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Q Fever Studies in Southern California

IV. Occurrence of *Coxiella burneti* in the Spinose Ear Tick, *Otobius megnini* [1]

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Since the discovery of Q fever as a disease of man in Australia by Derrick (*5*) and the recovery of the infectious agent from ticks in Montana by Davis and Cox (*3*) much evidence has been obtained which suggests that various species of ticks of the family Ixodidae are involved in the maintenance of the disease in nature.

In Australia, natural infection was demonstrated in one tick, *Haemaphysalis humerosa* (*8*), and experimental transmission was accomplished with three others, *Rhipicephalus sanguineus* (*9*), *Ixodes holocyclus* (*10*), and *Haemaphysalis bispinosa* (*11*). Numerous rural cases occurred in tick-infested areas. Feces from infected ticks were found highly infectious, and it was postulated that cases of Q fever in slaughterhouse employees resulted from inhalation of tick feces from the hides of tick-infested cattle.

The first isolation of the disease in the United States was from a guinea pig on which 50 ticks, *Dermacentor andersoni*, had fed (*3*). Natural infection has also been found in *Dermacentor occidentalis* (*2*) and in *Amblyomma americanum* (*6*) and in two other species for which the data have not been published.

Following the discovery of Q fever in man in Southern California by Young (*12*) and preliminary studies by Shepard and Huebner (*7*), which indicated the disease was occurring in man and in dairy cattle,

[1] This study has been facilitated by the Q Fever Laboratory, which was established September 12, 1947, in the endemic area of Southern California, as a cooperative undertaking of the National Institutes of Health, the California State Department of Public Health, the California State Department of Agriculture, and the Los Angeles County Health Department.

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a laboratory was established for the intensive study of Q fever in Los Angeles County. A search for ticks was made, since they were considered a possible vector.

The domestic dairies in the suburban areas of Los Angeles County are in general free from brush cover and many are entirely without green pasture. These conditions are unfavorable for Ixodid ticks common in the United States and none were found on any of the dairy cattle examined.

Dr. Clarence Ranney first called our attention to the presence of the spinose ear tick, *Otobius megnini* of the family Argasidae, as a common parasite of cattle on his own dairy in Orange County. It was soon determined that this tick is also present on dairies in Los Angeles County.

The spinose ear tick is indigenous to the southwestern States and to Mexico. It is found in the ears of cattle and other large animals, frequently deep in the ear cavity, where specimens may sometimes be found embedded in ear wax. After larval feeding and molting and nymphal feeding is completed during a long period of continuous attachment, the engorged nymphs drop to the ground for molting. This long period of continuous attachment (it may last for months) is in marked contrast to the brief periods of larval and nymphal feeding, each stage on a separate host, which are characteristic of ticks of other argasid genera. The spinose ear tick adults have rudimentary mouth parts unsuited for feeding. Oviposition occurs without ingesting blood. Nymphs have rarely been recorded as feeding on man. A long list of host records for this species is given by Cooley and Kohls (*1*).

The recovery of *C. burneti* from spinose ear ticks collected from dairy cattle in Southern California is reported in this paper. Some of the herds from which ticks were collected were known to be infected with Q fever.

Methods of Study

During the winter of 1947 and the spring of 1948, partially engorged and engorged nymphs of *O. megnini* were collected from cows and calves on ten dairies and from beef cattle in one slaughterhouse in Los Angeles County. They were tested at the Rocky Mountain Laboratory.

Lactating dairy cows showed the highest percentage of Q fever infection as determined by complement fixation tests. Particular attention was given to these animals in the search for ticks. Many calves were also examined and ticks collected from them. Earlier collections consisted of pools of ticks from several hosts but in the later studies ticks from individual animals were collected and tested separately in order that the infectivity of the ticks and the presence of

specific antibodies and/or *C. burneti* in individual hosts might be compared.

The ticks were tested in lots of 1 to 25 ticks each. Triturated saline suspensions were injected intraperitoneally and subcutaneously into guinea pigs. Surviving guinea pigs were bled 15 to 32 days after injection, and their serums were tested for Q fever antibodies by the complement fixation test.[5] [6] Subsequent to bleeding, the test animals were inoculated with a known strain of Q fever rickettsiae to test their immunity. The presence of high-titer antibodies in the serum of a test guinea pig and demonstrable immunity to a known strain of Q fever were accepted as evidence that the ticks injected were infected with *C. burneti*. In a few instances whole blood or spleen of guinea pigs febrile for two or more consecutive days was passed to other guinea pigs, and a strain was maintained through several serial transfers (three to five).

Results

In a total of 33 experiments, 2,954 ticks were tested in 246 lots of 1 to 25 ticks each. Ten of the 246 lots gave evidence of spontaneous infection with *C. burneti* as determined by the criteria described. The host and collection data of the 10 positive lots are summarized in table 1.

Table 1. *Data for 10 lots of nymphal ticks in which Q fever was demonstrated*

Experiment No.	Dairy	Lots tested	Lots positive	No. of ticks in positive lot	Source	Collection date
47	A	1	1	20	6 cows	Dec. 10, 1947
49	B	12	5	25 in each	32 dry cows	Dec. 16, 1947
68	C	6	1	4	1 cow (3208)	Jan. 23, 1948
82	B	13	1	5	1 cow (287)	Feb. 17, 1948
93	D	2	2	3 and 1	2 calves (9068 and 650)	Mar. 26, 1948

Cow 3208 was positive by complement fixation test. When tested January 24, the titer was 4+ at 1:128. Repeat tests on this cow March 10 and April 29 were negative.

Cow 287 was tested on December 16 and was negative by complement fixation test. When retested February 18 it gave a 1+ reaction at a titer of 1:8, which is a very weak reaction and of doubtful significance.

Calves 9068 and 650 were both negative by complement fixation test on March 26, 1948.

[5] The modified Kolmer technique was used.
[6] Hemzerling and Nine Mile strains were used for antigen.

The ticks tested in experiments 47 and 49 were pools from multiple animals, whereas those tested in each of the other experiments were from single hosts.

Dairy A is located near Artesia, California, and has about 800 head of cows of mixed dairy breeds, Holstein and Guernsey predominating. About 400 cows are added to the herd each year and a like number is sent to slaughterhouses. *C. burneti* has been found in the raw milk from this dairy. The complement fixation test was done on blood samples taken from 20 cows on December 10, 1947. Two were positive (4+) at titers of 1:16 and 1:32, respectively; three other cows showed slight evidence of antibodies. A single bull tested was negative.

Dairy B, near Downey, California, has about 870 head of cattle. These include about 840 milk cows and 30 bulls. About 200 head of stock are added to the herd each year, and a like number is disposed of to slaughterhouses. *C. burneti* has been found in the raw milk from this dairy, and there have been recent cases of Q fever among the employees. When ticks for testing were collected from these animals on December 17, 1947, blood samples were taken from 49 cows that had been on the premises one year or more. These blood specimens were tested for complement fixation but only one gave a positive test at significant titer, 1:32 or greater. Blood specimens taken on February 18, 1948, from 52 cows, including some recent admissions to the herd, were tested. Two of these were positive at 1:64 or greater. Blood specimens taken on December 17, 1947, February 5, 1948, February 17, 1948, and May 7, 1948, from 15, 28, 24, and 35 cows, respectively, all of which were recent admissions to the herd, were tested. Of these 102 animals, only one was positive at a significant titer (4+ at 1:16).

