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The Pharmacist's Place in Cancer Control

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People visit drug stores oftener than they consult physicians. Of all professional groups concerned with health matters, pharmacists are usually the first to come in contact with persons who may need medical attention. Properly utilized, the neighborhood drug store has an enormous potential as a health information center. In the field of cancer especially, where prompt and accurate information can save human lives, the pharmacist has a unique opportunity for public service.

To help pharmacists make the most of this opportunity, the American Pharmaceutical Association and the Public Health Service have jointly sponsored a year-long program of cancer education for pharmacists and pharmacy patrons.

As part of this program, some 15,000 cooperating drug stores will display a series of six counter cards, each emphasizing the early signs of cancer of a specific site and urging the spectator to see a doctor if cancer is indicated. An estimated 3,000,000 persons a day will see these displays when they visit the cooperating drug stores. Six bulletins to be posted in the prescription room will convey the messages in fuller detail to serve as a continual daily reminder to the pharmacist. At the same time an intensive survey will be made to determine how effectively the program is accomplishing its mission. To help finance these projects the National Advisory Cancer Council recommended two special cancer control grants, both of which were subsequently approved by the Surgeon General.

The cancer education program is part of a long-range health education plan that the American Pharmaceutical Association is developing for its members, as well as for other interested pharmacists. One of the major functions of APHA, the largest national organization in the profession, is to stimulate the interest and participation of pharmacists in public health, and help them keep up-to-date on disease control.

At the outset of the long-range program, the Association came to an agreement with the Public Health Service that the project be jointly sponsored. In determining which of the many health problems should initiate the program, primary consideration was given to the fields in which the pharmacist can make the most substantial contribution. Because he is so often the first to learn of cancer symptoms, and can be instrumental in warning against the dangers of self-medication and in urging proper medical examination and treatment, it was decided that the pharmacist would be most effective in the fight for cancer control. And, of course, due consideration was given to the fact that National Pharmacy week for the past 2 years has concentrated on cancer, thereby augmenting the annual drives of the American Cancer Society. For these reasons, the long-range program will concentrate on cancer for at least the first year.

Objective of the cancer portion of the program must be two-fold: first, to increase the pharmacist's accurate knowledge of cancer; second, to make certain that, in his role of informal adviser to patrons, he will transmit correct information on the nature and early symptoms of cancer, and—even more important—will forcefully present the urgency of immediate medical examination wherever indicated.

Early stages of cancer of such sites as larynx, gastro-intestinal system, skin, mouth, lungs, uterus, and lower bowel often present symptoms for which self-medication is practiced by those unfamiliar with cancer danger signals. The pharmacist, particularly in neighborhood drug stores, is thereby presented with an excellent opportunity to observe or hear about signs of early cancer, and to warn against delay in consulting a physician.

The device of bulletins as a periodic reminder to the pharmacist to think of cancer and of its controlability through early diagnosis has been adopted as showing promise of fruitful results. As an example of these bulletins, the following is the text of the first one which deals with cancer of the larynx:

> "You have an excellent opportunity to help find CANCER in its early stages, when it is most likely to be curable. Many of your customers ask you what they should take for hoarseness which they have had for two weeks or longer. Persistent hoarseness is one of the commonest symptoms of throat cancer. The use of lozenges and sprays may delay a medical examination until it is too late.
>
> "If your advice is asked, suggest that a physician be consulted. Persistent hoarseness should not be neglected. Cancer of the larynx is curable if discovered early enough."

The counter cards accompanying the bulletins are attractively printed in two colors and graphically present the high lights of the same message in more popular style:

"Chronic hoarseness is one of the commonest symptoms of throat CANCER. See your doctor if the hoarseness lasts for more than 2 weeks. Cancer of the larynx is curable if caught early enough."

Following the first set of counter cards and bulletins, the second and sixth sets will deal with early signs of cancer of the gastro-intestinal tract, which is responsible for nearly half of all cancer deaths. The remaining sets will be devoted to cancer of the lower bowel, mouth and lips, and uterus.

In addition to these direct mailings, a series of columns on cancer is being offered to some sixty pharmaceutical journals. These will cover in greater detail the early detection of cancer, will explain new developments in diagnosis, treatment and research, as well as the control work being done by the State and Federal Governments. A copy of each column will be enclosed with the bulletins and counter cards to be sent to the pharmacists.

Special feature articles by authorities in the field will be published from time to time in these journals.

The first bulletin and counter card in the series was mailed in June. Succeeding mailings will be made every second month for at least a full year. Continuation beyond this period will depend both upon the reception accorded the series and upon a survey now getting under way, which is expected to show, among other things, the relative effectiveness of the program.

This survey is under the sponsorship of New York University assisted by a grant of funds from the National Cancer Institute. It proposes to measure the extent to which the national educational program directed at pharmacists has stimulated them to recommend medical examination to their patrons presenting possible cancer symptoms. Analysis of the responses of a sampling of druggists before and after the educational program should yield evidence of the value of the program.

The study falls into two phases:

1. The collection and analysis of data covering answers to questions in the following groups:
   a. What complaints, questions, and requests do customers present to pharmacists?
   b. How do pharmacists respond?
   c. What criteria do pharmacists use to suspect cancer?

One hundred pharmacists in each of five cities have been interviewed and the data are now being analyzed.

2. From the analysis of these 500 interviews typical questions will be developed, suggestive of cancer in four sites—gastro-intestinal tract, uterus, larynx, and lower bowel. Anonymous interviewers will visit 1,500 pharmacies and ask one of the typical questions.

Survey areas are being selected which present specific characteristics in relation to size of population, type of population (agrarian or industrial), economic conditions and sectional or geographic differences in the population.

The pharmacies are selected by the random sample technique, to insure the inclusion of both those receiving and not receiving the educational material.

Summary

To utilize more fully the unique opportunities of the pharmacist for dissemination of health information, a cancer education program for pharmacists has been launched by the American Pharmaceutical Association and the Public Health Service. Its features include:

1. Periodic bulletins for pharmacists describing the early signs and symptoms of cancer of certain sites, and reminders to urge prompt medical examination wherever cancer is indicated; counter cards for use with the public, carrying a similar message.

2. Monthly columns in pharmaceutical journals elaborating the theme, and carrying it further by giving facts on developments in research and control.

A survey is now under way to determine the value of such an educational project and to throw light on where improvement is needed.

Should the study prove that the field is as productive as is now hoped, a pattern will have been set for future health-education programs.

Cancer of the Respiratory System in the United States Chromate-producing Industry

By Willard Machle, M. D., and Frederick Gregorius, M. D.[1]

In 1947, the management of one of the large producers of chromates in the United States became concerned with the incidence of lung cancer [2] among their employees. An analysis of the mortality data of this company, carried out by one of the authors (Machle), established the existence of high rates for lung cancer among the workers.[3] With a relationship between lung tumor and employment established in at least one situation in the chromate industry, the remaining members of the industry were apprised of the facts, and the investigation was then extended to include all companies engaged in the production of chromates in the United States.

It is this study we are now reporting—a study initiated by the

[1] 405 Lexington Avenue, New York 17, N. Y.

[2] The terms lung cancer and cancer of the respiratory system are used synonymously except where noted.

[3] Data for the two plants of this company are included in this report.

health committee of the chromate industry and made possible only by their full cooperation. This committee had representation from each of the five companies in the United States now engaged in the production of chromates. We emphasize at the outset that the data and inferences drawn from them apply only to the plants engaged in the extraction of chromates from ore. The geographical location of the seven plants of the five companies and the average census of workers are given below.

Location	*Approximate No. of employees*
Total, all locations	1,445
Glen Falls, N, Y	50
Jersey City, N. J	350
Jersey City, N. J	150
Baltimore, Md	450
Kearny, N. J	135
Newark, N. J	100
Painesville, Ohio	210

The periods for which records are available varied among the plants. Satisfactory data included a total of 11,019 man-years' employment for 6 of the 7 works, Plant A2 being excluded. These man-years yielded, according to the records, 156 deaths among which were 32 cases of cancer of the respiratory system in the total of 46 deaths from all cancers. In addition, 10 cases of lung cancer among 20 deaths from all cancers, and 37 total deaths, were recorded for Plant A2 for which adequate employment records are not available.

Both the exposed populations and the numbers of deaths are small; nonetheless, the ratios of deaths and mortality rates for cancer of the lung are so consistently high as to leave no doubt as to the relationship between exposure to chromates and the occurrence of cancer of the respiratory system. We, therefore, offer the results of this study as a contribution to the epidemiology of occupational cancer.

Hitherto there have been no reports on the incidence of cancer of the respiratory system among workers in the chromate industry in the United States. Experience has been limited to continental Europe where, from 1890 to 1932, the literature carried occasional records of cases of respiratory system tumor associated with exposure to chromates (*1*, *2*). As late as 1932, however, Lehmann maintained that the attack rates were not unduly high and no serious problem existed (*2*). Reports by Pfeil and others in 1935 and 1936 presented, for the first time, sufficient evidence of the existence of a relationship between exposure to chromates and the occurrence of lung cancer (*3*, *4*, *5*, *6*). There were certain limitations to these earlier studies. Many of the cases occurred long after the plants had been closed and in some instances the workers had additional exposure to aniline or polycyclic hydrocarbons suspected of carcinogenic properties. Also,

data on plant populations were insufficient to enable calculation of accurate mortality or morbidity rates. It was evident, nonetheless, that in the period from 1910 to 1936 the incidence of lung tumor was excessive in the populations of the chromate-producing plants. In 1940, Gross reported 38 cases of bronchogenic carcinoma among the 2,000 workers in the German chromate industry (*7*). There are no contributory reports from other countries. Hueper, in 1942, reviewed the European literature and discussed various aspects of the clinical disease (*8*).

