Public Health Reports

Vol. 64 • SEPTEMBER 23, 1949 • *No. 38*

Determination of the Specific Gravity of Ragweed Pollen (*Ambrosia elatior*) and Conversion of Gravity Sample Counts to Volumetric Incidence

By JAMES H. CRAWFORD*

Specific Gravity Determinations

This study is part of an investigation of the spread of pollen from a given point or aerial source by a turbulent wind. Since the rate of diffusion in the direction of wind motion is a function of the specific gravity of the individual pollen grain, it was felt necessary to reinvestigate the latter by more accurate methods than heretofore used. The need for accurate specific gravity data has been fully discussed by Durham (*1*, *2*).

In the determination of the specific gravity of pollen grains, it should be remembered that this material is hygroscopic causing the specific gravity to vary with the moisture content of the air. In this study a commercially dried pollen from the common ragweed, *Ambrosia elatior*, was used. Before the test was started the pollen was taken from the bottle and exposed to the air in the laboratory for at least 24 hours. Durham (*1*), in discussing some of the characteristics of pollen grains, points out that while extreme moisture absorption may cause appreciable changes in the weight and volume of pollen grains, it is quite likely that free-floating pollen usually contains little, if any, more moisture than commercially dried pollen. It was found that after exposure to the air in the laboratory there was no appreciable change in the weight of the ragweed pollen used in the present study.

The specific gravity of various pollens is generally stated to be less than 1.00. Usual values range from 0.50 to 1.00. These values are exceptionally low considering that cellulose and proteins have specific gravities in excess of 1.00. The low values for the specific gravity of pollens probably indicate that the pollen grains are made up from a spongelike mass. The following data indicate that pollen grains are probably more uniformly dense than is generally supposed.

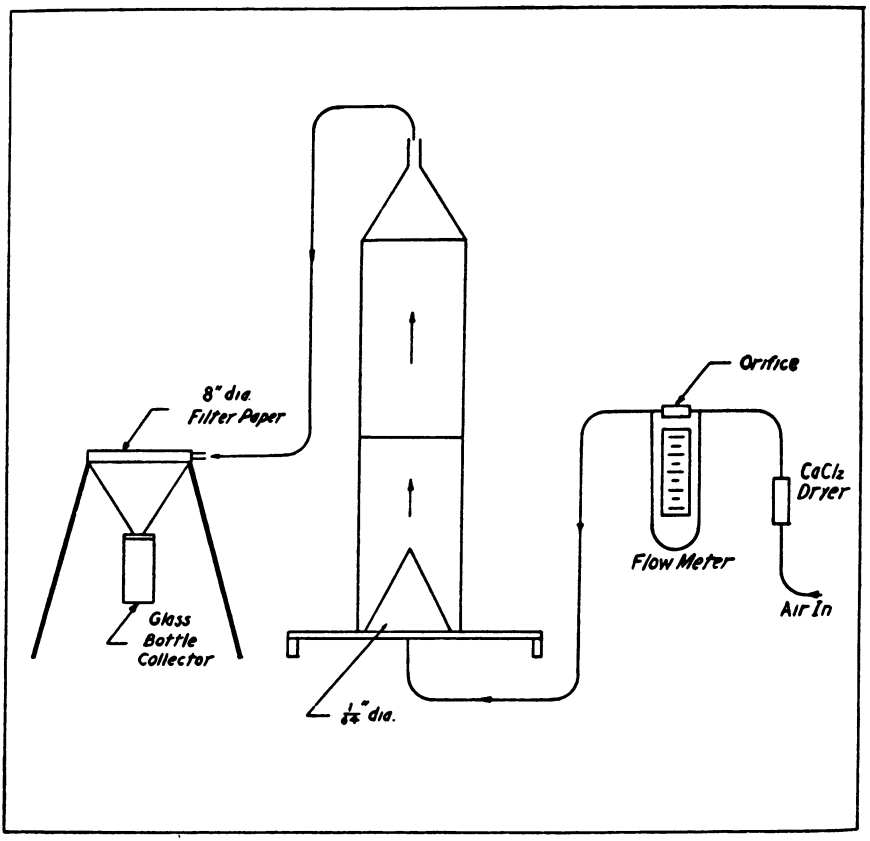
* Sanitary engineer (R), Communicable Disease Center, Public Health Service, Atlanta, Ga. Presented at the 1949 spring meeting of the Georgia Academy of Science while the author was a student in the Department of Public Health, Georgia Institute of Technology, Atlanta, Ga.

The rate of fall of pollen grains has been studied by various investigators (*1*, *3*, *4*). The method used consisted in observing the time taken for pollen grains to fall through a cylinder of known length. Pollen was allowed to enter the top of a cylinder and the time of its first appearance on a clean disc placed at the bottom of the cylinder at fixed intervals was noted.

Since the pollen used in this study proved to have grains of more or less uniform diameters, the calculation of the specific gravity of the individual grains by the application of Stokes' law was not a difficult task.

The method used in this study to determine the rate of fall of ragweed pollen is in a sense the reverse of that used by the investigators cited above. Instead of determining the time of fall of single pollen grains, the minimum velocity required to lift and convey pollen grains was measured. This was accomplished by means of an elutriator shown in the figure. Because of the uniformity of the pollen grains, this device was particularly effective.

The procedure used was as follows: Pollen was placed in the cyl-



Elutriator used for the determination of pollen density.

inder at the bottom of the elutriator—at the base of the cone. The cone was so constructed that dry air supplied through a series of 1/64-inch diameter holes, arranged so as to give a tangential motion to the air, caused the particles to be swept upward through the vertical cylinder.

When sufficient volume of air is blown through the tangential holes, the particles rise to the full height of the cylinder and are collected on a filter paper. Starting with a flow of air insufficient to raise the pollen grains, the flow was gradually increased and the filter paper was examined after a lapse of time sufficient to allow the pollen to pass from the base of the cone to the filter. The filter paper was then removed and examined under the microscope for pollen.

The volume of the air being known, the average velocity of flow across the elutriator cylinder is computed. Since in all experiments the flow was streamlined, the axial velocity is twice the average velocity determined from the volume of air measured and the cross-sectional area of the elutriator cylinder. Moreover, it is the axial velocity which governs, since the pollen grains moving along the axis of the elutriator where the air velocity is maximum will appear first on the filter paper. This is exactly the same velocity the pollen would have in free fall as in the experiments of Durham. The rate of fall, determined by this method, was 1.6 cm. per sec. or 0.0525 ft. per sec. which is approximately 80 percent higher than velocities obtained by other investigators for pollen of the common ragweed by the free-fall method.

The calculations for the determination of the specific gravity of the pollen grains are simple and the steps are as follows:

(1) The average air velocity is obtained by dividing the volume of air needed to show the first evidence of pollen grains on the filter paper by the cross-sectional area of the elutriator.

