Public Health Reports

Vol. 62 • MAY 2, 1947 • *No. 18*

Printed With the Approval of the Bureau of the Budget as Required by Rule 42 of the Joint Committee on Printing

EDITORIAL

MASS RADIOGRAPHY IN GENERAL HOSPITALS

Today, many hospitals throughout the Nation are participating in the greatest effort ever undertaken to eradicate tuberculosis from the population. Hospital administrators have been aware for many years of the grievous hazard of tuberculosis to the operating personnel of their institutions and have employed a variety of techniques to prevent contagion. However, the furtive ubiquity of the disease, its concealment in the chests of patients admitted to the wards for reasons other than tuberculosis, make possible the spread of tubercle bacilli even to the wary. In addition, the alert administrator knows that his institution can serve as the chief instrument in many of the aspects of public health control of tuberculosis.

Sixteen million people are admitted to general hospitals every year. These people constitute the largest single source of those adults among whom disease is most prevalent. They offer the hospital staff the opportunity to protect the community against spreaders of tuberculosis and the chance to save the lives of many who, if allowed to continue without treatment, would advance too far into disease to be saved.

In former years, mass case finding in general hospitals was not practicable because speedy and inexpensive X-ray equipment was not available. Until 5 years ago, all chest plates were 14 × 17 conventional diagnostic films. The advent of the photofluorograph, automatic phototimer, and fine-grain roll film made possible the X-ray examination of as many as 500 persons in an 8-hour day at slight cost and with a minimum expenditure of time and energy.

This is the fifteenth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month. The series began with the Mar. 1, 1946 issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946 issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

With photofluorographic equipment installed near the hospital admission office, incoming patients can easily be X-rayed before assignment to ward or room. Such a procedure will produce X-ray evidence of serious pulmonary disease in 1 to 3 percent of all patients. Tuberculosis in all stages of advancement will be found, for the most part, among persons 20 to 45 years of age. These persons constitute the most effective economic group in the community. Discovering and treating tuberculosis in this age group will be of untold value to the community. Most importantly, the disease will be minimal in the great majority of cases discovered, and these cases, given prompt attention, health instruction, and follow-up examinations, will return to sound health and economic productivity within a relatively short period of time.

In addition to case-finding, which perhaps, is the most important function of the general hospital in the control of tuberculosis, medical care and isolation can be provided, in many communities, by tuberculosis wards or wings. The current shortage of more than 50,000 beds for the tuberculous will become a less serious problem in treating the diseased and separating the infectious from the public if general hospitals provide beds for local citizens who do not require the specialized services of a tuberculosis hospital. Small sanatoria would be less pressed for service and would have opportunity to admit serious cases in need of immediate and prolonged attention.

The hospital laboratory, the X-ray department, and the services of expert consultants can be utilized effectively in the diagnosis of doubtful cases requiring careful study. Questionable asymptomatic cases can be supervised in the out-patient department until the presence or absence of active disease is determined. Persons who require pneumothorax may be hospitalized for a preliminary period of three to four weeks, and then, if there are no sanatorium or hospital beds for the tuberculous, they may be followed up as ambulatory cases. In many institutions, even advanced infectious cases may be given chest surgery and cared for until the local sanatorium is in a position to assume responsibility.

Indeed, the general hospital is in a unique position in tuberculosis control. Institutions in large cities, especially, can participate actively in such necessary contingent aspects of control as rehabilitation and the social and economic problems posed by this family and community disease. For highest effectiveness, hospital services for the tuberculous should be integreated with the public health programs in the city, town, or county. In every institution, the general practitioner must be an active participant in the radiography program. He provides the hospital with its patients, makes the final diagnosis, and treats those persons who are singled out by routine chest X-ray.

The various interested agencies and private physicians can then bring together their knowledge and techniques, in a total assault on a disease that can be forced to continue its retreat into oblivion.

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STUDIES OF FUNGUS ANTIGENS [1]

I. QUANTITATIVE STUDIES OF CROSS-REACTIONS BETWEEN HISTOPLASMIN AND BLASTOMYCIN IN GUINEA PIGS

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INTRODUCTION

The specificity of the histoplasmin reaction in man has become of great importance since the demonstration by Palmer (*1*) and Christie and Peterson (*2*) of a high degree of correlation between pulmonary calcification and sensitivity to histoplasmin in individuals who do not react to tuberculin. Emmons, Olson, and Eldridge (*3*) have reported cross-reactions between histoplasmin, blastomycin, coccidioidin, and haplosporangin in animals experimentally infected with the fungi from which these antigens were produced; in particular, nearly complete cross-reactions between histoplasmin and blastomycin. This paper reports further studies on the specificity of histoplasmin and blastomycin in animals with experimental histoplasmosis and blastomycosis.

The present paper is one of a series reporting the results of the extensive studies of histoplasmin sensitivity being conducted in Kansas City, Mo., where early in 1945 special facilities were established for research on histoplasmin sensitivity in both human beings and animals.

MATERIALS AND METHODS

Six strains of *Histoplasma capsulatum* and five of *Blastomyces dermatitidis* were used in these studies. One strain of *Histoplasma* was obtained from the American Type Culture Collection, designated by them as culture No. 8136. A second strain, isolated by Dr. James Owens at Vanderbilt University Hospital in 1943,[2] was furnished by Dr. J. C. Peterson of Vanderbilt University School of Medicine. The four additional strains of *Histoplasma* and the five strains of *Blastomyces* were obtained through the courtesy of Dr. Norman F. Conant, Duke University Medical School. These four strains of *Histoplasma*

[1] From the Field Studies Section, Tuberculosis Control Division, Bureau of State Services.
[2] Personal communications to the author.

were isolated from cases reported by Rhodes et al. (*4*), de Monbreun (*5*), Reid et al. (*6*), and Dr. B. C. Portuondo,[2] St. Louis, Mo. The five strains of *Blastomyces* were isolated from cases of blastomycosis observed at Duke University Hospital in 1945.

The histoplasmin and blastomycin used in these studies were prepared by a method similar to that used by Emmons et al. (*3*). Cultures were grown from 80 to 201 days on Long's synthetic medium to which 1 percent bacto dextrose had been added, or on the synthetic medium used by Emmons et al. (*3*). Three lots of histoplasmin and five lots of blastomycin were employed. These were designated as lots H–1, H–15, H–6, B–1, B–2, B–3, B–7, and B–11, respectively.

In addition to the several lots of histoplasmin and blastomycin, a heat-killed antigen was prepared from the yeast phase of both *Histoplasma* and *Blastomyces* for comparative purposes. In preparing these antigens, yeast-phase cultures of *Histoplasma* were grown for 5 days on blood-agar slants which were sealed with paraffin and incubated at 37° C., as described by Conant (*7*). Yeast-phase cultures of *Blastomyces* were grown for 7 days on brain-heart infusion agar and incubated at 37° C., as described by Conant and Howell (*8*). In both instances, the growth was washed from the slants with sterile saline, made up 1:10 by volume, and inactivated for four hours at 56° C., as recommended by Martin and Smith (*9*) for *Blastomyces dermatitidis*. Repeated injections of 0.1 cc. of a 1:100 dilution of these antigens into control guinea pigs showed that these antigens, in this dilution, do not sensitize these animals.

Each guinea pig used in this study was tested by the intradermal injection of 0.1 cc. of a 1:100 dilution, respectively, of histoplasmin, blastomycin, and the two heat-killed antigens (described above). None of these normal animals reacted to any of these antigens in this dilution. The guinea pigs were then experimentally infected by intraperitoneal inoculation of graded doses of a saline suspension of the yeast phase of *Histoplasma capsulatum* or of a similar pooled suspension of the yeast phase of five strains of *Blastomyces dermatitidis*.

Four to six weeks after inoculation, the animals were tested with several dilutions of each lot of histoplasmin and blastomycin and with the heat-killed yeast-phase antigens. One-tenth milliliter of each dilution of each lot was injected into each animal intradermally, and the reactions were read after both 24 and 48 hours. As reported by Emmons (*3*), reactions to histoplasmin and blastomycin in infected guinea pigs reach their height at 24 hours, and may disappear within 48 hours. It was observed in this work that reactions to the heat-killed yeast-phase suspensions may reach their peak within 24 hours but usually persist for 48 hours or longer. Only those animals

[2] Personal communications to the author.

that exhibited areas of induration of five or more millimeters in diameter were considered reactors.

I. *Titration of antigens on experimentally infected animals*

Filtrate antigens.—Forty-seven guinea pigs infected with *Histoplasma capsulatum* and thirty-seven infected with *Blastomyces dermatitidis* were tested with various dilutions of various lots of histoplasmin and blastomycin. The results of these tests are summarized in tables 1 and 2 and figures 1 and 2.

TABLE 1.—*Results of testing with various dilutions of specified lots of histoplasmin in guinea pigs experimentally infected with* Histoplasma capsulatum

Item	Lot H-6 (dilution)			Lot H-15 (dilution)				Lot H-1 (dilution)	
	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000	1:5,000	1:100	1:1,000
Number of animals tested	40	40	40	47	47	40	40	47	47
Number of reactors	39	39	32	47	42	13	1	43	2
Percentage of reactors	97.5	97.5	80.0	100.0	89.4	32.5	2.5	91.5	4.3
Average diameter of reaction [1]	8.8	7.1	6.3	[2] 9.0	9.7	6.7	5.0	8.8	6.0

[1] Induration in millimeters.
[2] Based on measurement of test on 5 animals.

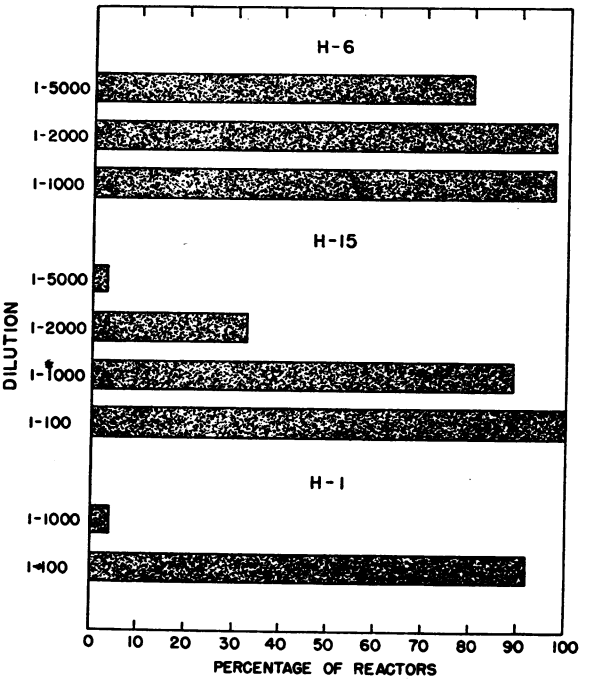

FIGURE 1.—Titration of specified lots of histoplasmin on guinea pigs experimentally infected with *H. capsulatum*.

It can readily be seen, from the data presented in table 1 and figure 1, that 39 of 40 or 97.5 percent of the animals infected with *Histoplasma* reacted to a 1:1,000 dilution of histoplasmin, lot H–6, whereas 42 of 47 or 89.4 percent reacted to a 1:1,000 dilution of H–15, and only 2 of 47 or 4.3 percent reacted to the same dilution of lot H–1. However, if the concentration of lot H–1 were increased to a 1:100 diultion, then 43 of 47 or 91.5 percent reacted.

TABLE 2.—*Results of testing with various dilutions of specified lots of blastomycin in guinea pigs experimentally infected with* Blastomyces dermatitidis

Item	Lot B–11 (dilution)			Lot B–7 (dilution)			Lot B–3 (dilution)			Lot B–2 (dilution)				Lot B–1 (dilution)		
	1:1,000	1:2,000	1:5,000	1:1,000	1:2,000	1:5,000	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000
Number of animals tested	33	33	33	33	33	33	33	33	33	37	34	28	34	36	37	37
Number of reactors	2	0	0	29	26	14	9	2	0	31	27	10	3	27	4	4
Percentage of reactors	6.1	0	0	87.9	78.8	42.4	27.3	6.1	0	83.8	79.4	35.7	8.8	75.0	10.8	10.8
Average diameter of reaction [1]	5.5	-----	-----	9.0	7.9	6.4	5.5	6.0	-----	[2] 6.9	7.4	6.5	6.0	7.9	7.0	8.2

[1] Induration in millimeter.
[2] Based on measurement of only 10 animals.

