Public Health Reports

Vol. 62 • MAY 9, 1947 • *No. 19*

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

THE TECHNIQUES OF APPLICATION AND THE CONTROL OF ROACHES AND BEDBUGS WITH DDT [1]

By ROBERT L. STENBURG, *Assistant Engineer (R), United States Public Health Service*

Although it has not been definitely shown that roaches are significant vectors in the transmission of disease, their frequent occurrence in human habitations where they may contact food after encountering garbage and other filth renders it probable that diseases may be mechanically transmitted by these insects. Considerable evidence exists regarding the high toxicity of DDT to flies and mosquitoes, but there have been contradictory reports regarding its effectiveness against roaches. Therefore, additional information on this subject was deemed desirable.

On the basis of these considerations, some work was done to determine (1) the most effective techniques of applying DDT for roach control, and (2) the effectiveness of DDT against the German roach, *Blattella germanica* (Linn.), and the American roach, *Periplaneta americana* (Linn.).

The tests were in general designed to duplicate conditions encountered by the users of commercially distributed DDT. All experimental applications were made in operating establishments, such as houses, apartments, grocery stores, restaurants, meat markets, hotels, and hospitals. Five-percent-DDT liquid spray and 10-percent-DDT dusting powder were selected for most experimental treatments, since these concentrations now appear to be more or less standardized in commercial insecticides.

PROCEDURE

Sampling methods, trapping.—Inasmuch as a proper evaluation of DDT applications would depend on the accurate sampling of roach populations both before and after treatment, some method of counting was required. Trapping of roaches was initially selected as a method for determining the index of the infestation in any one locality. Small

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

screen cages, 5 inches high and 4½ inches in diameter with funnel-shaped inlets, were used as traps. With a few bread crumbs inside to serve as bait, the cages were left overnight in drawers, cupboards, trunks, or boxes, and on tables or other localities where roaches existed. Although pretreatment trapping proved adequate for sampling certain localized infestations, this method of approximating roach populations was abandoned for the following reasons:

1. The cages trapped sufficient numbers of roaches to deplete the pretreatment populations. It was not deemed advisable to release the trapped roaches because of the adverse effect this would have had upon the householder, whose cooperation was essential, not to mention the possible effects the trapping might have had upon the behavior of the roaches themselves.

2. The traps proved to be unsatisfactory when populations were sparse. This became a consideration in posttreatment sampling because, ordinarily, populations were so reduced after treatment that in many cases no roaches entered the traps, even though a small degree of infestation still existed.

3. The selection of trapping sites was often difficult because the sphere of activity of German roaches appeared to be quite limited, and any one trap sampled only those roaches existing in a certain localized area, such as one section of a cupboard, one drawer, or perhaps a table. When a local infestation was completely eliminated by the treatment, infestations remaining in other parts of a room were not sampled by traps placed in pretreatment locations.

4. Unless cages were located so that they remained in semidarkness during daylight, the roaches escaped from the traps. This meant that infestations existing on tables and open shelves were not easily sampled.

Counting by inspection.—Since trapping did not prove satisfactory, a more direct method of approximating total populations was employed. Thorough inspections were made of cupboards, refrigerators, stoves, trunks, boxes, drawers, tables, chairs, and shelves; and every accessible crack and crevice was thoroughly examined with the aid of a flashlight. Occupants were questioned about any roaches they might have seen either during the day or at night, and while their reports were not entirely relied upon, they were nevertheless helpful to the inspector in locating remaining nests of roaches. On the basis of these infestation counts, premises were classified into one of the four following groups:

Class A.—No roaches in evidence according to weekly examinations by inspector and reports of occupants.

Class B.—Roaches do not constitute an obvious nuisance but are present. Weekly observations of inspector and reports of occupants show at least one, but less than five, roaches in any one room of a premise.

Class C.—Roaches are approaching nuisance stage. They are seen three or four at a time in cupboards, drawers, and tables. This classification includes premises showing more than 5 roaches, but less than 50, in any one room as reported by inspector.

Class D.—Roaches are definitely a nuisance and are too numerous to count in any one room of a premise.

These classifications were applicable to pretreatment and posttreatment populations but gave greater accuracy to posttreatment counts, which were usually in class C or better, whereas practically all pretreatment infestations were in class D. It is realized that this method could not account for every roach in a premise, but inspections were sufficiently thorough to insure locating those in the more obvious hiding places, and was considered entirely adequate for the purposes of this study.

In working out a satisfactory method of applying DDT to control roaches effectively, five general methods were investigated. During the treatment of all premises, every precaution was taken to keep DDT from getting onto dishes, cooking utensils, or uncovered food.

Method 1—Over-all spraying with 2½-percent DDT.—Several private houses were treated so as to duplicate the treatment used by the Malaria-Control-in-War-Areas (MCWA) program for mosquito control. This method consisted of spraying the ceilings and walls of an entire house with 2½-percent-DDT-xylene-Triton X-100 [2] emulsion to give a deposit of 100 mg. of DDT per square foot. In attempting to make this type of treatment more effective against roaches, additional spray was applied to the undersides of tables as well as to the insides of drawers, cupboards, and closets where roaches were in evidence. Many roaches were killed during the treatment and others continued to die in decreasing numbers for as long as 4 weeks after treatment. However, it was 2 or 3 weeks before class D infestations of German roaches were reduced to class C, and reduction beyond class C seldom occurred with this method. American-roach infestations dropped to class B in 3 weeks and to class A in 8 weeks.

Method 2—Over-all spraying with 5- and 10-percent DDT.—Another group of houses was sprayed in the manner described above, except that 5- and 10-percent concentrations of DDT-xylene emulsion were used to obtain 200 and 400 mg. of DDT per square foot, respectively. Roach mortalities resulting from these higher concentrations were approximately the same as those obtained with the 2½-percent spray, in that infestations were reduced considerably, but not as quickly nor as completely as seemed desirable. Class D infestations of German roaches were reduced to class C after 1 or 2 weeks, but there was no further reduction during the course of the study. Five-percent spray

[2] Manufactured by Rohm & Haas Co., Philadelphia, Pa.

applications reduced class D infestations of American roaches to class B in 3 weeks, whereas 10-percent spray reduced class D infestations of American roaches to class B in 1 week.

Method 3—Application of 10-percent-DDT dust to obvious resting places.—In a third group of houses only infested rooms were treated with 10-percent-DDT powder (90-percent powdered pyrophyllite), which was applied with a Getz [3] heavy-duty blower to cupboards, drawers, shelves, boxes, ledges, corners, and to all cracks around moulding, door frames, and window frames. These applications reduced the American-roach infestations to class A in 3 weeks. The number of German roaches was reduced greatly, but class D infestations did not drop to class C until 3 or 4 weeks after treatment.

These preliminary experiments made it apparent that over-all spraying of walls and ceilings with specific dosages of DDT or the application of 10-percent-DDT dust to the more obvious hiding places did not produce entirely satisfactory results. For example, American-roach infestations were reduced only from class D to class B in 1 to 3 weeks; whereas in the case of German roaches, 1 to 4 weeks was required to reduce a class D infestation to class C, and reduction beyond class C seldom occurred.

In most cases in which German roaches still existed in a premise 4 or more weeks after treatment, the remaining infestation occurred in a few localized spots which apparently had not received a thorough treatment. Further observations indicated that the dust applications were more effective against American roaches than against German roaches, partly because the former species seemed to travel greater distances and thus increased their chances of encountering the dust. German roaches appeared to move only short distances from their resting places and apparently always returned to approximately the same place.

Method 4—Combined use of 5-percent-DDT spray and 10-percent-DDT dust.—On the basis of the foregoing tests and observations, a treatment technique was adopted which attempted to apply heavier dosages of DDT (particularly in the form of 10-percent-DDT dust) to more concentrated areas, and especially to the daytime resting places of German roaches.

In a fourth series of tests, only infested rooms were treated with a combination of 5-percent-DDT liquid spray and 10-percent-DDT dust. This technique took advantage of the fact that roaches were driven from their resting places by xylene or other pungent DDT-spray solvents. All surfaces exhibiting cracks which might harbor roaches were sprayed. This included stoves, tables, chairs, refrigerators, cupboards, cabinets, shelves, sinks, trunks, and drawers. Most of

[3] Manufactured by Getz Exterminators, Inc., St. Louis, Mo.

the walls were treated thoroughly, particularly around window and door casings and around baseboards. Cracks in floors or floor coverings were treated when necessary. Ceilings were treated only if they had obvious cracks. As roaches emerged from hiding, their resting places were located, whereupon 10-percent-DDT dust was applied. Particular care was taken to dust every crack around sinks, and in tables, refrigerators and food cupboards. Shelves, cupboards, and drawers that could not be sprayed were dusted, and an application of dust was made under all furniture under which the floor was not regularly swept.

This technique produced excellent results in private houses and was therefore tried in commercial establishments, including restaurants, grocery stores, meat markets, hotels, and hospitals. In the majority of cases, infestations of German roaches were reduced from class D to class B within 1 week, the greatest mortality occurring within 3 or 4 days. Four weeks after treatment, class A conditions existed in two-thirds of the places treated, and the remainder were class B. In all but three cases, American-roach infestations were reduced from class D to class A or B within 1 week after treatment.

Method 5—Multiple spraying of infested areas.—An alternate method of applying larger dosages of DDT to more concentrated areas was tried, and although it was not as satisfactory as method 4, it is of interest because of the results obtained.

