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—Editorial—

The First Five Years

Anniversaries are useful dates for stock-taking. The Nation-wide Federal tuberculosis control program was inaugurated 5 years ago, in July 1944 with the creation of the Division of Tuberculosis. Although the tuberculosis control program is still developing, we can already see concrete evidence of the direction it is taking.

Tuberculosis is in retreat. The national tuberculosis death rate in 1944 was 41.3 per 100,000 population; in 1947, it was 33.5 per 100,000. On the basis of sample studies, the National Office of Vital Statistics estimates that the rate for 1948 will be still lower; perhaps about 31 per 100,000.

We can be sure that the Nation-wide program of mass case finding, diagnosis, follow-up, and treatment will accelerate the decline in tuberculosis mortality. The program is not the sole factor responsible for the retreat of tuberculosis; but without intensive, well-organized activities in every State and Territory, we would still be on the defensive against this disease. Through the development and refinement of effective control techniques, we have been able to take the offensive. And we shall hold the offensive, until tuberculosis is no longer a major cause of death and disability in the United States.

The success of our Nation-wide attack on tuberculosis is due to the zeal with which State and local health departments and voluntary agencies have undertaken new enterprises in this field. In the fiscal year 1948, tuberculosis control led all other health programs in the number of States and Territories planning to expand services. Basic control activities, such as a central register of reported cases and free laboratory diagnostic services, had been established in all 53 State and Territorial health departments.

Mass chest X-ray surveys and diagnostic services for private physicians and local health agencies are key activities in modern tuberculosis control. Virtually all the State and Territorial health agencies are providing these services. These agencies own and

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operate more than 1,000 X-ray units. Through the combined efforts of Federal, State, and local official health agencies and voluntary organizations, more than 10 million persons are being X-rayed annually.

Although the States and Territories have expanded their basic case-finding, diagnostic, and follow-up services each year since the program began, other services essential to tuberculosis control are not developing with comparable speed. In 1948, for example, only 32 States included the promotion of local out-patient pneumothorax centers for patients who are not hospitalized. Although more than 1,300 monthly tuberculosis diagnostic clinics were held throughout the country, these have centered largely in the metropolitan areas so that many communities still remain without such services.

It is true that laboratory facilities have expanded to the point where bacteriological services for the diagnosis of tuberculosis are now available to physicians throughout the country. More than half a million such examinations are being made in public health laboratories annually. Yet, it appears that physicians are not taking full advantage of these services in proportion to the number of patients now being referred to them as the result of mass chest X-ray surveys.

Physicians, as well as hospitals, could make a greater contribution to tuberculosis control through better reporting of cases which come to their attention. In too many instances, in too many parts of the country, the State and local health agencies first learn of cases of tuberculosis when they check the death certificates.

In the future, greater emphasis must be placed on meeting the community's needs for hospital beds and trained personnel to care for tuberculous patients. Without treatment, the patients discovered will continue to spread their disease and many will die needlessly. The means test and conflicting, unrealistic residence requirements still bar the doors of too many sanatoria to patients urgently in need of hospital care. The shortage of tuberculosis nurses—not an insoluble difficulty when more affiliation programs between schools of nursing and recognized tuberculosis institutions are achieved—also stands as an impediment to the efficient management of active tuberculosis. These are problems which can and must be worked out by community leaders.

More emphasis must be placed, too, on understanding and dealing effectively with the emotional and social factors in tuberculosis. Psychiatric consultation, medical social service, and rehabilitation are integral parts of tuberculosis control. Although progress has been made in these directions, the fact that only 20 States included medical social services in their tuberculosis control activities for 1948 shows that much remains to be done. Furthermore, even though all but

three State health departments had arranged for cooperation with their State vocational rehabilitation agencies, progress was slight toward complete and individualized rehabilitation services for the tuberculous. To be sure, there are shortages of personnel and facilities; but until we try to overcome these gaps in our service, we shall not have begun to build a truly effective tuberculosis control machinery in this country.

We believe that the cooperative research activities of the Division of Tuberculosis will eventually provide the answers to the many still-unresolved problems of tuberculosis epidemiology, prevention, and therapy. In the meantime, however, the actual work of coming to grips with the day-to-day problems of tuberculosis control remains the responsibility of the State and local health departments, sanatoria, voluntary agencies, and the private physicians. As the reservoir of tuberculous infection recedes, these groups will find it more difficult, more costly, and more important to locate the remaining sources of infection. This has been the experience in the fight against other infectious diseases. The ultimate victory over tuberculosis will require, therefore, even more vigorous action in the ensuing years of Federal-State cooperation.

LEONARD A. SCHEELE, *Surgeon General.*

Studies of Pulmonary Findings and Antigen Sensitivity Among Student Nurses

IV. Relationship of Pulmonary Calcification with Sensitivity to Tuberculin and to Histoplasmin*

By Jennie C. Goddard, B. A., Lydia B. Edwards, M. D., and Carroll E. Palmer, M. D.**

In the fall of 1943, a long term, comprehensive program for the study of tuberculosis was cooperatively undertaken by the National Tuberculosis Association, the Public Health Service, and a large number of schools of nursing located in representative metropolitan areas throughout the United States. The program was visualized as being essentially a "research facility" for the uniform, systematic, and continuous collection of a wide variety of pertinent observations on a large number of individuals who were exposed to substantial risks of becoming infected with tuberculosis. A "research facility" or such scope, employing uniform techniques and methods, having wide geographic coverage, continuing observations on a large number of cases, and involving centralized direction, was considered as both appropriate and necessary for investigating many fundamental problems in the pathogenesis of tuberculosis. One of the basic problems most urgently needing solution, and one which seemed to demand such a facility for an adequate investigation, was a clarification of the controversial question currently referred to as "pulmonary calcification in tuberculin negative persons."

A detailed review of published papers on the subject of pulmonary calcification in nonreactors to tuberculin has been made by Christie and Peterson (*1*), and it will suffice here to summarize briefly only the most general and pertinent evidence available early in 1943. First, it seemed necessary to accept as established facts that tuberculous infection is almost invariably associated with sensitivity to tuberculin, that it can cause lesions in the lung parenchyma and mediastinal lymph nodes, and that the lesions frequently heal with deposition of calcium which can be seen on X-ray films of the chest for many years. It appeared quite certain that tuberculous infection can and does *cause* shadows on the X-ray that are commonly interpreted as calcification. Second, there could be no doubt that pulmonary calcification entirely typical and character-

*For previous studies in this series see Palmer, Carroll E.: Nontuberculous pulmonary calcification and sensitivity to histoplasmin. Pub. Health Rep. **60**: 513–520 (1945); Palmer, Carroll E.: Geographic differences in sensitivity to histoplasmin among student nurses. Pub. Health Rep. **61**:475–487 (1946); Edwards, Lydia B., Lewis, Ira, and Palmer, Carroll E.: III. Pulmonary infiltrates and mediastinal adenopathy observed among student nurses at the beginning of training. Pub. Health Rep. **63**: 1569–1600 (1948).

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istic of healed tuberculous lesions is not infrequently observed in apparently healthy persons, including young children, whose tuberculin tests are currently interpreted as negative. Third, it was apparent from the reports of a number of basic studies that the frequency of pulmonary calcification varies widely in different geographic areas in the United States, and that this variation is not closely correlated with other evidence of tuberculosis, particularly mortality. A fourth, but less well established point involved evidence that pulmonary calcification in nonreactors to tuberculin is much more frequently encountered in some parts of the country than in others.

Attempts to explain and reconcile all of these issues led directly to the conclusion that at least one of several long established and generally accepted tenets in the pathogenesis of tuberculosis must be incorrect. On the basis of almost incontestable evidence, it was necessary to believe either that the tuberculin test was much less specific and much less stable than it was generally thought to be, or that the interrelationships of tuberculous infection, the tuberculin reaction, and pulmonary calcification was quite different in different parts of the country, or that pulmonary calcification was far from pathognomonic as evidence of healed tuberculous infection. The implications that the tuberculin test might be grossly inefficient as an index of tuberculous infection, or that pulmonary calcification was not pathognomonic of healed pulmonary tuberculosis, appeared to contradict two of the best founded concepts concerning tuberculosis.

The majority of the authorities in the tuberculosis field emphatically insisted, primarily on evidence from autopsy and pathological material, that tuberculosis was the only disease that need be seriously considered as a common and widespread cause of pulmonary calcification and attempted to rationalize the dilemma by questioning the specificity and stability of the tuberculin reaction. Other authorities, however, steadfastly defended the tuberculin test, creating in the course of its defense, considerable controversy over technical difficulties in performing and reading the test and uncertainties of interpretation in the roentgenologic diagnosis of pulmonary calcification. A few investigators, attempting to bridge the gap, cited a recent report by Aronson et al. (*2*) which indicated that in the southwestern part of the United States coccidioidomycosis is an important and frequent cause of pulmonary calcification. Some even suggested that the only satisfactory way to explain all of the contradictory evidence would be to postulate the existence of another disease, one which would cause pulmonary calcification, would not produce sensitivity to tuberculin, and had a geographic distribution in the United States different from that of tuberculosis and of coccidioidomycosis.

A full scale investigation of this whole complex problem was thought to be of sufficient importance to warrant its being considered one of

the major objectives of the cooperative study of tuberculosis among student nurses. The program, therefore, particularly its epidemiological aspects, was especially designed to facilitate a broad investigation of this problem.

In 1945 a highly significant advance was made in the solution of the general problem in the United States of pulmonary calcification in nonreactors to tuberculin. Christie and Petersen (*1*) from observations on children in Tennessee and Palmer (*3*) in the first paper from this cooperative investigation on student nurses, reported the results of intradermal testing with histoplasmin. The results of both of these studies led the authors to the conclusion that the unknown disease, postulated as the etiological agent of the pulmonary calcification observed in nonreactors to tuberculin, actually did exist, and that it was most probably a mild subclinical infection with the fungus *Histoplasma capsulatum*, or a closely related organism. During the past 4 years, studies on fungus infections, especially on *H. capsulatum* infection and the disease histoplasmosis, have gone rapidly forward and most of the published reports support the initial findings expressed by Christie and Petersen, and Palmer.

This study primarily represents an extension of the first report which dealt with the relationship of pulmonary calcification and sensitivity to tuberculin and to histoplasmin.

Source and Character of Data

When the program was initiated in the fall of 1943, the schools of nursing numbered 38 and were located in the metropolitan areas [1] of Baltimore, Detroit, Kansas City (Kansas and Missouri), Minneapolis, New Orleans, and Philadelphia. The group of participating schools was increased by inclusion of nursing schools in Columbus (Ohio) during the spring of 1944, in Los Angeles and San Francisco during the fall of 1944, and in the Denver area during the fall of 1945. By that time, other schools in Los Angeles, Minneapolis, and Philadelphia had joined the program to bring the total number of participating schools to 76, a number that was maintained through the spring 1947 test session.

From the beginning of the program all student nurses enrolled in the participating schools were tuberculin tested at regular 6-month intervals with the exception that retesting was not routinely done on nurses who, on their first or subsequent tuberculin test, gave very strong reactions to our first dose of tuberculin. In the spring of 1945, all nurses under observation were tested with histoplasmin. At the subsequent test sessions, newly admitted students and all those in

[1] Included with the nursing schools located in Kansas City, Mo., is one school in Independence; with Minneapolis, two schools in St. Paul; with San Francisco, two schools in Oakland; and with Denver and Los Angeles, several schools in nearby communities.

schools joining the program have been histoplasmin tested. Retesting with histoplasmin has not been routinely carried out, except in selected cities. The majority of the student nurses have also received tests with other fungus antigens.

