, 19.3 months; and breeding males, 172, average age 15.8 months.

Curves representing the percentage of the total of each group living to the beginning of each age period or longer are given in figure 1. Table 1 tabulates the primary breast and lung tumor data for the various groups giving percentages and average ages.

BREEDING FEMALES

Spontaneous mammary carcinoma was observed in 914, or 83.6 percent, of the breeding females. The average tumor age was 11.1 months. Forty-seven of this group had primary breast and primary

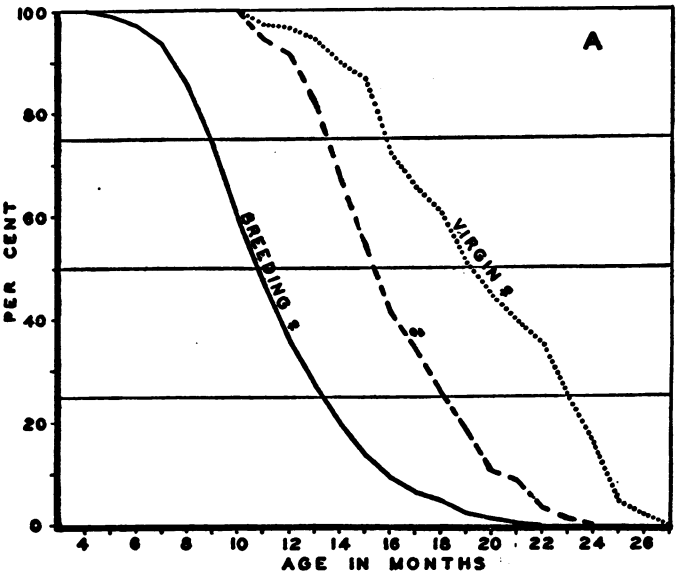

FIGURE 1.—Percentage of the total number in each group living to each age period or longer.

TABLE 1.—*Tabulation of breast and lung tumor observations made on "A" stock mice*

	Breeding ♀♀	Virgin ♀♀	♂♂
Breast cancer only:			
Number	184	2	0
Mean age	11.4±0.2	12.5	
Percent	16.8	0.9	
Breast cancer (sold or no autopsy):			
Number	683		
Mean age	10.8±0.1		
Percent	62.5		
Breast and lung cancer:			
Number	[1] 47	[1] 9	
Mean age	13.4±0.3	19.9	
Percent	4.3	4.0	
Noncancer (autopsied):			
Number	54	22	44
Mean age	12.5±0.4	17.2±0.6	15.0±0.3
Percent	4.9	9.9	25.6
Noncancer (no autopsy):			
Number	87		
Mean age	10.7±0.3		
Percent	8.0		
Lung cancer only:			
Number	38	190	128
Mean age	16.3±0.2	19.5±0.2	16.1±0.2
Percent	3.5	85.2	74.4
Totals:			
Breast cancer:			
Number	[2] 914	[3] 11	
Mean age	11.1±0.1	18.5	
Percent	83.6	4.9	
Lung cancer:			
Number	[3] 85	[3] 199	128
Mean age	14.7±0.2	19.5±0.2	16.1±0.2
Percent	7.8	89.2	74.4
Noncancer:			
Number	141	22	44
Mean age	11.4±0.2	17.2±0.6	15.0±0.3
Percent	12.9	9.9	25.6
Total:			
Number	1,093	223	172
Mean age	11.3±0.1	19.3±0.2	15.8±0.2

[1] Multiple tumors.
[2] Includes 47 with multiple tumors.
[3] Includes 9 with multiple tumors.

lung cancer (4.3 percent; av. age 13.4 months). The number of mice which had breast tumors and were autopsied numbered 184 (16.8 percent; av. age 11.4 months). Most of the breast-tumor mice were sent to other laboratories for experimental work. Slides of the breast tumors were received for diagnostic purposes but these animals were of little use in determining the lung-tumor ratio as autopsies were not made. The animals which could not be autopsied are included with the above animals and they total 683 mice, or 62.5 percent of the total, average age 10.8 months.

The earliest breast tumor was observed in a female which was 4 months of age, the oldest during the 21st month. The mode for the curve occurred at the 9th month and the mean at 11.1 months (table 1 and fig. 2). (In this chart the mice with multiple tumors—breast tumor and lung tumor—are tabulated with the breast-tumor mice.)

Thirty-eight breeding females had only pulmonary tumors (fig. 2). The percentage of the total at the 4th month was 3.5 percent (av. age 16.3 months). The earliest lung tumor was recorded in an 11-month-old animal and, based on the number surviving to this age (519), 7.3

percent developed lung carcinoma. Of the animals living 4 months or longer, 8.4 percent had primary lung tumors (47 with multiple tumors and 38 with only lung tumors). Based on the mice living to the age at which the first lung tumor was recorded, the incidence was 13.4 percent.

The total number of non-cancerous animals was 141 (12.9 percent; av. age 11.4 months), of which 54 were autopsied.

The percentage of the animals living to the beginning of each age period or longer to develop breast or lung tumors are represented

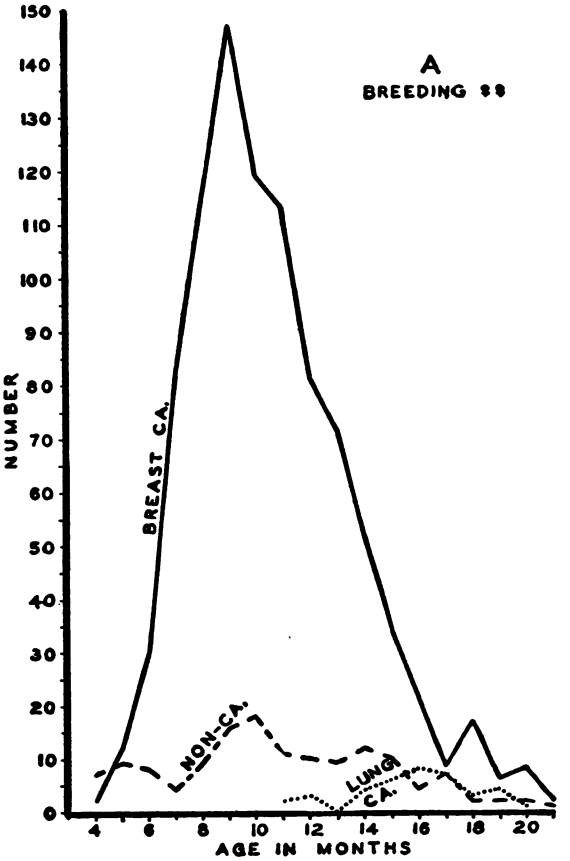

FIGURE 2.—Number of breeding females to die cancerous or noncancerous during each age period.

graphically in figure 3 and figure 5, respectively. Of the breeding females living 4 months or longer, the age at which the first tumor was observed, 83.6 percent developed breast tumors. At the 11th month, with 47.5 percent of the mice living, the tumor ratio was 79.2 percent. The ratio at the 14th month was 66.7 percent, with 20 percent of the mice living. From this age period until the 21st month the breast cancer incidence fluctuates between 60 and 70 percent.

The lung cancer curves (fig. 5) represent the percentage of the animals living to be 11 months or older to develop this type of tumor only. The curve does not include the mice with multiple tumors which were tabulated with the breast-cancer mice.

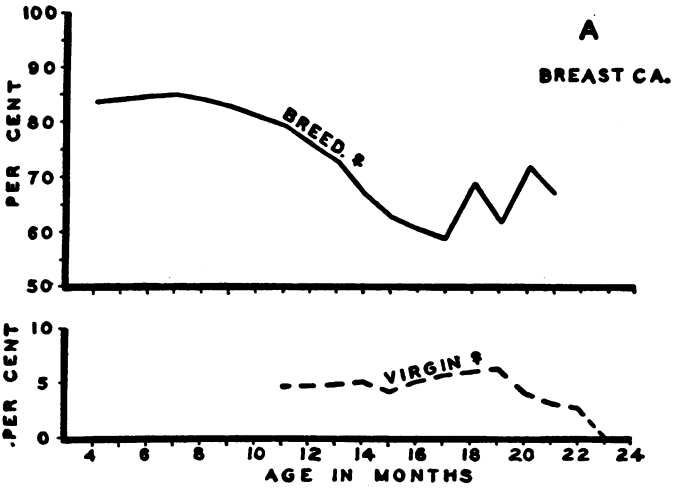

FIGURE 3.—Breast tumor ratio in breeding and virgin females.

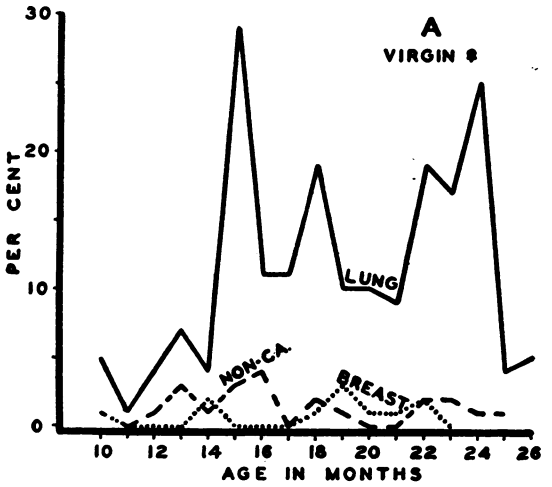

FIGURE 4.—Percentage of the virgin females to die (cancerous or noncancerous) during each monthly age period.

VIRGIN FEMALES

The number of virgin females observed was 223 surviving to an average age of 19.3 months (table 1 and fig. 1).

Figure 4 gives the percentage of the total dying in each age period from breast cancer, lung cancer, or noncancerous conditions. The

proportion having primary lung cancer only was 85.2 percent. Including the mice which had both lung and breast cancer, the ratio is 89.2 percent. The average ages were 19.9 and 19.5 months, respectively.

