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SICKNESS AMONG MALE INDUSTRIAL EMPLOYEES DURING THE FINAL QUARTER OF 1935 AND THE ENTIRE YEAR[1]

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Reports from a group of 33 industrial companies in which cash benefits are paid to employees who are disabled for more than 1 week by sickness or nonindustrial accident show that the frequency of 8-day or longer disabilities among the male employees of these companies was slightly higher in 1935 than in the preceding year (83.7 cases per 1,000 men in 1935 as compared with 79.3 in 1934). These sickness rates are based on reports from the same industrial concerns in the 2 years under review. The average number of male employees having sickness-insurance coverage in this group of corporations was 158,138 in 1935, and 153,970 in 1934.

The increase in the frequency of disabilities lasting more than 1 week was due almost entirely to a higher rate of respiratory diseases in 1935 than occurred in 1934 among the male industrial workers for whom sickness records have been made available. There was no alarming increase in the prevalence of respiratory diseases, however; the rate was even slightly below the average annual incidence of this group of diseases during the preceding 5 years (1930 to 1934 inclusive).

For several respiratory disease categories the frequency rate in 1935 was higher than the average annual incidence during the preceding 5-year period. The respiratory diseases showing rates somewhat unfavorable in comparison with the 5-year average were (*a*) bronchitis (acute and chronic), (*b*) tonsillitis and other diseases of the pharynx and tonsils, and (*c*) pneumonia (all forms).

The number of new cases of respiratory tuberculosis per 1,000 males in the sample of the industrial population under consideration was practically the same in 1935 as in the preceding year and during the 5 years 1930–34 as a whole.

The influenza rate was higher in 1935 than in 1934 by nearly one-fourth (24 percent); nevertheless, the rate was definitely below the average annual incidence of influenza during the years 1930 to 1934, inclusive. The 1935 influenza mortality rate among the

[1] A report covering the third quarter and the first 9 months of 1935 was published in the Public Health Reports for Jan. 31, 1936, vol. 51, no. 5, pp. 109–111.

millions of wage earners and their dependents who are insured in the industrial department of the Metropolitan Life Insurance Co. increased 28 percent over the corresponding mortality rate for 1934; but, like the influenza morbidity rate in the group under consideration, it fell short of the average rate of death from this cause during the preceding 5 years.[2]

For nonrespiratory diseases as a whole the morbidity frequency rate in 1935 was slightly higher than in the preceding year, but slightly lower than the average rate for the 5 years. A few disease subgroups in this broad category showed frequency rates in 1935 which may be considered as somewhat unfavorable in comparison with the average annual frequency of these diseases during the preceding 5 years. These subgroups were as follows: (*a*) Appendicitis; (*b*) neuralgia, neuritis, sciatica; (*c*) neurasthenia and kindred conditions; (*d*) maladies of the heart and arteries and of the genitourinary system; and (*e*) the epidemic and endemic group, exclusive of influenza.

In 1935 the frequency of disabilities lasting longer than one week was below the 5-year average for several important nonrespiratory diseases and conditions. Especially low was the 1935 rate of nonindustrial accidents among the male employees under consideration. Disabilities on account of hernia, rheumatism (acute and chronic), diseases of the organs of locomotion, and diseases of the skin occurred during 1935 at rates which were below the average for the 5 preceding years.

FOURTH QUARTER OF 1935

The frequency of 8-day and longer disabilities was slightly greater in the final quarter of 1935 than in the corresponding period of the preceding year, in spite of a decrease of 25 percent in the incidence of influenza and an appreciable reduction in the nonindustrial accident rate.

The favorable health record from the standpoint of diseases of the respiratory system was counterbalanced by an increase of 14 percent in the frequency of nonrespiratory diseases in comparison with the nonrespiratory rate for the fourth quarter of 1934. Nearly all subgroups of the nonrespiratory disease classification showed higher incidence rates than in the final quarter of 1934. The disease groups for which the increase in frequency exceeded 20 percent were as follows, listed in order of the magnitude of the increase in frequency: Neurasthenia and kindred conditions; epidemic and endemic diseases except influenza; diseases of the heart and arteries and nephritis; and the rheumatic group, which includes rheumatism (acute and chronic), diseases of the organs of locomotion, and neuralgia, neuritis, and sciatica.

[2] Statistical Bulletin, Metropolitan Life Insurance Co., vol. 17, no. 1, January 1936, p. 7.

TABLE 1.—*Frequency of disability lasting 8 calendar days or longer in the fourth quarter and in the year 1935, compared with the corresponding periods of 1934. (Male morbidity experience of industrial companies which reported their cases to the United States Public Health Service)*[1]

Diseases and disease groups causing disability [Numbers in parentheses are disease title numbers from the International List of the Causes of Death, fourth revision, Paris, 1929]	Annual number of disabilities per 1,000 men in—				
	Fourth quarter of—		Full year—		
	1935	1934	1935	1934	5 years, 1930–34
Sickness and nonindustrial injuries [2]	80.4	78.3	83.7	79.3	87.5
Nonindustrial injuries	11.3	12.8	10.9	12.3	12.8
Sickness [2]	69.1	65.5	72.8	67.0	74.7
Respiratory diseases	26.0	27.7	29.2	24.9	30.2
Bronchitis, acute and chronic (106)	4.1	3.6	3.7	3.2	3.4
Diseases of the pharynx and tonsils (115a)	4.4	3.7	5.0	4.3	4.2
Influenza and grippe (11)	10.0	13.4	12.9	10.4	15.5
Pneumonia, all forms (107–109)	2.0	2.1	2.3	2.0	2.1
Tuberculosis of the respiratory system (23)	.9	.8	.9	.8	.8
Other respiratory diseases (104, 105, 110–114)	4.6	4.1	4.4	4.2	4.2
Nonrespiratory diseases	43.1	37.8	43.6	42.1	44.5
Diseases of the stomach, cancer excepted (117–118)	3.4	3.0	3.4	3.3	3.6
Diarrhea and enteritis (120)	1.4	1.2	1.1	1.2	1.2
Appendicitis (121)	3.6	3.8	3.9	4.1	3.6
Hernia (122a)	1.5	1.4	1.3	1.5	1.6
Other digestive diseases (115b, 116, 122b–129)	2.8	2.7	2.8	2.9	3.0
Rheumatic group, total	8.7	7.1	8.8	8.5	9.8
Rheumatism, acute and chronic (56, 57)	3.3	2.9	3.9	4.0	4.6
Diseases of the organs of locomotion (156b)	3.0	2.3	2.6	2.7	3.1
Neuralgia, neuritis, sciatica (87a)	2.4	1.9	2.3	1.8	2.1
Neurasthenia and the like (part of 87b)	1.3	.5	1.2	.8	1.0
Other diseases of the nervous system (78–85, part of 87b)	1.4	1.4	1.2	1.4	1.2
Diseases of the heart and arteries and nephritis (90–99, 102, 130–132)	3.9	2.9	3.7	3.3	3.6
Other genitourinary diseases (133–138)	2.4	2.3	2.6	2.4	2.4
Diseases of the skin (151–153)	2.8	2.4	2.7	2.5	2.9
Epidemic and endemic diseases except influenza (1–10, 12–18, 33, 37, 38, part of 39 and 44)	2.6	1.7	2.9	2.5	1.9
Ill-defined and unknown causes (200)	1.8	1.6	2.0	1.7	1.9
All other diseases (19–22, 24–32, 36, part of 39 and 44, 40–43, 45–55, 58–77, 88, 89, 100, 101, 103, 154–156a, 157, 162)	5.5	5.8	6.0	6.0	6.8
Average number of males covered in the record	156,826	153,194	158,138	153,970	148,767
Number of companies included	30	30	33	33	----------

[1] In 1934 and 1935 the same companies are included.
[2] Exclusive of disability from venereal diseases and a few numerically unimportant causes of disability.

THIRD PAN AMERICAN CONFERENCE OF NATIONAL DIRECTORS OF HEALTH

Held in Washington, April 4–15, 1936, Under the Auspices of the Pan American Sanitary Bureau

The First International Conference of American States (republics) met in Washington in 1889 and effected permanent organization by establishing the Bureau of American Republics, now the Pan American Union, as the executive organ of that conference and of succeeding conferences. There have been seven such conferences. In 1902, in Mexico City, the Second International Conference of American States authorized the creation of a separate, autonomous entity, the International (now the Pan American) Sanitary Conferences. The First Pan

American Sanitary Conference met in Washington in 1902. There have been eight subsequent meetings, in various republics. These conferences, meeting from time to time, elected at each meeting a Directing Council, the Pan American Sanitary Bureau, but this body did not function until the Bureau was reorganized in 1920 by the Sixth Pan American Sanitary Conference, which met in Montevideo, Uruguay. Since that time the work of the Pan American Sanitary Bureau has grown rapidly and steadily, and its influence has each year become more extended.

The Fifth International Conference of American States, which met in Santiago, Chile, in 1923, provided that the Director of the Pan American Sanitary Bureau should call together in conference in Washington once in 5 years all of the directing heads of the Departments of Health of the various American Republics. These meetings, it was directed, should be held in the intervals between the meetings of the Pan American Sanitary Conferences, the next of which (the tenth) is scheduled to meet in Bogotá, Colombia, probably in 1938.

Following is the Acta Final of the Third Pan American Conference of National Directors of Health:

The Third Pan American Conference of National Directors of Health began its sessions in the City of Washington, at 10 a. m., April 6, 1936, in a meeting presided over by the Director General of the Pan American Union, Dr. Leo S. Rowe. Addresses of welcome were made by Hon. William Phillips, Under-Secretary of State of the United States, Dr. Leo S. Rowe, and Dr. Hugh S. Cumming in his capacity of Director of the Pan American Sanitary Bureau; responses were made by General José Siurob, M. D., on behalf of the delegates of the republics represented, and by Dr. Carlos Enrique Paz Soldán, on behalf of the Directing Council of the Pan American Sanitary Bureau. These addresses appear in the General Transactions.

The first plenary session of the conference was held in the afternoon of April 6, under the provisional presidency of Dr. Hugh S. Cumming, Director of the Pan American Sanitary Bureau. Credentials of delegates were approved as follows:

Argentina, Dr. Miguel Sussini; Brazil, Dr. João Barros Barreto; Chile, Dr. Víctor Grossi; Colombia, Dr. Enrique Torres; Costa Rica, Dr. Solón Núñez, Dr. Mariano Rodríguez Alvarado; Cuba, Dr. Domingo Ramos; Dominican Republic, Dr. Rafael Espaillat de la Mota; Guatemala, Lic. Enrique López Herrarte; Haiti, Dr. Rulx Léon; Mexico, General José Siurob, M. D., Dr. Ernesto Cervera, Dr. Gerardo Varela; Nicaragua, Dr. Emigdio Lola; Peru, Dr. Carlos Monge; United States, Dr. Hugh S. Cumming, Dr. Thomas Parran, Dr. F. A. Carmelia, Dr. W. L. Treadway, Dr. R. C. Williams, Dr. John D. Long, Dr. Bolívar J. Lloyd, Dr. George W. McCoy, Dr. J. P. Leake, Dr. C. L. Williams, Dr. L. L. Williams, Dr. J. W. Mountin; Uruguay, Dr. Justo F. González; Venezuela, Dr. Arnoldo Gabaldon.

There were admitted to the conference as *ex officio* members Drs. C. E. Paz Soldán, Lima, Peru, Vice-Director of the Pan American Sanitary Bureau; Waldemar E. Coutts, Santiago, Chile, member, and Miguel E. Bustamante, Mexico, D. F., alternate member of the

Directing Council; and Arístides A. Moll, Scientific Editor of the *Bulletin of the Pan American Sanitary Bureau.*

The following officers of the conference were elected, by acclamation:

President, Dr. Hugh S. Cumming.

Vice presidents: Dr. Miguel Sussini, General José Siurob, M. D., Dr. Solón Núñez, and Dr. Emigdio Lola.

General secretary, Dr. João Barros Barreto.

Executive secretary, Dr. Arístides A. Moll.

The following committees were named:

Credentials: Dr. Miguel Sussini, Dr. João Barros Barreto, and Dr. Waldemar E. Coutts.

Regulations: Dr. Solón Núñez, Dr. Emigdio Lola, and Dr. Domingo Ramos.

Program: Dr. José Siurob, Dr. Víctor Grossi, and Dr. Carlos Monge.

Resolutions: Dr. John D. Long, Dr. Rulx Léon, Dr. João Barros Barreto, Dr. Carlos Enrique Paz Soldán, and Dr. Arístides A. Moll.

Committee to study and report on the topics for consideration by the Tenth Pan American Sanitary Conference: Dr. Bolívar J. Lloyd, Dr. Justo F. González, Dr. Waldemar E. Coutts, Dr. Miguel Bustamante.

