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THE EFFECTS OF EXPOSURE TO DUST IN TWO GEORGIA TALC MILLS AND MINES

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The study herein described was carried out at the request of the Georgia State Department of Health in order to ascertain whether there is a connection between talc dust exposure and the relatively high tuberculosis death rate in Murray County, Ga., where two talc mills and mines are located. The study follows in outline the general procedure adopted by the Office of Industrial Hygiene and Sanitation in its studies of dusty trades and includes a survey of plant and mine conditions and the results of examinations made on a group of workers engaged at any time in the production of talc products. In contrast with the results of another study on the effects of talc dust exposure (1), the present investigation deals with a form of talc primarily adapted to the manufacture of marking pencils for the steel and building construction trades. Such talc powder is a by-product obtained from the waste incident to the sorting and cutting of raw talc.

The cutting of talc pencils and the crushing and milling of the waste were done in very close quarters. In fact, in one of the mills studied both operations were carried on in the same room. Consequently, it was difficult to obtain a true picture of the occupational exposures of various workers and to compare the results with those obtained in the previous study (1) referred to. Furthermore, in contrast with the previous study both plants were small and no provisions for exhausting the dust at the sources of generation were in evidence.

PROCEDURE AND INSTRUMENTS USED IN THE STUDY

The sanitary and occupational survey methods recently described by Bloomfield (2) were employed in the present study. These methods embody the principle that in any investigation regarding the health of workers, it is first necessary to study the environmental factors. This includes an "inventory" of all sanitary facilities, lighting, ventilation, etc.; and an evaluation of these items was based on the best practice specified by State or other accepted codes. Following such a survey a study of each worker's activities is made.

This is important, for it has been shown in the dust studies conducted by the Public Health Service that a worker's duties do not generally limit him to a single dust concentration through the entire working day. Consequently, in order to arrive at a fair estimate of the worker's actual daily dust exposure, it is necessary to know the time spent in each activity.

Dust sampling.—In obtaining dust samples, the Greenburg-Smith impinger (3) and the Owens' jet (4) apparatus were used. The former was employed for obtaining samples for the estimation of dust concentrations in accordance with the technique devised by the Public Health Service and the latter for obtaining small grab samples for particle size measurements.

NATURE OF TALC DUST

According to Ladoo (5) the Chatsworth talc deposits are steatite (hydrous magnesium silicate, $H_2Mg_3(SiO_3)_4$). This is ordinary talc, or soapstone, as distinguished from pyrophyllite, the hydrous aluminum silicate, deposits of which are found in North Carolina. Chatsworth talc rock is greenish-gray in appearance, firm, and translucent when cut into thin slabs. In the form of powder, the talc is grayish-white and finds its chief market in the manufacture of rubber and paper.

The importance of quartz as the chief causative agent in the production of disabling pneumoconiosis is well known. In an analysis of dust samples, therefore, it is of prime importance to obtain an estimate of the quartz content. The Office of Industrial Hygiene and Sanitation has for a number of years secured analyses both petrographically and chemically of the samples of dust obtained in its various studies. Three samples of dust submitted for petrographic analysis showed the following results:[1]

Talc as fibrous splinters, fibrous aggregates, and foliated masses, approximately 70 percent.

Dolomite as broken rhombs from 20 to 30 percent.

Tremolite in two samples as bladed crystals, 10 percent.

No quartz was found except as occasional fragments. The same samples were submitted to Associate Chemist Frederick Goldman for chemical analysis. The results are presented in table 1.

TABLE 1.—*Analysis of talc samples*

Sample number	Location taken	SiO_2	CaO	MgO	Combined oxides
1	Breast in mine	59.58	5.75	28.52	6.92
2	Talc mill near crusher	46.24	4.51	27.06	12.1
3	Talc as marketed	46.04	4.39	28.20	15

[1] We are indebted to Mr. Alden H. Emery and Dr. A. Gabriel, of the Bureau of Mines, for conducting the petrographic analyses of samples.

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In the previous talc study, the amount of tremolite found was more than four times that reported above. However, no free silica was found in either study. The chemical analyses of both studies are comparable except in the case of the combined silica (determined as SiO_2), which in the previous study was given as 56.54 percent.

Two samples were taken with the Owens jet dust counting apparatus and 100 particles were measured in each sample with a filar micrometer at a magnification of 1,000. The median size of particles was found to be 0.8 micron. Approximately 85 percent of the particles were larger than 0.5 micron.

DESCRIPTION OF PLANTS, OPERATIONS, AND OCCUPATIONS

Description of plants.—The two plants studied represent extreme types of construction, one being modern and the other consisting of a series of dilapidated wooden sheds. In the newer plant, the sawing and milling operations are carried on in separate, detached rooms, while in the older one all work is done in what may be described as a single large room.

From a sanitary point of view, neither plant had adequate lighting, except in the packing and sorting rooms, where good lighting was a necessity. One plant had no artificial lighting. Water was obtained from an outdoor faucet, thus requiring the use of the common drinking cup and pail. The newer plant, while having electric lights, did not possess much better sanitary facilities.

Operations and occupations.—The operations in the plants may be divided into two classes—pencil cutting and talc crushing and milling. In the former, the raw material from the mine is carefully selected and cut into blocks by a large circular saw. In both plants this work is conducted by one man known as a "blocker." His work requires considerable experience in choosing suitable pieces of talc with straight and uniform grain. The blocks thus selected and cut are in turn sawed into smaller sizes and passed on to a "slabber", or "facer", whose work consists in cutting the blocks into thin slabs. These slabs are again sawed by the pencil makers who use a small fine-toothed saw. The final step then consists in pointing or rounding the pencils in accordance with market requirements. All the above-mentioned operations are carried out on a long bench called the sawyer's bench. The final operations of sorting and packing are done by girls in separate rooms adjoining.

Pencilmaking, as might be expected, entails a great deal of waste. Talc is soft and frequently brittle and the sawing of it into thin slabs and pencils causes much breakage. The manufacture of talc powder merely consists in the crushing, milling, and screening of such talc waste and knurled talc rock which cannot be used for pencils. The milling process does not differ materially from that described in the

earlier study, except that in the present case the operations are on a smaller scale and employ only two men per plant, a crusherman and a packer. The former shovels the raw talc in the crusher or conveyor belt while the latter "bags" the talc. The filling process consists of lowering and raising a telescoping duct from a hopper into a paper or cloth sack. Each sack is filled to the proper weight and any excess is rem ved with a small scoop. The loaded bags are carried to the storing and shipping room by a helper.

DESCRIPTION OF MINING OPERATIONS AND OCCUPATIONS

The mines of the Chatsworth region consist of small openings at the base of Cohutta Mountain, with short tunnels and chambers pitched downward into the talc seam. The talc lies in pockets, which, in mining, frequently necessitates occasional exploration through rock. The mines are laid with narrow-gage track on which operates a small "buggy" connected by cable from the engine house outside the mine. Mine pillars for support of the roof are not used in the passages and chambers, although there is often some danger of a cave-in. The natural ventilation through the tunnels, by means of several surface openings, rendered the air fairly clean. In one of the mines a forced-draft fan from the surface provided air for some headings.

Briefly, the mining operations consist of drilling with a jackhammer, firing a charge of black powder, and loading the broken talc into the buggy. Because of the comparative softness of the talc, approximately an hours' time (on the average) is consumed in the drilling of the 1 to 6 holes daily.

The talc, which is blown out in large lumps, is loaded by muckers into the buggy and hauled to the surface. The talc rock is unloaded and placed in sheds to avoid wetting. No other operations are involved in mining. The talc is hauled to the mills, about 4 miles distant, by means of trucks.

Inasmuch as the mining properties of the two companies studied adjoined one another and the operations involved in the mining of talc were identical, dust samples during drilling and mucking operations were taken in only one of them.

RESULTS OF DUST ANALYSES

The results of dust samples taken in the two talc mills and mines described above are shown in tables 2 and 3. In all, 19 samples were taken, giving counts which may be taken as the average of the particular activities involved. It will be seen from these tables that the packermen, sawyers, and drillers receive the highest exposure to dust, that is, 16 workers out of the 36 employed in both plants and mines. The packermen actually receive the greatest exposure, although in one plant a low count was
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TABLE 2.—Occupa

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Packermen	
Pencil boxers [1]	
Foremen and helpers	
Total	

[1] Average of 2 samples in 1 plant.
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TABLE 3.—I

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Drillers and helpers	
Muckers	
Outside men (hoister)	

[1] Total inside and outside workers.

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plant a low count was obtained because the packing operations had not been carried on steadily at the time the sample was taken. However, in view of the fact that the packing methods were identical in both plants, the average count of 1,672 million particles per cubic foot may be taken as a fair average.