The given average lung tumor ages may be of little value, since they are based on the autopsy dates. The characteristics of the curve given in figure 4 illustrate this quite clearly. The personal factor also enters in determining to some degree when the animals should be killed, as the time at which they were killed was dependent on the

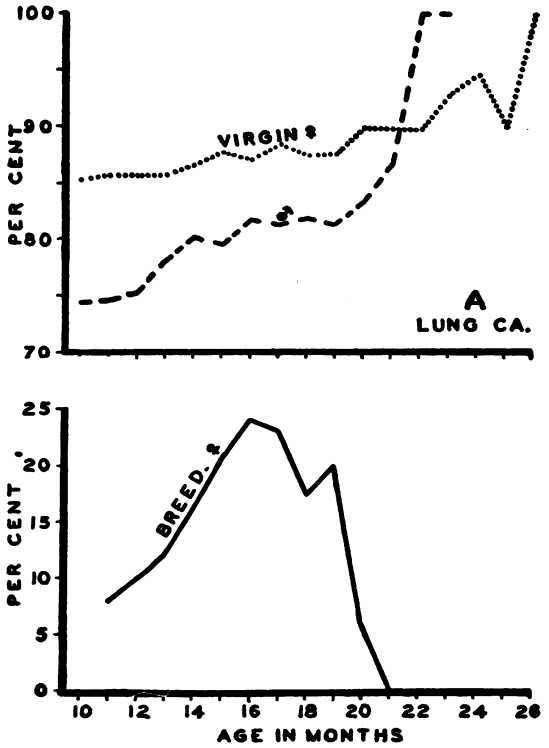

FIGURE 5.—Primary lung tumor ratio in breeding females, virgin females, and breeding males.

physical condition of the mice, and the age of each individual mouse was so determined. This age assumes that the tumor developed on the date of autopsy, whereas it is known that animals may survive several months with primary lung cancer.

Two, or 0.9 percent, of the virgin females had breast cancer only, and 9, or 4.0 percent, had multiple tumors, average ages 12.5 and 19.9 months. Thus, 4.9 percent of the virgin females had breast cancer, average age 18.5 months. The noncancerous mice averaged 17.2 months and include only mice which were autopsied.

The breast- and lung-cancer curves are represented in figure 3 and figure 5. The two mice with only breast tumors were 10 and 14

months old. The nine mice with multiple tumors were from 14 to 22 months of age. The breast-cancer ratio, which was 4.9 percent at the 10th month, does not exceed 6.2 percent (19th month). Fifty-five mice (24.7 percent) lived longer than the oldest mouse that had breast cancer.

The 9 animals (4.0 percent) with multiple tumors are not included in the lung cancer curve given in figure 5. The ratio of the animals having only lung cancer was 85.2 percent at the 10th month. During no age period does the incidence decrease. By the 23rd month (24.7 percent surviving) the incidence reaches 92.7 percent and the oldest five mice, killed during the 26th month, all had growths.

MALES

The number of males which were retired after breeding and observed was 172. They lived to an average age of 15.8 months. Figure 1

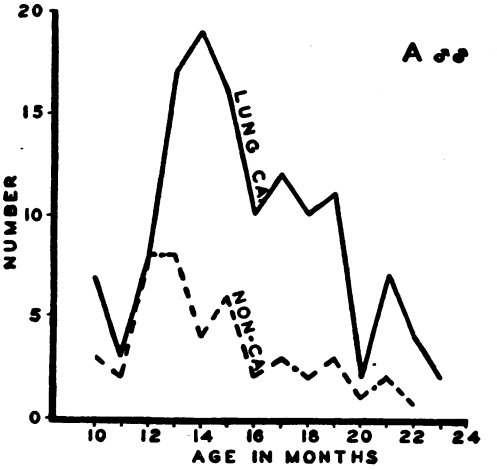

FIGURE 6.—Number of males to die (cancerous or noncancerous) during each monthly age period.

gives the proportion living to each period and figure 6 the percentage of the total dying in each period.

The average lung tumor age was 16.1 months. The lung cancer ratio at the 10th month was 74.7 percent (fig. 5). Forty-one percent of the males survived to the 16th month, and from this period until the 23rd month the ratio was above 81 percent.

Figure 7 presents the proportion of the mice of each group to be recorded with breast cancer and (or) lung cancer according to monthly age periods. The cancer ratios are given in figure 8. The incidence for the breeding females at the 4th month was 87.1 percent. The ratio remains above 85 percent until the 13th month and above 80 percent until the 20th month (1.3 percent living). The combined breast and lung cancer incidence for the virgin females is above 90

percent for every age period. The male tumor data are the same as previously described for primary lung cancer.

If the mice of the three groups are combined, they total 1,488. The percentage of this number living to the beginning of each age

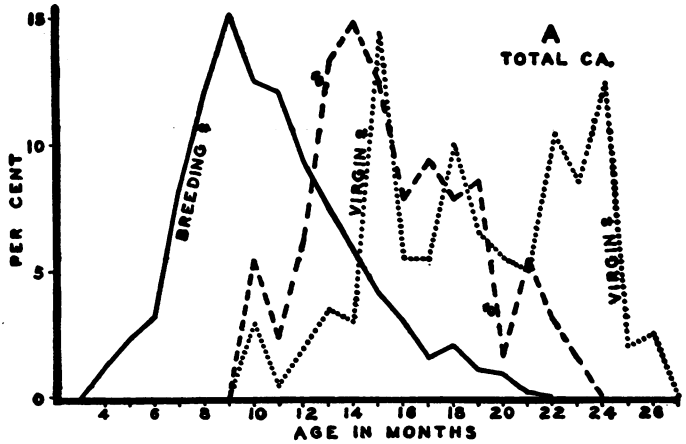

FIGURE 7.—Percentage of the total in each class to die from breast cancer and/or lung cancer during each monthly age period.

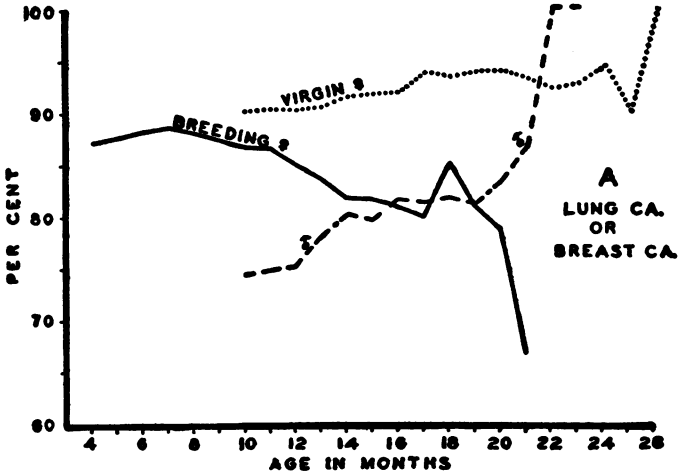

FIGURE 8.—Breast and/or lung cancer ratios in breeding females, virgin females, and breeding males.

period or longer is given in figure 9 together with the cancer (breast and (or) lung) curve.

At the 4th monthly age period the cancer ratio is 86.1 percent. The incidence drops to 84.4 percent for the 12th month and following this period increases until 90 percent is reached for all animals living 20 months or longer.

A summary of the average ages and the ratios of the mice having breast and (or) lung cancer are given in table 2. Mice with multiple

tumors are included in both the breast- and lung-cancer ratios. The percentages given represent the proportion of the total in each group to develop the type of cancer tabulated which lived to the beginning of the specified age period.

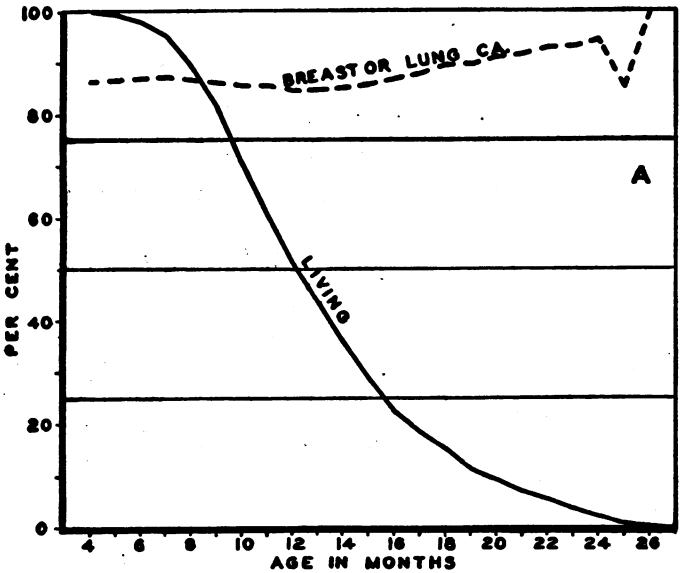

FIGURE 9.—Percentage of the total of all classes living to the beginning of each age period and the breast and/or lung tumor ratio.

TABLE 2.—*Summary of the breast- and lung-tumor data observed in "A" stock breeding females, virgin females, and breeding males*

	Breeding ♀♀	Virgin ♀♀	Males
Total number	1,093	223	172
Breast-cancer data:			
Average cancer age—months	11.1	18.5	----
Percent at age of appearance of earliest cancer	83.6	4.9	----
Percent at average cancer age	79.2	5.9	----
Lung-cancer data:			
Average cancer age—months	14.7	19.5	16.1
Percent at age of appearance of earliest cancer	13.4	89.2	74.4
Percent at average lung-cancer age	23.9	93.8	91.7
Combined breast- and (or) lung-cancer data:			
Percent at age of appearance of earliest cancer	87.1	90.1	74.4
Percent at average breast-cancer age	86.5	93.3	----
Percent at average lung-cancer age	81.7	93.8	81.7

The combined cancer ratios for the combined totals (1,488 mice) are not included in the table. The percentages of this number based on different age periods are as follows:

	Percent
Age of appearance of earliest cancer	86.1
Average breast-cancer age, breeding ♀♀	85.3
Average breast-cancer age, virgin ♀♀	89.5
Average lung-cancer age, breeding ♀♀	85.0
Average lung-cancer age, breeding ♂♂	86.9
Average lung-cancer age, virgin ♀♀	89.5

Although the "A" stock is used extensively for tumor work in many laboratories, meager data are available for spontaneous tumor studies. Strong has published several papers on the breast tumor mice of his "A" sub-line but since the noncancer animals are not listed, the tumor ratio for the stock cannot be compared with our line. Some average tumor ages for lines according to diet are given by Strong and these may be contrasted with the ages mentioned earlier. All the data are given in table 3.