The routine semiannual skin tests were made by a special team of nurses or doctors of the Public Health Service who have periodically visited the cooperating schools each spring and fall since 1943. In general the team spent one week in each city, usually traveling by plane to a different city over the weekend, according to a prearranged and organized schedule. Each school was visited three times during the week, either Monday, Wednesday, and Friday, or Tuesday, Thursday, and Saturday. On the first day the first dose of tuberculin and the fungus skin tests were given; on the second day, the tests were read and the second dose tests were given; and on the third day, the second dose tests were read. Uniformity in interpretation of the reactions has been considered of the utmost importance. Only two persons have been responsible for the reading of more than 95 percent of the tests performed since the beginning of the study and these two persons read together for more than one test session. The number of skin tests given and read by the team now totals nearly 300,000 and one member of the team, Assistant Nurse Officer (R) Virginia S. Trevett has interpreted over 200,000 skin tests.

Beginning in the fall of 1943, the student nurses under observation have had X-ray films of the chest semiannually, at approximately the same periods as the skin tests. A more intensive X-ray follow-up was maintained for selected groups, including those who became sensitive to tuberculin or one of the fungus antigens or who developed abnormalities of the chest as shown on their X-ray films. The X-ray films were made and read by the radiologists in hospitals of the cooperating schools and then were sent to the Field Studies Branch in Washington, where they were interpreted for the purposes of the program. While the file of X-ray films on each nurse was kept in the Washington Office, satisfactory arrangements were made with the nursing schools to return films to the hospitals for their use in connection with the student health services of the school. With the exception of one school, 14″ x 17″ films were used. Again, uniformity of interpretation was considered of great importance, and although more than one roentgenologist in the Washington Office participated in the work, every attempt was made to insure comparability of interpretation.

The basic data of the present report include observations on all student nurses having at least one tuberculin test, one histoplasmin test, and one chest X-ray film, in the period between the beginning of the study in 1943 and the spring of 1947. The student nurses meeting these criteria number 16,320.

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Only the first tuberculin test and the first histoplasmin test for each student are used in classifying sensitivity levels. Neither the interval between the time a nurse entered training and the time she received the two tests nor the interval between the two types of tests are taken into account in the present analysis. Most of the students received their initial tuberculin test during their first year in training. Since histoplasmin testing was not introduced into the program until the spring of 1945, 18 months after the tuberculin testing was begun, only about 60 percent were tested with histoplasmin during the first year of training. Since there are indications that the proportion of student nurses sensitive to tuberculin increases significantly during training, while there is no marked change during training in the proportion sensitive to histoplasmin, classification of nurses according to their first test would not appear to introduce any significant bias into the analysis.

Histoplasmin sensitivity has been shown (*4*) to vary markedly among residents of the different sections of the country and to have particularly high prevalence among residents of eastern central States. While residence, as such, has not been used as a classifying item in the present report, the location of the training center proves a usable index of residence, according to analysis now in progress.

This study population is homogeneous with respect to age, sex, and race:[2] about 80 percent were between 20 and 22 years of age, all are female, and it is estimated that less than 1 percent are nonwhite.

Tuberculin Tests

From the beginning of the program, the tuberculin used has been the cryochemed form of purified protein derivative (PPD–S) prepared by Dr. Florence B. Seibert of the Henry Phipps Institute in Philadelphia. The intradermal tests were made in the middle of the volar aspect of the forearm, about 3 inches below the anticubital fossa. The reactions were read at 48 hours. The routine procedure has been to give a first dose of 0.0001 mg. in 0.1 cc. of solution; those failing to give reactions of at least 10 mm. of firm induration to this dose were given a second dose of 0.005 mg. Occasionally students with previous severe reactions to tuberculin were given a preliminary test dose of 0.00001 mg.

In reading the tuberculin reactions, the widest transverse diameters of erythema and of induration were measured and recorded in millimeters. Vesiculation and other complications were also noted. In addition to the recorded measurements of erythema and induration, all indurations of 5 or more mm. were also classified into four qualitative categories designated as I, II, III, and IV.

[2] The two participating Negro schools of nursing are excluded from the present analysis, since the number of student nurses observed is insufficient to provide properly the important racial comparisons.

I is used to describe a typical textbook reaction with an area of induration which is firm, elevated, clearly defined, and well circumscribed. At the other end of the scale, IV is used to describe questionable induration which is very soft, ill-defined, and not well circumscribed. II and III are used to describe reactions which do not entirely fulfill the exacting conditions for either I or IV, but fall somewhere between the two; II denotes a reaction showing greater similarity to that described as I; and III, showing greater similarity to IV.

While it must be recognized that these descriptive, qualitative categories are not separate entities but are gradations of density or "palpability," they add better definition to the interpretation of the reaction than can be obtained by measurements alone. The need for such description of reactions arose from the observation that workers in the field of tuberculosis differ greatly in what they interpret as induration. For example, some workers would consider only our categories I and II as sufficiently distinct to be designated and recorded as induration; they would classify our categories III and IV as questionable or as erythema only. Other workers would record all categories, I through IV, as measurable induration.

In the analysis of the material to be presented, student nurses were classified in several different ways according to their tuberculin sensitivity. The basic categories most frequently used, are as follows:

1. Definite reactors (with induration of 5 mm. or more, described as I, II, or III to 0.0001 mg. PPD–S).
2. Questionable reactors (with induration of 10 mm. or more described as I or II, to 0.005 mg. PPD–S).
3. Essentially nonreactors (with induration of less than 10 mm. described as I or II, with all indurations described as III or IV, and with erythema only of 10 mm. or more, to 0.005 mg. PPD–S).
4. Nonreactors (with no reaction or with small erythema only, to 0.005 mg. PPD–S).

For the purpose of more general analysis, these categories have been combined as indicated in the text.

Histoplasmin Tests

Histoplasmin tests were made by intradermal injections of 0.1 cc. of a 1/1000 dilution of histoplasmin (a filtrate of broth culture of *H. capsulatum*) in a manner that corresponded to the procedure for the tuberculin tests. Reactions were read and recorded by the same person and in the same way as for the tuberculin tests, with an additional reading at 96 hours after injection whenever feasible with the test schedules. In the present analysis, classification of histoplasmin sensitivity is derived from either the 48-hour or the 96-hour reading, whichever gives the more definite reaction. These decisions on dosage and hour of reading as well as the classification of the histoplasmin reactions are obviously arbitrary, but they are of necessity so, in the light of present deficiencies of knowledge of optimum procedures.

Dr. C. W. Emmons of the National Institutes of Health kindly furnished the histoplasmin[3] used in the tests performed throughout all participating schools in the spring and fall of 1945 and in the schools located in Kansas City, in the spring of 1946. Histoplasmin used for the other spring 1946 tests and for all tests performed in the fall of 1946 and the spring of 1947 was prepared by Dr. Arden Howell, Jr., of the Field Studies Branch.

During the latter two test sessions, one common lot of histoplasmin (H–15) was routinely used for testing. However, for the spring 1946 tests, several different lots of histoplasmin were used in the various training centers. This divergence from uniformity is of less importance than might appear. The Cadet Nurse Corps program, stimulating enrollment of student nurses during the war, had been discontinued the preceding fall and enrollment reached a low ebb in the spring of 1946. Since newly enrolled students that spring in the participating schools numbered about 800, only about 5 percent of the total group under analysis were classified according to their spring 1946 histoplasmin tests. All histoplasmin tests were done with 1/1000 dilutions of stock antigens and a very high proportion of them with only two different lots of histoplasmin, Emmons' H–3 and Howell's H–15. Although controlled comparison of lots H–3 and H–15 has not been made, enough work has been done to indicate that in 1/1000 dilutions they were quite comparable.

For the purpose of the present analysis, the nurses were classified by their histoplasmin reactions into the following three categories:

1. Definite reactors (with induration of 5 mm. or more, described as I, II, or III).
2. Doubtful reactors (with induration of less than 5 mm., or of any size described as IV; and erythema of 5 mm. or more).
3. Nonreactors (with no reaction or small erythema of less than 5 mm.).

Pulmonary Calcification

Without knowledge of the results of the skin tests, the roentgenologists of the Field Studies Branch interpreted the individual X-ray films with respect to a number of specified factors, including calcification in the lung parenchyma and in the mediastinal lymph nodes.

Whenever more than one film was available for a student, the films were also read serially. For those nurses who discontinued training or were graduated, all films available were reviewed serially and a final summary was prepared. In the present analysis, the final summary or the last serial reading has been employed as the basis for determining pulmonary calcification whenever such were available.

[3] This is the antigen designated as H–3 in the paper by Emmons et al. (*5*).

This procedure tends to increase stability of interpretation and to minimize the effect of differences in the technical quality of individual films.

Pulmonary calcification has been classified by the roentgenologists into three categories:

1. Definite (opacities whose size, sharpness, irregularity, and density were so characteristic that the diagnosis of calcium was indisputable).
2. Probable (opacities similar to the above, though somewhat less characteristic, but such that vascular structures and calcifying costal cartilages could be excluded).
3. Questionable (opacities which possibly could be questioned as calcium but which the interpreter felt more probably were variations of the normal pattern of lung markings; particularly those shadows which might represent blood vessels seen in cross section).

For the purposes of the present analysis, persons whose chest films were designated by the roentgenologists as showing definite and/or probable calcification in the lungs or in the mediastinal lymph nodes, have been considered to have pulmonary calcification; those whose films were designated as showing only questionable calcification, have been classed with the negatives.

General Findings

Histoplasmin Reactors by Metropolitan Area

Among the 16,320 student nurses included in the present analysis, 23.2 percent had some reaction to histoplasmin, 19.5 percent having definite and 3.7 percent doubtful reactions.

The prevalence of histoplasmin sensitivity in the several metropolitan areas diverges widely from this over-all average, ranging from the high rate of 65 percent in Kansas City, Mo., to the relatively low rate of 7 percent in Minneapolis. These percentages and their range conform closely to the preliminary findings reported in 1945 (*3*).

The percentages of definite and of doubtful histoplasmin reactors among the nurses tested in each of the 11 cities are presented in table 1 and figure 1, the cities being listed in descending order by the percentage of histoplasmin reactors found. It is evident that there are three cities with outstandingly high rates: Kansas City, Mo., with 65 percent, Columbus, with 61 percent, and Kansas City, Kans., with 51 percent. Thereafter, the change in the sensitivity level from city to city is not a gradual and uniform decline, but tends to level off into three rather distinct plateaus: New Orleans and Baltimore, with rates of slightly more than 25 percent; Detroit, Los Angeles, and Philadelphia, with rates approximating 14 percent; and San Francisco, Denver, and Minneapolis with rates below 10 percent.