TABLE 2.—*Occupational and dust analyses made in 2 talc mills*

Activity	Number of workers employed	Number of dust samples taken	Millions of dust particles per cubic foot (average of all samples)
Sawyers (blockers, slabmen, and pencilmen)	10	5	324
Crushermen	2	2	55.6
Packermen	2	2	[1] 1,672
Pencil boxers [2]	4	2	17.1
Foremen and helpers	4	1	162
Total	23	14	

[1] Average of 2 samples in 1 plant. Third sample from other plant taken after short period of operation gave count of 53 million particles per cubic foot.
[2] Women employed at this occupation.

TABLE 3.—*Dust determinations made at a talc mine*

Activity	Number of men [1]	Number of samples	Average dust count
Drillers and helpers	2	2	855
Muckers	2	2	32
Outside men (hoister)	1		

[1] Total inside and outside workers, both mines, 13 men.

The crushermen were exposed to a lower count than was anticipated, inasmuch as the packing operations were carried on close by. The reason for this condition is perhaps due to the natural ventilation which existed near the crushers, since in both plants they were close to the unloading platform. It is probable that on certain days the counts might be much higher, almost of the same order as that of the packermen.

The sawyers showed a fairly high exposure to dust, the counts averaging 324 million particles per cubic foot. It is a curious fact that the newer mill showed higher counts than the older. This is undoubtedly due to the small quarters given to the activities. The pencil sorters and packers, as might be expected, showed minimum counts. The average plant dustiness, exclusive of the packing operations, to which helpers and foremen were exposed, was 162 million particles per cubic foot.

The chief activities in the mine are drilling and mucking. As has been pointed out, however, drillers are exposed only about an hour daily to an average concentration of 855 million particles per cubic foot. After firing, the drillers assist the muckers and are exposed to

a fairly low count of 32 million particles per cubic foot. The reason for this low dust count in mucking is probably due to the large sizes of talc which are handled. Inasmuch as both drillers and muckers are practically exposed to identical concentrations for varying periods of time, the weighted average of their exposure may be taken as 135 million particles per cubic foot. This average is based upon 1 hour's drilling time and 7 hours of mucking, thus $\frac{1\times855+(7\times32)}{8}=135$ million particles per cubic foot.

MEDICAL OBSERVATIONS

Procedure.—It was possible to secure physical examinations of 66 talc workers and former talc workers, of which number 55 were males and 11 females. All were native American white. Thirty of the group were working in the talc mines or mills or had been working up to within a few months of the time of these observations; 8 of the 30 were females.

The general procedure followed in making the medical examinations was the same as that used in the recent anthracite study (6). Briefly, the examination of each individual consisted of a present medical, past medical, and occupational history (7), with a height and weight determination, inspection of the mouth and throat, measurement of the chest expansion, a functional exercise test, and a careful clinical and roentgenological examination (by fluoroscopy and skiagraphy) of the chest. Cognizance was taken only of gross impairments elsewhere in the body.

Fifty-eight [2] persons were given the examination as outlined. To these were added certain persons examined by the Georgia Department of Health which furnished the Public Health Service roentgenograms and other data. Those persons of this supplemental group on whom sufficient data were obtained are included in the analysis.

The 66 talc workers were divided into 3 groups according to dust exposure, as follows:

(a) 33 mill workers, exposed to 300 or more million particles of dust per cubic foot.

(b) 13 miners, exposed to an average of 135 million particles per cubic foot.

(c) 20 additional workers,[3] exposed to an average of 17 million particles per cubic foot.

In those instances in which the individual had worked in both mill and mine, the job which contributed to more than two-thirds of his total weighted exposure was chosen for the final placing of the case.

[2] One of this number who had worked less than a year in the talc mines has been excluded from the analysis because of several year's exposure in rock tunneling elsewhere.

[3] A few cases who had worked only a few days or months at a higher concentration were also placed in this group.

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TABLE 5.—*Number*

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Sawyers, packers, and crusher
Miners
Others [1]

[1] Millworkers.

The age distribution of these workers showed that 26 (39 percent) were less than 30 years of age; 30 (45 percent) were between the ages of 30 and 49, and 10 (16 percent) were 50 years of age or older.

With reference to the length of service, regardless of exposure, 29 (44 percent) had worked less than 5 years; 18 (27 percent), 5 to 9 years; 13 (20 percent), 10 to 14 years; and 6 (9 percent), 15 or more years. Only two of the latter had worked 20 or more years in the trade. It is obvious, therefore, that a comparatively youthful group with short periods of exposure to dust is being dealt with.

CLINICO-ROENTGENOGRAPHIC FINDINGS

On physical examination, the talc mill workers were found to be more undersized and underweight than workers employed in other more arduous dusty occupations. This observation is similar to that noted in another Southern industry (cotton textile) (8). For the most part, the 42 men who were employed or had been employed in the mills were more under weight than the 13 miners who were examined. Table 4 gives the deviation in weight from the life insurance and actuarial standard of normal.

TABLE 4.—*Deviations in weight as found in 55 male talc workers*

Weight	Talc workers	
	Number	Percent
30 pounds and more over	1	1.8
10–29 pounds over	3	5.5
9 pounds over to 9 pounds under	23	41.8
10–29 pounds under	26	47.3
30 pounds and more under	2	3.6

It may be noted from this table that approximately one-half of the workers examined were more than 10 pounds under weight.

In table 5 are shown the number of cases having pneumoconiosis in the various major activities associated with the talc industry at Chatsworth, Ga.

TABLE 5.—*Number of workers in 3 major activities having pneumoconiosis*

Activity	Number of men exposed	Stage of pneumoconiosis		
		I	II	III
Sawyers, packers, and crushermen	22	6	5	2
Miners	13	6		
Others [1]	20			

[1] Millworkers.

This table shows that 16, or approximately half, of the mill workers in the higher dust groups were diagnosed as having pneumoconiosis. Of this group there were eight cases showing definite symptoms of the disease, such as dyspnoea, cough, chest pain, râles, and other abnormal chest findings, clubbing of the fingers and roentgenologic manifestations of nodular or nodular conglomerate types of fibrosis, and more or less diaphragmatic fixation. Considering all clinical and roentgenologic findings together, these eight cases were diagnosed pneumoconiosis II and III. Changes of this degree were noted in 3 mill workers with 5 to 9 years' exposure; in 4 of those with 10 to 14 years' exposure; and in 1 with more than 15 years' exposure.

The miners showed no evidence of advanced pneumoconiosis, although 6 of the 13 men examined had pneumoconiosis I. In the lower dust group all were diagnosed as essentially negative.

Five persons in the group exposed to more than 300 million particles per cubic foot were diagnosed pneumoconiosis plus tuberculosis. Only one additional case had findings which would make a diagnosis of tuberculosis tenable. This diagnosis was made on a sawyer whose length of exposure was less than 3 years.

The clinical findings of the mill workers in the advanced stages of pneumoconiosis (II and III) referred to above are best presented by abstracts of 4 of these cases illustrated by the accompanying plates (plates I and II).

CASE NO. 27.—NATIVE AMERICAN WHITE MALE; AGE 34 YEARS

Occupational history—chronologically from the time he began working at 20 years of age.—Packerman (talc mill), 1 year; farmer, 2 years; trammer (talc mine), 3 years; talc miner, 2 years; crayon sawyer (talc mill), 6 years. (Rated as 9 years' milling.)

Past medical history.—Influenza, 1927.

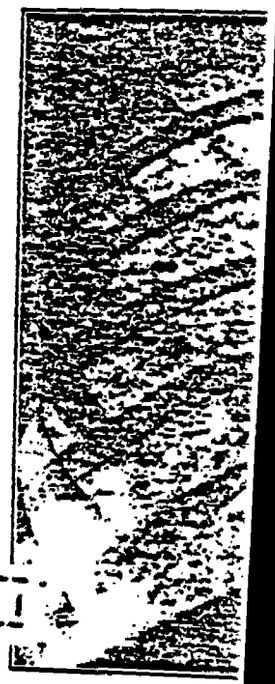
Complaints.—(1) Short-winded; (2) fatigues easily.