Dairy C, from which the ticks used in experiment 68 were obtained, is located near Norwalk. There were about 330 cows of mixed dairy breeds in this herd. Nearly all the animals are shipped in from outside the State. Calves are not raised on the premises. Infection has been repeatedly demonstrated in the raw milk from this dairy. On November 28, of the 39 cows tested for antibodies, 8 gave complete fixation at 1:8 or greater for Q fever. On January 24, 20 additional cows were tested and, of these, 5 were similarly positive at 1:8 or greater.

Dairy D, from which the ticks tested in experiment 93 were obtained, is a large dairy with a herd of Holstein and Guernsey cows, located in San Fernando Valley. About 1,000 head of stock, milk cows, bulls, and calves are kept on the premises. When the calves are weaned, they are sent to a farm outside the county for rearing and are returned just a few weeks before freshening. About 10 percent of the milk cows on this dairy show antibodies for Q fever in signifi-

cant titers, and Q fever infection has repeatedly been demonstrated in pooled milk samples and in milk from many individual cows.

The results in the 21 guinea pigs used in testing the positive lots of ticks are summarized in table 2.

Table 2. *Results of injection of guinea pigs with the nymphal ticks of the 10 positive lots*

Experiment	Tick lot	Guinea pig	Febrile reaction	Complement fixation titer	Result of immunity test
47	I	B99087	+	>1:2048	Immune.
		B99088	+	1:1024	Do.
		B99089	Killed 5th day		
		B99090	+	>1:2048	Do.
49	II	B99394	+	>1:512	Do.
		B99395	+ Killed		
	III	B99396	+	>1:512	Not tested.
		B99397	+	>1:512	Immune.
	IV	B99400	+	Negative	Not tested.
		C5001	+ Killed		
	V	C5014	+	>1:512	Immune.
		C5015	+	>1:512	Do.
	VI	C5016	+	>1:512	Do.
		C5017	+ Killed		
68	VII	C5761	+	1:1024	Do.
		C5762	+	1:512	Do.
82	VIII	C7513	+	1:512	Do.
		C7514	+	1:128	Not tested.
93	IX	C8146	+	1:512	Immune.
		C8147	Died 2d day		
	X	C8148	+	1:128	Do.

There were 21 guinea pigs injected with ticks of lots in which infection was demonstrated. The 18 guinea pigs used in experiments 47, 49, 68, and 82 all developed febrile reactions lasting from 1 to 10 days after an average incubation period of 4.1 days with a variation from 1 to 7 days. The three test animals in experiment 93 exhibited irregular and prolonged courses of fever which precluded determination of the incubation period. Nine of the positive tick lots produced serum antibodies in all test animals that survived the test period. Thirteen of the surviving animals representing all positive lots except lot IV were immune when reinoculated with the Nine Mile strain of Q fever.

One test animal injected with ticks of lot IV (table 2) was negative by complement fixation test when tested on the 30th day. A second animal receiving part of the same inoculum was sacrificed during its febrile period and tissues were passed to two other guinea pigs in which infection was subsequently demonstrated. Similar tissue transfers were also made from certain of the animals injected with ticks of lots I and II, and strains were established and were carried through several serial transfers. Typical febrile reactions were produced in passage guinea pigs, and gross pathological changes typical of Q fever

were observed, i. e., enlarged spleens, which were smooth and engorged with blood, and marked indurated inflammatory lesions following subcutaneous injection with passage material. Rickettsiae were demonstrated in large numbers both extra- and intra-cellularly in Giemsa-stained smears of the subcutaneous inflammatory exudate. The morphological and tinctorial characteristics of these organisms were indistinguishable from those observed in known strains of Q fever. Culture of heart blood of infected passage guinea pigs on suitable bacteriological media was consistently negative.

Discussion

The demonstration of Q fever in the spinose ear tick adds another species of tick to the growing list known to harbor this infection. It is, to our knowledge, the only species of soft ticks (family Argasidae) that has been found infected in nature. However, Davis (*4*) has reported experimental transmission by two species of Argasidae, *Ornithodoros moubata* and *Ornithodoros hermsi*. Transovarial transmission has also been reported for *O. moubata*.

Considering the unique biology of *Otobius megnini*, which completes its entire feeding period on a single host animal, transovarial transmission, which has not yet been demonstrated, would seem to be essential if this tick is a vector of Q fever.

ACKNOWLEDGMENT

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Industrial Sickness Absenteeism

Males and Females, 1947, and Males First and Second Quarters, 1948 [1]

By W. M. GAFAFER, *Principal Statistician, Public Health Service*

This report examines principally the 8-day or longer disability experience of male and female workers in 1947 and earlier years, supplementing published quarterly reports for 1947 covering male workers only (*1*, *2*); in addition, a table is presented on frequency of disability among males during the first and second quarters of 1948. Basic data are derived from periodic reports of sickness and nonindustrial injuries causing absence from work for more than 1 week among about 200,000 members of industrial sick benefit associations, group health insurance plans, and company relief departments. The last report covering females appeared in 1947 (*3*).

Frequency of Absences, 1938–1947

Year, 1947—Table 1 presents frequency rates by sex and cause for 8-day or longer disabilities beginning in 1946 and 1947, and in the 10-year period, 1938–47. While the 1947 male rate for all disabilities (111.9 absences per 1,000 males) is about the same as the average rate recorded for 1938–47 (112.8 absences per 1,000 males), the 1947 female rate for all disabilities (260.4 absences per 1,000 females) is more than 30 percent above the corresponding 10-year mean (195.7 absences per 1,000 females). In general, a comparison for each sex

[1] From Industrial Hygiene Division, Bureau of State Services.

Table 1. *Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of MALE and FEMALE employees in various industries, 1947, 1946, and 1938–47, inclusive* [1]

