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Evaluation of Detergents

IV. A Correlation of Washing Performance With Dissolving and Wetting Ability

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During the past 4 years a study of detergents for use in washing utensils and dishes in dairies and restaurants was undertaken by the Environmental Health Center at the request of a number of State and municipal health departments. Methods of evaluating detergents were investigated, and, in the course of the study, an experimental dishwashing machine and a procedure for a washing performance test were developed (*1*). The reproducibility of the test was not entirely satisfactory at first, and continuing study disclosed some of the factors causing variations in the performance test. The testing procedure for any detergent in this machine was then improved (*2*) so that the relative cleansing ability of dishwashing detergents under standardized conditions could be easily determined. With this testing procedure, dishwashing detergents may be classified as excellent, good, fair, and poor. The performance test may be used by any health laboratory in making recommendations on detergents to restaurant and dairy operators.

However, there are a number of criteria of detergent solutions, such as alkalinity, pH, surface tension, emulsification, and so forth, which are simpler to evaluate and are important factors in detergency. Unfortunately, as is well known, no single or simple characteristic will always indicate the effectiveness of a detergent in dishwashing performance. It was the purpose of this study to determine and compare the various criteria or factors of detergency with the results obtained in the previously described washing performance test. It was hoped that some correlation might be found between the results of the washing performance test and the values of the detergency factors or some combination of them.

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Note: References 1, 2, and 4 are considered the first three papers in this series.

In this study a detergent is broadly defined as any compound that is used or recommended for cleaning purposes or is used or proposed as an ingredient in cleansers. No attempt was made to obtain samples of all detergents or components of detergents on the market. The number of such materials may easily run into the hundreds. A representative number of samples representing each type of detergent was collected at random as manufacturers' samples or bought in the retail market. The samples used were classified simply as soaps or soap mixtures, alkaline detergents and buffers, surface active agents, and combinations of these upon a basis to be described.

Washing Performance Test

The laboratory washing performance test was applied to each detergent under study. In this test, glass microscope slides were dipped in a standard soil solution and drained so that uniform amounts of soil were deposited. The slides were then baked for 1 hour at 95° C. Six slides were washed at a time in a 0.3 percent solution of the detergent in Cincinnati tap water[1] at 60° C. for 3 minutes and rinsed for 2 minutes in boiling tap water. Light transmission through clean, soiled, and washed slides was measured in a photometer and the percent of soil removal was calculated following the methods described (*2*). Each detergent was tested on four different days to distribute possible variations in the water, and the mean values were taken as indicative of the relative washing efficiency of the detergent.

Arbitrary washing performance test ratings for excellent, good, fair, and poor dishwashing performance were set up. The percentage of soil removal washing performance ranges adopted for these were: excellent, 93.5 percent and above; good, 81–93 percent; fair, 50–80 percent, and poor, less than 50 percent soil removal. Using this arbitrary scale, it was found that 27 of the 98 detergents were rated as excellent, 22 were good, 14 were fair, and 35 were poor.

Other Determinations

In addition to washing performance the following determinations were made:

1. Phenolphthalein and total alkalinity, expressed as percent Na_2O in the undissolved sample.

Alkalinity was measured by titrating 50 ml. of 0.3 percent solution of the detergent in distilled water using 0.1000 N HCl with phenolphthalein and a mixed indicator[2] with an endpoint approximately that of methyl orange. The number of ml. HCl x 2.067 equals percentage of Na_2O in the original sample.

[1] Hardness about 100 ppm.

[2] 0.02 grams methyl red ground in mortar with 7.4 ml. N/20 NaOH, 0.109 Brom cresol green ground with 29 ml. N/20 NaOH. (Make up to 100 ml. with distilled water.)

2. Surface tension of a 0.3 percent solution in distilled water at room temperature.

3. Interfacial tension between a 0.3 percent water solution and mineral and cottonseed oils.

Surface and interfacial tension were measured with a DuNouy precision ring tensiometer.

4. Emulsifying ability of a 0.3 percent solution for mineral and and cottonseed oils.

Emulsifying ability was measured with the following qualitative test: 20 ml. of 0.3 percent detergent solution and 10 ml. of oil were carefully poured in a 1-inch test tube. After 10 quick inversions the size of globules and rate of breakdown were observed. Ratings were as follows:

Excellent—small globules, no breakdown in 30 minutes.
Good—medium globules, emulsion standing from 15–20 minutes.
Fair—large globules, emulsion standing from 3–5 minutes.
Poor—large globules breaking down in less than 2 minutes.

5. pH of a 0.3 solution.

pH was determined with a Leeds and Northup electrometric pH meter using a glass electrode. A correction for sodium ions was made.

6. Sequestering ability.

Sequestering ability was determined by titrating 100 ml. of 0.3 percent detergent solution at 60° C. with a solution of $CaCl_2$ containing the equivalent of 10 mg. $CaCO_3$ per ml. until the first permanent turbidity was observed. Results were expressed as ppm $CaCO_3$ absorbed by the solution (*4*).

Spreading coefficient for the solution over the mineral oil and inactive alkalinity (total alkalinity less twice the phenolphthalein alkalinity) were calculated. The alkalinity, pH, surface tension, interfacial tension, emulsifying ability, and sequestering ability of the solution will be referred to hereafter as factors of detergency.

Analysis of the Data

Analysis of the data indicated no direct correlation of any single factor of detergency with the dishwashing performance test efficiency. When the average value of any factor such as surface tension for all detergents in each of the four washing performance classifications is plotted against washing performance test results, a parabolic curve results. This indicates that a poor detergent may have a single detergency characteristic identical with an excellent detergent. For example, the means of the surface tension for each washing performance group were 33.2, 44.3, 55.6, and 49.0 for the detergents falling in the excellent, good, fair, and poor classifications, respectively. At first glance, this factor appears to be a fair choice for separating the performance groups. While it is one of the best of the factors studied, the standard deviation of the surface tension from the mean value for the performance classification group was found to be ± 4.9, ± 10.5,

±16.5, and ±18.1, respectively, for the four washing performance test classifications. The maximum to minimum surface tension ranges found for the classifications were 46.7–27.3, 60.9–30.0, 71.9–31.7, and 72.0–28.3, respectively. Thus, no division between good and poor detergents can be made on the basis of this factor alone.

When eight characteristics including pH; phenolphthalein, inactive and total alkalinity; surface tension; and interfacial tension, spreading coefficient, and emulsification with mineral oil were taken as criteria, some breakdown into performance groups could be made.

Several methods for classification were tried, but maximum to minimum range values for each performance group were found best for correlation study. Detergents with all detergency factors falling into the maximum to minimum range for these factors in the 93.5–100 percent removal group were evaluated as excellent. In a similar way the entire group of detergency factors was used to evaluate the detergents in the other performance classifications shown by the performance test. Even with this method of evaluation using all factors, only 67 or 68.4 percent of the samples could be classified into the same performance rating indicated by the washing performance test. One of the detergents showing a 2.5 percent soil removal by the performance test would be classified as an excellent detergent when judged by the group of detergency factors. Obviously, detergent efficiency evaluation on the basis of the entire group of factors could not be considered as feasible for all detergents. It was, therefore, decided to determine whether more successful evaluation might be made on some classes of detergents.

Classification of Detergents

The entire group of detergents was separated into the four classes, that is, combined detergents, alkaline detergents, surface active agents, and soaps. This classification was made using the surface tension, phenolphthalein and total alkalinity, and appearance as criteria. Soaps were classified also on the basis of a distinctive "silky" turbidity which they impart to water of about 100 ppm hardness after standing about 15–30 minutes at room temperature. The outline of the classification is as follows:

Class	Surface tension limits for class	Alkalinity limits for class in terms of Na_2O	
		Phenolphthalein	Total
	dynes/cm	*percent*	*percent*
Combined detergents	Less than 60.0		Over 7.0.
Alkaline detergents and buffers	Over 60.0		
Surface active agents	Less than 40.0	Less than 1.0	
Soaps	Less than 40.0		Over 3.0.

While the above classification is simple it was sufficient for the purposes of this study.

The number of samples found in each class and the number and percent found in each performance group are shown in table 1. These data show that of the detergents studied, combined detergents are usually good or excellent; soaps are usually excellent, and alkaline detergents and buffers and surface active agents are generally poor.

A careful study of the characteristics of each class indicated that a rough approximation could be made for grouping the detergents in each class by the maximum to minimum values for selected detergency factors. These maximum to minimum ranges for the selected detergency factors are given in table 2. These data indicate that individual factors cover a wide range in each group for each class of detergents. However, if a combination of factors is used, each factor contributes its influence.

Table 1. *Performance test efficiency ratings for four classes of detergents, by percentage of washing efficiency soil removal range*

Class	Excellent, 93.5–100		Good, 81–93		Fair, 50–80		Poor, less than 50		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Combined	17	42.5	16	40.0	3	7.5	4	10.0	40	40.8
Alkaline and buffer	0	0.0	2	8.4	8	33.3	14	58.3	24	24.5
Surface active agents	0	0.0	4	20.0	1	5.0	15	75.0	20	20.4
Soaps	10	71.4	0	0.0	3	21.4	1	7.2	14	14.3
Totals	27		22		15		34		98	100.0
Percent of grand total		27.6		22.4		15.3		34.7	98	100.0

Combined Detergents. With combined detergents the maximum to minimum values for pH, total alkalinity, surface tension, interfacial tension, and emulsifications are deemed significant.

Soaps. With soaps, very low alkalinity indicates poor detergency, but increasing amounts of phenolphthalein and total alkalinity indicate decreasing efficiency.

Alkaline Detergents. An increase in inactive alkalinity and minor increases in surface tension tend to decrease the efficiency of alkaline detergents and buffers. Very high or low pH values also decrease the efficiencies of alkaline detergents.

Surfactants. Contrary to the results in other classes of detergents, an increased interfacial tension and excellent emulsification indicate a good surface active agent.

Limiting values for the selected factors were established for each class of detergent. These are shown in table 3. By classification according to limits suggested for these factors in table 3, it was found possible to reach the same performance evaluation as the washing performance test in 90 or 91.8 percent of the 98 samples. This is shown in tables 4, 5, 6, and 7.

Table 2. *Maximum and minimum values for factors of detergency correlated with washing performance ratings on four classes of detergents*

Class and washing performance rating group	pH		Alkalinity percent Na_2O					
			Phenolphthalein		Inactive		Total	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Combined detergents								
Excellent	12.2	9.4	21.8	2.5	15.4	0.0	37.9	7.4
Good	13.0	9.2	26.0	1.1	15.2	0.0	49.6	17.4
Fair	11.3	10.1	20.6	13.6	7.3	0.0	40.5	34.5
Poor	11.8	9.3	13.4	7.0	14.6	0.0	30.2	22.5
Alkaline detergents and buffers								
Excellent [1]								
Good	11.8	10.3	12.7	10.4	0.8	0.6	26.0	21.6
Fair	13.0	7.3	72.2	0.0	7.4	0.0	73.8	3.7
Poor	13.0	4.4	73.0	0.0	27.3	0.0	73.9	0.0
Surface active agents								
Excellent [1]								
Good	6.9	6.3	0.0	0.0	2.3	0.4	2.3	0.4
Fair	6.3	6.3	0.0	0.0	0.2	0.2	0.2	0.2
Poor	9.1	5.2	0.6	0.0	14.0	0.1	14.0	0.1
Soaps								
Excellent	10.6	9.5	10.3	3.6	3.4	0.0	20.0	9.3
Good [1]								
Fair	10.9	10.3	15.1	14.4	5.9	0.0	34.8	27.5
Poor	10.1	10.1	1.0	1.0	1.1	1.1	3.1	3.1

Class and washing performance rating group	Surface tension dynes/cm.		Mineral oil						Sequestration	
			Interfacial tension dynes/cm.		Emulsification		Spreading coefficient			
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Combined detergents										
Excellent	46.2	29.2	12.9	1.8	E	F	−0.4	−26.2	420	0
Good	56.0	34.2	28.1	5.2	G	P	−8.9	−51.3	410	40
Fair	58.5	45.2	24.1	14.0	F	P	−26.4	−49.8	90	40
Poor	40.3	30.7	21.1	1.0	E	P	−0.2	−19.7	>1000	0
Alkaline detergents and buffers										
Excellent [1]										
Good	68.9	66.3	33.3	23.2	P	P	−56.7	−69.4	400	70
Fair	71.9	68.0	35.8	21.3	P	P	−54.6	−75.5	>1000	10
Poor	72.0	64.0	36.5	18.0	P	P	−49.4	−74.7	>1000	20
Surface active agents										
Excellent [1]										
Good	33.4	30.0	9.4	5.5	E	E	−2.7	−9.8	>1000	140
Fair	31.7	31.7	3.2	3.2	E	E	−2.1	−2.7	220	220
Poor	39.1	28.3	14.7	1.0	E	P	+1.4	−13.9	>1000	0
Soaps										
Excellent	30.8	27.2	5.0	1.0	E	G	+3.7	−2.4	10	0
Good [1]										
Fair	33.1	31.7	5.9	4.7	E	G	−4.0	−6.2	0	0
Poor	30.6	30.6	8.6	8.6	F	F	−6.4	−6.4	10	10

E = Excellent; G = Good; F = Fair; P = Poor.
[1] None found with this rating.