TABLE 3.—*Comparable breast-tumor data tabulated for the sublines of the "A" stock*

Investigator	Line	Number	Percent cancer	Oatmeal, average age cancer	Commercial diet, average age cancer	Average age noncancer
				Month	*Month*	*Month*
Strong (*10*)	A			10.8		
	A_2			10.4		
Strong (*14, 15*)	A			13.8	11.3	
	A_2			11.9		
Bittner (*2*)	A	421	63.9	12.3		9.1
Bittner (*3*)	A	292	88.0		11.5	9.6
Bittner	A	1,093	83.6		11.1	11.4

In 1934 Strong published curves of the breast-cancer mice of two sub-lines of the Strong "A" stock: the Strong "A" line, inbred and selected for early breast cancer, and the Strong "A_2" line, inbred and selected from mothers that lived the longest without cancer or which developed cancer last. Since no difference was observed, Strong concluded that selection for breast cancer in a homozygous stock obeys Johannsen's theory. From the chart the average breast-tumor ages were computed to be 10.8 months for the Strong "A" line and 10.4 for the Strong "A_2" line. The mice received a mixed rolled-oats diet.

In later publications Strong (*14, 15*) reported on 1,250 cancer-bearing mice of these two sub-lines receiving different diets. The average cancer age for the Strong "A" stock on the oatmeal diet changed from 10.8 months (10, computed age) to 13.8 months. The age for the Strong "A_2" line cancer mice was 11.9 months as compared with the computed age of 10.4 months in 1934 (*10*). When oil of wintergreen was added to the oatmeal the average cancer age was 14.6 months for Strong "A" stock mice. Some representatives of the Strong "A" line received a commercial food and the breast tumors were recorded at an average of 11.3 months. The cancer ratios are not given for any of the above classes.

Strong's conclusions regarding selection for late and early breast cancer sub-lines within the inbred Strong "A" stock were as follows: "With continued selection, there appears to be a small difference between female mice of the A and A_2 selected lines. Genetic vari-

ability is thus gradually producing divergent sub-lines of age distribution of spontaneous carcinomas in mice" (*14*).

Several reports have been made by the author on the breast-cancer ratios and ages for the "A" stock (1931) depending on diet and nursing (*2–9*, table 3). The animals included in the first report received an oatmeal mixed diet (*2*). The breast-cancer ratio was 63.9 percent, and the average cancer age was 12.3 months. Following a change to a commercial diet, the average age was 11.5 months with 83.0 percent of the breeding females developing breast cancer (*3*).

The difference in the tumor ratios according to diet was ascribed to the better physical condition of the animals on the commercial diet. The proportion of the mice receiving the rolled-oats diet to die noncancerous before the average cancer age was 27.5 percent, with 8.5 percent dying after that age. The proportions for the commercial diet were 7.2 percent and 4.8 percent, respectively. The ratios differed by 20.3 percent before the average cancer ages and 3.7 percent for animals dying after the average cancer ages.

From the data tabulated in this report using the same commercial diet the average tumor age was 11.1 months and the cancer ratio 83.6 percent. Thus, the average tumor age is earlier but the cancer ratio is smaller than for the first group observed for this diet (1935 (*3*)).

The average breast-cancer age for the Strong "A" stock was 11.3 months and for the Bittner "A" line 11.1 months when the animals received the same commercial diet. On the mixed rolled-oats diet the average age of the breast-cancerous animals of the Strong "A" line, a line selected for early cancer, changed from 10.8 months (*10*) to 13.8 months (*14, 15*); the Strong "A_2" strain, a line selected for late cancer, varied from 10.4 to 11.9 months, and the Bittner "A" strain cancerous mice averaged 12.3 months (*2*). Thus, the average breast-cancer ages of the Strong "A" and the Strong "A_2" sub-lines on the same diet differed more from each other during the past few years than either has from the Bittner "A" line. This emphasizes the fact that constant observations are necessary even for a single subline maintained under constant conditions.

Strong has also published an interesting series of papers on the tumor incidence for the CBA stock, an inbred low-tumor stock, following a change in diet (*12, 13, 16, 17*). Only breast tumors will be considered here. Strong observed two groups of 71 (*12*) and 53 (*13*) of the CBA breeding females receiving the mixed rolled-oats diet. Four, or 3.2 percent, developed breast tumors at an average age of 679.5 days. The nontumorous mice of the first group survived to an average of 502.4 days; for the second group it is not given. Two other samples received the commercial diet. One of these groups numbered 63 mice, of which 3, or 4.8 percent, had breast tumors,

average age not given (*16*). The average age of the nontumorous mice was 639.5 days. In the second series of 81 mice, 18, or 23.5 percent (*17*), had tumors. The average breast and nontumor ages were 655.6 and 708.2 days, respectively. The incidence for all types of tumors in the combined groups, by diet, were as follows: Rolled oats, 4.8 percent; commercial diet, 26.3 percent.

With this increase in the breast-cancer incidence, a longer survival time was noted. The breast-tumor mice on the rolled-oats diet averaged 679.5 days; on the commercial diet 18 cancerous mice (*17*) averaged 655.6 days. With the increase in the breast-cancer ratio from 2.8 percent (*12*) to 23.5 percent (*17*), the survival time of the noncancerous mice increased from 502.4 days (*12*) to 708.2 days (*17*).

Strong (*17*) stated that the role played by diet in determining the cancer incidence must be further investigated. Per se, diet may influence, directly or indirectly, the percentage of mice developing tumors by the physical condition of the animals (*3*). Since cancer is a disease of old age, it is usually necessary for the individuals to live to the average cancer age or longer before neoplasia result.

The proportion of animals in any stock reaching that age is influenced by the physical condition of the individuals, which, in turn, is dependent on diet. If the milk which the young obtain while nursing is included under diet, the breast-cancer incidence may be greatly altered by changing the source of the milk or foster-nursing (*7, 8, 9*).

CONCLUSIONS

Additional data on the primary breast- and lung-tumor ratios in the inbred "A" strain of mice demonstrate:

1. The breast-tumor incidence is high in breeding females and low in virgin females.

2. The lung-tumor incidence is high in virgin females and breeding males and low in breeding females.

Diet, *per se*, may influence the breast-tumor incidence primarily through the physical condition of the individuals in determining the number reaching the cancer age.

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THE COMPLEMENT FIXATION REACTION OF LLERAS IN LEPROSY[1]

By Sam H. Black, *Acting Assistant Surgeon*, and Hilary Ross, *Medical Technician, U. S. Public Health Service, Carville, La.*

Federico Lleras Acosta (*1*), in 1936, reported the cultivation of an acid-fast bacillus from the blood of patients suffering from cutaneous leprosy. Using Petragnani's medium, he reported positive results in 20 of 66 attempts. Lleras further reported using this culture for a complement fixation study. It is with the complement fixation study and its application as a diagnostic procedure that the present report is concerned and not with the highly controversial subject of the cultivation of the true etiological agent of leprosy. It seemed to make little difference what relation this bacillus held to the disease if the same results could be obtained by other workers.

Lleras' report of his complement fixation work was as follows:

First group.—Bacteriologically positive cases of leprosy, 638 cases: 634, or 99.38 percent, positive.

Second group.—Clinically leprous, neural cases not bacteriologically positive, 360 cases: 333, or 92.5 percent, positive.

Third group.—Children of leprous parents, 211 cases: 24, or 11.38 percent, positive.

Of the 24 children giving positive reactions, Lleras says:

> These children on being examined by competent doctors, in almost every case, were found to have symptoms that were suspicious, such as acromatic spots and

[1] From the laboratory of the National Leprosarium, Carville, Louisiana.

light anesthesias. In some cases the ganglionic puncture was made, which revealed Hansen's bacillus.

Fourth group.—Apparently healthy individuals living with leprous relatives, 211 cases: 39, or 18.48 percent, positive.

Of the 39 giving positive reactions Lleras says:

It was found that all of them showed more or less suspicious symptoms; some had spots, others anesthesias, adenitis, etc. In some cases the ganglionic puncture gave evidence of the bacillus.

Fifth group.—Leprous patients classified as arrested, 160 cases: 61, or 38.12 percent, positive.

Of the 61 giving positive reactions, Lleras says:

A careful examination showed some clinical symptoms, and in some cases the presence of Hansen's bacillus was still to be noted.

Sixth group.—Patients suffering from diseases other than leprosy including tuberculosis and syphilis, 264 cases; 4, or 1.52 percent, positive.

Lleras says:

Of these four, there is one with rheumatic erythema and another one with iritis, which would not be rare to have a leprous origin, but as they were external patients, we were unable to examine them.

Seventh group.—Presumably healthy individuals, 1,194 examined: 1, or 0.09 percent, positive.

Lleras says:

This reaction was obtained from a woman on whose back were found achromic spots.

Doctor Lleras sent a culture [2] of a highly chromogenic, strongly acid-fast bacillus along with a small amount of antigen to this laboratory for confirmation of his work. With the above report in mind, it seemed highly desirable that we attempt to confirm the work.

Lleras grew the bacillus on Petragnani's medium, prepared the antigen according to the Negré and Boquet method (*2*) for preparing antigen with tubercle bacilli and followed Kolmer's method of conducting the complement fixation tests. These methods were followed in our work except in instances that will be noted.