Cause [2]	Annual number of absences per 1,000 persons beginning in specified period					
	Males			Females		
	1947	1938–47 [3]	1946	1947	1938–47 [3]	1946
Sickness and nonindustrial injuries	111.9	112.8	114.5	260.4	195.7	248.2
Percent of female rate	*43*	*58*	*46*			
Percent of male rate				*233*	*173*	*217*
Nonindustrial injuries (169–195)	11.7	11.8	12.2	18.2	14.6	17.9
Sickness	100.2	101.0	102.3	242.2	181.1	230.3
Respiratory diseases	38.6	43.7	37.9	107.2	80.2	98.9
Tuberculosis of respiratory system (13)	.6	.7	.7	.5	.6	.5
Influenza, grippe (33)	15.6	18.5	14.2	41.6	30.5	29.7
Bronchitis, acute and chronic (106)	5.8	6.7	5.7	10.5	9.3	10.6
Pneumonia, all forms (107–109)	4.0	4.6	3.8	3.8	2.5	2.8
Diseases of pharynx and tonsils (115b, 115c)	4.0	5.2	4.3	16.0	14.5	18.5
Other respiratory diseases (104, 105, 110–114)	8.6	8.0	9.2	34.8	22.8	36.8
Digestive diseases	17.5	16.5	16.8	33.4	28.1	29.1
Diseases of stomach, except cancer (117, 118)	5.5	5.1	5.1	3.8	2.9	2.8
Diarrhea and enteritis (120)	2.3	1.9	2.1	7.8	4.3	6.2
Appendicitis (121)	3.7	4.3	3.3	11.3	13.2	10.5
Hernia (122a)	2.4	2.0	2.9	.7	.5	.6
Other digestive diseases (115a, 115d, 116, 122b–129)	3.6	3.2	3.4	9.8	7.2	9.0
Nonrespiratory-nondigestive diseases	40.6	37.5	44.4	96.9	68.0	96.6
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44) [4]	2.4	2.4	3.0	4.4	4.4	6.3
Cancer, all sites (45–55)	.6	.6	.6	.6	.5	.8
Rheumatism, acute and chronic (58, 59)	3.9	4.5	4.6	4.5	3.8	4.8
Neurasthenia and the like (part of 84d)	1.9	1.6	2.2	11.7	9.5	13.9
Neuralgia, neuritis, sciatica (87b)	2.4	2.6	2.9	2.3	2.5	2.9
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.7	1.5	1.9	1.8	1.4	2.0
Diseases of heart (90–95)	4.4	3.5	4.5	2.9	2.0	2.5
Diseases of arteries and high blood pressure (96–99, 102)	2.3	1.7	2.1	1.3	1.1	1.6
Other diseases of circulatory system (100, 101, 103)	4.1	3.4	4.4	6.9	4.4	6.5
Nephritis, acute and chronic (130–132)	.4	.4	.5	.6	.4	.1
Other diseases of genitourinary system (133–139)	3.1	2.9	3.3	24.4	14.3	21.3
Diseases of skin (151–153)	3.7	3.2	3.8	6.3	4.6	6.2
Diseases of organs of movement, except diseases of joints (156b)	3.4	3.3	3.8	6.1	3.8	5.7
All other diseases (56, 57, 60–79, 88, 89, 154, 155, 156a, 157, 162)	6.3	5.9	6.8	23.1	15.3	22.0
Ill-defined and unknown causes (200)	3.5	3.3	3.2	4.7	4.8	5.7
Average number of persons	216,471	2,365,741	221,442	21,021	212,174	22,112

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Average of the 10 annual rates.
[4] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

of specific cause rates for 1946 and 1947 reveals relatively more stable rates among males.

Ten years, 1938–47—An earlier report (*2*) examined the trend of disabling morbidity among males during the 10 years, 1938–47, with the use of a four-quarter moving average of quarterly frequency rates (annual basis) for all causes and four broad cause groups. Figure 1 presenting graphically annual frequency rates by sex and year for the same 10-year period, permits a comparison of time changes in male and female rates for absences due to all causes, four broad cause groups, and a number of selected causes.

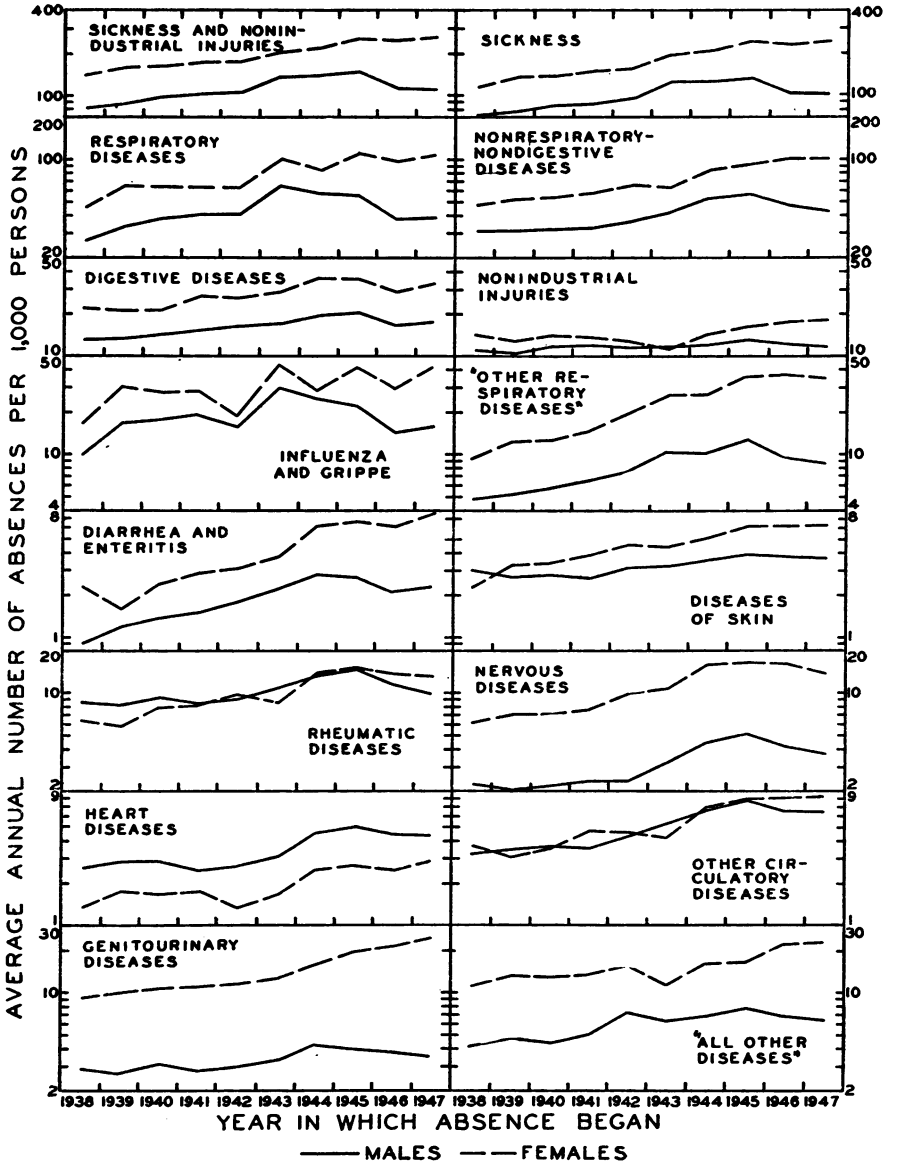

Figure 1. Annual number of absences per 1,000 persons on account of sickness and nonindustrial injuries lasting more than 1 week; experience of MALE and FEMALE employees in various industries. (Logarithmic vertical scale. Nonrespiratory-nondigestive diseases include ill-defined and unknown causes; other circulatory diseases include diseases of arteries and high blood pressure, and "other diseases of circulatory system.")