Committees to study and present recommendations on the unfinished business of the Ninth Pan American Sanitary Conference:

1. Sanitary regulation of aerial navigation: Yellow fever, malaria, plague:
   Dr. F. A. Carmelia.
   Dr. Ernesto Cervera.
   Dr. Emigdio Lola.
   Dr. João Barros Barreto.
   Dr. Arnoldo Gabaldon.
2. Demography: Graded promotions in health organizations; Pan American scientific institutions; narcotic control:
   General José Siurob, M. D.
   Dr. Sólon Núñez F.
   Dr. Domingo Ramos.
   Dr. Víctor Grossi.
   Dr. Miguel Bustamante.
3. Campaign against tuberculosis; campaign against the venereal diseases; Brucellosis; snake-bite:
   Dr. Miguel Sussini.
   Dr. Rafael Espaillat de la Mota.
   Dr. Carlos Monge.
4. Regulation of the preparation, manufacture, and sale of foods and drugs; milk as a public health problem; nutrition:
   Dr. Justo F. González.
   Dr. Carlos Monge.
   Dr. Gerardo Varela.
   Dr. Enrique López Herrarte.
   Dr. Enrique Torres Herrera.

The meetings held in the morning and afternoon of each day from April 6 to 13, 1936, offered, as is recorded in the General Transactions, a splendid opportunity for an exchange of impressions concerning the many, diverse, and important problems which confront the health authorities of the various republics.

The following motions, resolutions, and votes were discussed and unanimously approved:

VOTES AND RESOLUTIONS

MODERN TRENDS IN PUBLIC HEALTH

The Third Pan American Conference of National Directors of Health, after hearing the reports which have been submitted upon modern tendencies in public health, agrees to recommend, as a factor conducive to success in the development of the health activities of the State, the establishment of scientific services (departments) specially charged with the study of the problems of public health, which departments shall be distinct from those devoted to health administration, properly speaking, but subordinate to the higher health authority; it likewise recommends the continuance of the trend toward the technical unification of health work, aiming at the administrative coordination of health programs; and also the creation or increase of health centers and rural and urban health units with a definite program and a trained personnel dedicating full time to health work, in those countries which do not already have them.

The Third Pan American Conference of National Directors of Health congratulates the delegations which have reported on the topic Modern Trends in Public Health, on the thoroughness which their reports exhibited, and recommends to the Governments of the various American countries the preparation of similar reports for the Tenth Pan American Sanitary Conference.

APPROPRIATIONS FOR HEALTH WORK

The Third Pan American Conference of National Directors of Health deems it advisable, in those countries in which the cities maintain health services and set aside a percentage of their funds for these functions, that, whenever compatible with the form of Government, such services be subordinated administratively to the national health services.

The conference further suggests the advisability of the governments setting aside for the health activities, properly speaking, sums which should be increased as needed, and recommends as a proper criterion for the present, the basis of $1 per capita per year, or its equivalent in the national currency of each country, for the support of the respective services.

SPECIAL HEALTH CAMPAIGNS

The Third Pan American Conference of National Directors of Health deems it advisable that, for special health campaigns, the funds which are appropriated for such ends should be in lump sums, in sufficient quantities, and that their allocation (hiring of personnel, etc.) should be left completely to the discretion of the health authorities.

RURAL SANITATION

The Third Pan American Conference of National Directors of Health, in the interests of rural sanitation, recommends the study in each country of the most appropriate methods of treatment of sewage, and in particular the adoption of economical and practical toilets and septic tanks, installation of which should be obligatory in keeping with sanitary aims.

INDUSTRIAL HYGIENE

The Third Pan American Conference of National Directors of Health recommends to the countries of America:

(1) That campaigns for the prevention of industrial accidents be initiated or intensified; (2) that investigations be made to determine the prevalence of occupational diseases; and (3) that such measures be improved and amplified as tend to (*a*) better the conditions of factories and offices, particularly in regard to illumination, ventilation, sanitary equipment, personal cleanliness, and water supplies; (*b*) better the standards of work, especially for women and children; and (*c*) assure workers a good state of health, controlled through periodical medical examinations and founded upon adequate nutrition both qualitatively and quantitatively speaking, and also sanitary dwelling places.

Also there is recommended the study of pneumoconiosis and the degrees of physical incapacity which it causes, in relation to the climatic conditions of each country.

PRENATAL CARE

The Third Pan American Conference of National Directors of Health recommends, as a means of maternal and infant protection, the extension of free maternity centers.

EDUCATION OF WOMEN

The Third Pan American Conference of National Directors of Health, in the interest of the progress of hygiene on the continent, urges that special attention be accorded the specialized education of women in health matters in the countries of America.

LIFE IN HIGH ALTITUDES

The Third Pan American Conference of National Directors of Health, taking into account the exposition of the delegate of Peru on the health problems created by life in high altitudes, recommends to the countries with inhabited high altitudes the organization of institutes to study the subject, and that reports on these studies be made at the Tenth Pan American Sanitary Conference.

NUTRITION AND ALIMENTATION

The Third Pan American Conference of National Directors of Health, in recognition of the fact that various countries of America have incorporated, in separate organizations or institutions, activities which relate to correct nutrition and alimentation along health lines, recommends:

I. To the countries which have not yet begun this type of work, that they do so as soon as possible;

II. That public education in good nutrition practices forms part of the local health duties, the organization of a trained personnel being advisable for this purpose;

III. That suitable propaganda be instituted to spread knowledge of the correct and varied use of foods, under the scientific supervision of authoritative organizations; and, likewise, that the new knowledge concerning amino-acids, mineral salts, and vitamins be applied to better general nutrition.

IV. That when the existence of deficiency diseases is verified, proper research be made and correct alimentation be instituted according to modern scientific knowledge.

V. That statistics regarding the consumption of the principal foods be published, in order to facilitate comparative studies among the countries of America.

VI. That close cooperation be established between health organizations and agencies charged with the control and distribution of food products, in order to subordinate whenever possible the economic aspects of nutrition to the biological requirements.

VII. That scientific investigations be made of the food products of each country of America, and their nutritive value.

VIII. That infant feeding be supervised, most especially in the first months of life; that when breast feeding is not feasible, modified milk be used; that the employment of wet-nurses should be carefully supervised, considering also the interests of the wet-nurse's child; and that the establishment of mothers' milk stations be considered.

IX. That the study of the alimentation of man in America, in its various phases, as a subject of great importance for the future of the population of the continent, be chosen as a topic for the Tenth Pan American Sanitary Conference.

X. And, finally, that the Pan American Sanitary Bureau should appoint a Committee on Alimentation, as proposed by the Seventh International Conference of American States at Montevideo, in order to comply with the resolutions of previous conferences on this subject.

NARCOTICS

The Third Pan American Conference of National Directors of Health recommends (1) an active campaign against drug addiction in its various manifestations, chiefly through treatment of addicts, suitable isolation, and by a thorough and persistent educational campaign;

(2) That control over the traffic in habit-forming drugs be improved.

(3) Careful investigation of the results obtained by the enforcement of international agreements which subject commerce in drugs to severe restrictions; and, considering the special situation in which American coca-producing countries find themselves, and the effects already produced in them by international pacts, it recommends that the suggestion formerly made again be studied, namely, the possible Americanization of the supply of this drug, by means of direct agreements between the governments of the producing and of the consuming countries, as a step in the development of industrial relations in the pharmaceutical field.

AMEBIASIS

The Third Pan American Conference of National Directors of Health deems advisable the continuance of investigations with the aim of determining, by means of new diagnostic methods, the spread of amebiasis in the Americas, and recommends that the results be reported to the Tenth Pan American Sanitary Conference.

LEPROSY

The Third Pan American Conference of National Directors of Health has seen with satisfaction the progress achieved in the control and care of leprosy, in the countries where this disease is prevalent, and trusts that the work will continue and be amplified, to reduce the dangers and spread of this malady, until its disappearance, as a health problem, from America.

POLIOMYELITIS

The Third Pan American Conference of National Directors of Health recommends to the countries of America the adoption of the measures against infantile paralysis described in Publication No. 90 of the Pan American Sanitary Bureau, with the modifications already or hereafter suggested by experience, without prejudice to the continuance of investigations of this disease.

TRACHOMA

The Third Pan American Conference of National Directors of Health, recognizing the fact that trachoma is contracted principally in infancy, recommends the health education of mothers as an important preventive measure.

VENEREAL DISEASES

The Third Pan American Conference of National Directors of Health advises that in the fight against the venereal diseases, the epidemiologic aspects be considered, in each case, the source of the infection being studied in order to prevent possible new contagions.

MALARIA

The Third Pan American Conference of National Directors of Health, considering the magnitude of the problem of malaria in the greater part of the countries of America, firmly recommends that it be given foremost attention in all programs and plans of health work.

TERCENTENARY OF THE DISCOVERY OF CINCHONA

The Third Pan American Conference of National Directors of Health, considering that the year 1938 marks the third century of medical recognition of the value of cinchona bark, and that in this same year the Tenth Pan American Sanitary Conference will be held in Bogotá, recommends that in the said conference a special program be set aside to commemorate this event, which should preferably include a complete survey of the problem of malaria in America.

CARRIERS OF DISEASE

The Third Pan American Conference of National Directors of Health recommends the study of the problem of carriers in communicable diseases and advises, especially, the determination of the prevalence and the duration of the carrier state, registration of carriers, and practical means of rendering carriers harmless.

VACCINES

The Third Pan American Conference of National Directors of Health recommends to the scientific institutions of American countries that they continue the study of methods of obtaining antismallpox vaccine in the highest condition of efficiency and purity, and that the results be reported to the Tenth Pan American Sanitary Conference.

The Third Pan American Conference of National Directors of Health, believing that antityphoid and antidysenteric vaccines are useful as supplementary means of prophylaxis, recommends that investigations of the oral administration of these vaccines be continued, and that the results obtained be reported to the Tenth Pan American Sanitary Conference.

The Third Pan American Conference of National Directors of Health, after taking into account data and experiences submitted on the use of BCG in some American countries, recommends that the study of this preventive measure be continued with the same care and that the results be considered in the Tenth Pan American Sanitary Conference.

VITAL STATISTICS

The Third Pan American Conference of National Directors of Health recognizes that the securing of complete reports regarding the communicable diseases is a basic requirement for successful public health work, that the problem varies in different localities and in the several countries, and that while it is one that may never be entirely solved, it merits constant thought and consideration by public health officers throughout the world, in order that continual improvement in reporting may be achieved.

EXECUTION OF THE RECOMMENDATIONS OF THE NINTH PAN AMERICAN SANITARY CONFERENCE

The Third Pan American Conference of National Directors of Health has heard with pleasure the report relative to the manner in which the Department of Public Health of Uruguay has tried to carry out the recommendations made by the Ninth Pan American Sanitary Conference, and with this in view, recommends:

That similar reports be presented at future conferences of directors of health, by the health departments of the American countries.

PROGRAM OF THE TENTH PAN AMERICAN SANITARY CONFERENCE

After considering the report of the Committee on Program for the Tenth Pan American Sanitary Conference, the Third Pan American Conference of National Directors of Health recommends that the

following subjects, having received the most votes among the delegates consulted, be included in the program of said conference:

(1) Tuberculosis: Results of the campaign in each country; vaccination with BCG; coordination of activities.
(2) Antiplague campaigns.
(3) Antimalaria campaigns.
(4) Modern trends in the campaign against venereal diseases.
(5) Typhus fever and related diseases.
(6) Diseases produced by viruses.
(7) The problem of carriers in epidemiology.
(8) Rural sanitation, water supplies, disposal of refuse and sewage, dwellings.
(9) Regional diseases.
(10) Preventive and curative vaccines and sera.
(11) Training, selection, promotion, and guaranty of tenure of office for national health officials.
(12) Necessity for the coordination of health work under the national public health services.
(13) Human alimentation and nutrition.
(14) Social security.
(15) Maritime and aerial quarantine measures.
(16) Prenatal and infant hygiene.
(17) Leprosy.

ROCKEFELLER FOUNDATION

The Third Pan American Conference of National Directors of Health lauds the work of the International Board of Health of the Rockefeller Foundation and its cooperation in the sanitary activities of various countries in America, and expresses a wish for its extension to all American countries.

WORK OF THE PAN AMERICAN SANITARY BUREAU

The Third Pan American Conference of National Directors of Health, after hearing the report of the cooperative work performed by the Pan American Sanitary Bureau, expresses its approval and records a vote of applause for this truly Pan American work.

BULLETIN OF THE PAN AMERICAN SANITARY BUREAU

The Third Pan American Conference of National Directors of Health, after considering the policy of the Pan American Sanitary Bureau of distributing to all communities, even the smallest, in America, the *Bulletin* which it publishes monthly, and the high standing reached by this organ for the spread of American health doctrines, in its appearance, as well as in the quality and arrangement of the scientific material published;

Resolves to grant a vote of applause and encouragement to the Pan American Sanitary Bureau for this work and this progress, and to urge it to continue the publication of its official organ along the same lines.