The bacilli were grown on Petragnani's medium (*3*) and glycerol beef infusion broth at 37° C. for about 6 weeks. They grew equally well on the two media. After maximum growth had been reached, the cultures were examined for purity. They were then autoclaved at 110° C. for 15 minutes. The growth was removed from the solid Petragnani's medium with a small wooden spatula and placed in a watch glass to dry, care being taken not to remove any of the medium with the bacillary mass. The growth was removed from glycerol

[2] It is assumed that this culture was a transplant of the same organism he used for his antigen, although he reports several isolations. Doctor Lleras' death has prevented verification of this assumption.

broth by filtration, after which it was washed with distilled water to remove the glycerine. Drying was carried out in the incubator at 37° C. for 48 hours. The organisms were then extracted with C. P. acetone 1 cc. for each centigram for 24 hours at room temperature. They were then dried at 37° C. for 24 hours. Next they were extracted with C. P. absolute methyl alcohol, 1 cc. for each centigram, at 37° C. for 12 days with daily shaking. The antigen was then filtered from the bacillary residue and was ready for use. It was stored in airtight brown bottles at room temperature. Two separate antigens were prepared from Lleras' organism, one grown on Petragnani's medium and the other on glycerol broth. As controls for the preliminary work, antigens were prepared from glycerol broth cultures of Kedrowski's strain and a highly chromogenic acid-fast strain isolated in this laboratory from the blood stream of a fulminating case of leprosy.

Lleras used arbitrarily throughout his experiments an antigen dose of 0.5 cc. of a 1 : 20 dilution. We used this dose of the antigen sent us, which was sufficient to run only 15 sera using the 6-tube quantitative method. The 15 sera included 12 cases of leprosy in all stages of advancement, 1 case of leprosy arrested, 1 presumably normal individual, and 1 syphilitic (not leprous) giving a very strongly positive Kolmer–Wassermann (complete fixation in fifth tube), and a positive Kahn and Kline reactions. All the cases of leprosy gave positive reactions except the one classified as arrested. The syphilitic and normal control both gave negative reactions. It was decided to use these sera as controls in testing our antigens so that the work would be comparable. It was soon seen that the antigenic activity of the various extracts varied and that the use of an arbitrary dose of 0.5 cc. of a 1 : 20 dilution would not produce comparable results. It was found that by using one-third the anticomplementary dose the results were the same as those using the antigen prepared by Lleras. It was decided, therefore, to adopt one-third the anticomplementary dose as standard and this was used throughout the experiment. This dose ranged from 0.5 cc. of 1 : 15 to 0.5 cc. of 1 : 30 dilution instead of 0.5 cc. of 1 : 20 as set by Lleras. The titrations of the antigens did not vary during the experiments.

The tests were carried out by the same technique that we use for the syphilis test, that is, the Kolmer technique. The only differences were, of course, the antigen and the complement titration, which was carried out in the presence of the test dose of antigen. The serum doses were 0.2 and 0.1 cc. and 0.2 cc. in the serum control. In the first tests of the experiment the reactions were read 10 minutes after complete hemolysis of the antigen, hemolytic system and serum controls, at the end of the secondary incubation of 1 hour at 37° C. and after the cells had been allowed to settle in the refrigerator. These readings were quite constant, and so it was decided to make the

readings after the cells had settled in the refrigerator; consequently, all readings were made in that manner. The readings were made on the basis of 100, 75, 50, and 25 percent inhibition of hemolysis with less than 25 percent being disregarded in tabulating the results or, in other words, placed in the negative group. For purposes of comparison, all reactions in which 25 percent or more inhibition was recorded were placed in the positive group.

A preliminary group was run using four antigens, 2 of the Lleras bacillus (1 grown on Petragnani's medium, the other grown in glycerol broth), 1 from Kedrowski's strain, and 1 from a National Leprosarium strain. The two latter antigens were dropped after failing to produce as high a percentage of positives with the same sera run at the same time. There were no differences in the results of the antigens grown on Petragnani's medium and glycerol broth, therefore the antigens were used interchangeably.

The test sera totaled 567 and came from the four following groups:

1. Bacteriologically positive leprosy 164
2. Bacteriologically negative leprosy 24
3. Tuberculosis under sanatorium treatment 50
4. Miscellaneous (presumably nonleprous) 329

It may be stated here that these sera were scattered in the various runs, and especial care was taken to have some sera from cases of leprosy in with the third and fourth groups as well as positive and negative controls from previous runs.

The results are presented in the accompanying tables.

TABLE 1.—*Positive sera in the 4 groups tested*

GROUP 1 (LEPROSY, BACTERIOLOGICALLY POSITIVE)

Total number of cases	164
Strongly positive	104
Moderately positive	31
Weakly positive	20
Total number of cases positive	155
Percentage positive	94.5

GROUP 2 (LEPROSY, BACTERIOLOGICALLY NEGATIVE)

Total number of cases	24
Strongly positive	1
Moderately positive	4
Weakly positive	4
Total number of cases positive	9
Percentage positive	37.5

GROUP 3 (SANATORIUM CASES OF TUBERCULOSIS)

Total number of cases	50
Strongly positive	1
Weakly positive	2
Total number of cases positive	3
Percentage positive	6

GROUP 4 (MISCELLANEOUS)

Total number of cases	329
Strongly positive	6
Moderately positive	4
Weakly positive	23
Total number of cases positive	33
Percentage positive	10.03

NOTE.—The readings strongly, moderately, and weakly positive are after Kolmer (5).

TABLE 2.—*Positive Wassermanns among the groups tested*

Group 1 (all cases of leprosy), 188

Lleras		Wassermann	
		Number positive	Percent positive
Strongly positive	105	65	61.9
Moderately positive	35	20	57
Weakly positive	24	9	37.5
Negative	24	3	12.5

Group 2 (tuberculosis), 50

Lleras		Wassermann	
		Number positive	Percent positive
Strongly positive	1	0	0
Weakly positive	2	1	50
Negative	47	2	4.2

Group 3 (miscellaneous, presumably nonleprous), 329

Lleras		Wassermann	
		Number positive	Percent positive
Strongly positive	6	1	16.6
Moderately positive	4	2	50
Weakly positive	23	4	17.3
Total positives	33	7	21.2
Negative	296	42	14.2

DISCUSSION

In evaluating this work the authors wish to make clear the differences in the handling of the sera prior to testing. The sera from the cases of leprosy were taken in this laboratory and placed in the ice box until use, which, as a rule, was not over 48 hours. The sera from the cases of tuberculosis were taken by us and placed in the ice box upon returning to the laboratory, which was 2 or 3 hours later, and remained there until use. The chief difference in handling and the reason for recording are because of the miscellaneous group, the sera of which were collected at several hospitals, clinics, and penitentiaries through the Southern States, mailed to New Orleans, where sero-diagnostic tests for syphilis were conducted, after which the residuum was mailed to us. As these sera had already been inactivated for the syphilis tests they were inactivated for only 10 minutes at 55° C just prior to testing.

It is of interest that in the bacteriologically positive group 94.5 percent gave a positive reaction, but 100 percent of this group gave positive bacteriological smears; therefore as a practical diagnostic aid the complement fixation reaction falls short of the simple smear. In the bacteriologically negative cases in which new diagnostic aids would be highly desirable, this test in our hands was positive in only 37.5 percent of 24 cases.

The miscellaneous group of 329 sera is comparable to what would be received by any laboratory conducting sero-diagnostic tests for syphilis. Principally they were from patients hospitalized in, or visiting out-patient clinics of, marine hospitals, inmates of Federal penitentiaries and routine physical examinations. Thirty-three of this number were positive. The physicians submitting the blood were asked for the clinical diagnoses made in these 33 cases. They were varied and have no bearing on this subject; 23 were hospital or clinic cases, 7 were penitentiary inmates, and 3 were National Youth Administration affiliates undergoing physical examination. As far as we were able to ascertain, none had symptoms suspicious of leprosy. To rule out tuberculosis as a possible factor giving a positive reaction in this group, 50 cases of active pulmonary tuberculosis in all stages were tested. As is shown in the table, three were positive, which gives a lower percentage than was found in the miscellaneous group.

It is desirable to know what influence syphilis might have on the reaction. Forty-nine of the 329 patients of the miscellaneous group gave positive serologic evidence of syphilis. We realize the inadequacy of diagnosing or excluding syphilis on the basis of serologic tests alone; but for purposes of comparison we wish to assume that the group contained 49 syphilitics and 280 cases free from syphilis. If we are allowed to assume this, then 7, or 14.3 percent, of the syphilitics

gave positive Lleras reactions, while 26, or 9.2 percent, of the cases free from syphilis gave positive reactions. This difference does appear significant; but in so small a group it is probably better to withhold conclusions.

The purpose of this work has been to test the Lleras reaction as a diagnostic procedure. We do not desire at this time to discuss it from an immunologic standpoint. Neither does the question as to whether this bacillus is etiologically related to leprosy have a place here. Previous experience has taught us that a reagin is produced in cases of leprosy that will react in many cases with antigens prepared from acid-fast organisms as well as those antigens commonly used in the serologic tests for syphilis. In the case of the syphilis tests our experience has been confirmed by the American Committee for the Evaluation of Serodiagnostic Tests for Syphilis (*4*). It has been our experience in conducting various serodiagnostic tests for syphilis that the greatest percentage of positive reactors is found in the advanced cutaneous types of leprosy, while the smallest percentage is in the bacteriologically negative neural cases, with directly proportional percentages between the two types. A study of the tables shows the same to be true of the Lleras reaction.

In our hands at least, the Lleras reaction has not proved to be of any aid in the diagnosis of leprosy. The low percentage of positive reactors in the bacteriologically negative group and the positive reactors in the nonleprous groups seems to warrant this opinion.

SUMMARY

Lleras has reported the cultivation of an acid-fast bacillus from the blood of cases of cutaneous leprosy and the use of this bacillus as an antigen for complement fixation tests. His results seem to be of diagnostic importance.