Procedure

Since the disease under study was uniformly fatal (until recently) and since a period of latency in the development of disease might be anticipated, a study of mortality data offered the most direct approach. If exposure to chromates were associated with high attack rates for lung cancer, then the expected ratios of deaths by causes should be disturbed. Again, since the disease in question would usually result in death relatively quickly, any abnormal incidence should also be apparent in the mortality rates for the disease. X-ray survey was not considered for the initial study. The plant populations were not large (from 50 to 500), and the attack rates of cancer of the respiratory system in the general population are low (0.09 per 1,000 males), therefore any difference in attack rates due to exposure to chromates would have to be colossal to be elicited by medical survey of the workers currently employed.

Fortunately, the employees of most of the companies had been insured under group life insurance plans for the past 10 to 15 years, making a readily accessible source of information as to occurrence of death and its reported cause. Data from the insurance carriers were obtained and cross-checked with information from other places. The system of checking varied in accordance with the facilities of the company. In all instances personnel files were investigated and reviewed; employment records and medical notes were tabulated. Copies of death certificates were examined when available and records of hospital diagnoses, X-rays and biopsies obtained. Identical criteria for diagnosis were used in all cases, that is, record of necropsy, biopsy, positive X-ray, or other valid clinical data.

There were six or eight patients having clinical courses consistent with the presence of cancer of the respiratory tract and who carried various diagnoses including asthma, pneumonia, myocarditis, and lung abscess. Clinical data on these patients, however, were not definitive and the cases were not included in the group of cancers.

The ratios of deaths and the mortality rates for the chromate workers were compared with those for comparable industrial groups not exposed to chromates.

Owing to the low attack rate of the disease and the small size of the

plant populations, it was necessary to include the mortality data for periods of from 10 to 15 years, when available. Although basic production processes changed little in this time, hygienic conditions in all plants improved greatly. Improvements in equipment, better care and protection of workers have been advancing steadily. This is not, therefore, a static exposure situation. Other factors consequent upon better medical supervision (such as early diagnosis and better identification) were also operating in the period of study, with the result that the higher rates due to better case finding may tend to outweigh any reduction in rates that would be expected as a result of reduced exposure. This, indeed, appears to be the case.

The problem of evaluating (even roughly) the exposure in an operation of 10 or more years ago is difficult and may even be impossible. In many decades of operation this industry has acquired a number of skilled supervisors and technicians with from 25 to 40 years of experience. When interviewed these workers uniformly reported that magnitude of exposure had progressively lessened in the last 15 to 20 years. These reports are supported by the records of installation of ventilation equipment, increased provision of devices for personal protection, segregation of operations, and other measures designed to reduce exposure. Outstanding in the historical accounts has been the abandonment (in the early 1930's) of the use of reverberatory furnaces—a notorious source of exposure.

It is common knowledge that exposure to chromates often results in perforation of the nasal septum. The attack rates and intervals from first employment to appearance of perforation, therefore, were considered as lending themselves to an approximation of severity of exposure in the years for which analytical data were not available. Individual factors may affect markedly the rate and time of onset of septal perforations from chromates. There is, however, suggestive evidence of the existence of a direct relationship between severity of exposure and attack rate for perforations, with less time being required for septal perforation when exposure is greatest. If this assumption is accepted, then in the early years, when exposure was presumed to be highest, there should have been a higher attack rate for septal perforations; and these should have become apparent in a shorter interval than was the case in the later years, when exposure was presumed to be less severe.

Current analytical data and observation establish rather marked differences in exposure for various tasks, and occupational histories were obtained wherever possible. The long periods of time required for development of tumor with the usual advancement in grade, and changes in tasks of workers over a period of years made the occupational histories an array of most assignments in chromate production. These histories were, therefore, of little epidemiological value.

TABLE 1.—*Cancer cases of respiratory system identified in U. S. chromate-producing plants*

Case No.	Age at death	Exposure to chromates: Year begun	Exposure to chromates: Year ended	Duration of exposure (in years)	Date of diagnosis	Interval (in years) from initial exposure to diagnosis of cancer	Date of death	Interval (in months) from diagnosis of cancer to death
COMPANY A1: 3,500 male-years, 1936–46								
1	35	1936	1940	4	Jan. 13, 1940	4	Feb. 21, 1940	1.25
2	39	1934	1944	9	Feb. 3, 1944	9	Apr. 30, 1944	3.00
3	37	1933	1945	12	Oct. 15, 1945	12	Oct. 31, 1945	.50
4	54	1934	1945	11	Aug. 19, 1945	11	July 1, 1946	10.50
5	43	1926	1941	15	June 30, 1941	15	Nov. 29, 1941	5.00
6	37	1928	1939	11	Feb. 10, 1939	11	Mar. 27, 1939	1.50
7	33	1937	[1]1945	6	Aug. 23, 1945	8	Oct. 11, 1945	1.50
8	47	1930	[1]1941	11	Aug. 5, 1941	11	Nov. 18, 1941	3.50
9	56	1933	1944	11	June 14, 1944	11	July 30, 1944	1.50
10	49	1932	1942	10	May 29, 1942	10	Feb. 22, 1943	8.75
11	60	1917	1944	27	July 17, 1944	27	Feb. 1, 1945	6.50
12	55	1923	1940	17	Mar. 8, 1940	17	June 29, 1940	3.75
13	48	1923	1936	14	Dec. 24, 1936	14	May 24, 1937	5.00
14	46	1921	1944	23	Nov. 7, 1944	23	Dec. 25, 1944	1.50
15	47	1935	1944	9	Feb. 15, 1944	9	June 16, 1944	4.00
16	72	1898	1945	47	Nov. 7, 1945	47	June 26, 1946	7.75
17	54	1919	1938	20	Sept. 29, 1938	20	Mar. 8, 1939	5.25
18	41	1929	1945	18	Oct. 19, 1945	18	Dec. 18, 1945	2.00
COMPANY A2 (employment data not available)								
19	57	1918	1945	28	Nov. 7, 1945	28	July 7, 1946	8.00
20	52	1915	[1]1942	27	1942	27	Oct. 24, 1942	
21	64	1902	1944	42	Apr. 15, 1944	42	Nov. 7, 1945	6.75
22	47	1933	1940	7	Nov. 20, 1940	7	Feb. 19, 1941	3.00
23	44	1924	1942	18	1942	18	July 6, 1943	
24	59	1929	1943	17	Jan. 19, 1943	17	Unknown	
25	48	1923	[1]1946	15	Sept. 9, 1946	22	Feb. 8, 1947	5.00
26	63	1931	1946	15	Nov. 10, 1946	15	Nov. 18, 1946	.25
27	57	1913	[1]1940	13	Jan. 9, 1940	27	May 29, 1940	4.75
28	40	1934	1942	9	Aug. 3, 1942	9	Oct. 18, 1942	2.50
COMPANY B: 1,975 male-years, 1933–46								
36	51	1917	1939	22	Unknown	22	Feb. 11, 1939	
37	52	1933	1940	7	do	7	Mar. 5, 1940	
38	61	1919	1941	22	do	22	Oct. 1, 1941	
39	62	1928	1941	13	do	13	Jan. 6, 1941	
40	59	1923	1941	18	do	18	Jan. 17, 1942	
41	62	1927	1945	19	do	19	Sept. 16, 1945	
42	51	1929	1946	17	do	17	May 31, 1946	
COMPANY C: 406 male-years, 1938–47								
No deaths recorded for any cause.								
COMPANY D1: 2,491 male-years, 1930–47								
29	66	1916	1937	20	Unknown	20	Feb. 24, 1937	
30	43	1925	1945	20	do	20	Jan. 8, 1945	
31	52	1939	1947	7	do	7	Mar. 20, 1947	
32	54	1920	1942	22	do	22	Sept. 2, 1942	
33	49	1918	1943	25	do	25	Nov. 1, 1943	
COMPANY D2: 1,853 male-years, 1930–47								
No deaths recorded for cancer of respiratory system.								
COMPANY E: 794 male-years, 1944–47								
34	64	1936	[1]1945	8	Unknown	9	June 21, 1945	
35	60	1932	[1]1944	11	do	11	Dec. 16, 1944	
Mean	51.7			16.6		17.2		4.12
Range	33–72			4–47		4–47		.25–10.50

[1] 7 cases had additional occasional or intermittent exposure. Cases: 7 (1937–38); 8 (1939–40); 20 (1932); 25 (1924–32); 27 (1919–33); 34 (1938); 35 (1939).

Results

Raw Data.—A total of 42 deaths from cancer of the respiratory system was found. Data on the individual cases are given in table 1.

Ratios of Deaths.—Ratios are presented in table 2. The periods taken for study were determined by the lengths of time for which accurate mortality data could be obtained. The shortest interval was 4 years for Company E, the longest, 17 years for Company D. Company C is small and had no deaths in 9 years of operation from 1938 to 1947. Of the 193 deaths in all plants, 66, or 34.2 percent, were due to cancer in any location, a ratio over twice that for a control industrial group. The ranges are, from Plant D2 with a normal ratio of 12.1 percent to Plant A2 with a ratio of 54.1 percent of all deaths (3.5 times the ratio for controls). It is readily apparent from table 2 that these higher ratios for cancer (all sites) are due to an excessive proportion of deaths from cancer of the respiratory system.

