

With regard to the results of campaigning under tropical conditions, the most satisfactory data are naturally furnished by the two great colonizing powers, Great Britain and France. The figures given for these ser-

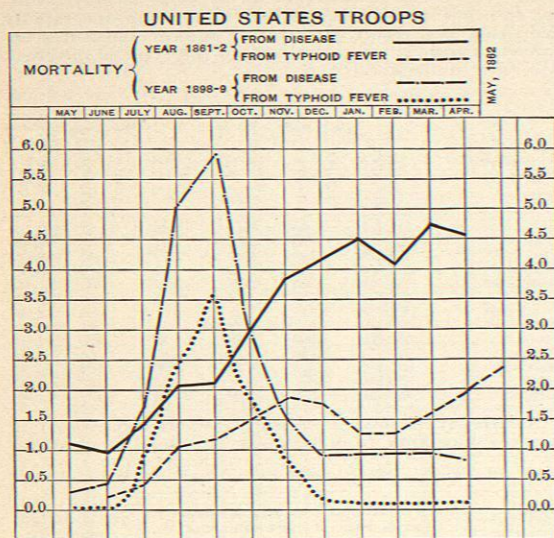


FIG. 283.—Mortality from All Diseases and from Typhoid Fever during the War with Spain and during the Corresponding Period of the Civil War. (After Sternberg.)

VICES are, however, so widely dissimilar as to furnish no foundation for any general conclusions based upon them both. For purposes of comparison merely, they are certainly valuable; the French having little reason to be proud of their sanitary showing.

TABLE OF MORTALITY FROM DISEASE IN CAMPAIGNS IN TROPICAL COUNTRIES, SHOWING RATE OF DEATH PER 1,000 STRENGTH. (After Bradford.)

British Expeditions.			French Expeditions.		
Soudan	1889	0.6	Tonkin	1884	60.0
Mashonaland	1876	2.0	Tunis	1881	61.0
Suakim	1885	2.2	Mexico	1862-63	71.0
Soudan	1885-86	4.1	Tonkin	1885	79.0
China (Talien-wan)	1890	5.4	Dahomey	1893	87.0
Ashanti	1895-96	5.6	Tonkin	1886	99.0
Egypt	1882	5.7	Tonkin	1887	106.0
Abyssinia	1867-68	12.1	Cochin-China	1863	107.0
Gaika Gaika	1877-78	14.0	Soudan	1887-88	116.0
China Field Force	1890	14.9	Cochin-China	1862	117.0
Matabeleland	1896	16.5	China	1862	118.0
Ashanti	1874	17.4	Tonkin	1888	133.0
Zululand	1879	24.8	Soudan	1885-86	200.0
Chitral	1895	25.1	Soudan	1886-87	220.0
Nile	1884-85	26.4	Soudan	1887-88	225.0
Dongola	1896	46.6	Soudan	1888-89	280.0
Afghanistan	1878-80	93.7	Madagascar	1895	300.0

The casualties of the French expedition in Madagascar are thus given by Gayet:

Killed by the enemy	7
Wounded	94
Deaths from sickness	5,600
Sick, more than 15,000, or 85 per cent. of the whole.	

From the above table it will be observed that with the exception of the Afghanistan campaign, in which the high mortality was largely the result of an outbreak of cholera, the most unhealthful of seventeen English ex-

peditions in warm climates had a lower death rate than the healthiest of an equal number of French campaigns under presumably similar climatic conditions. The British expedition against the Ashantis, in 1874, certainly demonstrated the efficiency of military hygiene under notoriously unhealthful conditions; and, in the excellent results obtained, the second expedition against this same tribe, in 1896, even surpassed the first. In our own expedition against Manila, during the war with Spain, the results were admirable, only 8 per thousand dying from disease. During the Cuban insurrection the Spanish are reported, for the year 1897, to have had a death rate of 36 per thousand from all causes. The admissions to hospital for the same period were 1,900 per thousand, of which 420 per thousand were for malaria. During 1897 the Spanish troops appeared to have suffered but little from yellow fever; this being probably due to an immunity to this disease acquired through previous visitations.