Table 1. *Number and percentage of definite and of doubtful histoplasmin reactors among student nurses tested in specified cities*

City	Percentage of student nurses			Number of student nurses		
	Definite and doubtful reactors	Definite reactors	Doubtful reactors	Definite reactors	Doubtful reactors	Total number tested
Individual Cities						
Kansas City, Mo.	64.8	57.7	7.1	653	80	1,131
Columbus, Ohio	60.5	55.6	4.9	740	65	1,330
Kansas City, Kans.	51.1	45.3	5.8	241	31	532
New Orleans	28.4	21.2	7.2	273	93	1,290
Baltimore	25.3	22.0	3.3	434	65	1,971
Detroit	14.3	12.6	1.7	158	21	1,250
Los Angeles	14.3	10.6	3.7	189	65	1,778
Philadelphia	13.7	10.5	3.3	228	71	2,179
San Francisco	9.7	7.0	2.7	78	30	1,111
Denver	8.4	6.6	1.8	88	24	1,329
Minneapolis	6.9	4.2	2.7	101	65	2,419
Grouped Cities						
Columbus, Kansas City	60.5	54.6	5.9	1,634	176	2,993
Baltimore, New Orleans	26.5	21.6	4.8	707	158	3,261
Detroit, Los Angeles, Philadelphia	14.1	11.0	3.0	575	157	5,207
Denver, Minneapolis, San Francisco	7.9	5.5	2.4	267	119	4,859
All cities	23.2	19.5	3.7	3,183	610	16,320

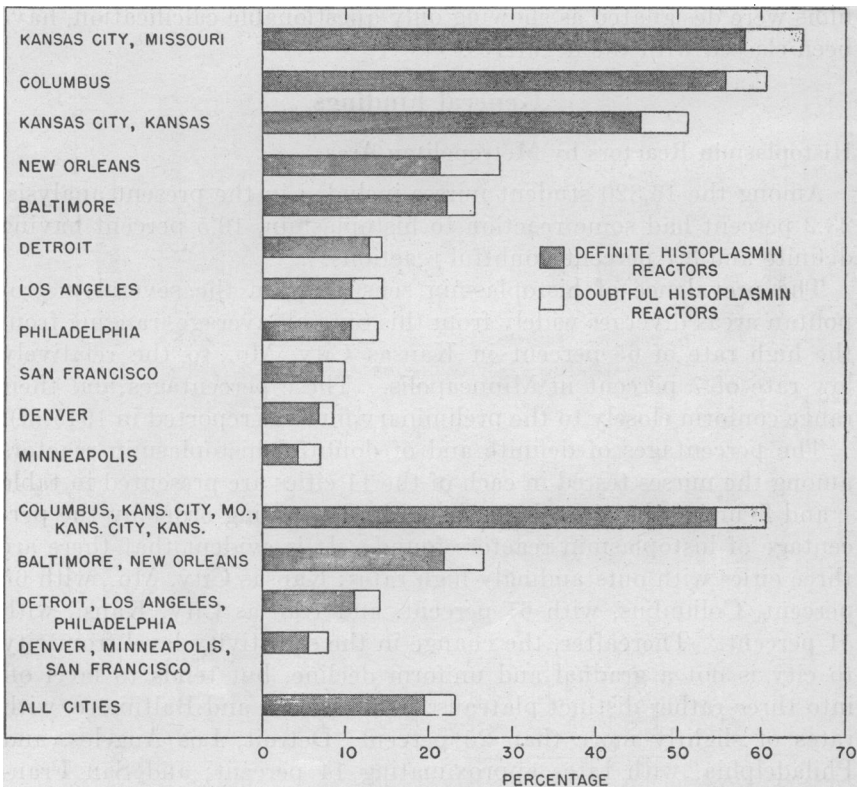

Figure 1. Percentage of definite and of doubtful histoplasmin reactors among student nurses tested in specified cities and groups of cities.

In the lower section of the table and graph, the cities have been combined so that the students tested in cities with approximately similar levels of histoplasmin sensitivity have been grouped together. For this purpose the three high cities, though exhibiting a fairly wide difference between their rates have been considered as one group, representing areas of high prevalence of histoplasmin reactors. Within each of the four groups thus created, the frequency of reactors does not vary significantly from one city to another.

Since criteria for defining a positive histoplasmin reaction are not yet available, and since evidence from previous studies indicates that reactions classified as doubtful may represent significant sensi-

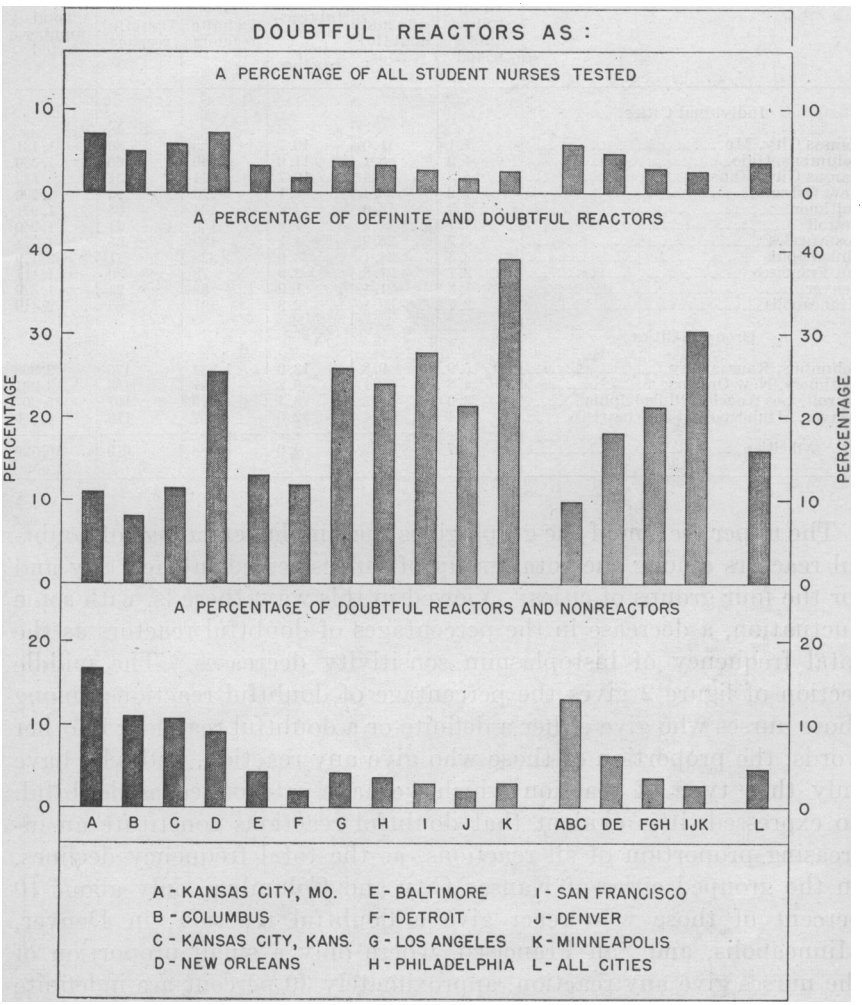

Figure 2. Doubtful histoplasmin reactors as percentages of all student nurses tested, of definite and doubtful histoplasmin reactors, and of doubtful histoplasmin reactors and nonreactors, among student nurses tested in specified cities and groups of cities.

tivity to histoplasmin, the variability in the frequency of doubtful histoplasmin reactions among nurses training in the different metropolitan areas is considered briefly. Figure 2 and table 2 show the frequency of doubtful histoplasmin reactions expressed in three different ways.

Table 2. ***Doubtful histoplasmin reactors as percentages of all student nurses tested, of definite and doubtful histoplasmin reactors, and of doubtful histoplasmin reactors and nonreactors, among student nurses tested in specified cities***

City	Doubtful histoplasmin reactors as percentages of specified groups			Number of student nurses		
	Of all student nurses tested	Of definite and doubtful reactors	Of doubtful reactors and nonreactors	Definite reactors	Doubtful reactors	Total number tested
Individual Cities						
Kansas City, Mo.	7.1	11.0	16.7	653	80	1,131
Columbus, Ohio	4.9	8.1	11.0	740	65	1,330
Kansas City, Kans.	5.8	11.4	10.7	241	31	532
New Orleans	7.2	25.4	9.1	273	93	1,290
Baltimore	3.3	13.0	4.2	434	65	1,971
Detroit	1.7	11.9	1.9	158	21	1,250
Los Angeles	3.7	25.9	4.1	189	65	1,778
Philadelphia	3.3	24.1	3.6	228	71	2,179
San Francisco	2.7	27.8	2.9	78	30	1,111
Denver	1.8	21.4	1.9	88	24	1,329
Minneapolis	2.7	39.1	2.8	101	65	2,419
Grouped Cities						
Columbus, Kansas City	5.9	9.8	13.0	1,634	176	2,993
Baltimore, New Orleans	4.8	18.1	6.2	707	158	3,261
Detroit, Los Angeles, Philadelphia	3.0	21.3	3.4	575	157	5,207
Denver, Minneapolis, San Francisco	2.4	30.4	2.6	267	119	4,859
All cities	3.7	15.9	4.6	3,183	610	16,320

The upper section of the graph gives the simple percentage of doubtful reactors among the total group of nurses tested in each city and for the four groups of cities. Viewed in this way, there is, with some fluctuation, a decrease in the percentages of doubtful reactors as the total frequency of histoplasmin sensitivity decreases. The middle section of figure 2 gives the percentage of doubtful reactions among those nurses who give either a definite or a doubtful reaction; in other words, the proportion of those who give any reaction, and who have only that type of reaction which we have categorized as doubtful. So expressed, it is evident that doubtful reactions constitute an increasing proportion of all reactions, as the total frequency declines. In the grouped cities of Kansas City and Columbus, only about 10 percent of those who react give a doubtful reaction; in Denver, Minneapolis, and San Francisco, where only a small proportion of the nurses give any reaction, approximately 30 percent are indefinite or doubtful in character. In the lower section of the figure, doubtful reactors are expressed as percentages of those who do not have definite reactions. With but two exceptions, Detroit and Denver, this

proportion for the student nurses in the individual cities decreases from 16.7 percent in Kansas City, Mo., to 2.8 in Minneapolis, a trend similar to that noted for all histoplasmin reactors in these arrayed cities.

Presentation of the doubtful reactions in these several ways does not lead to a simple explanation of the variations observed in the different areas. It cannot be shown that the doubtful reactors are a constant percentage of the total group tested, of all reactors, or of those who do not have definite reactions. Further study of the meaning of doubtful histoplasmin reactions is in progress, but at present it is possible only to indicate that the observed variation is to some extent related to the level of histoplasmin sensitivity.

In the material which follows in this report, definite and doubtful histoplasmin reactors are either combined into a single group, identified simply as histoplasmin reactors, or the analysis is made separately for the two different categories of reactors.

Histoplasmin and Tuberculin Reactions and Pulmonary Calcification by Metropolitan Area

Table 3 and figure 3 show the percentages of histoplasmin reactors (definite and doubtful combined), together with the corresponding percentages of persons having pulmonary calcification and of those having definite tuberculin reaction, for the nurses tested in each of the 11 cities. In contrast with the over-all histoplasmin rate of 23.2

Table 3. *Number and percentage of definite and doubtful histoplasmin reactors, of persons with pulmonary calcification, and of definite tuberculin reactors, among student nurses tested in specified cities*

City	Percentage			Number of student nurses			
	Definite and doubtful histoplasmin reactors	Persons with pulmonary calcification	Definite tuberculin reactors	Definite and doubtful histoplasmin reactors	Persons with pulmonary calcification	Definite tuberculin reactors	Total number tested
Individual Cities							
Kansas City, Mo.	64.8	27.3	10.9	733	309	123	1,131
Columbus, Ohio	60.5	24.7	11.4	805	328	151	1,330
Kansas City, Kans.	51.1	18.2	13.7	272	97	73	532
New Orleans	28.4	9.3	13.3	366	120	171	1,290
Baltimore	25.3	11.3	17.9	499	222	353	1,971
Detroit	14.3	7.0	13.9	179	88	174	1,250
Los Angeles	14.3	5.0	18.7	254	89	333	1,778
Philadelphia	13.7	5.3	22.8	299	115	497	2,179
San Francisco	9.7	4.1	18.6	108	46	207	1,111
Denver	8.4	5.5	18.8	112	73	250	1,329
Minneapolis	6.9	2.6	7.9	166	63	192	2,419
Grouped Cities							
Columbus, Kansas City	60.5	24.5	11.6	1,810	734	347	2,993
Baltimore, New Orleans	26.5	10.5	16.1	865	342	524	3,261
Detroit, Los Angeles, Philadelphia	14.1	5.6	19.3	732	292	1,004	5,207
Denver, Minneapolis, San Francisco	7.9	3.7	13.4	386	182	649	4,859
All cities	23.2	9.5	15.5	3,793	1,550	2,524	16,320

percent, only 9.5 percent of all the nurses have pulmonary calcification, and 15.5 percent have definite reactions to tuberculin.

In the different cities the frequency of definite tuberculin reactors ranges from a high of 22.8 percent in Philadelphia, to a low of 7.9 percent in Minneapolis. Other cities showing relatively high rates of tuberculin reactors include Denver, San Francisco, and Los Angeles. Relatively low rates are found in Kansas City, Mo., and Columbus. It should be noted that the range of tuberculin reactor rates is relatively limited, in comparison with the rates for histoplasmin reactors.