Similar results were obtained with different lots of blastomycin tested on animals infected with *Blastomyces*. For example, 29 of 33 or 87.9 percent of the animals tested reacted to a 1:1,000 dilution of blastomycin, lot B–7; 27 of 34 or 79.4 percent to a 1:1,000 dilution of lot B–2; whereas only 4 of 37 or 10.8 percent reacted to the same dilution of lot B–1, and only 2 of 33 or 6.1 percent to a 1:1,000 dilution of B–11. If the concentrations of various lots of blastomycin were increased, an increasing percentage of animals reacted. For example, although 10.8 percent of the animals infected with *Blastomyces* reacted to a 1:1,000 dilution of lot B–1, 75 percent reacted to a 1:100 dilution.

From these data, then, it is evident that the number of animals infected with *Histoplasma* which reacted to histoplasmin depends first, upon the particular lot of histoplasmin employed as a skin-testing antigen, and second, upon the dilution of this particular lot. Therefore, it would seem that if various lots of histoplasmin and blastomycin are to be used as antigens for intradermal testing of sensitization to the respective fungi or their products, some method of standardization of the various lots of antigen must be employed.

There are several methods of standardization employed for biological products. One common method is to adjust the concentrations of different lots of antigen so that they agree in terms of percentage of reactors obtained with any given dilution; thus, each lot might

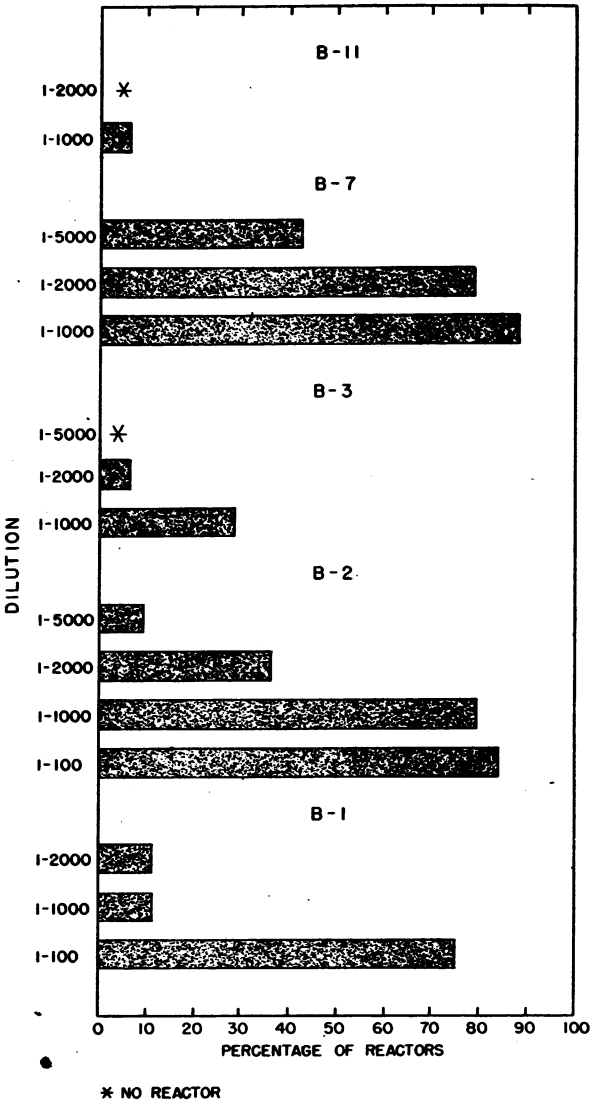

FIGURE 2.—Titration of specified lots of blastomycin on guinea pigs experimentally infected with *B. dermatitidis*.

be concentrated or diluted so that a 1:1,000 dilution of all lots would detect some stated percentage of sensitized animals. Another method is to disregard the standard dilution and employ a concentration of each lot which would detect a like percentage of sensitized animals. For example, a 1:100 dilution of one lot would be equal to a 1:2,000 dilution of another lot, since each would detect the same percentage of reactors among sensitized animals. In this study, the second method was employed.

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It is evident, then, from the data presented, that a dilution between 1:2,000 and 1:5,000 of lot H–6 histoplasmin is essentially comparable in skin-reacting potency to a 1:1,000 dilution of lot H–15 or a 1:100 dilution of lot H–1, since these dosages of histoplasmin gave reactions in 97.5–80.0 percent, 89.4 percent, and 91.5 percent, respectively, of animals infected with *Histoplasma*.

Similar results were obtained with various lots of blastomycin used on guinea pigs infected with *Blastomyces*. For example, from the data in table 2 and figure 2, it would seem that lot B–7 blastomycin, diluted 1:2,000, is comparable to lot B–2, diluted 1:1,000, or to lot B–1, diluted 1:100, since these dosages of blastomycin detected 78.8 percent, 79.4 percent, and 75 percent, respectively, of all animals known to be infected with *Blastomyces dermatitidis*.

It would appear, then, from the data presented, that fairly accurate comparisons of the potency of different lots of histoplasmin or blastomycin can be made by comparisons of the percentage of reactors obtained in infected animals. To obtain any given percentage of reactors, therefore, markedly different dilutions of different lots might have to be employed.

Furthermore, it would seem to be of great importance to determine, as accurately as possible, the *dosage* or *titer* of any new antigen which should be used to detect sensitization due to the organism from which the antigen was made. In the determination of such a *dosage* or *titer*, there are obvious practical difficulties. If, for instance, the titer were defined as the minimum dosage which would detect sensitization of 100 percent of the animals experimentally infected with the homologous organism, this dosage might be so high that many normal animals would react. The necessity to consider the latter point is evident in the material given in table 3, which shows that 88.1 percent of normal animals reacted to undiluted H–15, 90.9 percent to undiluted B–7, and 90 percent to a 1:10 dilution of the heat-killed antigen prepared from yeast-phase cultures of *Histoplasma capsulatum*.

If, however, the *titer* is defined as the minimum dosage which would detect less than 100 percent of the sensitized animals, then some arbitrarily selected percentage value must be designated. In this connection, it must be recognized that, in any practical experiment, the percentage of reactors is subject to a large sampling error unless a very large number of animals is used, and that not every animal employed will necessarily become sensitized. The latter is particularly true of fungus infections, even though each animal is given an infecting dose which is usually sufficient to produce sensitization of normal animals. Therefore, it would seem reasonable to say that a critical *dosage* or *titer* of any antigen, or lot of antigen, should be defined as the minimum amount which would detect

TABLE 3.—*Results of testing normal guinea pigs with various dilutions of specified lots of histoplasmin, blastomycin, and heat-killed yeast-phase antigens of* Histoplasma capsulatum *and* Blastomyces dermatitidis

Item	Histoplasmin [1]				Blastomycin [1]				Heat-killed yeast-phase antigens		
	Lot H–15 (dilution)		Lot H–1 (dilution)		Lot B–7 (dilution)		Lot B–1 (dilution)		*Histoplasma capsulatum* (dilution)		*Blastomyces dermatitidis* (dilution)
	Undiluted	1:10	Undiluted	1:10	Undiluted	1:10	Undiluted	1:10	1:10	1:100	1:100
Number of animals tested	59	19	19	19	11	11	40	20	10	84	84
Number of reactors	52	1	0	0	10	0	6	0	9	0	0
Percentage of reactors	88.1	5.3	0	0	90.9	0	15.0	0	90.0	0	0
Average diameter of reactions [2]	8.6	5.0	-------	-------	7.8	-------	5.3	-------	6.7	-------	-------

[1] None of the animals was a reactor to a 1:100 dilution of these antigens.
[2] Induration in millimeters.

sensitivity in approximately 80 to 90 [3] percent of a group of animals experimentally treated in such a way that all can be expected to become sensitive to an antigen prepared from the homologous organism. At the same time, increasing doses will detect a small number of sensitized animals which did not react to the critical *titer*. However, since a 1:1,000 dilution of lot H–15 histoplasmin detected, or produced a reaction, in 89.4 percent of the guinea pigs included in this study which were infected with *Histoplasma* (table 1, fig. 1), it would appear that there would be little justification for using this particular lot of histoplasmin in concentrations much greater than this.

The evidence presented, therefore, suggests that the *titers* of the antigens included in this study would be approximately as follows for guinea pigs infected with the homologous organism: lot H–6 histoplasmin, between 1 : 2,000 and 1 : 5,000; lot H–15, 1 : 1,000; lot H–1, 1:100; lot B–7 blastomycin, 1 : 2,000; lot B–2, 1 : 1,000; lot B–1, 1 : 100; lots B–3 and B–11, *titer* undetermined.

Yeast phase antigens.—Each guinea pig employed for the titration of the various lots of histoplasmin and blastomycin was tested with a 1 : 100 dilution of each of the heat-killed yeast-phase antigens prior to infection. No reactions were observed in any of these animals. The results of testing the group infected with *Histoplasma capsulatum* with several dilutions of the heat-killed yeast-phase antigens of *Histoplasma capsulatum* are shown in table 4 and figure 3. Similarly,

[3] The selection of these values involves a consideration of many practical and theoretical points, a complete discussion of which is beyond the scope of this paper.

TABLE 4.—*Results of testing with various dilutions of a heat-killed yeast-phase antigen of* Histoplasma capsulatum *in guinea pigs experimentally infected with* Histoplasma capsulatum

Item	Dilution		
	1:100	1:1,000	1:2,000
Number of animals tested	47	47	21
Number of reactors	47	45	18
Percentage of reactors	100.0	93.7	85.7
Average diameter of reaction [1]	10.2	6.5	6.6

[1] Induration in millimeters.

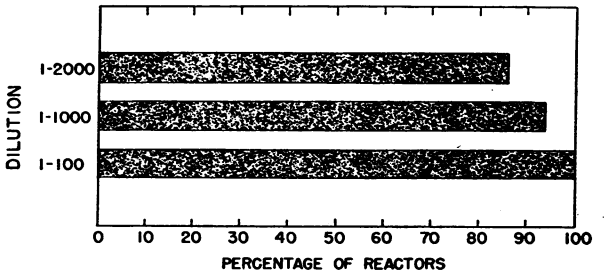

FIGURE 3.—Titration of heat-killed yeast phase antigen of *H. capsulatum* on guinea pigs experimentally infected with *H. capsulatum*.

the results of testing the group infected with *Blastomyces dermatitidis* with the heat-killed yeast-phase antigen of *Blastomyces* are summarized in table 5 and figure 4.

TABLE 5.—*Results of testing with various dilutions of a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *in guinea pigs experimentally infected with* Blastomyces dermatitidis

Item	Dilution			
	1:100	1:1,000	1:2,000	1:4,000
Number of animals tested	37	37	35	35
Number of reactors	32	31	21	17
Percentage of reactors	86.8	83.8	60.0	48.6
Average of diameter of reaction [1]	7.6	7.2	6.4	6.2

[1] Induration in millimeters.