(2) Since the axial velocity governs, and since this is twice the average velocity we have

$$v \text{ (axial velocity)} = 2v \text{ (average velocity)}.$$

(3) Stokes' law for the velocity of free fall of particles, when the motion is steady is

$$v = \frac{(\rho_p - \rho_a)\, 2gr^2}{9\mu}$$

where ρ_p is the density of the particle, ρ_a the density of air, r the particle radius, and μ the viscosity of air. Since ρ_a is negligible in comparison with ρ_p, we may then write that

$$\rho_p = \frac{9\mu v}{2gr^2}$$

The pollen grains studied were remarkably uniform and ranged from 18 to 22 microns in diameter. Using an average diameter of 20 microns (20×10^{-4} cm.), and since for air, μ equals 180×10^{-6} poise, we get

$$\rho_p=0.83v$$

If v is in cm. per sec. and represents the axial velocity through the elutriator, the specific gravity of the pollen is readily determined.

In this experiment it was found that the volume of air passed through the elutriator when the pollen appeared on the filter paper was 0.305 cu. ft. per min. Since the diameter of the elutriator cylinder was 6 inches, we obtain for the average velocity 0.79 cm. per sec. The axial velocity is, therefore, 2×0.79 or 1.58 cm. per sec. so that

$$\rho_p=0.83\times1.58 \text{ or } 1.30 \text{ (specific gr.)}$$

The value thus obtained is roughly 2.4 times the probable outdoor mean specific gravity published by Durham (*1*). This result was so surprising that it was decided to check it by a totally different technique, namely the permeameter method of surface measurement. This method has been fully described by Blaine (*5*). It consists of measuring the pressure drop through a small column packed with the material the surface of which is to be measured. By using a relation involving the pressure drop and the porosity of the material, the surface is easily calculated. If S_w represents the surface per gram of pollen as measured by the permeameter, then

$$S_w=\frac{6}{\rho d}$$

where the terms have the same meaning as in the formula given above. Substituting the value obtained for S_w which in this instance was 2280 cm. per gm. of pollen, and putting d equals 20×10^{-4} cm., we have

$$\rho_p=\frac{6}{S_w d}$$

we again obtain a value of 1.3 for the specific gravity checking the results already obtained from the elutriation technique.

The specific gravity of ragweed (*A. elatior*) pollen, determined in the manner described, warrants the assumption that pollen grains have specific gravities approaching that of cellulose and that they cannot be considered as possessing a spongelike structure. The difference in the results reported in this paper and those of others is primarily one of technique. Pollen grains are easily charged, and in

free fall undoubtedly deviate from a direct straight line of fall. By elutriation, the air acts as a carrier so that this influence is minimized. The check result obtained by the permeameter can hardly be fortuitous, considering that the pollen grains were remarkably uniform and that errors are less than those obtained by irregular particles. In the latter instance it is estimated that surface areas measured by the permeameter are probably within plus or minus 5 percent of the correct value.

Durham (*1*) found that common ragweed pollen, commercially dried, had a tendency to absorb very little moisture when taken from the container and exposed to the laboratory air. However, when placed in a humidifier, which would surely represent extreme outdoor conditions, the moisture absorbed represented about 65 percent of the weight of the bottled pollen. Durham further indicates that it was safe to infer that the dryness of bottled pollen would not differ essentially from that of free-floating pollen grains in dry warm weather.

Conversion of Gravity Samples to Volumetric Incidence

Two general methods have been devised for measuring the pollen in the air: volumetric methods and the so-called gravity methods. The gravity method is the more popular due to its simplicity. Various gravity methods for the collection of pollen grains have been described in the literature and need not be described at this point except to say that in general they consist of exposing a petrolatum or other adhesive treated microscope slide to the outdoor atmosphere for a period of time, usually 24 hours. The pollen grains thus collected are counted by means of the microscope.

Several attempts have been made by other investigators to interpret properly pollen numbers, collected by gravity methods, in terms of the number per unit volume of air. These attempts have met with little success, primarily because of the lack of knowledge of the true rate of fall. Also, factors other than the rate of fall and number of pollen grains in the air probably influence the number of pollen grains which will be collected on a slide during any particular period of time: wind velocities, variation in the specific gravity of the pollen grains due to humidity of the air, and air temperature.

Notwithstanding the variable factors, it appears that the gravity method will, under certain conditions, continue to be used as a method of sampling pollen from the air. Therefore, the following suggestion for a more logical interpretation of gravity collections, in terms of atmospheric incidence, is offered.

The rate of fall for common ragweed pollen, as determined in this study and previously noted, was 0.0525 ft. per sec. This value can

be substituted in the following formula which was derived by Scheppegrell (*6*) and revised by Dahl (*7*):

$$n=\frac{6.97\times N}{V\times t}$$

"where n is the approximate number of pollen grains per cubic yard of air, N the number of pollen grains per square centimeter of surface of exposed slide, V the velocity of fall of the pollen grain in feet per second, and t is time." The time should be expressed in hours. The author has checked the derivation of this formula.

By substituting the determined rate of fall for common ragweed pollen (0.0525 ft. per sec.) in the above formula we arrive at the following simplified form:

$$n=5.53\ N$$

The rates of fall for other pollens may be determined by the method used in this experiment and substituted in this formula thereby providing a method for converting gravity collections to atmospheric incidence.

ACKNOWLEDGMENTS

The assistance of Prof. H. A. Wyckoff, Department of Public Health, Georgia Institute of Technology, in the securing of materials and guiding the preliminary considerations of these experiments is gratefully acknowledged. Also, the author is indebted to Dr. J. M. DallaValle of the Chemical Engineering Department of the Georgia Institute of Technology, who was responsible for working out the procedures for the experiments and directly supervising the work.

REFERENCES

(*1*) Durham, O. C.: The volumetric incidence of atmospheric allergens. I. Specific gravity of pollen grains. J. Allergy **14**: 455–461 (1943).
(*2*) Durham, O. C.: The volumetric incidence of atmospheric allergens. II. Simultaneous measurements by volumetric and gravity slide methods. J. Allergy **15**: 226–235 (1944).
(*3*) Dyakowska, J.: Researches on the rapidity of the falling down of pollen of some trees. Bull. internat. Acad. polon. sc. et lett. Series B, Sc. nat. (1) 155–168 (1936).
(*4*) Dahl, A. O., and Ellis, R. V.: The pollen concentration of the air. J. Allergy **8**: 601 (1942).
(*5*) Blaine, R. L.: Study of the measurement of specific surface by air permeability. American Society for Testing Materials Bull. No. 108, 17–20 (1941).
(*6*) Scheppegrell, Wm.: Hay fever and hay fever pollens. Arch. Int. Med. **19**: 959 (1917).
(*7*) Dahl, A. O., and Ellis, R. V.: The pollen concentration of the atmosphere. Pub. Health Rep. **57**: 369 (1942).