The frequency of pulmonary calcification among nurses in the

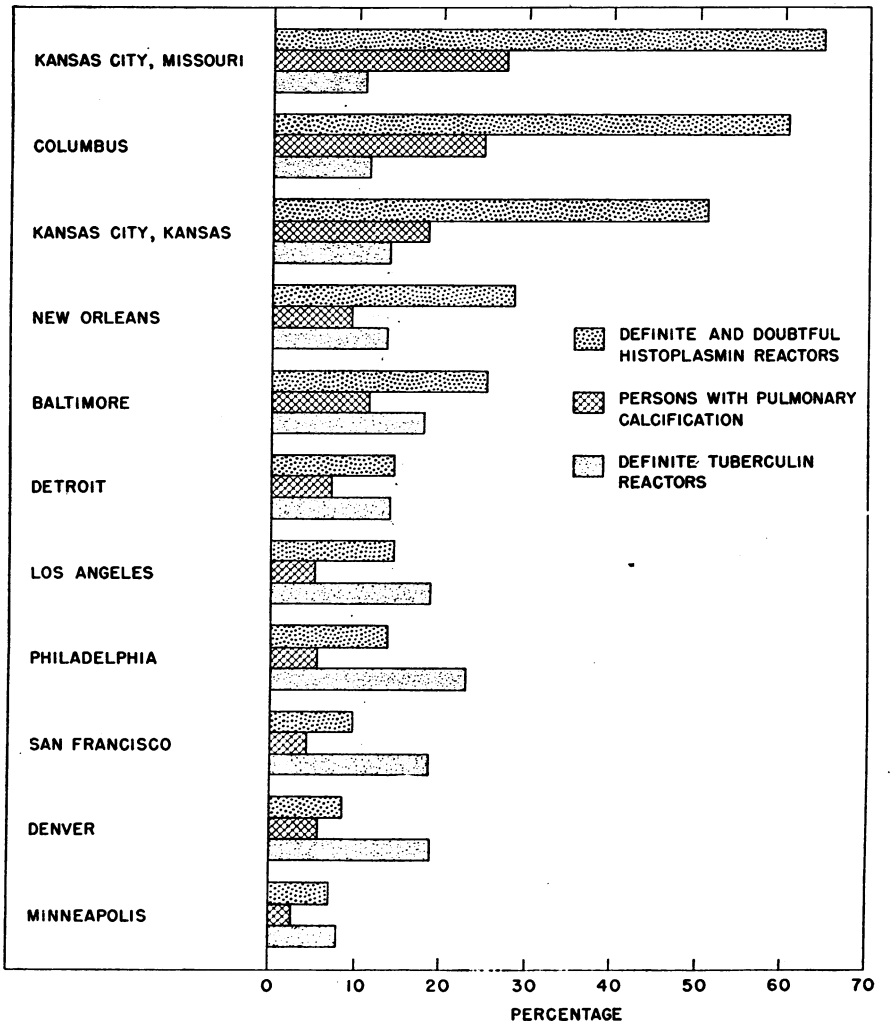

Figure 3. Percentage of definite or doubtful histoplasmin reactors, of persons with pulmonary calcification, and of definite tuberculin reactors among student nurses tested in specified cities.

several metropolitan areas varies widely from the average of 9.5 percent for nurses in all cities. The highest rates are found in Kansas City and Columbus, where approximately one-fourth of all the nurses examined show calcification on their chest X-ray films. The lowest rate, 2.6 percent, is found in Minneapolis. Between these two extremes, the trend in the decrease of the percentage of nurses having calcification is similar to the trend of decrease in the percentage of histoplasmin reactors in the individual cities. With but two minor exceptions, in each test area the student nurses with a successively lower histoplasmin reactor rate have a successively lower rate of calcification. While the rate of pulmonary calcification among nurses in Baltimore is somewhat higher than in New Orleans, and in Denver is slightly higher than in Los Angeles, Philadelphia, and San Francisco, these differences are not statistically significant.

It should be noted also that, although the calcification rates do not approach the magnitude of the rates of histoplasmin reactors, the relative decrease in the percentage of student nurses with pulmonary calcification in the arrayed cities, is of comparable magnitude to the relative decrease in the rate of histoplasmin reactors.

It is interesting that in the comparison of the gross rates for tuberculin reactors and persons having pulmonary calcification, the correlation that would be expected between them is not apparent. One explanation for this is the limited range in variation of tuberculin reactors, compared to the wide range for histoplasmin reactors, from one metropolitan area to another. Further, as will be shown later, the frequency of calcification among reactors to histoplasmin only is about three times as great as the frequency among reactors to tuberculin only.

Association of Pulmonary Calcification with Histoplasmin and Tuberculin Reactions

General Aspects

The best general summary of the relationship between pulmonary calcification and tuberculin and histoplasmin sensitivity may be made from the material of the present study simply by showing the frequency of calcification in four groups of nurses: (*a*) Those who react to both antigens (H+, T+), (*b*) those who react to histoplasmin but not to tuberculin (H+, T−), (*c*) those who react to tuberculin but not to histoplasmin (H−, T+), and (*d*) those who do not react to either antigen (H−, T−). As classified for present purposes of summarizing results, histoplasmin reactors (H+) are those who are categorized as having either a definite or a doubtful reaction to histoplasmin, while tuberculin reactors (T+) are only those categorized as definite reactors (those showing at least 5 mm. of definite induration to the first

or 0.0001 mg. dose of PPD–S). Nurses classified here as (H—) represent only those who are categorized as nonreactors to histoplasmin; nurses classified as (T—) include the three categories designated as questionable reactors, essentially nonreactors, and nonreactors. The frequency of calcification in these four groups of nurses is as follows:

Reaction group	*Percentage of nurses with calcification*	*Number of nurses with calcification*	*Number of nurses tested*
H+ T+	35. 0	219	626
H+ T—	33. 2	1, 062	3, 167
H— T+	10. 7	203	1, 898
H— T—	0. 7	76	10, 629

The extent to which the presence of pulmonary calcification is dependent upon sensitivity to either histoplasmin or tuberculin is strikingly brought out in the four percentage figures given above. Unless a nurse reacts to one or both antigens she has only 7 chances in a thousand of having pulmonary calcification; if she reacts only to tuberculin her chances are about 1 in 10; if she reacts to histoplasmin or to both histoplasmin and tuberculin, her chances are about 1 in 3.

Certain aspects and implications of these findings warrant emphasis and detailed consideration. Attention may be directed first to the large number of cases on which the rates are based and therefore to their relative stability. Moreover, the reliability of the rates is greatly strengthened by the uniformity in techniques and interpretations which it was possible to attain in the field work. The fact that the population under study is from widely separated geographic areas in the country points to the representativeness of the findings. If over 10,000 student nurses who are not reactors to either tuberculin or histoplasmin show a pulmonary calcification rate of less than 1 percent, that finding can be considered as reasonably well established and generally applicable to young white women in the country as a whole. Further, the finding of such a low frequency of calcification, only 0.7 percent, is evidence that pulmonary calcification unassociated with tuberculin or histoplasmin sensitivity constitutes a relatively minor problem. In other words, *calcification associated with conditions which do not also produce sensitivity to tuberculin or to histoplasmin, at least in the areas covered in this study, must occur relatively infrequently.*

The difference in the frequency of calcification in nurses who react to one antigen but not to the other, is striking: pulmonary calcification in histoplasmin reactors is over three times as frequent as it is in tuberculin reactors—33.2 percent as compared with 10.7 percent.

The frequency of calcification in nurses who react to both histoplasmin and tuberculin, 35.0 percent, is only slightly higher than it is in those who react only to histoplasmin, 33.2 percent. This finding is somewhat unexpected, on theoretical grounds at least, since reactors to both antigens might be expected to show a rate equal to the inde-

pendent probabilities of two chances of having pulmonary calcification, one chance associated with tuberculin and the other with histoplasmin sensitivity. If such were the case, reactors to both antigens would have had a calcification rate of 40.3 percent which is considerably more than the observed one of 35.0 percent.

Variation According to Levels of Sensitivity

Presentation in summary form of the relationships between pulmonary calcification and sensitivity to tuberculin and to histoplasmin furnishes only the bare elements of a basic pattern and in some respects gives an oversimplified description of the association among the three variables. In order to provide further significant details, table 4 and figure 4 show the same data except that here reactors to the two antigens are subdivided into the categories which are described in the section, Source and Character of Data. With respect to histoplasmin, three groups are used: definite reactors, doubtful reactors, and nonreactors. With respect to tuberculin, four groups are used: definite reactors, questionable reactors, essentially nonreactors, and nonreactors. Classification of the total group of 16,320 nurses according to their reactions to both tuberculin and histoplasmin furnishes 12 subgroups, and for each of these the frequency of pulmonary calcification is given in table 4. Figure 4 shows in three-dimensional graphic form the calcification rates for the 12 subgroups. For purposes of orientation it may be noted that the last column on

Table 4. *Number and percentage of student nurses with pulmonary calcification according to histoplasmin and to tuberculin reactions*

Tuberculin reaction	Histoplasmin reaction			
	Definite reactors	Doubtful reactors	Nonreactors	Total
PERCENTAGE OF STUDENT NURSES WITH PULMONARY CALCIFICATION				
Definite reactors	38.7	21.9	10.7	16.7
Questionable reactors	30.1	15.4	1.6	7.5
Essentially nonreactors	35.3	16.5	0.6	8.4
Nonreactors	38.7	16.0	0.7	8.0
Total	36.6	17.5	2.2	9.5
NUMBER OF STUDENT NURSES WITH PULMONARY CALCIFICATION				
Definite reactors	189	30	203	422
Questionable reactors	50	4	11	65
Essentially nonreactors	555	47	36	638
Nonreactors	370	26	29	425
Total	1,164	107	279	1,550
NUMBER OF STUDENT NURSES TESTED				
Definite reactors	489	137	1,898	2,524
Questionable reactors	166	26	675	867
Essentially nonreactors	1,571	285	5,759	7,615
Nonreactors	957	162	4,195	5,314
Total	3,183	610	12,527	16,320

the right in the front row, labeled 10.7, indicates that 10.7 percent of nurses who are definite reactors to tuberculin and nonreactors to histoplasmin show pulmonary calcification in their chest films. This group is the only one shown separately in this tabulation which corresponds exactly with one of the groups discussed in the summary review of the relationship between calcification and sensitivity to the two antigens. All of the other upright bars shows graphically the relative frequency of calcification in the various other subgroups in which the nurses have been classified for the present description.

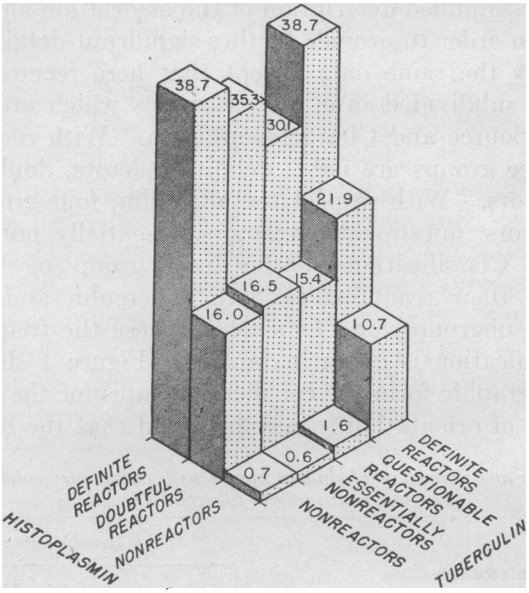

Figure 4. Percentage of student nurses with pulmonary calcification, according to histoplasmin and to tuberculin reactions.