An examination of figure 1 reveals that for both males and females the over-all trend of frequencies for a particular cause or cause group is generally increasing during the 10 years. Among males, the increasing trend is in evidence principally during the first 6 or 7 years of the period, rates tending to decrease in the years 1945 through 1947. Among females, on the other hand, decreases in 1945–47 are less marked, female frequencies for a number of causes continuing to increase throughout the 10-year period. Indeed, with the exception of nonindustrial injuries and the group of digestive diseases, the 1947 female rate for each cause shown in figure 1 is at least twice the corresponding rate for 1938. Among males, only diarrhea and enteritis yields such a striking relative increase from 1938 to 1947, the corresponding absolute difference in rates being small (1.4 absences per 1,000 males).

Observe that with the exception of rheumatic diseases,[2] other circulatory diseases,[3] and heart diseases, the female rate for a particular cause and year is generally higher than the corresponding male rate. No marked sex difference appears in the behavior of rates for rheumatic diseases and other circulatory diseases, while the frequency of heart diseases is notably higher each year among males. In respect of heart diseases it should be mentioned that if data on age were available and they showed the group of female workers to be younger, on the average, than the group of male workers, differences in frequency may reflect an age rather than a sex difference.

For a number of causes shown in figure 1, observed excesses in female rates when compared with corresponding rates for males increase in 1946 and 1947. During the earlier years of the period, however, male and female rates for a particular cause frequently tend to move in parallel, this parallelism being relatively well maintained throughout the 10 years by heart diseases, and nervous diseases.[4] Because the vertical scale of figure 1 is logarithmic, a parallel movement of the rates indicates the presence of a relatively constant ratio between male and female rates during the time period in which the parallelism appears.

Duration of Absences, 1940–47

For a number of reporting organizations, data on duration of absence are available for 8-day or longer absences beginning in each of 8 years, 1940–47, and terminating by June of the following year. These absences constitute about 98 percent of all 8-day or longer

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[2] Rheumatism, acute and chronic; neuralgia, neuritis, sciatica; and diseases of organs of movement except diseases of joints.

[3] Diseases of arteries and high blood pressure, and "other diseases of circulatory system."

[4] Neurasthenia and the like, and "other diseases of nervous system."

absences beginning each year. The availability of such data makes possible an investigation of duration of disability during the 8-year period with the use of (1) frequency rates for absences lasting more than each of four specified time periods, ranging from 1 to 13 weeks, and (2) percent of absences in each of four broad duration groups.

It is well recognized that duration of absence from work on account of disability is a variable quantity affected by a multiplicity of factors, including, among others, specific cause of disability; and age, sex, and race of disabled worker. For all absences occurring among a group of workers during a given time interval, a frequency distribution of absence durations may be determined, and suitable measures chosen to characterize the distribution numerically. If different values of one or more factors possibly affecting duration are specified, various subgroups of absences are determined, each subgroup yielding a distribution of absence durations and a set of descriptive constants. A comparison of corresponding magnitudes of a chosen descriptive measure for distributions resulting from variation in a single factor is frequently useful in attempting to define the nature and extent of the factor's effect on absence duration.

In a recent paper (4) reference was made to the fact that the arithmetic mean of a distribution of absence durations, namely, average number of days per absence, is of limited value in describing the distribution numerically, and a series of percents was given, specifying the proportion of 8-day or longer absences lasting more than an indicated number of weeks, the weeks ranging from 1 to 26.

In the present report, two sets of measures have been chosen to characterize distributions of absence durations specific for sex, broad cause group, and year in which absence began. The first set consists of four frequency rates, each frequency representing absences whose durations fall within a time interval with no upper limit, the lower limits being 1 week, 2 weeks, 4 weeks, and 13 weeks. Thus, there has been determined frequency rates per 1,000 persons based on absences lasting more than 1 week, more than 2 weeks, more than 4 weeks, and more than 13 weeks. It will be observed that the four duration intervals are overlapping, each succeeding interval being included in all preceding intervals. For this reason, the set of four frequencies for a particular distribution is nonincreasing, and reflects the ability of absences in the subgroup defined by a given sex, broad cause group, and year to continue to contribute to absence frequency as the lower limit of duration is increased.

The second set of measures consists of four percents derived for each distribution of absence durations, the percents representing the relative frequency of absence durations of four nonoverlapping intervals, namely, 8–14 days, 15–28 days, 29–49 days, and more than 49 days.

Frequency of absences lasting more than indicated number of weeks.— Figure 2 presents graphically by year, sex, and broad cause group annual frequency rates for absences lasting more than 1, 2, 4, and 13 weeks for the 8 years, 1940–47. For absences lasting more than 1 week, variation with time in male and female frequencies for all causes and each broad cause group is similar in pattern to that exhibited in figure 1 by corresponding rates for all reporting companies. Thus, the over-all trend of rates is generally increasing; female rates with but one exception are consistently higher than corresponding male rates;

and male and female rates for a particular cause tend to move in parallel especially during the first 5 or 6 years of the period.

It is notable that patterns of variation for all causes and each broad cause group shown for absences lasting more than 1 week tend to be

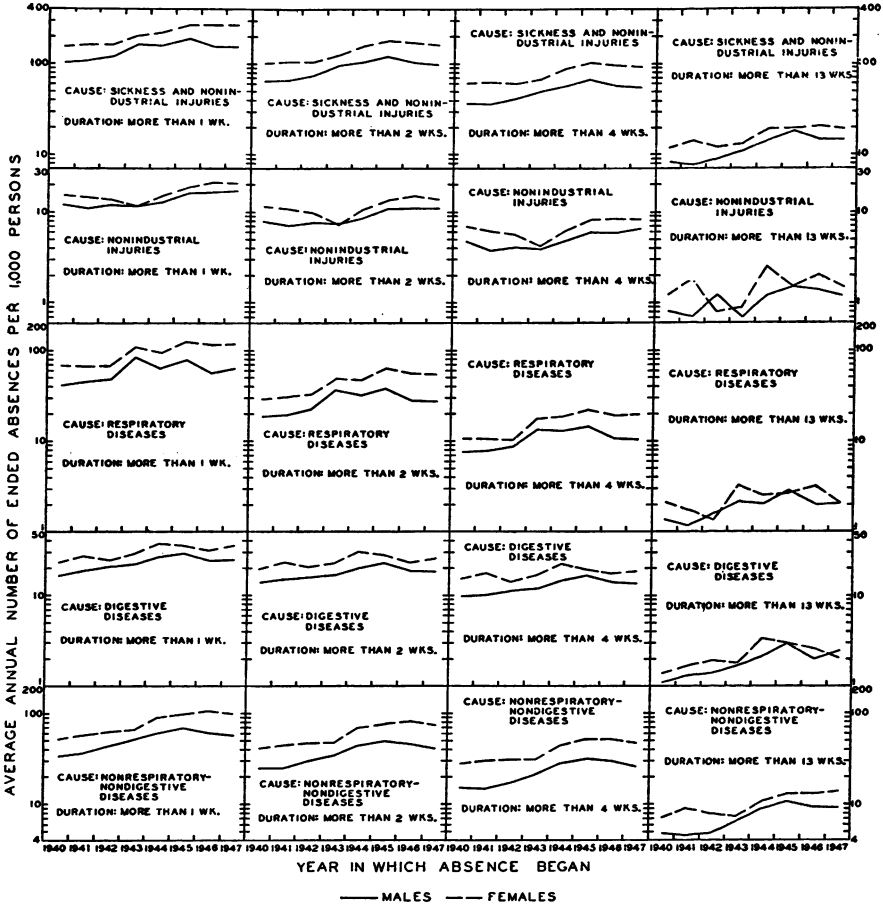

Figure 2. Annual number of ended absences per 1,000 persons on account of sickness and nonindustrial injuries lasting more than indicated number of weeks; experience of MALE and FEMALE employees in various industries reporting absences by duration. (Logarithmic vertical scale. Nonrespiratory-nondigestive diseases include ill-defined and unknown causes.)

repeated, at lower levels, by corresponding rates for absences lasting more than 2 weeks, and absences lasting more than 4 weeks, but are not maintained by rates for absences lasting more than 13 weeks. For this last group of absences, frequency rates reveal relatively wide variation, the increasing trend appears somewhat more marked, and female excesses tend to be relatively smaller, and occur, less consistently.