Table 3. *Limiting values of factors of detergency for evaluating performance characteristics*

Class and washing performance rating group	Limiting values of factors													
	pH		Alkalinity as percent Na_2O						Surface tension dynes/cm.		Mineral oil			
			Phenolphthalein		Inactive		Total				Interfacial tension dynes/cm.		Emulsification	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
Combined detergents														
Excellent	12.2	9.4	----	----	----	----	40	7	(1)		13	2	≥Good or fair if surface tension≤35.	
Good	13	9.4	----	----	----	----	50	17	(1)		28	5	≥Good or poor if surface tension≤56	
Fair	13	9.4	----	----	----	----	50	35	----		28	14	----	----
Poor	----	<9.4	----	----	----	----	----	----	----		>28	<2	----	----
Alkaline detergents and buffers														
Excellent [2]	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Good	12	10	----	----	1.0	----	----	----	69	66	----	----	----	----
Fair	13	8	----	----	8.0	----	----	----	70.6	70	----	----	----	----
Poor	----	<8	----	----	----	>8	----	----	>70.6	<66	----	----	----	----
Surface active agents														
Excellent [2]	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Good	----	----	----	----	----	----	----	----	33	30	10	5	----	E
Fair	----	----	----	----	----	----	----	----	33	30	4	3	----	E
Poor	----	----	----	----	----	----	----	----	33	<30	>10	<3	----	< E
Soaps														
Excellent	----	----	10	4	----	----	20	6	31	27	----	----	----	----
Good	----	----	13	11	----	----	26	21	----	----	----	----	----	----
Fair	----	----	16	14	----	----	35	27	33	31	----	----	----	----
Poor	----	----	----	----	----	----	----	----	----	----	----	----	----	----

[1] See emulsification.

[2] None found with this rating.

Table 4. *Correlation of ratings on the basis of detergency factors with rating based on washing performance tests for soaps*

Soap	Washing performance test efficiency (percent)	Alkalinity as percent Na_2O				Surface tension		Washing efficiency rating [1]	
		Phenolphthalein		Total					
		Found	Rating group	Found	Rating group	Found	Rating group	By machine	By factor
(Castile)									
1	97.0	3.6	E	9.3	E	27.2	E	E	E
2	97.0	9.1	E	14.6	E	30.0	E	E	E
3	96.0	4.1	E	11.6	E	29.6	E	E	E
4	96.0	7.3	E	15.7	E	30.8	E	E	E
5	96.0	6.6	E	17.1	E	29.2	E	E	E
6	95.5	10.3	E	20.0	E	29.2	E	E	E
7	95.5	4.8	E	10.2	E	28.1	E	E	E
8	94.5	6.0	E	10.1	E	28.4	E	E	E
9	94.5	5.2	E	10.0	E	27.5	E	E	E
10	93.5	6.2	E	11.8	E	29.0	E	E	E
11	80.0	15.1	F	27.7	F	32.1	F	F	F
12	79.0	14.7	F	27.5	F	33.1	F	F	F
13	61.5	14.4	F	34.8	F	31.7	F	F	F
14	0.0	1.0	P	3.1	P	30.6	E	P	P

[1] 14, or 100 percent, of ratings in agreement.

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Table 5. *Correlation of ratings on the basis of detergency factors with rating based on washing performance test for surface active agents*

Surface active detergent	Washing performance test efficiency (percent)	Surface tension dynes/cm.		Mineral oil				Washing efficiency rating [1]	
				Interfacial tension dynes/cm.		Emulsification			
		Found	Rating group	Found	Rating group	Found	Rating group	By machine	By factor
1	87.5	30.0	G	5.5	G	E	G	G	G
2	84.0	33.2	G	6.9	G	E	G	G	G
3	82.0	33.4	G	7.2	G	E	G	G	G
4. Emcol 4150	81.5	33.2	G	9.4	G	E	G	G	G
5	78.0	31.7	G	3.2	F	E	G	F	F
6. Emcol 4100	13.0	28.3	P	3.8	F	F	P	P	P
7. Triton x 200	12.0	39.0	P	14.7	P	F	P	P	P
8. Emcol 3478-S	10.5	29.1	P	2.3	P	F	P	P	P
9. Triton x 300	5.0	30.2	G	3.8	F	E	G	P	F
10. Triton A 20	2.0	34.3	P	3.3	F	E	G	P	P
11. Sharples 218	0	31.8	G	1.8	P	E	G	P	P
12. Emcol 888	0	35.5	P	1.6	P	P	P	P	P
13. Biopal G	0	34.3	P	1.0	P	F	P	P	P
14. Onyx Oil and Chem. Co. D921	0	38.3	P	3.5	F	E	G	P	P
15. Onyx Oil and Chem. Co. D920	0	39.1	P	3.2	F	G	P	P	P
16	0	30.1	G	1.0	P	G	P	P	P
17. Triton x 100	0	32.3	G	1.3	P	E	G	P	P
18. Triton x 155	0	32.4	G	1.0	P	E	G	P	P
19. Triton x 155 M	0	32.0	G	1.6	P	E	G	P	P
20	0	34.2	P	2.2	P	F	P	P	P

[1] 19. or 95 percent. of ratings in agreement.

It must be pointed out that the limiting factors were set by a comparatively few samples and are not definite in some groups. Therefore, these limits were set up merely as a guide and will not show exact performance groupings. The divisions are simple and the counter balancing effect of one factor may change the actual efficiency.

The washing performance test is not sufficiently reproducibile to permit classification of the detergent in any efficiency category with certainty by one test. In a series of four runs for each test, it was found that certain detergents would show large deviations in performance from the mean. It was found that some detergents classified as fair by a long series of tests would occasionally show excellent results. In the same way poor detergents would give good results on some tests. Excellent detergents would sometimes be rated as only good by one washing performance test and good detergents might occasionally run excellent or fair.

The fact that the removal of soil can be evaluated at present for only one type of surface, glass, is an important limitation of the test. The percentage removal of soil from metal or chinaware may differ from that on glass for the various detergents.

With the above limitations in mind, an experiment was conducted using each of the 22 combined detergents which showed less than excellent performance ratings. These 22 detergents were modified by the addition of a nonionic wetting agent, an alkaline agent and/or a

Table 6. *Correlation of ratings on the basis of detergency factors with ratings based on washing performance test for alkaline detergents and buffers*

Alkaline detergent or buffer	Washing performance test efficiency (percent)	pH		Inactive alkalinity percent Na_2O		Surface tension dynes/cm.		Washing efficiency rating [1]	
		Found	Rating group	Found	Rating group	Found	Rating group	By machine	By factor
1	87.0	10.3	G	0.6	G	68.9	G	G	G
2	82.0	11.8	G	0.8	G	66.3	G	G	G
3	74.5	10.9	G	0.0	G	71.9	P	F	P
4	73.0	13.0	F	0.0	G	70.6	F	F	F
5	71.0	10.2	G	2.3	F	66.2	G	F	F
6. Sodium tetrapyrophosphate	65	9.8	F	1.3	F	70.5	F	F	F
7. Sodium tetraphosphate	61	8.2	F	7.4	F	70.3	F	F	F
8. Trisodium phosphate	59.5	12.2	F	0.0	G	70.5	F	F	F
9. Sodium hexametaphosphate	53	7.3	P	3.7	F	71.5	P	F	P
10. Sodium sesquisilicate	53	12.9	F	0.0	G	68.0	G	F	F
11. Sodium meta-silicate	47	12.4	F	0.0	G	71.2	P	P	P
12	42	11.6	G	0.0	G	64.2	P	P	P
13. Sodium carbonate	34.5	11.3	G	27.0	P	70.6	F	P	P
14. Columbia alkali, modified soda No. 100	28.5	9.9	F	15.8	P	70.3	F	P	P
15. Columbia alkali, modified soda No. 300	19.5	9.8	F	17.4	P	71.5	P	P	P
16	19	11.0	G	7.6	F	71.1	P	P	P
17	17	13.0	F	0.0	G	71.4	P	P	P
18. Columbia alkali, modified soda No. 200	11	10.3	G	8.3	P	70.7	P	P	P
19. Sodium hydroxide	9	13	F	0.0	G	71.2	P	P	P
20. Borax	9	9.3	F	0.0	G	70.8	P	P	P
21. Sodium bicarbonate	2.5	8.1	F	27.3	P	71.6	P	P	P
22. Disodium phosphate	0	8.8	F	9.5	P	72.0	P	P	P;
23. Monosodium phosphate	0	4.4	P	0.0	G	70.3	F	P	P
24	0	7.7	P	1.4	F	62.8	P	P	P

[1] 22, or 91.7 percent, of ratings in agreement.

buffer salt to obtain the desired detergency characteristics of excellent detergents. Seven of the alkaline agents classified as fair by performance were modified by adding a nonionic wetting agent to change their characteristics to excellent. Two detergents were formulated by mixtures of materials to obtain excellent detergency characteristics. Washing performance tests were then run on the entire series of detergents. The results are shown in tables 8 and 9.

Of the 15 detergents that were good originally, 13, or 86.7 percent, were improved and showed excellent washing performance tests by slight modification (table 8). The washing performance test efficiency of the two others was improved slightly, from 88 percent to 91.5 percent and from 85 percent to 91 percent. None of the fair or poor detergents were improved to excellent, but all of the fair and one of the poor were brought into the good performance range group with improvements of 11 percent to 37.5 percent in the performance test. Three of the poor detergents were not noticeably improved even with drastic modification. In one case a 50 percent change in composition failed to bring about the desired washing performance test result.

Four of the alkaline or buffer detergents previously rated fair were

Table 7. *Comparison of detergency factors and washing performance test efficiency for combined detergents*

Combined detergent	Washing performance test efficiency (percent)	pH		Total alkalinity percent Na_2O		Surface tension dynes/cm.	Mineral oil				Rating classification [1]	
							Interfacial tension dynes/cm.		Emulsification			
		Found	Group	Found	Group		Found	Group	Found	Group	By performance test	By factors
1	99	10.0	E	10.1	E	29.2	7.8	E	E	E	E	E
2	96.5	11.1	E	37.9	E	37.4	9.6	E	G	E	E	E
3	96.5	9.4	E	24.4	E	33.2	4.7	E	E	E	E	E
4	96.5	9.8	E	27.7	E	34.1	2.2	E	E	E	E	E
5	96	12.2	E	26.7	E	42.2	12.5	E	G	E	E	E
6	96	11.5	E	37.4	E	39.7	10.4	E	F	G	E	G
7	96	9.8	E	7.4	E	33.3	4.8	E	E	E	E	E
8	96	10.1	E	19.4	E	33.9	3.5	E	E	E	E	E
9	96	10.9	E	19.8	E	33.3	3.4	E	E	E	E	E
10	96	10.3	E	28.4	E	35.1	5.5	E	E	E	E	E
11	96	9.8	E	33.3	E	29.3	3.9	E	F	E	E	E
12	95.5	10.1	E	32.4	E	30.7	6.1	E	G	E	E	E
13	95	11.2	E	30.6	E	35.9	8.7	E	G	E	E	E
14	95	12.2	E	25.5	E	40.9	9.8	E	G	E	E	E
15	95	12.2	E	17.9	E	46.2	12.9	E	G	E	E	E
16	94	10.2	E	32.0	E	34.5	1.8	E	E	E	E	E
17	93.5	10.9	E	27.5	E	39.3	10.3	E	G	E	E	E
18	93	11.8	E	21.5	E	46.9	14.0	G	G	G	G	G
19	93	10.3	E	25.6	E	38.3	10.3	E	F	G	G	G
20	92.5	13.0	G	49.6	G	51.2	22.8	G	P	G	G	G
21	92	12.2	E	23.8	E	50.8	20.6	G	F	G	G	G
22	92	10.7	E	35.1	E	49.4	16.8	G	F	G	G	G
23	91.5	9.6	E	20.7	E	34.2	7.5	E	G	E	G	E
24	91	12.0	E	24.6	E	43.0	13.4	G	G	E	G	G
25	91	12.5	G	26.8	E	56.0	28.1	G	P	G	G	G
26	89.5	11.3	E	35.1	E	51.9	20.0	G	F	G	G	G
27	89	9.2	P	17.4	E	36.9	5.2	E	G	E	G	P
28	88	10.3	E	25.2	E	35.6	12.0	E	F	G	G	G
29	87	11.4	E	40.2	G	37.4	6.2	E	F	G	G	G
30	85.5	12.4	G	26.2	E	39.9	13.7	G	G	E	G	G
31	85	10.7	E	32.2	E	55.1	25.4	G	P	G	G	G
32	84	12.1	E	32.3	E	40.1	10.0	E	G	G	G	G
33	82	11.7	E	42.3	G	42.8	13.6	G	G	E	G	G
34	78	11.3	E	40.5	G	55.2	21.0	G	F	G	F	G
35	69.5	10.1	E	34.5	E	45.2	14.0	G	P	G	F	G
36	53	10.8	E	36.6	E	58.5	24.1	G	P	F	F	F
37	45.5	9.3	P	28.6	E	30.7	21.1	G	F	E	P	P
38	21.0	10.4	E	22.6	E	31.6	1.5	P	E	E	P	P
39	3.0	11.8	E	30.2	E	32.0	1.0	P	F	E	P	P
40	2.0	9.3	P	22.5	E	40.3	12.2	E	P	P	P	P

[1] 35, or 87.5 percent, of ratings in agreement.

changed to the excellent rating by the addition of as little as 3 percent nonionic wetting agent, which gave the desired factors for the detergent (table 9). One poor alkaline detergent was modified so that it was rated excellent. One of the poor detergents was made fair by modification, but the other was not improved, even though the desired characteristics were present.