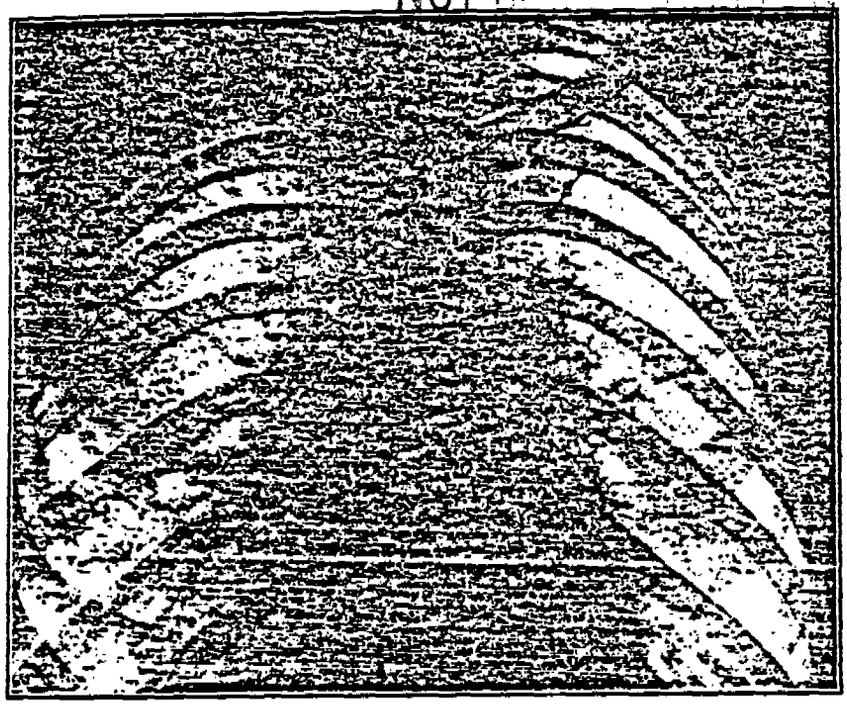
Physical examination.—General appearance, fair; asthenic development. Height, 69 inches; weight, 143 pounds. (Greatest weight, 160 lbs., 5 years previously.) Chest asthenic in type, with moderately prominent supra- and infra-clavicular fossæ. Chest expansion, 2½ inches. Slight clubbing of the fingers. Fremitus increased over both upper lobes. Resonance impaired from sixth thoracic spine and third rib up on the right. Breath sounds are bronchovesicular over the area of impaired resonance, and post-tussic crepitant râles are heard over this area. B. P., 120/78. Fair cardiac response to exercise. Respiratory rate before, immediately after, and 2 minutes after exercise, 16, 24, 24.

Fluoroscopy.—Diaphragm excursion is limited moderately (2+). Hilar shadows are increased moderately (2+) in density and slightly (1+) in size. Lung fields showed diffuse second degree grainy, 1st degree nodular shadows which were tending to coalesce.

X-ray (see plate I) shows slight veiling of the right apex and the diffuse, small, nodular shadows and increase in the hilar shadows. The linear markings are almost obliterated.

Diagnosis.—Pneumoconiosis II plus pulmonary infection.





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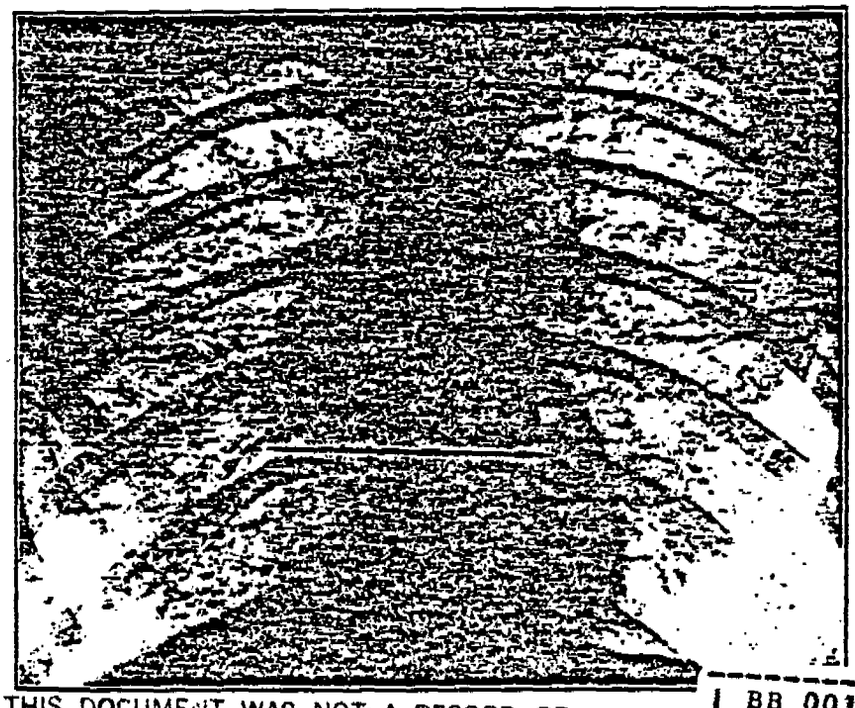

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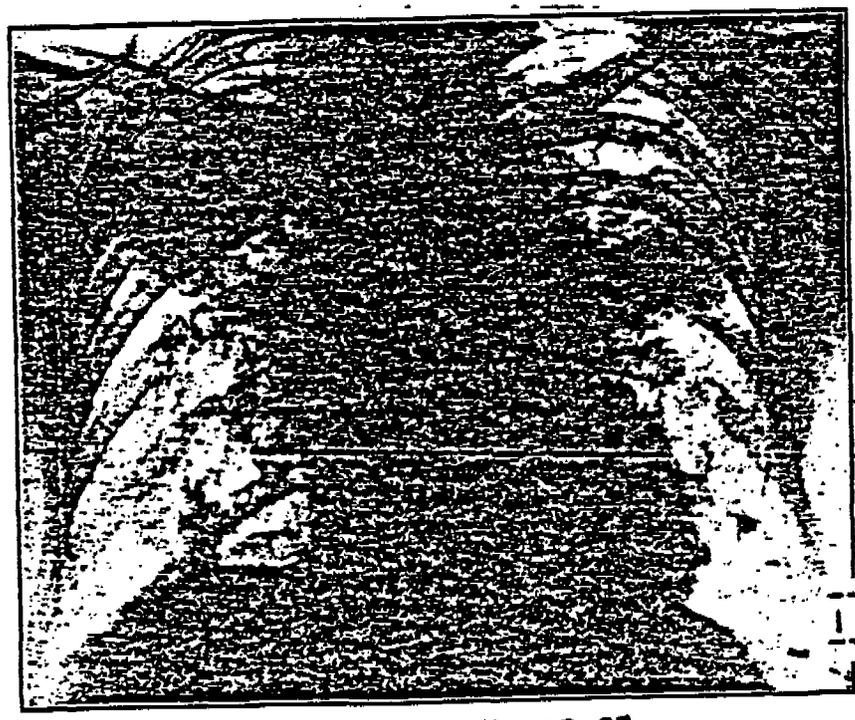

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Occupational history—ch of age.—Farmer, 1 year; l 5 years; talc sawyer (mill

Past medical history.—l right chest.

Complaints.—(1) Unabl in chest; (2) pain in right

Physical examination.— healthy appearing male B. P., 118/80. Pulse rate 80, 112, 84. Chest, prom inches. Fremitus modera slightly over the remainde left upper and right base particularly at right base.

Fluoroscopy.—Revealed (about 2.5 cm in diameter) of the diaphragm on bott and size; and a diffuse gra fields, with slight emphys

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Diagnosis.—Pneumocon

CASE NO. [illegible]

Occupational history.—(years: Farmer, 9 years; c farmer, 3 years.

Past medical history.— 1 week).

Complaints.—(1) Shortn left chest, posterior; occas cough (muco-purulent); a

Physical examination.— medium development. H lbs.). Moderate (2+) cl Chest was asthenic in typ and infra-clavicular foss Moderate impairment of r and second rib up; slight sounds and crepitant (pe apparently negative. Pu functional exercise test, 1 26. B. P., 138/72.

Fluoroscopy.—Congiom field. Moderate emphys regions. Moderate (2+) (1+) mediastinal distorti

CASE NO. 17. NATIVE AMERICAN WHITE MALE, AGE 34 YEARS

Occupational history—chronologically from the time he began working at 12 years of age.—Farmer, 1 year; laborer (lumber saw mill), 5 years; drillman (talc mine), 5 years; talc sawyer (mill), 9 years; idle, 2 years; and laborer, 3 months (CWA).

Past medical history.—Influenza, 1918 (3 weeks), complicated with pleurisy, right chest.

Complaints.—(1) Unable to work because of shortness of breath and distress in chest; (2) pain in right chest aggravated by breathing.

Physical examination.—Height, 70 inches; weight, 158 pounds. Comparatively healthy appearing male of medium-slender development. Mouth breather. B. P., 118/80. Pulse rate before, immediately after, and 2 minutes after exercise, 80, 112, 84. Chest, prominent supra- and infra-clavicular fossae; expansion, 3 inches. Fremitus moderately decreased in right base posteriorly, also decreased slightly over the remainder of the chest. Resonance, impaired in both right and left uppers and right base, posterior. Breath sounds were generally distant, and particularly at right base. Friction rub right base and axilla.