VOTES OF APPLAUSE

The Third Pan American Conference of National Directors of Health awards a special vote of gratitude and applause to Dr. Hugh S. Cumming for the impartial and far-seeing manner in which he has directed its deliberations and organized its work, and extends to him in his retirement as Surgeon General of the United States Public Health Service, best wishes, placing on record a testimonial to the services which he has rendered to the cause of Pan American cooperation in public health.

Likewise it applauds the labor of Dr. Bolivar J. Lloyd for his cooperation, through the Pan American Sanitary Bureau, in the work of obtaining closer relations in health work among the nations of the New World;

And records its approval of the manner in which the Scientific Editor of the *Bulletin*, Dr. Aristides A. Moll, Executive Secretary of the Conference, discharges his duties, which contribute so much to the spread of health knowledge in American countries.

The Third Pan American Conference of National Directors of Health attests its gratitude to Dr. Leo S. Rowe for the most gracious manner in which he has extended his hospitality to the members, and for the use of the facilities in the Building of the Pan American Union.

The Third Pan American Conference of National Directors of Health records its praise of the Secretary General of the Assembly, Dr. João de Barros Barreto, for the manner in which he has contributed to the success of the conference;

Likewise it extends its thanks to Drs. Miguel Sussini, José Siurob, Solón Núñez and Emigdio Lola, vice presidents, for the direction of the sessions over which they have presided.

The Third Pan American Conference of National Directors of Health extends a vote of applause for his valuable work to the Traveling Representative of the Pan American Sanitary Bureau, Dr. John D. Long.

The closing session took place Saturday, April 11, 1936, at 10 a. m., with Dr. Hugh S. Cumming, presiding. On this occasion, addresses were made by Dr. Domingo Ramos, in the name of the visiting delegates; Dr. Justo F. González, in the name of the Directing Council of the Pan American Sanitary Bureau, and by Dr. Hugh S. Cumming. The various addresses were incorporated in the General Transactions of the Conference.

Signed in the city of Washington on the 11th day of April 1936, it having been agreed that a copy of this Act shall be sent to each of the delegations, and furthermore, that a copy shall be sent to each of the American Governments (republics) through diplomatic channels, and

finally, that the original shall be kept in the office of the Pan American Sanitary Bureau.

Signed:

HUGH S. CUMMING, *President*

MIGUEL SUSSINI, *Vice President* (Argentina).
SOLÓN NÚÑEZ, *Vice President* (Costa Rica).
JOÃO BARROS BARRETO, *General Secretary* (Brazil).
MARIANO RODRÍGUEZ ALVARADO (Costa Rica).
VÍCTOR GROSSI (Chile).
F. A. CARMELIA (United States).
R. C. WILLIAMS (United States).
BOLÍVAR J. LLOYD (United States).
J. P. LEAKE (United States).
L. L. WILLIAMS (United States).
ENRIQUE LÓPEZ HERRARTE (Guatemala).
ERNESTO CERVERA (Mexico).
RAFAEL ESPAILLAT DE LA MOTA (Dominican Republic).
JUSTO F. GONZÁLEZ (Uruguay).
C. E. PAZ SOLDÁN (*ex officio*), (Peru).
MIGUEL E. BUSTAMANTE (*ex officio*), (Mexico).
JOSÉ SIUROB, *Vice President* (Mexico).
EMIGDIO LOLA, *Vice President* (Nicaragua).
ENRIQUE TORRES (Colombia).
DOMINGO RAMOS (Cuba).
THOMAS PARRAN (United States).
W. L. TREADWAY (United States).
JOHN D. LONG (United States).
GEORGE W. McCOY (United States).
C. L. WILLIAMS (United States).
J. W. MOUNTIN (United States).
RULX LÉON (Haiti).
GERARDO VARELA (Mexico).
CARLOS MONGE (Peru).
ARNOLDO GABALDON (Venezuela).
WALDEMAR E. COUTTS (*ex officio*), (Chile).
ARÍSTIDES A. MOLL (*ex officio*), *Executive Secretary* (United States).

ENGINEERING CONTROL OF OCCUPATIONAL DISEASES [1]

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The control of occupational diseases lies chiefly within the sphere of two types of workers, the physician and the engineer. It is within the province of the physician to diagnose occupational diseases and primarily to recognize the existence of those diseases due to the factory environment. Based on the findings of the physician, the engineer is in a position to learn where control measures are to be initiated. His functions are twofold: First, he must study the local plant conditions which have been shown to be detrimental to health and by precise quantitative measurements determine the extent of the hazard; second, once the nature and degree of the hazard have been demonstrated, the engineer must consider ways and means for controlling or minimizing the dangerous condition and for studying the effectiveness of these measures.

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It is the purpose of this paper to discuss the various engineering methods which may be applied in the evaluation and control of industrial health hazards.

THE STUDY OF THE WORKROOM ENVIRONMENT

It has been indicated that one of the functions of an engineer in the field of industrial hygiene is the study of the workroom environment, in an effort to determine any relationship between that environment and its effect on the health of the worker. In all such investigations there are certain preliminary steps of fundamental importance which must be undertaken in order to serve as a guide in the more detailed studies which may be indicated. These preliminary steps consist of the sanitary survey and the occupational analysis of the workroom (*1*).

The sanitary survey of a workroom consists of noting items of a general sanitary and hygienic nature, such as provisions for ventilation, illumination, fire protection, accident protection, exposure to specific poisons, such as dusts, fumes, vapors, and gases, fatigue, and so on. In other words, the sanitary survey yields information concerning the presence of various health hazards and serves as a guide in determining which hazards require further study in the form of actual quantitative determinations.

The occupational analysis permits one to learn of the activities involved and the particular hazards associated with each occupation and the number of persons in each occupation. Perhaps a typical illustration from actual experience will demonstrate the value of the preliminary survey of an industrial establishment.

Studies of industrial morbidity among iron and steel workers conducted by the Office of Industrial Hygiene and Sanitation showed that pneumonia, in all forms, occurred to nearly twice the extent among these workers that it did among employees of other industries during a 3-year period of observation (*2*). A 5-year inquiry into the causes of high pneumonia rates among iron and steel workers in a representative mill disclosed the fact that the largest number of cases occurred in certain departments, such as in the blast furnace and open-hearth steel mills. When one realizes, however, that these departments contain anywhere from 60 to 100 different occupations, the task of a preventive program is almost a hopeless one, unless definite information is obtained concerning such important items as (*a*) the number of persons in each occupation, (*b*) the activities associated with each occupation, (*c*) the health hazards associated with each occupation, and (*d*) the incidence of pneumonia for each occupation. Such information is available from a preliminary sanitary and occupational survey.

For example, in the study mentioned it was found that the most important exposures associated with the various occupations were

heat with wide changes in temperature, gases (sulphur dioxide, hydrogen sulphide, and carbon monoxide), dusts, strenuous work, and outdoor labor in all kinds of weather. The preliminary survey enabled one to note these exposures for those occupations in which they occurred. Table 1 presents the frequency of pneumonia according to occupation in the blast furnace department, in relation to the nature of the exposures, during the period of 1924–28. It is quite obvious that the highest pneumonia rates occurred among those occupations exposed to one or more of the potential hazards cited. The actual number of cases for those occupations not associated with these five exposures (all other sections) were found to be even less than the expected cases of pneumonia for such workers. Such a preliminary survey indicated that, in the blast furnace department, attention should be centered on the occupations in the casting and general labor sections, in an effort to determine the degree of exposure to gases, dusts, extreme temperature changes, and so on. Such studies are carried out by the engineer, whose task it is to determine the extent of the occupational exposure to the materials and conditions enumerated. Once these factors have been evaluated, the engineer is in a better position to initiate control measures for the minimization of the hazards demonstrated to be deleterious to health.

TABLE 1.—*Frequency of pneumonia according to occupation and in relation to the nature of industrial exposure involved in the blast-furnace department, 1924–28*

Sections and occupations	Nature and extent of industrial exposure [1]					Annual number of cases of pneumonia per 1,000 men	Number of cases of pneumonia		Approximate number of years of life observed
	Heat with wide changes in temperature	Strenuous work	Outdoor work in all kinds of weather	Gases and smoke	Dust		Actual	Expected [2]	
All sections	----	----	----	----	----	14.0	36	10	2,578
Stacks and stoves (casting section)	----	----	----	----	----	27.2	17	2	624
Keeper	**	**	*	**	*	8.3	1	0	120
First and second helpers	**	**	*	**	*	41.5	12	1	289
Blowers	*	0	*	*	0	0	0	0	52
Hot-blast men	*	*	**	**	*	16.7	2	1	120
Stove cleaners	*	*	**	**	**	46.5	2	0	43
General labor section and car-dumper laborers	0	0	**	0	0	30.7	15	2	489
All other sections [3]	*	*	*	*	*	2.7	4	6	1,465

[1] Symbols for extent of exposure are as follows: 0, no exposure; *, slight or occasional exposure; **, heavy exposure.

[2] Number expected from the rate per 1,000 men in "All other departments".

[3] 8 percent of the men heavily exposed, 23 percent slightly or occasionally exposed to heat with wide temperature changes. To strenuous work no one was heavily exposed, and only 5 percent had occasionally to work strenuously. To outdoor work in all kinds of weather about 8 percent of the men were heavily exposed, 80 percent slightly or occasionally exposed. To gases and smoke about 5 percent were heavily and 25 percent slightly or occasionally exposed. About 1 percent of the men were heavily exposed to dust, and about 55 percent slightly or occasionally exposed.

The magnitude of the problem confronting the engineer in industrial hygiene is as large as it is varied. According to a recent analysis made by Dublin and Vane (*3*), there are some 94 groups of industrial poisons in the United States, associated with about 900 different occupations. In the limited space allotted for the present discussion it will be possible only to point out a few of the major problems in this field with which the engineer is concerned.

The subject of the health of workers in dusty trades has been receiving considerable attention from students of industrial hygiene and others interested in the various phases of this problem. When one realizes that the workmen employed in the dusty trades comprise the largest group exposed to any one industrial hazard, it is quite apparent that the importance of this problem has not been overestimated. Furthermore, it is by now fairly well established that exposure to certain kinds of dust has increased the mortality rate from respiratory diseases.

As a result of the studies conducted by the Office of Industrial Hygiene and Sanitation and other interested agencies, it has been fairly well established that a knowledge of the properties of a given dust which determine its capacity to produce pulmonary pathology is essential. Numerous investigations of the industrial dust problem indicate that these properties are the chemical and mineralogical composition of the dust, its concentration in the industrial atmosphere, and its particle-size. It is within the province of the engineer to determine these factors in the industrial dust problem. How important these determinations are in such studies is well exemplified by the results of our recent investigation made among anthracite-coal miners (*4*).

In this particular investigation it was found that the various mine and surface workers were exposed not only to different concentrations of dust but also to dusts of varying composition. For this reason, in the present discussion, data will be given for a group of workers inhaling a dust of the same composition. For example, the engineering study disclosed that workers in the mine haulageways were exposed not only to the dust arising from both coal- and rock-working operations but also to the sand dust used on the rails to obtain traction. A study of the composition of this dust showed it to have a total silica content of 34 percent, a quartz content of 13 percent, with 58 percent of the dust consisting of coal. Due to the relatively low dust concentrations in the haulageways, the mine operators did not suspect a health hazard among the men employed in the gangways.

Figure 1 shows the percentage of men having anthraco-silicosis under different average dust concentrations and number of years' exposure to such concentrations. When the duration of employment

or exposure was less than 25 years, only a negligible proportion of the men developed anthraco-silicosis. There were, in fact, only 3 cases among the 408 men examined whose length of employment was less than 25 years, a percentage of less than 1 for this group as a whole. When the exposure exceeded 25 years, about one-fourth of the men were found to have anthraco-silicosis. The curve of cases mounted rapidly from an exposure of 10 to 20 million dust particles per cubic foot of air to 80 million particles, at which exposure about one-third of the men were found to have this disease. It is of interest to note that the curve of cases declined slightly under higher dust exposures. Although one cannot state definitely the reason for this tendency, it may be due to the factor of selection.

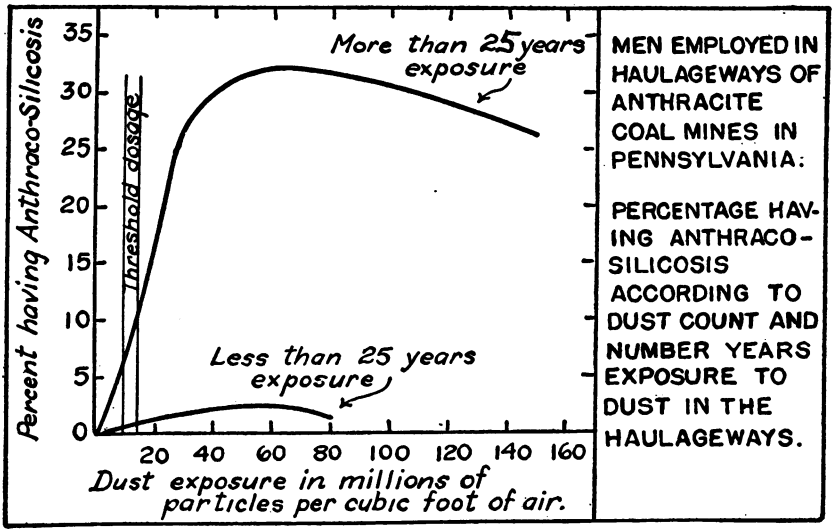

FIGURE 1.—Percentage of men having anthraco-silicosis according to dust concentration and years of exposure.