The two formulations made by a combination of alkalies and wetting agents, one with about 17 percent wetting agent and the other with only 3 percent wetting agent, gave washing performance test efficiencies of 97.5 percent and 98 percent, respectively. These were formulated to fall within the excellent limiting factors using alkaline or buffer agents with fair (50 percent–80 percent) ratings and wetting

Table 8. *Results of modification of combined detergents*

Combined detergent	Washing performance rating		Washing efficiency percent		pH		Total alkalinity percent Na_2O		Surface tension dynes/cm.		Mineral oil			
											Interfacial tension dynes/cm.		Emulsification	
	*O	*M	*O	*M	*O	*M	*O	*M	*O	*M	*O	*M	*O	*M
18	G	E	93	96.0	11.8	11.1	21 5	25.8	46.9	32.8	14.0	4.0	G	E
19	G	E	93	94.5	10.3	10.5	25.6	27.5	38.3	33.0	10.3	3.7	F	E
20	G	E	92.5	97.0	13.0	12.5	49.6	32.9	51.2	32.8	22.8	4.8	P	E
21	G	E	92	96.0	12.2	12.0	23.8	22.3	50.8	33.1	20.6	5.5	F	E
22	G	E	92	96.0	10.7	10.6	35.1	38.0	49.4	32.8	16.8	4.4	F	E
24	G	E	91	97.0	12.0	11.1	24.6	28.9	43.0	35.3	13.4	6.3	G	E
25	G	E	91	96.0	12.5	12.0	26.8	23.4	56.0	33.8	28.1	6.4	P	E
26	G	E	89.5	97.0	11.3	11.2	35.1	38.9	51.9	32.2	20.0	4.2	F	E
27	G	E	89	96.0	9.2	9.7	17.4	19.5	36.9	33.6	5.2	3.1	G	E
28	G	G	88	91.5	10.3	9.9	25.2	32.5	35.6	35.1	12.0	5.1	F	E
29	G	E	87	95.0	11.4	11.3	40.2	39.5	37.4	33.2	6.2	5.8	F	E
30	G	E	85.5	96.0	12.4	12.2	26.2	31.4	39.9	35.3	13.7	5.5	G	E
31	G	G	85	91.0	10.7	10.5	32.2	33.9	55.1	32.2	25.4	4.7	P	E
32	G	E	84	97.0	12.1	12.0	32.3	33.0	40.1	32.5	10.0	4.5	G	E
33	G	E	82	93.5	11.7	11.4	42.3	40.1	42.8	33.2	13.6	4.7	G	E
34	F	G	78	89.0	11.3	10.1	40.5	38.7	55.2	32.7	21.0	4.0	F	E
35	F	G	69.5	81.0	10.1	9.8	34.5	29.8	45.2	33.7	14.0	4.7	P	E
36	F	G	53	83.0	10.8	10.9	36.6	40.0	58.5	32.3	24.1	4.1	P	E
37	P	G	45.5	82.0	9.3	10.3	28.6	32.9	30.7	37.1	21.1	7.6	F	E
38	P	P	21	19.0	10.4	11.4	22.6	34.7	31.6	34.3	1.5	2.5	E	G
39	P	P	3	15.0	11.8	11.1	28.3	30.0	32.0	33.1	1.0	2.3	F	G
40	P	P	2	4.5	9.3	9.7	22.5	27.5	40.3	33.6	12.2	6.7	P	E

*O=Original.
*M=Modified.

agents with poor or fair ratings. The composition of these formulated detergents were as follows:

Compound	*Formula 1*	*Formula 2*
	Percent	*Percent*
Trisodium phosphate	17	45
Sodium tetraphosphate	66	44
Wetting agent	17	3
Sodium meta-silicate	—	8

Discussion

A dish and glass cleanser must have the ability to chemically and/or physically remove soil and prevent it from redepositing. Various authors in the past have attempted to measure cleansing ability of a detergent by single factors. Later work has indicated that soil removal cannot be measured by any single factor. The latter conclusion has been verified in this laboratory.

The factors of detergency may be broken down into three categories:

1. Dissolving power (measured by alkalinity factors).
2. Wetting ability (measured by surface activity factors).
3. Rinsibility.

Although the washing performance test rating of the majority of the samples studied could be correlated with dissolving power and wetting ability, several could not. The majority of the good and many of the fair detergents studied were raised to the excellent performance test

Table 9. *Results of modification of alkaline and formulated detergents*

Detergent	Washing performance group		Washing efficiency percent		pH		Total alkalinity percent Na_2O		Surface tension dynes/cm.		Mineral oil			
											Interfacial tension dynes/cm.		Emulsification	
	*O	*M	*O	*M	*O	*M	*O	*M	*O	*M	*O	*M	*O	*M
Alkaline														
6	F	E	65.0	93.5	9.8	10.0	13.7	15.7	70.5	33.6	30.7	6.8	P	E
7	F	E	61.0	94.0	8.2	9.4	9.9	10.9	70.3	37.2	21.3	9.0	P	E
8	F	E	59.5	94.5	12.2	12.0	18.4	22.9	70.5	32.7	37.8	5.0	P	E
10	F	E	53.0	95.5	12.9	12.4	35.7	35.2	69.0	35.5	28.7	7.5	P	E
11	P	E	47.0	93.5	12.4	12.0	29.3	29.0	71.2	34.3	29.1	6.5	P	E
13	P	F	34.5	65.0	11.3	11.0	55.1	55.0	70.6	33.0	30.6	5.2	P	E
20	P	P	9.0	7.0	9.3	9.4	16.6	21.5	70.8	33.0	36.7	5.2	P	E
Formulated														
1	------	E	------	97.5	------	10.0	------	10.1	------	29.2	------	5.8	------	E
2	------	E	------	98.0	------	11.6	------	15.1	------	35.2	------	7.3	------	E

*O = Original.
*M = Modified.

range by slight modification of alkalinity and/or surface activity. However, the other fair and poor detergents could not be improved to excellent by modification. This fact suggests that further study of rinsing ability is indicated before accurate estimation of detergent performance may be made on the basis of factors of detergency.

Summary

A series of about 100 commercial detergents and detergent components representing different types of detergents were included in a study involving the application of the washing performance test and the determination of the various factors of detergency. The factors determined included pH; phenolphthalein, inactive and total alkalinity; surface tension; interfacial tension and emulsification with mineral oil; and sequestering ability. No correlation could be found between the values of any single detergency factor and washing performance. When the samples examined were separated into classes of detergents, that is, soaps, alkaline, surface active, and combined detergents, correlation between a combination of factors and the washing performance test results was demonstrated. Optimum values for each factor were determined by the range set by the maximum-minimum values for the excellent detergents (93.5 percent–100 percent soil removal) for each type. Similarly, the maximum-minimum factor values for the good, fair, and poor detergents for each class were tabulated.

The detergency factors that were significant for evaluating dishwashing detergent performance (in lieu of performance tests) for the various classes of detergents were as follows:

Soaps. Phenolphthalein alkalinity, total alkalinity, surface tension.

Alkaline Detergents. pH, inactive alkalinity, surface tension.

Surfactants. Surface tension, and interfacial tension and emulsification with mineral oil.

Combined Detergents. pH, total alkalinity, surface tension, and interfacial tension and emulsification with mineral oil.

In general, however, decreasing pH and emulsifying power, and increasing phenolphthalein, inactive and total alkalinity, surface and interfacial tension indicated decreasing soil removing ability.

Using the limiting values shown in table 3 for the above criteria, it was found possible to correctly correlate with the washing performance test results 100 percent of the soaps, 95 percent of the surface active agents, 91.7 percent of the alkaline detergents, and 87.5 percent of the combined detergents studied. It was also found possible to modify the combined detergents with good washing performance so that the significant chemical and physical characteristics would be within the range of the excellent detergents. This modification improved the washing performance test results of 86.7 percent of them to excellent. However, fair or poor combined detergents were improved only slightly with modification. Fair alkaline detergents could be modified by adding surface active agents so that the characteristics and washing performance test results were excellent. Poor alkaline detergents were improved but slightly by changing their characteristics to match those of excellent detergents.

Conclusions

From the data presented in this paper, it is concluded that:

1. No single factor of detergency can be used to judge washing performance of the detergent.

2. If the detergent is classified as a soap, surfactant, alkaline, or combined detergent, a comparison of certain pertinent detergency factors will permit prediction of the washing performance of a large percentage of detergents.

3. With present knowledge, a washing performance test is the only reliable method for evaluating the dishwashing performance of detergents.

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Poultry Diseases as Public Health Problems

By C. A. Brandly, D.V.M.*

The infectious diseases of animals constitute a considerable hazard to man. In turn, but generally minimized, is the fact that various infections considered native to man are a threat to others of the animal kingdom. Interspecies infection chains or cycles are, as a rule, favored by similarity or closeness of relationship of the hosts. Hence, an infection chain among mammals generally has greater expectancy of prosperity than if it were to involve an avian host or hosts, and vice versa. That this may not inevitably follow is apparent; therefore, the hazards of current poultry diseases to public health are the subject of this discussion.

Extent of Poultry-Human Disease Problem

A substantial number of infectious and parasitic agents apparently may pass from active or passive residence in poultry to man. In his excellent recent review, Ingalls (*12*) lists 26 such agents including representatives of viral, bacterial, fungal, protozoal, and metazoan nature. Earlier, Brandly (*3*) had discussed the infections common to man and fowl from the standpoint of poultry inspection and public health.

A few of these diseases are mentioned to illustrate the nature of the host-parasite relationship as well as certain epizootiological implications pointing towards means for their ultimate suppression as public health hazards.

Food poisoning or infection in man by the genus *Salmonella* constitutes a vexing problem. Few genera of microbes have such a wide host range. More than 150 antigenic types of *Salmonella* have been recognized. Most of these involve several, if not many, hosts, and the number is being enlarged continually. Therefore, as pointed out by Hinshaw and McNeil (*9*) "There may well be no truly avian nor truly human types; in fact, such a description frequently means only priority in isolation. This is illustrated by *Salmonella typhimurium* which was named for the host from which it was first isolated—the mouse. *S. typhimurium* is now known to be of importance in other hosts, such as birds and humans, while *S. enteritidis* is the more common cause of salmonellosis in mice."

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True staphylococcal and streptococcal food poisoning in man has not been traced directly to avian origin, although the species and types of both these organisms recoverable from fowl have enterotoxic potentialities. Nevertheless, the staphylococci and streptococci are not common causes of disease among birds, and their contamination of poultry eggs or meat foods may be derived from nonavian sources.

Considered a native pathogen of swine, *Erysipelothrix rhusiopathiae* is an occasional and genuine occupational hazard to persons contacting or handling poultry infected with it. Less frequently occurring than swine erysipelas infection but more dangerous to man is the bacterial disease, tularemia, acquired not only by handling infected birds but also by consuming the inadequately cooked flesh.

The recent studies of Felsenfeld and associates (*6*) reemphasize that all three species of *Brucella* may find at least a temporary reservoir in chickens from whence they may be disseminated. Listeriosis is a relatively rare but serious bacterial disease of both fowl and man. The means of natural spread and routes of infection require considerable clarification.

Of the virus infections of man in which birds or poultry may play an active or intermediate role are psittacosis and several of the encephalitides, namely eastern and western equine encephalomyelitis, St. Louis and Japanese B encephalitis, and perhaps unidentified maladies. Psittacosis, native to parrot and related species in the jungle, appears to have expanded its host range spectrum significantly in recent years. Hence, infection among ducks and chickens, as well as columbiform and psittacine birds, would appear to constitute an increasing public health problem.

Further elucidation of the apparently complex infection chains, both direct and alternative, of the encephalitic viruses must precede a better understanding of them and the means of developing more effective combat methods as regards the role of poultry.

Only recently recognized as a public health problem is the virus entity, Newcastle disease. This virus possesses a substantial range of tissue tropisms—pneumal, neural, and endothelial. The latter is manifested in a hemorrhagic conjunctivitis of man which is being reported with increasing frequency. To the earlier records of occupational infection among virus workers in the laboratory and of poultry handlers, Burnet (*4*), Anderson (*1*), Shimkin (*19*), Yatom (*21*), Ingalls and Mahoney (*11*), Freyman and Bang (*7*), may be added the recent case reports of Kajumgiev (*17*), Ingalls (*12*), Boney (*2*), and Gustafson and Moses (*8*).

Current renewed interest in diseases caused by the higher fungi, for example, histoplasmosis, coccidioidal mycosis, and sarcosporidiosis, must embrace further attention to the possible role of poultry and birds from the veterinary public health standpoint.

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Metazoan animal parasites which may infest both man and birds, cyclically or otherwise, include certain mites and lice, schistosomes and echinostomes. Aside from involving the skin or other tissues, these parasites may act as carriers or vectors of virus or other pathogens. Instances include recovery of equine encephalomyelitis and St. Louis encephalitis viruses from chicken mites.