Estimation of Chronic Disease Prevalence With Particular Reference to Syphilis

By HAROLD A. KAHN, M. A., and HARRY B. SMITH, M. D., M. P. H.*

This study was undertaken to test in the field a method which might be an improvement over existing techniques for measuring disease prevalence. The proposed method was the examination by a physician of a random sample of individuals drawn from the population in which disease prevalence was to be estimated. The critical problem was the degree of voluntary acceptance of such examinations by the general public. The method was tried in Queen Anne's County, Md., in November 1948. The general findings suggest that the proposal is ineffective in the form attempted (31 percent refused examination). However, changed technique, based on experience gained in the trial, might reduce the refusal rate, perhaps to a level compatible with satisfactory estimates of the parameters involved.

Starting with the general idea that examination of a population sample by a physician is a possible improvement in estimation of disease prevalence or incidence, several specific questions have to be answered before a field trial is possible. These questions are:

1. What physicians are available for such examinations?
2. What fees will the physicians require for their services?
3. What places are available for conducting the examinations?
4. How much money is likely to be available for routine use of this method if it is found to be practical?

Low Cost Requirement

Considering the last question first, it was presumed that large sums would not be available and that the method should be tested by the cheapest means believed to have a possibility of success. With this factor in mind, it was necessary to depend on the physicians already operating disease control programs, namely the city and county health officers and their clinical assistants. By presuming that such physicians would be sufficiently interested to provide examination service without special charges and that the examinations could be held in existing health department quarters, the proposal was considered sufficiently practical (from a cost viewpoint) to warrant a trial.

*Health program analyst, Division of Venereal Disease, Public Health Service; and Deputy State and county health officer, Queen Anne's County, Md., and regional consultant in venereal diseases Maryland State Department of Health, respectively.

848796—49——2

It was realized that the acceptance of a project of this type would result in a burden upon the local health officer and his staff, since it would be superimposed upon existing duties and responsibilities. However, without actual trial, the extent of this burden and particularly its evaluation in terms of results achieved could not be determined.

Selection of the Parameter to be Estimated

The proposal to measure chronic disease by examination of a random sample preceded any decision regarding the specific parameter to be estimated. Consideration was given to the three listed below:

1. The number of cases existent in the population on a specific date.
2. The number of persons in the population on a specific date who are or who ever have been afflicted.
3. The number of cases acquired in the population during a specific time interval.

The first two are alternative definitions of prevalence, and the last is a definition of incidence.

The definition of prevalence as a cumulation of all cases previously acquired by a given group is a concept proposed by Turner (*1*) in 1943 for syphilis morbidity measurement and could, of course, be used for other diseases too. Turner also defines incidence essentially as it is given above. The definition of prevalence as the existing cases is one which is used by many authors (*2*). Although incidence would be considered by many as the most useful single parameter to estimate, we do not know of any practical scheme for accurate estimation of this measure in a civilian population such as exists in this country. To illustrate the obvious difficulty in estimating the number of cases acquired during a stated time interval (incidence), the alternative theoretical methods and their practical difficulties are noted below:

1. If a new sample is selected each time, then the physician must be able to judge the onset of observed disease with sufficient accuracy to correctly include it or exclude it from the period being studied. In addition, he must be able to elicit a history or other satisfactory evidence of disease acquired during the period under study but not currently in evidence, i. e., "cured." For syphilis and many other chronic diseases, these abilities are severely limited by the nature of the disease and the knowledge of many patients.

2. Instead of selecting new samples each time, the same sample group may be examined in successive periods to detect disease acquired in the interval between examinations. However, not only may the exposure to a series of successive examinations change the health practices of the group so that they are no longer representative, but the inevitable losses from observation because of changed address will further complicate the unbiased estimate of incidence.

The practical choice for the present then is between the two definitions of prevalence. Briefly restated these are: (a) Existent cases in the population; (b) existent or cured cases in the population.

On several counts the first is much preferred. It presents the current problem faced by the control program. It ignores the counting of cases which are no longer a problem. It may be expected to decrease with current control program success and vice versa. It is affected by both of the major control program approaches, namely the prevention of disease or its successful treatment. For these reasons the proposed method for measuring chronic disease tested in this study was directed toward the estimation of the prevalence rate defined as the rate of existing disease per population unit. For syphilis, "existing disease" requires further definition before practical application. It is proposed that this further definition of "existing syphilis" be "syphilis for which treatment is recommended."

Description of the Universe Tested

One of the authors performed the medical examinations using the county health department in Centreville, Maryland, as the place of examination. Because of special interest in estimating syphilis prevalence, it was decided to select a population group for sampling which would produce useful syphilis prevalence estimates for a sample size of 100. This sample size number was believed sufficient for a first test of the method and was as large a group as could be examined with available facilities. However, the sample size of 100 was not sufficient upon which to estimate with a reasonable proportionate error the total population syphilis prevalence believed to be on the order of 1–4 percent. Although the first purpose of the trial was to test the method and in particular to determine the degree of nonresponse, it was desirable to plan the study so that syphilis estimates regarding the county would be included if the trial was successful. Therefore, in order to satisfy the dual objective of method trial and estimation of syphilis prevalence for some group in Queen Anne's County it was decided to specify the universe as Negro residents of Queen Anne's County, age 15 and over. This group was believed to have a syphilis prevalence on the order of 10–30 percent and could be estimated with much less proportionate error than the total county population given a sample of equal size.

Similarity of Proposed Method to New York and Michigan Studies

A review of the literature on health surveys revealed two previous attempts to obtain sickness data by physical examination of a selected sample of civilians. The first of these was reported by Wheeler (*3*) in 1937, and the second by Hoffer (*4*) in 1947. Both studies were

associated with a house-to-house canvass health survey and tried to judge the accuracy of the results by medical examination of a sample. From their reports it appears evident that neither author considered the obtaining of detailed information on refusal rate as an important part of the study and consequently the studies are not well designed to provide these data. It is noted that in both cases the examination was offered to entire families selected in the sample and not to individuals independently of family. This item is perhaps worthy of more comment since it relates to the efficient conduct of a health survey based on medical examinations.

It is likely that intrafamily correlation on the presence or absence of disease is high and positive for many communicable, hereditary or environmentally induced diseases. This being the case, for any sample in which the cost of medical examination is high in comparison to the increased cost of individual rather than familial selection, sample efficiency is greatly improved by the selection of individuals without regard to family. With this in mind as a probable feature of any practical medical examination survey, it is necessary to test refusal rate with individual selection as a part of the sample design. This similarity of test design and actual design is proposed principally for a reason that may not be self-evident. Since the main purpose of the test is to gather information on refusal rate, it is important not to confuse acceptance by an individual because his wife is going and he may as well join her, with refusal by the same individual if he is the only one selected in the family and is not sufficiently interested.