In striking contrast to the fact that among both males and females the frequency of absences lasting more than 1 week and due to respiratory diseases is about three times the corresponding rate for digestive diseases, and over four times the nonindustrial injury rate, absences lasting more than 13 weeks on the other hand yield annual frequency rates for respiratory diseases, digestive diseases, and nonindustrial injuries of approximately the same order of magnitude.

Percent of absences of specified duration—The percent of 8-day or longer absences lasting 8–14 days, 15–28 days, 29–49 days, and more than 49 days, is shown graphically in figure 3 by year, sex, and broad cause group. Variation in percents in respect of these three factors may be briefly described as follows:

Time: For a particular cause group and sex, the percent of absences falling in a given duration group remains remarkably stable during the 8 years, only percents for absences due to digestive diseases among females exhibiting any marked change with time. For this group of absences, an increase from14 percent in 1940 to 28 percent in 1947 is recorded for absences of 8–14 days, a compensating decrease, from

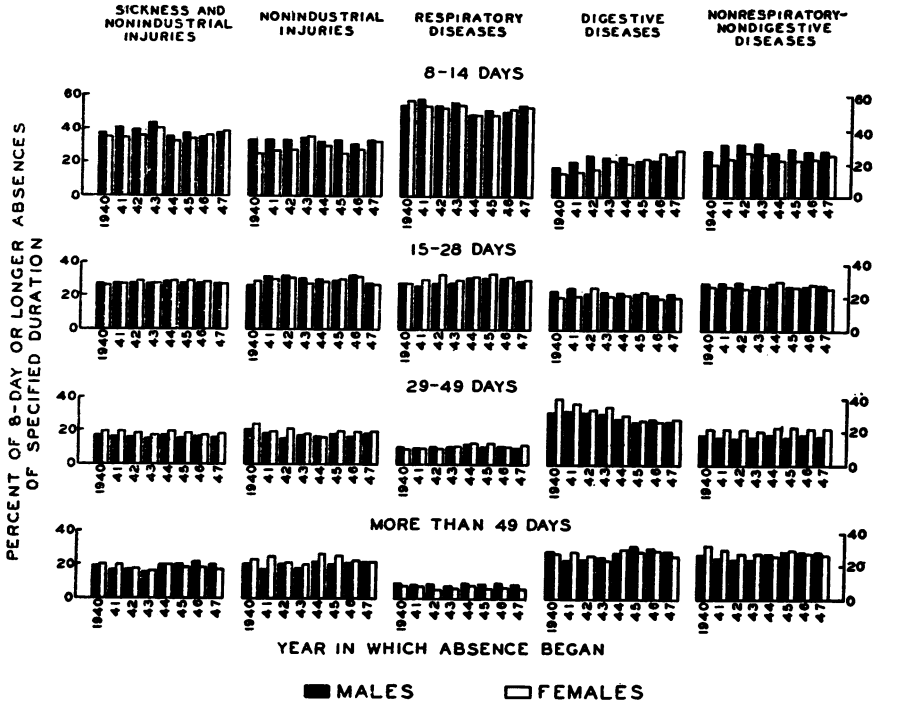

Figure 3. Percent of 8-day or longer (ended) absences on account of sickness and nonindustrial injuries causing disability of specified duration; experience of MALE and FEMALE employees in various industries reporting absences by duration. (Nonrespiratory-nondigestive diseases include ill-defined and unknown causes.)

39 percent in 1940 to 27 percent in 1947, occurring in absences of 29–49 days.

Sex: No notable sex difference is revealed for any of the cause groups. Attention is directed however to small but consistent excesses in male percents for nonrespiratory-nondigestive disabilities of 8–14 days, consistent excesses in female percents occurring for the same broad cause group in absences of 29–49 days.

Broad cause group: More striking than variation with time or sex are the different patterns revealed by percents for four broad cause groups. For both males and females, approximately half of all respiratory absences each year lasted 8–14 days, while corresponding proportions for digestive and nonrespiratory-nondigestive diseases are about one-fifth and one-fourth, respectively. Correspondingly, less

Table 2. *Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of MALE employees in various industries, first and second quarters of 1948* [1]

Cause[2]	Number of absences per 1,000 males (annual basis) beginning in specified period						
	Second quarter		First quarter		First half		
	1948	1947	1948	1947	1948	1947	1943–47
Sickness and nonindustrial injuries	86.5	105.1	129.1	139.8	108.2	122.2	141.3
Nonindustrial injuries (169–195)	10.8	10.8	12.5	12.3	11.7	11.5	12.2
Sickness	75.7	94.3	116.6	127.5	96.5	110.7	129.1
Respiratory diseases	25.3	33.8	52.6	61.0	39.2	47.3	62.2
Tuberculosis of respiratory system (13)	.6	.8	.5	.6	.6	.7	.7
Influenza, grippe (33)	6.7	14.9	21.1	29.1	14.0	21.9	26.4
Bronchitis, acute and chronic (106)	5.1	4.9	8.7	8.1	6.9	6.5	9.7
Pneumonia, all forms (107–109)	3.9	3.1	6.7	5.9	5.4	4.5	7.8
Diseases of pharynx and tonsils (115b, 115c)	3.4	3.5	4.5	5.0	3.9	4.3	6.4
Other respiratory diseases (104, 105, 110–114)	5.6	6.6	11.1	12.3	8.4	9.4	11.2
Digestive diseases	14.1	17.1	17.1	17.6	15.6	17.4	17.8
Diseases of stomach except cancer (117, 118)	4.4	5.2	6.3	5.7	5.4	5.5	5.8
Diarrhea and enteritis (120)	1.6	2.3	1.8	2.5	1.7	2.4	2.2
Appendicitis (121)	3.3	3.8	3.0	3.4	3.1	3.6	4.0
Hernia (122a)	2.4	2.4	2.3	2.3	2.4	2.3	2.4
Other digestive diseases (115a, 115d, 116, 122b–129)	2.4	3.4	3.7	3.7	3.0	3.6	3.4
Nonrespiratory-nondigestive diseases	32.9	39.3	43.2	44.5	38.1	41.8	44.4
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44)[3]	2.6	2.3	3.2	3.2	2.9	2.7	3.1
Rheumatism, acute and chronic (58, 59)	3.8	4.1	5.5	4.1	4.6	4.1	5.5
Neurasthenia and the like (part of 84d)	1.1	2.0	1.7	1.8	1.4	1.9	2.0
Neuralgia, neuritis, sciatica (87b)	2.4	2.6	2.6	2.8	2.5	2.7	3.1
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.1	1.5	1.7	1.7	1.4	1.6	1.8
Diseases of heart and arteries, and nephritis (90–99, 102, 130–132)	5.2	7.4	7.7	7.9	6.5	7.6	7.4
Other diseases of genitourinary system (133–138)	2.5	2.7	3.1	3.4	2.8	3.1	3.2
Diseases of skin (151–153)	2.9	3.3	3.2	3.2	3.1	3.2	3.3
Diseases of organs of movement except diseases of joints (156b)	2.7	2.8	3.5	3.6	3.1	3.2	3.6
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	8.6	10.6	11.0	12.8	9.8	11.7	11.4
Ill-defined and unknown causes (200)	3.4	4.1	3.7	4.4	3.6	4.2	4.7
Average number of males	190,293	194,861	196,772	191,812	193,533	193,336	1,133,793