A number of significant details are brought out in figure 4. First, considering the front row of columns to the right, which give calcification rates for different categories of tuberculin reactors among histoplasmin nonreactors, it is apparent that very low rates prevail except for the definite tuberculin reactors. Among the nonreactors and essentially nonreactors the rates are less than 1 percent, 0.7 and 0.6 percent, respectively, for these two groups. The calcification rate for the questionable reactors is only 1.6 percent, which may represent an unexpected finding to many readers when it is recalled that this group constitutes one which would be designated by many workers in the tuberculosis field as definite, or even strong, "second dose" tuberculin reactors. By definition, this group contains nurses who showed 10 or more mm. of firm induration (our qualitative descriptive classes I and II) to the 0.005 mg. dose of PPD–S. The frequency of

calcification in this group, compared with that in definite tuberculin reactors, 10.7 percent, has very important implications with regard to questions of the specificity of the tuberculin test. It must be apparent, at least for the purposes of selecting persons with tuberculous pulmonary calcification, that even strong reactors to the second dose of 0.005 mg. of PPD–S show only a very slightly higher frequency of calcification than those who give no reaction or a very slight one to this dosage of tuberculin. This finding represents another addition to accumulating evidence which points quite directly to the fact that for *practical* tuberculosis work, at least in the United States, little is gained by testing with large doses of tuberculin.

Another interesting finding from figure 4 is brought out by study of the frequency of calcification among doubtful histoplasmin reactors (shown as the middle row of bars). In a general way it is evident that the rate of calcification for the various groups of doubtful histoplasmin reactors approximates half of the rate for the definite histoplasmin reactors, and, further, that there are marked differences between the rates for doubtful reactors and those categorized as nonreactors to histoplasmin. For purposes of selecting cases showing that type of calcification which is associated with sensitivity to histoplasmin, it is evident that the point of separation between specific and nonspecific histoplasmin reactions is most efficiently made by designating our nonreactor group as "negative" and both our definite and doubtful reactors as "positive." According to our standards this would mean the allocation of all types of histoplasmin reactions to the "positive" group, except those which show only small areas of erythema of less than 5 mm. in diameter. This finding is obviously of significance, especially since in many of the reports on the relationship of pulmonary calcification and sensitivity to histoplasmin, reactions equivalent to those in our doubtful group have been classified as "negative." This practice may account, in part at least, for the findings of a higher rate of pulmonary calcification among nonreactors than is reported here and in our earlier paper on the subject.

The final observation to be made on the material presented in figure 4 concerns the variation in rates of pulmonary calcification among the various groups of definite histoplasmin reactors (shown as the back row of bars). A curious and unexpected type of variation in calcification rates appears in this group when the nurses are subdivided according to sensitivity to tuberculin. Again, as was noted in the summary analysis of the relationships of the three variables, the frequency of calcification in nurses who are definite reactors to both antigens is less than theoretically would be expected. Nonreactors and definite reactors to tuberculin have the same frequency of calcification, while those who show intermediate levels of tuberculin sensitivity have lower rates of calcification. These rates are not

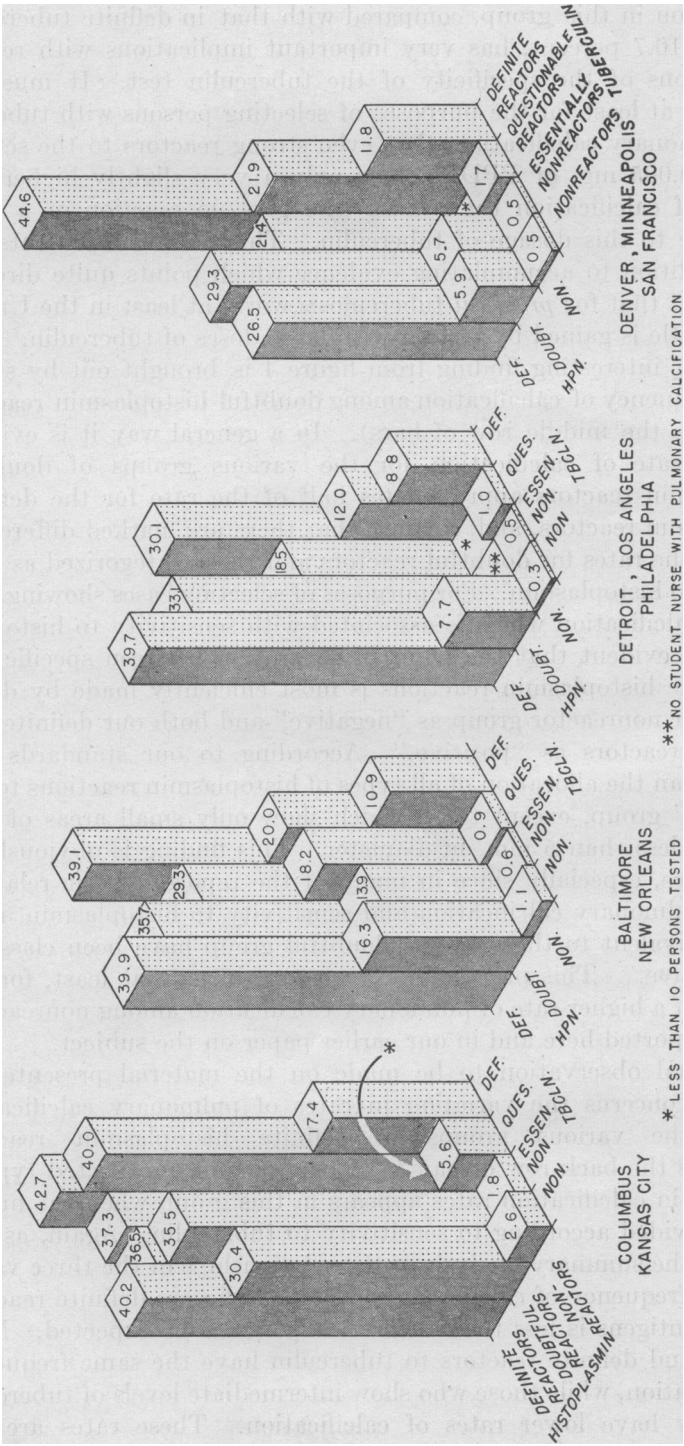

Figure 5. Percentage of student nurses with pulmonary calcification, according to histoplasmin and tuberculin reactions, in specified groups of cities.

based on small numbers of nurses and it is evident that some undetermined factor must exist which affects the association between reactions to tuberculin and to histoplasmin and the development of pulmonary calcification. Further study of this point is now in progress.

Variation by Metropolitan Area

While there are great differences in the frequency of pulmonary calcification when the nurses are subdivided according to their reactions to tuberculin and histoplasmin, it is of interest to determine whether the pattern of these differences varies with geographic area. Unfortunately, the number of nurses under observation in the separate areas is not large, and this analysis has been limited to the groups of cities combined according to the varying levels of histoplasmin sensitivity. The data assembled in the appendix table and shown in figure 5 in the form of three-dimensional graphs, give the results for the four groups of cities. Comparison of the four graphs in figure 5 with the one for all cities shown in figure 4 indicates that there is no great divergence from the general basic pattern of the relationship between pulmonary calcification and sensitivity to tuberculin and histoplasmin, especially when allowance is made for variations due to the small number of cases on which many of the rates in figure 5 are based. On the other hand, some significant differences among the four groups of cities are evident.

First, there is a tendency for the rates of pulmonary calcification to be high in cities where histoplasmin reactors are frequent and low where they are infrequent. In spite of minor fluctuations, the greatest contrast may be observed in the left hand compared with the right hand graph in figure 5. In Columbus and Kansas City, the calcification rates are substantially greater in every subgroup, except one, than in the group of cities composed of Denver, Minneapolis, and San Francisco. A visual impression of the extent of the difference is particularly brought out by the height of the "back" row of bars, those representing definite histoplasmin reactors, where the frequency of calcification in Kansas City and Columbus approaches twice that in Denver, Minneapolis, and San Francisco.

Second, in the four groups of cities, there are quite marked differences in calcification rates for nurses who have histoplasmin reactions categorized as doubtful. In Kansas City and Columbus, the frequency of pulmonary calcification among doubtful histoplasmin reactors is almost as great as among definite reactors. In contrast with this, among nurses in Denver, Minneapolis, and San Francisco, the doubtful reactors tend to have low rates of calcification both as compared with their own schoolmates who have definite histoplasmin reactions, and as compared with doubtful reactors in Kansas City and

Columbus. Although there are fluctuations in the rates, the intermediate groups of cities show intermediate rates of calcification.

A third point which warrants particular comment is the relatively high rate of calcification among nurses in Kansas City and Columbus who are nonreactors to histoplasmin, especially those who are not definite reactors to tuberculin. The frequency of calcification in the latter group is several times greater than for nurses with comparable skin-test results in the other groups of cities.

Histoplasmin and Tuberculin Reactions in Nurses With Pulmonary Calcification

In the preceding section of this paper, the relationship between pulmonary calcification and sensitivity to tuberculin and histoplasmin has been described in terms of relative frequencies, or chances of finding calcification in the chest film of a nurse if the results of her skin tests are known. These chances, within broad limits, were shown to be roughly similar, regardless of the general prevalence of tuberculin or histoplasmin reactors in the area in which the nurses were observed. Presentation of the findings of the study in such form would appear to be adequate for showing the dependence of pulmonary calcification upon sensitivity to tuberculin and histoplasmin.

From the practical side, however, the results of skin tests and X-ray findings may be viewed in a quite different way. The practicing physician or roentgenologist who deals, not with whole population groups, but with cases showing various types of deviation from the normal, may be less concerned with calcification rates among the various reactor groups in the population, than with the frequency of tuberculin and histoplasmin reactions *among his observed cases of calcification*. The material of the present study is presented in this section, therefore, in terms of the distribution of skin-test results among nurses who have pulmonary calcification, particularly to show the variation which occurs in different parts of the country.

Among the total group of over 16,000 nurses studied, 1,550 were found to have shadows interpreted as definite and/or probable pulmonary calcification on their chest films. In table 5 and figure 6, this special group of nurses is classified according to sensitivity to tuberculin and histoplasmin in the four broad groups consisting of reactors and nonreactors to each antigen.

Among the 1,550 nurses, reactors to histoplasmin alone account for 1,052 nurses; reactors to both antigens for 219; reactors to tuberculin alone for 203; and nonreactors to both antigens for 76. In percentage terms, the frequencies are 68, 14, 13, and 5, respectively. Considering the total frequency of reactors to each antigen, 82 percent of the nurses having calcification reacted to histoplasmin and 27 percent, to tuberculin.