Sample Selection

For purposes of the survey "resident" was defined as those persons living in the county on the date of enumeration, excluding those who planned to leave the county within 2 months of enumeration date, either permanently or because of seasonal labor migration. The elements of the sample design chosen for this study were area sampling with systematic stratification; direct enumeration of individuals in the selected areas, and systematic subsampling of individuals with

Table 1. *Age-sex distribution of the 100 persons selected in the sample*

Age	Total	Male	Female	Age	Total	Male	Female
15–19	9	3	6	55–59	6	4	2
20–24	11	4	7	60–64	4	3	1
25–29	11	4	7	65–69	5	2	3
30–34	8	3	5	70–74	4	3	1
35–39	12	7	5	75–79	1	1	0
40–44	12	3	9				
45–49	8	5	3	Total	100	48	52
50–54	9	6	3				

age, area, and sex stratification. An age-sex distribution of the 100 persons selected for the sample survey is given in table 1.

Response of Sample to Proposed Examination

The residence and/or place of employment of each person selected in the sample were visited to explain the nature of the health survey and the selected individual's relation to it. The elements of the presentation to all individuals located were as follows: (a) Establishment of rapport; (b) explanation of the purpose and type of survey; (c) emphasis on "your number picked out of hat"; (d) emphasis on a thorough examination not just for one disease; (e) emphasis on voluntary nature of proposal; (f) emphasis on ineligibility of persons not selected; (g) suggestion of personal value for the individual; (h) inquiry regarding a convenient date for appointment.

Of the 100 persons in the sample, 69 accepted appointments and were examined. Appointments were accepted by 17 others who did not keep them and who refused or did not keep later appointments. Nine persons refused any appointment. Two were moving to Baltimore before the next open appointment date but seemed interested. One person was in "a hospital in Baltimore for pneumonia" during the entire period from enumeration to the close of examinations (December 23, 1948); one moved away immediately after the enumeration, and one was never located. Table 2 presents these data on response by sex and age-group. The smallest proportion examined, of the 4 age-sex groups, was 50 percent for the 22 females, age 40–79. Whether this is accidental or suggestive of a real difference in response due to greater suspicion, prudery, caution or some other trait in this population group is not known. It can be noted, however, that the variation of acceptance among the four groups is not greater than could arise by chance in one out of every six samples of this size from a universe with equal acceptance for all age-sex groups. (Chi-square equals 4.97 for 3 degrees of freedom.)

Table 2. *Response to proposed examination*

Category	Total	Male		Female	
		15-39	40-79	15-39	40-79
Accepted examination	69	15	20	23	11
Refused appointment	9	0	3	2	4
Didn't keep appointment	17	4	3	5	5
Other*	5	2	1	0	2
Total	100	21	27	30	22
Percent examined	69	71	74	77	50

*Moved, hospitalized or not located.

A classification by reason for refusal is presented in table 3 for the 31 persons who were not examined. The inclusion of the four who moved out of the area may be considered as a failure to correctly restrict the universe at the time of first enumeration. For larger areas than single counties this proportion could be expected to be smaller, but, in any case, it does not seem to be a failure of a method designed to estimate disease prevalence within a given area.

Table 3. *Persons not examined*

Reason given for refusal	Number persons	Number visits		Appointments accepted
		Total	Seen	
Moved	4	9	3	1
Hospitalized	1	5	0	0
Too busy	13	37	25	19
Feel well	5	12	10	3
No confidence in doctors	4	8	7	1
None given	4	12	6	4
Total	31	83	51	28

The one person not examined because of hospitalization may be considered a failure of the method to obtain advance cooperation of the hospitals covering the area to be surveyed. It is possible that hospitals will not permit inspection of their records for statistical use, but this seems unlikely if the proposal is made through the correct channels. Unfortunately this particular case was hospitalized in Baltimore and there was no opportunity to make the necessary personal contacts to obtain a record of the patient's examination findings.

After talking with these individuals, it is the authors' opinion that the 13 cases stating that they were too busy for examination offered this reason as a cover-up for their real reasons. There may have been two or three at most who we honestly believe could not spare time or energy for the examination during the hours offered. For these few, Saturday or Sunday hours would have helped. For the majority of the 13 who were "too busy"; for those 5 who stated it was "unnecessary since they felt well"; for the 4 who "had no confidence in" or "were afraid" of doctors; and for the remaining 4 for whom no reason was given: The most necessary corrective measure in our opinion is the removal of a social atmosphere of mistrust, suspicion and fear on the part of some members of the community surveyed to the offerings of the local health department. Whether this is simply part of a larger social relationship between nonwhites and government agencies and whether it is susceptible to simple

corrective measures for a limited activity such as a health survey, we do not know. However, our personal conviction based on face-to-face negotiation with the population sample and supported by the opinion of the Negro minister in Centreville (in a post-survey discussion) is that presurvey negotiation and discussion with community leaders would appreciably lower the nonresponse rate. The nature of this suggested groundwork should be to: (a) Give publicity to the forthcoming survey; (b) originate the publicity with accepted community leaders; (c) attempt to create a favorable group reaction rather than "sell" just the selected individuals.

It was noted that the one sample tract which was in Centreville, within easy walking distance of the health department, had 13 of the 31 refusals. Of the 100 persons selected for the sample, only 29 were in this tract. Thus the refusal rate for this tract was about 45 percent compared with about 25 percent for the remainder of the county.

Persons taking the examination were found to be unanimous in their opinion that it was very worth while, that it should be given periodically, and that they would recommend it to anyone who might ask their advice about it.

Examination Method and Coverage

Appointments for survey examinations were not to exceed 5 between 9–12 a. m. and 5 between 1–4 p. m. Examination dates were each day Monday through Friday, morning and afternoon, excepting holidays and a few periods of special health department activities. In addition, three health survey examinations could be scheduled concomitantly with the venereal disease clinic held Thursday nights from 6 to 8 p. m. Thus, for a typical week there was space for 40 appointments during "office hours" and 3, during Thursday night venereal disease clinics.

Persons accepting appointment were told to appear between 9 and 10:30 a. m. for morning periods, between 1 and 2:30 p. m. for afternoon periods, and between 6 and 7 p. m. for the Thursday night clinic. Two nurses were on duty full time to assist with the survey examinations. They interviewed patients for current medical complaints and took such measurements as height, weight, blood pressure, respiration, pulse rate, and oral temperature. The nurses also gave the patient a chest X-ray, audiometer test, and an eye test (Snellen chart). They collected blood and urine samples, and directed the patients to a screened area to undress and put on an examining gown. When these preliminary steps had been completed, the clinical examination was made. This clinical examination took about 15 minutes and covered the following listings on the examination record:

General appearance; skin; muscosae; teeth and tonsils; palms and soles; anus and genitalia; lymphatics; bones, joints, frame, muscles; liver and spleen; other abdominal; lungs; cardiovascular; central nervous system; eyes; ears; facial nerve.