It can be seen from the data that heat-killed suspensions of the yeast phase of both *Histoplasma capsulatum* and *Blastomyces dermatitidis* are effective antigens for intradermal testing in guinea pigs. As with histoplasmin and blastomycin, however, the problem of the *titer* of these antigens is important. It would seem from the data presented in tables 4 and 5 and figures 3 and 4, and for the reasons stated above, that the critical *titer* would be a concentration of not more than a 1:2,000 dilution of a heat-killed suspension of the yeast phase of *Histoplasma capsulatum* or a 1:1,000 dilution of a similar sus-

pension of the yeast phase of *Blastomyces dermatitidis*, since these amounts gave reactions in 85.7 percent and 83.8 percent, respectively, of all animals infected with *Histoplasma capsulatum* or *Blastomyces dermatitidis*. It is also evident, from a comparison of tables 1 and 2

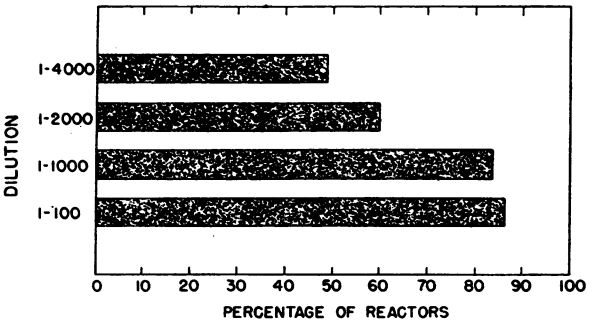

FIGURE 4.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* on guinea pigs experimentally infected with *B. dermatitidis*.

and figures 1 and 2 with tables 4 and 5 and figures 3 and 4, that a filtrate-type antigen, such as histoplasmin or blastomycin, is as effective for intradermal testing as an antigen prepared from the parasitic phase of these two fungi, provided proper attention is paid to the *titer* of the particular antigen employed. This confirms the work of Christie and Peterson (*2*), who reported that the yeast phase of *Histoplasma capsulatum* yields a very satisfactory antigen and that guinea pigs which received sublethal but infective doses of live *Histoplasma capsulatum* yeast cells develop skin reactions qualitatively similar to those observed in man.

II. *The degree of sensitivity of the animals and its effect on the titer of the antigens*

In another series of animals, an attempt was made to study the problem of the *titer* of filtrate antigens prepared from the mycelial phase of certain fungi and of heat-killed antigens prepared from the yeast phase of the same fungi for intradermal testing. In this experiment, however, some difficulty was encountered in obtaining reactions to the antigens employed. Relatively low values were obtained for the *titers* of these antigens, even though the same lots of histoplasmin and blastomycin (H–1 and B–1) and the same heat-killed yeast-phase antigens of *Histoplasma capsulatum* and *Blastomyces dermatitidis* were employed as were used in the experiments described above.

In this study, 66 guinea pigs were used. After testing each animal with a 1:100 dilution of each of the four antigens intradermally, to which none reacted, 32 were infected with a small amount of a saline

suspension of the yeast phase of *Histoplasma capsulatum* and 34 with a similar suspension of *Blastomyces dermatitidis*.

Several weeks after infection, and at intervals thereafter, these animals were tested with a 1:100 dilution of each type of antigen. Since these tests consistently produced nonreactors, most of the animals were reinfected and retested. The results of the final tests are summarized in tables 6 and 7 and in figures 5 and 6.

TABLE 6.—*Results of testing with histoplasmin, lot H–1, and a heat-killed yeast-phase antigen of* Histoplasma capsulatum *in guinea pigs experimentally infected with* Histoplasma capsulatum

Item	Heat killed yeast phase antigen (dilution)			Histoplasmin H–1 (dilution)	
	1:100	1:1,000	1:2,000	1:100	1:1,000
Number of animals tested	32	32	31	32	32
Number of reactors	31	23	14	12	0
Percentage of reactors	96.9	71.9	45.2	37.5	0
Average diameter of reaction [1]	7.6	6.1	5.6	6.8	----------

[1] Induration in millimeters.

TABLE 7.—*Results of testing with Lot B–1 blastomycin and a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *in guinea pigs experimentally infected with* Blastomyces dermatitidis

Item	Heat killed yeast phase antigen (dilution)			Blastomycin B–1 (dilution)	
	1:100	1:1,000	1:2,000	1:100	1:1,000
Number of animals tested	34	33	30	34	27
Number of reactors	33	16	5	15	1
Percentage of reactors	97.1	48.5	16.7	44.1	3.7
Average diameter of reaction [1]	7.9	6.5	5.2	7.7	5.0

[1] Induration in millimeters.

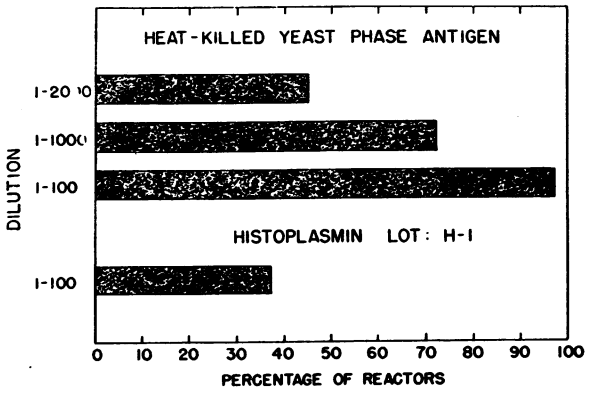

FIGURE 5.—Titration of heat-killed yeast phase antigen of *H. capsulatum* and Lot H–1 histoplasmin on guinea pigs experimentally infected with *H. capsulatum*.

In this group of animals, only 12 of 32 or 37.5 percent reacted to an intradermal injection of a 1:100 dilution of lot H–1 histoplasmin, although 31 of 32 or 96.9 percent reacted to a 1:100 dilution and 23 of 32 or 71.9 percent to a 1:1,000 dilution of the heat-killed yeast-

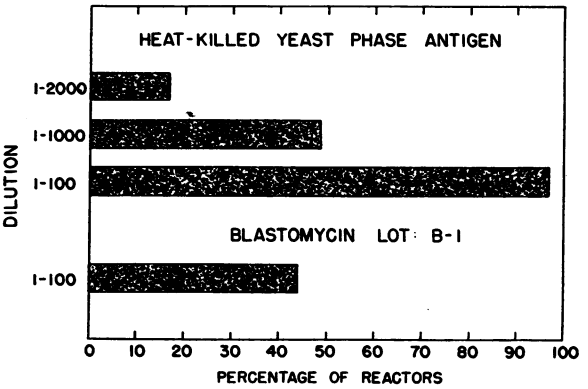

FIGURE 6.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* and Lot B–1 blastomycin on guinea pigs experimentally infected with *B. dermatitidis*.

phase antigen of *Histoplasma*. From these data, then, it would seem that the *titer* of lot H–1 histoplasmin would be greater than a 1:100 dilution, since this amount detected only 37.5 percent of the animals infected with *Histoplasma capsulatum;* and the *titer* of the yeast antigen would probably be between a 1:100 and a 1:1,000 dilution, since these dilutions detected 96.9 percent and 71.9 percent of the infected animals, respectively.

Similar results were obtained with lot B–1 blastomycin and the heat-killed yeast-phase antigen of *Blastomyces dermatitidis*, as shown in table 7 and figure 6. The *titer* of lot B–1 blastomycin would appear to be greater than a 1:100 dilution, since this dosage detected only 15 of 34 or 44.1 percent of the animals infected with *Blastomyces*. The *titer* of the yeast-phase antigen would appear to be between a 1:100 and a 1:1,000 dilution, since these dilutions detected 97.1 percent and 48.5 percent, respectively, of the infected animals.

It is evident, then, that the percentage of animals in the two groups which reacted to the same dilution of the same antigen was quite different and that, therefore, the value obtained for the *titer* of each antigen varied markedly with the two groups of animals studied. For example, a 1:100 dilution of lot H–1 histoplasmin detected only 12 of 32 or 37.5 percent (table 6, fig. 5) of one group of guinea pigs infected with *Histoplasma capsulatum*, whereas the same dilution of the same lot of histoplasmin (H–1) detected 43 of 47 or 91.5 percent of the other group of animals (table 1) infected with the same fungus. Similarly, a 1:2,000 dilution of the heat-killed yeast-phase antigen of *Histoplasma* gave reactions (table 6, fig. 5) in 14 of 31 or 45.2 per-

cent of the animals in one group. In the other group (table 4, fig. 3) a 1:2,000 dilution gave reactions in 18 of 21 or 85.7 percent.

Comparable results were obtained with lot B–1 blastomycin and with the heat-killed yeast-phase antigen of *Blastomyces dermatitidis* in the two groups of animals infected with *Blastomyces*.

It would seem, therefore, that in order to explain these variable results, several factors must be considered. First, it is well known that in any infection a definite time interval must elapse between the time of infection and the time at which sensitivity to the infective organism or its products can be demonstrated. Second, it would seem that, as an animal begins to develop sensitivity to an infecting or sensitizing agent, an antigen prepared from that organism or its products, if applied as an intradermal testing agent, would have to be used in much greater concentration in order to elicit a reaction than would be necessary to elicit the same reaction after sensitivity to that organism or its products has become fully established. For example, if an animal were infected with a fungus and shortly thereafter an antigen prepared from that fungus or its products were used as an intradermal testing agent, it would seeem that this animal might react to a relatively high concentration of the antigen but not react to a lower concentration of the same antigen. Later, if the tests are repeated, both dilutions might give rise to reactions, due to the increased level of sensitivity of the animal. If this is true, a false impression of the *titer* of an antigen of unknown strength would be obtained if the tests were applied before the animals had developed a high level of sensitivity. That is, the value obtained for the *titer* of the antigen would be too low. If, for example, the value for the *titer* of lot H–1 histoplasmin for guinea pigs infected with *Histoplasma capsulatum* were accepted on the basis of one group of animals studied (table 6, fig. 5), it would appear to be greater than a 1:100 dilution, since this amount gave reactions in only 12 of 32 or 37.5 percent of the animals infected. However, in the other group of animals studied (table 1, fig. 1), it was shown that the *titer* of this antigen was approximately a 1:100 dilution, since in this group of animals this dosage gave reactions in 43 of 47 or 91.5 percent of the animals.

Similar results were obtained with the heat-killed yeast-phase antigen of *Histoplasma* on the same two groups of guinea pigs. The *titer* of this antigen as determined from one group of animals (table 6, fig. 5) appeared to be not more than a 1:100 dilution, since this dosage detected 31 of 32 or 96.9 percent of the animals, whereas a 1:1,000 dilution detected only 23 of 32 or 71.9 percent, and a 1:2,000 dilution, only 14 of 31 or 45.2 percent. In the other group, however (table 4, fig. 3), it was found that the *titer* of this antigen appeared

to be approximately a 1:2,000 dilution since this dosage detected 18 of 21 or 85.7 percent of the infected animals.

It would appear, therefore, that the animals in the group reported in tables 6 and 7 and in figures 5 and 6 were tested at a time when their level of sensitivity was low, and that, therefore, the values obtained for the *titers* of the various antigens employed were too low.

This hypothesis, that the level of sensitivity of the animals employed to determine the *titer* of an antigen is of great importance, was further tested by a study of lot B–2 blastomycin and the heat-killed antigen prepared from yeast-phase cultures of *Blastomyces dermatitidis* in an additional group of 11 guinea pigs. These animals were tested with both antigens intradermally and then infected with the yeast phase of *Blastomyces dermatitidis*, as described above. They were then retested with a 1:100 and a 1:1,000 dilution of lot B–2 blastomycin and the yeast-phase antigen 25 and 35 days after infection. The results of these tests are summarized in table 8 and figure 7.

TABLE 8.—*Results of testing with a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *and lot B–2 blastomycin, 25 and 35 days after inoculation, in guinea pigs experimentally infected with* Blastomyces dermatitidis.

Item	Heat-killed yeast antigen			Blastomycin B–2		
	Number of days after inoculation					
	25		35	25		35
	Dilution			Dilution		
	1:100	1:1,000	1:1,000	1:100	1:1,000	1:1,000
Number of animals tested	11	11	11	11	11	11
Number of reactors	10	7	10	4	1	7
Percentage of reactors	90.9	63.7	90.9	36.4	9.1	63.7
Average diameter of reaction [1]	5.7	5.7	7.1	5.8	7.0	7.4

[1] Induration in millimeters.