Adaptation and Spread

The behavior of certain of the aforementioned pathogens, well adjusted to transfer from avian hosts to man, is sufficiently well known so that their suppression and eventual elimination awaits only the activation of the known means of control. This may require the erection of new barriers or precautions, in some instances, and, in others, the repair of old ones. Full scale efforts to discourage marketing of questionable or sick fowl by rigid ante-mortem and post-mortem inspection must precede and accompany well-planned and persistent programs to eradicate the avian reservoirs of infection. On the other hand, there is the perpetual problem of working out unknown epizootiologies and of recognizing new threats, both potential and actual, in the form of bird to man infection chains. In one respect, diseases of fowl and other birds represent a greater hazard to man than those of mammals. The United States population of domesticated fowl or poultry approximates a billion, while that of all our mammals classed as livestock is less than one-half this figure. Numerically then, there is the expectancy of greater opportunity for contact with diseased birds and, with this contact, an increased opportunity for adaptation of the disease agent from Aves to man. Strains of infectious agents, or their elementary components, which have the potential for adaptation to new hosts may, in consequence, more often encounter favorable new soil for their perpetuation.

Recognized as bearing on the transferrability of the infectious agent are such virulence factors as communicability (*20*). Ability to survive during sojourn outside of the animal is a pertinent quality of communicability.

Virulence of certain *Salmonella* has been shown by Maaloe (*18*) to be independent of their ability to penetrate the host's tissues. In contrast, penetrability of *Pasteurella tularensis* (*5*) is an essential attribute of virulence of this agent. Pneumotropism, as it may result in a large release of infective aerosol over a protracted period, would favor a high incidence of exposure and, therewith, selective adaptation. Newcastle disease virus, quite resistant to the poultry house environment, possesses this quality although the virus is eliminated over a brief time, and the carrier rate is low. In contrast, psittacosis is characterized by a more protracted course during whicb

the infection may be released in substantial quantity. Furthermore, there is a high rate of carrier, latent, and recurrent cases.

Adaptations to new host-parasite relationships are, as a rule, slow. The more recent evidence of infection of man by *Mycobacterium avium* may suggest progress toward adaptation as a result of repeated or prolonged contact.

Control

Of first importance toward suppressing the incidence of infections which man may acquire from poultry is the prime necessity of eliminating the reservoirs of infection. Improvements in diagnostic or detection methods will be largely nullified without adequate and judicious use of these methods. The need for caution is emphasized by the finding of neutralizing as well as antihemagglutinating factors against Newcastle disease virus which rise in titer following infection of man with mumps virus *(14, 15, 16)*.

The problem which the wide prevalence and extensive host spectrum of the *Salmonella* appears to pose seems less formidable in the light of the experience of Hinshaw and McNeil *(9)* in eradicating paratyphoid infection from turkey ranches. Surveys had shown that snakes might harbor and eliminate the causative *Salmonella* from season to season. Control of snakes removed the reservoir of infection for the turkeys. Likewise, it was found that human carriers may infect poultry and other animals *(10)*.

In summation, it may be emphasized that suppression and eventual eradication of transmissible diseases common to birds and man require, at the onset, thorough elucidation of epizootiology together with adequate and often needed improvements in detection and diagnostic methods. These knowledges and skills, supplemented by sound long-range perspectives and practices and abetted by persistent educational programs must inevitably lead to success against this costly and needless loss and waste. Now, and in the future, necessary safeguards must aim to reduce the "occupational hazards" both against established bird to man infection chains, and against the factors of contact and exposure which may favor adaptation of other infectious agents to man from birds, and vice versa. Finally, a sound and inclusive poultry inspection service based on established practices and under competent veterinary supervision must be our primary bulwark toward protecting both the health of the public and the integrity of one of our major sources of food.

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Reported Incidence of Communicable Diseases in the United States, 1950

This summary presents provisional total cases of communicable diseases reported by the health departments of each State and the outlying territories and possessions to the Public Health Service for the calendar year 1950. The figures represent the cumulation of cases reported each month during the year and are subject to change in the final annual reports released by each State at a later date.

The accompanying table shows the numbers of reported cases of selected communicable diseases by State for 1950. Data for diseases reported with low frequencies or by only a few States are given under the heading, "Additional Diseases."

Poliomyelitis

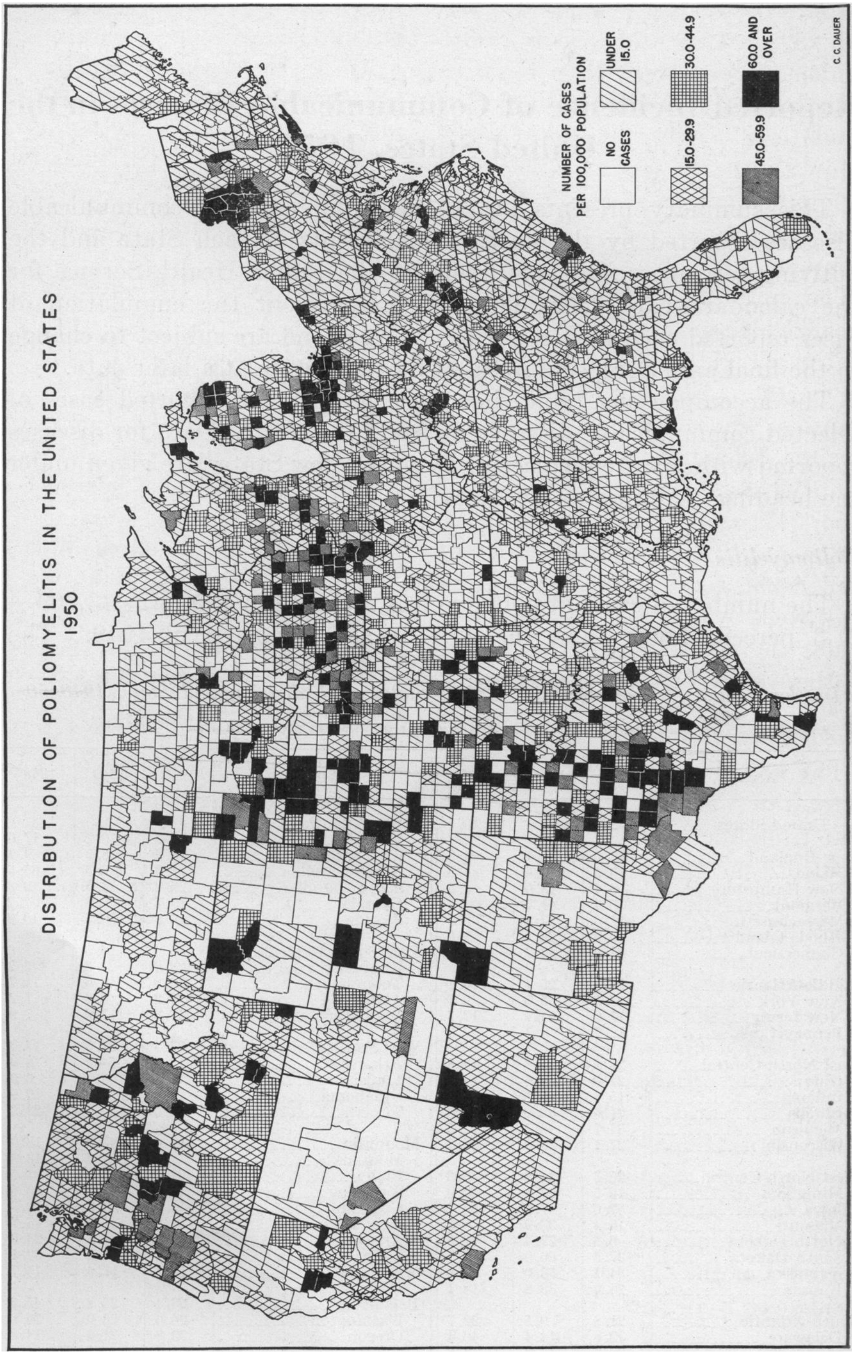
The number of cases of poliomyelitis reported in 1950 was 33,209—21.3 percent lower than the 42,173 cases reported in 1949. The

Incidence rates for poliomyelitis: United States, each division and State, 1948–50

(Rates per 100,000 estimated midyear population present in area)*

Area	1950	1949	1948	Area	1950	1949	1948
United States	22.0	28.4	19.1	South Atlantic—Con.			
				Virginia	36.4	10.2	17.6
New England	13.0	37.1	4.3	West Virginia	18.7	18.0	9.4
Maine	10.5	49.4	4.5	North Carolina	18.3	6.3	65.6
New Hampshire	6.4	43.0	4.5	South Carolina	20.1	5.5	19.3
Vermont	8.4	41.7	7.3	Georgia	13.7	6.8	7.2
Massachusetts	11.0	37.8	3.8	Florida	16.8	10.5	10.9
Rhode Island	6.9	24.4	1.0				
Connecticut	24.0	32.7	6.1	East South Central	16.6	16.5	8.6
				Kentucky	23.0	24.3	7.2
Middle Atlantic	20.8	25.4	10.1	Tennessee	16.9	16.6	11.7
New York	27.5	35.5	9.7	Alabama	9.2	8.4	7.2
New Jersey	17.9	31.7	17.3	Mississippi	17.8	17.2	7.9
Pennsylvania	12.7	8.1	7.3				
				West South Central	27.7	34.3	17.2
East North Central	23.8	32.8	13.8	Arkansas	17.4	54.2	8.0
Ohio	22.6	22.6	14.8	Louisiana	15.0	8.7	6.0
Indiana	15.5	29.5	10.4	Oklahoma	23.4	61.8	16.9
Illinois	21.6	32.9	13.0	Texas	36.0	30.7	23.3
Michigan	31.7	46.5	12.5				
Wisconsin	27.1	35.0	20.0	Mountain	17.0	43.3	18.9
				Montana	7.8	17.4	13.3
West North Central	25.3	48.9	38.3	Idaho	27.9	89.2	21.5
Minnesota	19.5	64.8	50.0	Wyoming	16.0	43.5	30.5
Iowa	52.6	47.9	50.7	Colorado	15.2	53.6	10.3
Missouri	10.4	33.9	8.3	New Mexico	19.5	31.0	13.7
North Dakota	6.8	77.4	22.6	Arizona	22.6	24.8	23.9
South Dakota	27.5	66.0	158.7	Utah	12.1	44.2	32.1
Nebraska	34.1	53.0	57.8	Nevada	13.1	17.6	15.7
Kansas	26.6	39.8	18.1				
				Pacific	23.4	25.8	45.3
South Atlantic	21.8	9.5	22.7	Washington	26.6	25.0	16.6
Delaware	12.6	14.4	40.4	Oregon	33.8	21.9	14.8
Maryland	29.7	11.3	6.8	California	21.2	26.5	56.0
District of Columbia	23.5	12.5	19.2				

*Source of population estimates, Bureau of the Census.


DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1950
NUMBER OF CASES PER 100,000 POPULATION
NO CASES
UNDER 15.0
15.0-29.9
30.0-44.9
45.0-59.9
60.0 AND OVER
C. C. DAUER

morbidity rate per 100,000 population in 1950 was 22.0 compared with 28.4 in 1949 and 19.1 in 1948. The States reporting the largest number of cases were New York with 4,079, Texas with 2,778, California with 2,249, and Michigan with 2,031, all of which have large populations. However, the highest morbidity rates were to be found in Iowa with 52.6 cases per 100,000 population; Virginia, 36.4; Texas, 36.0; and Nebraska, 34.5. The States with the lowest rates were New Hampshire, 6.4; North Dakota, 6.8; Rhode Island, 6.9; and Montana, 7.8.

The map shows the distribution of poliomyelitis by counties. Localized areas of varying extent in all parts of the country had relatively high rates of incidence. More of these areas were located in the northern half of the country than in the southern. Individual counties which had excessively high rates were Wythe County, Virginia, where the rate was 810 per 100,000 population; Van Buren County, Iowa, 336; Lewis County, New York, 308; Paulding County, Ohio, 242; and Nelson County, Kentucky, 224.

The peak incidence for the country as a whole was reached later than usual, namely, in the third week of September. In 1949, the peak week was the third week of August. However, as in previous years, the week of highest incidence was reached much earlier in southern States in 1950 than in the northern part of the country.

Diphtheria

The incidence of diphtheria reached a new low level during 1950. A total of 5,931 cases was reported, a decrease of more than 25 percent from the number reported for the previous year. The highest incidence on record was 206,939 cases reported by 46 States in 1921. The largest numbers of cases for 1950 were reported in Texas, 900; North Carolina, 503; and Alabama, 319.

Infectious Encephalitis

The reported incidence of infectious encephalitis increased for the second consecutive year which may be due to better recognition of the disease. From 575 cases in 1948, the number of reported cases rose to 781 and 1,051, respectively, for 1949 and 1950. The 5-year (1945–49) median was 669. Since 1927, the first year for which data are available, the high years are 1933 with 3,332 cases and 1941 with 3,045 cases, and the low year was 1942 when 564 cases were reported. California reported almost a third, 333 cases, of the total cases reported for the country as a whole. Other States reporting high incidences were New York, 144 cases, and Michigan, 72.

Influenza and Pneumonia

There were 284,235 cases of influenza reported for 1950, or more than two and a half times the number, 108,218, reported for the pre-

vious year. The outbreak of influenza, as shown by laboratory examinations, was shown to be due to influenza virus, type A-prime.