This report is concerned with an attempt to repeat Lleras' work. Five hundred and sixty-seven sera comprising 188 cases of leprosy, 50 cases of pulmonary tuberculosis, and 329 miscellaneous sera were tested. The miscellaneous group contained 49 sera giving positive serologic evidence of syphilis.

The percentage of positive reactors in each group, as well as the result of the Wassermann reactions, is shown in the tables.

ACKNOWLEDGMENT

We wish to acknowledge the kindness of Passed Asst. Surg. J. G. Pasternack of the marine hospital, New Orleans, La., in furnishing the sera of the 329 cases of the miscellaneous group. Dr. Pasternack also furnished the results of the Wassermann and Kahn reactions on these 329 sera as recorded in his laboratory.

We also wish to thank the Louisiana State Board of Health and the staff of Greenwell Springs Sanatorium for allowing us to take the blood of the 50 tuberculous patients.

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INFLUENZA PREVALENCE

For the week ended March 4, 1939, a total of 14,288 cases of influenza was reported, as compared with 8,987 cases for the preceding week, or an increase of 59 percent, as compared with an increase of 30 percent for the week ended February 25 and with an increase of 81 percent for the week ended February 18.

The four geographical groups of Central States and the South Atlantic States show the greatest relative prevalence. These States, with 62 percent of the total population, reported 94 percent of the total number of cases for the week ended March 4. The greatest increases as compared with the preceding week are shown for Iowa (291 to 1,083), North Dakota (64 to 364), South Carolina (592 to 1,181), Kentucky (405 to 1,348), Alabama (180 to 599), and Arkansas (182 to 1,473). Some of the States which reported a rather high incidence in the earlier weeks registered decreases for the current week.

For the week ended February 25, 1939, the pneumonia deaths reported in a group of large cities scattered throughout the United States and having an aggregate population of approximately 33,000,000 totaled 943, as compared with a 5-year average of 994, while the number of influenza deaths was 159 as compared with a 5-year average of 139. The total number of deaths in a group of 88 large cities was 10,086, as compared with a 5-year average of 9,713 for 86 of these cities.

The accompanying table gives the numbers of cases of influenza reported by States, arranged by geographical divisions, and by weeks from the first of the year to and including the week ended March 4. While the total figures for the current week are much above both the 5-year median and the 5-year average, and on that basis may indicate mild epidemic prevalence in certain areas, it must be recalled that three of the five preceding years recorded unusually low prevalence of influenza. In 1937, which may be considered a mild epidemic year, 37,101 cases were reported in the peak week of January 30.

Cases of influenza reported by weeks, Jan. 1–Mar. 4, 1939

Division and State	Jan. 7	Jan. 14	Jan. 21	Jan. 28	Feb. 4	Feb. 11	Feb. 18	Feb. 25	Mar. 4
NEW ENGLAND									
Maine	1	3	2	10	4	1	8	25	46
New Hampshire				1					
Vermont									
Massachusetts									
Rhode Island									
Connecticut	10	6	13	4	7	26	22	29	30
MIDDLE ATLANTIC									
New York	44	57	37	155	159	183	137	101	91
New Jersey	14	24	12	19	56	61	99	44	24
Pennsylvania									
EAST NORTH CENTRAL									
Ohio									
Indiana	12	11	22	4	21	21	363	1,085	607
Illinois	18	12	60	30	36	227	955	1,478	1,241
Michigan			1	2		1	39	255	429
Wisconsin	62	65	52	47	68	65	56	346	584
WEST NORTH CENTRAL									
Minnesota		2	3	2		1	3	24	12
Iowa		4	10	2	1	8	27	291	1,083
Missouri	70	59	24	33	24	42	137		644
North Dakota	34	11	12	6	27	15	14	64	364
South Dakota	6			2	1	10	3	6	77
Nebraska				1					2
Kansas	16	9	9	6	6	3	9	77	116
SOUTH ATLANTIC									
Delaware									
Maryland	4	5	12	10	61	103	182	209	124
District of Columbia	2	2	6		5	5	18	25	25
Virginia	454	420	282	617	1,100	553	1,338	1,604	1,509
West Virginia	21	13	34	41	21	26	33	36	271
North Carolina	3	7	28	9	9	18	71	230	97
South Carolina	909	495	865	649	772	701	972	592	1,181
Georgia	133	136	143	110	131	118	139	110	140
Florida	1	1	2	5		1	1		9
EAST SOUTH CENTRAL									
Kentucky	56	65	37	27	198	51	478	405	1,348
Tennessee	36	64	87	109	58	75	63	83	146
Alabama	158	191	188	169	259	186	160	180	599
Mississippi									
WEST SOUTH CENTRAL									
Arkansas	181	203	145	139	159	87	113	182	1,473
Louisiana	7	36	12	8	10	20	11	9	30
Oklahoma	222	149	119	193	162	207	129	193	334
Texas	492	716	531	703	699	621	983	737	965
MOUNTAIN									
Montana	5	26	33	50	25	42	35	200	126
Idaho	4	2	1	1	1			12	1
Wyoming									1
Colorado	21	21	31	45	35	93	125	121	150
New Mexico	2	1	21	10	6	9	1	3	57
Arizona	138	117	132	81	68	114	82	94	144
Utah	7	1	2	9	20	24	16	44	53
PACIFIC									
Washington		4	1			1	3		8
Oregon	71	39	46	53	25	40	42	34	97
California	41	41	82	33	76	43	28	59	50
Total	3,255	3,018	3,097	3,395	4,310	3,802	6,895	8,987	14,288

DEATHS DURING WEEK ENDED FEBRUARY 18, 1939

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

	Week ended Feb. 18, 1939	Corresponding week, 1938
Data from 88 large cities of the United States:		
Total deaths	9,939	[1] 8,611
Average for 3 prior years	[1] 9,729	
Total deaths, first 7 weeks of year	65,444	63,423
Deaths under 1 year of age	580	[1] 522
Average for 3 prior years	[1] 583	
Deaths under 1 year of age, first 7 weeks of year	3,844	3,769
Data from industrial insurance companies:		
Policies in force	68,049,622	69,776,044
Number of death claims	11,890	13,926
Death claims per 1,000 policies in force, annual rate	9.1	10.4
Death claims per 1,000 policies, first 7 weeks of year, annual rate	10.1	10.2

[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 Feb. 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median

Division and State	Diphtheria				Influenza				Measles			
	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median
NEW ENG.												
Maine	24	4	1	0	151	25	5	3	84	14	44	44
New Hampshire	0	0	0	0	----	----	4	----	0	0	23	24
Vermont	0	0	1	0	----	----	----	----	27	2	172	27
Massachusetts	5	4	0	5	----	----	----	----	1,224	1,041	245	400
Rhode Island	0	0	0	1	----	----	----	----	115	15	3	32
Connecticut	12	4	3	2	86	29	5	6	1,377	464	20	78
MID. ATL.												
New York	12	31	26	37	[1] 70	[1] 101	[1] 6	[1] 27	650	1,625	1,273	1,273
New Jersey	12	10	18	12	52	44	24	23	30	25	1,253	574
Pennsylvania	21	41	63	51	----	----	----	----	57	113	7,166	2,082
E. NO. CEN.												
Ohio	13	17	36	36	----	----	----	70	32	41	2,591	449
Indiana	19	13	81	36	1,612	1,085	19	71	12	8	740	584
Illinois	15	23	29	34	969	1,478	23	46	12	19	6,495	968
Michigan [2]	23	22	15	13	270	255	2	4	472	447	3,448	67
Wisconsin	5	3	4	4	608	346	57	78	1,872	1,065	3,476	1,024
W. NO. CEN.												
Minnesota	8	4	1	4	47	24	1	1	2,415	1,246	35	168
Iowa	10	5	2	2	589	291	14	14	322	159	66	66
Missouri	10	8	29	29	----	----	175	393	12	9	1,073	607
North Dakota	7	1	1	1	467	64	6	10	1,030	141	3	3
South Dakota	30	4	0	0	45	6	----	----	1,953	260	----	1
Nebraska	15	4	11	6	----	----	14	14	313	82	33	33
Kansas	20	7	4	9	215	77	8	8	56	20	322	125
SO. ATL.												
Delaware	39	2	0	0	----	----	----	----	----	----	21	76
Maryland [2]	12	4	5	8	644	209	28	34	3,555	1,153	48	136
Dist. of Col	57	7	10	10	202	25	----	3	154	19	4	11
Virginia	32	17	18	17	3,006	1,604	----	----	418	223	456	456
West Virginia	27	10	8	13	97	36	69	131	132	49	439	26
North Carolina	32	22	25	25	336	230	16	173	2,089	1,430	2,662	765
South Carolina [2]	11	4	4	4	1,617	592	604	880	93	34	559	54
Georgia [2]	8	5	8	9	183	110	----	356	385	232	419	----
Florida [2]	15	5	7	8	----	----	----	35	416	138	564	40

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Feb. 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued.