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

than 10 percent of all absences due to respiratory diseases each year caused absence from work for more than 49 days, while more than one-fourth of all absences due to digestive and nonrespiratory-nondigestive diseases lasted more than 49 days. Among the four duration periods, relatively least variation with cause is shown in percent of absences lasting 15–28 days.

Male Absences, First and Second Quarters, 1948

Male frequency rates by cause are given in table 2 for the first and second quarters of 1948 and 1947. Attention is particularly directed to decreases in each quarter of 1948 in frequency of all sickness and nonindustrial injuries, the group of respiratory diseases, and influenza and grippe. For influenza and grippe, the 1948 first-quarter rate is more than 25 percent below the first quarter rate for 1947, the second-quarter frequency being less than half the corresponding rate for 1947. For the group of respiratory diseases, and also for influenza and grippe, rates for the first and second quarters of 1948 are the lowest first- and second-quarter rates yielded for these causes in the 10 years, 1939–48.

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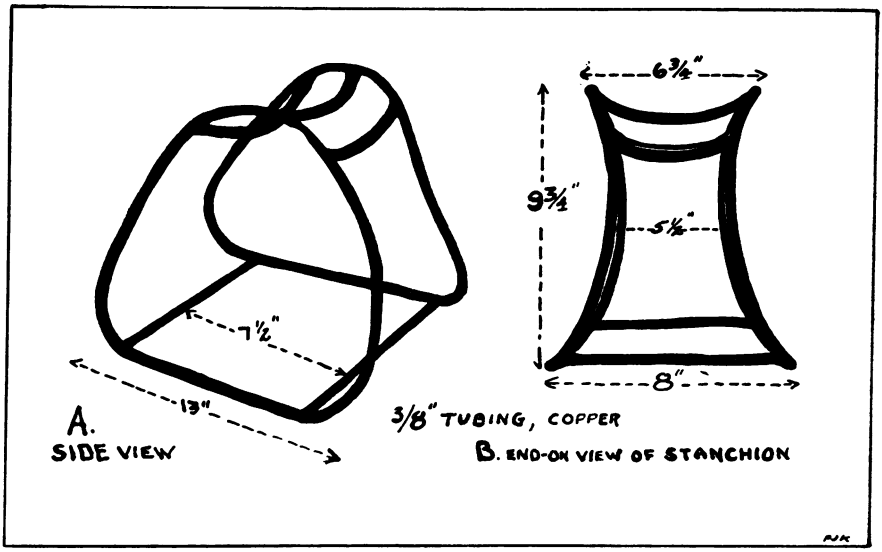
(*3*) ———: Sickness absenteeism among male and female industrial workers, 1937–46, inclusive. Pub. Health Rep. **62:** 1538 (1947). (Reprint No. 2817.)

(*4*) ———, Frasier, E. S., and Sitgreaves, R.: Studies on the Duration of Disabling Sickness. VII. Duration table for specific causes of disability among male workers. Pub. Health Rep. **63:** 901 (1948). (Reprint No. 2873.)

A Knee Stanchion

By Frederick J. Krueger, *Senior Surgeon, Public Health Service**

Frequently the surgeon has to do knee surgery without enough assistants to hold retractors, distract or distort the knee joint, or does not have a table that will break at the right time or place. Much of this can be alleviated by a handy, simple, inexpensive knee stanchion.



The knee stanchion, illustrated above, can be made from three-eighths or one-fourth inch copper tubing in any hospital plumbing shop or machine shop. The specifications are on the illustration. These can be varied according to the surgeon's needs. This stanchion is light in weight, can be wrapped in double muslin and autoclaved with the rest of the surgical instruments. It tarnishes a bit, but not enough to prohibit its use. However, at a minimal charge it can be plated by a local electro-plating shop if desired. It is so constructed that no padding is necessary between leg and stanchion. The weight of the leg and foot distract the joint nicely, as well as hold it solidly.

This apparatus has been found to be useful even with plenty of assistants and table gadgets.

*From the Department of Orthopedics, U. S. Marine Hospital, Staten Island, New York City.

INCIDENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED OCTOBER 23, 1948

A net decline of 43 cases was recorded in the incidence of poliomyelitis—from 1,122 last week to 1,079 currently—as compared with 976 cases for the corresponding week of 1946 (representing a decline of 66 cases) and a 5-year (1943–47) median of 618. Of the 23 States reporting 10 or more cases, 12 reported an aggregate increase of 143 and 11 showed a decrease of the same number. Reports of the 5 States showing an increase of more than 7 cases (aggregate increase, 113 cases) are as follows (last week's figures in parentheses): South Dakota 121 (66), Iowa 79 (61), Michigan 39 (24), Ohio 52 (38), Utah 13 (2). Since March 20, approximate average date of seasonal low incidence, 22,244 cases have been reported, as compared with 21,195 for the same period in 1946 and a 5-year median of 11,066.

Of 1,756 cases of influenza reported (last week 2,010, 5-year median 1,510), 1,464 cases (83 percent) occurred in 3 States—Virginia 267 (last week 399), South Carolina 252 (last week 354), and Texas 945 (last week 962). For the corresponding week last year the same States reported 1,422 cases (84 percent) of that week's total of 1,688.

The current total of 1,537 cases of measles and 6,761 cases reported for the 7-week period since the approximate average date of seasonal low incidence (week ended September 4, 1948) are above the figures for the corresponding periods of the past 4 years but lower than those of 1943 (2,096 and 9,241, respectively).

During the week, 1 case of psittacosis was reported, in California.

Deaths recorded during the week in 93 large cities in the United States totaled 8,946, as compared with 8,675 and 8,739, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 8,739. The total for the year to date is 394,710, as compared with 394,472 for the same period in 1947. Infant deaths totaled 700, as compared with 630 last week and a 3-year median of 702. The cumulative figure is 28,636, as compared with 31,786 for the same period last year.