Infested rooms in a fifth group of houses were sprayed with 2½-, 5-, and 10-percent concentrations of DDT in a xylene-water emulsion. When an infestation was encountered, the locality of the infestation was sprayed three or four times, in order to kill as many of the emerging roaches as possible with the oil spray and, simultaneously, to leave a heavy deposit of DDT crystals on or near the resting place. This method gave better results than the controlled-dosage spraying, but was not as effective as the combination spray-and-dust method. The main objection to this type of treatment was the mess which resulted from drenching walls and furniture with DDT spray. It could be used only in very poor quality establishments.

GENERAL DISCUSSION AND SUGGESTIONS

Method 4, as described above, applied particularly to the treatment of private houses, and when other types of establishments were treated, certain variations in technique were found to be necessary. In the kitchens of restaurants, hotels, and hospitals where roaches were found mostly around sinks and shelves, or in tables and benches used for preparing and storing food, special care was taken to protect all food and dishes before spraying.

Infestations in hospital rooms usually resulted from food and crumbs being dropped by patients eating in bed. Heavy infestations existing in bedsprings were eliminated by repeated applications of 5-percent-DDT spray as described in method 5. This left a comparatively heavy deposit of DDT crystals on the bedsprings.

Infestations in hotel rooms were usually traced to food in the room and were eliminated by the treatment outlined under method 4.

Control of both species of roaches in grocery stores and meat markets required greater dependence on the 10-percent-DDT powder than on the liquid spray. Meat counters and cold-storage boxes were sprayed, but only dust was applied to shelves, cash registers, inside spools of wrapping paper, and wherever possible behind and under display cases. Ten-percent-DDT dust was also applied on and between packages and crates in storage rooms.

Special treatment was necessary in two cases in which American roaches entered houses from the outside, even after 10-percent-DDT dust had been applied to closets, under electric stoves and refrigerators, behind cupboard drawers, and in attics. These inside treatments only partially reduced the number of American roaches observed by the occupants at night. Therefore, an outside application of 5-percent-DDT spray was made to incinerators, garbage disposals, garages, and outside lavoratories. Wherever roaches were driven out of hiding by the spray, 10-percent-DDT dust was applied. Additional dust applications were made on the steps and porches, as well as to the ground immediately surrounding the houses. The following day, many dead roaches were counted as a result of this treatment, and the occupants did not report roaches inside the houses for the duration of the study.

RESULTS OF ROACH CONTROL

A complete summary of all tests made during this study is included in tables 1 and 2.

When over-all spraying of regulated dosages (100, 200, and 400 mg. of DDT per square foot) were applied to all rooms of infested houses as described in methods 1 and 2, several hundred German and American roaches, comprising class D infestations, were killed. Many roaches were not killed during these treatments, but some continued to die each day for about 2 weeks. In some cases dead German roaches were found for as long as 4 weeks after treatment. Infestations of American roaches were reduced to class A or class B, 3 or 4 weeks subsequent to treatment, and this control continued for the duration of the 16-week study. Class D German-roach infestations required from 1 to 3 weeks for reduction to class C, and seldom dropped below class C during the period of the study.

TABLE 1.—*Infestation classifications of American roaches before and after various methods of DDT treatment*

Test number [1]	Type of establishment	Type of DDT treatment	Extent of treatment	Classification of infestation							
				Before treatment	Time after treatment (in weeks)						
					1	2	3	4	8	12	16
1-1A	House	2½-percent spray	Entire house	D	C	C	B	B	A	A	A
2-1A	do	5-percent spray	do	D	C	C	B	B	A	A	A
2-2A	do	do	do	B	A	A	A	A	A	A	A
3-2A	do	10-percent dust	Kitchen and bedroom.	D	B	B	A	A	A	A	A
4-1A	Grocery store.	5-percent spray, 10-percent dust.	Store and storeroom.	D	B	B	B	B	A	A	A
4-2A	do	do	do	D	B	A	A	A	B	A	A
4-3A	do	do	do	D	C	C	C	C	B	A	A
4-5A	Meat market	do	do	D	A	A	A	A	A	A	A
4-6A	House	do	Kitchen	D	B	B	B	B	A	A	A
4-9A	do	do	do	C	A	A	A	A	A	A	A
4-10A	do	10-percent spray, 10-percent dust.	Kitchen and outside.	D	C	C	C	B	B	A	A
4-11A	do	do	Kitchen	C	A	A	A	A	A	A	A
4-12A	do	5-percent spray, 10-percent dust.	do	C	B	B	B	B	A	A	A
4-13A	do	do	do	C	B	A	A	A	A	A	A
4-14A	do	do	Entire house	D	B	B	A	A	A	A	A
4-15A	do	do	Kitchen and porch	D	B	B	B	B	A	A	A
4-16A	do	do	do	D	B	B	B	B	A	A	A
4-21A	do	do	Kitchen and outside.	D	C	B	A	A	A	A	A
4-22A	Hospital.	do	Entire building	D	B	A	A	A	A	A	A
4-23A	Restaurant.	do	Kitchen and storeroom.	D	A	A	A	A	A	A	A
4-24A	do	do	do	D	B	A	A	A	A	A	A
5-3A	House	5-percent spray	Kitchen	D	A	A	A	A	A	A	A
5-5A	do	do	do	D	A	A	A	A	A	A	A
5-7A	do	10-percent spray	do	D	A	A	A	A	A	A	A
5-8A	do	do	do	D	B	B	A	A	A	A	A

[1] First digit in this number refers to the method of treatment as numbered in the text.

TABLE 2.—*Infestation classifications of German roaches before and after various methods of DDT treatment*

Test number	Type of establishment	Type of treatment	Extent of treatment	Classification of infestation							
				Before treatment	Time after treatment (in weeks)						
					1	2	3	4	8	12	16
1-1	House	2½-percent spray	Entire house	D	D	D	C	C	C	C	C
1-2	do	do	do	D	D	C	C	C	C	C	C
1-3	do	do	do	D	D	C	C	C	C	C	C
2-1	do	5-percent spray	do	D	D	C	C	C	C	C	C
2-2	do	do	do	D	C	C	C	C	C	C	C
2-3	do	10-percent spray	do	D	C	C	C	C	C	C	C
3-1	do	10-percent dust	Kitchen and pantry.	D	D	D	C	C	C	C	C
3-2	do	do	Kitchen and bedroom.	D	D	D	D	C	C	C	C
4-1	Grocery store.	5-percent spray, 10-percent dust.	Store and storeroom.	D	C	B	B	B	A	A	A
4-2	do	do	do	D	C	C	C	B	B	A	A
4-3	do	do	do	D	C	B	B	A	A	A	A
4-4	do	do	do	C	B	A	A	A	A	A	A

TABLE 2.—*Infestation classifications of German roaches before and after various methods of DDT treatment*—Continued

Test number [1]	Type of establishment	Type of treatment	Extent of treatment	Classification of infestation							
				Before treatment	Time after treatment (in weeks)						
					1	2	3	4	8	12	16
4-5	Meat market.	5-percent spray, 10-percent dust.	Store and stockroom.	D	B	B	A	A	A	A	A
4-6	House	do	Kitchen	D	B	B	B	B	A	A	A
4-7	do	do	do	C	B	A	A	A	A	A	A
4-8	do	do	do	C	B	B	A	A	A	A	A
4-9	do	do	do	C	B	B	B	B	A	A	A
4-10	do	10-percent spray, 10-percent dust.	Kitchen and outside.	C	A	A	A	A	A	A	A
4-11	do	do	Kitchen	D	B	B	A	A	A	A	A
4-12	do	5-percent spray, 10-percent dust.	do	D	B	B	B	B	A	A	A
4-13	do	do	do	C	B	B	B	A	A	A	A
4-14	do	do	Entire house	C	B	B	A	A	A	A	A
4-15	do	do	Kitchen and porch	D	B	A	A	A	A	A	A
4-16	Apartment house.	do	do	D	B	A	A	A	A	A	A
4-17	do	do	Kitchen and pantry.	C	A	A	A	A	A	A	A
4-18	do	do	do	D	A	A	A	A	A	A	A
4-19	do	do	do	D	B	B	A	A	A	A	A
4-20	do	do	do	D	B	B	A	A	A	A	A
4-22	Hospital	do	Entire building	D	C	C	B	B	B	B	A
4-23	Restaurant.	do	Kitchen and stockroom.	D	B	B	B	A	A	A	A
4-24	do	do	do	D	C	C	B	B	A	A	A
5-1	House	2½-percent spray	Kitchen	D	C	C	C	C	C	C	C
5-2	do	do	do	D	C	C	C	C	C	C	C
5-3	do	5-percent spray	do	D	B	B	B	B	B	B	B
5-4	do	do	do	D	B	A	A	A	A	A	A
5-5	do	do	do	D	C	C	C	B	B	B	B
5-6	do	10-percent spray	Entire house	D	C	B	A	A	A	A	A
5-7	do	do	Kitchen	D	C	C	C	C	C	C	C
5-8	do	do	do	D	B	B	B	B	A	A	A

Dusting of the more obvious roach resting places in infested rooms with 10-percent-DDT powder, as described in method 3, likewise resulted in a heavy mortality immediately after treatment. This method was particularly effective against American roaches, which were reduced from class D to class B in 1 week and often to class A in 3 weeks. The mortality of German roaches was also high immediately after treatment. Noticeable numbers of dead roaches were observed on the floors for about 3 weeks, at which time the infestation dropped from class D to class C. No further reduction in the classification of the German-roach infestation resulted during the course of the study.