Division and State	Diphtheria				Influenza				Measles			
	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median
E. SO. CEN.												
Kentucky	16	9	9	13	704	405	43	108	73	42	698	374
Tennessee	12	7	12	12	146	83	152	246	60	34	1,520	202
Alabama [3]	23	13	18	21	317	180	316	1,189	454	258	1,172	568
Mississippi [3]	10	4	6	7	------	------	------	------	------	------	------	------
W. SO. CEN.												
Arkansas	32	13	9	10	451	182	154	154	169	68	346	60
Louisiana	56	23	15	15	22	9	9	24	329	136	5	70
Oklahoma	10	5	8	8	388	193	218	227	356	177	83	50
Texas [3]	29	35	38	44	611	737	754	754	101	122	322	310
MOUNTAIN												
Montana	19	2	3	2	1,872	200	------	64	4,156	444	30	30
Idaho	10	1	0	1	122	12	7	7	755	74	4	34
Wyoming	22	1	2	0	------	------	------	------	1,462	67	3	4
Colorado	39	8	27	6	583	121	------	------	457	95	518	78
New Mexico	0	0	1	4	37	3	2	6	259	21	81	62
Arizona	12	1	8	2	1,153	94	101	101	258	21	16	23
Utah [3]	0	0	0	0	437	44	------	------	1,539	155	178	26
PACIFIC												
Washington	12	4	1	3	------	------	1	1	836	271	7	130
Oregon	10	2	2	1	169	34	84	143	139	28	15	55
California	26	32	34	37	48	59	110	158	2,499	3,047	252	601
Total	18	441	603	603	424	8,987	3,031	7,018	612	15,134	38,903	26,841
8 weeks	22	4,483	5,197	5,370	217	36,759	24,618	38,450	456	90,202	201,876	135,462

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median
NEW ENG.												
Maine	0	0	1	0	0	0	0	0	229	38	18	18
New Hampshire	0	0	0	0	0	0	0	0	10	1	18	17
Vermont	0	0	0	0	0	0	0	0	67	5	28	16
Massachusetts	1.2	1	2	2	0	0	0	0	274	233	299	241
Rhode Island	15	2	1	1	0	0	1	0	107	14	16	17
Connecticut	0	0	0	1	0	0	0	0	297	100	107	78
MID. ATL.												
New York	2	5	8	8	0	0	1	0	289	721	740	793
New Jersey	0	0	1	1	0	0	0	0	223	187	136	174
Pennsylvania	2.5	5	6	6	0	0	2	0	207	408	610	561
E. NO. CEN.												
Ohio	0.8	1	7	8	0	0	0	0	413	537	482	493
Indiana	0	0	0	3	0	0	1	0	322	217	270	248
Illinois	1.3	2	2	7	0.7	1	1	1	322	491	736	706
Michigan [2]	0	0	2	2	1.1	1	1	0	618	585	594	486
Wisconsin	1.8	1	1	2	0	0	0	0	594	338	214	349
W. NO. CEN.												
Minnesota	0	0	0	1	1.9	1	0	0	229	118	171	169
Iowa	0	0	2	2	0	0	0	0	322	159	266	178

See footnotes at end of table.

Cases of certain diseases reported by telegraph by State health officers for the week ended Feb. 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Meningitis, meningococcus				Poliomyelitis				Scarlet fever			
	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median
W. NO. CEN.—continued												
Missouri	2.6	2	4	4	2.6	2	0	0	0	0	218	215
North Dakota	7	1	0	0	0	0	0	0	197	27	18	47
South Dakota	0	0	0	0	0	0	0	0	113	15	11	17
Nebraska	0	0	1	1	0	0	0	0	179	47	94	94
Kansas	0	0	0	2	0	0	0	0	369	132	209	209
SO. ATL.												
Delaware	0	0	0	0	0	0	0	0	0	0	16	12
Maryland [2]	3	1	7	7	0	0	0	0	163	53	62	73
Dist. of Col	16	2	0	1	0	0	1	0	162	20	18	21
Virginia	4	2	0	6	4	2	0	0	62	33	35	38
West Virginia	8	3	3	3	0	0	1	0	137	51	44	55
North Carolina	1.5	1	2	3	0	0	2	1	82	56	52	33
South Carolina [2]	0	0	2	2	0	0	0	0	14	5	5	5
Georgia [2]	1.7	1	0	1	1.7	1	0	0	3	2	13	13
Florida [2]	0	0	1	1	3	1	1	0	30	10	9	4
E. SO. CEN.												
Kentucky	5	3	9	9	1.7	1	0	0	129	74	97	87
Tennessee	0	0	9	8	0	0	0	0	69	39	62	40
Alabama [2]	5	3	12	3	5	3	2	1	18	10	7	18
Mississippi [2]	8	3	1	1	0	0	2	0	18	7	9	14
W. SO. CEN.												
Arkansas	0	0	1	2	2.5	1	2	0	42	17	9	9
Louisiana	5	2	2	2	0	0	0	0	39	16	13	14
Oklahoma	2	1	1	2	0	0	0	0	99	49	20	21
Texas [2]	0	0	6	7	0.8	1	2	2	72	87	124	121
MOUNTAIN												
Montana	0	0	1	1	0	0	0	0	524	56	26	26
Idaho	0	0	1	0	0	0	0	0	92	9	19	19
Wyoming	0	0	0	0	0	0	0	0	284	13	6	6
Colorado	5	1	2	1	0	0	0	0	159	33	73	73
New Mexico	0	0	0	0	12	1	2	0	136	11	24	24
Arizona	37	3	0	0	0	0	0	0	184	15	12	17
Utah [2]	10	1	0	0	10	1	0	0	367	37	49	49
PACIFIC												
Washington	6	2	1	1	3	1	1	0	163	53	57	62
Oregon	0	0	0	0	0	0	0	0	224	45	58	58
California	1.6	2	2	5	0	0	1	1	210	256	184	242
Total	2	51	101	160	0.7	18	24	15	216	5,430	6,358	6,901
8 weeks	2.2	437	755	833	0.7	133	174	174	213	42,750	48,076	50,571

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases
NEW ENG.											
Maine	0	0	0	0	6	1	0	1	66	11	27
New Hampshire	0	0	0	0	0	0	2	0	10	1	4
Vermont	0	0	0	0	0	0	0	0	255	19	46
Massachusetts	0	0	0	0	1	1	1	1	265	225	84
Rhode Island	0	0	0	0	0	0	0	0	649	85	39
Connecticut	0	0	0	0	0	0	0	0	193	65	49

Cases of certain diseases reported by telegraph by State health officers for the week ended Feb. 25, 1939, rates per 100,000 population (annual basis), and comparison with corresponding week of 1938 and 5-year median—Continued

Division and State	Smallpox				Typhoid and paratyphoid fever				Whooping cough		
	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases	1934–38, median	Feb. 25, 1939, rate	Feb. 25, 1939, cases	Feb. 26, 1938, cases
MID. ATL.											
New York	0	0	0	0	2	5	5	5	227	568	410
New Jersey	0	0	0	0	1	1	0	1	524	440	166
Pennsylvania	0	0	0	0	2	4	5	5	185	355	295
E. NO. CEN.											
Ohio	24	31	37	1	2	3	7	4	164	213	169
Indiana	202	136	47	1	0	0	2	1	39	26	25
Illinois	7	11	41	8	2	3	13	4	182	278	85
Michigan [1]	50	47	11	1	8	8	4	3	238	225	197
Wisconsin	9	5	7	12	0	0	1	1	559	318	136
W. NO. CEN.											
Minnesota	17	9	16	9	0	0	0	1	81	42	27
Iowa	69	34	53	5	2	1	0	2	49	24	24
Missouri	5	4	52	5	8	6	4	1	41	32	125
North Dakota	44	6	15	10	7	1	0	0	73	10	0
South Dakota	8	1	4	5	0	0	0	0	0	0	70
Nebraska	31	8	8	8	0	0	1	0	31	8	14
Kansas	28	9	31	7	0	0	0	0	89	32	93
SO. ATL.											
Delaware	0	0	0	0	0	0	0	0	197	10	5
Maryland [2]	0	0	0	0	0	0	0	1	62	20	48
Dist. of Col	0	0	0	0	8	1	1	1	137	17	4
Virginia	0	0	0	0	4	2	4	4	122	65	89
West Virginia	0	0	0	0	13	5	5	4	59	22	88
North Carolina	0	0	0	0	6	4	5	2	339	266	383
South Carolina [3]	0	0	0	0	5	2	4	3	205	75	68
Georgia [3]	0	0	0	0	3	2	1	2	90	54	43
Florida [3]	0	0	1	0	3	1	2	1	75	25	14
E. SO. CENT.											
Kentucky	12	7	21	0	5	3	3	6	40	23	67
Tennessee	5	3	32	0	4	2	1	2	25	14	86
Alabama [3]	11	6	0	0	4	2	4	3	79	45	32
Mississippi [3]	3	1	6	0	3	1	2	2	------	------	------
W. SO. CENT.											
Arkansas	12	5	6	1	0	0	1	2	20	8	26
Louisiana	0	0	0	1	111	46	25	6	29	12	12
Oklahoma	44	22	20	6	0	0	0	3	4	2	41
Texas [3]	21	25	20	2	5	6	12	12	53	64	177
MOUNTAIN											
Montana	28	3	21	11	9	1	0	1	140	15	24
Idaho	41	4	16	1	0	0	0	0	20	2	12
Wyoming	22	1	0	3	0	0	0	0	262	12	4
Colorado	82	17	14	4	0	0	0	0	212	44	15
New Mexico	12	1	0	0	0	0	7	0	247	20	31
Arizona	245	20	10	0	0	0	0	0	442	36	43
Utah [3]	0	0	1	0	0	0	0	0	219	22	23
PACIFIC											
Washington	15	5	51	23	3	1	1	1	114	37	138
Oregon	20	4	21	5	0	0	2	2	60	12	26
California	21	25	17	9	1.6	2	11	4	95	116	363
Total	18	451	579	196	5	115	136	113	163	4,025	3,947
8 weeks	16	3,201	4,650	1,634	4	891	986	986	173	34,185	31,816

[1] New York City only.
[2] Period ended earlier than Saturday.
[3] Typhus fever, week ended Feb. 25, 1939, 31 cases as follows: South Carolina, 5; Georgia, 15; Florida, 3; Alabama, 5; Texas, 3.