The incidence of pneumonia increased slightly for 1950, 85,374 cases from 82,882 for 1949. The 5-year median was also 82,882.

Measles

The total of 321,054 cases reported in 1950 indicated that measles was not epidemic in as many parts of the United States as it had been in 1949 when 620,905 cases were reported. The 5-year median was 613,810. The highest incidence on record was in 1941 with 891,051 cases and lowest was 1945 with 144,398. For 1950, the largest numbers were reported in the East North Central States, 98,346 cases, and the Middle Atlantic States, 81,480. The East and West South Central States reported the lowest incidence with 13,040 and 17,893 cases, respectively.

Meningococcal Meningitis

The total number of cases of meningococcal meningitis reported for 1950 was 3,700 as compared with 3,469 for 1949. The year of highest incidence for the country as a whole was 1943 when 17,974 were reported.

Plague

During 1950, three cases of bubonic plague were reported in the Nation as follows: New Mexico, Lea and Sante Fe Counties, one case each; and Arizona, Fort Defiance, one case.

Scarlet Fever and Septic Sore Throat

There were 56,851 cases of scarlet fever reported in 1950, which was the lowest on record. The decline in reported cases of scarlet fever has been partially offset by an increase in the incidence of septic sore throat. During that year, 20,897 cases of septic sore throat were reported compared with 19,867 for 1949, and 15,905 for the 5-year median.

Smallpox

There were only 42 cases of smallpox reported in the United States for 1950. Of these, 17 cases were reported in the West North Central States and 10 in the East South Central States. A total of 56 cases was reported in 1949. The peak year for which data are available was 1921, when 45 States reported 102,707 cases.

Tuberculosis

Total reported cases of tuberculosis (all forms) was 121,663 as compared with 133,612 for 1949 and a 5-year median of 130,474. These figures were obtained from State semiannual reports in many instances and as such are based on color and sex. A portion of the decline for 1950 appears to be due to changes in the definition of a

reportable case, particularly in relation to cases of borderline significance found in surveys.

Endemic Typhus Fever

The peak year for endemic typhus fever was 1944, when 5,353 cases were reported. Since that year, the incidence has been decreasing rapidly to 686 cases reported for 1950. The 5-year median was 1,901 cases. States reporting the largest numbers were Texas, 222; Georgia, 165; and Alabama, 130.

Venereal Diseases

Total reported cases of syphilis for the calendar year 1950 was 217,559 as compared with 256,541 reported in 1949. The 5-year median (1945–49) is 349,065.

A decrease in reported cases of gonorrhea and other forms of venereal disease also occurred. For 1950, 286,755 cases of gonorrhea were reported as compared with 318,032 for 1949. A total of 8,212 cases of other venereal diseases were reported, consisting of 5,006 cases of chancroid, 1,779 cases of granuloma inguinale and 1,427 cases of lymphogranuloma.

Whooping Cough

The number of cases of whooping cough was 120,157 for 1950, an increase over the 69,377 cases reported for the previous year. However, it was below the 155,991 cases reported in 1947 and the 265,269 reported for the peak year in 1934.

Additional Diseases

Figures for most of the additional diseases reported by health departments of the States, the territories, and the outlying possessions in 1950, and not shown in the table, are listed below. The numbers in parentheses are category numbers from the manual of the International Statistical Classification of Diseases, Injuries, and Causes of Death, World Health Organization, 1948.

Actinomycosis (132): Colorado 2, Connecticut 1, Georgia 4, Iowa 3, Michigan 2, Minnesota 8, New York 1, Ohio 1, Pennsylvania 1, South Dakota 1, Tennessee 1.

Anthrax (062): Arkansas 1, California 1, Colorado 2, Connecticut 1, Delaware 2, Georgia 1, Maryland 1, Massachusetts 4, New Hampshire 8, New Jersey 7, New York 3, Pennsylvania 21, Texas 1.

Botulism (049.1): California 6, Colorado 3, Minnesota 3, New Mexico 1, Tennessee 1.

Cancer (140–205): Alabama 4,475, Arkansas 522, Colorado 3,290, Florida 4,552, Georgia 292, Idaho 1,098, Kansas 4,622, Louisiana 2,834, Montana 1,104, Nevada 38, New Mexico 834, North Dakota 730, Pennsylvania 8,623, South Carolina 297, Tennessee 3,391, Utah 338, Wyoming 442, Alaska 15, Virgin Islands 7.

Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

Area	Brucellosis (044)	Chickenpox (087)	Diphtheria (055)	Dysentery		Encephalitis, infectious (082)	German measles (086)
				Amebic (046)	Bacillary (045)		
New England	**91**	**29,098**	**184**	**22**	**116**	**43**	**6,986**
Maine	12	3,424	17	-------	2	1	2,558
New Hampshire	2	1,068	8	-------	-------	-------	569
Vermont	8	3,124	2	-------	-------	1	532
Massachusetts	22	15,032	144	7	104	37	2,279
Rhode Island	4	1,177	8	-------	2	1	28
Connecticut	43	5,273	5	15	8	3	1,020
Middle Atlantic	**257**	**67,780**	**408**	**1,076**	**503**	**193**	**12,132**
New York	149	22,516	194	1,017	475	144	3,511
New Jersey	36	21,153	50	49	9	42	6,644
Pennsylvania	72	24,111	164	10	19	7	1,977
East North Central	**804**	**69,033**	**541**	**841**	**373**	**164**	**10,954**
Ohio	41	14,231	220	18	20	3	1,538
Indiana	42	2,412	154	8	8	26	369
Illinois	447	13,274	63	617	142	49	1,665
Michigan	93	14,044	85	197	203	72	6,093
Wisconsin	181	25,072	19	1	-------	14	1,289
West North Central	**761**	**15,998**	**285**	**71**	**107**	**77**	**252**
Minnesota	228	1,811	91	47	89	6	-------
Iowa	213	1,816	24	4	3	7	11
Missouri	80	2,160	72	9	8	6	160
North Dakota	33	646	6	2	-------	23	-------
South Dakota	49	527	21	(*)	(*)	22	-------
Nebraska	15	2,634	21	5	-------	1	-------
Kansas	143	6,404	50	4	7	12	81
South Atlantic	**283**	**13,785**	**1,605**	**321**	**478**	**44**	**371**
Delaware	-------	212	5	-------	2	1	1
Maryland	42	3,543	101	9	18	6	176
District of Columbia	2	717	3	5	28	1	-------
Virginia	67	3,037	191	10	-------	2	-------
West Virginia	8	1,861	191	7	41	5	149
North Carolina	21	-------	503	132	43	1	-------
South Carolina	8	-------	213	6	52	7	-------
Georgia	99	2,470	300	39	246	13	-------
Florida	36	1,945	98	113	48	8	45
East South Central	**172**	**5,316**	**1,048**	**414**	**199**	**57**	**597**
Kentucky	19	1,175	221	149	56	6	180
Tennessee	48	1,832	259	101	75	32	376
Alabama	43	2,309	319	45	(*)	5	41
Mississippi	62	-------	249	119	68	14	-------
West South Central	**455**	**4,578**	**1,310**	**1,024**	**19,437**	**87**	**213**
Arkansas	35	1,707	158	126	217	7	82
Louisiana	30	364	123	337	2	2	8
Oklahoma	102	2,507	129	38	22	19	123
Texas	288	-------	900	523	19,196	59	-------
Mountain	**137**	**14,372**	**213**	**287**	**1,515**	**42**	**1,765**
Montana	19	1,585	35	8	2	2	194
Idaho	24	1,301	25	2	-------	7	314
Wyoming	5	470	5	1	-------	1	171
Colorado	55	3,205	44	6	25	10	219
New Mexico	1	807	24	22	63	1	208
Arizona	16	2,725	58	221	1,424	13	359
Utah	14	3,995	18	27	1	3	300
Nevada	3	284	4	-------	-------	5	-------
Pacific	**203**	**35,096**	**337**	**552**	**587**	**344**	**3,176**
Washington	37	2,085	21	27	27	9	362
Oregon	45	-------	43	156	8	2	-------
California	121	33,001	273	369	552	333	2,814
Total 1950	3,163	255,046	5,931	4,608	23,315	1,051	36,446
Total 1949	4,124	373,324	8,027	5,374	28,503	781	92,267
Median 1945-49	4,959	317,565	12,405	4,073	24,164	669	29,222
Alaska	1	686	2	-------	-------	1	47
Hawaii	4	1,517	10	6	101	1	77
Panama Canal Zone	2	329	41	68	61	-------	62
Puerto Rico	-------	933	408	-------	-------	-------	-------
Virgin Islands	-------	21	-------	-------	-------	-------	-------

*Reported not notifiable.

Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

Area	Hepatitis, infections (092, part)	Hookworm disease (129)	Influenza (480–483)	Malaria (110–117)	Measles (085)	Meningitis, meningococcal (057.0)	Mumps (089)
New England	**27**	**4**	**1,613**	**6**	**19,468**	**140**	**20,829**
Maine	8	-------	1,443	-------	999	24	3,318
New Hampshire	-------	-------	55	-------	572	5	775
Vermont	-------	-------	15	-------	607	2	4,283
Massachusetts	8	-------	(*)	3	12,854	61	8,431
Rhode Island	-------	-------	24	-------	342	11	347
Connecticut	11	4	76	3	4,094	37	3,675
Middle Atlantic	**730**	**191**	**646**	**23**	**81,480**	**587**	**48,758**
New York	102	190	[1] 302	12	32,515	248	14,135
New Jersey	-------	-------	204	10	30,813	79	10,335
Pennsylvania	628	1	140	1	18,152	260	24,288
East North Central	**123**	**13**	**4,336**	**29**	**98,346**	**725**	**41,677**
Ohio	-------	2	210	2	13,490	227	9,678
Indiana	36	-------	400	1	7,604	31	1,147
Illinois	43	-------	423	22	19,220	223	6,974
Michigan	44	11	142	-------	38,245	132	9,916
Wisconsin	-------	-------	3,161	4	19,787	112	13,962
West North Central	**439**	**5**	**3,258**	**5**	**24,384**	**301**	**14,704**
Minnesota	411	-------	169	2	4,037	66	17
Iowa	14	1	-------	1	10,872	44	2,231
Missouri	-------	-------	516	2	2,372	99	1,371
North Dakota	-------	-------	803	-------	372	19	16
South Dakota	-------	2	11	-------	808	18	240
Nebraska	1	-------	774	-------	3,924	16	1,500
Kansas	13	2	985	-------	1,999	39	9,329
South Atlantic	**5**	**10,051**	**78,078**	**192**	**24,931**	**562**	**9,467**
Delaware	-------	-------	4	-------	628	18	119
Maryland	4	-------	628	6	1,544	63	2,096
District of Columbia	-------	-------	85	2	1,783	16	697
Virginia	-------	-------	53,282	16	2,947	121	2,575
West Virginia	1	-------	14,869	1	6,171	78	1,501
North Carolina	-------	-------	-------	37	5,116	108	-------
South Carolina	-------	-------	2,849	86	2,001	46	-------
Georgia	-------	-------	6,126	37	2,240	64	1,027
Florida	-------	10,051	235	7	2,501	48	1,452
East South Central	**233**	**3,237**	**16,236**	**175**	**13,040**	**439**	**3,563**
Kentucky	18	162	2,630	6	5,315	137	934
Tennessee	215	14	5,321	18	3,760	166	1,330
Alabama	-------	-------	7,784	87	1,654	84	1,299
Mississippi	-------	3,061	501	64	2,311	52	-------
West South Central	**1**	**1,162**	**160,670**	**1,755**	**17,893**	**520**	**5,246**
Arkansas	-------	10	17,419	52	1,885	63	2,071
Louisiana	-------	1,111	123	5	786	61	242
Oklahoma	1	41	11,768	93	646	51	2,933
Texas	-------	-------	131,360	1,605	14,576	345	-------
Mountain	**46**	**2**	**17,679**	**23**	**20,529**	**80**	**10,806**
Montana	13	-------	5,184	-------	1,833	8	615
Idaho	8	-------	2,518	1	1,875	8	630
Wyoming	6	-------	382	3	651	9	411
Colorado	4	-------	2,546	3	5,431	27	2,332
New Mexico	-------	-------	114	1	972	3	782
Arizona	-------	-------	6,198	13	2,566	17	2,742
Utah	9	-------	271	-------	6,861	7	3,094
Nevada	6	2	466	2	340	1	202
Pacific	**274**	**3**	**1,719**	**19**	**29,983**	**346**	**34,779**
Washington	99	-------	635	1	3,695	65	1,434
Oregon	127	3	595	1	784	39	-------
California	48	-------	489	17	16,504	242	33,345
Total 1950	2,727	14,668	284,235	2,227	321,054	3,700	189,831
Total 1949	1,961	15,810	108,218	4,231	620,905	3,469	214,073
Median 1945–49	1,458	15,810	284,138	17,317	613,810	3,469	196,317
Alaska	5	-------	535	1	346	5	491
Hawaii	5	-------	3,483	1	80	7	152
Panama Canal Zone	-------	-------	20	436	1,244	5	1,322
Puerto Rico	-------	-------	1,025	96	2,163	-------	-------
Virgin Islands	-------	-------	-------	-------	-------	1	2

*Reported not notifiable.
[1] New York City only.

Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

Area	Pneumonia (490–493)	Poliomyelitis (080.0-080.3)	Rheumatic fever (400–402)	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Septic sore throat (051)	Smallpox (084)
New England	**2,742**	**1,211**	**98**	-------	**6,339**	**475**	-------
Maine	668	96	7	-------	383	40	-------
New Hampshire	1	34	-------	-------	278	-------	-------
Vermont	25	32	-------	-------	143	47	-------
Massachusetts	(*)	513	(*)	-------	4,423	108	-------
Rhode Island	193	54	91	-------	265	16	-------
Connecticut	1,855	482	(*)	-------	847	264	-------
Middle Atlantic	**17,622**	**6,280**	**663**	**39**	**9,956**	**90**	-------
New York	11,379	4,079	(*)	14	[1] 4,902	(1)	-------
New Jersey	2,908	867	(*)	10	1,410	90	-------
Pennsylvania	3,335	1,334	663	15	3,644	-------	-------
East North Central	**8,924**	**7,267**	**759**	**29**	**16,970**	**899**	**2**
Ohio	1,937	1,794	85	7	6,541	31	1
Indiana	562	610	11	8	1,536	5	-------
Illinois	3,856	1,890	183	12	2,087	90	-------
Michigan	1,963	2,031	473	2	4,665	521	-------
Wisconsin	606	942	7	-------	2,141	252	1
West North Central	**6,177**	**3,581**	**135**	**5**	**3,327**	**241**	**17**
Minnesota	1,882	585	116	-------	719	203	-------
Iowa	91	1,389	2	-------	356	3	2
Missouri	862	414	2	2	644	20	2
North Dakota	2,456	43	6	-------	128	5	1
South Dakota	16	183	(*)	-------	118	3	2
Nebraska	215	457	1	1	555	-------	7
Kansas	655	510	8	2	807	7	3
South Atlantic	**10,719**	**4,631**	**316**	**242**	**5,358**	**3,410**	-------
Delaware	19	40	1	1	132	-------	-------
Maryland	1,587	695	70	57	756	42	-------
District of Columbia	895	184	4	1	206	-------	-------
Virginia	3,616	1,205	110	76	937	2,756	-------
West Virginia	660	378	39	12	550	251	-------
North Carolina	-------	751	-------	71	1,855	47	-------
South Carolina	498	431	28	11	185	35	-------
Georgia	2,820	476	64	13	546	194	-------
Florida	624	471	(*)	-------	191	85	-------
East South Central	**7,506**	**1,915**	**365**	**49**	**3,600**	**292**	**10**
Kentucky	1,282	683	32	7	1,105	138	7
Tennessee	2,422	556	91	22	1,587	154	1
Alabama	2,373	283	178	15	611	(*)	-------
Mississippi	1,429	393	64	5	297	(*)	2
West South Central	**24,689**	**4,049**	**98**	**29**	**2,316**	**10,686**	**6**
Arkansas	1,978	337	9	16	195	1,899	-------
Louisiana	1,369	404	37	4	168	13	-------
Oklahoma	1,966	530	52	9	510	386	5
Texas	19,376	2,778	(*)	-------	1,443	8,388	1
Mountain	**3,357**	**877**	**434**	**59**	**1,995**	**3,733**	**6**
Montana	40	47	3	15	382	149	-------
Idaho	395	166	64	10	239	492	-------
Wyoming	66	47	37	4	56	3	-------
Colorado	1,147	205	113	17	436	211	2
New Mexico	567	136	59	2	163	4	1
Arizona	926	171	129	-------	433	2,411	1
Utah	138	84	29	7	266	19	-------
Nevada	78	21	-------	4	20	444	2
Pacific	**3,638**	**3,398**	**767**	**15**	**6,990**	**1,071**	**1**
Washington	663	632	282	-------	1,671	88	-------
Oregon	908	517	83	12	597	350	1
California	2,067	2,249	402	3	4,722	633	-------
Total 1950	85,374	33,202	3,635	467	56,851	20,897	42
Total 1949	82,882	42,173	4,457	560	74,913	19,867	56
Median 1945–49	82,882	25,196	4,515	560	84,379	15,905	173
Alaska	64	62	30	-------	18	71	-------
Hawaii	23	23	28	-------	28	5	-------
Panama Canal Zone	425	74	5	-------	5	-------	2
Puerto Rico	-------	38	-------	-------	-------	-------	-------
Virgin Islands	-------	-------	-------	-------	-------	-------	-------

* Reported not notifiable.
[1] Cases reported as septic sore throat included with scarlet fever.

Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

Area	Tetanus (061)	Trachoma (095)	Trichiniasis (128)	Tuberculosis (all forms) (001–019)	Tularemia (059)	Typhoid fever (040)	Paratyphoid fever[1] (041)
New England	**25**		**66**	**5,137**	**2**	**64**	**81**
Maine	5		13	465		14	3
New Hampshire	1			161		6	1
Vermont				252		1	
Massachusetts	9		33	2,493	2	21	68
Rhode Island	5		4	471		8	1
Connecticut	5		16	1,295		14	8
Middle Atlantic	**32**	**1**	**157**	**22,481**	**12**	**310**	**143**
New York	22	1	127	13,372	1	82	89
New Jersey	6		13	3,058	2	61	13
Pennsylvania	4		17	6,051	9	167	41
East North Central	**57**	**20**	**34**	**24,546**	**115**	**302**	**165**
Ohio	10	1	19	7,300	6	121	8
Indiana	12		2	2,237	26	48	8
Illinois	19	5	2	7,588	71	74	3
Michigan	16	1	11	5,800	9	43	136
Wisconsin		13		1,621	3	16	10
West North Central	**29**	**863**	**7**	**7,949**	**63**	**141**	**28**
Minnesota	8	6	6	2,675	1	7	22
Iowa	2			852		9	
Missouri	7	688		2,989	53	87	2
North Dakota	2	22		292	2	3	2
South Dakota	1	124		286		2	
Nebraska	1	22	1	292		7	1
Kansas	8	1		563	7	26	1
South Atlantic	**101**	**28**	**7**	**20,799**	**184**	**434**	**147**
Delaware			2	315		11	3
Maryland	12	1	3	2,635	15	41	8
District of Columbia	2		2	1,672		7	7
Virginia	11			3,555	44	68	20
West Virginia	1	26		2,099	3	69	4
North Carolina				3,658	26	60	8
South Carolina	2			1,333	9	71	5
Georgia	35			3,192	69	77	53
Florida	38	1	(*)	2,340	18	30	39
East South Central	**112**	**30**	**1**	**11,993**	**112**	**353**	**48**
Kentucky	5	27		3,501	12	118	4
Tennessee	37	3	1	4,005	33	126	27
Alabama	42		(*)	3,092	19	52	16
Mississippi	28		(*)	1,395	48	57	1
West South Central	**59**	**203**	**5**	**10,883**	**347**	**651**	**82**
Arkansas	24	77		2,001	193	117	4
Louisiana	30		2	2,254	27	138	16
Oklahoma	5	54	3	2,010	63	83	19
Texas	(*)	72	(*)	4,618	64	313	43
Mountain	**7**	**419**	**7**	**6,428**	**95**	**124**	**34**
Montana	1	74		422	31	10	2
Idaho	3		6	185	2	13	10
Wyoming		7		89	9	3	
Colorado			1	1,657	2	23	8
New Mexico	2	26		910	7	45	4
Arizona	1	307		2,623	3	27	6
Utah				369	39	2	3
Nevada		5		173	2	1	1
Pacific	**51**	**29**	**35**	**11,447**	**4**	**136**	**439**
Washington		2	13	1,896		21	42
Oregon	2	6	2	676	2	12	8
California	49	21	20	8,875	2	103	389
Total 1950	473	1,593	319	121,663	934	2,515	1,167
Total 1949	522	1,465	342	133,612	1,218	2,842	1,312
Median 1945–49	488	1,465	342	130,474	1,465	2,905	1,006
Alaska				778	1	19	
Hawaii	13			372			1
Panama Canal Zone	11			354		19	
Puerto Rico	156			5,857		74	
Virgin Islands			12	8			

*Reported not notifiable.

[1] Includes cases reported as salmonellosis.

Reported Cases of Selected Communicable Diseases: United States, Each Division and State, 1950—Continued

[Numbers under headings are category numbers of the Sixth Revision of the International Lists, 1948]

Area	Typhus fever, endemic (101)	Venereal diseases					Whooping cough (056)
		Total syphilis (020–029)	Gonorrhea (030–035)	Chancroid (036)	Granuloma Inguinale (038)	Lymphogranuloma (037)	
New England		**3,559**	**3,419**	**24**	**4**	**9**	**15,549**
Maine		398	304	3	0	0	1,964
New Hampshire		182	86	0	0	1	400
Vermont		191	128	0	0	0	1,784
Massachusetts		1,265	1,927	11	2	5	5,639
Rhode Island		692	221	0	0	0	1,987
Connecticut		831	753	10	2	3	3,775
Middle Atlantic	7	**40,088**	**34,047**	**343**	**141**	**244**	**20,387**
New York	6	25,536	19,621	229	79	178	7,560
New Jersey		5,838	3,933	23	14	21	6,206
Pennsylvania	1	8,714	10,493	91	48	45	6,621
East North Central		**40,254**	**41,820**	**657**	**63**	**136**	**28,071**
Ohio		13,886	8,919	54	12	16	7,334
Indiana		4,144	2,615	14	2	3	1,737
Illinois		11,247	20,879	383	32	88	3,341
Michigan		8,822	8,678	202	17	29	9,184
Wisconsin		2,155	729	4	0	0	6,475
West North Central		**12,269**	**8,416**	**68**	**19**	**10**	**6,174**
Minnesota		836	848	1	0	0	1,356
Iowa		1,953	754	1	0	0	1,160
Missouri		5,720	4,485	47	16	9	1,356
North Dakota		254	122	0	0	0	333
South Dakota		322	209	2	0	0	168
Nebraska		830	736	13	2	0	302
Kansas		2,354	1,262	4	1	1	1,499
South Atlantic	228	**46,822**	**86,669**	**2,230**	**1,027**	**490**	**13,190**
Delaware		638	261	1	2	3	263
Maryland	1	4,376	8,097	125	40	35	2,272
District of Columbia		3,078	13,500	535	37	26	188
Virginia	4	4,998	9,806	99	57	69	2,822
West Virginia	1	2,896	3,499	36	7	0	2,342
North Carolina	9	5,095	14,282	250	81	90	3,304
South Carolina	14	5,871	8,682	123	105	21	475
Georgia	165	9,156	14,501	818	252	212	1,053
Florida	34	10,714	14,041	243	446	34	471
East South Central	158	**26,744**	**42,240**	**567**	**228**	**187**	**5,294**
Kentucky	1	3,198	4,351	15	7	1	1,958
Tennessee	12	5,213	20,867	172	48	54	1,866
Alabama	130	6,982	4,248	146	90	27	1,219
Mississippi	15	11,351	12,774	234	83	105	251
West South Central	288	**31,121**	**45,020**	**583**	**269**	**210**	**14,778**
Arkansas	3	7,283	4,155	63	19	42	2,011
Louisiana	62	9,487	11,099	310	184	64	223
Oklahoma	1	3,129	5,125	76	8	9	928
Texas	222	11,222	24,641	134	58	95	11,616
Mountain	1	**5,103**	**4,494**	**45**	**4**	**4**	**6,526**
Montana	1	219	163	1	0	0	614
Idaho		352	401	6	0	0	720
Wyoming		202	106	0	0	0	120
Colorado		726	1,073	6	1	2	1,134
New Mexico		1,068	697	14	0	1	994
Arizona		1,984	1,673	15	2	1	2,093
Utah		188	119	0	0	0	727
Nevada		364	262	3	1	0	124
Pacific	4	**11,599**	**20,630**	**489**	**24**	**137**	**10,188**
Washington		779	1,613	132	0	2	2,142
Oregon		525	614	22	0	0	1,419
California	4	10,295	18,403	335	24	135	6,627
Total 1950	686	217,559	286,755	5,006	1,779	1,427	120,157
Total 1949	983	256,541	318,032	6,744	2,402	1,925	69,377
Median 1945–49	1,901	349,065	345,501	7,661	2,354	2,526	108,718
Alaska		202	668	0	0	0	128
Hawaii	10	310	444	5	0	0	35
Panama Canal Zone	4	301	535	15	1	1	199
Puerto Rico	25	8,491	6,988	49	4	15	2,604
Virgin Islands		105	106	0	0	5	164

Dengue (090): Georgia 1, Mississippi 1, Texas 23, Virginia 3.

Diarrhea of the newborn (764): California 135, Connecticut 3, Florida 65, Illinois 137, Indiana 9, Iowa 2, Kansas 2, Maryland 8, Michigan 14, Minnesota 10, New Jersey 1, New Mexico 22, New York 18, North Dakota 5, Ohio 110, Oklahoma 8, Pennsylvania 19, Rhode Island 6, South Carolina 31, Washington 4, West Virginia 13.

Erysipelas (052): Arizona 1, Arkansas 6, Colorado 3, Connecticut 25, Florida 15, Idaho 17, Illinois 148, Indiana 11, Kansas 7, Kentucky 4, Louisiana 4, Maryland 3, Michigan 91, Minnesota 5, Missouri 12, Montana 4, Nebraska 2, Nevada 2, New Mexico 1, North Dakota 9, Ohio 21, Oregon 34, Pennsylvania 45, South Dakota 1, Tennessee 28, Vermont 1, Wisconsin 31, Wyoming 2, Alaska 3, Hawaii 6.