This single example concerning one of the important problems in industry illustrates the role played by the engineer in the field of industrial hygiene. In the present case not only was the study of the degree and nature of the dust exposure valuable in determining the cause and extent of the hazard, but it served as an aid to the solution of the problem; namely, the removal of the dust to a level indicated as safe by the results of the investigation. The graph also shows the approximate threshold dosage, which may be set tentatively at 10 to 15 million particles per cubic foot for this type of dust. Only 4 cases of anthraco-silicosis were found among the men exposed to 10–20 million particles and none were found at an exposure of less than 10 million particles. With such information, the engineer is in a position to consider ways and means for the suppression of the dust in the haulageways to the concentration which is indicated as safe.

In the studies of occupational diseases due to the inhalation of certain toxic dusts, such as lead and radium, the engineer has also played a valuable role. In a recent study of lead poisoning among storage-battery workers, conducted by the Public Health Service (*5*), it was of importance to determine the relationship between the amount of lead dust inhaled by the men and the incidence and severity of plumbism. Such a study is valuable in that it may indicate the maximum amount of lead which may be inhaled with impunity. Table 2 shows the fundamental correlation between the lead in the air and the rate of plumbism in the major departments of the plant in which our study was made.

TABLE 2.—*Lead exposure and maximum monthly rate of initial compensation cases for plumbism*

Department	Milligrams of lead per 10 cubic meters of air	Maximum monthly rate (per 100)
Mixing	120	44
Pasting	50	12
Burning	5.7	4.4
Casting	1.2	.18

It is evident that a close correlation exists between the lead exposure in different departments and the risk of developing a case of lead poisoning. Of considerable interest is the fact that a more detailed analysis of the clinical and dust findings indicated that 1.5 milligrams of lead dust per 10 cubic meters of air, except for prolonged exposure, is the limit of safety under the conditions encountered in this study. This important finding is of great value to the engineer, since it gives him a basis upon which to develop protective devices in the way of exhaust ventilation, respiratory protection, and so on.

Utilizing the same technique as that employed in the study of the dust problem, the writer conducted a study in 1928 on the health hazards associated with chromium plating (*6*). A study of the amount of chromic acid inhaled by these workers, along with physical examinations, showed that ulceration and perforation of the nasal septum were usually associated with an exposure in excess of 1 milligram of chromic acid in 10 cubic meters of air. These results are shown in detail in table 3. It is observed that a fairly good correlation was found to exist between the intensity of exposure to chromic acid mist and the amount of damage to the nasal mucosa, that part of the respiratory tract usually affected by such exposure. As a result of this finding, it was possible to design chromium plating tanks provided with a certain type and degree of exhaust ventilation which keeps the air at the worker's breathing level completely free from chromic acid, or at least to an amount less than 1 milligram in 10 cubic

meters. In a later portion of this discussion it will be shown exactly how this control problem was handled.

TABLE 3.—*Occupational history and clinical findings of workers employed in plants engaged in chromium plating*

Case no.	Occupation	Months employed in chromium plating room	Hours per day over tank	Approximate CrO_3 exposure in milligrams per 10 cubic meters	Perforated septum [1]	Ulcerated septum [1]	Inflamed mucosa [1]	Nose bleed	Chrome holes	Remarks
1	Chromium plater	6½	4	15.0	++	−	++	+	+	
2	do	20	4	28.0	++	−	+	+	+	
3	Foreman plater	7	2	25.0	−	++	++	+	−	
4	do	8½	3	25.0	−	++	++	+	−	
5	Chromium plater	3½	4	56.0	−	++	++	+	+	
6	do	¾	7	1.2	−	−	++	+	+	
7	do	¼	7	1.2	−	−	++	+	−	
8	do	7	7	1.2	−	−	++	+	−	
9	do	3	7	1.2	−	−	++	−	+	
10	do	36	4	2.0	−	−	++	−	−	
11	do	5	6	1.2	−	−	+	+	+	
12	do	¾	6	1.2	−	−	+	−	−	
13	do	12	4	28.0	−	−	−	−	−	Used vaseline in nose.
14	do	⅔	2	28.0	−	−	−	−	−	
15	Nickel plater	1½	0	(2)	------	+	+	+	−	Cyanide burns.
16	Racker	8	0	(2)	+	−	+	+	−	
17	do	¾	0	(2)	−	−	+	−	−	
18	do	¾	0	(2)	−	−	+	−	−	
19	Wiper	1¼	0	(2)	−	−	+	−	−	
20	Foreman	0	0	0	−	−	+	−	−	Work in other departments of factory.
21	do	0	0	0	−	−	+	−	−	
22	Clerk	0	0	0	−	−	−	−	−	
23	Inspector	0	0	0	−	−	+	−	−	

[1] ++, marked; +, slight; −, negative.
[2] Unknown.

It is by now apparent from the few examples given in the present discussion that the engineer's part in industrial hygiene is an important one. Studies of the industrial environment of the type indicated may be said to serve a threefold purpose. First, they enable one to determine the extent of the hazard. This is accomplished by obtaining occupational exposures to the toxic material or condition under consideration. Second, if clinical studies are made, the findings on occupational exposure may indicate the permissible amounts of the toxic material which may be tolerated with safety. Third, quantitative studies of the workroom environment are valuable in the control of a hazard. This is performed by testing the efficiency of any devices which may have been introduced for the minimization of the hazard.

In closing this portion of the discussion it is well to point out that the engineering problems in industrial hygiene will increase in number in the very near future. New processes and chemicals are constantly coming into use and many well-known toxic substances are finding new applications in industry. Our knowledge of these substances as to their action on the body is being augmented by the work of toxi-

cologists and by field studies of the type presented in this paper. It is the engineer's task, once this knowledge is available, to devise ways and means for controlling these injurious materials and conditions, which brings one to a discussion of the main purpose of this paper, namely, the engineering control of occupational diseases.

THE CONTROL OF INDUSTRIAL HEALTH HAZARDS

The control of industrial hazards rests in the hands of the physician and engineer. The physician recognizes the existence of diseases due to the workroom environment and exercises medical supervision and initiates studies designed to eradicate the dangerous conditions. The engineer, once he has determined the extent of a hazard and is armed with a knowledge of the toxicity of the material involved, is in a position to consider methods and equipment for the control of the hazard. No set rules may be established for the mechanical protection to be instituted in an attempt to control an industrial poison. Specific conditions encountered in a plant will determine the type of protection to be employed. In general, there are five methods which may be attempted in the minimization of an industrial poison; these are (1) substitution of a nontoxic material for the toxic one, (2) isolation of the harmful process, (3) wet methods in the case of some dusty processes, (4) exhaust ventilation, and (5) respiratory protection.

The protection of workers against certain dusts known to be toxic may at times be accomplished by the substitution of a nontoxic material for the toxic one. One example of such a procedure is the possible use of a metallic or other type of artificial abrasive for sand in the sandblasting process in those operations in which it is not essential to use sand, a substance high in quartz content (7). Again, the mechanical enclosure or isolation of the dust-creating process also serves to protect the worker. An excellent illustration of this type of protection is afforded by the modern sandblast barrel used in the cleaning of small objects. Sometimes it is possible to protect workers by the substitution of wet for dry processes. This method is illustrated in the results shown in table 4.

TABLE 4.—*Contrasting wet and dry methods of rock drilling and loading*

Processes	Number of samples	Average dust count in millions of particles per cubic foot	
		Dry	Wet
Drilling	23	568	33
Loading	10	636	32

It is apparent from the results presented in table 4 that a tremendous reduction in dust has been effected by the use of wet methods in the case of both the drilling and loading rock operations.

In most dusty processes, however, the most effective means of dust elimination are employing the use of properly designed exhaust ventilation systems. Since in many instances it is difficult, costly, and at times an unnecessary procedure to remove all the dust in the vicinity of a worker, it would be helpful to determine the minimum amount of a certain dust which the worker can apparently tolerate with impunity. Such information can be made available by the type of studies carried out by the Public Health Service (mention of which was made earlier in this paper).

For example, in the anthracite coal study (*4*) it was found that miners exposed to less than 50 million particles of coal dust per cubic foot with less than 5 percent quartz in the dust apparently suffered no disability even after many years of work. In the case of the workers in the haulageways, who were shown to be inhaling a dust with a higher silica content, the safe limit was placed at 10–15 million particles. With such information at hand the engineer is in a better position to study various methods for the suppression of the dust to the safe limit indicated. In certain of the mines under investigation, control measures were already in force, showing that dust may be eliminated to a certain extent and oftentimes to a safe concentration. Table 5 shows the results of an engineering study of the control measures practiced in some of the mines and clearly depicts the effective reduction of dust in many of the occupations.

TABLE 5.—*Summary of results contrasting the dust exposure of mine workers under controlled and uncontrolled working conditions*

Operation	Dust concentration in millions of particles per cubic foot of air		Remarks
	Controlled	Uncontrolled	
Firing charge	40	834	Unless at least 15 minutes elapsed after firing a charge, miners were found to be exposed to high dust concentrations.
Loading coal or rock	32	636	By wetting the loaded material the dust count is reduced as shown.
Loading coal	4–26	[1] 291–1,138	Mechanical loading decreases the dust exposure as indicated.
Drilling	33	568	Wet drilling is effective in reducing the dust concentration. Further reduction would necessitate exhaust ventilation.
Hauling coal in mines	1.2	17	Wetting coal and empty cars reduces dust in haulageways.
Preparation of coal	24	380	Wet breakers reduce dust counts as shown.

[1] The lower result is associated with the hand loading of wet coal while the higher average is based on the hand loading of dry coal.

Another example of the methods which are at present in use in an attempt to control industrial health hazards is indicated in the results of a study now in progress in connection with mercurialism among workers in the hatters' fur-cutting industry. Table 6 shows the exposure to mercury dust and vapor of some of the workers in this industry under controlled and uncontrolled working conditions. It is quite apparent that where some measure of control is practiced by such methods as segregation or local exhaust ventilation, a material reduction in the exposure to mercury is effected.

TABLE 6.—*Exposure of hatters' fur workers to mercury dust and vapor under controlled and uncontrolled conditions*

Occupation	Total mercury exposure in milligrams per 10 cubic meters		Method of control
	Uncontrolled	Controlled	
Blowers	4.6	0.7	Local exhaust ventilation.
Shippers	7.2	Trace	Good natural ventilation.
Cutters	4.0	1.8	Local exhaust ventilation.
Sorters	3.8	1.7	Do.
Brushers	3.1	1.2	Do.
Drummers	2.5	.6	Segregation.
Clippers	1.5	.7	Do.

It will be recalled that earlier in this discussion some results were shown in connection with the chromium-plating study which indicated that apparently no harm was involved in an exposure to less than 1 milligram of chromic acid in 10 cubic meters of air, at least as far as damage to the respiratory tract was concerned. While this study was being conducted, exhaust ventilation methods for the removal of chromic acid mist from the air were also being investigated. Figure 2 shows the relation between the degree of air velocity at the exhaust ducts and the amount of chromic acid in the air (*6*). It is evident from this study that in order to keep the chromic acid content in the air to an amount less than 1 milligram in 10 cubic meters (the minimum amount found to cause no damage to the nasal septum) at least 1,500 feet per minute of air movement at the face of the duct is necessary, especially at the higher current densities commonly encountered in electroplating.