The examination described was the best that available time and facilities could supply. However, the more complete the examination coverage, the more fruitful the survey will be. Of course, the principle of applying the complete examination on a routine basis to all persons in the sample, is necessary for extrapolation of results to the population sampled.

Additional tests and examinations, at a later date, were performed on those suspected of disease who could not be diagnosed on the initial examination.

Examination Findings

The results of examination for the 69 persons accepting it are summarized in table 4. Results of the audiometer and Snellen chart tests are not given in the table. They were omitted because audiometer testing was incomplete (the machine was frequently loaned to the school system and was not available for survey tests), and Snellen chart testing was performed without glasses when these were worn normally by the patient. The chart entry was stated as "Corr. visual acuity" but it was misunderstood. It is our opinion that a

Table 4. *Results of 69 health survey examinations*

Final diagnosis	Total number	Number recommended for treatment [1]
No evidence of disease	7	----
Teeth carious or missing and not replaced	51	----
Syphilis, total	29	14
Early latent	4	2
Late latent	19	11
Neurosyphilis	1	1
Cardiovascular	2	----
Late congenital	2	----
Unknown stage	1	----
Hypertension	11	----
Eye disease or injury	4	----
Blind (one eye)	2	----
Cataract (one eye)	1	----
Involvement of extra-ocular muscles (one eye)	1	----
Obesity	4	----
Tuberculosis	2	----
Diabetes, enlarged heart, mental deficiency, inguinal hernia, traumatic arthritis of hip, ichthiosis, vitiligo, varicose veins, Parkinson's disease, vaginal discharge (gonorrhea?), penis destroyed by destructive lesion (old granuloma inguinale?)	(2)	----

[1] Applies to syphilis only. Indicates persons in whom syphilis is detected and who do not have prior adequate treatment.
[2] 1 (each).

visual defect satisfactorily corrected by glasses does not constitute a health problem.

Briefly restating the findings, as given in table 4, for diagnoses made in more than one individual, we note first that only 7 of the 69 persons were found to have no evidence of disease. Dental defects were observed in 51; syphilis in 29, only 14 of whom required treatment and are included in the estimate of prevalence made in this study; hypertension in 11; eye disease or injury in 4; obesity in 4; and tuberculosis in 2.

Deferring to a later section discussion of the possible nature and extent of bias due to nonresponse, the syphilis prevalence rate of Queen Anne's County Negro residents, age 15 or over, may be estimated at 20.7 percent.

The standard error for this estimate of syphilis prevalence is approximately 4.9 percent, and it is estimated that the range 20.7 percent $\pm$ 9.8 percent includes the population syphilis prevalence rate. The relative frequency of error in estimates of this class is 1 out of 20. Granted that this estimate is poor in terms of its large range, it is of some value considering the absence of other objective data on the subject. Also it should be realized that this study was conducted to test a method and was not intended as a suggested sample size for practical use. Following this thought, it is obvious that local areas which cannot undertake about 500 examinations would not find a method of this type practical for local estimates. However, an entire State might use a similar method for estimating State-wide parameters by distributing 500 examinations over 25 or more counties. The number of examinations would not then be burdensome for any one county, but neither would each county have usable local estimates.

Of course, the sample size required for satisfactory estimates of disease prevalence rates varies with the size of the rates being estimated. If it is accepted that a proportionate error in estimation limited to 25 percent (e. g., with an actual prevalence rate of 8 percent, the error is limited to 2 percent) in 9 out of 10 samples is satisfactory, then the approximate sample sizes required for several different parameters are given below:

Parameter percent	*Approximate sample size*
1	4,300
5	850
10	400
20	175

It can be noted from this brief table that required sample sizes are quite large for estimates of parameters below 5 percent. Perhaps estimates of these smaller parameters are practical only for the larger States, or groups of States pooling their sample requirements.

Syphilis Examination Findings Versus Interview Statement

As previously stated, each person accepting examination was interviewed by a nurse. One of the questions included in this interview was: "Do you have syphilis or bad blood?" Table 5 presents the cross tabulation of this item as answered by the patients with the medical findings. It strongly suggests that syphilis prevalence data, as defined in this paper, cannot be accurately obtained by direct population interview.

Table 5

Patients' response to the question: "Do you have syphilis or bad blood?"	Medical findings on the presence of syphilis requiring treatment		
	Total	Negative	Positive
No	65	53	12
Maybe	2	1	1
Yes	2	1	1
Total	69	55	14

Bias in Refusals

The degree of nonresponse (31 percent) found in this study would be of no major importance if it were not associated with health status. Unfortunately this is not known and, for safety, bias should be presumed to be present. It is for this reason that the proposed sampling method as described for Queen Anne's County is considered a failure in the form attempted (to the extent that the observed nonresponse is at all suggestive of what might be found in other universes). Although no money for the purpose was available in this study, it is possible that some later project might examine all volunteers and then offer the refusals payment for their acceptance in order to study the difference between groups.

In an attempt to obtain some evidence regarding the health status of the refusals in this study, the local venereal disease clinic records (filed since 1939) were searched for the names of all persons selected in this study. Records of previous diagnosis and treatment for syphilis in the local clinic were found for 19 of the 100 persons in the sample. Of the 31 persons not examined, 2, or 6.5 percent, were in the old record file. Of the 69 persons accepting examination, 17, or 24.6 percent, had old clinic records on file. If there actually were no difference between these percentages for the total population, less than 5 percent of all the samples which could be drawn of size 100 (including 69 acceptances or 69 refusals) would show percentage differences equal to or larger than observed in this sample. The knowledge that this difference in proportion is probably not entirely

due to chance is of little help in deciding the possibility of bias. At first glance it might seem that the nonrespondents are healthier, at least as regards syphilis status. However, on considering the implications of these data, at least the following additional hypotheses are equally suited to the evidence: (a) The nonrespondents use private rather than public medical care facilities in greater proportion than those accepting examination; (b) the nonrespondents use less medical care facilities of any type than those accepting examination.

Since hypotheses (a) and (b) are possibly, although not necessarily, contradictory to the first hypothesis presented, namely that the nonrespondents are healthier than those accepting examination, this study offers no objective data on the nature or extent of possible bias due to nonresponse. In the authors' opinion, those with existing pain or other obvious symptoms of disease are more likely to accept than others, and hence increase the estimation of total disease prevalence. For particular diseases or stages of disease characterized by the absence of obvious symptom, this "upward" bias would probably not exist.