As shown in table 8 and figure 7, when these animals were tested with the heat-killed yeast-phase antigen 25 days after infection with *Blastomyces dermatitidis*, 10 of 11 or 90.9 percent reacted to a 1:100 dilution, and 7 of 11 or 63.7 percent reacted to a 1:1,000 dilution; whereas 35 days after infection, 10 of 11 or 90.9 percent of the same animals reacted to a 1:1,000 dilution. There was also a definite increase in the average size of the reaction to a 1:1,000 dose. For example, at 25 days the diameter of the indurated area of reaction to a 1:1,000 dilution averaged 5.7 mm., whereas after 35 days it was increased to 7.1 mm. A similar increase in the response to blastomycin was observed. After 25 days, only 1 of 11 animals or 9.1 per-

cent reacted to a 1:1,000 dilution of blastomycin, lot B–2, whereas after 35 days, 7 of 11 or 63.7 percent of the same animals reacted to the same dilution of the same antigen. These data would seem to confirm the hypothesis that, in the titration of antigens on infected

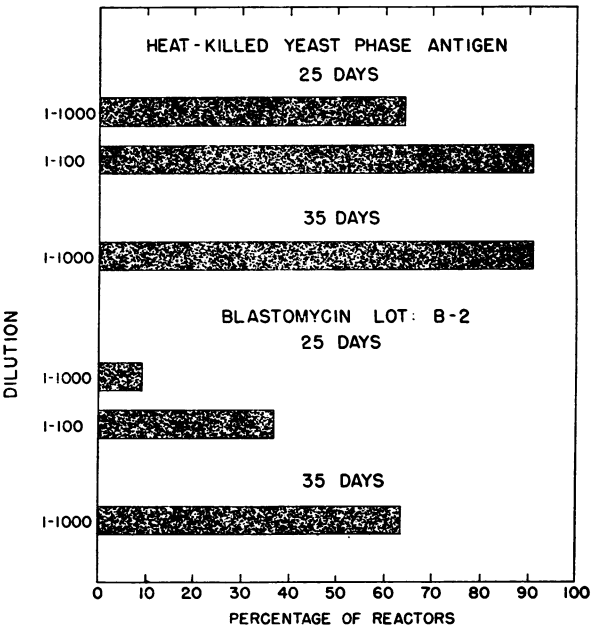

FIGURE 7.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* and Lot B–2 blastomycin on guinea pigs experimentally infected with *B. dermatitidis* 25 and 35 days after infection.

animals, the level of sensitivity of the animals at the time the tests are performed is a very important factor, and one which must be taken into consideration. If the sensitivity of the animals tested is not at a high level, the *titer* determined on these animals will be too low.

III. *Cross reactions of histoplasmin and blastomycin*

In addition to the experiments described above, in which various lots of histoplasmin and blastomycin and heat-killed antigens prepared from cultures of the yeast phase of both *Histoplasma capsulatum* and *Blastomyces dermatitidis* were used as intradermal testing agents on guinea pigs experimentally infected with the homologous fungi, the cross reactions of each of these antigens were also studied.

At the same time that the group of animals infected with *Histoplasma* reported in table 1 were tested with various dilutions of each of the homologous antigens, they were also tested with various dilutions of several lots of blastomycin and the heat-killed antigen prepared from the yeast phase of *Blastomyces*. Similarly, the animals infected with *Blastomyces* reported in table 2 were tested with various

dilutions of several lots of histoplasmin and the heat-killed antigen prepared from cultures of the yeast phase of *Histoplasma*. The results of these tests are summarized in tables 9 and 10 and in figures 8 and 9.

TABLE 9.—*Results of testing with various dilutions of specified lots of histoplasmin and various dilutions of a heat-killed yeast-phase antigen of* Histoplasma capsulatum *in guinea pigs experimentally infected with* Histoplasma capsulatum *or* Blastomyces dermatitidis

Antigen	Histoplasmin									Heat-killed yeast-phase antigen		
Lot number	H-6				H-15			H-1				
Dilution	1:100	1:1,000	1:2,000	1:5,000	1:100	1:1,000	1:2,000	1:100	1:1,000	1:100	1:1,000	1:2,000
Item	Animals infected with *Histoplasma capsulatum*											
Number of animals tested	-----	40	40	40	47	47	40	47	47	47	47	21
Number of reactors	-----	39	39	32	47	42	13	43	2	47	45	18
Percentage of reactors	-----	97.5	97.5	80.0	100.0	89.4	32.5	91.5	4.3	100.0	93.7	85.7
Average diameter of reactions [1]	-----	8.8	7.1	6.3	[2] 9.0	9.7	6.9	8.8	6.0	10.2	6.5	6.6
	Animals infected with *Blastomyces dermatitidis*											
Number of animals tested	32	32	32	32	32	32	32	37	37	37	37	37
Number of reactors	27	9	1	0	24	5	0	3	0	24	3	2
Percentage of reactors	84.4	28.1	3.1	0	75.0	15.7	0	8.1	0	64.9	8.1	5.9
Average diameter of reactions [1]	8.8	5.3	5.0	-----	7.3	5.3	-----	5.3	-----	6.5	6.0	6.0

[1] Induration in millimeters.
[2] Based on measurement of 5 animals.

TABLE 10.—*Results of testing with various dilutions of specified lots of blastomycin and various dilution of a heat-killed yeast-phase antigen of* Blastomyces dermatitidis *in guinea pigs experimentally infected with* Blastomyces dermatitidis *or* Histoplasma capsulatum.

Antigen	Blastomycin					Heat-killed yeast-phase antigen	
Lot number	B-7			B-2			
Dilution	1:100	1:1,000	1:2,000	1:100	1:1,000	1:100	1:1,000
Item	Animals infected with *Blastomyces dermatitidis*						
Number of animals tested	-----	33	33	37	34	37	37
Number of reactors	-----	29	26	31	27	32	31
Percentage of reactors	-----	87.9	78.8	83.8	79.4	86.8	83.8
Average diameter of reactions [1]	-----	9.0	7.9	[2] 6.9	7.4	7.6	7.2
	Animals infected with *Histoplasma capsulatum*						
Number of animals tested	40	40	40	47	47	47	47
Number of reactors	23	5	2	19	5	39	4
Precentage of reactors	57.5	12.5	5.0	40.5	10.7	82.9	8.5
Average diameter of reactions [1]	6.5	5.3	5.5	7.7	5.0	6.1	5.5

[1] Induration in millimeters.
[2] Based on measurement of 10 animals.

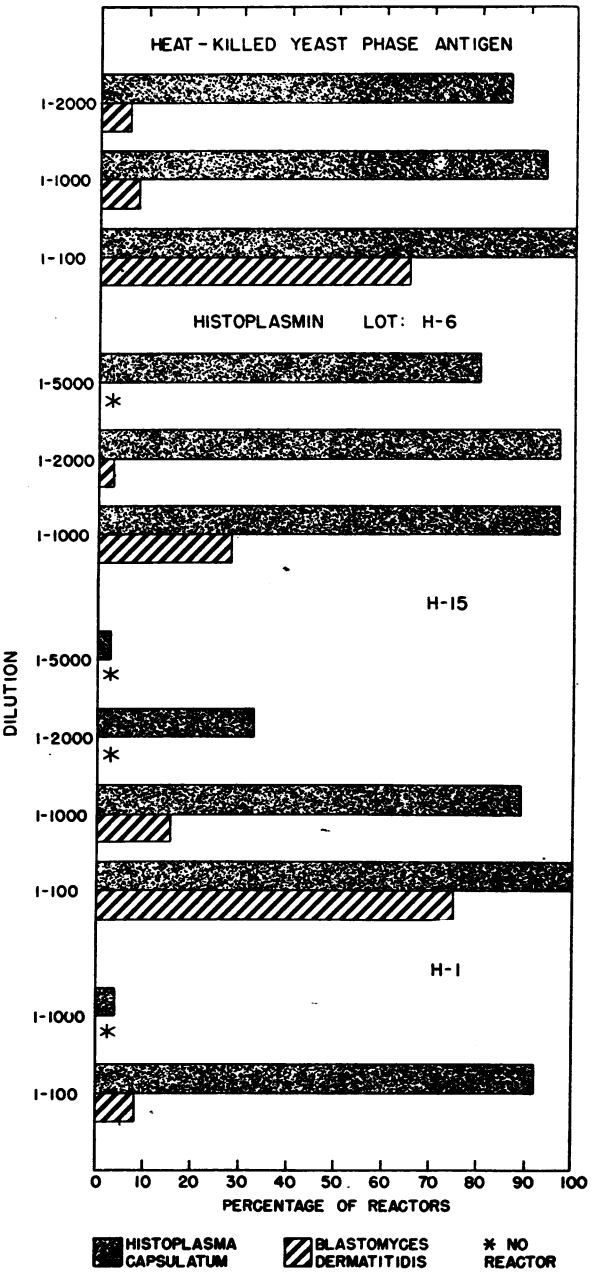

FIGURE 8.—Titration of heat-killed yeast phase antigen of *H. capsulatum* and histoplasmin on guinea pigs experimentally infected with *H. capsulatum* and *B. dermatitidis*.

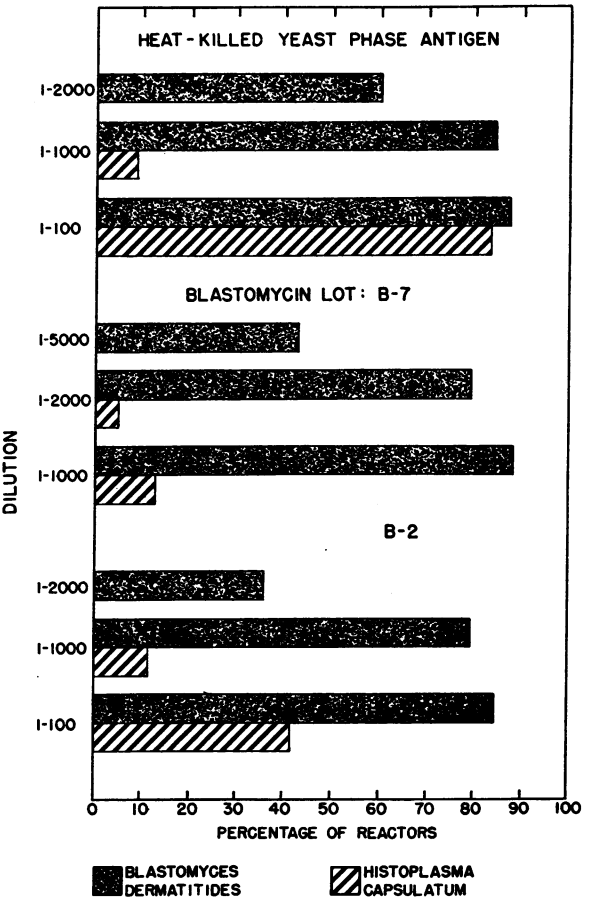

FIGURE 9.—Titration of heat-killed yeast phase antigen of *B. dermatitidis* and blastomycin on guinea pigs experimentally infected with *B. dermatitidis* and *H. capsulatum*.

It is evident from the data presented in tables 9 and 10 and in figures 8 and 9 that most of the guinea pigs experimentally infected with *Blastomyces dermatitidis* reacted also to each lot of histoplasmin employed and to the heat-killed antigen prepared from cultures of the yeast phase of *Histoplasma*. Similarly, most of the animals experimentally infected with *Histoplasma capsulatum* reacted also to each lot of blastomycin and to the heat-killed antigen prepared from cultures of the yeast phase of *Blastomyces dermatitidis*.

However, in both groups, as in the reactions of these animals to the homologous antigens (tables 1 and 2), the percentage of cross reactions with any antigen is seen to depend first upon the particular antigen or lot of antigen employed, and second upon the dilution of that antigen or lot. For example, when lot H–6 histoplasmin was used on guinea pigs infected with *Histoplasma*, 39 of 40 or 97.5 percent (table 9)

reacted to either a 1:1,000 or a 1:2,000 dilution; when used on guinea pigs experimentally infected with *Blastomyces*, only 9 of 32 or 28.1 percent (table 9) reacted to a 1:1,000 dilution, and 1 of 32 or 3.1 percent to a 1:2,000 dilution of H–6. When, however, the concentration of this histoplasmin was increased to a 1:100 dilution, 27 of 32 or 84.4 percent of the guinea pigs infected with *Blastomyces* reacted. Conversely, when the concentration of histoplasmin was decreased to a 1:5,000 dilution, 32 of 40 or 80 percent of the animals infected with *Histoplasma* reacted, but none of the 32 infected with *Blastomyces* reacted. Similarly, when lot H–15 was used in a 1:1,000 dilution as the testing agent, 42 of 47 or 89.4 percent of the animals infected with *Histoplasma*, but only 5 of 32 or 15.7 percent of the animals infected with *Blastomyces*, reacted. When the concentration was increased to a 1:100 dilution, 100 percent of 47 animals infected with *Histoplasma* and 75 percent of 32 animals infected with *Blastomyces* reacted.