TABLE 2.—*Ratios (in percent) of deaths from cancers to total deaths in chromate-producing plants in United States*

Plant	All causes		All cancers		Cancer of respiratory system		
	Number of deaths	Percent of all deaths	Number of deaths	Percent of all deaths	Number of deaths	Percent of all deaths	Percent of all deaths from cancers
Total, chromate-producing plants	193	100.0	66	34.2	42	21.8	63.6
Control group [1]	733	100.0	115	15.7	10	1.4	8.7
A1	55	100.0	19	34.5	18	32.7	94.7
A2	37	100.0	20	54.1	10	27.0	50.0
B	34	100.0	14	41.2	7	20.6	50.0
C	0		0		0		
D1	29	100.0	7	24.1	5	17.2	71.4
D2	33	100.0	4	12.1	0	0	0
E	5	100.0	2	40.0	2	40.0	100.0

[1] Metropolitan Life Insurance Co. industrial policyholders, year 1946.

Except for Plants D2 and C, the problem is common in some degree to all of the industry. Excluding Company C, five of the six plants of the remaining four companies exhibit ratios for deaths from lung cancer of from 13 to 31 times the normal, cancers of the lung, making up from 50 percent to 100 percent of all cancers. Taking the industry as a whole, lung cancers comprised 60 percent of all cancers as compared with an expected ratio of 9 percent.

The ratios of deaths from selected causes in addition to cancer are given in table 3, where the figures for the chromate industry are compared with those for industrial policyholders of the Metropolitan Life Insurance Co. for the first 10 months of 1947. In companies A1, B, and D1, where the cancer rate is high, there is a tendency toward deficiency in ratios of deaths from other causes with the exception of the ratios for tuberculosis, pneumonia, and suicide.

TABLE 3.—*Ratios (in percent) of deaths from selected causes to total deaths, and death rates for selected causes in chromate-producing plants in United States*

Cause	Plant						Control group [1]
	A1	B	C	D1	D2	E	
	Ratio (in percent) of deaths from specified causes to total deaths						
Total, all causes	100.0	100.0	.....	100.0	100.0	100.0	100.0
Heart disease	21.8	14.7	.....	31.0	39.4	20.0	38.0
Cancer, all sites	34.5	41.2	.....	24.1	12.1	40.0	16.3
Cerebral hemorrhage	5.5	0	.....	3.5	9.1	0	9.3
Accident	5.5	8.8	.....	3.5	3.0	40.0	6.2
Nephritis and uremia	1.8	0	.....	0	6.1	0	5.5
Tuberculosis, all forms	10.9	2.9	.....	3.5	3.0	0	4.7
Pneumonia, all forms	7.3	8.8	.....	17.2	9.1	0	3.1
Suicide	5.5	2.9	.....	3.4	0	0	1.0
Syphilis	1.8	3.0	.....	0	0	0	1.0
All other causes	5.4	17.7	.....	13.8	18.2	0	14.9
	Annual number of deaths per 1,000 males						
Total, all causes	15.71	17.22	0	11.64	17.81	6.30	7.28
Heart disease	3.43	2.53	0	3.61	7.01	1.26	2.38
Cancer, all sites	5.43	7.09	0	2.81	2.16	2.52	1.19
Cerebral hemorrhage	.86	0	0	.40	1.62	0	.68
Accident	.86	1.52	0	.40	.54	2.52	.45
Nephritis and uremia	.28	0	0	0	1.08	0	.40
Tuberculosis, all forms	1.71	.51	0	.40	.54	0	.35
Pneumonia, all forms	1.14	1.52	0	2.01	1.62	0	.23
Suicide	.86	.51	0	.40	0	0	.07
Syphilis	.28	.50	0	0	0	0	.07
All other causes	.86	3.04	0	1.61	3.24	0	1.46
Male-years	3,500	1,975	406	2,491	1,853	794	[2]
Period	1936–46	1933–46	1938–47	1930–47	1930–47	1944–47	[2]

[1] Metropolitan Life Insurance Co. industrial policyholders.
[2] Over 100,000, 10 months, 1947.

With the exception of Plant E, which had only five reported deaths, the ratios for pneumonia are consistently higher than the control group. This difference becomes less significant when one recognizes that the low ratios for the control group are for 1947 while those for the chromate group cover much earlier periods. The difference in ratios for suicide is perhaps more significant but since we have no data on state of health prior to suicide, the cause of these differences (if real) must remain conjectural.

Mortality Rates.—Comparison of death rates for selected causes is made in table 4. The excessive rates for cancer (all sites) are readily apparent and are common to all plants. Rates for cancer of the digestive tract are excessive in Plants B and D2. The low rates for cancer of the digestive tract in A1 and D1 are associated with high rates for lung tumor but this inverse association between cancer of the lung, and cancer of the digestive tract is not common to all companies since there are high rates for both in Plant B. Three of five plants exhibit high rates for cancers of the oral region, nose, and pharynx. The number of cases is small, however, and rates are not conclusive.

The outstanding distortion of rates results from the excessive rate

TABLE 4.—*Cancer death-rates by site and broad age group in chromate-producing plants in United States*

Plant	Annual number of deaths per 1,000 males					Male years	Period
	All sites	Site					
		Respiratory system		Digestive tract	Other		
		Bronchi and lungs	Oral region				
	All ages						
Total, chromate-producing plants [1]	4.17	2.63	0.27	1.18	0.09	11,019	
Control group [2]	0.78	.09	.05	.59	.05	60,000	1933–38
A1	5.43	4.86	.28	.29	0	3,500	1936–46
B	7.09	3.04	.50	3.04	.51	1,975	1933–46
C	0	0	0	0	0	406	1938–47
D1	2.81	1.61	.40	.80	0	2,491	1930–47
D2	2.16	0	0	2.16	0	1,853	1930–47
E	2.52	2.52	0	0	0	794	1944–47
	50 years of age and under						
Total, chromate-producing plants [3]	2.67	1.97	0	0.70	0	7,112	
Control group [2]	0.37	.05	0	.28	.04	46,000	1933–38
A1	4.38	4.04	0	.34	0	2,970	1936–46
B	0.81	0	0	.81	0	1,240	1933–46
D1	1.81	1.21	0	.60	0	1,654	1930–47
D2	1.60	0	0	1.60	0	1,248	1930–47
	Over 50 years of age						
Total, chromate-producing plants [3]	9.24	4.80	1.11	2.96	0.37	2,707	
Control group [2]	2.13	.22	.22	1.62	.07	14,000	1933–38
A1	11.32	9.43	1.89	0	0	530	1936–46
B	17.69	8.17	1.36	6.80	1.36	735	1933–46
D1	4.78	2.39	1.19	1.20	0	837	1930–47
D2	3.31	0	0	3.31	0	605	1930–47

[1] Plant A2 is not included since adequate employment data are not available.
[2] Data from table 2 *in* Gafafer, W. M., and Sitgreaves, R.: Disabling morbidity, and mortality from cancer among the male employees of an oil refining company with reference to age, site, and duration, 1933–38, inclusive. Pub. Health Rep. 55: 1517 (1940). (Reprint No. 2192.)
[3] Plants A2, C, and E are not included, adequate data on age being unavailable for Plant C and E.

for cancer of the bronchi and lungs. With the exception of Plant D2, the rates are greatly in excess of normal—from 18 to 50 times.

For the group 50 years of age and under (table 4), the over-all cancer rate ranges from 2 to 11 times the normal. For the ages over 50, the rates for cancer, all sites, range from 1½ to 8 times normal. The rates for cancer of the bronchi and lungs in this group range from 10 to 43 times that for the comparable industrial group (except for Plants D2 and C). High rates for cancer of the respiratory system are common to both age groups; the ranges of excess, however, are unequal in the two groups. Despite the small number of deaths from lung cancer in the group 50 years of age and under, the rates are from 20 to 70 times that for the control population, the excess being almost twice that exhibited by the group over 50 years of age.

Etiology

Process.—The chromium-bearing spinel, chromite ($FeO.Cr_2O_3$) is the raw material used by all companies. The general processing pattern is given in figure 1. The chemistry and principles of operation for all companies are essentially the same. There are great differences in equipment, segregation of operations, and handling

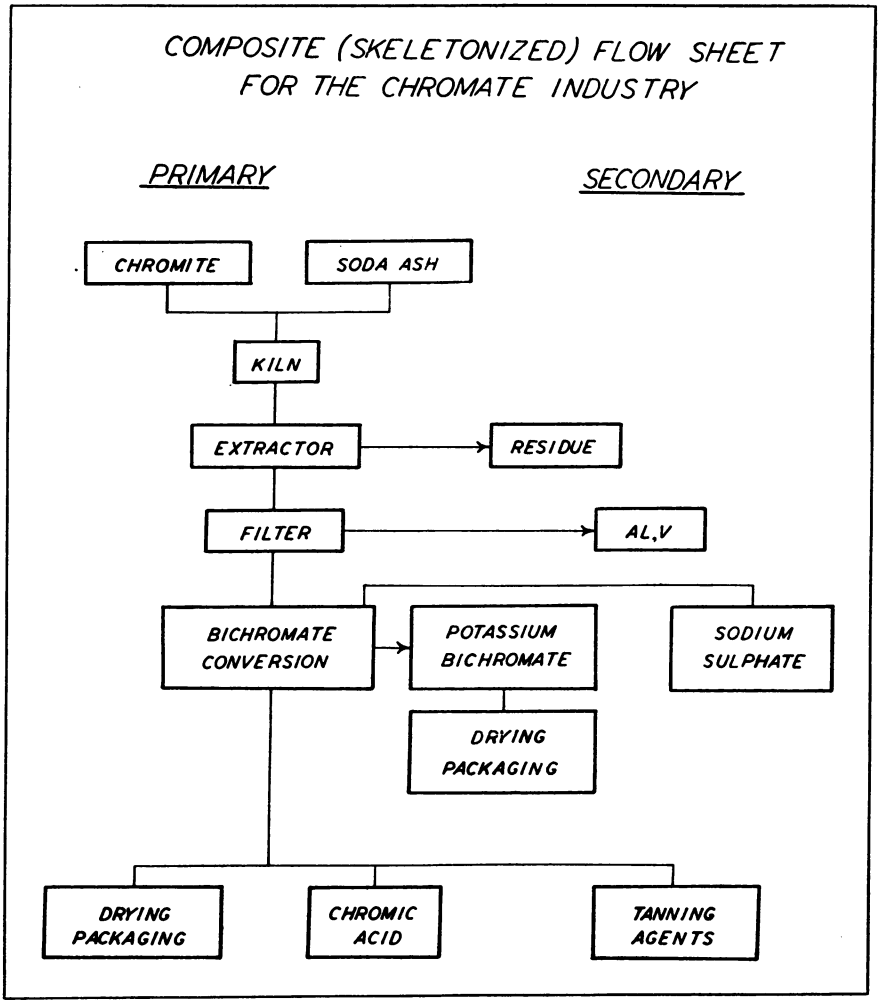

FIGURE 1

methods. These merely result in certain differences in magnitude, source, and distribution of exposure—from an hygienic point of view they are similar in chemistry and procedure.