Perhaps one additional illustration of the role played by the engineer in the control of industrial hazards may be mentioned at this time, to show the varied and important problems confronting him. In the study conducted in connection with the health hazards involved in the cleaning of castings by means of abrasive blasting (*7*), it was found that the only practical safeguard to the worker was to provide him with a mask or helmet of the positive-pressure type. In studying the efficiency of such devices it was found that a relationship existed

between the amount of air supplied to the helmet and the concentration of dust inside the helmet during blasting. In an attempt to determine the optimum air volume to be supplied to such protective devices, it was necessary to obtain dust samples from inside the helmet while varying the air volume, at the same time maintaining the dust concentration in the sandblast room (outside the helmet) constant. Figure 3 shows the results of such a study and clearly indicates that the positive supply of 6 cubic feet of dust-free air per minute will protect a worker under the operating conditions now in practice in sandblast rooms. The ultimate criterion of protection, however, is the result of dust determinations of the air within the

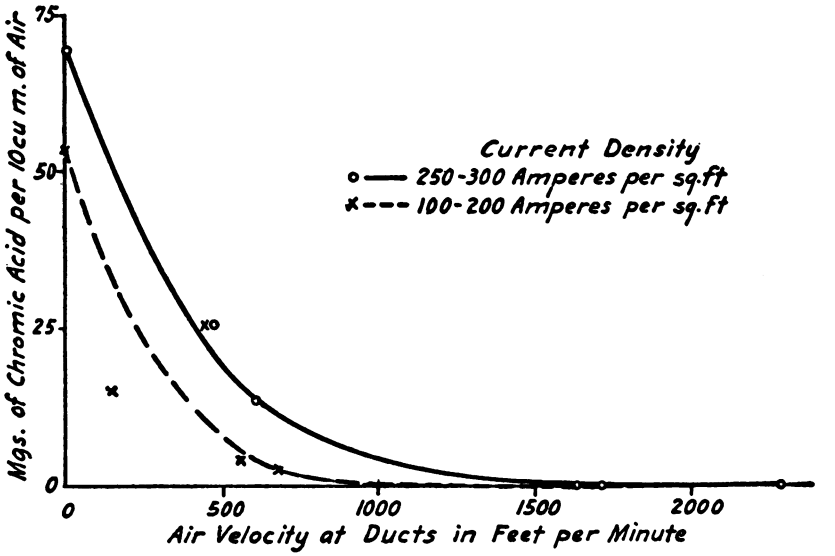

FIGURE 2.—Relation between air velocity of local exhaust system and amount of chromic acid in air for different current densities.

helmet, that is, the air actually breathed by the worker and not the volume of air supplied.

From some of the examples cited in this paper it is apparent that there is some knowledge concerning the effects on health due to exposure to certain toxic materials in industry, and it would seem logical to take appropriate measures for their control. That the problem of industrial hygiene is of considerable magnitude is evinced by the fact that we now know that the industrial population experiences high morbidity and mortality rates, partly as a direct result of the working environment, and, in addition, the number of persons involved is rather large. According to the United States census figures for 1930 (*8*), in the manufacturing, mechanical, and mining industries alone there are some 15 million persons gainfully employed, and so industrial hygienists are at once faced with the task of pro-

viding adequate health services for a large number of workers engaged in occupations that are known to entail an exposure, in many instances, to deleterious materials and conditions.

One is also confronted with the fact that, in this country, the majority of establishments are very small, too small in fact to conduct

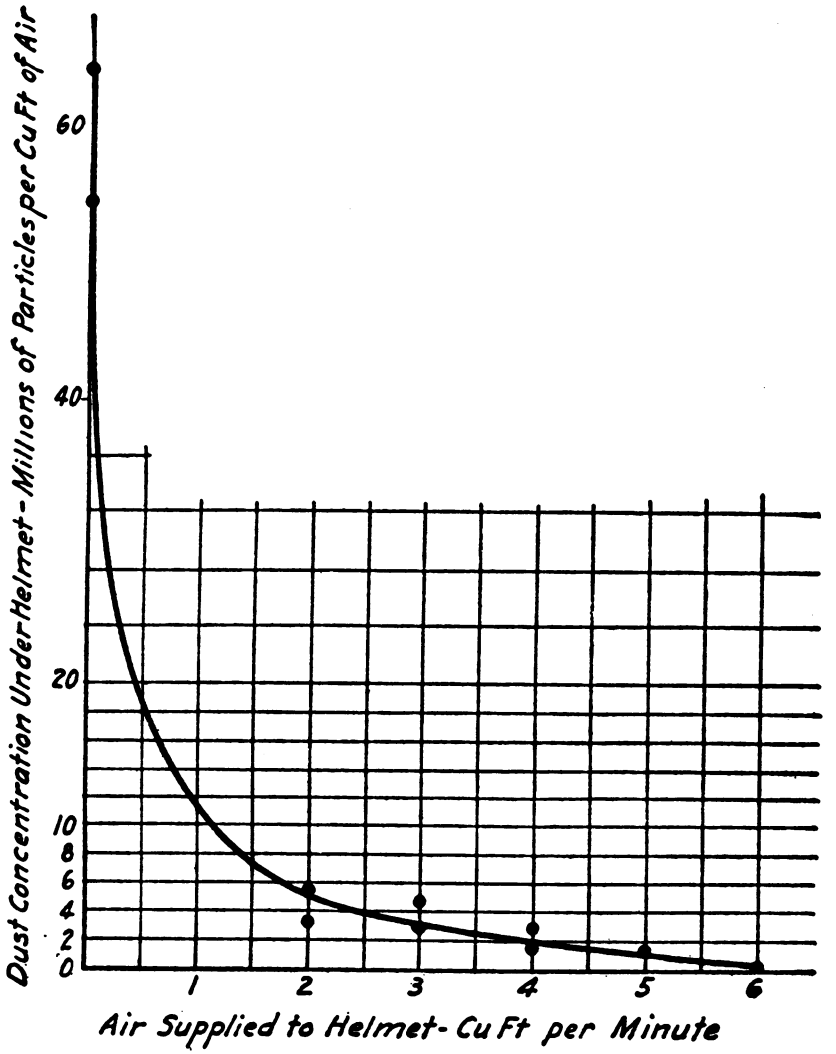

FIGURE 3.—Curve showing relationship between the volume of air supplied to helmets and the number of dust particles in air breathed by worker.

individual programs of industrial hygiene. From a study recently made by the writer in a typical industrial area (*9*), and from the census data of 1930, it is known that approximately 90 percent of the industrial plants in this country employ less than 100 persons. The consensus of opinion among students of this subject is that the needs of industrial hygiene in our industries may best be cared for by local

health departments. In fact, many of the State departments of health are now recognizing the necessity of a preventive program in industry and are considering ways and means for establishing such work as an integral part of their organizations.

It is not the purpose of the present paper to delve into the reasons for the necessity of industrial hygiene work in health departments, except to indicate that once such a program is initiated, the engineer's role in it will be an important one, since the task of prevention will largely lie in his hands. It is probably apparent by now from the brief discussion given herein that, in order for an engineer to carry on such work, he will have to be thoroughly trained in industrial hygiene and be familiar with industrial processes. Such a person should be well grounded from both a theoretical and practical viewpoint in the fields of microscopy, gas chemistry, physiology and mechanics of ventilation, industrial sanitation, illumination, and, most important of all, he should have a broad public health viewpoint. It is apparent that a sanitary, mechanical, or chemical engineer, *per se*, does not exactly fulfill these requirements. But there is no reason why an individual with basic engineering training cannot in time be metamorphosed into an industrial hygiene engineer.

In closing, it is well to emphasize one point; namely, that occupational diseases are in a large measure preventable, and the degree of prevention exercised by a community will be reflected in the general health status of that community.

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CHEMICAL STUDIES ON TUMOR TISSUE

III. Titration of Mouse Tumors[1]

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In the course of studies on the chemical treatment of tumors in mice, the widely employed method of transplanting tumors by means of implantation of tumor fragments gave results which were not satisfactory for some purposes. The transplants produced tumors which would often vary considerably in size and in growth rate. These variations were so great that a slight difference between the tumors of the treated and of the control mice in therapeutic experiments would, if present, be obscured by the greater differences among the individual tumors within each group.

Attempts were therefore made to obtain more regular and more closely reproducible results. First, pure strain mice [2] were substituted for ordinary stock or market mice. In the second place the method of transplanting was modified.

In the commonly used procedures, tumors are transplanted by means of tumor fragments, tumor mashes, or tumor suspensions. The last-named method, somewhat modified, has been employed in the procedure described in this report.

TECHNIQUE

The procedure finally adopted was as follows: Healthy tumor tissue was minced and shaken for one-half hour with glass beads in a solution containing 0.9 percent NaCl and 10 percent gelatin; for each gram of tissue, 10 cc of solution was used. The larger particles were removed by centrifuging at low speed for 2 minutes, and the supernatant fluid, a homogeneous suspension of finely divided tumor tissue, was employed in the titrations. In preparing the less concentrated suspensions, this stock suspension was diluted with the gelatin solution. All solutions were adjusted to pH 7.0 to 7.5 before using.

The gelatin served a double purpose: It both retarded sedimentation and counteracted the destructive swelling of tumor cells that occurs in protein-free solutions but which is retarded by protein (*3*).

The suspensions were all injected subcutaneously in doses of 0.1 or 0.2 cc. The tables show the dosage and the results obtained in the

[1] Read at the Detroit meeting of the Federation of American Societies for Experimental Biology, Apr. 12, 1935 (Jour. Biol. Chem., **109**: lxxxi (1935)).

Earlier papers of this series are as follows:

Volume changes of tumor cells in vitro. By M. J. Shear and L. D. Fogg. Pub. Health Rep., **49**: 225–240 (1934).

Chemical studies on tumor tissue. II. The effect of protein on the swelling of normal and tumor cells of mice in vitro. By M. J. Shear. Am. Jour. Cancer, **23**: 771–783 (1935).

[2] The pure strain mice were obtained from the Roscoe B. Jackson Memorial Laboratory, Bar Harbor, Maine. For the characterization of these mice, see reference (1), Andervont (1935).

various experiments. Tumor size is indicated by numbers, which correspond to the estimated average diameters, the average diameter being defined as the arithmetical mean of the three diameters of the tumor. The relation between the arbitrarily chosen numbers for "tumor size" and the corresponding "average diameter" is as follows:

Tumor size	Average diameter
	mm
0	0
1	0.5
2	1
3	2
4	4
5	6
6	8
7	10
8	15
9	20
*	>20

* Denotes a very large tumor.

The description of tumor size by this arbitrary scheme has been found to be a convenient and rapid method of comparing tumor size in experiments in which the measurement and designation of the precise dimensions of the tumors would be cumbersome and of little added value.

EXPERIMENTAL

Sarcoma 180.—In a preliminary experiment a suspension was made by treating 1 g of minced sarcoma 180 tissue with 12 cc of physiological saline containing 5 percent gelatin. This suspension (1:12) was allowed to stand for 15 minutes and the supernatant solution (1:12 A) was then pipetted off. After four-fold dilution, it was centrifuged for 5 minutes and the supernatant solution (1:48 B) was separated. Each of the three suspensions was administered subcutaneously to six strain D mice.

The concentrated suspensions (1:12) gave rise to tumors in a short time in all cases. The lighter suspension (1:12 A) produced only four tumors in six mice; moreover, these tumors appeared more slowly than in the 1:12 group. The most dilute preparation (1:48 B) had produced no tumors by the time the experiment was terminated.

In the next experiment with sarcoma 180 (see table 1), fragments of the tumor were inoculated into 6 mice for comparison with the 3 tumor suspensions which were injected into 3 groups of 10 mice each, respectively. Here, too, the concentrated suspension gave 100 percent "takes", as did the fragments. Centrifuging for only 2 minutes at low speed rendered the solution inactive. With the suspension centrifuged for 1 minute, tumors were obtained in 2 cases out of 10.

TABLE 1.—*Tumors obtained in strain A mice with suspensions of sarcoma 180*

[Gelatin concentration, 10 percent; amount injected, 0.2 cc; number of mice, 36]

Days after inoculation	Tumor size			
	Fragment implants	Dilution of suspension		
		1:10	1:10 A	1:10 B
11	3-3-4	3-3-5-3-8	0-0-0-0-0	0-0-0-0-0
	3-3-3	3-2-4-6-3	0-0-0-0-0	0-0-0-0-0
18	5-4-7	6-6-7-6-*	2-0-0-0-3	0-0-0-0-0
	4-3-4	5-4-6-*-4	0-0-0-0-0	0-0-0-0-0
39	8-7-*	8-*-*-*-*	4-0-0-0-7	0-0-0-0-0
	9-4-8	8-*-*-*-*	0-0-0-0-0	0-0-0-0-0

A denotes preparation centrifuged for 1 minute.
B denotes preparation centrifuged for 2 minutes.
The size of each tumor is designated by a number, from 1 to 9, corresponding to the "average diameter"; 0 denotes tumor absent; * denotes a very large tumor.

Dibenzanthracene sarcoma (strain A, first and second transplants).—From the preceding experiments it was obvious that centrifuging for only a few minutes rendered the suspensions of sarcoma 180 inactive, even in the case of the 1:10 concentration. Since sarcoma 180 is a tumor that has been passed for many years through mice of widely diverse genetic constitution, it was thought that perhaps better results might be obtained with dilute suspensions if a tumor were used that had arisen originally in a pure-strain mouse and that had been propagated only in mice of the same strain.

Accordingly, the next experiment was performed with a sarcoma that had originally been induced in a strain A mouse by means of 1, 2, 5, 6–dibenzanthracene and which had been transplanted once in this strain. Fragments of the transplanted tumor were implanted into six mice for comparison; six other mice received 0.1 cc of a 1:10 suspension. After centrifuging for 2 minutes, the suspension (1:10 B) was injected into six mice. Finally, after 10-fold dilution, it (1:100 B) was also injected. All the mice were of the same pure strain.