In the combined use of 5-percent-DDT spray and 10-percent-DDT dust, as described in method 4, the greatest mortality of both species occurred immediately after treatment. Roaches continued to die for 3 or 4 days, but after 1 week very few dead roaches were seen. With few exceptions, class D infestations of German and American roaches in all types of establishments were reduced to class B or better in 1 week, and, in the majority of places treated, class A conditions existed within 4 weeks after treatment. No evidence of reinfestation of either species

was noted at any time during the study. The greater effectiveness which this method of treatment appeared to have over other methods tried, resulted chiefly from the fact that, insofar as possible, every nest of roaches was sought out and thoroughly dusted with 10-percent-DDT powder, whereas other methods of treatment relied to a great extent upon the roaches sooner or later passing over a locality having sufficient DDT to be toxic.

Repeated spraying of areas where roaches were encountered, as described in method 5, had the double advantage of killing many roaches with the DDT solvent as they emerged from hiding and simultaneously depositing heavier dosages of DDT crystals in the locality of the resting places. The results obtained using 2½-percent concentrations were not as satisfactory as those when 5- and 10-percent spray concentrations were used. With the two latter concentrations, some class D infestations of American roaches were reduced to class A in 1 week, whereas others required 3 weeks. German roaches were often reduced to class B or C infestations after 2 or 3 weeks. In general, the control which could be expected from this type of treatment was not as reliable as the combined use of spray and dust. Excellent results were obtained, however, in test No. 5–6 (table 2), in which an infestation of several thousand German roaches was reduced to class A 3 weeks after treatment. During the following 7 months no roaches were seen in this place by either occupant or inspector, although the type of housekeeping which permitted such an infestation to develop still existed.

In the two cases in which outside treatments were made in an effort to control American roaches which had been entering the houses at night, over 300 dead roaches were counted around the garages, incinerators, and garbage disposal units of each of the two premises. The treatment, which consisted of 5-percent-DDT spray applications followed by extensive dusting with 10-percent-DDT powder, apparently eliminated or greatly reduced the source of infestation, since no roaches were seen in either dwelling thereafter.

BEDBUG CONTROL

Eradication of bedbug infestations has been difficult in the past because some bedbugs would leave beds and furniture to hide in the cracks of walls and floors where they were not affected by the petroleum insecticides sprayed on the beds, mattresses, furniture, and wall surfaces.

DDT overcomes this difficulty because of its lasting toxicity, and many studies already conducted have shown that DDT is the most effective insecticide yet used against bedbugs (*1, 2, 3, 4, 5*).

In this study the extent and type of treatment was varied, different solvents were used, and various concentrations of DDT were applied, in an effort to determine the importance of these factors in bedbug control when DDT is used under practical conditions, i. e., by the householder. Observations were also made on the advantages or disadvantages in the use of various types of sprayers and nozzles.

All spray applications were made in dwellings in which bedbug counts had been made on mattresses, beds, and furniture prior to spraying. After spraying, inspections were made once each week for 16 weeks.

Procedure.—Premises were divided into groups, according to the extent of the DDT treatment applied in each house, as follows:

1. Mattresses were sprayed on both sides and around the edges. No other spraying was done in houses of this group.
2. Mattresses and bedsprings were sprayed.
3. Mattresses, bedsprings, and bedsteads were sprayed. Treatment of bedsteads consisted of spraying chiefly into cracks on the inside of sideboards, as well as into the joints where sideboards fasten to bed ends.
4. Entire beds, including mattresses, bedsprings, and bedsteads, were sprayed, as were the walls of the bedroom.
5. Walls and ceilings of the entire house were sprayed, together with all chairs, divans, and beds.

Sprayers and nozzles.—In the treatment of beds and mattresses, the 1-quart-capacity "Sure Shot Milwaukee" sprayer was tried, but the majority of spraying was done with the 4-gallon-capacity knapsack type of compressed-air sprayer. Use of the "Sure Shot" sprayer resulted in very little waste of spray, but considerable time was consumed in making the applications. The knapsack-type sprayer, equipped with an atomizing nozzle, producing a flat-fan spray pattern of approximately 50° and having a discharge rate of one-tenth gallon per minute at 40 pounds' pressure, appeared to be the most suitable for quick and thorough treatment of beds. With this nozzle, most surfaces could be given an even application of spray without getting them too wet and without excessive waste. Nozzles of the same type, having wider spray angles and higher discharge rates, left surfaces too wet and were found to result in excessive waste of spray.

RESULTS OF BEDBUG CONTROL

Actual counts of bedbugs made in all premises during this 16-week study are summarized in table 3. No bedbug reinfestations occurred during this period, although many of the places treated were immediately adjacent to infested houses in multiple-unit dwellings. In the

case of test No. 2–3 (table 3), two treated beds repeatedly showed no bedbugs, whereas inspections of a third untreated bed in the same house showed between 25 and 50 bedbugs each week, during the study.

TABLE 3.—*Bedbugs counted before and after treatment with various DDT sprays*

Test number	Extent of treatment	Solvent	Percent DDT	Number of bedbugs counted			
				Before treatment	After treatment (weeks)		
					1	8	16
1–1	Mattress	Xylene	2½	31	0	0	0
1–2	do	do	5	117	0	0	0
1–3	do	do	10	74	0	0	0
2–1	Mattress and bedsprings	do	2½	43	0	0	0
2–2	do	do	5	81	0	0	0
2–3	do	do	10	240	0	0	0
3–1	Mattress, bedsprings, and bedstead	do	2½	62	0	0	0
3–2	do	do	5	29	0	0	0
3–3	do	do	10	42	0	0	0
3–4	do	Kerosene deodorized	5	37	0	0	0
3–5	do	do	5	45	0	0	0
4–1	Entire bed and walls of bedroom	Xylene	2½	138	0	0	0
4–2	do	Velsicol AR–50 (regular).	2½	40	0	0	0
4–3	do						
4–4	do	Velsicol AR–50 (regular).	5	48	0	0	0
4–5	do	Velsicol AR–50 (special).	5	92	0	0	0
4–6	do	Solvesso No. 2	5	28	0	0	0
4–7	do	do	5	39	0	0	0
4–8	do	Xylene	10	46	0	0	0
4–9	do	do	10	28	0	0	0
4–10	do	Solvesso No. 2	10	83	0	0	0
4–11	do	do	10	27	0	0	0
4–12	do	Xylene	35	61	0	0	0
5–1	Beds, chairs, walls, and ceilings of entire house.	do	2½	52	0	0	0
5–2	do	PD–544C	2½	68	0	0	0
5–3	do	Velsicol AR–50 (regular).	2½	45	0	0	0
5–4	do	Solvesso No. 2	2½	36	0	0	0
5–5	do	Xylene	5	8	0	0	0
5–6	do	PD–544C	5	79	0	0	0
5–7	do	Velsicol AR–50 (regular).	5	38	0	0	0
5–8	do	do	5	26	0	0	0
5–9	do	do	5	42	0	0	0
5–10	do	Solvesso No. 2	5	30	0	0	0
5–11	do	Xylene	5	23	0	0	0

SUMMARY

In order to compare the effects of various methods of applying DDT for roach control, pretreatment and posttreatment infestations were classified into one of the four following groups:

A. No roaches evident.

B. One to five roaches per room in evidence.

C. Six to fifty roaches per room in evidence.

D. Roaches too numerous to count.

DDT has been used, with a relative degree of success, for controlling German and American roaches in a variety of establishments. Experi-

ments have been conducted wherein infestations of several hundred German and American roaches have been reduced to a negligible number within 1 week after treatment and further reduced after 4 weeks to a point at which, in many cases, no roaches were observed for the remainder of the 16-week study.

Against German roaches, the most satisfactory results have been obtained by the use of a DDT treatment technique involving the spraying of infested rooms with 5-percent-DDT spray, followed by a thorough application of 10-percent-DDT dust to every crack from which roaches were driven by the pungent spray. The successful use of this technique required a great deal of attention in the application of dust to cracks around sinks, and in refrigerators, food cupboards, chairs, tables, or benches where food was stored, prepared, or served.

Against American roaches, over-all dusting with 10-percent-DDT powder of obvious cracks around baseboards, window frames and door frames, as well as applications in cupboards, trunks, cabinets, and drawers, resulted in effective control of American roaches which were living inside the house. American roaches entering the house from the outside were effectively controlled, at least for the duration of this study, by treating the outside breeding places, such as incinerators, garages, and garbage-disposal places, with 5-percent-DDT spray and 10-percent-DDT dust, supplemented by dusting the ground immediately surrounding the house.

In general, it can be said that American roaches were more effectively controlled with lighter dosages of DDT spray, and less thorough applications of DDT dust, than were German roaches. This was attributed partly to the difference in habits of the two species, the German roach appearing to move only short distances from its resting place, whereas the American roach moves about considerably more and therefore has greater opportunity to encounter DDT in toxic doses.

DDT toxicity to bedbugs was investigated by treating groups of infested houses with various DDT sprays, using different solvents and in concentrations ranging from 2½ to 35 percent DDT.

Extent of DDT treatment ranged from spraying only the mattress, in the first group of houses, to spraying the entire house and furniture, in the fifth group.

All methods of treatment used resulted in complete control of bedbugs for the duration of the study.

REFERENCES

(*1*) Madden, A. H.; Lindquist, A. W.; and Knipling, E. F.: DDT and other insecticides as residual-type treatments to kill bedbugs. J. Econ. Ent., **38**: 265–271 (1945).

(*2*) Madden, A. H.; Lindquist, A. W.; and Knipling, E. F.; DDT as a residual spray for the control of bedbugs. J. Econ. Ent., **37**: 127–128 (1944).

(3) McGovran, E. R.; Richardson, H. H.; and Piquett, P. G.: Toxicity of DDT to bedbugs, cockroaches, the Mexican bean beetle and housefly larvae. J. Econ. Ent., 37: 139–140 (1944).
(4) Kulash, W. M., and Maxwell, J. M.: DDT and bedbugs in chicken houses. J. Econ. Ent., 38: 606 (1945).
(5) Report on Experimental Studies of DDT for Bedbug Eradication by United States Public Health Service Consultants Office, Federal Public Housing Authority, June 1945.