Table 5. *Number and percentage of histoplasmin reactors, of reactors to both histoplasmin and tuberculin, of tuberculin reactors, and of nonreactors to both antigens, among 1,550 student nurses with pulmonary calcification in specified cities*

City	Histoplasmin reactors, tuberculin nonreactors (H+, T−)	Histoplasmin reactors, tuberculin reactors (H+, T+)	Histoplasmin nonreactors, tuberculin reactors (H−, T+)	Histoplasmin nonreactors tuberculin nonreactors (H−, T−)	Total number of student nurses with pulmonary calcification
PERCENTAGE DISTRIBUTION OF SPECIFIED REACTORS AMONG STUDENT NURSES WITH PULMONARY CALCIFICATION					
Kansas City, Mo.	82.2	12.0	1.6	4.2	100.0
Columbus, Ohio	83.2	11.0	3.4	2.4	100.0
Kansas City, Kans.	71.1	18.5	7.2	3.1	100.0
New Orleans	77.5	13.3	5.8	3.3	100.0
Baltimore	64.0	15.3	15.8	5.0	100.0
Detroit	67.0	10.2	21.6	1.1	100.0
Los Angeles	50.6	18.0	22.5	9.0	100.0
Philadelphia	47.0	18.3	28.7	6.1	100.0
San Francisco	32.6	17.4	39.1	10.9	100.0
Denver	37.0	15.1	41.1	6.8	100.0
Minneapolis	33.3	20.6	28.6	17.5	100.0
All cities	67.9	14.1	13.1	4.9	100.0
NUMBER OF SPECIFIED REACTORS AMONG STUDENT NURSES WITH PULMONARY CALCIFICATION					
Kansas City, Mo.	254	37	5	13	309
Columbus, Ohio	273	36	11	8	328
Kansas City, Kans.	69	18	7	3	97
New Orleans	93	16	7	4	120
Baltimore	142	34	35	11	222
Detroit	59	9	19	1	88
Los Angeles	45	16	20	8	89
Philadelphia	54	21	33	7	115
San Francisco	15	8	18	5	46
Denver	27	11	30	5	73
Minneapolis	21	13	18	11	63
All cities	1,052	219	203	76	1,550

The proportion of nurses with calcification accounted for by histoplasmin and by tuberculin sensitivity varies markedly in the different cities as would be expected. The relative importance of histoplasmin sensitivity in all areas is clearly shown. In 9 of the 11 cities, more histoplasmin than tuberculin reactors are observed among nurses with pulmonary calcification. The findings for Kansas City, Columbus, and New Orleans are particularly striking. In these cities, a tremendously high proportion of nurses have calcification associated with histoplasmin sensitivity, and only a very small proportion, with definite tuberculin sensitivity. As the cities are arrayed, there is a progressive decrease in the proportion reacting to histoplasmin, but even in San Francisco, Denver, and Minneapolis, where the prevalence of histoplasmin sensitivity is low, more than 50 percent of the calcification observed is associated with histoplasmin sensitivity.

The prevalence of tuberculin reactors among student nurses with pulmonary calcification is sharply contrasted with that of histoplasmin reactors in the different cities. With but minor exceptions,

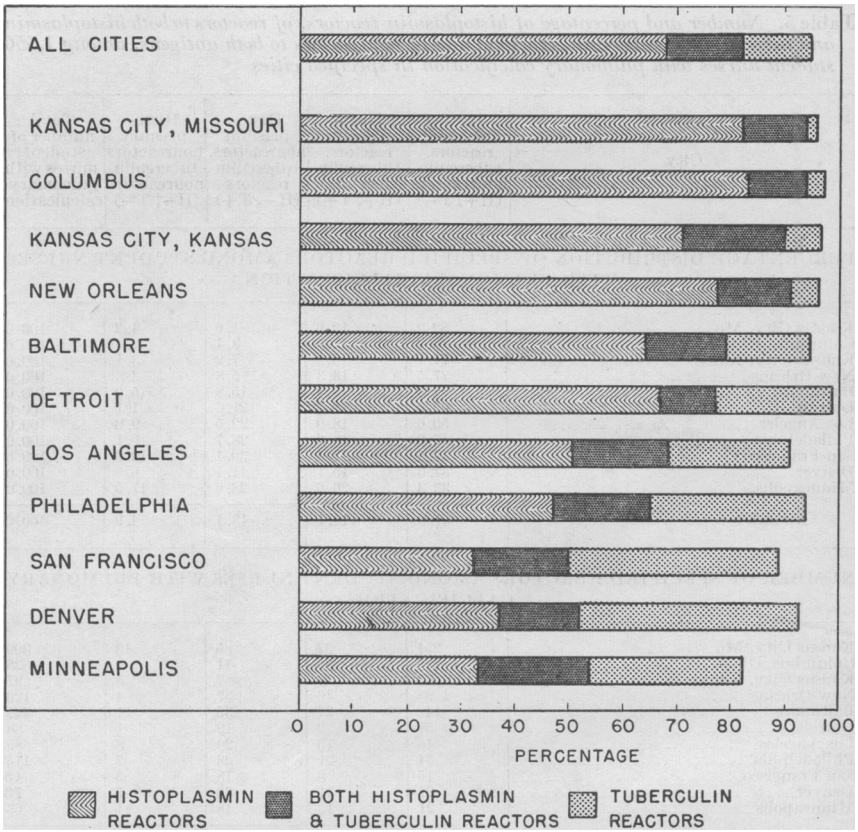

Figure 6. Percentage of definite or doubtful histoplasmin reactors, of both definite or doubtful histoplasmin and definite tuberculin reactors, and of definite tuberculin reactors among 1,550 student nurses with pulmonary calcification, in specified cities.

the prevalence of definite tuberculin reactors begins in the arrayed cities at about 15 percent in Kansas City, Mo., and Columbus, and gradually increases to reach a maximum of about 55 percent in the last cities in the array. This finding is the obvious result, not of an increasing frequency of tuberculin reactors in the population of student nurses in the arrayed cities, but, a progressive decrease in the frequency of cases of calcification associated with histoplasmin sensitivity. Student nurses with pulmonary calcification who have neither reaction to histoplasmin nor definite reaction to tuberculin show a similar trend, increasing gradually in the arrayed cities from about 3 to nearly 20 percent.

Special attention is directed to the finding in Minneapolis of 11 out of 63 nurses (17.5 percent) who have calcification and who are not considered as being sensitive to either histoplasmin or tuberculin. This finding of 17.5 percent nonreactors among nurses with calcifica-

tion is in no way incompatible with the extremely close relationship demonstrated in this study between pulmonary calcification and sensitivity to tuberculin and histoplasmin. It merely reflects the sizable contribution to the total number of cases of calcification that is made by a very large nonreactor group in the population even though the calcification rate for that group is very small.

Summary

This paper is the fourth in a series of reports from a long term tuberculosis research program cooperatively undertaken in 1943 by the National Tuberculosis Association and the Public Health Service. The basic data consist of results of testing with tuberculin and histoplasmin, and observations on pulmonary calcification, on 16,320 student nurses in 76 nursing schools located in 10 metropolitan areas in the United States.

The frequency of reactors to histoplasmin varied from over 60 percent in Kansas City, Mo., and Columbus, Ohio, to less than 10 percent in San Francisco, Denver, and Minneapolis. Tuberculin reactors varied from 23 percent in Philadelphia to 8 percent in Minneapolis, while rates for pulmonary calcification were found above 20 percent in Kansas City, Mo., and Columbus and 5 percent or below in San Francisco, Los Angeles, and Minneapolis. Areas having high levels of frequency of pulmonary calcification corresponded with those having high rates of reactors to histoplasmin, and vice versa, indicating a gross association of the two variables.

Detailed analysis was made of the relationship between pulmonary calcification and sensitivity to histoplasmin and tuberculin. About one-third of the nurses reacting to histoplasmin (or to both histoplasmin and tuberculin) had pulmonary calcification, about one-tenth of those reacting only to tuberculin had calcification, while only 0.7 percent with reaction to neither antigen had calcification. The basic pattern of this relationship remained essentially unchanged in different geographic areas of the study.

It was noted that calcification among reactors to histoplasmin alone was three times as high as among reactors to tuberculin alone. This factor, together with the higher average prevalence of histoplasmin as compared with tuberculin reactors, resulted in the finding that very much more calcification was observed associated with histoplasmin than with tuberculin sensitivity.

The extremely rare occurrence of calcification in nurses who did not react to either tuberculin or histoplasmin is considered strong presumptive evidence that tuberculosis, plus whatever causes sensitivity to histoplasmin, accounts for almost all roentgenologically observable pulmonary calcification in nurses in the areas studied.

The analysis of the material included an attempt to determine the levels of sensitivity to tuberculin and histoplasmin which would most efficiently and specifically select nurses who have pulmonary calcification. The results showed that tuberculin reactions, 5 or more mm. in diameter, of definite induration, to a dosage of 0.0001 mg. PPD–S would serve as a highly satisfactory definition of a specific tuberculin reaction. Results of testing with a larger dose of 0.005 mg. of PPD–S, whatever the size or description of the reaction, was of little assistance in selecting nurses with tuberculous pulmonary calcification. A specific histoplasmin reaction, on the other hand, was found to be induration of any size or of erythema of 5 or more mm. in diameter, to a 1/1000 dilution of the histoplasmin used in the study.

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APPENDIX

Number and percentage of student nurses with pulmonary calcification, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States

City	Tuberculin: Definite reactors; Histoplasmin: Definite reactors	Tuberculin: Definite reactors; Histoplasmin: Doubtful reactors	Tuberculin: Definite reactors; Histoplasmin: Nonreactors	Tuberculin: Definite reactors; Histoplasmin: Total	Tuberculin: Questionable reactors; Histoplasmin: Definite reactors	Tuberculin: Questionable reactors; Histoplasmin: Doubtful reactors	Tuberculin: Questionable reactors; Histoplasmin: Nonreactors	Tuberculin: Questionable reactors; Histoplasmin: Total	Tuberculin: Essentially nonreactors; Histoplasmin: Definite reactors	Tuberculin: Essentially nonreactors; Histoplasmin: Doubtful reactors	Tuberculin: Essentially nonreactors; Histoplasmin: Nonreactors	Tuberculin: Essentially nonreactors; Histoplasmin: Total	Tuberculin: Nonreactors; Histoplasmin: Definite reactors	Tuberculin: Nonreactors; Histoplasmin: Doubtful reactors	Tuberculin: Nonreactors; Histoplasmin: Nonreactors	Tuberculin: Nonreactors; Histoplasmin: Total	Tuberculin: Total; Histoplasmin: Definite reactors	Tuberculin: Total; Histoplasmin: Doubtful reactors	Tuberculin: Total; Histoplasmin: Nonreactors	Tuberculin: Total; Histoplasmin: Total
PERCENTAGE OF STUDENT NURSES WITH PULMONARY CALCIFICATION																					
Individual cities																					
Kansas City, Mo.	45.7	38.5	12.5	34.1	35.7	(*)	3.3	18.0	37.2	39.0	4.5	26.2	43.0	39.1	2.3	28.3	40.0	37.5	4.5	27.3
Columbus, Ohio	39.2	45.5	18.0	31.1	31.8	(*)	5.3	20.4	37.3	38.2	.7	22.7	41.5	23.5	3.4	26.4	38.6	35.4	3.6	24.7
Kansas City, Kans.	44.4	(*)	22.6	34.2	47.1	(*)	8.7	24.4	31.5	22.2	------	15.8	26.6	(*)	1.3	13.0	33.2	22.6	3.8	18.2
New Orleans	38.9	14.3	5.8	13.5	27.9	(*)	.7	8.1	40.1	13.5	.2	9.5	26.9	5.3	1.1	6.9	35.5	12.9	1.2	9.3
Baltimore	39.2	27.3	13.3	19.5	33.3	(*)	1.1	5.4	32.7	14.8	.8	9.0	45.2	25.0	1.1	13.1	37.6	20.0	3.1	11.3
Detroit	38.1	(*)	12.9	16.1	(*)	(*)	------	3.8	42.9	(*)	------	6.1	44.2	(*)	.2	5.2	41.8	9.5	1.9	7.0
Los Angeles	28.6	9.1	7.6	10.8	16.7	(*)	2.7	5.7	28.8	------	.7	3.6	37.5	5.3	.2	3.5	30.2	6.2	1.8	5.0
Philadelphia	28.6	13.6	8.0	10.9	(*)	(*)	------	1.0	27.8	------	.5	2.9	38.0	6.7	.5	4.8	31.1	5.6	2.1	5.3
San Francisco	38.9	(*)	9.8	12.6	(*)	(*)	7.1	6.8	14.8	7.7	.3	1.5	29.0	9.1	.2	2.4	25.6	10.0	2.3	4.1
Denver	39.1	20.0	13.8	16.4	(*)	(*)	------	4.4	48.3	9.1	.4	3.1	33.3	(*)	.7	2.6	39.8	12.5	2.9	5.5
Minneapolis	60.0	25.0	11.2	16.1	(*)	(*)	------	------	25.6	3.4	.5	1.5	20.0	5.0	.5	1.4	27.7	9.2	1.3	2.6
Grouped cities																					
Columbus, Kansas City	42.7	40.0	17.4	32.9	37.3	(*)	5.6	20.5	36.5	35.5	1.8	22.8	40.2	30.4	2.6	25.0	38.4	34.1	4.0	24.5
Baltimore, New Orleans	39.1	20.0	10.9	17.6	29.3	18.2	.9	7.1	35.7	13.9	.6	8.6	39.9	16.3	1.1	11.0	36.8	15.8	2.4	10.5
Detroit, Los Angeles, Philadelphia	30.1	12.0	8.8	11.8	18.5	(*)	1.0	3.4	33.1	------	.5	4.0	39.7	7.7	.3	4.5	33.7	6.4	2.0	5.6
Denver, Minneapolis, San Francisco	44.6	21.9	11.8	15.1	21.4	(*)	1.7	3.2	29.3	5.7	.5	1.9	26.5	5.9	.5	2.0	31.1	10.1	1.9	3.7
All cities	38.7	21.9	10.7	16.7	30.1	15.4	1.6	7.5	35.3	16.5	.6	8.4	38.7	16.0	.7	8.0	36.6	17.5	2.2	9.5
NUMBER OF STUDENT NURSES WITH PULMONARY CALCIFICATION																					
Individual cities																					
Kansas City, Mo.	32	5	5	42	10	0	1	11	127	16	9	152	92	9	3	104	261	30	18	309
Columbus, Ohio	31	5	11	47	7	1	1	9	155	13	2	170	93	4	5	102	286	23	19	328
Kansas City, Kans.	16	2	7	25	8	0	2	10	39	4	0	43	17	1	1	19	80	7	10	97
New Orleans	14	2	7	23	12	2	1	15	57	7	1	65	14	1	2	17	97	12	11	120
Baltimore	31	3	35	69	5	0	1	6	70	4	6	80	57	6	4	67	163	13	46	222
Detroit	8	1	19	28	2	0	0	2	33	0	0	33	23	1	1	25	66	2	20	88
Los Angeles	14	2	20	36	2	1	2	5	23	0	5	28	18	1	1	20	57	4	28	89
Philadelphia	18	3	33	54	1	0	0	1	22	0	4	26	30	1	3	34	71	4	40	115
San Francisco	7	1	18	26	0	0	3	3	4	1	1	6	9	1	1	11	20	3	23	46
Denver	9	2	30	41	3	0	0	3	14	1	2	17	9	0	3	12	35	3	35	73
Minneapolis	9	4	18	31	0	0	0	0	11	1	6	18	8	1	5	14	28	6	29	63