Positive results were obtained in all the mice which had received tumor fragments or the 1:10 suspensions. In the latter cases, however, it took longer for the tumors to become evident than in the fragment implant group. Furthermore, it is to be noted that the tumors produced by the centrifuged suspension (1:10 B) developed more slowly than those produced by the uncentrifuged suspension. The 1:100 B suspension had the longest latent period; but even at this dilution tumors were obtained in five of the six mice by the end of 1 month.

Since positive results were obtained with the centrifuged preparations even at the 1:100 dilution, the experiment was repeated, using the next generation of this same tumor, and increasing the dilution of

the centrifuged suspension to 1:1,000. The results are summarized in table 2.

TABLE 2.—*Tumors obtained in strain A mice with suspensions of a dibenzanthracene sarcoma*

[Tumor history: Second transplant of a sarcoma induced by dibenzanthracene in a strain A mouse: gelatin concentration, 10 percent; amount injected, 0.1 cc; number of mice, 43]

Days after inoculation	Tumor size			
	Fragment implants	Dilution of suspension		
		1:10 B	1:100 B	1:1,000 B
6	3-2-2-1	0-0-0-0-0-0	0-0-0-0-0-0	0-0-0-0-0-0
	4-1-2-0	0-0-0-0-0-0	0-0-0-0-0-0	0-0-0-0-0
12	5-3-4-3	0-0-0-0-0-0	0-0-0-0-0-0	0-0-0-0-0-0
	5-5-5-3	1-0-0-0-0-0	0-0-0-0-0-0	0-0-0-0-0-0
19	9-4-8-4	0-2-1-0-0-0	1-0-0-0-0-0	0-0-0-0-0-0
	8-9-8-7	2-2-0-2-2-2	1-2-1-0-1-0	0-0-0-0-0
33	*-7-*-7	3-7-6-4-4-4	3-1-2-0-2-1	0-0-0-0-0-0
	--*-9	6-4-3-4-4-3	3-4-4-0-2-0	0-0-0-0-0
61	*-*-*-*	*-*-*-*-*-*	9-6-8-8-5	0-0-0-0-0-0
	--*-*	*-*-*-*-*-*	7-8-8-1-3	0-0-0-0-0

B denotes preparations centrifuged for 2 minutes.
The size of each tumor is designated by a number, from 1 to 9, corresponding to the average diameter; 0 denotes tumor absent; * denotes a very large tumor.

As before, tumor fragments gave rise to tumors rapidly. The centrifuged 1:10 and 1:100 preparations also gave rise to tumors in all cases, but more slowly; again, the greater the dilution, the longer the latent period. The 1:1,000 dilution produced no tumors in 61 days.

Dibenzanthracene sarcoma (strain D; twelfth and thirteenth transplants).—The results obtained in the two experiments with a strain A dibenzanthracene sarcoma in strain A mice were in satisfactory agreement. Similar experiments were thereupon carried out, using strain D mice, with twelfth and thirteenth transplants of a sarcoma originally induced in a strain D mouse by 1, 2, 5, 6-dibenzanthracene and subsequently carried in strain D mice only.

In the first of the experiments with this tumor (see table 3), results similar to those obtained with the strain A sarcoma were obtained. However, there was one striking difference: with the strain A sarcoma no tumors were obtained with the 1:1,000 dilution, whereas the corresponding dilution of the strain D tumor produced tumors in five out of eight mice. On repeating[3] the experiment with the strain D sarcoma, tumors were again obtained at the 1:1,000 dilution. Furthermore, the 1:10,000 dilution produced a tumor in 1 of 10 mice. As in

[3] Some of the mice receiving the concentrated suspensions failed to develop tumors in this experiment. This is an unusual occurrence. It may possibly have been due to accidental inclusion of some mice of a different strain; this could account for the failure to obtain tumors in those mice. Or possibly in some instances the injected material may have been infected; this could also account for the negative results.

the preceding titrations, the tumors that were produced had a latent period which was longer the greater the dilution.

TABLE 3.—*Tumors obtained in strain D mice with suspensions of a dibenzanthracene sarcoma*

[Tumor history: Twelfth transplant of a sarcoma induced by dibenzanthracene in a strain D mouse; gelatin concentration, 10 percent; amount injected, 0.1 cc; number of mice, 32]

Days after inoculation	Tumor size			
	Dilution of suspension			
	1:10 B	1:50 B	1:250 B	1:1,000 B
12	3-2-0-3	0-0-0-0	0-0-0-0	0-0-0-0
	3-4-0-4	0-0-1-0	0-?-0-0	0-0-0-0
18	7-5-4-5	1-3-3-1	2-3-0-2	0-0-0-0
	5-8-4-5	1-2-4-1	1-4-0-3	1-2-0-1
32	*-8-*-*	8-9-8-2	8-9-2-4	0-2-0-1
	--*-*	1-7-9-4	9-*-3-*	3-7-0-2
39	*-*-*-*	*-*-9-4	9-*-4-6	0-4-0-2
	--*-*	3-8-9	*-*-5-*	5-8-0-4

B denotes preparations centrifuged for 2 minutes.
The size of each tumor is designated by a number, from 1 to 9, corresponding to the average diameter
0 denotes tumor absent; * denotes a very large tumor.

Carcinoma 29,225 (first and second transplants).—The preceding experiments had all been carried out with sarcoma tissue. In the succeeding experiments, carcinoma tissue was employed. Titrations were carried out, in duplicate, with a carcinoma from each of two pure strains of mice.

The first was a carcinoma that had occurred spontaneously in strain A mouse 29,225. This tumor was transplanted into strain A mice and the tissue obtained from the first transplant tumors was employed in the titration summarized in table 4. It is seen that mere standing of the 1:10 preparation for one-half hour so reduced its potency that only 50 percent "takes" were obtained. Centrifuging for only 2 minutes, without dilution, rendered the suspension inactive.

TABLE 4.—*Tumors obtained in strain A mice with suspensions of carcinoma 29,225*

[Tumor history: First transplant of a carcinoma which occurred spontaneously in a strain A mouse; gelatin concentration, 10 percent; amount injected, 0.2 cc; number of mice, 24]

Days after inoculation	Tumor size			
	Fragment implants	Dilution of suspension		
		1:10	1:10 A	1:10 B
19	0-2-0	0-0-0	0-0-0	0-0-0
	1-2-0	0-0-0	0-0-0	0-0-0
25	3-4-1	2-3-1	0-0-0	0-0-0
	2-4-0	1-1-2	0-0-0	0-0-0
32	3-5-1	3-3-2	2-0-0	0-0-0
	3-4-0	2-3-4	0-4-0	0-0-0
60	7-8-8	*-*-*	7-0-0	0-0-0
	8-9-0	*-*-*	0-*-7	0-0-0

A denotes preparation allowed to settle under gravity ½ hour.
B denotes preparation centrifuged for 2 minutes.
The size of each tumor is designated by a number, from 1 to 9, corresponding to the average diameter;
0 denotes tumor absent; * denotes a very large tumor.

Essentially the same results were obtained on repetition of the experiment with the next generation of this same carcinoma, using a larger number of mice.

Carcinoma 62 (first and second transplants).—This carcinoma was a tumor which had arisen spontaneously in a strain D mouse. For the titration, the first transplant tumors were employed. The stock suspension was prepared and diluted in the usual way.

With this carcinoma, 100 percent "takes" were obtained with the centrifuged 1:10 suspension, although the tumors were slow in making their appearance. The 1:30 dilution produced two tumors in six cases, while the 1:90 dilution gave negative results.

Analogous results were obtained on repetition of the titration with the next generation of carcinoma 62. (See table 5.) Here, too, there was a progressive decrease in the percentage of tumors obtained, and a progressive increase in the latent period, with increasing dilution of the suspension.

TABLE 5.—*Tumors obtained in strain D mice with suspensions of carcinoma 62*

[Tumor history: Second transplant of a carcinoma that occurred spontaneously in a strain D mouse; gelatin concentration, 10 percent; amount injected, 0.1 cc; number of mice, 30]

Days after inoculation	Tumor size		
	Dilution of suspension		
	1:10 B	1:30 B	1:90 B
26	1-0-0-0-0	0-0-0-0-0	0-0-0-0-0
	0-0-1-1-0	0-0-0-0-0	0-0-0-0-0
33	4-1-0-0-1	0-0-0-2-0	0-0-0-0-0
	0-0-2-3-0	?-0-1-0-0	0-0-0-0-0
46	8-2-0-0-2	0-0-2-4-0	0-0-0-0-0
	2-0-7-7-1	2-0-4-0-0	0-0-0-0-0
60	*-7-3-0-5	0-0-4-7-0	2-0-0-0-0
	3-3-*-*-2	4-0-8-0-0	0-0-0-0-0

B denotes preparations centrifuged for 2 minutes.
The size of each tumor is designated by a number, from 1 to 9, corresponding to the "average diameter"; 0 denotes tumor absent; * denotes a very large tumor.

DISCUSSION

Analogous experiments with rat tumors have recently been carried out, independently, by Schrek (*2*), who stated: "In a quantitative study of tumor growth, it is necessary that the inoculum used should be easily and accurately measurable and should be of known potency. For this purpose, a homogeneous tumor cell suspension was prepared. The potency of this suspension was found by titration." The results obtained by Schrek in rat tumor titrations and those obtained in this laboratory in mouse tumor titrations are in general agreement as regards the following points: (1) With increasing dilution of the tumor suspensions, the percentage of "takes" decreased until finally no tumors were obtained; (2) the latent period was increased by in-

creasing the dilution; (3) duplicate titrations had about the same reproducibility in the rat tumor and in the mouse tumor titrations.

The chief differences in the two investigations were: (1) The rat tumor suspensions were prepared in physiological saline and were filtered by gravity through an 80-mesh sieve, whereas the mouse tumor suspensions were prepared in saline that contained 10 percent gelatin and were centrifuged to remove the large particles; (2) pure strain animals were employed in the mouse experiments; (3) tumors were used that had arisen in the same pure strains of mice that were employed in the titrations.

Schrek stated: "The minimal inoculating dose, used as a measure of the potency of the suspension, is defined, in accordance with the principles developed by Trevan's work on drugs and toxins * * *, as the volume of suspension which gave rise to tumors in 50 percent of the animals of a suitable strain, age, and weight." A similar concept was employed in the mouse tumor titrations in which "Intermediate dilutions were sought which gave rise to tumors in about 50 percent of the cases. With different tumors, this mid-point in the titration occurred at different dilutions" (*4*).

With the two rat tumors studied by Schrek, the titers of the suspensions of both tumors were roughly the same. With the mouse tumors, wide differences in the titers were noted. Emulsions of sarcoma 180, even in the 1:10 dilution, failed to give any tumors at all after centrifuging for a few minutes. When sarcomas were used that had arisen originally in pure-strain mice, tumors were obtained, even after centrifuging, with 1:100 dilution in the case of the strain A sarcoma and with 1:1,000 dilution in the case of the strain D sarcoma. This result is not unexpected; for, even though sarcoma 180 *tissue* gives 100 percent "takes," isolated *cells* of sarcoma 180 would not be so likely to establish themselves as successfully as isolated cells of sarcomas that were derived from tissues of other mice of the same pure strain.

The two carcinomas examined in this way gave considerably lower titers than did the two pure-strain sarcomas. Carcinoma 29,225 gave about the same results as sarcoma 180 in that the centrifuged suspensions gave negative results even in the 1:10 dilution. Carcinoma 62 gave a higher titer; tumors were obtained with centrifuged preparations in 1:10 and 1:30 dilution. However, this was a much lower titer than that obtained with the pure-strain sarcomas.

It would appear that carcinomas of the same pure strain, which give 100 percent "takes" when implanted as tissue or in a highly concentrated and uncentrifuged suspension, fail to give rise to tumors when only isolated cells or very small clumps of cells are implanted. This also is not unexpected, for the suspensious were injected *sub-*

cutaneously; in such an environment small numbers of sarcoma cells are more likely to establish themselves successfully than equally small numbers of carcinoma cells, even though the latter be of the same pure strain.

In the titrations reported by Schrek, the finely divided tumor tissue was diluted 1:10, 1:100, 1:333, and 1:1,000 and injected in doses of 0.1 cc. This is essentially the procedure employed in the mouse titrations. With the rat tumors, Schrek obtained about 34 percent "takes" with 1:100 dilution. With this same dilution the pure strain mouse sarcomas gave a much higher percentage of "takes", while the pure-strain mouse carcinomas gave no "takes." The actual concentrations of tumor material in suspensions of a stated dilution are, however, not comparable in the mouse and rat experiments inasmuch as the mouse suspensions were centrifuged before dilution.

Microscopic examination[4] of the centrifuged suspensions showed that the tumor material was present as single cells, as small clumps of cells, and as cellular debris. Attempts were made at cell counts, but these were soon abandoned, inasmuch as it was not found possible to differentiate living from dead cells. Other studies,[4] now in progress, may perhaps furnish criteria that will be helpful in such cell counts. Staining with neutral red has so far not been found reliable in distinguishing the living from the dead cells in such preparations.