Fluoroscopy.—Revealed apparently clear apices except a conglomerate shadow (about 2.5 cm in diameter) behind right mid-clavicle; slight limitation in excursion of the diaphragm on both sides; hilar shadows moderately increased in density and size; and a diffuse grainy appearance was noted over the entirety of the lung fields, with slight emphysema at bases. The heart appeared normal.

X-ray and comments (see plate I).—It will be noted that the predominant appearance of the fibrosis is grainy and nodular, yet a suggestion of linear appearance still remains. The conglomerate in the right apex probably represents an early infiltrate (Ghon's focus). This finding, with other clinical findings pointing to pathology in the right side of the chest, suggests that the infective element plays a prominent role in the clinical picture of this case.

Diagnosis.—Pneumoconiosis II (with dormant tuberculous infection).

CASE NO. 18. NATIVE AMERICAN WHITE MALE, AGE 33 YEARS

Occupational history.—Chronologically from beginning to work at the age of 8 years: Farmer, 9 years; crayon sawyer (talc mill), 5 years; talc miner, 8 years; farmer, 3 years.

Past medical history.—Influenza, 1921 (1 week); pleurisy, 1934 (bedridden 1 week).

Complaints.—(1) Shortness of breath; (2) pain in left lumbar region and lower left chest, posterior; occasional supra-clavicular pain on left; (3) productive a. m. cough (muco-purulent); and (4) progressive loss of weight for last 3 years.

Physical examination.—Chronically ill, pale, slightly cyanotic white male of medium development. Height, 63 inches; weight, 125 pounds (usual weight 150 lbs.). Moderate (2+) clubbing of the fingers and slight cyanosis of the nails. Chest was asthenic in type; expansion, 2¼ inches. Moderately prominent supra- and infra-clavicular fossae. Tactile fremitus increased over left upper lobe. Moderate impairment of resonance over left lung from level of fifth thoracic spine and second rib up; slight impairment over right apex. Broncho-vesicular breath sounds and crepitant (persistent post-tussic) rales over left upper lobe. Heart apparently negative. Pulse rate before, immediately after, and 2 minutes after functional exercise test, 104, 128, 96. Respiratory rate at same intervals, 18, 28, 28. B. P., 138/72.

Fluoroscopy.—Conglomerate and coalescing nodules in upper ⅓ of each lung fields. Moderate emphysema at bases. Most dense involvment in subapical regions. Moderate (2+) limitation in the excursion of the diaphragm. Slight (1+) mediastinal distortion.

X-ray (see plate II).—Slight irregularity of the diaphragm is noted. The hilar shadows are indefinite as they merge with shadows of involved parenchymal tissue. Massive coalescing—conglomerate shadows most dense on the left are seen in both infra-clavicular regions.

Comment.—This man's incapacity for work is suggested by his returning to farming during the last 3 years. One antiforminized specimen of sputum was negative for acid-fast micro-organisms. The marked constitutional changes with the symptoms and X-ray findings on the case suggest that pulmonary infection (clinical tuberculosis) is an important contributor to his present condition.

Diagnosis.—Pneumoconiosis III with pulmonary infection.

CASE NO. 32. WHITE MALE, AGE 60 YEARS

Occupational history.—Chronologically from beginning to work at age of 16: Farmer, 17 years; logger (lumber saw-mill), 6 years; railroad laborer, 10 years; talc miller (crusherman), 11 years.

Past medical history.—Influenza, 1917 (10 days); pneumonia, 1910; subject to frequent colds.

Complaints.—(1) Productive cough; (2) shortness of breath.

Physical examination.—Comparatively healthy appearing male; height, 66 inches; weight, 150 pounds. Moderate dyspnoea. Not subjected to functional exercise test because of cardiac condition. Moderate (2+) clubbing of the fingers. B. P., 132/78. Pulse, about 56, irregular in rate, rhythm, and force, with pulse deficit. Chest moderately emphysematous; expansion, 1½ inches. Fremitus increased over entire right and upper portion of left lung. Moderate impairment (dull) of resonance from the angle of scapula and third rib up on both sides with hyper-resonance over the lower anteriors. Breath sounds were harsh. Persistent (post-tussic) crepitant and subcrepitant rales in both interscapular areas.

Fluoroscopy.—Right diaphragm was peaked with moderate (2+) limitation in the excursion of the diaphragm on both sides. A large conglomerate shadow was noted in the right infra-clavicular region and a smaller, less dense shadow of similar nature in upper left lung field extending from the upper pole of the hilus to the periphery; slight mediastinal distortion; both apices were comparatively clear; moderate emphysema at bases.

X-ray (see plate II).—Note irregularity of the diaphragm on the right, marked increase in hilar shadow. Areas of increased density continuous with the hilar shadow extending to the right and left in upper lung fields. Emphysema especially marked at both bases.

Comment.—In addition to extensive pulmonary changes, it is interesting to note the presence of cardiac disease.

Diagnosis.—Pneumoconiosis III with pulmonary infection.

It was mentioned earlier that only 30 of the 66 persons examined were working or had been working recently in the plants. Among the remainder were 9 who had been separated from the exposure for 3 or more years. These 9 men had pneumoconiosis, 4 of whom were in the advanced stages. Three of this same group had not worked in talc or any other dusty trade since 1920; 2 of the men in this latter group were in the advanced stages of the disease. The fact that these 9 cases still showed pneumoconiosis, particularly the last-mentioned cases where 13 to 14 years had lapsed since the cessation of exposure, suggests that the pulmonic changes are permanent.

COMPARISON OF THE FINDI

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[1] Catoosa, Gordon, Gilmer, Fannin,
[2] Biennial Report, Department of Pu

COMPARISON OF THE FINDINGS WITH THOSE OF A PREVIOUS TALC STUDY

The previous talc study (1) revealed similar findings as regards cases designated "pneumoconiosis I." With regard to the earlier findings, it is necessary to point out that, with one exception, this was the maximum degree of severity observed. This exceptional case was designated "pneumoconiosis II" and was diagnosed in a worker who had been employed in the talc industry for more than 40 years at a dust concentration of approximately 50 million particles per cubic foot. In the present instance, however, about a third of the workers having pneumoconiosis are in the advanced stages and have been exposed to over 300 million particles per cubic foot, and in no case had a worker been exposed for more than 20 years.

TUBERCULOSIS MORTALITY

Since one of the reasons for undertaking the investigation of the conditions in the Georgia talc plants was to ascertain a possible contributory cause to the high tuberculosis morbidity and mortality rates in the county where the plants are located, a brief review of certain available data on this subject is in order.

All the counties of northern Georgia have a comparatively low percentage of Negroes. If 7 other northern Georgia counties[4] are considered for comparison, in addition to Murray County, the collective population of these counties for all classes is found to be 103,231 (United States census, 1930). Of this number, 6,152 (5.9 percent) are Negroes. The average tuberculosis mortality rate (all forms, chiefly pulmonary) for this group of counties in 1931 and 1932 was computed as 76.8 and 77.9 per 100,000, respectively. On the other hand, in the county where the talc observations were made, the rates[5] for these years are 53.2 and 146.7, respectively, even though there is a smaller proportion of Negroes (2.5 percent).

The sudden increase in the tuberculosis death rate for 1932 occurs in other counties for the same year. What is more important and to the point is that probably not more than 100 persons in the county have been exposed to talc dust during the period that the mills have been in operation. It is apparent from the medical findings considered in the light of the dust exposure, that a comparatively small proportion of the workers have been exposed to dangerous amounts of dust over a period sufficiently long to produce disabling pulmonary changes or predispose to tuberculosis. It is not felt, therefore, that the increase in the tuberculosis death rate for the county in 1932 can be explained by exposure to talc dust.

[4] Catoosa, Gordon, Gilmer, Fannin, Pickens, Walker, and Whitfield Counties.
[5] Biennial Report, Department of Public Health, Georgia State Board of Health. Atlanta, 1931-32.

inous matrix is definitely a zeolite. In continuation of the same series of papers, the behavior of activated sludge will be shown to conform rigidly to the action of a zeolite. The sterilized sludge, for example, can be regenerated by sodium chloride in exactly the same manner as the commercial zeolites. Under natural conditions, however, the regeneration of the sludge is technically called a "reactivation", with the bacteria as the active agents instead of sodium chloride. Natural sludge is, therefore, termed a "bio-zeolite." In conclusion, the clotting enzyme, or sewage colloid of the earlier chemists, will be identified with the sludge zeolite.

MILK-SANITATION RATINGS OF CITIES

Cities for Which Milk-Sanitation Ratings of 90 Percent or More Were Reported by the State Milk-Sanitation Authorities During the Period January 1, 1933, to December 31, 1934

The accompanying table gives the first annual revision of the list of American municipalities for which milk-sanitation ratings of 90 percent or more have been reported by their respective State milk-sanitation authorities, and includes those reported from January 1, 1933, to December 31, 1934. Lists previously published have now lapsed and should be discarded.