The ore is fused with an alkaline carbonate to advance the valence and the (usual) sodium chromate extracted. Other products such as

bichromates or chromic acid are prepared from the chromate by acidification, or tanning materials are produced by reduction of the bichromate.

Compounds—A situation of considerable interest exists as a result of the separation of operations between Plants 1 and 2 of Company D, this segregation being associated with noteworthy differences in rates for both nasal perforation and lung cancer. In Plant D1 the nasal perforation rate was 43.5 percent as compared with a rate of 15.2 percent for Plant D2 (table 5). Seventeen percent of all deaths

TABLE 5.—*Attack rates of nasal irritation and septal perforation in two chromate-producing plants of Company D*

Item	Plant D1		Plant D2	
	Number	Percent	Number	Percent
Total, all employees	361		236	
Total, known information	354	100.0	236	100.0
Irritation	35	9.9	34	14.4
Perforation	154	43.5	36	15.2
No complaints	165	46.6	166	70.4
No information	7		0	

in Plant D1 were from cancer of the respiratory system as compared with none in Plant D2 (table 2). Both plant populations were similar with respect to age distribution, exposure history, color, geographical location, and were not greatly different in size (1,853 versus 2,491 male-years for the 17-year sample) (table 4). An obvious difference in exposure might exist at the two locations. There were regrettably no analytical data by which properly to evaluate any such differences. If data for nasal irritation and septal perforation is used to estimate the exposure in a rough fashion, a significant difference is found in the rates for the two plants (table 5) and this may be taken as evidence that the magnitudes of exposure were different, with resulting differences in ensuing effect. However, the differences in perforation rate exist only in degree, whereas there is a definite line of cleavage between the compounds handled in the two plants. These are best shown by the following tabulation:

Plant 1	*Plant 2*
Chromite	----
Soda ash	----
Fused mixture	----
Sodium chromate	----
Sodium bichromate →*transfer in solution*←	Sodium bichromate
Sodium sulphate	Chromic acid
Sulphuric acid	Basic chromic sulphate
	Sulphuric acid

Viewing the above, it is apparent that the use of septal perforation rates for measuring differences in magnitude of exposure between the two plants is not justifiable, since if perchance different compounds

of chromium had different capacities to produce cancer, they might also have similar or related activities in causing perforations. One fact emerges, though. In Plant D2 where the significant exposure was restricted to that from bichromates and chromic acid, no cancer of the respiratory system occurred, whereas the population of Plant D1 experienced rates 18 times the normal in the whole industry (table 4).

Two important inferences may be drawn from the foregoing: first, exposure to certain compounds of chromium is not necessarily associated with high rates for lung cancer; and second, the mere occurrence of nasal irritation and septal perforation does not imply that exposure to the compounds of chromium has been significant in causing cancer—perforations may occur without associated high rates for lung cancer.

Evidence from Plants D1 and D2 further suggests that the carcinogenic compounds of chromium are the monochromates. Soda ash is widely used in industry without suspicion of causing cancer. Chromite is a highly insoluble compound. Exposure to it, moreover, is limited to very few men in the processing, whereas cancer of the lung is widely distributed in the occupations entailing exposure to monochromates. The bichromate exposure is common to both operations; the drying and packaging (which usually results in the greatest exposure) are done in Plant D2, where there was no lung cancer. The chromic acid and basic chromic sulphate, the trivalent chromium compound, are limited to Plant D2, hence it does not appear that they possess carcinogenic properties. The fact that exposure to chromic acid and the bichromates, though capable of causing perforation of the nasal septum, did not result in cancer of the respiratory system is of considerable importance from the point of view of hazard to users of bichromates, and chromic acid.

Intensity of Exposure.—No data on magnitudes of exposure were available prior to 1941 and information obtained at that time is not complete. It is, therefore, not possible to make any inter-plant comparisons. In any one plant, however, the analytical data will serve for rough comparison of exposure at the various operations and loca-

TABLE 6.—*Concentration of chromates in air (mgm./m3) by location in chromate-producing plants in United States*

Location	Range of concentrations in specified plant (available data)			
	A1	C	D1	E
Kilns and mills	0.06–1.00	0.30–2.80	0.80–4.60	0.01– 1.40
Dryers	.20	.04	.34	.25
Packing	– .20			5.0 –21.0
General air	.02–1.00		.04	.003
Concentrators	.02– .20	.02	2.17	1.3 – .28
Granulators	.03– .57	.01– .73		.12– .14

tions. As mentioned above, one cannot associate tumor rates with tasks, because of shifting of personnel and the generally insufficient records of work assignments over the period of years. Inspection of table 6, in which a summary of analytical data is presented, reveals significant and rather consistent differences in exposure for the various operations. Analytical data needed for control purposes are now being regularly gathered in all plants. When the carcinogenic attributes of the various compounds have been established, the accumulated information will be of importance. At present data on severity of exposure, whether derived from observation, air analyses, or occupation, cannot be applied epidemiologically.

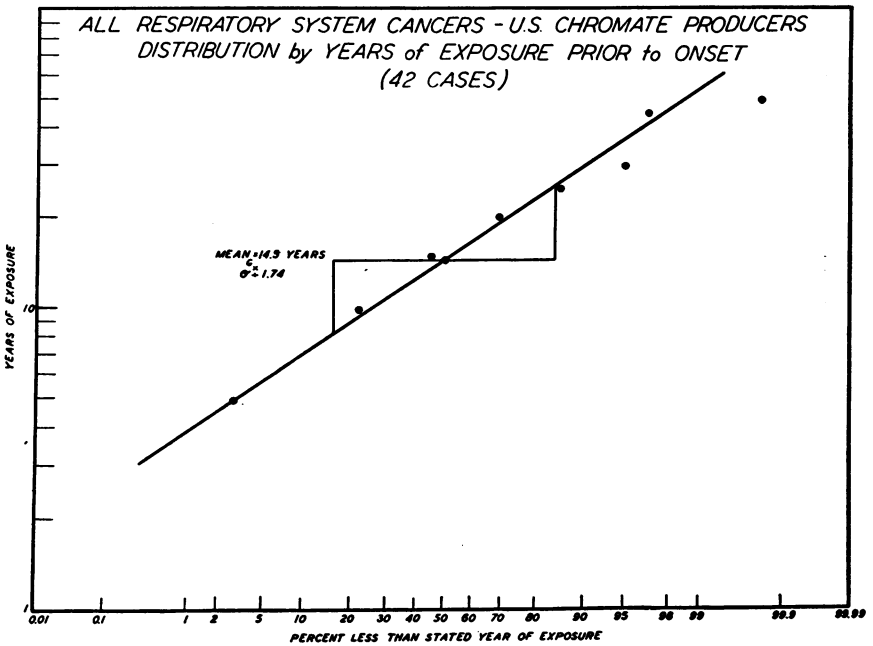

FIGURE 2.—Cumulative distribution (in percent) of 42 cases of cancer of respiratory system identified in chromate-producing plants in United States according to years of exposure. (Normal probability paper, logarithmic vertical scale.)

Duration of Exposure.—Employment records were good, and meaningful data was available on the relationship between duration of exposure and occurrence of disease. These are given in figure 2 and in table 1. The mean duration of exposure prior to onset was 14.5 years. There were too few cases to permit valid inter-company comparisons. The data in figure 2 may be compared with those in figure 3 which gives the mean duration of exposure (15 years) for the 39 cases collected from the German literature.

Contributing Factors.—Data were insufficient to enable statistically valid arrays on the bases of age, sex, color, rate, constitutional types, heredity, occurrence of other diseases which might have contributed

to knowledge of etiology. No history of exposure to other known potential carcinogens was obtained in any case.

Clinical Characteristics.—Insufficient data were obtainable to permit conclusions or comment upon symptoms, signs, therapeutic measures, pathology, and the like. Data on clinical course (duration of disease) lead to erroneous inferences, the short intervals between diagnosis and death noted in table 1 being the result of the manner of keeping insurance records—the patient was retained on the rolls as an employee until the date of death.