A NEW TECHNIQUE FOR SAMPLING THE DENSITY OF HOUSEFLY POPULATIONS [1]

By H. I. Scudder, *Senior Assistant Sanitarian (R), United States Public Health Service* [2]

The evaluation of insect control measures is dependent upon an adequate method of measuring the insect population or of estimating its importance. In the case of highly mobile insects such as houseflies, it is practically impossible to count all the individuals in even a small unit area. Moreover, houseflies are very gregarious, in the sense that large numbers often congregate in attractive spots, leaving the greater portion of the premise entirely free of flies. This characteristic is significant in that the usual small sample, if taken at random, results in a biased estimate of the mean of the population. The distribution of houseflies is often so extremely irregular, with only three or four peaks of population in an entire premise, that random samples are of very little value.

A common method of estimating the population of such mobile insects is the use of bait traps. In general, such traps have been unsatisfactory, first because it has been difficult to find baits of uniform and constant attractiveness, and secondly because the sphere of influence of a given bait will vary under different atmospheric conditions and in competition with counter-attractants of varying importance. Counting the number of flies resting on unit areas of walls or floors, collecting samples stuck on flypaper, and sweeping the air with regular insect nets have been tried; but none of these methods have met with the general approval of entomologists. A reasonable solution to this problem appears to be the use of a standard neutral resting surface that will neither repel nor actively attract the flies. By placing such a device at points where flies are concentrated, it should be possible to estimate the relative size of the population at such points.

In constructing a neutral resting surface, consideration has been given to the fact that houseflies are commonly observed to select

[1] From Communicable Disease Center, Technical Development Division (Savannah, Ga.), States Relations Division.

[2] Resigned December 1, 1946. Acknowledgment is made of the careful criticism and assistance of William M. Upholt, Entomologist, U. S. Public Health Service.

edges as resting places. Accordingly, a device known as a "fly grill" was constructed of ¼-inch strips cut from a ¾-inch board 3 feet long. These strips were left unplaned and were tacked ¾ inch apart on a rigid 3-piece frame to form a "fly grill" 1 yard square. Such a device contains a total of 147 linear feet of edge in the surface plane. Its open structure, moreover, allows the flies free movement through it and does not interfere with the natural attractiveness of the area in which it is placed. It has been suggested that the barred pattern of contrast formed by the structure may produce a positive optometer response in flies. There is no evidence available regarding this hypothesis other than that such a pattern does have a focus-shifting effect upon human vision. In any case, the device has an extremely high capacity for flies, as shown by figure 1, in which 485 flies may be counted resting on it at one time.

It will be noted in figure 1 that the fly grill has been divided into quadrants and that the strips have been tipped with black paint at alternate ends in groups of three. This permits easier counting of the flies when large numbers are present and is important because counts should be made quite rapidly in view of the frequent movement of individual flies.

The 3-foot fly grill is so large and conspicuous to use in restaurants and similar places that a small fly grill, 18 inches on each side, was used in such situations (fig. 2). It was constructed of thirty-four ¼-inch-square strips spaced ¼ inch apart. Its construction and use was similar in all other regards to the 3-foot fly grill. Since the two grills were used in entirely different situations, one size was never evaluated in terms of the other. Each appeared to have a satisfactory capacity in the situation for which it was designed.

As indicated above, random placement of the fly grill in most natural fly populations would result in a great many zero counts, with the possibility of no large counts unless a large number of placements were used in each sampling. Accordingly, it was decided to use the fly grill to determine the size of obvious peaks of population. The procedure used was rather simple. The inspector first observed the fly concentrations and selected the points of maximum fly annoyance. The fly grill was then placed in the center of each such concentration. With as little motion as possible, all flies resting at the edges of the area of concentration were disturbed to redistribute them and give them an opportunity of alighting on the fly grill. As their number rapidly stabilized within half a minute, the flies were counted rapidly about 30 seconds later. The number of flies counted was used as an approximate density value for each point chosen by the inspector.

During the first season in which the fly grill was used, as many as five counts were made at each grill placement, gently disturbing the

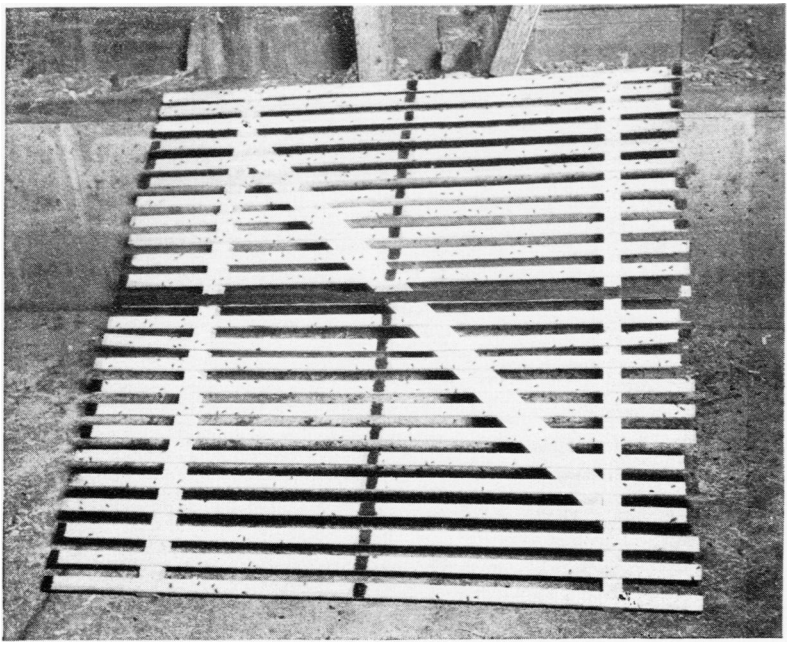

FIGURE 1.—The large fly-counting grill in use in a dairy barn. Its division into quadrants facilitated making high counts under such heavily infested conditions as prevail here. There are 485 houseflies resting on the grill.

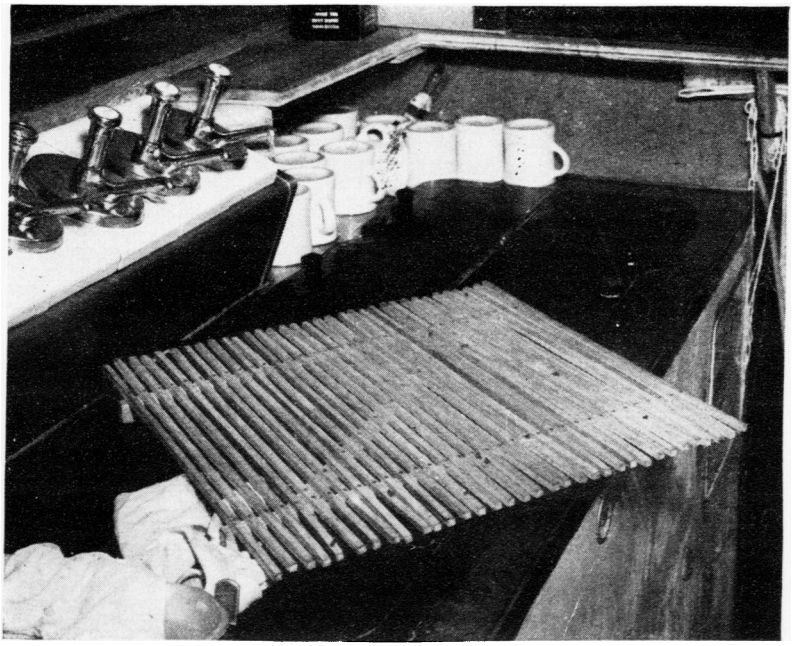

FIGURE 2.—The 18-inch grill placed on an ice-cream cabinet in a restaurant kitchen, showing 11 houseflies.

flies and allowing them to come to rest again between each successive count. The highest count so obtained was considered the pertinent value for that particular placement. In general, the second count made at any point was the highest, though the counts of houseflies did not vary appreciably until after the fourth or fifth count. On the other hand, there was great variation from one point to another, the points with obviously more flies always yielding the highest counts.

The fly grill was placed as nearly as possible on the same level as the field of activity of the flies and in the center of their concentration. It was rarely necessary to stand the fly grill at an angle, as the horizontal position was usually nearer the level at which the flies were resting or actively moving about. The fly grill was placed in position carefully, so that the flies were not driven from the general area by the action. Houseflies are very persistent in returning to a location, so that moderate caution was sufficient in handling them; but blowflies (Calliphoridae) are more active and required far greater care.

In the case of establishments such as dairies, restaurants, etc., the entire establishment was arbitrarily divided into zones of a natural type, such as those shown in table 1, and counts were made at one or more locations in each such zone. Extreme midday heat seemed to disperse the flies from their normal outdoor pattern, making it necessary at times to discontinue sampling city blocks under such conditions.