The primary reason for announcing such ratings from time to time is to encourage the municipalities of the United States to attain and maintain a high level of excellence in the public health control of milk supplies. Another reason is to furnish the traveling public with some means of knowing the cities in which milk sanitation is properly done. It is emphasized, however, that the Public Health Service does not intend to imply that cities not on the list are necessarily doing poor milk-control work. Some cities which are doing excellent milk-control work are not included, because arrangements have not yet been made for the determination of their ratings by the State milk-control authority. In other cases the ratings which have been determined by the State are now more than 2 years old and have therefore lapsed.

The rules under which a municipality is included in this list are as follows:

(1) All ratings must have been determined by the State milk-control authority in accordance with the Public Health Service rating method, based upon the Public Health Service Milk Ordinance and Code.

(2) No city will be included in the list unless both its pasteurized-milk and its raw-milk ratings are 90 percent or more; provided, that cities in which only raw milk is sold will be included if the raw-milk ratings are 90 percent or more.

(3) The rating used
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(3) The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old.

(4) Additional supplementary lists will hereafter be published quarterly, and complete revisions of the entire list semiannually.

(5) Occasional surprise checks will be made of the rating methods used by the State, and discounts will be applied if State ratings are found to be more than 5 percent too high.

(6) Ratings will be accepted for any city irrespective of the type of milk ordinance in force, provided that the ratings have been made in accordance with paragraph (1) above.

Cities are urgently advised to bring their ordinances up to date at least every 5 years, since ratings will hereafter be made on the basis of later editions if those adopted locally are more than 5 years old. It is also urged that cities now on the list do not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

Cities which are not now on the list should improve their milk supplies as much as possible and then request the State milk-control authority to determine their ratings. Where the Public Health Service Milk Ordinance has not as yet been adopted, thoughtful consideration should be given to the advisability of its adoption, for the reason that the standard rating method is based upon the grade A requirements of the Public Health Service Milk Ordinance, and it is obviously easier to satisfy these requirements if they are included in the local legislation. Copies of the Public Health Service Milk Ordinance and Code are available upon request.

State milk-control authorities which are not now equipped to determine municipal milk-sanitation ratings are urged to equip themselves as soon as possible in fairness to their cities. The personnel required is very small, as in most States one milk specialist will be sufficient for the rating work. The Public Health Service will, upon request from the State milk-control authority, furnish assistance in standardizing the rating work.

Cities which are enforcing the Public Health Service Milk Ordinance and which have nevertheless failed to achieve ratings of 90 percent or more, should determine whether their low ratings resulted from failure to enforce the ordinance strictly or from failure to bring their ordinance up to date.

The ratings on which the accompanying table is based apply only to market milk. Family-cow milk is not included; and consumers should, therefore, not infer that the milk from neighborhood cows in such cities is of a high grade.

Cities having ratings of 90 percent or more according to last rating received during the period Jan. 1, 1933, to Dec. 31, 1934

City	Percentage of milk pasteurized	Date of rating
INDIANA (1 CITY)		
Frankfort	100	Mar. 11, 1933
KANSAS (3 CITIES)		
Horton	0	Dec. 4, 1934
Lawrence	34	Apr. 1934
Topeka	51	Nov. 25, 1934
KENTUCKY (3 CITIES)		
Bowling Green	31	Dec. 5, 1934
Henderson	37	May 1934
Louisville	97	May 12, 1934
MINNESOTA (1 CITY)		
Winona	100	Sept. 14, 1934
MISSISSIPPI (17 CITIES)		
Brookhaven	0	May 12, 1933
Cleveland	41	July 20, 1933
Columbus	30	July 12, 1933
Durant	0	May 22, 1933
Greenville	12	May 31, 1933
Greenwood	23	July 14, 1933
Hollandale	0	June 1, 1933
Indianola	0	June 2, 1933
Jackson	72	Aug. 11, 1933
McComb	0	June 21, 1933
Meridian	22	May 4, 1933
Natchez	16	May 17, 1933
Ocean Springs	0	July 7, 1933
Pascagoula	78	June 8, 1933
Ruleville	0	June 2, 1933
Vicksburg	28	June 26, 1933
Yazoo City	0	May 24, 1933
MISSOURI (2 CITIES)		
Ash Grove	0	Aug. 24, 1934
Jefferson City	41	Dec. 15, 1934
NEW MEXICO (3 CITIES)		
Clayton	0	June 3, 1933
Deming	0	Apr. 27, 1934
Las Cruces	20	Feb. 27, 1934
NORTH CAROLINA (29 CITIES)		
Angier	0	Sept. 4, 1934
Apex	0	Sept. 28, 1933
Beaufort	0	July 15, 1933
Bries Creek	0	Sept. 4, 1934
Charlotte	19	Dec. 15, 1934
Clinton	0	Oct. 25, 1934
Coats	0	Sept. 4, 1934
Dunn	0	Dec.
Durham	53	Dec. 14, 1934
Elkin	0	Sept. 12, 1934
Erwin	0	Oct. 10, 1933
Greensboro	62	Nov. 24, 1934
Hamlet	0	Aug. 23, 1934
Hendersonville	35	Oct. 3, 1933
High Point	80	Oct. 21, 1933
Hope Mills	0	Sept. 6, 1934
Lenoir	0	Nov. 20, 1934
Lillington	0	Sept. 4, 1934
Lumberton	0	Sept. 11, 1934
Manteo	0	Oct. 23, 1934
Monroe	0	Oct. 24, 1934
Mount Airy	0	Sept. 12, 1934
New Bern	0	Oct. 11, 1934
Pinehurst	0	Dec. 15, 1934
Rockingham	0	Aug. 28, 1934
Rocky Mount	20	Sept. 12, 1934
Southern Pines	0	Aug. 31, 1934
Williamston	0	Dec. 12, 1934
Winston-Salem	46	Nov. 11, 1934
OKLAHOMA (3 CITIES)		
Bartlesville	15	Mar. 6, 1934
Blackwell	46	Sept. 5, 1934
Tulsa	74	Feb. 16, 1934
OREGON (1 CITY)		
Portland	79	Oct. 1934
SOUTH CAROLINA (1 CITY)		
Charleston	100	Apr. 1934
TENNESSEE (2 CITIES)		
Dyersburg	0	June 1, 1933
Memphis	73	July 1933
TEXAS (17 CITIES)		
Abilene	70	Oct. 17, 1934
Amarillo	68	May 20, 1934
Brenham	0	Apr. 20, 1934
Canyon	0	May 28, 1934
Colorado	0	Sept. 6, 1934
Corsicana	0	Feb. 22, 1934
Dallas	72	May 1934
Denton	88	Sept. 22, 1934
El Paso	70	Aug. 24, 1934
Jacksonville	0	May 1934
Laredo	34	Dec. 12, 1934
Livingston	0	Oct. 1934
Lubbock	32	Dec. 14, 1934
San Antonio	58	July 1934
Sherman	21	Dec. 21, 1934
Texarkana	32	May 1934
Tyler	80	Mar. 1934
WASHINGTON (2 CITIES)		
Camas	19	Sept. 1934
Vancouver	24	Dec.

The inclusion of a city in this list means that the pasteurized milk sold in the city, if any, is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required for grade A pasteurized milk is 90 percent or more, and that similarly the raw milk sold in the city is of such a

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degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required for grade A raw milk is 90 percent or more. However, high-grade pasteurized milk is safer than high-grade raw milk, because of the added protection of pasteurization. To secure this added protection, friendly customers of high-grade raw-milk dairies need not discontinue their patronage, but may pasteurize the milk at home in the following simple manner: Place the milk in an aluminum vessel on a hot flame and heat to 155° F., stirring constantly; then immediately set the vessel in cold water and continue stirring until cool.

BIOLOGICAL PRODUCTS

ESTABLISHMENTS LICENSED FOR THE PROPAGATION AND SALE OF VIRUSES, SERUMS, TOXINS, AND ANALOGOUS PRODUCTS

There is presented herewith a list of the establishments holding licenses issued by the Treasury Department in accordance with the act of Congress approved July 1, 1902, entitled "An act to regulate the sale of viruses, serums, toxins, and analogous products in the District of Columbia, to regulate interstate traffic in said articles, and for other purposes."