The three major points brought out in this investigation are: *First*, that with sufficiently dilute suspensions no tumors are obtained, and that a point may be found in the titration at which tumors are obtained in about half of the mice; *second*, that the time required for the development of the tumors increases with the dilution of the suspension; and *third*, different tumors give widely different results in such titrations.

For chemotherapeutic studies, this technique has several advantages. In the first place the period available for treatment is lengthened appreciably by the use of dilute suspensions. In the second place, the tumors obtained do not vary so greatly among themselves in size and in growth rate as is often the case when other methods of transplanting are used. Finally, the possibility is opened for investigation as to whether agents which have no effect when a so-called "overwhelming dose" of tumor is given may be found to have a detectable effect at the dilution which gives rise to tumors in about half of the animals.

(Technical assistance was given by Mr. Adrien Perrault. This work was aided by personnel supplied by the Boston office of the Federal Emergency Relief Administration.)

[4] In collaboration with Dr. Morris Belkin.

SUMMARY

1. Homogeneous tumor suspensions have been prepared by shaking minced tumor tissue in salt solutions containing gelatin.

2. Mouse tumors have been titrated by injecting into pure strain mice equal volumes of tumor suspensions of varying dilution.

3. With concentrated suspensions 100 percent "takes" were obtained, and with highly diluted ones no tumors were obtained. Dilutions may be found with which tumors may be obtained in approximately half of the mice.

4. When suspensions of tumors arising in pure-strain mice were injected subcutaneously into mice of the same pure strain, sarcomas gave rise to tumors at high dilutions, whereas carcinomas gave rise to tumors only at comparatively low dilutions.

5. Duplicate titrations gave results of satisfactory reproducibility

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DEATHS DURING WEEK ENDED MAY 2, 1936

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

	Week ended May 2, 1936	Corresponding week, 1935
Data from 86 large cities of the United States:		
Total deaths	9,480	8,715
Deaths per 1,000 population, annual basis	13.2	12.1
Deaths under 1 year of age	582	537
Deaths under 1 year of age per 1,000 estimated live births	53	49
Deaths per 1,000 population, annual basis, first 18 weeks of year	13.6	12.6
Data from industrial insurance companies:		
Policies in force	68,511,026	67,870,719
Number of death claims	14,293	13,604
Death claims per 1,000 policies in force, annual rate	10.9	10.5
Death claims per 1,000 policies, first 18 weeks of year, annual rate	10.9	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended May 9, 1936, and May 11, 1935

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 9, 1936, and May 11, 1935

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935
New England States:								
Maine	1	1	3	1	134	160	0	0
New Hampshire	----	1	----	----	82	----	0	0
Vermont	1	1	----	----	545	39	0	0
Massachusetts	7	10	----	----	1,407	374	7	2
Rhode Island	----	----	----	----	76	319	3	1
Connecticut [1]	6	5	3	1	249	1,535	5	1
Middle Atlantic States:								
New York	73	35	[2] 8	[2] 10	3,892	3,027	25	19
New Jersey	9	27	14	7	567	2,037	8	2
Pennsylvania	21	44	----	----	1,114	3,543	9	7
East North Central States:								
Ohio	20	30	65	26	333	1,544	9	27
Indiana	6	13	40	17	23	376	10	3
Illinois	25	69	54	30	43	2,188	9	17
Michigan	5	7	5	----	113	5,459	3	5
Wisconsin	1	2	37	8	130	1,613	2	1
West North Central States:								
Minnesota	1	12	2	2	456	585	2	0
Iowa	7	8	31	2	3	445	3	3
Missouri	16	18	207	54	41	487	8	7
North Dakota	----	1	18	2	----	30	0	0
South Dakota	----	----	----	----	4	38	0	1
Nebraska	2	3	----	11	20	234	0	3
Kansas	10	14	48	4	22	1,034	2	2
South Atlantic States:								
Delaware	1	----	----	2	19	12	0	0
Maryland [3]	2	6	12	9	429	67	10	12
District of Columbia	16	8	1	1	187	----	1	11
Virginia	18	9	147	----	256	581	11	11
West Virginia	8	14	27	35	76	449	7	5
North Carolina [1]	19	7	28	2	43	200	8	2
South Carolina	6	4	142	80	76	29	4	1
Georgia [1]	4	10	----	----	----	----	2	2
Florida	3	6	8	1	29	50	4	1
East South Central States:								
Kentucky	9	9	101	10	27	506	9	6
Tennessee	6	12	160	28	29	112	7	4
Alabama [1]	13	13	123	51	16	164	1	1
Mississippi [3]	5	11	----	----	----	----	0	1

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 9, 1936, and May 11, 1935—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935
West South Central States:								
Arkansas	6	----	169	70	1	62	0	2
Louisiana	11	15	310	15	63	70	2	0
Oklahoma [4]	5	8	247	51	26	66	1	4
Texas	28	38	498	92	450	161	4	0
Mountain States:								
Montana [4]	6	----	2	16	----	364	1	2
Idaho	----	----	6	1	11	8	0	0
Wyoming [4]	2	1	----	----	2	124	0	0
Colorado	3	7	----	----	26	307	1	0
New Mexico	2	5	26	5	38	66	1	0
Arizona	1	2	35	10	116	11	1	2
Utah [3]	----	2	----	----	12	14	2	0
Pacific States:								
Washington	1	4	3	----	330	436	2	3
Oregon [4]	2	----	14	32	138	288	0	0
California	23	36	163	28	1,914	1,682	9	6
Total	411	528	2,757	714	13,568	30,896	193	177
First 19 weeks of year	10,570	12,527	132,745	98,748	181,394	521,529	4,515	2,664

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935
New England States:								
Maine	0	0	9	12	0	0	3	1
New Hampshire	0	0	13	7	0	0	1	0
Vermont	0	0	5	9	0	0	0	1
Massachusetts	2	0	246	191	0	0	1	8
Rhode Island	0	0	19	10	0	0	0	1
Connecticut [1]	0	0	40	108	0	0	2	0
Middle Atlantic States:								
New York	1	0	904	1,147	0	0	12	5
New Jersey	1	0	328	204	0	0	0	1
Pennsylvania	2	1	381	660	0	0	16	8
East North Central States:								
Ohio	0	0	288	664	0	0	4	5
Indiana	0	0	180	114	4	1	0	2
Illinois	0	0	575	1,287	18	4	6	6
Michigan	1	1	283	369	0	0	4	1
Wisconsin	1	2	546	431	6	10	0	1
West North Central States:								
Minnesota	1	0	314	367	7	9	2	1
Iowa	0	1	203	83	62	6	4	1
Missouri	0	0	205	60	1	1	1	5
North Dakota	0	0	63	56	8	1	0	0
South Dakota	0	0	16	11	19	9	0	0
Nebraska	0	1	101	80	21	28	0	0
Kansas	0	0	296	56	38	22	1	3
South Atlantic States:								
Delaware	0	0	3	6	0	0	0	0
Maryland [3]	0	0	46	54	0	0	2	5
District of Columbia	0	0	17	64	0	0	1	0
Virginia	1	3	49	26	0	0	0	6
West Virginia	0	0	32	63	0	0	4	9
North Carolina [1]	2	0	23	8	0	1	3	3
South Carolina	0	0	4	3	0	0	3	5
Georgia [1]	0	0	7	12	0	0	9	9
Florida	0	1	7	3	0	0	5	1
East South Central States:								
Kentucky	0	0	23	38	1	0	4	6
Tennessee	0	0	20	21	0	1	3	6
Alabama [1]	0	1	6	7	0	1	3	4
Mississippi [3]	0	0	6	4	0	0	2	3

See footnotes at end of table.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended May 9, 1936, and May 11, 1935—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935	Week ended May 9, 1936	Week ended May 11, 1935
West South Central States:								
Arkansas	0	2	8	6	0	0	1	2
Louisiana	0	2	3	10	1	0	5	14
Oklahoma [4]	0	4	36	14	0	2	2	5
Texas	3	1	65	28	2	3	3	7
Mountain States:								
Montana [5]	1	0	66	7	11	9	0	0
Idaho	1	0	23	3	3	0	0	1
Wyoming [5]	0	0	77	10	24	7	0	0
Colorado	0	0	87	149	24	3	0	0
New Mexico	0	0	52	13	0	2	1	2
Arizona	1	0	23	41	0	0	0	0
Utah [3]	0	0	41	91	4	0	0	0
Pacific States:								
Washington	0	2	73	61	9	25	3	3
Oregon [5]	0	0	21	57	8	3	5	1
California	4	7	271	218	1	18	13	4
Total	22	29	6,104	6,943	272	166	129	146
First 19 weeks of year	338	459	144,638	136,417	4,396	3,623	2,145	2,540

[1] Typhus fever, week ended May 9, 1936, 6 cases, as follows: Connecticut, 1; North Carolina, 1; Georgia, 2; Alabama, 2.
[2] New York City only.
[3] Week ended earlier than Saturday.
[4] Exclusive of Oklahoma City and Tulsa.
[5] Rocky Mountain spotted fever, week ended May 9, 1936, 15 cases, as follows: Montana, 6; Wyoming, 5; Oregon, 4.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
April 1936										
Connecticut	7	9	35	1	423	-------	0	272	0	9
District of Columbia	20	62	5	-------	404	1	0	81	0	3
Iowa	10	18	38	-------	18	-------	0	1,000	169	1
North Carolina	22	70	183	-------	223	48	4	82	3	7
Pennsylvania	41	138	-------	2	4,110	-------	4	2,297	0	40
Wyoming	1	2	-------	-------	16	-------	0	242	27	0

April 1936

	Cases
Anthrax:	
Pennsylvania	1
Chickenpox:	
Connecticut	396
District of Columbia	60
Iowa	233
North Carolina	322
Pennsylvania	2,384
Wyoming	39
Conjunctivitis:	
Connecticut	18
Dysentery:	
Connecticut (bacillary)	1
Epidemic encephalitis:	
Connecticut	1
Iowa	1
Pennsylvania	4
German measles:	
Connecticut	1,675
Iowa	5
North Carolina	713
Pennsylvania	1,901
Leprosy:	
Pennsylvania	1
Mumps:	
Connecticut	385
Iowa	637
Pennsylvania	3,111
Wyoming	114
Ophthalmia neonatorum:	
North Carolina	1
Pennsylvania	2
Paratyphoid fever:	
Connecticut	2
Rabies in man:	
Pennsylvania	2
Rocky Mountain spotted fever:	
North Carolina	1
Wyoming	4
Septic sore throat:	
Connecticut	26
Iowa	1
Septic sore throat—Contd.	
North Carolina	1
Wyoming	5
Tetanus:	
Connecticut	1
Tularaemia:	
North Carolina	1
Typhus fever:	
North Carolina	1
Undulant fever:	
Connecticut	6
Iowa	8
Pennsylvania	5
Whooping cough:	
Connecticut	563
District of Columbia	94
Iowa	58
North Carolina	129
Pennsylvania	1,140
Wyoming	11

WEEKLY REPORTS FROM CITIES

City reports for week ended May 2, 1936

This table summarizes the reports received weekly from a selected list of 140 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference.