Similar results were obtained with two lots of blastomycin and the heat-killed antigen prepared from the yeast phase of *Blastomyces*. For example, when lot B–2 blastomycin was tested on animals infected with *Blastomyces* (table 10), 27 of 34 or 79.4 percent reacted to a 1:1,000 dilution, whereas only 5 of 47 or 10.7 percent of those infected with *Histoplasma* reacted. When, however, the concentration was increased to a 1:100 dilution, then 31 of 37 or 83.8 percent of those infected with *Blastomyces* reacted, but only 19 of 47 or 40.5 percent of those infected with *Histoplasma* reacted.

In addition to the differences in the number and percentage of animals infected with these two fungi which reacted to the same dilution of any particular antigen, marked differences also occurred in the average size of the reaction. For example, a 1:1,000 dilution of lot H–6 histoplasmin produced an average indurated area 8.8 mm. in diameter in animals infected with the homologous fungus (table 9) but the same amount of the same lot of histoplasmin produced an average diameter only 5.3 mm. in animals infected with *Blastomyces*. Similar differences in the average size of the indurated area were obtained with all antigens and all dilutions employed (tables 9 and 10).

A comparison of the data in table 3 with those in tables 9 and 10 brings out the fact that, in the case of animals infected with *Histoplasma* or *Blastomyces*, infection with one fungus increases the sensitivity of an animal to an antigen prepared from the other fungus. For example, none of 32 guinea pigs reacted to a 1:100 dilution of H–15 histoplasmin before infection with *Blastomyces*, but 75 percent reacted to this dilution of H–15 after infection with *Blastomyces*. It would appear, nevertheless, while any antigen prepared from a culture of one fungus produces a reaction in guinea pigs experimentally

infected with the other fungus, the percentage and size of these cross reactions are dependent on the dosage of the particular antigen used.

It should also be pointed out that even though the percentage of reactors can be increased by increasing the dosage, the percentage of cross reactions is also increased, and by a much larger amount. For example, increasing the dosage of lot H–15 histoplasmin from a 1:1,000 dilution to a 1:100 dilution increased the percentage of reactors from 89.4 percent to 100 percent, and the percentage of cross reactions (the percentage of those animals infected with *Blastomyces* which reacted) was increased from 15.7 percent to 75 percent (table 9, fig. 8). This fact, then, would seem to be further evidence for the need to determine the critical *titer* of any antigen to be used for intradermal testing. If the critical *titer* is determined for the various antigens included in this study, it would then seem that, with any particular antigen or lot of antigen, there are dilutions or dosages which will detect sensitization in most of the animals sensitized with the homologous organism and at the same time give relatively few cross reactions in animals sensitized by the heterologous organism. That is, if histoplasmin and blastomycin, and the antigens prepared from the yeast phase of these fungi, are used at their critical *titers*, then the percentage of cross reactions between histoplasmin and blastomycin in guinea pigs experimentally infected with *Blastomyces* and *Histoplasma* would be relatively small, varying from 3.1 to 15.7 percent in the animals included in this study, depending on the particular lot of histoplasmin or blastomycin employed.

In addition to the studies on the various lots of histoplasmin and blastomycin, the reactions of the same guinea pigs to tuberculin and coccidioidin were determined. The tuberculin employed was old tuberculin furnished by Mr. W. Steenken, Jr., of the Trudeau Laboratory, Trudeau, N. Y. One-tenth cubic centimeter of a 5-percent solution (5.0 mg.) was employed. The coccidioidin (lot No. 24) was furnished by Dr. C. E. Smith, Stanford University Medical School, and was used in a 1:100 dilution.

One animal infected with *Histoplasma* and three infected with *Blastomyces* gave small reactions (6–7 mm. indurated area at 48 hours) to old tuberculin. The cause of these reactions was not determined. None of the animals infected with *Blastomyces* and only one of those infected with *Histoplasma* reacted to a 1:100 dilution of coccidioidin. Therefore, although the *titer* of this lot of coccidioidin was not determined for guinea pigs in this study, it would seem that cross reactions of coccidioidin in guinea pigs experimentally infected with either of these fungi are negligible. This is in agreement with the findings of Emmons et al. (*3*).

The conclusion reached by Emmons (*3*) that there is a high degree

of cross reaction between histoplasmin and blastomycin in guinea pigs infected with *Blastomyces* and *Histoplasma* is not in agreement with the findings in this study. However, if the data presented by Emmons are analyzed according to the suggestions presented above (first, the determination of the critical *titer* of each antigen and second, the study of the cross reactions based on the critical *titer* of each antigen) it will be found that 12 of 24 or 50 percent of the animals infected with *Blastomyces* reacted to histoplasmin (lot H–3) and 9 of 15 or 60 percent of the animals infected with *Histoplasma* reacted to blastomycin (lot B–4). These degrees of cross reaction would not seem to support Emmons' conclusion that histoplasmin and blastomycin cross-react "almost completely" in experimental blastomycosis and histoplasmosis in guinea pigs. It would appear, also, from analysis of the figures of Emmons et al. (*3*) that the degree of cross reactions which he demonstrated, and which are larger than those found in this series, may have been due in part to a relatively low level or degree of sensitivity in his test animals. Therefore, it may have been necessary to use high concentrations of the antigens to elicit reactions in the test animals. However, it has been shown above that, if this is true, a false impression of the critical *titer* of the antigens will be obtained, and that at these concentrations a higher degree of cross reaction will be obtained than if the *titer* is determined at a time when the level of sensitivity is high.

It is clear from the material presented in this paper that cross reactions are intimately related to dosage and to the antigens used for testing. Before definite conclusions, therefore, can be drawn regarding specificity or lack of specificity, it is obvious that the whole problem must be much more completely investigated than has been accomplished in this or other work on the subject.

SUMMARY AND CONCLUSIONS

Three lots of histoplasmin, five of blastomycin, and heat-killed antigens prepared from yeast cultures of *Histoplasma capsulatum* and *Blastomyces dermatitidis* have been tested on guinea pigs experimentally infected with *Histoplasma capsulatum* and *Blastomyces dermatitidis*.

It has been shown that—

(1) The number of experimentally infected guinea pigs which reacted to histoplasmin, blastomycin, or the heat-killed yeast-phase antigens depends upon the particular lot of antigen employed and upon the dilution of this particular lot;

(2) Although antigens prepared from cultures of *Histoplasma capsulatum* or *Blastomyces dermatitidis* will give reactions in guinea pigs infected with either fungus, the percentage and size of these

cross reactions are dependent upon the dosage of the particular antigen employed;

(3) If the critical *titers* of these antigens are determined, and if these concentrations are used to study cross reactions, the degree of cross reaction between these antigens is small and the antigens are therefore relatively specific for guinea pigs experimentally infected with the homologous fungi;

(4) The level or degree of sensitivity of the animals employed to determine the *titer* of an antigen must be considered. That is, if the sensitivity level is low, a high concentration of the antigen will have to be used to elicit a reaction, and, therefore, a false impression of the critical *titer* of the antigen will be obtained. Such high concentrations of antigen will produce a high percentage of cross reactions.

ACKNOWLEDGMENT

The author wishes to express his appreciation to Dr. M. L. Furcolow, Surgeon, and to Dr. Carroll E. Palmer, Senior Surgeon, for their assistance in the preparation of this manuscript.

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COMMUNITY-WIDE CHEST X-RAY SURVEYS

I. AN INTRODUCTION TO THE PROBLEM

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Within the past few years, millions of people throughout the world have been examined for tuberculosis by the mass X–ray technique. Indeed, in one year of operation the United States Public Health Service surveyed a million persons by means of miniature chest films. Within the next 5 years, if all resources are mobilized and a national plan is efficiently executed, a complete and exact picture of tuberculosis in the United States can be obtained. Not until every adult in the country has been examined by means of a chest X-ray film will the first great stride have been taken toward eradication of tuberculosis from the Nation.

The Tuberculosis Control Division of the United States Public Health Service is dedicated to the pursuit of four major objectives: (1) the discovery of every person in the country infected with tuberculosis, (2) isolation and medical care for every patient needing treatment, (3) after-care and rehabilitation, and (4) protection of the afflicted family against economic distress.

It is generally recognized that the first step in a well conceived program of tuberculosis control should be an extensive campaign of case finding. Properly, this step is the initial approach to the other three objectives, which must be sought directly when cases are discovered. The mass chest X-ray survey, then, is one of the most important techniques in the work of the Division.

In order to cope successfully with the problem of tuberculosis, the disease must be detected in the early stages of infection, so that treatment can be undertaken in time to protect the community and ensure the best possible prognosis for the individual. Experience has taught that it is costly to wait for patients to report findings that were formerly considered indicative of early tuberculosis. Indeed, such signs as hemoptysis, blood-streaked sputum, and pleurisy are more likely to point to a late case than an early one. We have learned to look for the disease in presumably healthy persons, and the result of case-finding programs has invariably been the discovery of tuberculosis unsuspected by the patient himself. Tuberculosis that can only be brought to light through an active search may constitute a menace to the community.

Detection of early cases is easily achieved by means of the photofluorograph. Repeated success has proved this instrument to be a practical and economical tool for the discovery of tuberculosis in the early, remediable stages. Thus, technical problems are now of minor

importance in the total work of case finding. In actual practice, the main difficulty is in getting people before the machine for examination. The purpose of the present article is to consider that problem in a preliminary way, and to introduce subsequent publications of the results of mass chest X-ray surveys conducted by the Division.

The present discussion deals primarily with tuberculosis case-finding surveys of entire communities. In the community-wide chest X-ray survey, the Division has limited the examination to persons 15 years of age or older. This procedure has saved the time and expense of surveying the younger group, a labor not usually fruitful, and has permitted completion of the work within specified periods of time. Community-wide examinations take from a few weeks to a few months to conduct. In Cleveland County, N. C., for example, the Division X-rayed 25,621 persons in 4 weeks; and in Gaston County, N. C., in cooperation with the North Carolina State Health Department, 50,828 were X-rayed in 6 weeks. Equally successful surveys of short duration were made in other parts of North Carolina, such as Wayne County, and in Savannah and Columbus, Ga.

Objection may be raised by those who believe that we should concentrate our efforts on special population groups rather than on the total populations of communities. And the question will be asked, Is it necessary to compress such a large examination program into so short a period of time? The Division is well aware of these two divergent views and appreciates the advantages represented in each. In the light of experience in this work, however, the Division has come to recognize the important place of the community survey in the national program of tuberculosis control, and perceives certain advantages in the short-term approach.

Certainly the community-wide survey would seem the best in small communities where no industrial or other group is readily accessible, and where no group deserves precedence because of an expected higher incidence of disease. In the small community of heterogeneous population, the chest X-ray survey must be community-wide.

Experience indicates, however, that mass-survey work need not be limited to small communities. Case-finding by the mass X-ray technique has proved successful in some metropolitan areas. Here, the examination of a part of the population seems to have equaled, in efficiency and service rendered, the examination of entire communities.

With regard to the time element, it is not necessary, of course, to survey the entire community in, say, 4 to 6 weeks—the time range of community surveys to date. Actually, it would suffice to cover the same number of persons in a 2-year period, or perhaps in as

long a period as 5 years. The Division, however, finds the short-term program more practical, at least in the smaller communities. In the first place, a long-term survey will usually necessitate the establishment of provisions for more or less permanent special services to the community. Generally, such services can only be afforded in the larger cities. There, it is often economically feasible to purchase one or more X-ray units and to keep a full-time staff occupied throughout the long-term period. But even in large cities, the short-term approach is sometimes preferable.

Extensive and thorough preparation must, of course, be made by a community that proposes to conduct a case-finding survey of the entire population 15 years of age and over. The community may consider several types of approach. First may be mentioned the "campaign" approach, a type so familiar as to need no special consideration. This consists in rapid organization of community members and in working up community interest to a sudden peak as the time of examination nears. The campaign type is generally of short duration; the entire program (preliminary publicity, examinations, etc.) is frequently measured in days and requires no longer than a few weeks at most for completion. This approach has its place, but is limited in that its benefits are likely to be of a temporary nature if the survey is not followed by an extended educational program in the area.