The licenses granted to these establishments for the products mentioned do not imply an endorsement of the claims made by the manufacturers for their respective preparations. The granting of a license means that inspection of the establishment concerned and laboratory examinations of samples of its products are made regularly to insure the observance of safe methods of manufacture, to ascertain freedom from contamination, and to determine the potency, or safety, or both, of botulinus antitoxin, diphtheria antitoxin, perfringens antitoxin, scarlet fever streptococcus antitoxin, staphylococcus antitoxin, tetanus antitoxin, vibrion septique antitoxin, antidysenteric serum, antimeningococcic serum, antipneumococcic serum, bacterial vaccines made from typhoid bacillus, paratyphoid bacillus A, and paratyphoid bacillus B, diphtheria toxin-antitoxin mixture, diphtheria toxoid, diphtheria toxin for Schick test, scarlet fever streptococcus toxin for Dick test, scarlet fever streptococcus toxin for immunization, and the arsphenamines, the only products for which potency standards or tests have been established.

The enumeration of the products is as follows: Serums are placed first, the antitoxins, being more important, heading the list. The other products are arranged generally in the order of their origin. The items in each class are arranged alphabetically.

Establishments Licensed and Products for Which Licenses Have Been Issued

AMERICAN ESTABLISHMENTS

Parke, Davis & Co., Detroit, Mich.—License no. 1:

Diphtheria antitoxin; meningococcus antitoxin; pertussis antitoxin; scarlet fever streptococcus antitoxin; tetanus antitoxin; vibrion septique antitoxin; antianthrax serum; antidysenteric serum; antigonococcic serum; anti-influenza bacillus serum; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum; hemostatic serum (Lapenta); normal horse serum; thyroidectomized horse serum; smallpox vaccine; rabies vaccine (Cumming); tuberculin old; tuberculin T. R.; tuberculin B. E.; tuberculin B. F.; bacterial vaccines made from acne bacillus, acne diplococcus, Brucella melitensis, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, prodigiosus bacillus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus and typhoid bacillus, diphtheria toxin antitoxin mixture; diphtheria toxoid-antitoxin mixture; diphtheria toxoid, diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization; animal epidermal extracts; animal food extracts; vegetable food extracts; pollen extracts; modified bacterial derivatives made from colon bacillus, gonococcus, paratyphoid bacillus A, paratyphoid bacillus B, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigens made from colon bacillus, gonococcus, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, and streptococcus.

Mulford Biological Laboratories, Sharp & Dohme, Broad and Wallace Streets, Philadelphia, Pa.—License no. 2:

Botulinus antitoxin; diphtheria antitoxin; erysipelas streptococcus antitoxin; B. histolyticus antitoxin; B. edematiens antitoxin; perfringens antitoxin; scarlet fever streptococcus antitoxin; B. sordelli antitoxin; staphylococcus antitoxin; tetanus antitoxin; vibrion septique antitoxin; antianthrax serum; antidysenteric serum; antierysipeloid serum; antigonococcic serum; anti-influenza bacillus serum; antimelitensis serum; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum, antitularemic serum, antivenin (Nearctic crotalidae); antivenin Bothropic; antivenin (crotalus terrificus); normal horse serum; smallpox vaccine; rabies vaccine (Pasteur); rabies vaccine (killed virus); tuberculin old; tuberculin T. R.; tuberculin B. E.; tuberculin B. F.; bacterial vaccines made from acne bacillus, cholera vibrio, colon bacillus, dysentery bacillus, Friedländer, bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, micrococcus melitensis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, plague bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, bacterium tularense, and typhoid bacillus; sensitized bacterial vaccines made from acne bacillus, cholera vibrio, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; staphylococcus toxoid; tetanus toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization; pollen extracts; animal epidermal extracts; animal food extracts; vegetable food extracts; poison ivy extract; poison oak extract; pneumococcus antibody solution; bacterial antigen made from streptococci; snake venom solution.

The Cutter Laboratory, Berkeley, Calif.—License no. 3:

Diphtheria antitoxin; B. edematiens antitoxin; perfringens antitoxin; scarlet fever streptococcus antitoxin; B. sordelli antitoxin; tetanus antitoxin; vibrion septique antitoxin; antianthrax serum; antistreptococcic serum; normal horse serum; smallpox vaccine; rabies vaccine (Pasteur); rabies vaccine (killed virus); tuberculin old; tuberculin B. F.; bacterial vaccines made from acne bacillus, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigens made from colon bacillus, staphylococcus aureus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; diphtheria toxin for Schick test; pollen extracts; poison ivy extract; poison oak extract.

Bureau of Laboratories, Department of Health, Foot East Sixteenth Street, New York City.—License no. 14:

Smallpox vaccine.

Lederle Laboratories (Inc.), Pearl River, N. Y.—License no. 17:

Diphtheria antitoxin; erysipelas streptococcus antitoxin; B. histolyticus antitoxin; B. edematiens antitoxin; perfringens antitoxin; B. sordelli antitoxin; tetanus antitoxin; vibrion septique antitoxin; antianthrax serum; antidysenteric serum; antigonococcic serum; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum; measles immune serum; immune globulin (human); normal horse serum; smallpox vaccine; rabies vaccine (killed virus); tuberculin old; tuberculin B. E.; tuberculin B. F.; bacterial vaccines made from acne bacillus, Brucella melitensis, cholera vibrio, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, plague bacillus,

pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigens made from colon bacillus, gonococcus, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, and streptococcus.

Eli Lilly & Co., Indianapolis, Ind.—License no. 18:

Diphtheria antitoxin; erysipelas streptococcus antitoxin; B. histolyticus antitoxin; B. edematiens antitoxin; perfringens antitoxin; B. sordelli antitoxin; tetanus antitoxin; vibrion septique antitoxin; antianthrax serum; antidysenteric serum; antierysipeloid serum; antigonococcic serum; anti-influenza bacillus serum; antimelitensis serum; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum, antitularemic serum, antivenin (Nearctic crotalidae); antivenin Bothropic; antivenin (crotalus terrificus); normal horse serum; smallpox vaccine; rabies vaccine (Pasteur); rabies vaccine (killed virus); tuberculin old; tuberculin T. R.; tuberculin B. E.; tuberculin B. F.; bacterial vaccines made from acne bacillus, cholera vibrio, colon bacillus, dysentery bacillus, Friedländer, bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, micrococcus melitensis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, plague bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, bacterium tularense, and typhoid bacillus; sensitized bacterial vaccines made from acne bacillus, cholera vibrio, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; staphylococcus toxoid; tetanus toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization; pollen extracts; animal epidermal extracts; animal food extracts; vegetable food extracts; poison ivy extract; poison oak extract; pneumococcus antibody solution; bacterial antigen made from streptococci; snake venom solution.

Gilli and Laboratories, Marietta, P.:

Diphtheria antitoxin; scarlet fev... antipneumococcic serum; ant... vaccine (Pasteur); rabies vacc... bacterial vaccines made from ... paratyphoid bacillus B, pert... aureus, streptococcus, and typ... diphtheria toxin for Schick te... coccus toxin for immunization.

Antitoxin and Vaccine Laboratory, 373 South Street, Jamaica Plain, E... Diphtheria antitoxin; scarlet fe... coccic serum; smallpox vaccin... A, paratyphoid bacillus B, a... toxoid, diphtheria toxin for Sc...

pneumococcus; pseudo-diphtheria bacillus, staphylococcus albus, staphylococcus aureus, staphylococcus citreus, streptococcus, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; staphylococcus toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization; pollen extracts; poison ivy extract; poison oak extract; animal epidermal extracts; animal food extracts; vegetable food extracts; animal oil extracts; vegetable oil extracts; oidiomycon extract; trichophyton extract; snake venom solution.

Bacterio-Therapeutic Laboratory, Asheville, N. C.—License no. 21:

Watery extract of tubercle bacilli (von Ruck); modified tubercle bacillus derivative (von Ruck).

O. M. Sherman, M. D., Inc., 14400 East Jefferson Avenue, Detroit, Mich.—License no. 30:

Bacterial vaccines made from acne bacillus, Brucella melitensis, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, nonvirulent tubercle bacillus, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; pollen extracts; bacterial antigens made from colon bacillus, gonococcus, micrococcus catarrhalis, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, and streptococcus.

The Abbott Laboratories, Fourteenth Street and C. W. Interurban Railroad Tracks, North Chicago, Ill.—License no. 42:

Bacterial vaccines made from acne bacillus, Brucella melitensis, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, micrococcus tetragenus, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigens made from acne bacillus, colon bacillus, Friedländer bacillus, gonococcus, micrococcus catarrhalis, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus; pollen extracts; animal epidermal extracts; animal food extracts; vegetable food extracts.

The Upjohn Co., Kalamazoo, Mich.—License no. 51:

Bacterial vaccines made from colon bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigen made from staphylococcus aureus; pollen extracts.