Telegraphic case reports from State health officers for week ended October 23, 1948

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	1	98	---	7	---	---	13	---	---	1	4	---
New Hampshire	---	---	---	1	1	---	---	---	---	---	---	---	1	---
Vermont	---	---	---	55	---	---	---	---	3	---	---	---	7	---
Massachusetts	4	---	---	213	3	16	4	---	76	---	---	---	39	---
Rhode Island	---	---	---	1	---	1	1	---	4	---	---	---	3	---
Connecticut	1	---	1	22	1	21	5	---	3	---	---	---	---	---
MIDDLE ATLANTIC														
New York	8	---	[2] 2	86	4	155	55	---	[4] 77	---	---	5	71	15
New Jersey	2	---	1	28	1	49	32	---	19	---	---	---	41	3
Pennsylvania	12	---	([2])	115	6	---	33	---	59	---	---	2	76	2
EAST NORTH CENTRAL														
Ohio	4	---	3	21	4	26	52	---	122	---	---	7	21	17
Indiana	14	---	6	8	1	22	8	---	26	---	1	1	4	17
Illinois	---	1	1	5	7	78	41	---	56	---	1	1	30	1
Michigan [3]	6	---	4	72	---	13	39	---	61	---	---	1	37	---
Wisconsin	1	---	1	67	---	6	47	---	20	---	---	---	16	---
WEST NORTH CENTRAL														
Minnesota	1	---	---	1	2	5	72	---	25	---	---	1	5	---
Iowa	2	1	---	3	3	2	79	---	14	---	---	---	19	---
Missouri	2	---	1	16	---	13	7	---	21	---	1	1	15	---
North Dakota	---	1	---	21	---	---	3	---	2	---	---	---	---	---
South Dakota	2	---	---	1	---	---	121	---	2	---	---	1	---	---
Nebraska	---	---	7	1	---	2	20	---	11	---	---	---	4	---
Kansas	1	---	---	5	---	9	12	---	18	---	---	1	3	---
SOUTH ATLANTIC														
Delaware	1	---	---	---	---	---	3	---	---	---	---	1	---	---
Maryland [3]	9	---	1	28	---	20	7	---	[4] 26	---	---	---	8	---
District of Columbia	1	---	---	2	---	19	5	---	4	---	---	---	3	---
Virginia	7	---	267	21	1	34	18	---	17	---	---	3	16	1
West Virginia	5	---	8	7	1	1	10	---	23	---	---	2	53	---
North Carolina	12	---	---	9	---	---	42	---	39	---	1	1	14	---

South Carolina	27		252	2	1	75	6		11			1	19	4
Georgia	40		14	1	1	16	11		25			3	1	3
Florida	7			5		20	6		8			1	2	
EAST SOUTH CENTRAL														
Kentucky	17		1	3	1	7	3		44			2	18	5
Tennessee	20		24	14	2	37	13		68		1	4	17	
Alabama	50		1	10	1	38	9		26				3	8
Mississippi [3]	5		3	1		6	3		5		1	2		
WEST SOUTH CENTRAL														
Arkansas	6		55	2	2	19	3		5		2	3	6	1
Louisiana	3		1	5	3	19	1		9			5		1
Oklahoma	7		49	6		11	3		4		2	2	2	4
Texas	17		945	202		126	28		15		1	10	51	21
MOUNTAIN														
Montana			2	13					9				4	
Idaho			19	10		2	2		[4] 6				4	
Wyoming			1	42	1	1	3		1					
Colorado			24	81	1	16	6		8				17	
New Mexico	3		1	9		7	1		5			1	3	
Arizona			45	25		8	12		1			1	5	
Utah [3]	2		1	48	1	2	13		2		4		5	
Nevada							1							
PACIFIC														
Washington				39	1	8	21		29			1	8	
Oregon	1		9	58		10	12		7				8	
California	3		5	78	2	15	206		47			4	39	5
Total	303	3	1,756	1,561	52	942	1,079		1,076		15	69	702	
Median, 1943–47	438	16	1,510	922	73		618	2	2,041	3	5	103	1,893	
Year to date, 42 weeks	7,334	474	152,057	558,199	2,667		22,594	506	61,514	53	799	2,999	65,002	
Median, 1943–47	10,303	542	200,048	548,387	6,918		11,463	450	111,119	300	681	4,166	102,802	
Seasonal low weeks ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	2,724		13,242	6,785	231		22,244		5,898	3		2,526	2,079	
Median, 1943–47	4,004		9,851	4,647	423		11,066		11,162	22		3,542	5,266	

[1] Including paratyphoid fever, reported separately, as follows: South Dakota 1, Kentucky 2, Texas 4, California 1. Salmonella infections, not included, were reported separately, as follows: Massachusetts 1.

[2] New York City and Philadelphia only, respectively.

[3] Period ended earlier than Saturday.

[4] Including cases reported as streptococcal infections and septic sore throat.

Psittacosis: California, 1 case.

Alaska: Influenza 7.

Territory of Hawaii: Measles 39; whooping cough 3; lobar pneumonia 2; scarlet fever 2; Measles approaching epidemic proportions in Honolulu.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—week ended October 2, 1948.—During the week ended October 2, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		12		19	75	35	25	32	92	290
Diphtheria				6	4	1				11
Dysentery:										
Amebic					1					1
Bacillary				2						2
Encephalitis, infectious						1	2			3
German measles				1	7		2	1	6	17
Influenza		40			10				8	58
Measles		6	1	89	38	10	16	8	40	208
Meningitis, meningococcus					2					2
Mumps		3		25	51	28	16	9	15	147
Poliomyelitis		2		2	27	7	10	16	1	65
Scarlet fever		1	1	41	21	7	2		7	80
Tuberculosis		5	14	79	32	15	7		30	182
Typhoid and paratyphoid fever				7	2				2	11
Undulant fever				3	1				1	5
Venereal diseases:										
Gonorrhea		10	16	147	79	26	16	44	67	405
Syphilis		4	16	54	19	5	8	7	13	126
Whooping cough		3		89	8	11	29	1		141

JAPAN

Notifiable diseases—4 weeks ended September 25, 1948, and accumulated totals for the year to date.—Certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended Sept. 25, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	804	56	11,250	1,008
Dysentery, unspecified	2,545	746	12,890	3,409
Encephalitis, Japanese "B"	[1] 2,827	996	[1] 8,047	2,197
Gonorrhea	14,950		174,278	
Influenza	62		2,504	
Malaria	513	6	4,391	28
Measles	920		46,875	
Meningitis, epidemic	171	44	1,787	435
Paratyphoid fever	311	14	2,355	111
Pneumonia	2,358		94,663	
Scarlet fever	151	3	2,058	27
Smallpox	1		27	1
Syphilis	15,455		166,577	
Tuberculosis	33,418		287,730	
Typhoid fever	1,013	143	7,326	875
Typhus fever	4		458	33
Whooping cough	4,738		42,381	

[1] Includes suspected cases.