The second type is the "continuous" program. In public health work, this approach is generally preferred, since it offers the advantages of joint planning by all community leaders and professional persons concerned. It assumes all possible assistance from public health and other civic officials, as well as from voluntary associations, labor leaders, unofficial civic groups, the medical profession, and everyone else with an interest in community life.

It must be remembered, however, that even the so-called "continuous" program, when applied to a communicable disease like tuberculosis, must be bounded by certain time limits. We must discover and isolate, as soon as possible, a sufficient number of open, infection-spreading cases to provide a marked reduction in disease hazard for the remaining population. In view of this, 2 to 5 years has been estimated as the maximum duration of a successful program in which the entire adult population is examined. Any program geared so low that more than 5 years is required for its completion may well be seriously questioned.

The experience of the Tuberculosis Control Division points to a combination of the two types as the best general approach. Since time limits in case-finding are imposed by epidemiological factors, most areas, and particularly the smaller communities, must conduct

intensive surveys. Outside help is therefore required in most instances, in order to provide the equipment and the number of specialists needed. This additional help must arise, as a rule, through cooperation with the State health department, or with the district health department if one exists for that work.

In association with State health departments, the photofluorographic units of the Public Health Service and the teams assigned to them have conducted several community-wide surveys on a demonstration basis within the past 2 years. The remainder of this article will discuss the demonstration program in general terms.

It should be emphasized here that the organization and conduct of community-wide chest X-ray surveys require joint planning on the part of many groups: (1) Official health departments, State and local, as well as other official agencies, such as welfare departments and vocational rehabilitation offices, (2) voluntary associations, State, local and others, and (3) the medical profession. Preparations for the survey cannot be made quickly. About 3 months is generally required before the necessary preparations can be completed.

In explaining the role of the United States Public Health Service in the community case-finding program, it should be mentioned that Congress has authorized the Tuberculosis Control Division to have in operation a number of demonstration units. At the present time, there are approximately 20 such units, of which about half are detailed to large community surveys. It is the work of this half that will be discussed here, since the other units are assigned individually to communities for work on a somewhat reduced scale.

When the Division is called upon to begin a demonstration survey, the first step is a request from the State or a local group for a demonstration. This request is followed by a preliminary meeting of Division members with State and local officials and with other groups concerned in the survey. These other groups which will participate in the program are selected by the official State and local agencies.

The question of need for a survey must first be considered. Since the number of demonstration units is limited and the Public Health Service is dedicated to serve the Nation, it is necessary that the Division avoid concentrating too much of its personnel and equipment in one section of the country. Rather, an attempt is made to begin in those areas having the greatest problem, and to extend the demonstrations gradually to other areas representative of their particular regions.

The first scene of the demonstration work has been the southeastern region of the United States, mainly because of the great interest on the part of officials there and because of the magnitude of the problem.

After the need for a survey is decided, an investigation is made of the ability of the area to fulfill other requirements:

1. The area must be one with a definite problem. Where the problem is regional in extent, an area within the region, typical with respect to the problem, is considered.

2. Since the work of the demonstration unit is confined to a definite period, the State or other sponsoring agency must evince a willingness to conduct an effective tuberculosis follow-up program after the unit has left the area. There must be evidence that adequate provisions exist for nursing, treatment, and other measures needed in the follow-up, or there must be reasonable assurance that such provisions will be made.

3. The community must demonstrate a willingness to cooperate in the continued support of the general public health program, as well as of the program of tuberculosis control.

If it is shown that these requirements can be met, the next step is taken—the planning of specific details. One of the first questions to be answered is the amount of time that will be spent on actual case-finding. This will depend upon a number of conditions, one of the most important being the type of community; that is, whether the community is predominantly rural or urban. Generally speaking, it will take longer to cover a rural population than an urban one. In the North Carolina demonstrations mentioned above, about twice as many persons were examined among the rural-urban population of Gaston County in 6 weeks as among the rural population of Cleveland County in 4 weeks. In these two counties, several X-ray units with full complements of personnel were employed, but in another community a great majority of the adult population was reached in a period of 6 months with only one unit.

When the probable amount of time to be spent on case-finding is determined, the Division considers the following demands:

1. The number of units required for the work. If operating conditions are satisfactory, a fully automatic unit with qualified personnel can expose and develop 500 X-ray films in an average working day. Many of the units have far exceeded this number, but all factors considered, 300 films may be accepted as a good daily average in actual practice.

2. The probable number of cases to be detected that will require treatment and follow-up.

3. The necessary facilities present in the community and other facilities that must be obtained—clinics, hospital beds, and health department facilities.

4. The facilities needed for follow-up. This will include estimates of medical, nursing, and record-keeping requirements, and of needed provisions for a continuous educational program with emphasis on interpretation of the control work and the disease.

5. The number of personnel needed to carry out the work within the time prescribed.

In all of this planning, a fundamental concept is observed: The aim of the Division in a case-finding survey is to obtain a good knowledge of the local tuberculosis problem, and to leave the community with

the majority of active cases either under treatment or with preliminary arrangements for treatment. In this way, the community will not be left with too large a task, but rather with an awakened consciousness of its tuberculosis control program and with a number of cases that it will be able to handle in its routine health department operations.

One of the basic considerations in any case-finding program is the question of support for the survey. In case-finding demonstrations, the Tuberculosis Control Division furnishes standard, fully automatic photofluorographic units employing 70-mm. roll film. With these units, the Division assigns medical officers for the organization of the survey and interpretation of results, and lends nurses, X-ray technicians, and reporting-methods analysts. The Public Health Service, in brief, furnishes the necessary equipment and personnel.

The work done by the Division, however, is only a part of the entire task, for a considerable amount of preliminary work is required, as well as a supplementary provision of funds on the part of the State and local organizations. Specifically, the State and local health departments have contributed the funds required for the employment of additional clerical personnel. In order to treat cases discovered during the survey, these departments have also provided clinic facilities, nurses, and other workers.

Additional financial support may be needed for organizing the community. In this respect, the Public Health Service limits its support to expert consultation in community organization, in order to assure a high degree of systematized community effort. The actual work of organizing the community is left to local groups, mainly to the voluntary associations, which cooperate with the appropriate local official agencies. In some areas, such groups as the chamber of commerce, civic clubs, and religious organizations have made important contributions for newspaper and other publicity to enlist support for the program.

As previously explained, the program of the Division combines the campaign and the continuous types of approach, with great stress placed upon community organization. In some of the programs, ordinary publicity media—radio, newspapers, pulpit and school announcements—sufficed to bring people out for the survey. In others, the Division added door-to-door canvassing, a technique found to be of value in war-bond and community-chest drives. It should be pointed out that good community organization is essential to the success of a demonstration program. Both the long- and short-term successes are determined by the quality of this organization, which is one of the most important elements in the planning.

The final step to be made before commencing the actual survey is to reach a formal agreement with the agencies concerned. In this,

the Division uses an agreement form which defines the project and presents a statement of obligations and responsibilities. Broadly speaking, the form specifies the following:

1. The Public Health Service will provide the technical personnel and technical equipment for the tuberculosis case-finding survey.
2. The State and local health departments will supply basic services, including clinical and follow-up facilities.
3. The community by means of publicity will do the basic organizing necessary to bring the people out for examination.

The community-wide chest X-ray survey has been compared to the modern military campaign; with respect to both tactics and objective, the analogy seems justified. Whatever we war against, we cannot expect victory if we resort to defense alone: we must attack. Organization, training, equipment, financial support, planning—all are of basic importance, whether we attack an army of men or man's common enemy, disease. The individual attack must be systematically planned and executed. Furthermore, a central plan and policy, designed to give direction in each phase of an extended campaign and to solve each new problem that may arise, are essential to the achievement of permanent, unconditional success.

The Tuberculosis Control Division of the United States Public Health Service has formulated the central plan, the policy. It is prepared to guide and assist in the discovery of every person in the country infected with tuberculosis, and to approach the other three objectives as this is accomplished. The community-wide chest X-ray survey, a technique of case-finding both rapid and thorough, is waging highly effective war against tuberculosis. The ultimate objective of the tuberculosis movement in the United States—complete eradication of the disease—can be attained through a combination of this and other techniques if they are applied relentlessly in a cooperative, Nation-wide program.

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 APRIL 12, 1947

Summary

The reported incidence of influenza declined for the third consecutive week, and the total mortality, all causes, in 93 major cities in the United States declined for the second consecutive week. Exclusive of Kentucky (which reported 5,048 cases of "upper respiratory infection," as compared with 1,036 cases for the preceding week), the current total is 23,536 as compared with 35,939 for the preceding week.

According to the reports furnished the Public Health Service by the State health authorities, no extensive outbreaks of influenza have been reported this season in the New England, Middle Atlantic, and East North Central areas, although high school-absenteeism was reported from certain areas in New York State. The most severely affected areas, according to reported and estimated cases, were the South Atlantic, and South Central areas, Iowa and Kansas in the North Central group, and Colorado in the Mountain States. The State health officer of California reported extensive outbreaks in the northern part of the State during February and March, but the actual incidence was not indicated by the reported figures. This same situation probably obtained in other States, for which the reported figures fail to show the actual incidence of the disease.

During the current week, 7 cases of smallpox were reported in New York State, 4 of which were in New York City. (See p. 661.) Only 1 other case (in Mississippi) was reported during the week. A total of 76 cases has been reported to April 12 this year, as compared with 149 for the same period last year and a 5-year (1942–46) median of 184 cases for the period.

The reported incidence of poliomyelitis, tularemia, undulant fever, and whooping cough is above both last year's figures and the median expectancy, while the other communicable diseases listed in the following table are below or approximately at the median expectancy.

A total of 10,154 deaths was reported in 93 large cities in the United States, as compared with 10,193 last week, 10,820 for the next earlier week and 9,105 for the corresponding week last year. The accumulated total to date this year is 151,812, as compared with 150,718 for the same period last year.

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*Telegraphic morbidity reports from State health officers for the week ended Apr. 12, 1947, and comparison with corresponding week of 1946 and 5-year median**