Bias in Examination

It is believed that examination by a physician is superior to interview in determining the prevalence of specific diseases among a population group. However, it should be recognized that medical examination findings will vary with different physicians and that bias, in terms of departure from the average finding of all possible physicians, may be present in an indeterminate amount. Britten and Thompson (*5*) showed that percentage-defect findings among workers in different industries varied more than would be expected unless the different physicians had different standards for definition of defect. Sydenstricker and Britten (*6*) found that medical examination of life insurance policyholders resulted in a higher defect rate when examinations were made at the "central office" than when they were made in the "field." In establishing the kind of examination to be used in a prevalence study of this type, consideration should be given to as many objective measurements as possible in order to reduce variation and bias introduced by subjective standards of diagnosis.

Estimated Cost

Since dollar costs for the same article or service vary greatly with time and area, no attempt will be made to calculate this survey's expense in dollars. The following listing of time and car mileage spent by various persons assisting in conduct of the survey may be considered the "real" cost of the study:

Physician	7 working days.
Public health nurses	26 working days.
Venereal disease investigators	20 working days.
Statistician	25 working days.
Automobile mileage	2, 650 miles.

All working time was computed by prorating the percent of time spent in the health survey inasmuch as no persons were continuously occupied by full-time survey duties during its operation. Follow-up activities on syphilis and tuberculosis suspects are not included, because these are considered to be regular health department activities. In attempting to relate these data to dollar expense, it should be realized that the health officer and venereal disease investigators continued their regular duties concomitantly with survey operation.

Two remediable defects of the study contributed toward higher costs than necessary. These were the failure to overschedule appointments and the failure, in several instances, to get good addresses on enumeration, necessitating much visiting and questioning to locate the selected individuals.

Relationship to Routine Health Department Activity

Unquestionably, the survey added to the work load of health department personnel, but it is believed that routine activities did not suffer. Survey activities were skipped on days of special clinic activities; two of the four nurses conducted the survey examinations while the other two carried out the usual program; VD investigators assisted in areas they were visiting anyway; and the staff was generally cooperative.

Conclusion

This study of disease prevalence estimation has described the results of a technique proposed as a possible improvement.

The principal item on which the proposed technique is found to be unsatisfactory is the failure to approximate 100 percent acceptance of free physical examinations by a selected sample. The observed nonresponse rate of 31 percent is believed to be partly due to a failure to seek participation by community leaders in advance of the survey. It is hoped this participation can be obtained in advance of any future survey using this method. Objective data regarding bias in the prevalence estimates based on those accepting examinations are unavailable, and bias should be presumed sufficient to require approximately 100 percent acceptance until proved otherwise.

As a first attempt to obtain voluntary acceptance of free physical examinations by individuals selected at random, the study was poorly conducted from a viewpoint of efficiency in cost. However,

the expense for this sample of 100 with 69 examinations is not believed to suggest costs over the limits of practical application if the problem of bias can be solved. Costs are higher for estimates of small prevalence rates than they would be for those close to 50 percent. Most States with prevalence of specific diseases between 10–90 percent will probably find the cost of estimating these data, by a method of the type described in this paper, to be within practical limits. For estimating prevalance rates below 10 percent, costs increase rapidly and may exceed the resources of individual States. For estimates of these lower rates, regional or nation-wide surveys would be more practical although obviously less informative.

REFERENCES

(*1*) Turner, Thomas B.: Studies on syphilis in the eastern health district of Baltimore City. I. Principles concerned in measuring the frequency of the disease. Am. J. Hyg. **37:** 259–272 (1943).
(*2*) Vonderlehr, R. A. and Usilton, Lida J.: Syphilis among men of draft age in the United States. J. A. M. A. **120:** 1369–1372 (1942).
(*3*) Wheeler, Ralph E.: Impairments in a rural population. Milbank Memorial Fund Quart. **15:** 248–261 (1937).
(*4*) Hoffer, Charles R.: Medical needs of the rural population in Michigan. Rural Sociol. **12:** 162–168 (1947).
(*5*) Britten, Rollo H. and Thompson, L. R.: A health study of ten thousand male industrial workers. Pub. Health Bull. No. 162, Washington, U. S. Government Printing Office, June 1926.
(*6*) Sydenstricker, Edgar and Britten, Rollo H.: The physical impairments of adult life. Am. J. Hyg. **11:** 73–135 (1930).

Snap Traps Versus Cage Traps in Plague Surveillance

By Bertram Gross, M. S., and David D. Bonnet, Ph. D.*

Plague infection is found in the Territory of Hawaii in two relatively small areas; one on the Island of Maui, and one on the Island of Hawaii. These areas, as well as adjacent areas, are under continual surveillance by the Bureau of Rodent Control, Department of Health, in order to detect the presence of active plague in rodents and fleas, and to define the plague region. Surveillance consists of regular and systematic daily trapping of rodents, combing for fleas, examination of trapped rodents for plague, and daily inoculation of guinea pigs with pooled rodent tissues and with macerated flea pools from individual districts. In addition to surveillance, the Bureau of Rodent Control carries on intensive plague suppressive measures within the known endemic areas including ratproofing, poisoning, gassing, trapping, clearing, DDT spraying and dusting, sanitary inspection, and education of the public in rodent control procedures.

From time to time a question has been raised concerning the advisability of using snap traps rather than cage traps, since it has been shown (*1*) that some of the rodent fleas leave the dead victims of snap traps within a few hours. This loss of fleas may increase the plague hazard to humans, since these fleas attempt to find a new individual host. Furthermore, there might be a reduction in the number of fleas which could be recovered for use in guinea-pig inoculations.

To evaluate this problem in a plague area in Hawaii, an experiment was performed to compare the results obtained from snap traps with the results obtained from cage traps. One hundred snap traps (Victor type) and one hundred cage traps (Marine type) were placed alternately 50 feet apart along a trap line in Kaholo Gulch, Hamakua, Hawaii (plague district 17A). The traps were baited similarly, using squares of coconut meat, and were examined, baited, and set daily during the early morning. All live rodents were gassed with cyanogas in the cages and immediately placed in paper bags, while dead rats secured in the snap traps were placed in paper bags and subsequently gassed to kill the fleas. Every effort was made to avoid the loss of fleas through handling.

The trial period began July 1, 1946, and ended November 25, 1946, thus making a total of 10,900 trap-days for each type of trap.

---

*Chief, Bureau of Rodent Control, and Medical Entomologist, respectively, Division of Sanitation, Department of Health, Territory of Hawaii.