Favus (131 part): Missouri 4, Nevada 4.

Food poisoning (049): California 1,322, Colorado 2, Connecticut 84, Florida 30, Idaho 65, Illinois 252, Indiana 51, Iowa 2, Kansas 1, Kentucky 106, Louisiana 12, Maine 1, Minnesota 76, Nevada 165, New Jersey 5, New Mexico 156, New York 988, Ohio 56, Oklahoma 57, Oregon 18, Pennsylvania 300, Utah 3, Washington 10, Alaska 30, Panama Canal Zone 218.

Glandular fever (infectious mononucleosis) (093): Arizona 40, Connecticut 184, Idaho 27, Kentucky 33, Maryland 21, Michigan 140, Minnesota 406, Montana 1, Nebraska 40, New Hampshire 1, Ohio 2, Oklahoma 9, Pennsylvania 14, Tennessee 67, Washington 52, Alaska 1.

Impetigo (695, 766): Colorado 57, Connecticut 12, Idaho 51, Illinois 15, Indiana 25, Iowa 6, Kansas 23, Kentucky 95, Maryland 2, Michigan 1,027, Missouri 39, Montana 24, Nevada 133, New York 100, North Dakota 9, Ohio 136, Rhode Island 1, Washington 248, Wyoming 2, Alaska 15, Hawaii 169.

Leprosy (060): California 9, Connecticut 1, Florida 3, Illinois 1, Louisiana 2, Missouri 1, New Jersey 1, New York 8, Oregon 1, Texas 16, Hawaii 34, Panama Canal Zone 4.

Ophthalmia neonatorum (033, 765): Arizona 7, Arkansas 4, California 7, Connecticut 2, Florida 22, Georgia 4, Illinois 128, Louisiana 6, Maryland 3, Massachusetts 167, Michigan 23, Mississippi 35, New Jersey 6, New Mexico 5, New York 23, Ohio 535, Pennsylvania 8, South Carolina 4, Tennessee 13, Texas 75, West Virginia 87, Wisconsin 4.

Pellagra (281): Alabama 21, Arizona 4, Arkansas 14, Georgia 67, Louisiana 1, Nevada 2, New Mexico 4, Oklahoma 10, Tennessee 34, Virginia 6, Virgin Islands 2.

Plague (058): Arizona 1, New Mexico 2.

Psittacosis (096.2): California 10, Indiana 1, Louisiana 1, Massachusetts 1, Michigan 4, New York 2, Ohio 3.

Rabies (094): Arizona 1, Arkansas 1, Indiana 1, Missouri 1, Pennsylvania 3, Tennessee 4, West Virginia 1.

Relapsing fever (071): California 4, Nevada 10, Oregon 2, Texas 18, Panama Canal Zone 1.

Rickettsialpox (108): New York City 115.

Ringworm of the scalp (131 part): Arkansas 3, Connecticut 79, Florida 6, Georgia 97, Illinois 1,406, Indiana 130, Iowa 232, Kansas 99, Kentucky 160, Maryland 1, Minnesota 18, Missouri 40, Montana 4, Nevada 38, New Mexico 1, Ohio 149, Oklahoma 44, Oregon 137, Pennsylvania 32, South Carolina 68, Utah 31, Virginia 245, Washington 897.

Scabies (135): Idaho 60, Indiana 17, Kansas 33, Kentucky 255, Maryland 6, Michigan 642, Missouri 24, Montana 7, Nevada 54, North Dakota 19, Ohio 57, Pennsylvania 330, Wyoming 3, Alaska 26.

Schistosomiasis (123): New York 73.

Vincent's infection (070): Colorado 125, Florida 96, Georgia 49, Idaho 33, Illinois 80, Indiana 11, Kansas 41, Kentucky 32, Maryland 18, Montana 3, Nevada 52, New Hampshire 9, Ohio 12, Oklahoma 103, Rhode Island 1, South Dakota 8, Tennessee 73, Vermont 116, Washington 121, Wyoming 1.

Weil's Disease (072): California 3, Louisiana 1, Massachusetts 1, Michigan 15, Montana 1, New York 1, Ohio 2, Pennsylvania 2, Tennessee 1.

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Rabies in Animals: Alabama 331, Arizona 10, Arkansas 120, California 100, Colorado 130, Florida 31, Georgia 390, Illinois 106, Indiana 520, Iowa 372, Kansas 48, Kentucky 617, Louisiana 22, Michigan 225, Minnesota 15, Mississippi 62, New Jersey 5, New Mexico 5, New York 1,013, Ohio 306, Oklahoma 125, Pennsylvania 95, South Carolina 324, Tennessee 256, Texas 1,174, Virginia 94, Washington 1, West Virginia 242, Wisconsin 14.

Incidence of Disease

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

UNITED STATES

Reports From States for Week Ending May 5, 1951

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever in the Mountain and Pacific States in the past has appeared in March and has reached a peak in May or June. In the 5-year period, 1933–37, the average number of cases reported in March was 11 and in April, 45. In the 5-year period, 1940–44, the average number of cases in March and April was 6 and 29 cases, respectively. In March of the present year, only 1 case was reported and in April none were reported in these groups of States. The disease appears and reaches a peak 1 to 2 months later in the eastern part of the country.

Measles

Measles incidence continues to be higher than for the same period last year. For the current week there were 24,611 cases as compared with 14,452 for the same week last year. The cumulative total for the first 18 weeks of 1951 is 294,061 compared with 160,816 for the same period of 1950.

Epidemiological Reports

"Water Hemlock" Poisoning

Dr. A. S. McCown, Virginia Department of Health, reports the fatal poisoning of three children living in Coeburn, Va., who had eaten water hemlock (*Cicuta maculata*). Three other children were affected but they recovered. The six children, all between 4 and 13 years of age, were reported to have mistaken this plant for wild carrot, which is considered to be edible. The onset of symptoms after ingestion was not accurately determined but was considered to be about 3 to 4 hours. Symptoms in the fatal cases consisted of convulsions and vomiting. The survivors were disoriented for a while in addition to having convulsions and visual disturbances. Poisoning of cattle is known to occur as a result of eating this plant. The roots contain the highest concentration of the active principle, coniine, an alkaloid which produces motor paralysis.

Gastroenteritis

Dr. R. M. Albrecht, New York State Department of Health, has reported an outbreak of mild afebrile gastroenteritis in a school in Westchester County. In the investigation made by Dr. E. A. Lane, it was found that 50 pupils and 9 teachers were affected between April 4 and 6. Cases were scattered throughout the school and were confined mainly to those eating in the cafeteria. However, no single food was common to those who became ill. The etiological agent has not been determined.

Rabies

The Veterinary Public Health Section of the Iowa Department of Health reported that 373 animals throughout the State were found to have rabies in 1950. There were 164 rabid dogs, 80 skunks, 64 cattle, 31 cats, and 14 hogs. Other animal species in which the disease was recognized were foxes, raccoons, squirrels, horses, ground hogs, rabbits, and ferrets. In the first 3 months of 1951, 142 rabid animals were reported in 53 of the counties in the State, all confirmed by laboratory examination. There were 14 additional cases reported on the basis of history and clinical manifestations.

Comparative Data for Cases of Specified Reportable Diseases: United States

[Numbers after diseases are International List numbers, 1948 revision]

Disease	Total for week ended—		5-year median 1946–50	Seasonal low week	Cumulative total since seasonal low week		5-year median 1945–46 through 1949–50	Cumulative total for calendar year—		5-year median 1946–50
	May 5, 1951	May 6, 1950			1950–51	1949–50		1951	1950	
Anthrax (062)	2	2	1	(1)	(1)	(1)	(1)	28	11	18
Diphtheria (055)	45	89	158	27th	4,422	6,819	9,833	1,515	2,548	3,475
Encephalitis, acute infectious (082)	12	12	12	(1)	(1)	(1)	(1)	275	236	153
Influenza (480–483)	1,711	2,162	1,375	30th	124,931	143,004	143,004	110,389	132,420	124,578
Measles (085)	24,611	14,452	27,787	35th	322,762	179,946	369,886	294,061	160,816	334,940
Meningitis, meningococcal (057.0)	75	86	79	37th	2,860	2,616	2,568	1,899	1,702	1,596
Pneumonia (490–493)	1,452	2,366	(2)	(1)	(1)	(1)	(1)	[3]34,840	45,249	(2)
Poliomyelitis, acute (080)	70	72	60	11th	411	450	321	1,623	1,581	808
Rocky Mountain spotted fever (104)	6	6	7	(1)	(1)	(1)	(1)	13	24	24
Scarlet fever (050) [4]	1,938	1,407	1,985	32d	56,204	47,134	70,008	40,513	30,695	47,007
Small pox (084)			2	35th	13	41	65	5	20	44
Tularemia (059)	17	17	15	(1)	(1)	(1)	(1)	250	363	363
Typhoid and paratyphoid [5] fever (040, 041)	48	41	53	11th	285	290	335	720	800	820
Whooping cough (056)	1,415	2,691	2,073	39th	49,938	68,646	68,646	28,336	47,110	38,450

[1] Not computed. [2] Data not available. [3] Additions for week ended Apr. 21: Florida, 16 cases; Tennessee, 76. [4] Including cases reported as streptococcal sore throat. [5] Including cases reported as salmonellosis

Reported Cases of Selected Communicable Diseases: United States, Week Ended May 5, 1951

[Numbers under diseases are International List numbers, 1948 revision]

Area	Diphtheria (055)	Encephalitis, infectious (082)	Influenza (480–483)	Measles (085)	Meningitis, meningococcal (057.0)	Pneumonia (490–493)	Poliomyelitis (080)
United States	**45**	**12**	**1,711**	**24,611**	**75**	**1,452**	**70**
New England	**3**	**1**	**24**	**831**	**2**	**49**	
Maine			22	15		26	
New Hampshire			2	15		1	
Vermont				123			
Massachusetts	3	1		489			
Rhode Island				12		1	
Connecticut				177	2	21	
Middle Atlantic	**7**	**5**	**7**	**3,414**	**13**	**129**	**9**
New York	4	4	[1] 2	1,122	8	46	4
New Jersey	1	1	5	742	1	45	4
Pennsylvania	2			1,550	4	38	1
East North Central	**6**	**4**	**14**	**4,528**	**15**	**130**	**3**
Ohio	4			1,263	3		
Indiana	2	1	1	146	2	6	
Illinois		1	12	880	6	70	3
Michigan		2	1	627	1	54	
Wisconsin				1,612	3		
West North Central	**4**	**1**	**52**	**1,668**	**6**	**105**	**9**
Minnesota	1		1	118		13	3
Iowa				216	1		2
Missouri	1		7	215	3	3	1
North Dakota			44	73	1	84	2
South Dakota		1		40		1	
Nebraska				65			1
Kansas	2			941	1	4	
South Atlantic	**6**	**1**	**476**	**2,003**	**12**	**410**	**10**
Delaware				26	2		
Maryland			3	194	1	28	
District of Columbia				56		8	1
Virginia	2		354	657	1	71	
West Virginia	1			387			
North Carolina	3			179	3		1
South Carolina			19	30		2	1
Georgia		1	100	304	3	301	1
Florida				170	2		6
East South Central	**7**		**300**	**949**	**8**	**109**	**5**
Kentucky	1		27	420	4	28	1
Tennessee	1		224	259	2		
Alabama	3			227	2	40	2
Mississippi	2		49	43		41	2
West South Central	**9**		**589**	**4,466**	**12**	**362**	**12**
Arkansas			386	360	2	43	1
Louisiana	1		4	33	1	40	4
Oklahoma	1		199	525	2	51	
Texas	7			3,548	7	228	7
Mountain	**1**		**203**	**1,212**	**1**	**75**	**6**
Montana			17	27	1		
Idaho				135			
Wyoming	1			102			1
Colorado			5	295		11	
New Mexico			6	127		32	3
Arizona			175	447		32	2
Utah				76			
Nevada				3			
Pacific	**2**		**46**	**5,540**	**6**	**83**	**16**
Washington			8	1,070	4		2
Oregon	1		9	746		15	
California	1		29	3,724	2	68	14
Alaska							
Hawaii			3	3			

[1] New York City only.

Anthrax: New York and Pennsylvania, 1 case each.