*Less than 10 persons tested.

Number and percentage of student nurses with pulmonary calcification, according to histoplasmin and to tuberculin reaction, in specified cities throughout the United States—Continued

City	Tuberculin																			
	Definite reactors				Questionable reactors				Essentially nonreactors				Nonreactors				Total			
	Histoplasmin				Histoplasmin				Histoplasmin				Histoplasmin				Histoplasmin			
	Definite reactors	Doubtful reactors	Nonreactors	Total	Definite reactors	Doubtful reactors	Nonreactors	Total	Definite reactors	Doubtful reactors	Nonreactors	Total	Definite reactors	Doubtful reactors	Nonreactors	Total	Definite reactors	Doubtful reactors	Nonreactors	Total
NUMBER OF STUDENT NURSES WITH PULMONARY CALCIFICATION— Continued																				
Grouped cities																				
Columbus, Kansas City	79	12	23	114	25	1	4	30	321	33	11	365	202	14	9	225	627	60	47	734
Baltimore, New Orleans	45	5	42	92	17	2	2	21	127	11	7	145	71	7	6	84	260	25	57	342
Detroit, Los Angeles, Philadelphia	40	6	72	118	5	1	2	8	78	0	9	87	71	3	5	79	194	10	88	292
Denver, Minneapolis, San Francisco	25	7	66	98	3	0	3	6	29	3	9	41	26	2	9	37	83	12	87	182
All cities	189	30	203	422	50	4	11	65	555	47	36	638	370	26	29	425	1,164	107	279	1,550
NUMBER OF STUDENT NURSES TESTED																				
Individual cities																				
Kansas City, Mo	70	13	40	123	28	3	30	61	341	41	198	580	214	23	130	367	653	80	398	1,131
Columbus, Ohio	79	11	61	151	22	3	19	44	415	34	299	748	224	17	146	387	740	65	525	1,330
Kansas City, Kans	36	6	31	73	17	1	23	41	124	18	130	272	64	6	76	146	241	31	260	532
New Orleans	36	14	121	171	43	8	134	185	142	52	492	686	52	19	177	248	273	93	924	1,290
Baltimore	79	11	263	353	15	3	94	112	214	27	752	893	126	24	363	513	434	65	1,472	1,971
Detroit	21	6	147	174	8	1	43	52	77	9	453	539	52	5	428	485	158	21	1,071	1,250
Los Angeles	49	22	262	333	12	3	73	88	80	21	680	781	48	19	509	576	189	65	1,524	1,778
Philadelphia	63	22	412	497	7	4	87	98	79	30	773	882	79	15	608	702	228	71	1,880	2,179
San Francisco	18	6	183	207	2	0	42	44	27	13	361	401	31	11	417	459	78	30	1,003	1,111
Denver	23	10	217	250	9	0	59	68	29	11	510	550	27	3	431	461	88	24	1,217	1,329
Minneapolis	15	16	161	192	3	0	71	74	43	29	1,111	1,183	40	20	910	970	101	65	2,253	2,419
Grouped cities																				
Columbus, Kansas City	185	30	132	347	67	7	72	146	880	93	627	1,600	502	46	352	900	1,634	176	1,183	2,993
Baltimore, New Orleans	115	25	384	524	58	11	228	297	356	79	1,244	1,679	178	43	540	761	707	158	2,396	3,261
Detroit, Los Angeles, Philadelphia	133	50	821	1,004	27	8	203	238	236	60	1,906	2,202	179	39	1,545	1,763	575	157	4,475	5,207
Denver, Minneapolis, San Francisco	56	32	561	649	14	0	172	186	99	53	1,982	2,134	98	34	1,758	1,890	267	119	4,473	4,859
All cities	489	137	1,898	2,524	166	26	675	867	1,571	285	5,759	7,615	957	162	4,195	5,314	3,183	610	12,527	16,320

Characteristics of Commercial X-Ray Screens and Films—VII

By WILLARD W. VAN ALLEN, B. Sc.*

This is the seventh in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier issue of this journal [1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations* [1] [2]

Film and developer [3]	Screens								
	D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	E–2	B sample 1	B sample 2	B–2
Ansco Fluorapid:									
Eastman X-ray	120	150	155	100	125	------	--------	--------	------
Ansco Liquadol	105	125	140	75	100	------	--------	--------	------
G. E. Supermix	155	170	200	100	130	------	--------	--------	------
Eastman Rapid	135	145	165	85	110	------	--------	--------	------
DuPont Fluorofilm:									
Eastman X-ray	95	115	130	80	100	------	--------	--------	------
Ansco Liquadol	90	110	120	65	85	------	--------	--------	------
G. E. Supermix	130	145	165	90	110	------	--------	--------	------
Eastman Rapid	100	110	125	65	85	------	--------	--------	------
Eastman Blue Photoflure:									
Eastman X-ray	95	115	130	75	100	------	--------	--------	------
Ansco Liquadol	85	105	115	65	85	------	--------	--------	------
G. E. Supermix	110	120	145	75	95	------	--------	--------	------
Eastman Rapid	105	110	130	75	90	------	--------	--------	------
Eastman Green Photoflure:									
Eastman X-ray	--------	--------	--------	--------	--------	140	60	70	95
Ansco Liquadol	--------	--------	--------	--------	--------	120	55	55	85
G. E. Supermix	--------	--------	--------	--------	--------	155	75	75	110
Eastman Rapid	--------	--------	--------	--------	--------	115	50	55	80

[1] Speeds determined with film and screen in direct contact and therefore do not represent overall speed of the same combinations when used in a photofluorograph.

[2] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table. These will include: Eastman Liquid X-ray, Buck X-ray, Dupont X-ray.

[3] Development time (as recommended by the manufacturer of the developer): Eastman X-ray Developer, 8 minutes; Ansco Liquadol, 4 minutes; G. E. Supermix, 8 minutes; Eastman Rapid, 8 minutes except for Green Photoflure, 7 minutes. All developments at 68° F.

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[1] Pub. Health Rep. **64:** 430 (1949).

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

Film and developer [2]	Screens								
	Buck			Eastman			Patterson		
	Xtra Speed	Mid-speed	Defi-nition	Ultra speed	Fine Grain	Defi-nition	High Speed	Par-speed	Detail
Ansco High Speed: [3]									
Ansco Liquadol	70	60	50	110	85	60	115	60	20
G. E. Supermix	75	60	50	110	85	60	115	65	20
Eastman Rapid	65	55	45	100	75	55	100	55	20
Dupont No. 508:									
Eastman X-ray	55	50	40	90	70	50	80	55	20
Ansco Liquadol	50	45	40	85	65	45	85	50	15
G. E. Supermix	55	45	40	80	65	45	80	50	15
Eastman Rapid	45	40	30	65	55	40	65	40	15
Eastman Blue Brand:									
Eastman X-ray	85	70	60	140	110	80	120	90	25
Ansco Liquadol	90	75	65	145	110	75	130	80	25
G. E. Supermix	90	75	65	145	105	75	135	80	25
Eastman Rapid	75	65	55	120	90	65	105	60	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table. These will include: Eastman Liquid X-ray, Buck X-ray, DuPont X-ray.
[2] Development time (as recommended by the manufacturer of the developer): Eastman X-ray Developer, 4½ minutes; Ansco Liquadol, 3 minutes; G. E. Supermix, 3 minutes; Eastman Rapid, 3½ minutes. All development at 68° F.
[3] Test with Eastman X-ray developer to be reported in a subsequent issue.

Table 3. *Average value of fog and contrast (gamma)* [1]

Film	Fog densities				Contrast (gamma)			
	Developer [2]				Developer [2]			
	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman Rapid	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman Rapid
Photofluorographic:								
Ansco Fluorapid	0.08	0.09	0.23	0.12	2.1	1.8	2.1	2.0
DuPont Fluorofilm	.21	.15	.40	.20	1.9	2.0	2.1	1.9
Eastman Blue Photoflure	.07	.04	.09	.05	1.8	1.8	1.9	1.7
Eastman Green Photoflure	.10	.11	.28	.09	2.0	2.1	2.3	2.2
Roentgenographic:								
Ansco High Speed	-------	.10	.10	.04	-------	2.8	2.8	2.3
DuPont No. 508	.18	.20	.04	.04	2.6	2.7	2.6	2.2
Eastman Blue Brand	.06	.08	.06	.05	2.8	3.0	-------	3.2

[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F.
[2] Development time as given in tables 1 and 2. Similar data for other developers will appear in subsequent issues.

NOTICE

The *Index of Hospitals and Sanatoria With Tuberculosis Beds in the United States and Territories as of January 1, 1949,* is now available. The new edition has been expanded to include tuberculosis beds in institutions operated by the Federal Government. The *Index* now shows the name, location, and number of tuberculosis beds for all hospitals which accept tuberculosis patients.

Address requests for this publication to: Scientific Publications Section, Division of Tuberculosis, Public Health Service, Washington 25, D. C.

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 ENDING JUNE 11, 1949

A total of 243 cases of poliomyelitis was reported for the current week, as compared with 139 last week, 219 for the corresponding week last year, and a 5-year (1944–48) median of 92. Of 15 States reporting currently more than 3 cases each, only California showed a decline. Texas reported the largest number (as well as more than half of the total net increase), 94 cases (last week 37, next earlier week 72). Other States reporting more than 5 cases are as follows (last week's figures in parentheses): Oklahoma 22 (19), Arkansas 12 (2), California 12 (15), Mississippi 11 (3), Massachusetts 7 (7), Alabama 7 (1), Louisiana 7 (1), Florida 6 (2). The total since March 19 (average week of seasonal low incidence) is 1,079, as compared with 1,097 for the same period last year and a 5-year median of 506.