The problem of the proper statistical techniques to apply to these fly-grill counts is as yet unsolved. Since counts are not made at random but rather are selected at peak concentrations, each figure is a maximum and cannot be averaged with the others to provide an estimate of the mean population. Probably the most suitable statistical method is to use a function of both the number of maxima found in the establishment and the size of each count. Not knowing the exact relationship between these counts and the total number of flies, the particular function to be used must be determined empirically. As a preliminary index for use in food-handling establishments, such as dairies, abbatoirs, restaurants, etc., a constant number (usually 4 or 5) of the highest counts were selected (with not more than one from a single zone), and the arithmetic mean of these maxima was recorded as the index for the establishment (see table 1). In the case

TABLE 1.—*An example of grill-count figures of housefly density and the present mode of index computation for dairies*

[Dairy (large grill counts]

Sampling zone	Highest single zone count [1]	Sampling zone	Highest single zone count [1]
Barn entrances	*80	Milk room	14
Stanchions	*18	Entrance of milk room	8
Floor of barn	*20	Feed room	*22

[1] Average of starred (*) maxima=35, the fly index figure for the inspection.

of fly control on a city-wide basis, individual blocks were handled in the same manner; the mean from a constant number of counts in a given block was used as an index for that area of the city. The usual method of employing indices in control operations either in individual establishments or in entire municipalities was to institute further control measures as soon as the index for the establishment or for the city block exceeded an arbitrary figure such as 10.

This index appeared to have some practical justification. Thus, table 2 shows the range of values obtained in establishments rated

TABLE 2.—*The midsummer relationship between housefly index figures based on the grill technique and the general level of premise sanitation (Savannah, Ga.). (No comparison between large and small grills is intended)*

Sanitation level (untreated premises)	Dairies (large grill index)	Restaurants [1] (small grill index)
Good	Less than 20	Less than 3.
Average	20–60	3–5.
Poor	60–150	5–10.
Extremely poor	Over 150	Over 10.

[1] A clean restaurant or shop with an open front (short order) may have an index figure over 5, since the flies have such free access to it from the street.

independently for general level of sanitation. The indices determined by fly-grill counts are in agreement with the commonly observed fact that relatively large fly populations are associated with poor sanitation.

Figure 3 presents graphically the grill indices obtained in certain Texas cities [3] during 1946 and shows the very high peak of fly abundance associated with the peak of the tomato-canning activities in late June. All the cities were similar in size, population, industrial activities, and geographical conditions. Again, the indices are in agreement with the easily observed fact that the fluctuations in fly population were similar in all the cities, gradually building up to an extremely high peak in late June, after which the population declined very rapidly, building up again slightly in the cooler weather of the late fall months.

A third example of the results to be expected from the use of the fly-grill counts is presented in table 3.[4] The indices averaged over monthly periods indicate clearly the gradual increase in fly abundance at the dairy in question up to June 20. At that time, the dairy was sprayed, and, as indicated by the indices, the flies were kept under control at least through October. Figure 4 [4] presents similar evidence graphically.

[3] These data obtained on the Dysentery Control Project at Pharr, Texas, were kindly furnished by Dr. Dale R. Lindsay, Senior Assistant Sanitarian (R) of the U. S. Public Health Service.

[4] Data from Baker, Walter C.; Scudder, H. I.; and Guy, E. L.: The control of houseflies by DDT sprays. Pub. Health Rep., 62: 597–612 (Apr. 25, 1947).

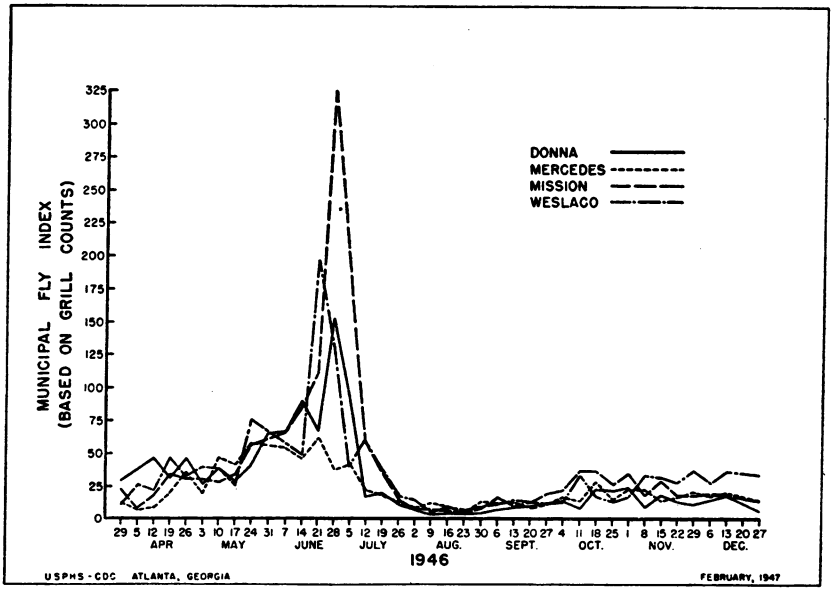

FIGURE 3.—A graph of municipal fly indices showing the seasonal trend in four similar towns in Hidalgo County, Tex.

TABLE 3.—*Housefly index figures computed from large grill counts made at a large dairy before and after spraying with DDT (data from Baker, et al.)*

Pretreatment fly index			Posttreatment fly index		
Date—1945	Index	Monthly index average	Date—1945	Index	Monthly index average
Apr. 4	7		June 26	11	
Apr. 10	23	20.5	July 3	4.50	
Apr. 18	15		July 9	0.75	
Apr. 24	37		July 16	3.75	5.9
May 5	76		July 23	7.50	
May 7	74		July 30	13.00	
May 14	133	93.4	Aug. 6	3.75	
May 21	76		Aug. 13	4.25	3.6
May 28	108		Aug. 21	5.25	
June 4	188		Aug. 27	1.00	
June 11	250	199.7	Sept. 7	5.25	
June 18	161		Sept. 12	7.25	6.2
			Sept. 18	8.25	
			Sept. 25	4.00	
Dairy sprayed June 20, 1945			Oct. 3	8.25	
			Oct. 9	10.50	
			Oct. 18	1.75	5.1
			Oct. 23	3.00	
			Oct. 30	1.75	

This technique of estimating fly populations was designed for use with the housefly, *Musca domestica* L. It has also been used successfully to estimate blowfly (Calliphoridae) populations.[5] The Calliphorids are far more active than houseflies and, unlike them, tend to rest only briefly on neutral surfaces. In using the fly grill, there-

[5] Baker, W. C., and Schwartz, L. G.: Preliminary studies on the control of blowflies with DDT. Pub. Health Rep. (in press).

fore, these flies had to be counted rapidly before they moved downward through the grill to rest again upon the food from which they were disturbed.

The fly grill as described has been used as a standard counting surface for estimating peaks of fly populations from which index

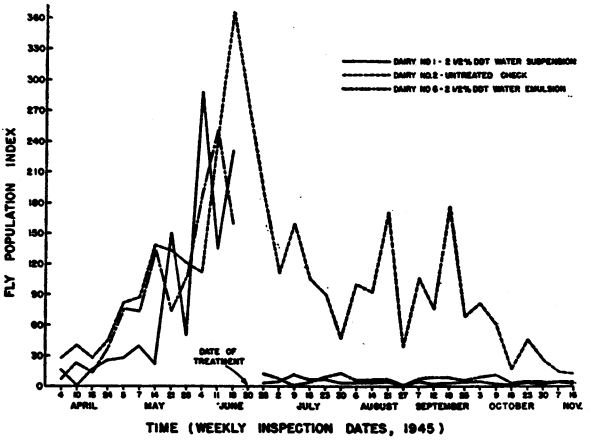

FIGURE 4.—Comparison of the grill indices of housefly density in three dairies, two of which were treated with DDT sprays (Savannah, Ga.).

figures can be computed for use in guiding fly-control programs in single establishments or in entire municipalities. Direct observations in the field by experienced sanitarians supported the validity of the method, which was found to be quite simple in application and economically feasible. Since statistical analysis of the data is dependent upon further studies of insect distributions and non-random samples, it is not yet possible to validate the method or the index used on other than its present empirical basis. In general, the method has found favor with both entomologists and sanitarians who have seen it demonstrated and actually used it themselves under a variety of conditions.

DEATHS DURING WEEK ENDED APRIL 12, 1947

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

	Week ended Apr. 12, 1947	Corresponding week, 1946
Data for 93 large cities of the United States:		
Total deaths	10,154	9,105
Median for 3 prior years	9,154	
Total deaths, first 15 weeks of year	151,812	150,718
Deaths under 1 year of age	723	596
Median for 3 prior years	599	
Deaths under 1 year of age, first 15 weeks of year	12,075	9,079
Data from industrial insurance companies:		
Policies in force	67,308,805	67,201,289
Number of death claims	12,738	13,322
Death claims per 1,000 policies in force, annual rate	9.9	10.3
Death claims per 1,000 policies, first 15 weeks of year, annual rate	9.9	11.2

INCIDENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 19, 1947

Summary

The reported incidence of influenza again declined sharply during the week. A total of 12,616 cases was reported, as compared with 23,536 last week. The current figure, however, is still high above the 5-year (1942–46) median of 1,815 cases. Only 9 States reported more than 164 cases each, and only 2 of these, Georgia and Alabama, showed increases. The 9 States are as follows (last week's figures in parentheses): Virginia 3,242 (4,673), West Virginia 202 (935), South Carolina 2,151 (2,650), Georgia 791 (485), Tennessee 406 (741), Alabama 1,366 (727), Arkansas 538 (1,255), Oklahoma 717 (3,347), Texas 1,774 (3,896). Of the total for the year to date, 278,753 cases (as compared with a 5-year median of 69,295), 238,162 or 85 percent, occurred during the past 7 weeks. The respective corresponding percentages for 1946, 1945, and 1944 are 11, 30, and 6 percent. Thirteen States with reports of more than 2,534 cases each during the 7-week period since March 1 and an aggregate of 220,900 cases, or approximately 93 percent of the total for the period, are as follows: Wisconsin 3,266, Iowa 15,109, Kansas 14,294, Virginia 19,164, West Virginia 12,435, South Carolina 13,951, Georgia 4,734, Tennessee 4,509, Alabama 7,647, Arkansas 22,653, Oklahoma 22,216, Texas 75,384, Colorado 5,538. The total since the last week of July, the approximate average date of seasonal low weekly incidence, is 311,728, as compared with 542,880 for the 1945–46 period, and a 5-year median of 105,157.