Reported Cases of Selected Communicable Diseases: United States, Week Ended May 5, 1951—Continued

[Numbers under diseases are International List numbers, 1948 revision]

Area	Rocky Mountain spotted fever (104)	Scarlet fever (050)	Smallpox (084)	Tularemia (059)	Typhoid and paratyphoid fever [1] (040, 041)	Whooping cough (056)	Rabies in animals
United States	**6**	**1,938**		**17**	**48**	**1,415**	**148**
New England		**166**			**2**	**90**	
Maine		19			1	36	
New Hampshire		[2] 6				4	
Vermont		5				8	
Massachusetts		115				38	
Rhode Island		8				2	
Connecticut		13			1	2	
Middle Atlantic	**1**	**313**		**2**	**5**	**172**	**8**
New York		[2] 166		2		61	8
New Jersey	1	42			1	64	
Pennsylvania		105			4	47	
East North Central		**695**		**3**	**3**	**199**	**25**
Ohio		222			1	32	4
Indiana		24				39	9
Illinois		74		3	2	24	4
Michigan		305				40	8
Wisconsin		70				64	
West North Central		**113**		**2**	**2**	**38**	**27**
Minnesota		13				2	3
Iowa		15				8	17
Missouri		50		1		6	7
North Dakota		2				3	
South Dakota		6			2	1	
Nebraska		5				2	
Kansas		22		1		16	
South Atlantic	**1**	**119**		**3**	**6**	**185**	**20**
Delaware				1		5	
Maryland		13				12	
District of Columbia		7				10	
Virginia		21			2	40	4
West Virginia		[2] 14					1
North Carolina	1	33			1	55	
South Carolina		2		2		1	8
Georgia		13			3	42	7
Florida		[2] 16				20	
East South Central		**45**			**9**	**122**	**30**
Kentucky		18			1	13	13
Tennessee		23			2	32	10
Alabama		3			3	55	
Mississippi		1			3	22	7
West South Central	**1**	**77**		**4**	**8**	**372**	**36**
Arkansas		4		1	2	30	3
Louisiana		6		1	2	7	
Oklahoma		16				16	3
Texas	1	51		2	4	319	30
Mountain	**1**	**93**		**3**	**4**	**141**	
Montana		3				18	
Idaho		8					
Wyoming		2				10	
Colorado		4				15	
New Mexico		2			2	36	
Arizona		12			1	55	
Utah		[2] 62		3	1	7	
Nevada	1						
Pacific	**2**	**317**			**9**	**96**	**2**
Washington	1	54				30	2
Oregon	1	29			3	5	
California		[2] 234			6	61	
Alaska						2	
Hawaii							

[1] Including cases reported as salmonellosis. [2] Including cases reported as streptococcal sore throat.

FOREIGN REPORTS

CANADA

Reported Cases of Certain Diseases

Week Ended April 14, 1951

Disease	Total	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Brucellosis	2					1		1			
Chickenpox	934	1		28		163	420	50	13	104	155
Diphtheria	3					2		1			
Dysentery, bacillary	7					2	3				2
German measles	541			156		26	218	3	9	45	84
Influenza	298			25	9		6	34			224
Measles	1,336	6		37	6	251	792	90	1	78	75
Meningitis, meningococcal	10	5					3	2			
Mumps	1,025	1		12		261	356	49	50	129	167
Scarlet fever	299			2		105	61	11	8	50	62
Tuberculosis (all forms)	230	10		9	25	58	41	25	7		55
Typhoid and paratyphoid fever	8				1	4	2				1
Venereal diseases:											
Gonorrhea	310	4		9	9	56	54	23	19	49	87
Syphilis	104	3		5	7	56	17		6	1	9
Primary	8					5	3				
Secondary	9			1	1	4	1		2		
Other	87	3		4	6	47	13		4	1	9
Whooping cough	177	7		1		27	71	17	2	9	43

Week Ended April 21, 1951

Disease	Total	Newfoundland	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia
Brucellosis	6					3	2				1
Chickenpox	806	2		33		130	405	27	17	43	149
Diphtheria	6					5				1	
Dysentery, bacillary	3					2					1
Encephalitis, infectious	1								1		
German measles	493	1		175		24	176		10	20	87
Influenza	126			20	11		5	59			31
Measles	1,380	5		86	7	262	665	114	12	106	123
Meningitis, meningococcal	4			1		1			1		1
Mumps	789	1		14		224	298	39	47	67	99
Scarlet fever	289	1				91	48	30	15	45	59
Tuberculosis (all forms)	181	10		3	17	81	28	15	2	9	16
Typhoid and paratyphoid fever	15					7	1	1			6
Venereal diseases:											
Gonorrhea	261	6		6	2	51	27	16	10	42	101
Syphilis	114	3		12	1	57	19	5	5		12
Primary	7			2		2	2				1
Secondary	8				1	3	2	1			1
Other	99	3		10		52	15	4	5		10
Whooping cough	174					89	33	10	2	9	31

MADAGASCAR

Reported Cases of Certain Diseases and Deaths—January 1951

Disease	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beriberi	1		2	
Bilharziasis			31	
Diphtheria	4		8	2
Dysentery:				
Amebic	1		110	
Bacillary	1		1	
Influenza	12		1,921	5
Leprosy			26	3
Malaria	94	2	31,363	107
Measles	6		98	
Mumps			75	
Plague			64	47
Pneumonia (all forms)	4		502	42
Puerperal infection			5	2
Relapsing fever			1	
Tuberculosis, respiratory	11	2	176	14
Typhoid fever			7	4
Whooping cough	7		388	1

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

The following tables are not complete or final for the list of countries included or for the figures given. Since many of the figures are from weekly reports, the accumulated totals are for approximate dates.

CHOLERA

(Cases)

Place	January–February 1951	March 1951	April 1951—week ended—			
			7	14	21	28
ASIA						
Burma	484	119	81	118	[1] 63	[1] 78
Akyab	7					
Bassein	78	[2] 11	8	12	53	66
Moulmein	1	86	36	28	8	9
Rangoon	10	1		6	2	3
India	20,670	7,971	[1] 167	[1] 211	[1] 223	[1] 327
Bombay	1				1	
Calcutta	565	628	160	203	210	322
Cuddalore	3	4				
Madras	88	30	2	8	11	5
Nagpur	58	9			1	
Negapatam	68	19				
Tiruchirappali	71	29				
Tuticorin	23	6	5			
India (French):						
Karikal	32	4				
Pondicherry	67	[2] 71				
Indochina:						
Cambodia	30	5			[3] 2	
Viet Nam	4	3	7	3		
Cantho			2			
Haiphong	3					
Soc Trang	1	1				
Pakistan	3,033	2,067	251	236	[1] 5	[1] 4
Chittagong	1	10	4	2	5	4
Dacca	18	14	3	4		
Thailand					1	

[1] Preliminary. [2] Including imported cases. [3] Suspected.

PLAGUE

(Cases)

Place	January–February 1951	March 1951	April 1951—week ended—			
			7	14	21	28
AFRICA						
Belgian Congo	3	7	1			
Stanleyville Province	3	7	1			
British East Africa:						
Tanganyika		[1] 19				
Madagascar	86	23		[2] 3	[3] 9	
Union of South Africa	1		6			
Orange Free State	1		6			
ASIA						
Burma	150	45	6	1		
Rangoon				[4] 1		
Tavoy		2				
India	2,546	1,950	[5] 20	[5] 35	[5] 20	[5] 19
Allahabad	[4] 4	[4] 32	[4] 12	[4] 34	[4] 16	[4] 11
Bombay		[4] 1				
Calcutta		2	3	1	2	8
Cawnpore		2	[4] 5		[4] 1	
Lucknow	[4] 3	[6] 9				
Nagpur		10			1	
Indochina:						
Cambodia		6		1		
Pnom Penh		6		1		
Viet Nam	16	4	3	5	3	9
Phanthiet	9	4		5	3	
Indonesia:						
Java	4		1			
Bandoeng			1			
Djakarta	[4] 1					
Jogjakarta	2					
Semarang	[4] 1					
Madura					[1] 12	
Thailand	7					
SOUTH AMERICA						
Ecuador	6	2				
Chimborazo Province	6	2				

[1] Includes suspected cases. [2] Apr. 1–10, 1951. [3] Apr. 11–20, 1951. [4] Imported. [5] Preliminary figure. [6] Includes imported cases.

SMALLPOX

(Cases)

AFRICA						
Algeria	16	22				
Bechuanaland	80					
Belgian Congo	306	375	71	57	37	
British East Africa:						
Kenya	1					
Nyasaland	13	9	1	12		
Tanganyika	90	12				
Cameroon (British)	4					
Cameroon (French)	50	14		[1] 6	[2] 1	
Egypt		1				
Ethiopia	5					
French Equatorial Africa	28	17		[1] 5		
French West Africa	719	426		139	5	
Dahomey	229	61		[1] 8	[2] 5	
Guinea	7	2				
Ivory Coast	49	53		[1] 46		
Niger Territory	138	82		[1] 17		
Senegal		2				
Sudan	214	143		[1] 54		
Upper Volta	82	83		[1] 14		
Gambia		1				
Gold Coast	265	39	13	6		
Morocco (French)	5	1				
Mozambique	45	38				
Nigeria	2,278	388				
Rhodesia:						
Southern	210	27				

SMALLPOX—Continued

(Cases)

Place	January–February 1951	March 1951	April 1951—week ended— 7	14	21	28
AFRICA—continued						
Sierra Leone	2	1				
Sudan (Anglo-Egyptian)	12	4		1		
Togo (French)	21	9				
Tunisia		1				
Union of South Africa	269					
ASIA						
Arabia		2				
Aden		[2] 1				
Oman		1				
Afghanistan	118	45				
Burma	228	238	29	17	7	2
Ceylon		10			1	
China	4					
India	58, 744	45, 922	[4] 776	[4] 454	[4] 479	[4] 365
India (French)	658	1, 092		141		
India (Portuguese)	58	44				
Indochina:						
Cambodia	55	20				
Viet Nam	34	140	70	48	77	67
Indonesia:						
Borneo	487	255	102	59		
Java	77	29	1	8	19	
Iran	134	75	3	2		7
Iraq	99	12		5	4	1
Japan	16	7				
Pakistan	10, 600	9, 439	209	20	4	14
Straits Settlements	1					
Thailand	26	6			1	
Turkey						[5] 120
EUROPE						
Great Britain:						
England:						
Brighton	15					
Portugal	1					
Netherlands						[6] 19
SOUTH AMERICA						
British Guiana	8	3				
Colombia	9	11				
Ecuador	68	3				
Paraguay	7					

[1] Apr. 1–10, 1951. [2] Apr. 11–20, 1951. [3] Imported. [4] Preliminary figure. [5] Mar. 25–Apr. 28, 1951. [6] Date of telegram May 1, 1951.

TYPHUS FEVER*

(Cases)

AFRICA						
Algeria	5	5				
Belgian Congo		1				
British East Africa:						
Kenya	8					
Somaliland	1					
Uganda		1				
Egypt	34	17				
Eritrea	4	2	1		1	
Ethiopia	141	97				
Libya:						
Cyrenaica		1				
Tripolitania	1	1		1	1	
Morocco (French)		1				
Morocco (Spanish)	7					
Tunisia	1					
Union of South Africa	11					

TYPHUS FEVER—Continued

(Cases)

Place	January-February 1951	March 1951	April 1951—week ended—			
			7	14	21	28
ASIA						
Afghanistan	94	65				
India	12	20				
India (Portuguese)	12	13				
Indochina: Viet Nam	11	1		2		
Iran	53	107		7		13
Iraq	5	9		2	5	6
Israel		2				
Japan	5					
Pakistan	5	2	3		1	
Syria		1				
Transjordan	1	34	3			
Turkey	45	13	3	4	6	3
EUROPE						
Portugal	1	2				
Sicily	5					
Yugoslavia	34	32				
NORTH AMERICA						
Costa Rica		[1] 5				
Guatemala	1					
El Salvador		[1] 4				
Jamaica	[1] 1	[1] 1		[1] 1		
Mexico	[2] 14	[2] 15				
SOUTH AMERICA						
Chile	20	21	8	7		
Colombia	17	9				
Ecuador	[2] 128	[2] 32				
Paraguay	11					
Venezuela	[1] 2					

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine. [2] Includes murine type.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA							
Gold Coast	C	1	4	2	[1] 2	[1] 3	
Accra	C	1	2	[1] 1			
Adeiso	C		2		[1] 2	[1] 3	
Nigeria	C					[1] 1	
Eziachi	C					[1] 1	
Sierra Leone	C	[1] 1	[1] 1				
Koinadugu District	C	[1] 1	[1] 1				
Freetown	C	[1] 1	[1] 1				
NORTH AMERICA							
Panama	C				1		
Bocas Del Toro Province	C				1		
SOUTH AMERICA							
Brazil	D	[2] 400	[2] 2				
Goiaz State	D	[2] 14	[2] 1				
Goiania	D	[2] 1	[2] 1				
Goiaz	D	[2] 3					
Niquelandia	D	[2] 3					
Porangatu	D	[2] 1					
Uruacu	D	[2] 2					
Matto Grosso State	D	2					
Colombia	D	12	3				
Boyaca Department	D	1					
Otanche	D	1					
Caqueta Commissary	D	2					
Montanita	D	1					
Meta Territory	D		1				

(C—cases; D—deaths)

Place		January–February 1951	March 1951	April 1951—week ended—			
				7	14	21	28
SOUTH AMERICA—continued							
Colombia—Continued							
North Santander Department	D	4	1				
La Vega	D	3					
Rionegro	D	1	1				
Santander Department	D	5	1				
Campohermoso	D	1					
Guamales	D	1					
Maradales	D	1					
Tambo Redondo	D	1					
Venecas	D	1					
Ecuador	C	35	49	1			
Quininde	D		1				
Santo Domingo de Los Colorados	C	35	48				
San Mequel	D			1			
Peru	D	1					

[1] Suspected. [2] The number of deaths from Dec. 1–Feb. 20, 1951, was estimated to be 400 and the number of cases was estimated to be 2,000. [3] Confirmed deaths.