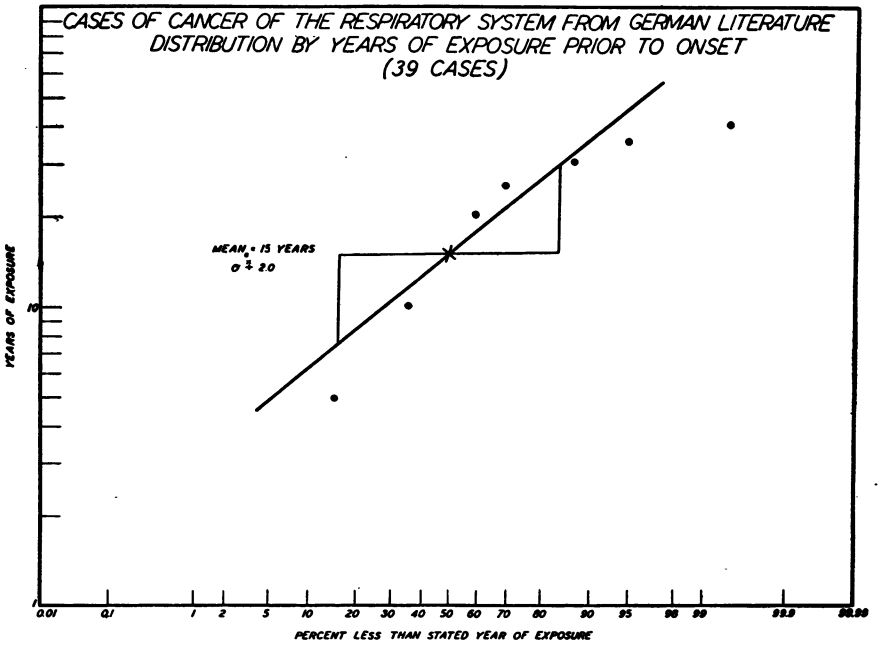

FIGURE 3.—Cumulative distribution (in percent) of 39 cases of cancer of respiratory system from German literature according to years of exposure. (Normal probability paper, logarithmic vertical scale.)

Summary

Analysis of mortality data of the chromate-producing industry in the United States reveals a high death rate for cancer of the respiratory system among exposed employees. The following points are of special interest:

1. Twenty-one and eight-tenths percent of all deaths in the chromate industry were reported as being due to cancer of the respiratory system. This ratio is 16 times the expected ratio of 1.3 percent. The individual ratios in five of the six plants ranged from 13 to 31 times the normal.

2. The crude death rate for cancer of the lung was 25 times the normal—the range of excess for the various plants being from 18- to 50-fold.

3. In 5 of 6 plants the death rates for lung cancer in the group 50 years of age and under ranged from 20 to 70 times that for a comparable industrial group.

4. The mortality rates for lung cancer at ages over 50 years ranged from 10 to 40 times that for a comparable industrial group.

5. The high rate for cancer of the respiratory system results in a high rate in the industry for "cancer—all forms." Due to the small number of deaths, there are no convincingly significant or consistent abnormalities in the rates for cancer in sites other than the lung. From the data at hand, it would appear that the problem in the chromate industry is limited to the cancers of the respiratory system. Although 66 of the 193 deaths in our group and period of study were due to cancer (a ratio of 34.2 percent), 42 of the deaths were from cancers of the lung. If these are excluded from consideration, then the ratio of deaths from all other cancers becomes 12.4 percent for the chromate industry—a ratio slightly less than that for a comparable industrial group (15 percent).

6. One plant handling only bichromates, chromic acid, and a tanning compound had an experience of 1,853 male-years of exposure with 33 deaths, none of which was due to cancer of the respiratory system. This experience suggests that the monochromates may be the compounds responsible for lung cancer.

7. The occurrence of nasal irritation and perforation does not necessarily imply exposure to kinds and quantities of chromium compounds capable of producing lung cancer. Rates for nasal irritation of 14.4 percent and for septal perforation of 15.2 percent may occur among exposed workers with no lung cancer reported.

ACKNOWLEDGMENT

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A Half Century of State Cancer Legislation

By Austin V. Deibert, M. D., *Chief, Cancer Control Branch, National Cancer Institute* [1]

The year 1948 marks a half century since the first State cancer legislation was enacted in this country. So it seems appropriate to review briefly the State legislation that has been enacted during this period.

The first State to give legislative recognition to the cancer problem was New York. In 1898 the legislature of that State inserted an item in the State supply bill which read: "For the faculty of the medical department of the University of Buffalo for the equipment and maintenance of a laboratory to be devoted to an investigation into the causes, nature, mortality rate, and treatment of cancer; and the salaries of officials of the same, ten thousand dollars. . . ." [2]

Massachusetts became the second State to take legislative action on the cancer problem. In 1919 the legislature of that State authorized the State Department of Health to spend $3,000 "for the purpose of gathering information about the prevalence of cancer and for the purpose of prevention and control of this disease".[3]

Led by New York and Massachusetts, two-thirds of the States now have enacted legislation dealing with cancer. In several States the original legislation has been replaced by new and more comprehensive laws. Several States have enacted laws similar to those adopted earlier in other States and in one instance (Connecticut and Maine) identical laws have been enacted. But for the most part, the legislation presents great diversity, and shows that men, if given a choice, will approach the solution of their problems in different ways.

The diversity in these laws makes any hard and fast classification difficult, but for convenience in discussion they have been arranged in six groups.

I. States with specific cancer laws establishing some type of permanent cancer program in the State Health Department

Twelve States [4] and Puerto Rico have legislation directing their health departments to conduct cancer programs on a continuing basis.

Massachusetts and New York, two of the States with the longest history of cancer control, initiated their permanent programs with laws establishing State cancer hospitals. The Massachusetts law directs the State health department to provide hospital facilities for

[1] Material assembled and analyzed by Ora Marshino, J. D., Cancer Reports Section.

[2] Laws of the State of New York, 1898, Chap. 606, p. 1449.

[3] Cancer Control—The What, Whither, How, p. 3., The Committee on Publication, 483 Beacon St., Boston, Mass.

[4] Alabama, Connecticut, Florida, Georgia, Illinois, Maine, Massachusetts, New York, North Carolina, Rhode Island, South Carolina, West Virginia.

the "care and treatment" of persons suffering from cancer, to establish and maintain cancer clinics in such parts of the State as it deems most advantageous to the public health, and to otherwise provide services and treatment for cancer. An amendment to the basic law states that "providing treatment" shall include transportation or the reasonable cost of transportation to and from the place where treatment is given, whenever the patient is not able to pay for such transportation. The law includes authority to make the necessary rules and regulations concerning the admission of patients to the hospitals or clinics. It also contains a number of provisions concerning the responsibility of persons or local governments for the cost of caring for a patient at the State-operated cancer hospitals. It outlines the procedure for recovering these charges in the event that the patient is unable to pay and other persons, or his place of settlement, are properly liable for them. (See Section IV, p. 1133, for reference to another Massachusetts law.)

The present cancer law of New York is a product of 50 years' growth and frequent amendment. Its chief provisions are:

> The State Department of Health shall have the management and control of the State cancer hospital,[5] now known as the Roswell Park Memorial Institute, to which patients are admitted free of charge under regulations established by the State commissioner of health.
>
> Investigations of the cause, mortality rate, treatment, prevention and cure of cancer and allied diseases shall be conducted at the institute.
>
> The commissioner of health shall conduct investigations of various phases of the cancer problem and cooperate with local health authorities, physicians and other agencies in the development of suitable facilities for the diagnosis, treatment, and control of the disease.

Other provisions of the law deal with administrative matters pertaining to the State cancer hospital.

The laws of Connecticut and Maine are identical and consist of one provision authorizing the State Department of Health to make investigations concerning cancer including mortality, prevention and treatment, and to take such action as it may deem necessary to bring about a reduction in the cancer mortality.

The Illinois law authorizes the Department of Public Health to establish a division of cancer control "to promote necessary measures to reduce the mortality from cancer." The law states that there shall be a "Chief of Division of Cancer Control" in the Department of Public Health, and an Advisory Board to the division. Other

[5] The State cancer hospital, originally known as the State Institute for the Study of Malignant Diseases, was established in 1911 under the direction of a board of trustees.

provisions relate to the appointment, term of office, etc., of the chief and the advisory board, and the acceptance and expenditure of voluntary contributions.

The cancer law of Puerto Rico provides for the establishment of a Cancer Institute under the jurisdiction of the Insular Department of Health, to consist of a hospital for diagnosis and treatment of and research in cancer; a dispensary for the examination and treatment of ambulatory cases; a research laboratory; and an office to carry on educational work. Pending establishment of the Institute, the commissioner of health may contract with private organizations for the immediate treatment of cancer cases urgently in need of assistance.

Seven of these States with continuing legislation—Alabama, Florida, Georgia, North Carolina, Rhode Island, South Carolina, and West Virginia—have laws which vary in some respects but provide for essentially the same types of activities. In essence, the laws of these States provide that the State Health Department shall: (a) Formulate a plan for the care and treatment of, and furnish financial assistance to "indigent" (Alabama, Florida, Georgia, Rhode Island, South Carolina), or "low-income" (North Carolina), or "needy" (West Virginia) cancer patients in obtaining necessary care. In all instances the department has the power to make rules and regulations specifying the extent of the aid and the conditions under which it will be given; (b) designate the location of and set up standards for the organization, equipment, and conduct of cancer services; (c) formulate and put into effect an informational program for lay and professional groups.

In addition, the West Virginia law creates a division of cancer control in the State Department of Health;[6] provides for free tissue diagnosis for needy cancer patients; and provides for the follow-up of cancer patients to determine "the progress of the disease and the success of the treatment." Unusual provisions contained in the North Carolina law require the State Board of Health to compile, tabulate, and preserve statistical, clinical, and other records relating to the prevention and cure of cancer, and specify certain requirements to be met by "any clinic, group, organization, or department set up, established, or sponsored by the State Board of Health" under the terms of the act. The Georgia, North Carolina, and South Carolina laws authorize the departments to accept gifts for the cancer program.

Florida is the only one of these seven States in which the law does not specify that the health department shall cooperate with the State Medical Society in carrying out the cancer program. The North Carolina law assures geographical representation on the committee from the State medical society by specifying that it shall consist of one physician from each congressional district.