E. R. Squibb & Sons' Research and Biological Laboratories, New Brunswick, N. J.—License no. 52:

Diphtheria antitoxin, erysipelas streptococcus antitoxin, perfringens antitoxin, scarlet fever streptococcus antitoxin, tetanus antitoxin; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum; immune globulin (human); normal horse serum; smallpox vaccine; rabies vaccine (Pasteur); rabies vaccine (killed virus); bacterial vaccines made from acne bacillus, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, staphylococcus citreus, streptococcus, and typhoid bacillus; bacterial antigen made from staphylococcus aureus; leucocytic extract from the horse; diphtheria toxin-antitoxin mixture; diphtheria toxoid; staphylococcus toxoid; tetanus toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization; pollen extracts; poison-ivy extract; poison-oak extract; arsphenamine, neoarsphenamine, sulpharsphenamine.

Eli Lilly & Co., Indianapolis, Ind.—License no. 56:

Diphtheria antitoxin; erysipelas streptococcus antitoxin; perfringens antitoxin; tetanus antitoxin; vibrion septique antitoxin; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum; normal horse serum; hemostatic serum (Lilly); heterophile antibody; smallpox vaccine; rabies vaccine (Harris); tuberculin old; bacterial vaccines made from acne bacillus, cholera vibrio, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, plague bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial vaccine made from partially autolized pneumococci; diphtheria toxin-antitoxin mixture; diphtheria toxoid; diphtheria toxin for Schick test; bacterial antigens made from acne bacillus, colon bacillus, gonococcus, pneumococcus, staphylococcus albus, staphylococcus aureus, and streptococcus.

Gilli and Laboratories, Marietta, Pa.—License no. 63:

Diphtheria antitoxin; scarlet fever streptococcus antitoxin; tetanus antitoxin; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum; normal horse serum; smallpox vaccine; rabies vaccine (Pasteur); rabies vaccine (killed virus); tuberculin old; tuberculin B. E.; tuberculin B. F.; bacterial vaccines made from acne bacillus, gonococcus, influenza bacillus, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization.

Antitoxin and Vaccine Laboratory, Department of Public Health, Commonwealth of Massachusetts, 375 South Street, Jamaica Plain, Boston 30, Mass.—License no. 64:

Diphtheria antitoxin; scarlet fever streptococcus antitoxin; antimeningococcic serum; antipneumococcic serum; smallpox vaccine; tuberculin old; bacterial vaccine made from paratyphoid bacillus A, paratyphoid bacillus B, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid, diphtheria toxin for Schick test.

United States Standard Products Co., Woodworth, Wis.—License no. 65:
Diphtheria antitoxin; erysipelas-streptococcus antitoxin; pertussis antitoxin; tetanus antitoxin; vibrion septique antitoxin; antimeningococcic serum; normal horse serum; smallpox vaccine; rabies vaccine (killed virus); bacterial vaccines made from acne bacillus, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigens made from staphylococcus albus, staphylococcus aureus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; tetanus toxoid; diphtheria toxin for Schick test; pollen extracts.

D. L. Harris Laboratories, Metropolitan Building, St. Louis, Mo.—License no. 66:
Rabies vaccine (Harris).

The Arlington Chemical Co., Yonkers, N. Y.—License no. 67:
Bacterial vaccines made from colon bacillus, micrococcus catarrhalis, micrococcus tetragenus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, staphylococcus citreus, and streptococcus; pollen extracts; animal epidermal extracts; animal food extracts; vegetable food extracts.

Dermatological Research Laboratories, 1720 Lombard Street, Philadelphia, Pa.—License no. 68:
Arsphenamine; silver arsphenamine; neoarsphenamine; sulpharsphenamine; bismuth arsphenamine sulphonate; neosilver arsphenamine.

The Winthrop Chemical Co., Inc., 33 Riverside Avenue, Rensselaer, N. Y.—License no. 69:
Arsphenamine; arsphenamine dihydroxide; neoarsphenamine; sodium arsphenamine; silver arsphenamine; neosilver arsphenamine; sulpharsphenamine.

Diarsenal Co. (Inc.), 771 Ellicott Square, Buffalo, N. Y.—License no. 70:
Arsphenamine; neoarsphenamine; sodium arsphenamine; sulpharsphenamine.

Mallinckrodt Chemical Works, St. Louis, Mo.—License no. 77:
Arsphenamine; neoarsphenamine; sulpharsphenamine.

Merck & Co. (Inc.), Rahway, N. J.—License no. 82:
Arsphenamine; neoarsphenamine; sulpharsphenamine; a compound of glucose with arsphenamine base.

Terrell Laboratories, Tarrs National Bank Building, Fort Worth, Tex.—License no. 84:
Rabies vaccine (killed virus).

Jensen-Salsbery Laboratories, Twenty-first and Penn Streets, Kansas City, Mo.—License no. 85:
Botulinus antitoxin; antianthrax serum; rabies vaccine (killed virus); bacterial vaccine made from Brucella melitensis; diphtheria toxoid.

Hollister Stier Laboratories, Paulsen Medical and Dental Building, Spokane, Wash.—License no. 91:
Acute anterior poliomyelitis serum (human); bacterial vaccines made from acne bacillus, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and tetanic bacillus; pollen extracts; poison-ivy extract; poison-oak extract.

Medical Arts Laboratory, Medical Arts Building, Oklahoma City, Okla.—License no. 96:
Rabies vaccine (killed virus).

Bureau of Laboratories, Michigan State Department of Health, Lansing, Mich.—License no. 99:
Diphtheria antitoxin; scarlet fever streptococcus antitoxin; tetanus antitoxin; antimeningococcic serum; smallpox vaccine; rabies vaccine (Cumming); tuberculin old; bacterial vaccines made from paratyphoid bacillus A, paratyphoid bacillus B, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization.

National Drug Co., 5139 Germantown Avenue, Philadelphia, Pa.—License no. 101:
Diphtheria antitoxin, pertussis antitoxin; tetanus antitoxin; vibrion septique antitoxin; antimeningococcic serum; antipneumococcic serum; antistreptococcic serum; normal horse serum; tuberculin old; smallpox vaccine; rabies vaccine (killed virus); bacterial vaccines made from acne bacillus, Brucella melitensis, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, meningococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; tetanus toxoid; diphtheria toxin for Schick test; scarlet fever streptococcus toxin for Dick test; scarlet fever streptococcus toxin for immunization; pollen extracts.

Mulford Colloid Laboratories, 5139 Germantown Avenue, Philadelphia, Pa.—License no. 102:
Poison-ivy extract; poison-oak extract.

Allergy Laboratories, 1200 North Walker Street, Oklahoma City, Okla.—License no. 103:
Pollen extracts; vegetable food extracts; animal epidermal extracts

Hinson Laboratories (Inc.), Johnstown, Ohio.—License no. 104:
Diphtheria antitoxin; tetanus antitoxin; normal horse serum; rabies vaccine (killed virus); bacterial vaccines made from paratyphoid bacillus A, paratyphoid bacillus B, and typhoid bacillus; diphtheria toxin-antitoxin mixture; diphtheria toxoid; tetanus toxoid; diphtheria toxin for Schick test.

C. F. Kirk Co., Bloomfield, N. J
Bacterial vaccines made from:
bacillus, micrococcus catarr
pneumococcus, staphyloco
The Parke Biological Laboratorie
Pollen extracts.
Knapp & Knapp, Independence,
Pollen extracts.
Phagoid Laboratories (Inc.), Bro
Bacterial antigens made from
lococcus aureus, streptococ
Pitman-Moore Co., Zionsville, In
Tetanus antitoxin; antistrepto
acne bacillus, colon bacillus,
micrococcus catarrhalis, mi
pertussis bacillus, pneumoco
typhoid bacillus; bacterial a
toroccus; diphtheria toxoid;
The Wm. S. Merrell Co., Cincin
Bacterial vaccines made from
bacillus, gonococcus, micro
pertussis bacillus, pseudodi
lococcus citreus, streptococc
lococcus albus, staphylococc
toxin for Schick test.
The Wyatt Clinic Research Labor
Bacterial antigen made from s
Mirhael Reese Hospital, Twenty-
Acute anterior poliomyelitis in
immune serum (human); ne

Institut Pasteur de Paris, Paris, F
Charlilan, Pasteur Vaccine Labo
Diphtheria antitoxin; tetanus a
antistreptococcic serum; bacte
albus, and staphylococcus aur
Interessen Gesellschaft Farbenindu
Selling agents for the United Stat
Tuberculin old; tuberculin T.
cholera vibrio, gonococcus, sta
typhoid bacillus; sanitized t
arsphenamine; neoarsphenam
mine; sulpharsphenamine; su
Connaught Antitoxin Laboratory, U
Diphtheria antitoxin; staphyloc
toxoid.
Laboratoire de Biochimie Médicale
for the United States, Anglo-Fre
Puerto Rico, Chas. Vere, box 214,
Sulpharsphenamine.
Instituto Sieroterapico Milanese, V
United States, Opo-Pharmacal Co
286 Lafayette Street, New York Ci
Antianthrax serum; bacterial vac
lococcus albus, staphylococcus
Boots Pure Drug Co., Ltd., Nottingh
The United Drug Co., 43 Leon Str
Arsphenamine diglucoside.
Sero-Bacteriological Department, Br
Section, Marburg-Lahn, Germany
throp Chemical Co., 170 Varick Str
Diphtheria antitoxin; tetanus a
vaccines made from colon bacill
albus, staphylococcus aureus, a

C. F. Kirk Co., Bloomfield, N. J.—License no. 106:
Bacterial vaccines made from acne bacillus, colon bacillus, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus and typhoid bacillus.