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	Meningitis, meningococcus	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid and paratyphoid fever
January 1939										
Alabama	11	42	706	63	434	12	2	69	1	10
Colorado	3	65	113	-------	167	-------	0	183	45	7
Illinois	8	210	128	3	178	-------	6	2,139	62	12
Indiana	6	99	49	-------	45	-------	0	986	296	4
Kansas	2	31	37	-------	44	-------	1	756	88	3
Kentucky	16	61	228	1	188	4	3	377	16	15
Louisiana	6	74	63	4	417	-------	3	76	2	45
Massachusetts	5	22	-------	1	1,986	-------	1	796	0	8
Minnesota	4	29	13	-------	4,229	-------	1	599	122	5
Mississippi	4	26	7,356	1,057	1,774	263	2	54	1	8
Montana	0	6	164	-------	1,996	-------	1	120	9	6
Nevada	0	1	37	-------	180	-------	0	12	0	0
Oklahoma	1	62	734	43	460	8	0	203	93	15
Oregon	1	5	211	1	94	-------	3	302	39	3
Rhode Island	0	1	1	-------	26	-------	0	58	0	0
South Dakota	1	41	64	-------	1,944	-------	1	118	68	1
Vermont	0	1	-------	-------	53	-------	0	24	0	2
Washington	0	4	24	-------	676	-------	5	277	26	4

January 1939

	Cases
Actinomycosis:	
Illinois	1
Anthrax in man:	
Massachusetts	1
Chickenpox:	
Alabama	314
Colorado	365
Illinois	2,421
Indiana	706
Kansas	657
Kentucky	651
Louisiana	48
Massachusetts	1,433
Minnesota	453
Mississippi	914
Montana	202
Nevada	8
Oklahoma	193
Oregon	268
Rhode Island	230
South Dakota	157
Vermont	334
Washington	975
Dysentery, amoebic and bacillary:	
Colorado (amoebic)	1
Colorado (bacillary)	1
Illinois (amoebic)	4
Illinois (bacillary)	21
Illinois (amoebic carriers)	15
Kentucky (bacillary)	2
Louisiana (amoebic)	8
Louisiana (bacillary)	1
Massachusetts (bacillary)	20
Minnesota (amoebic)	12
Minnesota (bacillary)	2
Montana (amoebic)	1
Mississippi (amoebic)	120
Mississippi (bacillary)	215
Oklahoma (bacillary)	2
Encephalitis, epidemic or lethargic:	
Alabama	1
Illinois	6
Kansas	6
Kentucky	2
Massachusetts	2
Montana	1
Washington	1

January 1939—Continued

	Cases
German measles:	
Alabama	2
Illinois	50
Kansas	17
Kentucky	2
Massachusetts	66
Montana	15
Rhode Island	4
Washington	17
Hookworm disease:	
Louisiana	28
Mississippi	400
Impetigo contagiosa:	
Kansas	10
Montana	7
Oregon	96
Washington	3
Jaundice, infectious:	
Kansas	1
Leprosy:	
Illinois	1
Mumps:	
Alabama	86
Colorado	13
Illinois	492
Indiana	151
Kansas	1,019
Kentucky	95
Massachusetts	771
Mississippi	240
Montana	17
Nevada	112
Oklahoma	26
Oregon	109
Rhode Island	320
South Dakota	100
Vermont	255
Washington	355
Ophthalmia neonatorum:	
Kansas	1
Massachusetts	109
Minnesota	1
Mississippi	13
Montana	1
Psittacosis:	
Oregon	1
Puerperal septicemia:	
Mississippi	30
Washington	2

January 1939—Continued

	Cases
Rabies in animals:	
Alabama	24
Illinois	22
Indiana	34
Louisiana	4
Massachusetts	3
Minnesota	4
Mississippi	13
Oregon	3
Washington	75
Rabies in man:	
Indiana	1
Scabies:	
Kansas	13
Montana	4
Oregon	82
South Dakota	30
Washington	1
Septic sore throat:	
Colorado	4
Illinois	8
Kansas	22
Kentucky	46
Louisiana	9
Massachusetts	11
Minnesota	20
Montana	12
Oklahoma	50
Oregon	9
Rhode Island	29
South Dakota	10
Vermont	1
Washington	8
Tetanus:	
Alabama	3
Illinois	4
Kentucky	1
Massachusetts	1
Trachoma:	
Illinois	26
Indiana	1
Kentucky	2
Mississippi	5
Montana	1
Oklahoma	5
South Dakota	2
Trichinosis:	
Massachusetts	3
Tularaemia:	
Alabama	2
Illinois	70

January 1939		January 1939		January 1939	
Tularaemia—Continued.	Cases	Undulant fever—Contd.	Cases	Whooping cough—Contd.	Cases
Indiana	14	Minnesota	7	Kansas	53
Kansas	2	Mississippi	1	Kentucky	53
Kentucky	19	Oklahoma	73	Louisiana	38
Louisiana	9	Oregon	2	Massachusetts	951
Oklahoma	14	Rhode Island	1	Minnesota	215
Washington	1	Washington	1	Mississippi	790
Typhus fever:		Vincent's infection:		Montana	87
Alabama	22	Illinois	23	Nevada	92
Louisiana	3	Kansas	12	Oklahoma	27
Mississippi	5	Oklahoma	25	Oregon	76
Undulant fever:		Oregon	31	Rhode Island	254
Alabama	2	Whooping cough:		South Dakota	47
Illinois	13	Alabama	129	Vermont	346
Kansas	8	Colorado	212	Washington	102
Louisiana	5	Illinois	1,775		
Massachusetts	8	Indiana	92		

WEEKLY REPORTS FROM CITIES

City reports for week ended Feb. 18, 1939

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

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Data for 90 cities:											
5-year average	192	989	144	5,980	993	2,158	25	409	17	1,200	----
Current week [1]	141	1,413	104	3,801	871	1,489	47	383	12	1,294	----
Maine: Portland	0	----	0	1	3	1	0	0	0	12	28
New Hampshire:											
Concord	0	----	0	0	2	0	0	1	0	0	10
Nashua	0	----	0	1	1	0	0	0	0	0	11
Vermont:											
Barre	0	----	0	0	1	0	0	1	0	0	5
Burlington	0	----	0	0	0	2	0	0	0	0	8
Rutland	0	----	0	0	0	0	0	0	0	0	3
Massachusetts:											
Boston	0	----	0	271	25	62	0	10	0	48	240
Fall River	0	----	0	1	6	4	0	2	0	0	45
Springfield	0	----	0	10	3	0	0	2	0	3	49
Worcester	0	----	0	0	19	23	0	4	0	32	69
Rhode Island:											
Pawtucket	0	----	0	0	2	0	0	0	0	1	20
Providence	0	----	0	11	9	1	0	2	0	59	68
Connecticut:											
Bridgeport	1	----	0	3	1	5	0	1	0	2	33
Hartford	0	----	0	143	1	3	0	2	0	16	44
New Haven	0	4	0	58	1	5	0	1	0	5	31
New York:											
Buffalo	1	----	0	90	7	67	0	2	0	32	159
New York	22	137	17	45	194	209	0	83	2	179	1,798
Rochester	1	----	0	85	4	18	0	0	1	24	64
Syracuse	0	----	0	60	5	6	0	1	0	23	50
New Jersey:											
Camden	1	5	0	0	6	5	0	2	0	1	46
Newark	0	14	2	1	7	34	0	8	0	44	118
Trenton	0	----	1	1	5	2	0	0	0	7	41
Pennsylvania:											
Philadelphia	6	13	1	41	44	44	0	30	0	94	581
Pittsburgh	4	8	3	1	22	29	0	10	1	24	203
Reading	5	----	0	0	3	2	0	0	0	1	27
Scranton	0	----	----	0	----	15	0	----	----	24	----
Ohio:											
Cincinnati	2	----	2	0	8	18	0	6	1	5	110
Cleveland	2	129	2	8	24	63	0	15	0	48	216
Columbus	4	1	1	1	8	19	0	1	0	4	88
Toledo	1	2	2	2	11	21	0	5	0	18	76
Indiana:											
Anderson	0	----	0	0	3	6	0	0	0	0	11
Fort Wayne	0	----	1	0	1	0	0	1	0	0	26
Indianapolis	1	----	1	2	17	40	35	13	0	9	101
Muncie	0	----	0	0	2	2	1	0	0	0	16
South Bend	0	----	0	0	4	3	0	0	0	7	26
Terre Haute	0	----	0	0	2	1	0	0	0	0	21

[1] Figures for Los Angeles, Calif., estimated; report not received.