[6] Other States in this group have such divisions created by the health department under its general powers.

At least two of the States, North Carolina, and West Virginia, mention that health authorities may cooperate with public welfare or public assistance agencies in determining the eligibility of cancer patients for financial assistance.

II. States with specific laws making appropriations for cancer, or items for this purpose inserted in general appropriation acts

The health departments of eight States [7] and the District of Columbia have received their only legislative directives concerning cancer through acts making appropriations for cancer activities. In this way they are similar to the early cancer programs of New York and Massachusetts. Delaware and Pennsylvania passed specific appropriation acts for this purpose. The first act passed in Delaware provided that the funds were to be used "for the detection of cancer, for research in cancer, and for other purposes related to cancer prevention and control." The Pennsylvania law provided that the funds were to be used for research "to determine the cause, mortality rate, methods of treatment, prevention, and cure of cancer and allied diseases including the nature and extent of the facilities available to the several counties and cities of the State for the diagnosis and treatment of these diseases."

In the States where the legislatures have included cancer items in the laws making appropriations for the State health departments, two, Kentucky and Mississippi, have given specific directives as to the activities to be conducted. In the other four, Iowa, Kansas, Michigan, and Virginia, the funds merely have been designated for "cancer control." In Kentucky, the current appropriation item reads "Kentucky Division of Women's Field Army of the American Cancer Society for ordinary recurring expenses and for educational purposes in connection with control of cancer, for care of indigent cancer patients and for control of cancer under the supervision of the State Board of Health." In Mississippi the funds are designated for Statewide "education work and diagnostic and treatment facilities in cancer control."

In the District of Columbia where the health department receives a lump-sum appropriation for operating expenses, the only guide for spending the money for cancer control was this phrase in the 1947 appropriation act—"the establishment of a cancer control project."

Although several States with this type of legislation have extensive programs, it should be noted that these programs lack assurance of continuity that is provided by a law conferring permanent responsibility for a cancer program on some State agency.

[7] Delaware, Iowa, Kansas, Kentucky, Michigan, Mississippi, Pennsylvania, and Virginia.

III. States with laws creating a State Cancer Commission

Four States, Arkansas, Missouri, New Hampshire, and Vermont, have passed laws establishing State Cancer Commissions. The laws of Arkansas, New Hampshire and Vermont give their cancer commissions the authority to conduct cancer clinics wherever they deem them desirable; to provide free care for indigent cancer patients, and, to a limited extent, to patients who are not wholly indigent but who are unable to provide adequate care for themselves; and to make studies of the cancer situation in their respective States. The Commission in Arkansas has additional authority to engage in a program of cancer education.

The law establishing the State Cancer Commission of Missouri deals principally with the establishment of a State cancer hospital, matters related to its administration, and procedures to be followed in determining eligibility for admission. The only power conferred on the commission, other than those relating to the hospital, is authority to establish cancer clinics in the larger cities of the State on request of local medical societies. The law sets up certain minimum standards to which the clinics must conform, but leaves their administration to committees appointed by the local medical organizations.

IV. States with laws establishing cancer activities or facilities under the jurisdiction of the State University

Only one State, Texas, has passed legislation establishing a State cancer program under the jurisdiction of the State University. However, several other State legislatures have authorized the State university to carry on some specific cancer control activity or have placed a cancer facility under the jurisdiction of the State university. In South Carolina such responsibility has been placed on the State Medical College.

The Texas law established a State cancer hospital and a division of cancer research under the control and management of the University of Texas. It also authorized the University to establish and maintain diagnostic and treatment substations wherever it was deemed desirable. Both the institutions and the substations must be devoted to the diagnosis, teaching, study, prevention, and treatment of neoplastic and allied diseases. The acceptance of gifts to be used for the purposes of the law also was authorized. Other provisions of the law deal chiefly with administrative matters involved in the operation of the institutions and substations.

The California and Wisconsin legislatures have made specific appropriations to their State universities for the purpose of carrying on cancer research. The legislation in California is particularly noteworthy because of the size of the appropriation—$250,000 for the two years ending June 30, 1949.

The Massachusetts legislature in 1947, apparently anticipating the availability of Federal funds under the Federal Hospital Survey and Construction Act, passed a law authorizing the construction of a building by the University of Massachusetts at Amherst, which, among other things, would provide suitable clinical facilities for the carrying out of cancer and other programs by the State public health department.

The South Carolina legislature at its 1947 session passed a law establishing a State-wide cancer clinic at the Medical College of South Carolina. The clinic is to be considered one of the departments or subdivisions of the medical college and is under the jurisdiction of its board of trustees. It is intended to provide care for medically indigent cancer patients. The law goes into detail concerning matters involved in the administration of the clinic, states the conditions under which patients may be admitted, and authorizes an appropriation of $500,000 to be expended within a period of ten years.

V. Laws making cancer a reportable disease

Five States, Idaho, Nevada, New York, Rhode Island, and Wisconsin, have passed laws which make cancer a reportable disease. In New York, Rhode Island and Wisconsin, the subject is taken up in some detail by separate sections of the public health laws. In Idaho and Nevada, cancer is listed among the reportable diseases in the sections of the law dealing with this subject. Cancer is also a reportable disease in Alabama, Arkansas, Colorado, Delaware, Florida, Georgia, Kansas, Kentucky, Louisiana, Mississippi, Montana, New Mexico, North Dakota, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, and Utah, but has been made so by health department regulation, not by legislative enactment.

VI. Miscellaneous

Four States, California, Illinois, Mississippi, and Oregon, have passed laws relating to cancer which do not fall under any of the above headings and which as a group cannot be classified under any single definitive title.

The Legislature of California, at its session in 1947, passed a resolution requesting and directing the State department of public health to investigate the cancer problem and report the results of its investigations to the 1949 legislature, with the recommendations as to the type and costs of the program that should be instituted.

A law passed in Illinois in 1943, as amended at subsequent sessions of the legislature, authorizes counties to levy a tax to raise funds for the treatment of persons afflicted with cancer and unable to pay for their own care. The adoption of the plan is entirely optional with

the counties. If adopted, the plan is administered by the local authorities. The law contains several provisions relating to administrative features of the activity.

A Mississippi law, passed in 1946 "to provide for the treatment of charity patients who have cancer," liberalizes the provisions of an earlier law providing medical care for charity patients in general. The new law permits charity patients who have cancer to be cared for in hospitals other than those receiving State funds if they cannot receive proper care for cancer in such State-aided hospitals. It also permits the commission administering the medical relief funds to pay a higher per diem allowance for cancer patients (when necessary) than the general rates established by the earlier law.

An Oregon law passed in 1947 designates the State Board of Health as the agency to receive grants from the Federal Government for promoting public health and the prevention of disease. It specifically mentions "grants for cancer control," and directs that, so far as possible, plans for such programs should be made State-wide in application.

This review serves to show the extent and the nature of the State cancer legislation passed from 1898 to 1948. During this period the legislatures of 32 States and Puerto Rico have passed a variety of laws providing for some type of cancer control activities in their respective jurisdictions and authority has been given by the Federal Congress for a cancer project in the District of Columbia.

It is not the purpose of this review to discuss the merits of these respective laws or their results in terms of the activities developed under them. It seems pertinent, however, to call attention to the importance of State cancer legislation in general as a factor in the development and stability of a cancer program.

The passage of a State cancer law is by no means a necessary factor in such a program, as is well illustrated by the programs which some States have developed under the general authority of the State health department. There is no question, however, but that specific cancer legislation has been a powerful stimulant in the initiation and continuity of many State programs. A basic cancer law gives the program direction and stability which may be lacking when it is based only on the general authority of the administrative agency, or on authority to spend a special appropriation which expires at a specified date. Also, in the absence of any legislative direction, the decision as to types of cancer activities to be carried on by an official agency is left entirely in the hands of the administrative officers. These decisions vary with the wisdom, interest, training and experience of the persons involved. They also are subject to change, for better or worse, with changes in the agency's personnel.

While granting that the administration of any cancer program will vary from State to State, in accordance with local conditions, it must be admitted that certain basic activities should be included in all well-rounded programs. These essentials have been described by the National Advisory Cancer Council [8] as follows:

> Statistical research to determine the nature and extent of the cancer problem in the State and to evaluate the results of activities.
>
> Educational activities for the public and all professional groups concerned in the detection, diagnosis, and treatment of cancer.
>
> Activities to provide adequate detection, diagnostic, and treatment facilities and services accessible to persons of all economic groups in all sections of the State, including facilities for care of the terminal case either at home or in an institution.

The report also points out that a complete State cancer service calls for integration of effort by all organizations and individuals concerned.

A State which wants a stable cancer program, including at least all the features described in the Council's report, can achieve it only by enacting legislation which places the directive and the authority on the executive branch of the government.

[8] Cancer Facilities and Services: A Report from the National Advisory Cancer Council. Part II. Basic Elements of a Cancer Program. J. Nat. Cancer Inst., Vol. 6, No. 5, April 1946.

INCIDENCE 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 AUGUST 7, 1948

Summary

A slight net increase was recorded during the week in the incidence of poliomyelitis—from 1,215 last week to 1,239 for the current week, as compared with 1,284 for the corresponding week in 1946 and a 5-year (1943–47) median of 474. Of 32 States reporting currently 10 or more cases each, 21 showed an increase from 385 to 572, 10 (including North Carolina, Texas, and California) reported a decline (751 to 601), and one, Wisconsin, reported 15 cases for each week. The 19 States reporting 20 or more cases each for the current week are as follows (last week's figures in parentheses): *Increases*—New York 65 (51), New Jersey 32 (21), Pennsylvania 29 (24), Ohio 57 (44), Indiana 23 (19), Illinois 57 (32), Michigan 28 (18), Minnesota 63 (38), Nebraska 29 (28), Kansas 21 (8), Kentucky 20 (11), Tennessee 31 (28); *decreases*—Iowa 34 (47), Virginia 36 (42), North Carolina 179 (212), South Carolina 26 (50), Oklahoma 23 (33), Texas 81 (82), California 177 (224). The total number of cases reported since March 20 (approximate average date of seasonal low incidence in past years) is 6,687 cases, as compared with 4,983 for the corresponding period in 1946, 1,355 for the same period last year, and a 5-year median of 2,516.