The Perre Biological Laboratories, Rhodes-Medical Arts Building, Tacoma, Wash.—License no. 107:
Pollen extracts.

Knapp & Knapp, Independence, Mo.—License no. 108:
Pollen extracts.

Phagoid Laboratories (Inc.), Brwlin Medical Arts Building, Louisville, Ky.—License no. 109:
Bacterial antigens made from colon bacillus, gonococcus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus.

Pitman-Moore Co., Zionsville, Ind.—License no. 110:
Tetanus antitoxin; antierysipeloid serum; rabies vaccine (killed virus); bacterial vaccines made from acne bacillus, colon bacillus, Brucella melitensis, Friedländer bacillus, gonococcus, influenza bacillus, micrococcus catarrhalis, micrococcus tetragenus, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pneumococcus, staphylococcus albus, staphylococcus aureus, streptococcus, and typhoid bacillus; bacterial antigens made from staphylococcus albus, staphylococcus aureus, streptococcus; diphtheria toxoid; pollen extracts.

The Wm. S. Merrell Co., Cincinnati, Ohio.—License no. 111:
Bacterial vaccines made from Brucella melitensis, colon bacillus, dysentery bacillus, Friedländer bacillus, gonococcus, micrococcus catarrhalis, paratyphoid bacillus A, paratyphoid bacillus B, pertussis bacillus, pseudodiphtheria bacillus, staphylococcus albus, staphylococcus aureus, staphylococcus citreus, streptococcus, typhoid bacillus; bacterial antigens made from colon bacillus, staphylococcus albus, staphylococcus aureus, streptococcus, typhoid bacillus; diphtheria toxoid, diphtheria toxin for Schick test.

The Wyatt Clinic Research Laboratories, Tucson, Ariz.—License no. 112:
Bacterial antigen made from streptococcus.

Michael Reese Hospital, Twenty-ninth Street and Ellis Avenue, Chicago, Ill.—License no. 113:
Acute anterior poliomyelitis immune serum (human); measles immune serum (human); scarlet fever immune serum (human); normal human serum.

FOREIGN ESTABLISHMENTS

Institut Pasteur de Paris, Paris, France.—License no. 41. Selling agents for the United States, Mr. A. Charkilan, Pasteur Vaccine Laboratories of France, 516 Fifth Avenue, New York; N. Y.:
Diphtheria antitoxin; tetanus antitoxin; antianthrax serum; antidysenteric serum; antiplague serum; antistreptococcic serum; bacterial vaccines made from cholera vibrio, plague bacillus, staphylococcus albus, and staphylococcus aureus.

Interessen Gesellschaft Farbenindustrie Aktiengesellschaft, Hoechst am Main, Germany.—License no. 24. Selling agents for the United States, The Winthrop Chemical Co., 170 Varick Street, New York City:
Tuberculin old; tuberculin T. R.; tuberculin D. E.; tuberculin B. F.; bacterial vaccines made from cholera vibrio, gonococcus, staphylococcus albus, staphylococcus aureus, and staphylococcus citreus; typhoid bacillus; sensitized bacterial vaccine made from typhoid bacillus; trichophyton extract; arsphenamine; neoarsphenamine; sodium arsphenamine; silver arsphenamine; neosilver arsphenamine; sulpharsphenamine; sulphoxylarsphenamine.

Connaught Antitoxin Laboratory, University of Toronto, Toronto, Canada.—License no. 72:
Diphtheria antitoxin; staphylococcus antitoxin; tetanus antitoxin; diphtheria toxoid; staphylococcus toxoid.

Laboratoire de Biochimie Médicale, 19-21 rue Van-Loo, Paris, France.—License no. 82. Selling agents for the United States, Anglo-French Drug Co., 1270 Broadway, New York City. Selling agents for Puerto Rico, Chas. Vera, box 218, San Juan, P. R.:
Sulpharsphenamine.

Institute Sieroterapico Milanese, Via Darwin 20, Milan, Italy.—License no. 87. Selling agents for the United States, Opo-Pharmacal Co., 27 Cleveland Place, New York City; Italian Drugs Importing Co., 258 Lafayette Street, New York City.
Antianthrax serum; bacterial vaccines made from colon bacillus, gonococcus, pneumococcus, staphylococcus albus, staphylococcus aureus, staphylococcus citreus, and streptococcus; neoarsphenamine.

Boots Pure Drug Co., Ltd., Nottingham, England.—License no. 92. Selling agents for the United States, The United Drug Co., 43 Leon Street, Boston, Mass.:
Arsphenamine diglucoside.

Sero-Bacteriological Department, Bayer-Meister-Lucius, Behringswerke, I. G. Farbenindustrie, A. G. Section, Marburg-Lahn, Germany.—License no. 97. Selling agents for the United States, The Winthrop Chemical Co., 170 Varick Street, New York City.
Diphtheria antitoxin; tetanus antitoxin; antistreptococcic serum; normal horse serum; bacterial vaccines made from colon bacillus, gonococcus, pneumococcus, pyocyaneus bacillus, staphylococcus albus, staphylococcus aureus, and streptococcus.

Laboratoire de Bacteriophage, 73 rue Olivier de Serres, Paris, France.—License no. 103. Selling agents for the United States, Anzio-French Drug Co., 1270 Broadway, New York City; selling agents for Puerto Rico, Mr. Joaquin Belander, San Juan, P. R.

Bacterial antigens made from colon bacillus, dysentery bacillus, enterococcus, Friedländer bacillus, paratyphoid bacillus A, paratyphoid bacillus B, pneumococcus, proteus bacillus, pyocyaneus bacillus, staphylococcus albus, staphylococcus aureus, staphylococcus citreus, streptococcus, and typhoid bacillus.

Dr. Kads, Elisabeth Ufer 35, Berlin SO, 36, Germany.—License no. 114:

Bacterial vaccine made from colon bacillus.

Le Biotherapie, 3 rue Maublanc, Paris, France.—License no. 115:

Bacterial vaccines made from cholera vibrio, dysentery bacillus, paratyphoid bacillus A, paratyphoid bacillus B, and typhoid bacillus; bacterial antigens made from pneumococcus, staphylococcus albus, staphylococcus aureus, and streptococcus.

Laboratorio Brasileiro de Chimiotherapia, Rio de Janeiro, Brazil.—License no. 116:

Trichophytan extract.

DEATHS DURING WEEK ENDED JAN. 12, 1935

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

	Week ended Jan. 12, 1935	Corresponding week, 1934
Data from 86 large cities of the United States:		
Total deaths	10,046	9,186
Deaths per 1,000 population, annual basis	14.0	12.8
Deaths under 1 year of age	652	610
Deaths under 1 year of age per 1,000 estimated live births	60	57
Deaths per 1,000 population, annual basis, first 2 weeks of year	13.8	12.9
Data from industrial insurance companies:		
Policies in force	67,073,884	67,359,046
Number of death claims	15,023	15,305
Death claims per 1,000 policies in force, annual rate	11.7	12.2
Death claims per 1,000 policies, first 2 weeks of year, annual rate	10.0	10.8

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No health department, Sta... knowledge of when,...

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These reports are preliminary, ...

Reports for W...

Cases of certain communi... for week:

Division and State
New England States:
Maine
New Hampshire
Vermont
Massachusetts
Rhode Island
Connecticut
Middle Atlantic States:
New York
New Jersey
Pennsylvania
East North Central States:
Ohio
Indiana
Illinois
Michigan
Wisconsin
West North Central States:
Minnesota
Iowa
Missouri
North Dakota
South Dakota
Nebraska
Kansas
South Atlantic States:
Delaware
Maryland [1]
District of Columbia
Virginia [1]
West Virginia
North Carolina
South Carolina [1]
Georgia [1]
Florida
East South Central States:
Kentucky
Tennessee
Alabama [1]
Mississippi [1]
West South Central States:
Arkansas
Louisiana
Oklahoma [1]
Texas [1]

See footnotes at end of table.