Snap traps proved to be almost five times (4.9) more efficient than the cage traps in retrieving rodents as shown in table 1. The figures

Table 1. *Rodent catch*

	Rats caught	Percent	Mice caught	Percent	Total rodents	Percent
Snap traps	852	82.4	568	84.4	1,420	83.0
Cage traps	185	17.6	105	15.6	290	17.0

also indicate the probability that some mice were able to escape from the cage traps. Almost all of the animals taken were carefully combed and examined for fleas and the results are presented in table 2.

Table 2. *Flea recovery*

	Number rodents combed	Number infested with fleas	Number fleas recovered	Percent rodents infested	Average number fleas per infested rodent	Flea index*
Snap traps	1,317	73	88	5.5	1.2	0.07
Cage traps	262	27	47	10.3	1.7	.18

*Flea index $= \frac{\text{Total fleas}}{\text{Total rodents examined}}$

On a percentage basis, twice as many infested rodents were taken in the cage-trap series than were taken with the snap-trap series. This indicates that some rodents in the snap-trap group lost their fleas completely. This migration of fleas away from snap-trapped animals is also shown by a comparison of the average number of fleas per infested rodent, which was 1.2 in the snap-trapped group as against 1.7 in the cage-trapped series.

Although there is a loss of fleas with the use of snap traps compared to cage traps, it must be kept in mind that the recoveries were made with the same unit of effort for each series (10,900 trap days). Therefore with this same unit of work, 2.7 times as many infested rodents were obtained with snap traps and, from these rodents, 1.8 times as many fleas were recovered. Thus a greater number of fleas distributed over a greater number of rodents is obtained with snap traps. This is a desirable feature when the primary purpose of the trapping is plague surveillance and the fleas are utilized for guinea-pig inoculations. The loss of fleas from infested rats will not reduce appreciably the chance of plague detection, since it has been shown that one plague-infected flea out of a hundred (the remainder being noninfected) is readily detected by guinea-pig inoculation (*2*) and the loss of these fleas from snap-trapped animals is less than the number which would result from destroying an equal number of rodents by poisons.

Inasmuch as all places of human habitation are regularly treated with residual DDT, and because of the greater number of rodents destroyed and the increased efficiency of the plague-detection procedures by snap traps, it is the considered opinion of the authors that snap traps have definite advantages over cage traps in the type of continual plague surveillance carried on by the Bureau of Rodent Control, Department of Health, Territory of Hawaii in the Hamakua District, Island of Hawaii.

REFERENCES

(*1*) Cole, L. C., and Koepke, J. A.: Problems of interpretation of the data of rodent ectoparasite surveys. *In* Supp. No. 202 to the Pub. Health Rep. pp. 1–24, 1947.

(*2*) Tiflov, V. E.: Detection of plague infection in nature by examinations of fleas. Medit. Parazitol. (Moscow) **15**: (6) 69–75 (1946). Abstracted in Rev. Appl. Entomol. **36B**: (5) 80–81 (1948).

INCIDENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED SEPTEMBER 3, 1949

A net decline of 47 cases was recorded in the incidence of poliomye litis—from a total of 3,244 cases reported last week, to 3,197 for the current week. The total cases reported for the corresponding week last year was 1,505, an increase of 93 cases over the preceding week's total. The 5-year (1944–48) median is 1,505 cases. Currently, slight net decreases were reported in all of the 9 geographic divisions except the East North Central (818 cases last week to 902 for the current week), the East South Central (95 to 115), and the Mountain area (136 to 144).

Of the 38 States reporting currently more than 9 cases, 21 showing increases reported an aggregate of 1,577 cases (last week 1,365); 16 showing decreases reported 1,359 (last week 1,581). The 30 States reporting more than 19 cases each are as follows (last week's figures in parentheses): *Increases*—New Jersey 137 (122), Pennsylvania 78 (65), Ohio 171 (123), Indiana 61 (58), Illinois 282 (276) Michigan 287 (280), Wisconsin 101 (81), North Dakota 52 (50), South Dakota 38 (25), Kansas 52 (33), West Virginia 23 (18), Kentucky 60 (33), Tennessee 36 (31), Colorado 55 (53), Washington 50 (48); *decreases*—Maine 37 (44), New Hampshire 24 (32) Connecticut 56 (70), New York 538 (573), Minnesota 168 (183), Iowa 72 (134), Missouri 101 (116), Nebraska 39 (51), Virginia 27 (34), Arkansas 44 (50), Oklahoma 50 (62), Texas 63 (69), Idaho 27 (33), California 89 (101); *no change*—Massachusetts 194. For the year to date 23,740 cases have been reported, as compared with 12,657 for the same period last year and a 5-year median of 9,474.

During the week, 2 cases of relapsing fever were reported, in California. Of 15 cases of Rocky Mountain spotted fever reported in 8 Eastern and Central States, 4 occurred in North Carolina and 3 each in Maryland and Arkansas.

Deaths recorded during the week in 93 large cities in the United States totaled 8,458, as compared with 8,049 last week, 10,555 and 7,678, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 7,950. For the year to date the total is 323,771, same period last year, 326,660. Infant deaths totaled 672, last week 649, 3-year median 682, same week last year, 740. The cumulative figure is 22,939, corresponding period last year 23,560.

Telegraphic case reports from State health officers for week ended Sept. 3, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever *	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1			3			37		3				4	
New Hampshire							24							
Vermont				5			15							
Massachusetts	1			21			194		10				98	
Rhode Island				1		4	17						1	
Connecticut				5	1	16	56		3				38	
MIDDLE ATLANTIC														
New York	7		[c] 1	62	4	117	538	1	[d] 18		1	4	167	15
New Jersey	2		2	32	2	8	137		7				69	
Pennsylvania	2	2	(c)	39	1		78		9			8	121	
EAST NORTH CENTRAL														
Ohio	3		1	12	1	30	171	1	18			4	85	10
Indiana	23			6		3	61		1		1		7	4
Illinois		1	1	21	4	51	282	1	13			5	102	
Michigan [a]	6	1		36		19	287		9			4	99	2
Wisconsin				28	1	2	101		3				107	
WEST NORTH CENTRAL														
Minnesota		3		3	3	4	168		2					
Iowa	1			6		3	72		1					4
Missouri	1			1	1	9	101		3			2	5	
North Dakota		16		4			52		3				1	
South Dakota		1		5	2		38							
Nebraska							39		1					
Kansas	1	1		3		4	52		2				3	1
SOUTH ATLANTIC														
Delaware				2			4		1				8	
Maryland [a]	1			14		20	13	3	[d] 3			3	19	
District of Columbia	1			2		13	7						6	
Virginia	1		93	20		26	27	1	7		2	5	16	1
West Virginia			4	5	4	4	23		4			2	14	
North Carolina	13			9	2		9	4	17		2	2	10	
South Carolina	2		4	3		12	4		1			3	1	1
Georgia	6		14	10	1	87	5	1	8		1	5	7	5
Florida	1		1	10		6	14		4			1	2	1