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46	Week ended—		Median 1942-46
	Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946	
NEW ENGLAND												
Maine	0	4	0	4	------	2	250	91	91	0	0	5
New Hampshire	0	0	0	8	1	------	9	125	27	0	1	1
Vermont	0	0	0	15	------	------	285	11	100	0	0	0
Massachusetts	9	3	4	------	------	------	360	1,816	1,314	1	2	5
Rhode Island	1	0	0	------	1	1	206	12	14	0	0	1
Connecticut	0	1	0	9	------	3	864	247	430	1	3	3
MIDDLE ATLANTIC												
New York	12	36	19	[1] 18	[1] 1	[1] 2	532	5,894	2,317	6	14	17
New Jersey	3	6	6	16	1	6	451	3,976	1,831	1	10	10
Pennsylvania	17	29	12	[2] 4	[2] 2	[2] 2	283	3,409	1,264	7	13	13
EAST NORTH CENTRAL												
Ohio	10	24	13	32	5	11	582	916	916	13	3	9
Indiana	4	12	3	17	5	7	120	768	224	0	5	5
Illinois	4	15	17	16	4	6	92	1,352	1,281	16	10	13
Michigan [3]	4	9	8	11	------	1	69	2,508	812	7	4	5
Wisconsin	4	2	2	290	36	36	326	4,222	2,277	2	4	4
WEST NORTH CENTRAL												
Minnesota	2	7	2	3	------	1	96	53	153	4	3	3
Iowa	0	5	5	1,576	------	------	181	148	204	2	2	2
Missouri	25	4	4	7	3	3	6	73	392	3	1	6
North Dakota	0	2	1	2	------	4	7	8	55	1	0	0
South Dakota	1	1	2	------	------	------	12	38	38	0	0	0
Nebraska	2	0	1	------	3	2	8	579	311	1	0	0
Kansas	4	3	3	72	5	4	4	693	623	0	1	3
SOUTH ATLANTIC												
Delaware	0	0	0	------	------	------	------	29	13	1	1	1
Maryland [3]	14	8	5	11	1	6	23	567	521	5	2	10
District of Columbia	0	0	0	------	1	1	44	212	83	2	0	2
Virginia	4	4	4	4,673	114	274	288	771	488	3	5	8
West Virginia	4	8	3	935	2	5	22	123	123	3	1	2
North Carolina	6	9	9	------	------	2	221	623	623	5	2	8
South Carolina	9	5	4	2,650	292	292	210	427	251	0	0	1
Georgia	5	0	1	485	5	43	155	216	216	0	3	4
Florida	2	4	3	109	2	3	127	139	139	1	3	3
EAST SOUTH CENTRAL												
Kentucky	8	6	44	[4]	45	4	3	430	126	3	3	7
Tennessee	5	5	3	741	27	43	96	286	286	3	1	2
Alabama	1	7	7	727	11	87	188	235	235	5	4	6
Mississippi [3]	3	6	6	118	------	------	16	------	------	1	3	3
WEST SOUTH CENTRAL												
Arkansas	3	3	2	1,255	35	35	113	229	193	2	2	2
Louisiana	2	4	4	300	15	15	26	102	102	0	1	2
Oklahoma	3	0	3	3,347	69	79	11	344	304	1	2	2
Texas	18	34	29	3,896	635	690	374	2,107	2,107	10	9	9
MOUNTAIN												
Montana	0	4	1	571	4	3	162	123	123	0	0	0
Idaho	0	0	0	63	8	1	12	122	78	0	0	0
Wyoming	0	0	0	------	------	------	19	60	79	0	0	1
Colorado	9	4	4	641	20	25	93	890	279	0	0	0
New Mexico	0	1	1	7	1	2	77	24	24	0	0	0
Arizona	8	15	1	165	78	78	81	258	155	0	1	1
Utah [3]	1	0	0	98	3	2	13	555	207	0	1	0
Nevada	0	0	0	------	------	------	------	11	16	0	0	0
PACIFIC												
Washington	2	7	5	480	------	2	28	786	209	2	2	3
Oregon	1	7	7	85	2	13	27	315	203	0	1	1
California	20	12	12	79	29	29	178	3,823	2,795	10	8	22
Total	230	316	244	23,536	1,466	1,917	7,350	40,746	27,161	122	131	194
15 weeks	4,231	5,568	4,478	266,137	179,321	67,152	82,918	301,196	262,946	1,322	2,837	3,617
Seasonal low week [5]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	11,797	17,212	13,214	299,112	541,569	103,014	105,905	327,320	300,959	2,294	4,341	6,069

*Cumulative totals for 1947 are exclusive of figures for Pennsylvania for week ended Apr. 5.

[1] New York City only. [2] Philadelphia only. [3] Period ended earlier than Saturday.

[4] Kentucky reported 5,048 cases of influenza (upper respiratory infection), as compared with 1,036 last week, not included in the totals.

[5] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended Apr. 12, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947	Apr. 13, 1946		Apr. 12, 1947[6]	Apr. 13, 1946	
NEW ENGLAND												
Maine	1	1	0	21	34	34	0	0	0	0	1	1
New Hampshire	0	0	0	9	8	8	0	0	0	0	0	0
Vermont	[7] 0	0	0	10	12	7	0	0	0	0	0	0
Massachusetts	0	0	0	115	202	450	0	0	0	6	1	1
Rhode Island	0	0	0	16	22	22	0	0	0	0	0	0
Connecticut	0	0	0	42	70	71	0	0	0	0	2	0
MIDDLE ATLANTIC												
New York	7	4	3	343	912	535	7	0	0	0	0	3
New Jersey	2	2	1	155	190	167	0	0	0	0	1	0
Pennsylvania	0	1	1	216	405	405	0	0	0	4	4	4
EAST NORTH CENTRAL												
Ohio	0	0	0	358	401	311	0	1	1	2	0	1
Indiana	0	1	0	71	83	115	1	1	1	2	0	1
Illinois	1	1	1	103	203	281	0	0	1	0	0	4
Michigan [3]	1	0	0	128	160	160	0	0	0	2	4	1
Wisconsin	0	0	0	39	134	168	0	0	0	1	3	0
WEST NORTH CENTRAL												
Minnesota	0	0	0	48	62	76	0	0	0	0	0	0
Iowa	0	1	0	40	50	57	0	0	0	1	0	0
Missouri	0	0	0	38	56	116	0	0	0	0	0	0
North Dakota	0	0	0	7	8	22	0	0	0	0	0	0
South Dakota	0	0	0	10	6	20	0	0	0	0	0	0
Nebraska	0	0	0	13	38	38	0	2	0	0	0	0
Kansas	0	1	0	43	72	82	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	0	0	7	7	13	0	0	0	0	1	0
Maryland [3]	0	0	0	28	83	148	0	0	0	0	1	0
District of Columbia	0	0	0	8	24	24	0	0	0	0	1	0
Virginia	0	0	0	32	85	82	0	0	0	0	1	1
West Virginia	0	0	0	11	39	39	0	0	0	0	0	3
North Carolina	0	0	0	20	37	39	0	0	0	0	0	2
South Carolina	0	0	0	2	8	4	0	0	0	0	0	1
Georgia	0	0	0	14	8	17	0	0	0	1	1	2
Florida	2	2	0	13	3	8	0	0	0	1	1	1
EAST SOUTH CENTRAL												
Kentucky	3	0	0	26	19	45	0	0	0	2	2	4
Tennessee	1	0	0	42	25	38	0	0	0	0	1	1
Alabama	0	0	1	6	65	17	0	0	0	0	0	1
Mississippi [3]	1	1	0	4	4	10	1	0	0	0	3	2
WEST SOUTH CENTRAL												
Arkansas	0	1	0	5	5	6	0	0	1	0	0	1
Louisiana	0	2	0	4	7	8	0	0	0	4	3	4
Oklahoma	2	0	0	7	16	16	0	0	1	0	0	0
Texas	0	6	3	31	29	63	0	0	1	1	11	7
MOUNTAIN												
Montana	0	0	0	3	17	17	0	0	0	0	0	0
Idaho	0	0	0	7	12	28	0	0	0	0	1	0
Wyoming	0	0	0	2	7	22	0	0	0	0	0	0
Colorado	0	0	0	43	23	45	0	0	0	2	1	0
New Mexico	0	0	0	11	9	10	0	0	0	0	1	1
Arizona	0	0	0	11	13	13	0	0	0	0	2	2
Utah [3]	0	0	0	15	35	30	0	0	0	0	0	0
Nevada	0	0	0	0	0	3	0	0	0	0	0	0
PACIFIC												
Washington	1	1	1	28	30	44	0	8	0	0	0	0
Oregon	0	0	0	47	32	38	0	0	0	1	0	0
California	10	3	3	129	201	201	0	0	0	2	2	2
Total	32	28	20	2,381	3,971	4,483	9	12	12	32	49	59
15 weeks	[7] 734	574	378	40,604	52,463	59,767	77	149	184	641	683	834
Seasonal low week [5]	(11th) Mar. 15–21			(32d) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[7] 109	108	76	67,290	91,034	98,520	131	225	301	156	208	217

[3] Period ended earlier than Saturday.
[5] Dates between which the approximate low week ends. The specific date will vary from year to year.
[6] Including paratyphoid fever reported separately as follows: Massachusetts 4 (salmonella infection); Ohio 2; Michigan 1; Louisiana 1; Colorado 1.
[7] Delayed report: Poliomyelitis, Vermont, week ended March 1, 1 case, included in cumulative totals only.

Telegraphic morbidity reports from State health officers for the week ended Apr. 12, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended Apr. 12, 1947							
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Apr. 12, 1947	Apr. 13, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	19	17	17								1
New Hampshire		1									
Vermont	15	32	19								3
Massachusetts	124	111	127	1	3						2
Rhode Island	5	18	26								
Connecticut	36	45	45								8
MIDDLE ATLANTIC											
New York	115	163	219	4	4						3
New Jersey	129	124	124	1							2
Pennsylvania	163	111	161				1				
EAST NORTH CENTRAL											
Ohio	144	71	133								2
Indiana	48	35	35				2		1		
Illinois	54	75	75	2	1						10
Michigan [3]	148	93	93								6
Wisconsin	127	104	104								8
WEST NORTH CENTRAL											
Minnesota	23	9	10	2							
Iowa	10	11	16				2				10
Missouri	20		11								
North Dakota		6	6			1					
South Dakota	1		2								5
Nebraska	6		9								3
Kansas	18	15	28								3
SOUTH ATLANTIC											
Delaware	3		1								
Maryland [3]	58	19	45			1	1				1
District of Columbia	7	4	8								
Virginia	84	27	48			75					1
West Virginia	10	20	26								
North Carolina	13	92	95						1	1	
South Carolina	108	79	79	3	8					2	
Georgia	30	35	21		1				6	6	1
Florida	48	4	17	5						3	3
EAST SOUTH CENTRAL											
Kentucky	9	57	42								
Tennessee	25	31	29	2		3					1
Alabama	38	4	18							7	6
Mississippi [3]	5			5	2					3	2
WEST SOUTH CENTRAL											
Arkansas	17	7	8			5					
Louisiana	20		3	1					3	1	
Oklahoma	13	9	10	1					2		
Texas	583	182	213	10	168	31			1	13	12
MOUNTAIN											
Montana	1		4					1			
Idaho	10	6	3								
Wyoming		10	10								
Colorado	33	40	39								
New Mexico	21	2	7	2							
Arizona	12	14	26			30					
Utah [3]	6	34	34								
Nevada			3								
PACIFIC											
Washington	18	27	43								2
Oregon	10	19	18								
California	141	51	309	3			2				4
Total	2,528	[1] 1,814	2,551	42	187	146	8	1	14	36	99
Same week, 1946	1,814			45	261	92	7	4	17	38	73
Median, 1942–46	2,551			36	261	62	7	4	12	36	[2] 88
15 weeks: 1947	38,005			697	4,612	3,171	101	13	[4] 525	614	1,564
1946	27,212			562	4,252	1,547	119	10	294	692	1,134
Median, 1942–46	36,627			417	3,087	958	119	7	267	692	[2] 1,211

[3] Period ended earlier than Saturday.
[2] 2-year average, 1945–46.
[4] Includes delayed reports, Oklahoma, 17 cases.

Anthrax: New York 1 case. *Leprosy:* Louisiana 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended April 5, 1947

This table lists the reports from 89 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	37	0	2	0	0	0	0	4
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	1	0	0	------
Vermont:												
Barre	0	0	------	0	9	0	0	0	0	0	0	4
Massachusetts:												
Boston	6	0	------	1	56	2	3	0	27	0	1	16
Fall River	0	0	------	0	2	0	0	0	1	0	0	6
Springfield	0	0	1	0	22	0	0	0	4	0	0	1
Rhode Island:												
Providence	1	0	1	2	98	0	1	0	5	0	0	13
Connecticut:												
Bridgeport	0	0	------	0	13	0	2	0	2	0	0	------
Hartford	0	0	1	0	25	0	0	0	2	0	0	------
New Haven	0	0	1	0	32	0	2	0	14	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	1	1	0	11	0	6	0	0	3
New York	22	0	14	2	145	3	62	0	153	*0	2	56
Rochester	0	0	------	0	2	1	7	0	8	0	0	1
Syracuse	0	0	------	0	------	0	2	0	3	0	0	5
New Jersey:												
Camden	0	0	------	0	------	0	2	0	2	0	0	3
Newark	0	0	4	0	24	1	4	0	13	0	0	31
Trenton	0	0	7	0	15	0	4	0	3	0	0	6
Pennsylvania:												
Philadelphia	4	0	12	2	7	2	19	0	41	0	1	24
Pittsburgh	0	0	3	5	27	0	8	0	16	0	0	9
Reading	0	0	------	0	------	0	3	0	5	0	0	------
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	------	3	------	4	7	0	10	0	0	1
Cleveland	1	0	17	3	202	3	18	0	25	0	0	23
Columbus	2	0	2	2	10	0	5	0	11	0	0	2
Indiana:												
Fort Wayne	0	0	------	0	15	1	2	0	5	0	0	------
Indianapolis	1	0	------	3	1	0	3	0	17	0	0	2
South Bend	0	0	------	0	6	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	------	0	2	0	0	0	0	------
Illinois:												
Chicago	4	1	11	2	9	1	58	0	29	0	1	18
Springfield	0	0	------	0	------	0	2	0	7	0	0	1
Michigan:												
Detroit	1	1	6	1	6	0	15	0	34	0	0	62
Flint	0	0	------	0	1	2	5	0	6	0	0	2
Grand Rapids	0	0	------	1	4	0	2	0	5	0	0	8
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	1	0	0	1
Milwaukee	0	0	2	2	43	1	16	0	21	0	0	19
Racine	0	0	------	0	------	0	0	0	4	0	0	10
Superior	0	0	------	0	------	0	2	0	2	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	1	0	1	0	0	0	0	2
Minneapolis	0	0	------	0	2	0	9	0	3	0	0	3
St. Paul	0	0	------	1	65	0	5	0	4	0	0	1
Missouri:												
Kansas City	0	0	7	1	1	0	9	0	12	0	0	------
St. Joseph	1	0	------	0	------	0	0	0	0	0	0	4
St. Louis	0	0	11	4	14	1	19	0	17	0	1	7

[1] In some instances the figures include nonresident cases.