Of 10 cases of smallpox reported for the week, 4 occurred in Texas, 2 in Oklahoma, and 1 each in New Jersey, Indiana (last week 1), Mississippi (last week 1), and Nebraska. Through April 22 a total of 12 cases of smallpox, with 2 deaths, has been reported in New York City and its environs. (See p. 693).

The total of poliomyelitis reported since March 15, the average week of lowest seasonal incidence, is 141, as compared with 137 for the same period last year and a 5-year median of 99.

Deaths recorded for the week in 93 large cities of the United States totaled 9,701, as compared with 10,154 last week, 9,082 and 9,109, respectively, for the corresponding weeks of 1946 and 1945, and a 3-year (1944–46) median of 9,109. The cumulative total is 161,153, as compared with 159,800 for the corresponding period last year.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1947, and comparison with corresponding week of 1946 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median, 1942–46	Week ended—		Median, 1942–46	Week ended—		Median, 1942–46	Week ended—		Median, 1942–46
	Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946	
NEW ENGLAND												
Maine	2	1	1	8	------	------	184	64	64	0	0	3
New Hampshire	0	0	0	16	------	------	18	78	23	1	1	1
Vermont	0	0	0	------	------	------	231	3	118	0	1	0
Massachusetts	7	3	2	------	------	------	461	1,607	1,187	0	3	7
Rhode Island	1	0	1	3	------	1	357	9	24	3	0	0
Connecticut	0	3	2	8	------	------	758	283	447	2	3	3
MIDDLE ATLANTIC												
New York	23	25	20	[1] 4	(1)	[1] 2	447	5,386	2,314	6	10	32
New Jersey	5	13	5	14	3	5	391	3,466	1,545	2	3	5
Pennsylvania [2]	11	26	8	------	------	1	204	4,225	1,419	4	14	14
EAST NORTH CENTRAL												
Ohio	2	17	8	27	1	8	879	754	754	5	5	6
Indiana	3	4	5	17	4	6	97	563	256	3	1	2
Illinois	1	5	8	23	1	6	104	808	808	2	6	11
Michigan [3]	5	8	7	13	2	2	43	1,769	944	2	5	6
Wisconsin	0	1	1	106	57	37	295	4,566	1,620	0	4	4
WEST NORTH CENTRAL												
Minnesota	7	13	4	2	------	1	188	30	285	4	0	1
Iowa	1	3	3	159	------	2	202	205	205	3	1	1
Missouri	2	7	2	4	2	2	36	331	375	3	6	9
North Dakota	0	1	1	7	------	7	5	9	70	0	0	0
South Dakota	4	1	1	------	------	------	42	24	19	0	1	0
Nebraska	3	1	2	31	------	2	------	376	198	0	0	1
Kansas	7	0	2	60	------	3	10	700	576	0	1	
SOUTH ATLANTIC												
Delaware	1	0	0	2	------	------	1	66	15	1	0	0
Maryland [3]	2	22	9	13	4	3	28	499	499	5	2	5
District of Columbia	0	3	1	------	------	2	24	269	112	2	1	2
Virginia	5	5	5	3,242	159	159	232	430	425	5	8	8
West Virginia	1	9	3	202	5	11	65	67	176	1	1	2
North Carolina	12	7	7	------	------	6	159	498	498	4	1	4
South Carolina	10	3	3	2,151	229	265	256	341	341	1	0	0
Georgia	5	0	4	791	1	7	181	160	160	0	0	2
Florida	2	9	6	125	2	2	144	179	171	3	0	5
EAST SOUTH CENTRAL												
Kentucky	4	4	4	13	9	9	15	227	198	4	5	5
Tennessee	2	7	3	406	17	40	80	238	219	2	3	12
Alabama	1	2	4	1,366	18	95	354	266	266	0	1	8
Mississippi [3]	6	3	5	132	------	------	24	------	------	2	1	3
WEST SOUTH CENTRAL												
Arkansas	5	8	4	538	33	33	75	178	178	4	1	1
Louisiana	2	9	2	29	4	2	225	51	116	2	3	4
Oklahoma	0	2	3	717	24	45	5	483	306	1	2	2
Texas	16	32	28	1,774	595	595	329	2,005	1,974	7	2	3
MOUNTAIN												
Montana	0	0	1	51	1	2	164	64	132	0	0	0
Idaho	0	1	1	46	22	1	6	121	87	0	1	1
Wyoming	0	0	0	------	------	------	11	102	100	0	0	0
Colorado	7	8	7	88	6	19	77	1,318	511	0	1	1
New Mexico	0	1	1	3	2	2	63	71	71	0	0	0
Arizona	1	5	2	164	40	57	------	236	145	1	0	0
Utah [3]	1	0	0	86	1	2	10	465	319	0	0	0
Nevada	0	0	0	------	------	------	2	10	1	0	0	0
PACIFIC												
Washington	0	2	2	32	------	2	15	615	393	1	1	5
Oregon	3	4	2	112	23	17	24	371	165	6	2	2
California	14	18	18	31	46	46	189	3,374	3,374	5	11	23
Total	184	296	201	12,616	1,311	1,815	7,710	37,960	25,362	97	112	190
16 weeks [3]	4,432	5,864	4,687	278,753	180,632	69,295	90,810	339,156	288,308	1,425	2,949	3,807
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low [3]	11,998	17,508	13,412	311,728	542,880	105,157	113,697	365,280	326,321	2,397	4,453	6,259

[1] New York City only.

[2] Pennsylvania reports for week ended April 5: Cerebrospinal meningitis, 6; diphtheria, 17; measles, 182; poliomyelitis, 1; scarlet fever, 200; typhoid fever, 1; undulant fever, 1; whooping cough, 174; these figures are included in cumulative totals only.

[3] Period ended earlier than Saturday.

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

Telegraphic morbidity reports from State health officers for the week ended April 19, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46	Week ended—		Median 1942–46
	Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947	Apr. 20, 1946		Apr. 19, 1947[3]	Apr. 20, 1946	
NEW ENGLAND												
Maine	0	0	0	26	36	36	[6]	0	0	1	1	1
New Hampshire	1	0	0	10	19	13	0	0	0	3	0	0
Vermont	0	0	0	5	12	12	0	0	0	0	0	0
Massachusetts	0	0	0	126	157	386	0	0	0	4	1	2
Rhode Island	0	0	0	6	12	25	0	0	0	0	0	0
Connecticut	0	0	0	46	47	72	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	3	5	3	242	855	643	[6] 1	0	0	1	4	5
New Jersey	1	0	0	84	147	147	1	0	0	1	1	1
Pennsylvania[2]	0	0	0	185	519	519	0	0	0	0	2	6
EAST NORTH CENTRAL												
Ohio	0	2	0	234	373	341	0	0	0	0	0	2
Indiana	0	0	0	100	91	102	1	0	0	2	3	0
Illinois	3	1	1	118	172	204	0	0	0	0	2	2
Michigan[2]	2	0	0	93	202	288	0	0	0	0	4	3
Wisconsin	0	0	0	69	128	176	0	1	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	1	0	0	42	38	63	0	0	0	0	0	0
Iowa	1	1	0	30	56	56	0	0	0	2	2	1
Missouri	1	0	0	32	92	92	0	0	0	0	0	2
North Dakota	0	0	0	2	9	18	0	0	0	0	0	0
South Dakota	0	0	0	1	7	20	0	0	0	0	0	0
Nebraska	1	0	0	36	10	36	1	0	0	0	0	0
Kansas	0	0	0	36	64	65	0	0	0	0	1	1
SOUTH ATLANTIC												
Delaware	1	0	0	3	12	12	0	0	0	0	0	0
Maryland[2]	0	0	0	37	82	82	0	0	0	1	0	1
District of Columbia	0	0	0	7	38	36	0	0	0	0	4	0
Virginia	0	0	0	47	90	90	0	0	0	2	3	1
West Virginia	0	0	0	14	25	31	0	0	0	1	0	3
North Carolina	0	0	0	17	22	38	0	0	0	0	1	1
South Carolina	0	0	0	5	6	6	0	0	0	2	0	0
Georgia	0	0	0	11	12	11	0	0	0	1	3	5
Florida	2	6	1	8	10	8	0	0	0	0	3	3
EAST SOUTH CENTRAL												
Kentucky	0	0	1	23	26	49	0	1	0	2	2	1
Tennessee	0	0	0	32	17	58	0	0	0	2	2	2
Alabama	0	1	1	18	2	12	0	0	0	3	1	1
Mississippi[2]	1	0	1	4	3	9	1	0	0	0	2	2
WEST SOUTH CENTRAL												
Arkansas	1	0	0	6	9	4	0	0	0	1	2	1
Louisiana	2	1	0	8	7	8	0	0	0	2	8	4
Oklahoma	0	0	0	9	16	19	2	2	0	0	2	1
Texas	4	2	3	20	58	58	4	1	1	3	14	7
MOUNTAIN												
Montana	0	0	0	7	8	17	0	0	0	1	0	0
Idaho	0	0	0	5	3	28	0	0	0	0	0	0
Wyoming	0	0	0	2	5	9	0	0	0	0	0	0
Colorado	0	1	0	38	49	52	0	0	0	0	0	0
New Mexico	0	0	0	7	1	9	0	0	0	0	0	1
Arizona	0	0	0	9	10	10	0	0	0	1	0	0
Utah[2]	0	0	0	17	28	30	0	0	0	0	0	0
Nevada	0	0	0	2	0	0	0	0	0	0	0	0
PACIFIC												
Washington	2	3	0	45	28	35	0	4	0	0	2	0
Oregon	0	0	0	26	40	35	0	0	0	0	3	0
California	5	6	4	126	180	180	0	0	0	3	3	3
Total	32	29	26	2,076	3,833	4,031	10	9	12	39	76	76
16 weeks[2]	767	603	401	42,880	56,296	63,789	88	158	189	681	759	904
Seasonal low week[4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low[2]	141	137	99	69,566	94,867	102,126	142	234	306	196	284	297

[2] For footnote 2, see p. 688. [3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including paratyphoid fever reported separately, as follows: Massachusetts 4 (salmonella infection); New Jersey 1; Georgia 1; Texas 2.
[6] In New York City, delayed reports for period April 5-9 included in cumulative total only. Onset of last reported case April 9.