City reports for week ended Feb. 18, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Illinois:											
Alton	1	----	0	0	3	2	0	0	0	1	8
Chicago	15	591	30	11	94	184	0	37	0	159	1,037
Elgin	0	1	3	0	3	11	0	0	0	4	15
Moline	0	----	0	2	2	0	1	0	0	1	7
Springfield	0	8	0	1	0	10	0	0	0	2	31
Michigan:											
Detroit	10	67	9	12	56	126	0	13	1	62	345
Flint	0	----	0	173	4	27	0	2	0	0	30
Grand Rapids	0	----	0	2	2	30	0	4	0	0	46
Wisconsin:											
Kenosha	0	2	0	1	2	11	0	0	0	10	10
Madison	0	----	0	1	0	7	0	0	0	12	18
Milwaukee	0	2	1	7	3	79	0	4	0	120	116
Racine	0	----	0	11	0	6	0	0	0	3	12
Superior	0	----	0	2	0	3	1	0	0	1	7
Minnesota:											
Duluth	0	----	0	10	0	2	0	3	0	4	33
Minneapolis	3	----	0	191	6	20	3	1	0	15	110
St. Paul	0	----	0	426	8	21	1	3	0	5	63
Iowa:											
Cedar Rapids	0	----	----	0	----	4	1	----	0	0	----
Davenport	0	----	----	0	----	5	3	----	0	0	----
Des Moines	0	----	0	1	0	14	0	0	0	0	43
Sioux City	0	----	----	25	----	3	0	----	0	8	----
Waterloo	2	----	----	0	----	15	0	----	0	1	----
Missouri:											
Kansas City	1	----	2	1	9	21	0	2	0	2	125
St. Joseph	0	----	0	0	0	4	0	1	0	0	17
St. Louis	3	1	2	3	13	26	2	3	0	25	238
North Dakota:											
Fargo	0	----	0	1	0	0	0	0	1	0	4
Grand Forks	0	----	----	6	----	1	0	----	0	0	----
Minot	1	----	0	16	0	0	0	0	0	0	7
South Dakota:											
Aberdeen	0	----	----	15	----	0	3	----	0	0	----
Sioux Falls	0	----	0	40	0	0	0	0	0	0	12
Nebraska:											
Lincoln	0	----	----	5	----	4	0	----	0	2	----
Omaha	0	----	0	5	5	12	0	1	0	0	49
Kansas:											
Lawrence	0	3	0	3	0	1	0	0	0	0	2
Topeka	0	----	0	1	2	5	0	0	0	1	24
Wichita	1	----	0	0	3	0	0	0	0	0	20
Delaware:											
Wilmington	2	----	0	0	4	4	0	0	0	0	29
Maryland:											
Baltimore	1	116	3	1,085	28	19	0	8	0	19	264
Cumberland	0	----	0	0	1	2	0	0	0	0	12
Frederick	0	1	0	0	0	0	0	0	0	0	4
Dist. of Col.:											
Washington	3	18	4	10	26	20	0	14	1	24	170
Virginia:											
Lynchburg	0	----	0	55	5	0	0	0	0	11	15
Norfolk	1	96	0	3	4	4	0	0	0	0	34
Richmond	0	----	2	44	10	4	0	2	0	2	63
Roanoke	0	----	0	0	0	0	0	1	0	0	12
West Virginia:											
Charleston	0	----	1	0	3	1	0	0	0	0	23
Huntington	1	----	----	0	----	0	0	----	0	0	----
Wheeling	0	----	0	1	1	0	0	0	0	7	17
North Carolina:											
Gastonia	0	----	----	0	----	0	0	----	0	1	----
Raleigh	0	----	0	2	2	1	0	2	0	4	11
Wilmington	0	----	0	2	1	0	0	0	0	9	11
Winston-Salem	1	----	0	194	0	2	0	0	0	0	15
South Carolina:											
Charleston	0	49	0	0	0	3	0	1	0	8	16
Florence	0	----	0	0	3	0	0	0	0	0	12
Greenville	0	----	0	0	2	0	0	0	0	3	9
Georgia:											
Atlanta	1	12	1	0	8	12	0	4	0	1	86
Brunswick	0	----	0	12	1	0	0	0	0	3	5
Savannah	0	7	0	1	3	0	0	1	0	8	25
Florida:											
Miami	1	----	0	0	1	1	0	2	1	3	39
Tampa	0	1	0	37	0	2	0	0	0	1	30

City reports for week ended Feb. 18, 1939—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet fever cases	Smallpox cases	Tuberculosis deaths	Typhoid fever cases	Whooping cough cases	Deaths, all causes
		Cases	Deaths								
Kentucky:											
Ashland	0	4	1	0	5	0	0	1	0	0	11
Covington	0	1	0	0	3	10	0	0	0	0	14
Lexington	0	------	0	1	3	6	0	1	0	0	21
Louisville	0	4	0	3	7	16	0	4	0	0	97
Tennessee:											
Knoxville	0	1	2	0	4	2	0	2	1	0	30
Memphis	0	------	0	0	1	11	0	2	0	21	67
Nashville	3	------	2	0	5	15	0	4	0	1	69
Alabama:											
Birmingham	3	6	3	2	2	4	0	4	0	0	61
Mobile	0	------	1	0	4	0	0	1	0	0	32
Montgomery	0	------	--------	6	-------	1	0	-------	0	1	--------
Arkansas:											
Fort Smith	3	------	--------	6	-------	0	0	-------	0	0	--------
Little Rock	0	------	0	0	3	4	0	0	0	0	3
Louisiana:											
Lake Charles	0	------	0	20	1	0	0	0	0	0	4
New Orleans	5	4	2	32	20	3	0	10	0	14	145
Shreveport	1	------	0	2	7	2	0	2	0	0	46
Oklahoma:											
Oklahoma City	1	5	0	0	4	10	3	1	0	0	46
Tulsa	0	------	--------	6	-------	8	0	-------	0	0	--------
Texas:											
Dallas	4	1	1	1	10	6	3	4	1	0	76
Fort Worth	0	10	0	0	5	7	2	2	0	1	41
Galveston	0	------	0	0	3	1	0	1	0	0	20
Houston	3	1	0	32	19	5	0	9	0	4	110
San Antonio	1	------	3	3	11	0	0	7	1	1	83
Montana:											
Billings	0	------	0	22	0	1	0	1	0	0	9
Great Falls	0	------	0	2	1	0	0	0	0	0	13
Helena	0	------	0	107	0	2	0	0	0	0	3
Missoula	0	1	1	22	0	0	0	0	0	0	7
Idaho:											
Boise	0	------	1	0	2	1	0	0	0	0	9
Colorado:											
Colorado Springs	0	------	0	9	0	5	0	1	0	7	16
Denver	10	------	2	9	12	4	0	4	0	25	101
Pueblo	0	------	0	1	0	1	0	0	0	1	10
New Mexico:											
Albuquerque	0	------	1	0	2	3	0	1	0	4	14
Utah:											
Salt Lake City	0	------	0	3	1	14	0	1	0	1	33
Washington:											
Seattle	0	------	0	27	1	9	0	4	0	8	80
Spokane	0	------	0	43	1	1	0	0	1	0	27
Tacoma	0	------	0	4	1	1	0	0	0	0	22
Oregon:											
Portland	0	3	1	1	6	3	1	3	0	0	104
Salem	1	2	--------	0	-------	2	0	-------	0	0	--------
California:											
Los Angeles	------	------	------	------	------	------	------	------	------	------	------
Sacramento	3	1	1	102	4	1	2	4	0	0	30
San Francisco	2	2	0	466	9	17	0	5	0	11	199

State and city	Meningitis, meningococcus		Poliomyelitis cases	State and city	Meningitis, meningococcus		Poliomyelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Maryland:			
Worcester	0	1	0	Baltimore	2	2	0
Rhode Island:				District of Columbia:			
Providence	1	0	0	Washington	1	0	0
New York:				South Carolina:			
New York	2	1	0	Charleston	0	0	2
Pennsylvania:				Tennessee:			
Philadelphia	1	0	0	Memphis	1	1	0
Indiana:				Alabama:			
Indianapolis	0	1	0	Birmingham	1	1	0
Illinois:							
Chicago	1	0	0				

Encephalitis, epidemic or lethargic.—Cases: Lexington, 1.
Pellagra.—Cases: Pittsburgh, 2; Atlanta, 1; Savannah, 1; San Antonio, 1.
Typhus fever.—Cases: Atlanta, 1; Savannah 2; Ft. Worth, 1.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended January 21, 1939.—During the week ended January 21, 1939, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					2			1		3
Chickenpox		3	16	322	511	32	61	39	130	1,114
Diphtheria			3	42	9	4	1	1		60
Influenza		10			16	1			5	32
Measles		4		172	932	9	8	2	3	1,130
Mumps				143	98	34	9	9	4	297
Pneumonia		2			36		1	3	19	61
Scarlet fever		12	16	112	219	43	44	35	31	512
Smallpox						2	7			9
Trachoma					2	1				3
Tuberculosis	1	5	12	48	48	2	3	3	23	145
Typhoid and paratyphoid fever				11	4				1	16
Whooping cough		1	6	172	301	11	11	3	62	567

JAMAICA

Communicable diseases—4 weeks ended February 18, 1939.—During the 4 weeks ended February 18, 1939, 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		Puerperal fever		1
Chickenpox	4	5	Scarlet fever		1
Diphtheria	3		Tuberculosis	36	57
Dysentery	6	2	Typhoid fever	6	36
Leprosy		4			

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 February 24, 1939, pages 322-333. A similar cumulative table will appear in future issues of the PUBLIC HEALTH REPORTS for the last Friday of each month.

Plague

Brazil.—During the month of December 1938, plague was reported in Brazil as follows: Alagoas State, 5 cases; Parahiba State, 1 case; Pernambuco State, 17 cases, 5 deaths; Rio de Janeiro State, 1 case, 1 death.

Hawaii Territory—Island of Hawaii—Hamakua District—Hamakua Mill Sector—Kukaiau.—A rat found on January 31, 1939, in Kukaiau, Hamakua Mill Sector, Hamakua District, Island of Hawaii, T. H., has been proved positive for plague.

Smallpox

Mexico.—During the month of December 1938, smallpox was reported in Mexico as follows: Aguascalientes, Aguascalientes State, 6 cases, 6 deaths; Mexico, D. F., 6 cases; Pachuca, Hidalgo State, 36 cases.

According to information dated March 3, 1939, 1 case of smallpox was reported in Tampico on February 4, 1939, and 8 cases with 2 deaths were reported during the week ended February 28. It was stated that prompt action had been taken, including general vaccination and the prohibition of unvaccinated persons from leaving the city, and that no new cases had been reported since February 28. Health authorities stated that the outbreak was under control.

Typhus Fever

Mexico.—During the month of December 1938, typhus fever was reported in Mexico as follows: Aguascalientes, Aguascalientes State, 2 cases, 1 death; Mexico, D. F., 6 cases, 1 death; Pachuca, Hidalgo State, 1 case; Queretaro, Queretaro State, 1 case; San Luis Potosi, San Luis Potosi State, 5 cases, 2 deaths.

Yellow Fever

Brazil—Espirito Santo State.—Yellow fever has been reported in Espirito Santo State, Brazil, as follows: Alegre, January 25, 1939, 1 death; Joao Pessoa, January 24–29, 1939, 2 deaths; Sao Felipe, January 29, 1939, 1 death.

Ivory Coast.—Yellow fever has been reported in Ivory Coast as follows: Abidjan, February 20, 1939, 1 suspected case; Azaguie, February 22, 1939, 1 case.

Nigeria—Maiduguri.—On February 15, 1939, 2 suspected cases of yellow fever were reported in Maiduguri, Nigeria.

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