* Delayed report: Smallpox, New York City, 4 cases, with 1 death, since March 1.

City reports for week ended April 5, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	1	------	0	2	0	1	0	0	------
Kansas:												
Topeka	0	0	------	0	------	0	0	0	6	0	0	------
Wichita	0	0	2	1	1	0	5	0	1	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	------	0	1	0	2	0	0	2
Maryland:												
Baltimore	3	0	14	1	15	4	13	0	15	0	0	49
Cumberland	0	0	1	0	------	0	4	0	2	0	0	------
Frederick	0	0	------	0	------	0	0	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	18	0	12	0	18	0	0	5
Virginia:												
Lynchburg	0	0	------	0	------	0	2	0	1	0	0	1
Richmond	0	0	1	1	65	1	5	0	2	0	0	8
Roanoke	0	0	------	0	7	0	0	0	9	0	0	------
West Virginia:												
Charleston	0	0	------	0	1	0	0	0	8	0	0	------
Wheeling	0	0	------	1	1	1	3	0	1	0	0	1
North Carolina:												
Raleigh	0	0	------	0	1	0	1	0	0	0	0	2
Wilmington	0	0	------	0	14	0	2	0	0	0	0	------
Winston-Salem	0	0	------	0	25	0	2	0	4	0	0	------
South Carolina:												
Charleston	0	0	137	0	11	0	1	0	1	0	0	------
Georgia:												
Atlanta	0	0	69	6	10	0	3	0	2	0	0	2
Brunswick	0	0	------	0	------	0	0	0	0	0	0	------
Savannah	0	0	31	1	12	0	2	0	0	0	0	1
Florida:												
Tampa	1	0	5	1	2	1	0	0	3	0	1	2
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	10	0	2	0	13	0	1	0	0	9
Nashville	0	0	------	2	------	0	1	0	8	0	0	3
Alabama:												
Birmingham	0	0	42	1	46	0	9	0	8	0	1	2
Mobile	0	0	11	1	31	1	1	0	1	0	0	3
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	143	3	------	0	5	0	0	0	0	------
Louisiana:												
New Orleans	0	0	3	1	38	3	12	0	5	0	0	6
Shreveport	0	0	------	0	------	0	6	0	1	0	0	------
Oklahoma:												
Oklahoma City	0	0	238	0	2	0	3	0	1	0	0	3
Texas:												
Dallas	1	0	------	0	44	0	4	0	3	0	0	7
Galveston	0	0	------	1	------	0	1	0	0	0	0	------
Houston	2	0	1	3	1	0	10	0	4	0	0	------
San Antonio	3	0	4	5	3	0	3	0	1	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	------	0	1	0	1	0	0	------
Great Falls	1	0	------	0	60	0	0	0	2	0	0	------
Helena	0	0	------	0	1	0	1	0	0	0	0	------
Missoula	0	0	200	0	------	0	1	0	0	0	0	------
Idaho:												
Boise	0	0	------	0	1	0	0	0	1	0	0	------
Colorado:												
Denver	3	0	7	0	49	2	11	0	6	0	0	11
Pueblo	1	0	------	0	------	0	2	0	6	0	0	------
Utah:												
Salt Lake City	0	0	------	1	4	0	0	0	6	0	0	------

City reports for week ended April 5, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	1	4	0	6	0	2	0	0	1
Spokane	0	0	4	0	15	0	2	0	2	0	0	7
Tacoma	0	0	------	0	1	0	0	0	1	0	0	6
California:												
Los Angeles	1	0	9	0	13	0	6	0	17	0	2	29
Sacramento	0	0	1	1	1	1	2	0	1	0	0	5
San Francisco	2	0	1	0	3	0	6	0	13	0	1	2
Total	63	2	1,034	69	1,397	36	476	0	688	0	11	519
Corresponding week, 1946*	81	------	42	17	13,229	------	325	------	1,301	5	18	533
Average 1942-46 *	68	------	92	[2] 25	[3] 7,193	------	[2] 386	------	697	1	13	719

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.
Anthrax.—Cases: New York 1.
Dysentery, amebic.—Cases: New York 2; Chicago 2; Los Angeles 1.
Dysentery, bacillary.—Cases: Chicago 1; San Antonio 1; Los Angeles 1.
Dysentery, unspecified.—Cases: Cincinnati 1; San Antonio 2.
Tularemia.—Cases: New Orleans 4.
Typhus fever, endemic.—Cases: Washington, D. C., 1; Tampa 1; Mobile 1; Houston 2.

Rates (annual basis) per 100,000 population, by geographic groups, for the 89 cities in the preceding table (estimated population, 34,421,800)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	20.1	0.0	11.5	8.6	845	5.7	28.7	0.0	161	0.0	2.9	135
Middle Atlantic	12.0	0.0	18.5	4.6	102	3.2	56.5	0.0	116	0.0	1.4	64
East North Central	6.1	1.2	23.1	10.3	181	7.3	83.3	0.0	109	0.0	0.6	91
West North Central	4.0	0.0	40.2	16.1	169	2.0	100.6	0.0	88	0.0	2.0	34
South Atlantic	6.5	0.0	421.7	18.0	297	11.4	83.4	0.0	111	0.0	1.6	119
East South Central	0.0	0.0	371.8	23.6	466	5.9	141.6	0.0	106	0.0	5.9	100
West South Central	15.2	0.0	988.1	33.0	224	7.6	111.8	0.0	38	0.0	0.0	43
Mountain	39.7	0.0	1,644.1	7.9	913	15.9	127.1	0.0	175	0.0	0.0	87
Pacific	4.7	0.0	23.7	3.2	59	1.6	34.8	0.0	57	0.0	4.7	79
Total	9.6	0.3	157.1	10.5	212	5.5	72.3	0.0	105	0.0	1.7	79

PLAGUE INFECTION IN YAKIMA COUNTY, WASHINGTON

Plague infection was reported proved on April 11 in a pool of 91 fleas from 59 meadow mice, *Microtus* sp., collected on March 22 on the Antiaircraft Range, 12 miles east of Yakima, Yakima County, Washington.

SMALLPOX IN NEW YORK

During the period March 1–24, 4 cases of smallpox, with 1 death, were reported in New York City. The infection was introduced by a person arriving from Mexico on March 1. The patient was hospitalized on March 5 and died on March 10. Up to April 15 a total of 12 cases, with 2 deaths, had been reported in New York City and its environs.

Vigorous measures are being carried forward by the State and local health departments for the control of the outbreak, and it is not expected that it will reach epidemic proportions.

This is the first reported occurrence of smallpox in New York State since 1939, in which year 51 cases were reported, including 1 case in New York City. The upstate cases occurred in 3 separate outbreaks in as many counties, and in each instance the infection was introduced from outside the State.

* * *

DEATHS DURING WEEK ENDED APRIL 5, 1947

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

	Week ended Apr. 5, 1947	Corresponding week, 1946
Data for 92 large cities of the United States:		
Total deaths	10,010	8,905
Median for 3 prior years	9,005	
Total deaths, first 14 weeks of year	139,574	139,405
Deaths under 1 year of age	775	600
Median for 3 prior years	599	
Deaths under 1 year of age, first 14 weeks of year	11,139	8,327
Data from industrial insurance companies:		
Policies in force	67,348,051	67,196,295
Number of death claims	11,433	13,151
Death claims per 1,000 policies in force, annual rate	8.9	10.2
Death claims per 1,000 policies, first 14 weeks of year, annual rate	9.9	11.2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 22, 1947.—During the week ended March 22, 1947, 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		21		218	322	18	17	61	74	731
Diphtheria		1	1	7	1	4		5	5	24
Dysentery:										
Amebic					1					1
Bacillary				2					1	3
German measles		1		59	68	1	6	3	11	149
Influenza		48			33				17	98
Measles	4	53	2	200	206	476	111	175	494	1,721
Meningitis, meningococcus					1				1	2
Mumps		13	1	75	901	51	129	22	197	1,389
Poliomyelitis					1					1
Scarlet fever	1	1	76	77	85	4	1	5	11	261
Tuberculosis (all forms)		6	1	103	27	21	12	28	137	335
Typhoid and paratyphoid fever				7				2	5	14
Undulant fever				1	3				2	6
Venereal diseases:										
Gonorrhea	1	29	11	158	74	48	20	33	67	441
Syphilis	1	7	9	83	76	9	7	9	45	246
Other forms									8	8
Whooping cough		3	1	22	78	14	1	12	40	171

JAMAICA

Notifiable diseases—4 weeks ended March 8, 1947.—During the 4 weeks ended March 8, 1947, cases of certain notifiable 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	2	2	Leprosy		3
Chickenpox	3	5	Puerperal sepsis		1
Diphtheria	8	6	Tuberculosis, pulmonary	37	60
Dysentery, unspecified		6	Typhoid fever	8	58
Erysipelas		1	Typhus fever	2	4

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

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

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Siam (Thailand).—For the week ended March 15, 1947, 148 cases of cholera with 72 deaths were reported in Siam (Thailand).

Plague

Brazil.—For the month of September 1946, 29 cases of plague with 6 deaths were reported in Brazil by States as follows: Bahia, 2 cases, 1 death; Ceara, 26 cases, 5 deaths; Parahyba, 1 case.

Peru.—Plague has been reported in Peru as follows: December 1–31, 1946, Libertad Department—city of Trujillo, 6 cases, 3 deaths, Veru, 1 case; February 1947, Libertad Department, Trujillo Province, 2 cases, 1 death; Lima Department, Chancay Province, 12 cases, 2 deaths; Piura Department, Huancabamba Province, 12 cases, 4 deaths.

Turkey (in Asia)—Akcakale.—For the week ended March 29, 1947, 2 cases of plague with 2 deaths were reported in Akcakale, Turkey.

Smallpox

Burma.—Smallpox has been reported in Burma as follows: Weeks ended—March 15, 1947, 165 cases, 89 deaths; March 22, 1947, 195 cases, 102 deaths; for the week ended March 22, 1947, 117 cases of smallpox with 61 deaths were reported in Rangoon, Burma.

Egypt—Alexandria.—For the week ended March 8, 1947, 36 cases of smallpox were reported in Alexandria, and for the week ended March 15, 1947, 30 cases were reported.

Great Britain.—During the week ended April 5, 1947, 1 case of smallpox was reported in Scunthorpe, Lincolnshire, and another case was reported in Doncaster. Both cases are stated to have been associated with contacts in Grimsby. Three other cases suspected of being smallpox were reported on March 5, March 23, and March 25, respectively, at Bilston, Staffordshire, England.

Indochina (French)—Cochinchina.—For the period March 11–20, 1947, 129 cases of smallpox with 88 deaths were reported in Cochinchina, French Indochina.

Ivory Coast.—For the period March 1–10, 1947, 133 cases of smallpox with 3 deaths were reported in Ivory Coast.

Libya—Tripoli.—For the week ended March 22, 1947, 178 cases of smallpox with 13 deaths, were reported in Tripoli, Libya.

Siam (Thailand).—For the week ended March 15, 1947, 90 cases of smallpox with 10 deaths were reported in Siam (Thailand).