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet-fever cases	Smallpox cases	Tuberculosis deaths	Typhoid-fever cases	Whooping-cough cases	Deaths, all causes
		Cases	Deaths								
Maine:											
Portland	0	------	0	28	3	4	0	0	0	4	26
New Hampshire:											
Concord	0	------	0	0	0	0	0	1	0	0	10
Manchester	0	------	0	0	4	3	0	2	0	0	12
Nashua	0	------	--------	25	-------	0	0	-------	0	0	--------
Vermont:											
Barre	-------	------	--------	-------	-------	-------	-------	-------	-------	-------	--------
Burlington	0	------	0	114	0	0	0	0	0	2	10
Rutland	0	------	1	55	0	1	0	0	0	0	6
Massachusetts:											
Boston	2	------	0	470	33	69	0	7	0	23	275
Fall River	1	------	0	4	1	22	0	1	0	0	33
Springfield	0	------	0	1	2	10	0	2	0	3	47
Worcester	0	------	0	77	5	9	0	2	0	16	61
Rhode Island:											
Pawtucket	0	------	0	0	0	2	0	0	0	0	14
Providence	0	------	0	21	3	15	0	4	0	5	77
Connecticut:											
Bridgeport	1	------	1	11	1	1	0	2	0	0	38
Hartford	1	------	0	0	7	10	0	0	0	4	61
New Haven	0	------	2	0	4	1	0	1	0	34	64
New York:											
Buffalo	0	------	0	50	18	45	0	9	0	6	177
New York	41	------	8	1,831	142	456	0	74	5	61	1,561
Rochester	0	------	0	2	5	6	0	0	1	0	80
Syracuse	0	------	0	98	2	11	0	2	0	24	56
New Jersey:											
Camden	0	2	2	6	1	5	0	1	0	0	35
Newark	0	6	1	15	15	156	0	5	2	14	124
Trenton	0	------	0	2	3	9	0	2	0	9	35
Pennsylvania:											
Philadelphia	2	4	3	609	46	84	0	34	1	77	491
Pittsburgh	6	5	4	20	41	92	0	13	2	16	214
Reading	0	------	0	2	1	11	0	2	0	1	38
Scranton	0	------	--------	0	-------	1	0	-------	0	0	--------
Ohio:											
Cincinnati	1	------	2	19	19	34	0	13	0	0	154
Cleveland	3	26	0	87	26	93	0	15	0	74	225
Columbus	0	1	1	2	12	1	0	2	0	1	106
Toledo	0	2	2	29	7	3	0	6	0	29	89
Indiana:											
Anderson	0	------	0	-------	2	15	0	0	0	4	18
Fort Wayne	0	------	0	0	4	10	0	1	0	0	37
Indianapolis	1	------	0	6	25	65	0	9	0	5	128
Muncie	0	------	1	0	2	1	0	1	0	0	18
South Bend	0	------	0	0	2	1	0	0	0	22	16
Terre Haute	0	------	0	0	7	0	0	0	0	0	28
Illinois:											
Alton	0	------	0	0	1	3	0	0	0	1	8
Chicago	7	8	2	17	74	194	0	48	0	96	878
Elgin	0	------	0	0	1	5	0	0	0	0	14
Moline	0	------	0	0	3	9	0	0	0	0	10
Springfield	0	------	0	0	4	9	0	0	0	0	30
Michigan:											
Detroit	5	5	4	38	29	144	1	14	0	247	290
Flint	0	------	0	2	8	10	0	1	0	14	34
Grand Rapids	0	------	0	10	1	9	0	0	0	4	32
Wisconsin:											
Kenosha	0	2	0	0	0	11	0	0	0	0	6
Madison	0	------	0	2	4	10	0	1	0	6	24
Milwaukee	0	1	1	5	13	81	0	4	0	110	125
Racine	0	------	0	2	1	16	0	0	0	3	15
Superior	0	------	0	1	0	26	0	0	0	0	12
Minnesota:											
Duluth	0	------	0	7	2	15	0	1	0	16	22
Minneapolis	2	------	0	260	8	90	0	1	0	8	124
St. Paul	0	1	1	201	9	33	0	1	0	2	67
Iowa:											
Cedar Rapids	0	------	--------	0	-------	3	0	-------	0	4	--------
Davenport	0	------	--------	0	-------	9	0	-------	0	0	--------
Des Moines	0	------	--------	1	-------	5	1	-------	0	0	37
Sioux City	1	------	--------	0	-------	23	30	-------	0	0	--------
Waterloo	0	------	--------	1	-------	5	0	-------	0	0	--------

City reports for week ended May 2, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet-fever cases	Smallpox cases	Tuberculosis deaths	Typhoid-fever cases	Whooping-cough cases	Deaths, all causes
		Cases	Deaths								
Missouri:											
Kansas City	1	1	0	0	9	107	0	3	0	2	112
St. Joseph											
St. Louis	3		3	7	21	77	0	13	0	13	264
North Dakota:											
Fargo	0		0	1	1	2	0	1	1	0	16
Grand Forks	0			1		0	0		0	0	
Minot	0		0	0	0	8	0	0	0	0	5
South Dakota:											
Aberdeen	0			0		0	0		0	0	
Nebraska:											
Omaha	2		0	4	10	59	4	4	0	4	73
Kansas:											
Lawrence	0	1	0	1	0	10	0	0	0	0	8
Topeka	0		0	2	11	60	0	0	0	1	41
Wichita	1	1	1	2	12	46	1	0	0	0	39
Delaware:											
Wilmington	0		0	2	2	1	0	1	0	14	24
Maryland:											
Baltimore	5	4	0	235	25	33	0	11	0	58	231
Cumberland	1		0	0	2	1	0	1	0	0	12
Frederick	0		0	1	0	0	0	0	0	0	4
District of Col.:											
Washington	7	3	2	126	23	23	0	14	1	28	182
Virginia:											
Lynchburg	2		0	1	1	1	0	0	0	9	14
Norfolk	0		0	1	4	2	0	1	0	0	32
Richmond	0		2	1	7	37	0	2	0	0	62
Roanoke	0		0	0	2	1	0	0	0	0	23
West Virginia:											
Charleston	0	2	0	2	1	1	0	0	1	0	8
Huntington	0			0		4	0		0	0	
Wheeling	0		0	65	1	0	0	2	0	3	18
North Carolina:											
Gastonia	0		0	0	0	0	0	0	0	0	
Raleigh											
Wilmington	0		0	0	3	0	0	0	0	0	13
Winston-Salem	0	2	0	34	2	2	0	0	1	0	13
South Carolina:											
Charleston	0	9		1	5	1	0	0	1	9	17
Columbia											
Florence	0		0	0	3	0	0	0	0	0	12
Greenville	0		0	8	0	0	0	0	0	0	
Georgia:											
Atlanta	1	8	3	1	12	9	0	4	1	0	89
Brunswick	0		0	0	2	0	0	0	0	0	4
Savannah	0	22	1	0	2	0	0	2	0	1	41
Florida:											
Miami	0	8	3	2	2	2	0	1	0	0	39
Tampa	0	2	2	11	0	4	0	1	0	0	29
Kentucky:											
Ashland	0		4	0	2	0	0	0	0	0	18
Covington	0		0	1	1	3	0	1	0	0	12
Lexington	0	10	0	12	3	2	0	2	0	2	22
Louisville	0	2	1	32	13	11	0	6	0	4	96
Tennessee:											
Knoxville	0	3	3	9	3	1	0	3	0	0	38
Memphis	1		3	0	10	6	0	3	0	21	81
Nashville	1		3	2	14	2	0	1	1	0	70
Alabama:											
Birmingham	0	8	4	0	6	0	0	7	1	0	62
Mobile	1	1	1	1	2	0	0	1	0	0	21
Montgomery	0			1		0	0		0	0	
Arkansas:											
Fort Smith	0			0		0	0		0	0	
Little Rock	2		0	0	6	1	0	2	1	0	9
Louisiana:											
Lake Charles	0		0	0	2	1	0	0	0	0	3
New Orleans	5	19	10	8	22	9	0	10	4	65	192
Shreveport	0		0	35	12	1	0	1	0	1	51
Oklahoma:											
Oklahoma City	1	30	2	0	6	0	0	4	0	0	70
Tulsa	0			3		3	0		0	0	
Texas:											
Dallas	0	7	7	32	8	10	0	2	0	6	72
Fort Worth	0		0	2	2	3	0	0	0	0	39
Galveston	0		0	2	4	0	0	1	0	0	19
Houston	2		4	36	14	5	0	6	0	1	79
San Antonio	2		2	7	10	1	0	8	0	0	85

City reports for week ended May 2, 1936—Continued

State and city	Diphtheria cases	Influenza		Measles cases	Pneumonia deaths	Scarlet-fever cases	Smallpox cases	Tuberculosis deaths	Typhoid-fever cases	Whooping-cough cases	Deaths, all causes
		Cases	Deaths								
Montana:											
Billings	0	------	0	0	2	4	0	0	0	0	11
Great Falls	0	------	0	1	0	3	0	0	0	1	11
Helena	0	------	0	0	0	4	1	0	0	0	4
Missoula	0	------	0	0	0	1	0	0	0	0	1
Idaho:											
Boise	0	------	0	4	0	1	0	0	0	0	5
Colorado:											
Colorado Springs	0	------	0	1	2	6	0	0	0	2	14
Denver	2	------	0	23	10	17	1	7	0	26	84
Pueblo	0	------	0	1	3	15	0	0	0	1	10
New Mexico:											
Albuquerque	1	------	0	6	3	6	0	3	0	2	9
Utah:											
Salt Lake City	0	------	0	33	2	38	1	1	0	3	40
Nevada:											
Reno	------	------	------	------	------	------	------	------	------	------	------
Washington:											
Seattle	1	------	------	225	3	6	2	3	0	12	68
Spokane	0	------	0	15	1	30	1	0	0	16	27
Tacoma	0	------	0	20	5	2	0	0	0	3	22
Oregon											
Portland	0	2	2	31	5	5	0	2	0	1	74
Salem	0	6	------	8	------	0	0	------	0	0	------
California:											
Los Angeles	16	22	0	460	25	61	0	14	0	41	292
Sacramento	0	1	0	6	2	5	0	4	1	8	40
San Francisco	0	------	0	199	11	67	0	5	0	26	178

State and city	Meningococcus meningitis		Poliomyelitis cases
	Cases	Deaths	
Massachusetts:			
Boston	3	1	1
Rhode Island:			
Providence	1	1	0
New York:			
New York	14	6	2
New Jersey:			
Newark	1	0	0
Pennsylvania:			
Philadelphia	4	0	0
Pittsburgh	2	1	0
Reading	2	0	0
Ohio:			
Cincinnati	5	1	0
Cleveland	1	1	0
Columbus	0	1	0
Toledo	1	0	0
Indiana:			
Indianapolis	2	0	0
Illinois:			
Chicago	8	3	0
Michigan:			
Detroit	3	2	1
Wisconsin:			
Madison	0	0	1
Minnesota:			
Minneapolis	2	2	0
St. Paul	1	0	0
Iowa:			
Davenport	1	1	0
North Dakota:			
Grand Forks	1	1	0
Kansas:			
Topeka	0	1	0
Maryland:			
Baltimore	10	6	0
District of Columbia:			
Washington	8	1	0
Virginia:			
Lynchburg	2	1	0
Richmond	1	0	0
West Virginia:			
Huntington	1	0	0
North Carolina:			
Wilmington	1	0	0
South Carolina:			
Charleston	3	1	0
Georgia:			
Atlanta	2	0	0
Kentucky:			
Lexington	1	1	0
Louisville	1	1	0
Tennessee:			
Nashville	1	0	0
Louisiana:			
New Orleans	7	2	0
Shreveport	0	2	0
Oklahoma:			
Oklahoma City	2	1	0
Texas:			
Dallas	1	1	0
Fort Worth	0	0	1
Galveston	0	1	0
Houston	1	1	0
Utah:			
Salt Lake City	1	0	0
Washington:			
Spokane	1	0	0
California:			
Los Angeles	2	0	0
San Francisco	1	0	0

Dengue.—Cases: Charleston, S. C., 1.
Epidemic encephalitis.—Cases: Worcester, 1; Toledo, 1.
Pellagra.—Cases: Winston-Salem, 4; Charleston, S. C., 2; Savannah, 6; Miami, 1; San Francisco, 1.
Typhus fever.—Cases: Wilmington, N. C., 1; Fort Worth, 1.

FOREIGN AND INSULAR

HAWAII TERRITORY

Honolulu—Rat leprosy.—Under date of April 16, 1936, it was reported that a wild rat trapped in the city of Honolulu, Hawaii Territory, on April 9, 1936, had been found infected with rat leprosy.

SWITZERLAND

Communicable diseases—January—March 1936.—During the months of January, February, and March 1936, cases of certain communicable diseases were reported in Switzerland as follows:

Disease	January	February	March	Disease	January	February	March
Cerebrospinal meningitis	3	1	2	Paratyphoid fever			2
Chicken pox	316	246	248	Poliomyelitis	11	4	8
Diphtheria and croup	221	120	98	Scarlet fever	302	279	228
German measles			11	Tuberculosis	314	343	319
Lethargic encephalitis		1	3	Typhoid fever	1	3	4
Measles	122	104	102	Undulant fever			4
Mumps	250	221	169	Whooping cough	124	136	151

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for April 24, 1936, pages 522-534. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued May 29, 1936, and thereafter, at least for the time being, in the issue published on the last Friday of each month.

Cholera

India—Chittagong.—During the week ended May 2, 1936, 4 cases of cholera with 1 death were reported at Chittagong, India.

Plague

Argentina—San Luis Province.—For the period April 16–30, 1936, 6 cases of pneumonic plague with 6 deaths were reported at Medanos and Los Medanitos, San Luis Province, Argentina.

Ceylon—Kalutara—Correction.—The case of bubonic plague in Kalutara, Ceylon, reported in PUBLIC HEALTH REPORTS for May 15, 1936, page 642, was stated in a later report not to be plague.

Ceylon—Manar.—On April 17, 1936, 1 case of bubonic plague was reported at Manar, Ceylon.

Hawaii Territory—Island of Hawaii—Hamakua District—Paauhau Sector.—Two rats found April 27, 1936, in Paauhau Sector, Hamakua District, Island of Hawaii, Hawaii Territory, have been proved plague-infected.

Smallpox

Argentina—Buenos Aires Province—Ayacucho.—During the period April 16–30, 1936, 1 case of smallpox with 1 death was reported at Ayacucho, Buenos Aires Province, Argentina.