Telegraphic morbidity reports from State health officers for the week ended April 19, 1947, and comparison with corresponding week of 1946 and 5-year median—Con.

Division and State	Whooping cough			Week ended April 19, 1947								
	Week ended—		Median 1942–46	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Apr. 19, 1947	Apr. 20, 1946		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	17	32	25	1							
New Hampshire	3	2	6								
Vermont	8	11	11								1
Massachusetts	109	78	85	1	1						
Rhode Island	7	34	16								
Connecticut	35	71	38								2
MIDDLE ATLANTIC											
New York	142	161	242	10	1					3	4
New Jersey	152	91	117								1
Pennsylvania [2]	128	104	190				1				2
EAST NORTH CENTRAL											
Ohio	133	67	99								
Indiana	83	21	21		1						1
Illinois	86	68	68	2					2		8
Michigan [3]	134	89	89	1	4						10
Wisconsin	129	80	81								2
WEST NORTH CENTRAL											
Minnesota	19	8	29	3							2
Iowa	21	16	16								7
Missouri	28	9	11						1		
North Dakota	1	1	1								
South Dakota			2								
Nebraska	20		2	1							1
Kansas	41	25	30								11
SOUTH ATLANTIC											
Delaware			1								
Maryland [3]	68	7	63			1					1
District of Columbia	7		9								
Virginia	53	37	59			74					4
West Virginia	35	41	26								
North Carolina	34	67	133		1					1	
South Carolina	135	61	61	14	7		1		2	1	2
Georgia	18	6	13	1	4				5	10	2
Florida	65	7	13							2	
EAST SOUTH CENTRAL											
Kentucky	24	34	36				1				
Tennessee	42	18	26			1		1	1		
Alabama	84	22	35						1		1
Mississippi [3]				8	16						1
WEST SOUTH CENTRAL											
Arkansas	27	12	12		1	1			2		
Louisiana	5	1	3						1	1	
Oklahoma	21	13	14						1		3
Texas	539	268	240	9	166	27				5	11
MOUNTAIN											
Montana	13	2	6								
Idaho	14	9	3								1
Wyoming	2	3	5								
Colorado	39	28	34		2			2			
New Mexico	10	5	12								
Arizona	19	28	21			15					
Utah [3]	2	39	39		1						2
Nevada											
PACIFIC											
Washington	34	68	50								1
Oregon	23	19	19								1
California	271	74	319	5	6		1				7
Total	2,880	1,837	2,621	56	211	119	4	3	16	23	89
Same week, 1946	1,837			46	267	60	12	4	10	45	115
Median, 1942–46	2,621			31	258	60	10	4	11	35	[7] 99
16 weeks: 1947 [3]	41,069			753	4,823	3,290	105	16	541	637	1,654
1946	29,049			608	4,519	1,607	131	14	304	737	1,249
Median, 1942–46	39,248			442	3,345	1,023	131	14	275	737	[7] 1,310

[2] For footnote 2, see p. 688.

[3] Period ended earlier than Saturday.

Anthrax: New York 1 case.

[7] 2-year average, 1945–46.

Leprosy: Texas 1 case.

WEEKLY REPORTS FROM CITIES [1]

City reports for week ended April 12, 1947

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	52	0	0	1	1	0	0	2
New Hampshire:												
Concord	0	0	------	0	------	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	10	0	0	0	0	0	0	2
Massachusetts:												
Boston	6	0	------	1	39	0	22	0	22	0	1	26
Fall River	0	0	------	0	4	0	1	0	1	0	0	4
Springfield	0	0	------	0	5	0	0	0	4	0	0	7
Worcester	0	0	------	0	6	0	10	0	3	0	1	11
Rhode Island:												
Providence	1	0	------	0	150	0	5	0	14	0	0	5
Connecticut:												
Bridgeport	0	0	------	0	13	0	0	0	0	0	0	1
New Haven	0	0	1	0	64	0	3	0	9	0	0	12
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	5	------	0	4	0	6	0	0	1
New York	11	0	18	0	244	2	91	4	141	4	0	76
Rochester	0	0	------	1	2	0	6	0	11	0	0	2
Syracuse	0	0	------	1	------	0	4	0	8	0	0	6
New Jersey:												
Camden	3	0	------	0	1	0	1	0	1	0	0	------
Newark	0	0	3	0	24	1	4	0	10	0	0	30
Trenton	0	0	3	0	9	0	3	0	3	0	0	2
Pennsylvania:												
Philadelphia	9	0	4	1	8	2	41	0	49	0	0	31
Pittsburgh	1	0	2	4	16	2	15	0	21	0	0	4
Reading	0	0	------	0	4	0	3	0	4	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	1	0	8	5	4	1	9	0	6	0	0	8
Cleveland	0	0	9	1	195	4	13	0	18	0	0	38
Columbus	1	0	4	4	47	0	7	0	15	0	0	8
Indiana:												
Fort Wayne	0	0	------	0	21	0	2	0	1	0	0	4
Indianapolis	0	0	------	2	5	1	6	0	14	0	0	33
South Bend	0	0	------	0	22	0	0	0	2	0	0	------
Terre Haute	0	0	------	0	------	0	3	0	1	0	0	1
Illinois:												
Chicago	0	0	5	2	16	12	50	0	31	0	0	21
Michigan:												
Detroit	3	1	3	0	5	0	15	0	35	0	1	59
Flint	0	0	------	0	------	0	11	0	0	0	0	------
Grand Rapids	0	0	------	0	------	0	1	0	0	0	0	2
Wisconsin:												
Kenosha	0	0	------	0	------	0	0	0	3	0	0	4
Milwaukee	0	0	2	2	23	0	2	0	8	0	0	29
Racine	0	0	------	0	1	0	0	0	10	0	0	8
Superior	0	0	------	0	------	0	1	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	------	2	2	0	3	0	0	5
Minneapolis	1	0	------	1	4	1	7	0	14	0	0	2
St. Paul	0	0	------	0	77	1	10	0	0	0	0	14
Missouri:												
Kansas City	0	0	2	1	2	1	9	0	10	0	0	2
St. Joseph	0	0	------	0	------	0	0	0	0	0	0	------
St. Louis	2	0	5	1	5	1	12	0	15	0	0	15

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

City reports for week ended April 12, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	2	0	------	1	-------	0	2	0	5	0	0	------
Kansas:												
Topeka	0	0	------	0	-------	0	3	0	9	0	0	5
Wichita	0	0	------	0	1	0	3	0	4	0	0	------
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	-------	1	1	0	0	0	0	2
Maryland:												
Baltimore	9	1	3	1	4	3	11	0	11	0	0	54
Cumberland	0	0	------	0	-------	0	1	0	1	0	0	------
Frederick	0	0	------	0	-------	0	1	0	0	0	0	------
District of Columbia:												
Washington	0	0	------	0	44	2	0	0	8	0	0	7
Virginia:												
Lynchburg	0	0	------	0	-------	0	1	0	0	0	0	2
Richmond	0	0	------	0	79	1	3	1	1	0	0	------
Roanoke	0	0	------	0	6	0	0	0	2	0	0	------
West Virginia:												
Charleston	0	0	------	0	-------	0	0	0	0	0	0	------
Wheeling	0	0	------	0	-------	0	4	0	0	0	0	4
North Carolina:												
Raleigh	0	0	------	0	2	0	1	0	0	0	0	4
Wilmington	0	0	------	0	12	0	1	0	0	0	0	------
Winston-Salem	0	0	------	0	14	0	4	0	1	0	0	------
South Carolina:												
Charleston	0	0	124	1	21	0	0	0	0	0	0	1
Georgia:												
Atlanta	0	0	17	3	9	0	3	0	5	0	0	1
Brunswick	0	0	------	0	-------	0	0	0	0	0	0	------
Savannah	0	0	12	2	19	0	2	0	2	0	0	------
Florida:												
Tampa	0	0	------	0	4	0	3	0	3	0	0	6
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	6	3	1	0	9	0	3	0	0	8
Nashville	0	0	------	4	4	1	2	0	4	0	0	3
Alabama:												
Birmingham	0	0	28	0	32	1	1	0	0	0	0	------
Mobile	0	0	33	1	27	1	2	0	0	0	0	12
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	7		2	0	1	0	0	0	0	------
Louisiana:												
New Orleans	0	0	10	2	69	0	6	0	1	0	0	3
Shreveport	0	0	------	1	-------	0	6	0	0	0	0	------
Oklahoma:												
Oklahoma City	0	0	50	1	-------	0	3	0	2	0	0	------
Texas:												
Dallas	0	0	------	0	73	1	1	0	1	0	0	2
Galveston	0	0	------	0	-------	0	2	0	0	0	0	------
Houston	4	0	------	0	1	0	6	0	0	0	0	2
San Antonio	0	1	2	0	15	0	3	0	3	0	0	4
MOUNTAIN												
Montana:												
Billings	0	0	------	0	1	0	2	0	1	0	0	------
Great Falls	0	0	------	0	49	0	0	0	0	0	0	------
Helena	0	0	------	0	-------	0	0	0	0	0	0	------
Missoula	0	0	250	0	17	0	2	0	0	0	1	------
Colorado:												
Denver	7	0	2	0	31	0	5	0	19	0	1	6
Utah:												
Salt Lake City	0	0	1	0	6	0	4	0	6	0	0	4