One case of anthrax was reported during the week, in South Dakota, and 1 case of smallpox, in Ohio. Of 38 cases of Rocky Mountain spotted fever reported (last week 32, 5-year median 40), 25 occurred in the South Atlantic Area, 6 in New York, 4 in Tennessee, and 1 each in Ohio, Illinois, and Kentucky.

A total of 8,216 deaths was recorded during the week in 93 large cities in the United States, as compared with 8,295 last week, 8,577 and 7,866, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 7,919. The cumulative figure is 301,075, as compared with 301,332 for the corresponding period last year. Infant deaths totaled 671, as compared with 691 last week and a 3-year median of 668. The total for the year to date is 21,496, as compared with 24,126 for the same period last year.

Telegraphic case reports from State health officers for week ended Aug. 7, 1948

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Measles	Meningitis, meningococcus	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough
NEW ENGLAND										
Maine			76	2	1		6			1
New Hampshire	[d]		4							
Vermont			6							
Massachusetts	5		236	2	10		15		2	42
Rhode Island			1				1			7
Connecticut			44	2	12		5			5
MIDDLE ATLANTIC										
New York	4		393	5	65	6	[b] 35		4	124
New Jersey	2		228	2	32		5		3	62
Pennsylvania	1		114	3	29		26		5	76
EAST NORTH CENTRAL										
Ohio	9		54	2	57	1	38		4	36
Indiana	5	1			23		8	1	2	13
Illinois	1	2	41		57	1	18	3	4	39
Michigan [a]			141	3	28		18	1	2	13
Wisconsin			234	2	15		10		1	45
WEST NORTH CENTRAL										
Minnesota	2		3	1	63		12			11
Iowa	1	2	6	2	34		3			8
Missouri	1		12		11		4	5	3	
North Dakota			2		4		1			1
South Dakota	2		6		10					1
Nebraska	1		9		29		15			1
Kansas	4		11		21		2			15
SOUTH ATLANTIC										
Delaware	1		1		16					3
Maryland [a]	4		119	1	6	5	3		1	15
District of Columbia			8		10	2	3			10
Virginia		1	13	2	36	9	1	2	5	24
West Virginia	8		2		16	1	3			4
North Carolina	7		11	1	179	8	3		1	44
South Carolina	5		11		26		4		6	54
Georgia	7		1	1	18		3	2	6	2
Florida	4		15		16		4		3	10
EAST SOUTH CENTRAL										
Kentucky	4		24		20	1	6		6	15
Tennessee	4	5	18	5	31	4	11	1	7	18
Alabama	4		8	2	18		4		5	21
Mississippi [a]	6	2	5	1	5		2		5	1
WEST SOUTH CENTRAL										
Arkansas			5	1	8		1	3	4	7
Louisiana			3		10				7	
Oklahoma	2		6	1	23		1		1	4
Texas	18		205	3	81		10	2	11	123
MOUNTAIN										
Montana			19				3			3
Idaho		1	12		3		[b] 5		1	1
Wyoming			2		3		1			7
Colorado	2		56	2	6		3		1	9
New Mexico			16		[d] 4				2	5
Arizona		1	18		2					11
Utah [a]	7		57		4					3
Nevada					1					
PACIFIC										
Washington	2		45		15		4			6
Oregon			49	1	4		3			43
California	3	4	218	10	177		16		5	31
Total	126	19	2,568	57	1,239	38	316	20	107	974
Median, 1943–47	190	19	1,387	123	474	40	744	16	179	3,000
Year to date, 31 weeks	5,043	294	545,980	2,178	7,037	356	55,261	619	1,958	55,549
Median, 1943–47	6,888	338	533,746	6,004	2,913	323	96,206	564	2,485	79,405
Seasonal low week ends	July 10		Sept. 4	Sept. 18	Mar. 20		Aug. 14		Mar. 20	Oct. 2
Since seasonal low week	431		580,926	2,960	6,687		77,900		1,485	86,815
Median, 1943–47	669		571,759	8,456	2,516		134,527		1,861	101,452

[a] Period ended earlier than Saturday. [b] Including cases reported as streptococcal infections and septic sore throat. [c] Including paratyphoid fever and salmonella infections; currently reported separately, as follows: Massachusetts (salmonella infection) 1; Michigan (salmonella infection) 2; New York 1; New Jersey 1; Ohio 1; Indiana 1; Illinois 1; Missouri 1; Virginia 1; Georgia 1; Kentucky 1; Texas 1; New Mexico 1; California 3. [d] Corrections: Week ended July 24—New Hampshire, diphtheria, no cases (instead of 2); New Mexico, poliomyelitis, 6 cases (instead of 7).

Anthrax: South Dakota 1.

Smallpox: Ohio 1.

Alaska: Chickenpox 12; mumps 2; German measles 1; diarrhea 1.

Territory of Hawaii: Measles 7; lobar pneumonia 1; whooping cough 5.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 17, 1948.—During the week ended July 17, 1948, 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
Chickenpox		16		50	232	84	26	29	28	465
Diphtheria				7		1				8
Dysentery, bacillary						1				1
German measles				12	3			6	2	23
Influenza		2			4	2				8
Measles		1	25	183	473	29	3	50	27	791
Meningitis, meningococcus								2		2
Mumps		5	1	54	77	16	7	24	3	187
Poliomyelitis					11	2		5		18
Scarlet fever		3		26	26	6	1	2	3	67
Tuberculosis (all forms)		2	4	86	23	29	9	215		368
Typhoid fever			1	7	1				4	13
Undulant fever					5	1			2	8
Venereal diseases:										
Gonorrhea	7	18	10	105	81	34	18	28	56	357
Syphilis		9	3	103	32	10	4	8	15	184
Other forms									1	1
Whooping cough				99	7	2	1	9	1	119

JAPAN

Notifiable diseases—4 weeks ended June 26, 1948, and accumulated totals for the year to date.—For the 4 weeks ended June 26, 1948, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended June 26, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	878	55	9,087	855
Dysentery, unspecified	1,070	206	2,549	554
Encephalitis, Japanese "B"			1	
Gonorrhea	15,477		125,961	
Influenza	143		2,257	
Malaria	636	3	2,085	15
Measles	7,082		37,776	
Meningitis, epidemic	109	29	1,172	291
Paratyphoid fever	280	14	1,178	56
Pneumonia	5,735		85,370	
Scarlet fever	207	1	1,455	18
Smallpox	1	0	19	5
Syphilis	15,319		117,824	
Tuberculosis	31,269		180,702	
Typhoid fever	745	79	3,462	419
Typhus fever	54	1	428	31
Whooping cough	4,241		22,193	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–May 1948	June 1948	July 1948—week ended—				
			3	10	17	24	31
AFRICA							
Egypt	1						
Cairo	1						
ASIA							
Burma	18	9					
Akyab	2	3					
Bassein		1					
Rangoon	2						
China:							
Hupeh Province		1					
Wuchang		1					
Kiangsi Province		[1] 9					
Kiangsu Province		1					
India	58,041	22,934	3,801	2,473			
Ahmadabad	2			24	10		
Alleppey	1						
Bombay [2]	1	4	1	2	17		
Calcutta [2]	5,445	779	167	127	109		
Cawnpore	31	45	6	3	9	2	
Cocanada	2						
Colachel	12						
Cuddalore	12						
Jodhpur [2]		1			2		
Kilakarai	21						
Lucknow	19	10	6	2	1		
Madras	43	16	22	15	5		
Nagpur	4	2			3		
Negapatam	16						
New Delhi	14	11					
Raj Samand		[3] 6					
Tuticorin	16						
Vizagapatam	1						
India (French):							
Chandernagor	21						
Karikal	300						
Pondicherry	59						
Indochina (French):							
Cambodia	1,046	174	51	19	21		
Cochinchina	542	35	5	3			
Bien Hoa	1						
Chaudoc	2						
Cholon	29						
Giadinh	23						
Longxuyen	7						
Mytho	47	7	2				
Rachgia	132						
Saigon	126	6	2	2			
Laos	[4] 12		12	8			
Tonkin	1			19			
Pakistan	22,749	667	128				
Chittagong	33	1					
Karachi	2						
Lahore [5]	[6] 2,627						
Siam	38	2	2				
Syria	3						

[1] Suspected.
[2] Includes imported cases.
[3] May 25-June 14.
[4] Deaths.
[5] Lahore City and District.
[6] Corrected figure.