EAST SOUTH CENTRAL														
Kentucky	2					1	60		6			3	11	7
Tennessee	3		28	6	2	9	36		12			6	17	
Alabama	2		2			6	13		3				9	4
Mississippi [a]	4		2	13		6	6		1			1	5	
WEST SOUTH CENTRAL														
Arkansas	7		16	1	1	15	44	3	6		7	11	13	2
Louisiana	2			1		12	7		3			3	1	
Oklahoma	4			3		9	50		1			2	2	1
Texas	14		350	31	3	170	63		4		1	8	67	6
MOUNTAIN														
Montana		2		2			8		1		2		3	
Idaho	1			2			27		1		1	3	13	
Wyoming				1	1		7				1	1		
Colorado			6	1		4	55		2			1	1	
New Mexico			1	8		11	16					1	4	
Arizona	3		17	9		4	11					1	11	
Utah [a]				25			19						31	
Nevada							1						9	
PACIFIC														
Washington			1	13	1		50		11				22	
Oregon			4	15		4	9		6				20	
California	5	1		72	5	15	89		[d] 12			5	80	3
Total	120	28	548	571	40	704	3,197	15	220		19	94	1,309	
Median, 1944–48	193	29	617	680	56		1,505	16	527		13	123	1,970	
Year to date, 35 weeks	4,586	445	78,654	588,518	2,421	57,298	23,740	483	58,938	41	842	2,488	40,900	
Median, 1944–48	7,389	363	193,041	551,414	4,568		9,474	444	63,252	273	647	2,785	68,302	
Seasonal low week ends	(27th) July 9		(30th) July 30	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 13	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	818		2,787	640,911	3,265		22,824		678	51		2,028	50,933	
Median, 1944–49 [b]	1,496		2,844	586,282	6,072		9,211		1,617	355		2,310	95,404	

[a] Period ended earlier than Saturday.

[b] The median of the 5 preceding corresponding periods; for measles, meningitis, smallpox, and whooping cough, the corresponding periods are 1943–44 to 1947–48.

[c] New York and Philadelphia only, respectively.

[d] Including cases reported as streptococcal infection and septic sore throat.

[e] Including paratyphoid fever; currently reported separately, as follows: Virginia 1, North Carolina 1, South Carolina 1, Georgia 1, Louisiana 1, Texas 1, Wyoming 1, and California 3. Cases reported as Salmonella infection, not included in the table, were as follows: Massachusetts 4, and New York 1.

Relapsing fever: California 2.

Alaska: Influenza 1.

Hawaii Territory: Measles 5, typhoid fever 1.

PLAGUE INFECTION IN PARK COUNTY, COLO.

Under date of August 26, plague infection was reported proved in a pool of 16 fleas obtained on August 11 by flagging the openings of burrows of prairie dogs, *Cynomys gunnisoni*, in an area 2 miles south of Fairplay, Park County, Colo.; in a pool of 55 fleas obtained on August 12 in the same manner from burrows of prairie dogs of the same species at a location approximately 15 miles southwest of Fairplay; and in a pool of 5 fleas from 1 pocket gopher, *Thomomys* sp., trapped August 11 in the locality first described above.

DEATHS DURING WEEK ENDED AUG. 27, 1949

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

	Week ended Aug. 27, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,060	8,746
Median for 3 prior years	8,418	
Total deaths, first 34 weeks of year	315,874	316,726
Deaths under 1 year of age	649	705
Median for 3 prior years	719	
Deaths under 1 year of age, first 34 weeks of year	22,284	22,833
Data from industrial insurance companies:		
Policies in force	70,222,284	70,939,272
Number of death claims	12,617	9,590
Death claims per 1,000 policies in force, annual rate	9.4	7.1
Death claims per 1,000 policies, first 34 weeks of year, annual rate	9.4	9.6

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended August 13, 1949.—During the week ended August 13, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	1		13		16	40	8	14	31	16	139
Diphtheria					3						3
Dysentery, bacillary					7	1					8
Encephalitis, infectious						1	1	1			3
German measles			2		1	7	3	1	3	1	18
Influenza			1			5	2	1			9
Measles			4		31	58	27	67	49	36	272
Meningitis, meningococcal			1			1				1	3
Mumps			2	1	3	55	2	2	5	26	96
Poliomyelitis			12	1	61	125	5		2		206
Scarlet fever				1	6	20	1		6	5	39
Tuberculosis (all forms)	13		5	6	90	21	59	7		39	240
Typhoid and paratyphoid fever					7	7				3	17
Undulant fever							1				1
Venereal diseases:											
Gonorrhea	6		7	8	103	79	18	14		73	308
Syphilis	2		7	5	57	24	6	3		9	113
Whooping cough	1				61	36	3	6			107

MADAGASCAR

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

Disease	July 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis			80	0
Cerebrospinal meningitis			13	4
Diphtheria	1	0	2	0
Dysentery, amebic	13	0	217	2
Erysipelas			8	1
Influenza	68	0	4,387	57
Leprosy			23	2
Malaria	388	1	33,154	204
Measles	18	0	236	6
Mumps	1	0	88	0
Paratyphoid fever	1	0		
Plague			4	4
Pneumonia, broncho	3	1	378	63
Pneumonia, pneumococcic	1	1	589	64
Puerperal infection			7	3
Relapsing fever			1	0
Trachoma	1	0		
Tuberculosis, pulmonary	7	2	97	15
Typhoid fever	1	1	11	1
Whooping cough	1	0	286	12

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

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

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

Smallpox

Afghanistan.—During the period June 23–July 23, 1949, 57 cases of smallpox were reported in Afghanistan.

French Equatorial Africa.—Smallpox has been reported in French Equatorial Africa as follows: June 21–30, 1949, 42 cases, 16 deaths; July 11–20, 18 cases, 5 deaths; July 21–30, 40 cases, 9 deaths.

Netherlands Indies—Java—Bandoeng and Batavia.—During the period July 3–16, 1949, 64 cases of smallpox were reported in Bandoeng, Java, and for the week ended July 23, 50 cases with 6 deaths were reported in that city; for the week ended August 20, 1949, 222 cases of smallpox were reported in Batavia, Java.

Typhus Fever

Czechoslovakia.—During the week ended August 13, 1949, 24 cases of typhus fever were reported in Czechoslovakia.

Yellow Fever

Gold Coast.—Yellow fever has been reported in Gold Coast as follows: In Winneba Area—on August 15, 1949, 1 death in Apam (a seaport), on August 16, 1 death in Akukuom, during the week ended August 13, 1 fatal suspected case in Nyakrom, on August 21, 1 suspected case in Nyakrom, and on August 23, 1 death in Nyakrom; in Oda Area, on August 29, 1 suspected case in Esuboni.