The reported incidence of measles showed a net decline during the week from 17,967 last week to 16,813. Increases were reported in several States, the largest in New Jersey, from 1,214 to 2,146. Both current and cumulative totals are above the corresponding 5-year medians. The total for the year to date is 536,114, 5-year median (reported last year), 469,024.

Of 27 cases of Rocky Mountain spotted fever (5-year median 18, corresponding week last year 28), only 3 States (Virginia, Tennessee and Wyoming, 4 cases each) reported more than 2 cases each. Eight cases occurred in the Middle Atlantic and South Atlantic areas, 6 in the North Central, 5 in the East South Central and 8 in the Mountain area.

Of 86 cases of typhoid and paratyphoid fever (last week 52, 5-year median 80), only 2 States reported more than 5 cases—Georgia 17 (including 16 paratyphoid) and Texas 17 (including 7 paratyphoid).

During the week New York reported 2 cases of anthrax, and Mississippi 1 case of smallpox.

Deaths recorded during the week in 94 large cities in the United States totaled 9,025, as compared with 8,731 last week, 8,952 and 8,917, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,917. The total for the year to date is 220,069, as compared with 223,973 for the corresponding period last year. Infant deaths totaled 590, last week 611, 3-year median 681. The cumulative figure is 14,932, as compared with 15,710 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended June 11, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [a]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine		1		190		9	4		10			1	8	
New Hampshire			1	15										
Vermont				148			1		4					
Massachusetts	8			292	2		7		114				110	1
Rhode Island	1			15		3	1		7				4	
Connecticut		1	2	564		14	1		13				19	1
MIDDLE ATLANTIC														
New York	5	3	[c]	1,436	4	155	2		[d] 122			4	163	3
New Jersey	6		2	2,146	2	49	5	1	68				75	2
Pennsylvania	1		[c]	1,413	3			1	85		1	4	79	20
EAST NORTH CENTRAL														
Ohio	7		1	1,759	5	52			110			3	47	10
Indiana	3	1	1	159	1	4	4	2	8				10	23
Illinois			1	363	5	117	3	1	33		2	2	83	2
Michigan [b]	4	1		543	2	37	1	1	149			1	56	9
Wisconsin	1	2	1	2,210		4	1		51				52	
WEST NORTH CENTRAL														
Minnesota				105		1	2		19				8	
Iowa				70	1	1	5		5				6	9
Missouri	4		1	48	1	7	1	2	9		8		5	
North Dakota		2	1	8	3		1		2					
South Dakota				59			1		2					
Nebraska	1	1	3	79			3		19				1	
Kansas	1			113		6	3		8				2	1
SOUTH ATLANTIC														
Delaware				18			1		2					
Maryland [b]	2	1	3	131		26			[d] 27				5	
District of Columbia				20		9	1		5			1	2	
Virginia	3		66	398	6	30		4	9		3	5	32	1
West Virginia	1		14	93	1	3	2		10			1	33	
North Carolina	3			199	1		2	1	15		1	2	44	
South Carolina	3		140	372	2	72	3		1			4	13	2
Georgia	2			149		11	4	1	10		1	17		8
Florida	2		1	233	3	7	6		6			1	2	

EAST SOUTH CENTRAL														
Kentucky				64	2	10	1	1	9				16	11
Tennessee	1	1	5	106	4	25		4	6		1	1	3	
Alabama	1		45	96	1	36	7		4			4	3	8
Mississippi [a]	1		18	23		9	11		5	1		1	4	
WEST SOUTH CENTRAL														
Arkansas	2		11	212		19	12				8	4	20	1
Louisiana			4	79	2	33	7		5			3	2	3
Oklahoma			14	180	2	20	22		1			3	3	4
Texas	16	1	488	664	3	173	94		21		2	17	128	14
MOUNTAIN														
Montana	1		4	201				1	5		2			
Idaho				57		4	2	1	[d] 6				3	
Wyoming	1			6	1	2	1	4	2		4		3	
Colorado	3		10	90		12	1	2	3				2	2
New Mexico			3	65		18	1		6			1		
Arizona			40	85		14			4			1	5	
Utah [a]				66		2	2		1				34	
Nevada														
PACIFIC														
Washington	1			213	2	2	4		23				8	
Oregon				110		17	1		1				24	
California	24	1	16	1,148		32	12		[d] 69			5	99	4
Total	109	16	896	16,813	59	1,045	243	27	1,094	1	33	86	1,216	
Median, 1944–48	154	7	676	14,112	93		92	18	2,213	3	19	80	1,886	
Year to date 23 weeks	3,440	233	72,540	536,114	1,841	47,152	2,003	155	54,591	40	563	1,082	23,692	
Median, 1944–48	5,709 (27th)	200	186,516 (30th)	469,024 (35th)	3,701 (37th)		1,004 (11th)	104	77,487 (32d)	224 (35th)	400	1,268 (11th)	46,339 (39th)	
Seasonal low week ends	July 10		July 31	Sept. 4	Sept. 18		Mar. 19		Aug. 14	Sept. 4		Mar. 19	Oct. 2	
Since seasonal low week	8,554		108,810	588,507	2,685		1,079		77,289	50		622	33,725	
Median, 1943–48 [b]	13,275		330,606	503,970	5,205		506		116,058	307		777	77,605	

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944–1945 to 1948–49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; currently reported separately, as follows: Maine 1; New York 2; Virginia 1; Georgia 16; Louisiana 1; Texas 7; California 1. Cases reported as salmonella infecton, not included, were as follows: New York 2; Pennsylvania 1.
[f] Corrections.—Delayed reports: Poliomyelitis, Arkansas 1 case (week ended March 12), Maryland 2 cases (May onset); Rocky Mountain spotted fever, Maryland 5 cases (May onset); paratyphoid fever, Maryland 1 case (March onset). Deductions, smallpox, Michigan 2 cases (reported week ended May 28), North Carolina 1 case (week ended May 14).
Alaska: Measles 4; pneumonia 2.
Hawaii Territory: Measles 180; lobar pneumonia 1; poliomyelitis 1.

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 21, 1949.—During the week ended May 21, 1949, cases of certain notifiable 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		10	1	204	378	36	82	41	109	861
Diphtheria				3	1					4
Dysentery, bacillary							1		1	2
German measles		40		379	62	14	46	52	15	608
Influenza		30			1	31	50			112
Measles		93	24	245	236	232	148	473	243	1,694
Meningitis, meningococcal		1				2	1			4
Mumps		36	1	103	241	15	11	3	60	470
Poliomyelitis				1				1		2
Scarlet fever		9		78	58	1		9	10	165
Tuberculosis (all forms)		3	10	117	45	21	18	2	27	243
Typhoid and paratyphoid fever			1	15					3	19
Undulant fever					4					4
Venereal diseases:										
Gonorrhea	1	8	4	57	68	31	18	28	79	294
Syphilis		5	3	66	35	8	2	2	23	144
Whooping cough				60	11		26	1		98

MADAGASCAR

Notifiable diseases—April 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during April 1949 as follows:

Disease	April 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi			2	0
Bilharziasis			99	0
Cerebrospinal meningitis			6	2
Diphtheria	1	0	1	1
Dysentery, amebic	31	0	292	3
Erysipelas			11	1
Influenza	73	0	3,707	37
Leprosy			44	0
Malaria	531	1	40,799	288
Measles	3	0	53	2
Mumps	1	0	99	0
Plague	1	0	11	10
Poliomyelitis			1	1
Pneumonia, broncho	4	2	224	55
Pneumonia, pneumococcic	2	0	254	51
Puerperal infection			1	0
Relapsing fever			6	0
Tuberculosis, pulmonary	5	1	72	18
Typhoid fever	4	0	18	3
Whooping cough	1	0	244	8

JAMAICA

Notifiable diseases—4 weeks ended May 28, 1949.—For the 4 weeks ended May 28, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities
Chickenpox	21	35
Diphtheria	3	1
Erysipelas	2	
Puerperal sepsis		2
Tuberculosis (pulmonary)	35	53
Typhoid fever	2	37

NEW ZEALAND

Notifiable diseases—5 weeks ended April 30, 1949.—During the 5 weeks ended April 30, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	4		Poliomyelitis	53	3
Diphtheria	16	4	Puerperal fever	2	
Dysentery:			Scarlet fever	119	1
Amebic	5		Tetanus	2	
Bacillary	14		Trachoma	3	
Erysipelas	14		Tuberculosis (all forms)	174	42
Food poisoning	7		Typhoid fever	10	
Lead poisoning	1		Undulant fever	4	
Malaria	1				

SWITZERLAND

Notifiable diseases—January–March 1949.—During the months of January, February, and March 1949, cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	January	February	March
Cerebrospinal meningitis	5	7	9
Chickenpox	421	340	457
Diphtheria	118	120	125
Dysentery		3	
Hepatitis, epidemic	61	38	27
Influenza	7,436	7,945	2,944
Measles	1,368	1,166	1,744
Mumps	253	341	406
Paratyphoid fever	6	10	6
Poliomyelitis	5	4	4
Scarlet fever	403	337	451
Tuberculosis	278	286	389
Typhoid fever	3	7	1
Undulant fever	17	24	16
Whooping cough	685	713	836

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

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. 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

Burma—Bassein.—Cholera has been reported in Bassein, Burma, as follows: Week ended May 14, 1949, 18 cases, 12 deaths; week ended May 21, 56 cases, 41 deaths.

Siam—Bangkok.—During the week ended May 21, 1949, two cases of cholera were reported in Bangkok, Siam.

Plague

India—Bombay.—During the week ended June 4, 1949, one fatal case of plague was reported in Bombay, India.

Java—Bandoeng.—During the week ended April 30, 1949, two cases of plague were reported in Bandoeng, Java.

Smallpox

Cuba—Habana.—On June 6, 1949, one case of smallpox was reported in the suburban area of Habana, Cuba.

French West Africa—Niger Territory.—Smallpox has been reported in Niger Territory, French West Africa, as follows: For the period April 1–30, 1949, 133 cases, 19 deaths; for the period May 1–20, 129 cases, 20 deaths.

Italy—Rome.—Information dated June 7, 1949, states that an outbreak in Rome of what was originally diagnosed as chickenpox is now regarded as smallpox. Since February, 90 cases with 3 deaths are reported to have occurred in the city.

Japan—Osaka.—During the period April 22–June 2, 1949, 52 cases of smallpox were reported in Osaka Region, Japan, including 20 cases in Osaka City.

Mozambique.—During the week ended April 30, 1949, 27 cases of smallpox, with 5 deaths, were reported in Quelimane Province, Mozambique.

Netherlands Indies:

Java—Batavia.—Smallpox has been reported in Batavia, Java, as follows: Week ended May 21, 1949, 297 cases, 29 deaths; week ended May 28, 240 cases, 35 deaths.

Riouw Archipelago—Selat Pandjang.—During the week ended May 21, 1949, two cases of smallpox were reported in Selat Pandjang in the Riouw Archipelago, Netherlands Indies.

Yellow Fever

No reports of yellow fever were received during the current week.

DEATHS DURING WEEK ENDED JUNE 4, 1949

	Week ended June 4, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,731	8,606
Median for 3 prior years	9,192	
Total deaths, first 22 weeks of year	211,044	215,021
Deaths under 1 year of age	611	661
Median for 3 prior years	661	
Deaths under 1 year of age, first 22 weeks of year	14,342	15,098
Data from industrial insurance companies:		
Policies in force	70,396,235	71,068,262
Number of death claims	10,152	9,621
Death claims per 1,000 policies in force, annual rate	7.5	7.1
Death claims per 1,000 policies, first 22 weeks of year, annual rate	9.6	10.1

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