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

MADAGASCAR

Notifiable diseases—August 1948.—Notifiable diseases were reported in Madagascar and Comoro Islands during August 1948 as follows:

Disease	August 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri	0	0	1	0
Bilharziasis	1	0	186	0
Cerebrospinal meningitis	0	0	43	17
Diphtheria	0	0	3	1
Dysentery:				
Amebic	6	0	251	6
Bacillary	0	0	5	0
Encephalitis, lethargic	0	0	1	0
Erysipelas	1	0	27	2
Influenza	35	0	8,742	101
Leprosy	0	0	55	0
Malaria	455	4	37,688	221
Measles	0	0	74	0
Mumps	5	0	115	0
Plague	0	0	7	4
Pneumonia:				
Broncho	0	0	428	67
Pneumococcic	5	0	856	158
Puerperal infection	0	0	4	2
Relapsing fever	1	0	0	0
Tuberculosis, pulmonary	3	0	105	18
Typhoid fever	0	0	5	1
Whooping cough	0	0	75	1

NEW ZEALAND

Notifiable diseases—5 weeks ended October 2, 1948.—During the 5 weeks ended October 2, 1948, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	12	1	Malaria	2	
Diphtheria	11		Poliomyelitis	156	7
Dysentery:			Puerperal fever	3	
Amebic	10		Scarlet fever	114	
Bacillary	16		Tetanus	2	
Erysipelas	13		Trachoma	2	
Food poisoning	1		Tuberculosis (all forms)	237	71
Influenza	2	2	Typhoid fever	6	
Lethargic encephalitis	1	1	Undulant fever	5	

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

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

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

Cholera

India.—During the month of August 1948, 26,488 cases of cholera were reported in India. During the 2 weeks ended October 2, 204

cases with 34 deaths were reported in Madras, 86 cases with 24 deaths in Calcutta, and 10 cases with 9 deaths in Cuddalore.

Plague

India—Bombay.—During the period October 3–9 a case of plague was reported in the city of Bombay.

Union of South Africa.—During the period September 19–25, a case of plague was reported in a native in the Queenstown District, Cape Province.

China—Hsiakwan.—On October 15, 1948, an outbreak of plague was reported in Hsiakwan, 420 kilometers west of Kunming, on the Burma Road.[1] Later information dated October 22 reports 22 cases with 9 deaths in Hsiakwan.

Smallpox

Argentina—Buenos Aires.—During the week ended September 19, 1948, 1 case of smallpox was reported in the port of Buenos Aires.

British East Africa.—During the period September 20–26, 1948, 60 cases of smallpox with 2 deaths were reported in Nyasaland, of which 18 cases 1 death occurred in Blantyre, 13 cases in Cholo, and 19 cases 1 death in Dedza. During the week ended September 11, 33 cases with 6 deaths were reported in Fort Johnson. During the 2 weeks ended September 11, 84 cases with 14 deaths were reported in Tanganyika (including delayed reports).

Colombia.—During the month of September 1948, 12 cases of smallpox were reported in the city of Medellin, and for the week ended October 3, 4 cases were reported in Cartagena.

Ecuador.—During the week ended October 2, 1948, 15 cases of smallpox (alastrim) were reported in Guayaquil.

Egypt—Alexandria.—During the week ended September 30, 1948, 1 case of smallpox was reported in Alexandria.

Iraq—Basra.—During the week ended October 9, 1 case of smallpox with 1 death was reported in Basra.

Libya—Tripoli.—During the week ended October 2, 1948, 4 cases of smallpox were reported in Tripoli.

Syria.—During the week ended September 23, 1948, 9 cases of smallpox were reported in Syria.

Typhus Fever

Brazil—Porto Alegre.—During the week ended September 18, 1948, 1 case of typhus fever was reported in Porto Alegre.

[1] See PUB. HEALTH REP., Nov. 5, 1948.

Canada—Toronto.—During the week ended October 15, 1948, 1 case of murine typhus fever was reported in Toronto.

Colombia—Medellin.—During the month of September 1948, 26 cases of typhus fever with 1 death were reported in Medellin.

Libya—Tripoli.—During the week ended October 2, 1948, 4 cases of typhus fever were reported in Tripoli.

Union of South Africa—Johannesburg.—During the week ended September 11, 1948, 2 cases of murine typhus fever were reported in Johannesburg.

Yellow Fever

British Guiana.—During the week ended September 14 a confirmed fatal case of yellow fever was reported in British Guiana, with onset on September 7. The locality of infection was stated to be a lumber camp in the forested interior area 60 miles up the Berbice River from Kwakwani.

DEATHS DURING WEEK ENDED OCTOBER 16, 1948

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

	Week ended October 16, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,498	8,780
Median for 3 prior years	8,780	
Total deaths, first 42 weeks of year	385,764	385,797
Deaths under 1 year of age	630	703
Median for 3 prior years	703	
Deaths under 1 year of age, first 42 weeks of year	27,936	31,084
Data from industrial insurance companies:		
Policies in force	70,832,898	67,088,351
Number of death claims	9,292	8,975
Death claims per 1,000 policies in force, annual rate	6.9	7.0
Death claims per 1,000 policies, first 42 weeks of year, annual rate	9.3	9.2

Regular Corps Appointments For Milk and Food Sanitarians

Milk and food specialists will have the opportunity in the near future to take competititive examinations for appointments in the Regular Corps of the Public Health Service in the grades of assistant sanitarian (1st lieutenant) and senior assistant sanitarian (captain).

Regular Corps appointments are permanent. Assignments to duty are made with consideration of the officer's preferences, abilities and experience.

Assistant sanitarians with dependents receive an entrance pay (without benefits) of $3,811 a year; senior assistant sanitarians, $4,489. Through promotions made at regular intervals they may attain the full grade of sanitarian, corresponding to the rank of major at $5,822 to $7,981 a year.

Promotion to the senior grade (lieutenant colonel) and to the director grade (colonel) is by selection. Retirement pay for the director grade after 30 years' service or at the age of 64 is $4,950 a year. Full medical care, including disability retirement at three-fourths base and longevity pay, as well as 30 days annual leave with pay, are provided.

An applicant for the assistant grade must (1) be a citizen of the United States at least 21 years of age, (2) have a bachelor's degree from a school of recognized standing in one or more fields in the biological, chemical, or physical science which, in the opinion of the Examining Board, is related to milk and food sanitation, (3) have a master's degree from an approved school in public health or in a science listed in (2) above, and (4) have had at least 7 years of educational (exclusive of high school) and professional training and experience, including at least 1 year of experience which, in the opinion of the Examining Board, would qualify the candidate to perform the duties of an officer in the special field.

An applicant for the senior assistant grade must meet the above requirements (1), (2), (3), and in addition must have had at least 10 years of educational (exclusive of high school) and professional training and experience.

Each applicant will receive (1) physical examination by a medical officer of the Public Health Service, (2) a written examination in the fields of bacteriology, chemistry, physics, epidemiology, administration, and their relation to environmental sanitation in general and to milk and food control in particular, and (3) an oral interview by a Board of Commissioned Officers.

Application forms and additional information may be obtained from the Surgeon General, Public Health Service, Washington 25, D. C.