PLAGUE

(Cases)

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA							
Belgian Congo	10	4		1			
British East Africa:							
Kenya	16			1			
Tanganyika	271	4					
Madagascar	343						
Tamatave	1						
Tananarive	26	3					
Rhodesia, Northern	26						
Union of South Africa	[1] 37						
ASIA							
Burma [2]	493	18	2	2	2	5	
Mandalay	17						
Rangoon	14	1		1			
China:							
Chekiang Province	25						
Wenchow	8						
Fukien Province	157	71		5			
Foochow		4					
Kiangsi Province	17	2					
Kwangtung Province	97	2					
Yunnan Province	72						
India	19,749	[3] 64	[3] 12	[3] 26	[3] 20		
Indochina (French):							
Annam	137	5					
Cambodia		1		2			
Cochinchina	40			1			
Laos	2						
Mountain Area South-Indochina	6	6					
Java	600	12					
Pakistan	11						
Siam	102	1					
EUROPE							
Portugal: Azores	8						
SOUTH AMERICA							
Argentina	12						
Buenos Aires Province	9						
Ecuador	[4] 15						
Chimborazo Province	1						
Loja Province	14						
Peru	19						
Cajamarca Department	8						
Huacho Department	1						
Libertad Department	1						
Lima Department	5						
Venezuela:							
Aragua State	7						
OCEANIA							
Hawaii Territory: Plague-infected rats [5]	5						

[1] Includes 4 cases of pneumonic plague.
[2] Includes imported cases.
[3] Preliminary figures.
[4] Corrected figure.
[5] Plague infection was also reported in Hawaii Territory, under date of February 27, 1948, in a mass inoculation of tissue from 19 rats.

SMALLPOX

(Cases)

(P=present)

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA							
Algeria	173	8					
Angola	122						
Basutoland	3						
Belgian Congo [1]	1,066	105	42				
British East Africa:							
Kenya	87						
Nyasaland	2,060	575	73	70			
Tanganyika	646	21					
Uganda	180	9					
Cameroon (French)	3						
Dahomey	240	31		[2] 12		[3] 2	
Egypt [4]	419	26	3		1		
Eritrea	9						
French Equatorial Africa	13						
French Guinea	123	1					
French West Africa: Haute-Volta	409	9		1			
Gambia	27						
Gold Coast	865	81					
Ivory Coast	490	31		[2] 35			
Libya	254	[5] 1					
Mauritania	1						
Mauritius							[6] 1
Morocco (French)	28	4		[3] 1			
Mozambique	34	11					
Nigeria	3,286	150					
Niger Territory	293	31					
Rhodesia:							
Northern	342	9					
Southern	493						
Senegal	7						
Sierra Leone	136	17					
Sudan (Anglo-Egyptian) [1]	898	288	47	21	23		
Sudan (French)	16						
Swaziland	5						
Togo (British)	9						
Togo (French)	68	17					
Tunisia	507	5					
Union of South Africa	22		P	P			
ASIA							
Arabia	8						
British North Borneo	1						
Burma [4]	2,282	55	3	34	5	12	
Ceylon [4]	15						
China	3,320	229	[7] 11	[7] 26	[7] 11	14	
India	47,344	4,539	709	233	[8] 35		
India (French)	6						
Indochina (French)	2,322	234	461				
Iran	463	21	2				
Iraq	646	40	11	2	10	13	
Java	1						
Japan	[9] 18	1					
Lebanon	57						
Malay States (Federated)	384	23	1				
Manchuria	42	2					
Pakistan [4]	10,709	[8] 17	[8] 1	[8] 16			
Palestine	8						
Siam	454	34	3				
Straits Settlements	11						
Sumatra	[10] 1,472						
Syria	35	13	4		5		
Transjordan	13						
EUROPE							
France	3						
Germany	3						
Portugal	67	2					
Spain	19						
Canary Islands	9						

See footnotes at end of table.

SMALLPOX—Continued

Place	January-May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
NORTH AMERICA							
Guatemala	2						
Mexico	420	26	5	3			
SOUTH AMERICA							
Argentina	9						
Bolivia	31						
Brazil	27	7					
Chile	5						
Columbia	3,926	482					
Ecuador [1]	2,007	[11] 23					
Paraguay [1]	[9] 70	6					
Peru	253						
Trinidad	[12] 10						
Venezuela [1]	2,967	29		[8] 3	[8] 1	[8] 15	

[1] Includes alastrim.
[2] July 1–10, 1948.
[3] July 11–20, 1948.
[4] Includes imported cases.
[5] In Tripoli.
[6] Imported.
[7] In Shanghai only.
[8] In ports only.
[9] Corrected reports.
[10] Correction: For period January 3–May 1, 1948; previously reported as June 1–18, 1948.
[11] In Guayaquil and Quito only.
[12] Alastrim.

TYPHUS FEVER*

(Cases)

(P=Present)

AFRICA							
Algeria	128	4					
Basutoland	6						
Belgian Congo	120	21	5				
British East Africa:							
Kenya [1]	35	18					
Egypt	249	18	[2] 1	[2] 1			
Eritrea	26	7	5		1		
Gold Coast	2						
Libya	314	52	7	23			
Morocco (French)	59	6		4	1		
Morocco (International Zone)	2						
Morocco (Spanish) [1]	3						
Mozambique [1]	2	1					
Nigeria [1]	5						
Rhodesia (Southern)	[3] 1						
Senegal	[3] 1						
Sierra Leone	[3] 5	[3] 1					
Somalia	1						
Tunisia [1]	523	30					
Union of South Africa [1]	179	P	P	P			
ASIA							
Burma	5						
China [1]	83	20	[4] 16				
Indochina (French) [1]	21	10	2	1			
Iran [1]	87	15	1				
Iraq [1]	116	32	7	3	4	3	
Japan	[5] 371	54	2				
Java	3						
Manchuria	37	1					
Pakistan	22						
Palestine [1]	12						
Philippine Islands	[3] 1						
Straits Settlements [1]	10	2					
Syria [1]	41	1	3		4		
Transjordan	42	6		1			
Turkey (see Turkey in Europe).							

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
EUROPE							
Albania	15						
Bulgaria	598	44		16			
Czechoslovakia	6						
France	1	2		1			
Germany	11	2					
Great Britain:							
England:							
London		[3] [6] 1					
Ireland (Northern)				2			
Malta [3]	9	1					
Greece [1] [7]	63	9	2	1	2		
Hungary	42	3	3	1	1		
Italy [1]	86	43					
Sicily	4						
Netherlands	[3] 1						
Poland	223	7					
Portugal—Madeira Islands:							
Funchal	1						
Rumania [1]	21, 218	216					
Spain	3	7					
Turkey	224	31	5	2	6	3	
Yugoslavia	484	41	8				
NORTH AMERICA							
Costa Rica [3]	6	1					
Cuba [3]	9						
Guatemala	85						
Jamaica [3]	8						
Mexico [1]	461	31	6	4	8		
Panama Canal Zone [1]	3						
Puerto Rico [3]	19	8	1				
SOUTH AMERICA							
Argentina	1						
Bolivia	[8] 105						
Brazil	84	12	3				
Chile [1]	162	[9] 4					
Colombia	1, 382	217					
Curaçao [3]	12						
Ecuador [1]	226	[2] 12					
Peru	214						
Venezuela	77	[2] 1	[2] 3		[2] 1		
OCEANIA							
Australia [3]	154	22	1				
Hawaii Territory	5	1					
New Caledonia	1						

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type.
[2] In sea- and air ports only.
[3] Murine type.
[4] In Tientsin.
[5] Corrected reports.
[6] Imported.
[7] Includes suspected cases.
[8] Includes 9 deaths reported as cases in Cochabamba Department in March, 1948.
[9] In Valparaiso.

YELLOW FEVER*

[D-deaths]

Place		January–May 1948	June 1948	July 1948—week ended— 3	10	17	24	31
AFRICA								
Gold Coast:								
Kumasi	D					1		
Ivory Coast:								
Gagnao	D	1						
SOUTH AMERICA								
Argentina:								
Misiones Territory	D						1	
Colombia:								
Antioquia Department	D	5						
Boyaca Department	D	1						
Caldas Department	D	3						
Cundinamarca Department	D	7						
Intendencia of Meta	D	3						

*Delayed report: During the months of April and May 1947, 5 confirmed cases of yellow fever were reported in Bolivia, distributed as follows: Santa Cruz Department, Nuflo de Chavez 1, Concepcion 1, Cercado 1; La Paz Department, Province of Sud Yungas, Chulumani 1; Province of Nor Yungas, Coroico 1.

GOLD COAST

Yellow fever.—During the period June 27–July 7, 1948, 1 fatal case of yellow fever was reported in Kumasi, Ashanti Province, Gold Coast, occurring in an African male. The last previous report of yellow fever in the Gold Coast was that of a suspected case reported in June 1947, later reported "not confirmed."

DEATHS DURING WEEK ENDED JULY 31, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended July 31, 1948	Corresponding week, 1947
Data for 90 large cities of the United States:		
Total deaths	8,018	8,229
Median for 3 prior years	7,951	
Total deaths, first 31 weeks of year	285,417	285,401
Deaths under 1 year of age	643	639
Median for 3 prior years	650	
Deaths under 1 year of age, first 31 weeks of year	20.156	22,746
Data from industrial insurance companies:		
Policies in force	70,988,876	67,239,490
Number of death claims	12,259	12,042
Death claims per 1,000 policies in force, annual rate	9.0	9.3
Death claims per 1,000 policies, first 31 weeks of year, annual rate	9.6	9.6

Vaccination Requirements for Persons Leaving Colombia

According to a resolution issued May 28 by the Minister of health of Colombia, all persons departing from that country must possess a medical certificate stating they have no infectious or contagious diseases, and also certificates of vaccination against smallpox and yellow fever. It is stated that these latter certificates must be issued by an official. This has been interpreted to mean that vaccination certificates are acceptable when issued by the Colombian Ministry of Health or by national public health services of other countries on Pan American Sanitary Bureau forms. Certificates issued by private physicians, clinics, etc., in Colombia or elsewhere are not acceptable. Americans traveling to Colombia may avoid re-vaccination and delay if they obtain acceptable vaccination certificates in the United States.

Colombia also requires that persons departing from that country bear official certificates of vaccination against typhoid "in the event of typhoid fever and whenever the situation warrants."

(The foregoing information was taken from a Department of State communication.)