City reports for week ended April 12, 1947—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza cases	Influenza deaths	Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
PACIFIC												
Washington:												
Seattle	0	0	------	0	4	1	5	0	0	0	0	8
Spokane	0	0	------	0	1	0	2	0	2	0	0	------
Tacoma	0	0	------	0	2	0	0	0	1	0	0	1
California:												
Los Angeles	6	0	2	0	2	2	2	4	30	0	0	11
Sacramento	2	0	------	0	2	1	2	0	2	0	0	5
San Francisco	1	0	4	0	7	3	7	0	12	0	1	1
Total	70	3	615	52	1,639	49	490	10	633	4	6	633
Corresponding week, 1946*	95	------	58	15	13,891	------	357	------	1,433	3	9	497
Average 1942-46*	67	------	82	[2] 24	[3] 7,001	------	[2] 373	------	1,671	1	13	737

[2] 3-year average, 1944-46.
[3] 5-year median, 1942-46.
*Exclusive of Oklahoma City.

Dysentery, amebic.—Cases: Boston 1; Buffalo 1; New York 2; Grand Rapdis 1; Memphis 2; Los Angeles 1.
Dysentery, bacillary.—Cases: Worcester 1; Baltimore 1.
Dysentery, unspecified.—Cases: Cincinnati 3; San Antonio 5.
Leprosy.—Cases: New Orleans 2.
Typhus fever, endemic.—Cases: Mobile 1.

***Rates** (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (latest available estimated population, 34,275,100)*

	Diphtheria case rates	Encephalitis infectious, case rates	Influenza case rates	Influenza death rates	Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
New England	20.0	0.0	2.9	2.9	982	0.0	117.4	2.9	155	0.0	5.7	200
Middle Atlantic	11.1	0.0	13.9	5.6	143	3.2	79.6	1.9	118	1.9	0.0	71
East North Central	3.1	0.6	15.9	9.8	208	11.0	73.6	0.0	88	0.0	0.6	132
West North Central	10.1	0.0	14.1	8.0	179	12.1	96.5	0.0	121	0.0	0.0	86
South Atlantic	14.7	1.6	255.0	11.4	350	11.4	58.8	1.6	56	0.0	0.0	132
East South Central	0.0	0.0	395.4	47.2	378	17.7	82.6	0.0	41	0.0	0.0	136
West South Central	10.2	2.5	175.3	10.2	406	2.5	71.1	0.0	18	0.0	0.0	28
Mountain	63.3	0.0	2,289.4	0.0	941	0.0	117.6	0.0	235	0.0	18.1	90
Pacific	14.2	0.0	9.5	0.0	28	11.1	28.5	6.3	74	0.0	1.6	41
Total	10.7	0.5	93.8	7.9	250	7.5	74.7	1.5	97	0.6	0.9	97

SMALLPOX IN THE UNITED STATES

As of April 22, Dr. Israel Weinstien, Health Commissioner of New York City, stated that there had been a total of 8 cases of smallpox, with 2 deaths, in New York City from March 1 to April 22, the latest occurrence being 5 cases between April 5 and 9. Up to April 22 there had been 4 cases reported upstate (in Millbrook), about 60 miles north of New York City, with origin in a contact with the New York City

infection. This makes a total of 12 cases and 2 deaths in New York City and its environs, instead of 13 cases and 3 deaths as previously stated, of which 1 fatal case was erroneously reported.

In addition to these cases, 1 fatal case of smallpox was reported in Camden, New Jersey, on April 17, onset on April 8, stated possibly to have been a contact with a New York City case. During the week ended April 19, cases of smallpox were reported in other States as follows: Texas 4, Oklahoma 2, Indiana, Mississippi, and Nebraska 1 each. During the preceding week, New York (7 cases), Mississippi, and Nebraska (1 each) were the only States which reported any cases.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (in rodents and ectoparasites).—Plague infection has been reported in Hamakua District, Island of Hawaii, T. H., as follows: Month of March 1947, in 1 rodent; March 20, 1947, in 1 pool of fleas in District 3C, Kapulena.

Panama Canal Zone

Notifiable diseases—February 1947.—During the month of February 1947, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	15		8		2		4		29	
Diphtheria	159		1		1		38		199	
Dysentery:										
Amebic	1				2		4		7	
Bacillary			1		5				6	
Malaria [2]	8		2		28		32	1	70	1
Measles	4				10		2		16	
Meningitis, meningococcus	1		1				1	1	3	1
Mumps					2				2	
Pneumonia		11		5	16	1		6	[3] 16	23
Poliomyelitis					1	1			1	1
Relapsing fever							1		1	
Tuberculosis		23		9	2	2		5	[3] 2	39
Typhoid fever			1				2		3	
Typhus fever							2		[4] 2	
Whooping cough					3				[3] 3	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 9 recurrent cases.
[3] In the Canal Zone only.
[4] During the latter part of February and first part of March 1947, 15 cases of typhus fever (murine type) occurred in the outskirts of Panama City.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 29, 1947.—During the week ended March 29, 1947, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		37	1	115	334	24	19	66	110	706
Diphtheria				13	6	2				21
Dysentery:										
Amebic					3					3
Bacillary				1	1				1	3
German measles				16	44	1	12	2	5	80
Influenza		24			60	2			10	96
Measles		65		74	76	345	100	72	439	1,171
Meningitis, meningococcus				1	2		1		1	5
Mumps		12		66	694	55	180	21	142	1,170
Poliomyelitis					1					1
Scarlet fever		3		64	85	8	2	2	6	170
Tuberculosis (all forms)		3	4	132	30	19	10	26	62	286
Typhoid and paratyphoid fever			1	19	4					24
Undulant fever				10	4					14
Venereal diseases:										
Gonorrhea	3	17	7	106	79	49	20	33	85	399
Syphilis	3	15	6	70	70	14	11	9	47	245
Other forms									2	2
Whooping cough		10		66	143	15	1	2	26	263

CUBA

Habana—Communicable diseases—5 weeks ended March 29, 1947.—During the 5 weeks ended March 29, 1947, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	21	1	Poliomyelitis	3	1
Diphtheria	21	1	Scarlet fever	1	
Malaria	5		Tuberculosis	8	4
Measles	23		Typhoid fever	14	1

Provinces—Notifiable diseases—5 weeks ended March 29, 1947.—During the 5 weeks ended March 29, 1947, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	7	20	16	10		22	75
Cerebrospinal meningitis					1		1
Chickenpox		21		1		1	23
Diphtheria		27	4	2		1	34
Hookworm disease		21		1			22
Leprosy		8				3	11
Malaria	1	5		1	4	23	34
Measles		32	2	6	1	6	47
Poliomyelitis	3	4		1		6	14
Scarlet fever		1	1				2
Tuberculosis	36	24	23	56	23	40	202
Typhoid fever	12	39	10	21	8	46	136
Whooping cough	1	6				1	8

[1] Includes the City of Habana.

MOROCCO (FRENCH)

Notifiable diseases—January 1947.—For the month of January 1947, cases of certain notifiable diseases were reported in French Morocco as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	4	Paratyphoid fever	5
Conjunctivitis and ophthalmia of the newborn	6,929	Poliomyelitis	1
Diphtheria	14	Puerperal infection	10
Dysentery:		Recurrent fever	11
Amebic	2,235	Scarlet fever	5
Bacillary	187	Smallpox	23
Leprosy	14	Tuberculosis, pulmonary	782
Measles, including German measles	387	Typhoid fever	56
Ophthalmia neonatorum	8,349	Typhus fever	39

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

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

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

Cholera

Siam (Thailand).—Cholera has been reported in Siam (Thailand) as follows: Weeks ended—March 22, 1947, 108 cases, 66 deaths; March 29, 1947, 153 cases, 109 deaths.

Plague

China—Kiangsi Province.—According to information dated April 21, 1947, 2 cases of plague were reported in Kiukiang, Kiangsi Province, China. It is also stated that cases of plague in Nanchang are rapidly increasing.

Syria—Euphrates Province—Wasta.—On April 11, 1947, 6 cases of bubonic plague with 4 deaths were reported in Wasta, Euphrates Province, Syria.

Turkey (in Asia)—Urfa Province—Akcakale.—For the week ended April 5, 1947, 1 case of plague with 1 death was reported in Akcakale, Urfa Province, Turkey.

Smallpox

Burma.—For the week ended March 29, 1947, 226 cases of smallpox with 108 deaths were reported in Burma.

Great Britain.—Information dated April 14, 1947, states that 7 cases of smallpox have been reported in Scunthrope, Lincolnshire, Great Britain. No deaths have occurred.

Niger Territory.—For the period March 11–20, 1947, 221 cases of smallpox with 20 deaths have been reported in Niger Territory.

Typhus Fever

Algeria.—Typhus fever has been reported in Algeria as follows: January 21–31, 1947, 18 cases; February 1–10, 1947, 41 cases; February 11–20, 1947, 39 cases.

×