That constant exposure to infectious disease of all kinds, and not only yellow fever, does actually exert a seasoning influence on the survivors and reduce their mortality is well known. As illustrating this point, it may be noted that the sick rate of colored troops during the civil war fell from 4,092 per thousand during the first year of their service to 2,797 in the last, while their death rate dropped from 211 to 94 per thousand strength. The total rates for sickness during the civil war underwent considerable diminution, as follows:

First year, admissions per 1,000 strength	2,983
Second year, admissions per 1,000 strength	2,696
Third year, admissions per 1,000 strength	2,210

In this connection the chart already given in the section showing the influence of race as affecting the prevalence of disease is of interest.

It is not, however, during active wars or on expeditions that the highest mortality is observed among troops in the field. When an army is condemned to inaction through a siege, for purposes of mobilization, or even in cantonments after a laborious expedition, sickness rages with the greatest violence. The typhus that tried the Crimean army occurred in the winter after the capture of Sebastopol and after conclusion of the armistice; and examples might be indefinitely multiplied in our own service to show that the stationary force, during war, is an unhealthy force. In January, 1862, the medical director of the Army of the West, then in winter quarters, reported 13.5 per cent. of the total strength as being excused from duty, and a little over 12 per cent. in March of the same year. In August, 1861, of some troops encamped on the Arlington flats on the Potomac, 33 per cent. were reported sick with diarrhoea and malarial fever. During the war with Spain the typhoid epidemics, as is well known, occurred in the large fixed camps. An excellent instance is found in the condition of the French troops during the Crimean War, a struggle from which so many sanitary lessons have been drawn. According to Rawlinson, reliable estimates as to the sickness among these troops, for the winter of 1854-55, were as follows:

Month.	Strength.	Sick in hospital.
October	46,000	3,200
November	55,000	5,000
December	65,000	6,000
January	75,000	9,000
February	88,000	8,000

These figures do not include the sick treated in the regimental infirmaries or in the hospitals at Constantinople.

Comparison of Military Statistics.—It is a matter of the greatest difficulty, if not indeed impossible, accurately to compare the sanitary conditions of various armies, since

their statistical tables are often differently constructed, the physical requirements for recruits are not identical, and diverse regulations as to discharges for disability prevail.

In attempting to institute such comparisons it is well to appreciate at the outset that a sick rate can be kept low by excluding the doubtful or milder cases from the benefits of quarters or hospital, and so preventing them from appearing on the official records; that the sick rates, mortality, and constant non-efficiency can be held down by a searching system of discharge for disability, and that the total loss—as shown by the sum of the rates for death and discharge—is, in determining the sanitary state of an army, of much more importance than either of its complementary factors.

In comparing the rates of our service with those of foreign armies the admission rate is the one which, by its magnitude, attracts attention. This higher rate of admissions, however, does not in itself imply a greater prevalence of disease among the troops of the United States; since with us, in contradiction to the practice in other armies, the soldier is officially taken on sick report whenever he is excused by the medical officer from any part of his duty, whatever be the cause. When it is observed, as was the case in the year 1888, that 796.89 admissions per thousand strength from the Italian army resulted in a death rate of 9.31, while 1,270.73 admissions for each thousand United States troops for the same period—divided into 621.61 cases admitted into hospital and 649.12 treated in quarters—had a mortality of only 8.15 per thousand, it is evident that the admissions in the two instances—the rates for discharge for disability not varying greatly—do not constitute facts of equal gravity and are therefore not available for comparison.

The rate for constant non-efficiency is obviously largely dependent upon the admission rate and that of discharge for disability, and reflects, to a considerable degree, their variations. Taken by itself the rate is misleading, and it acquires a certain value only when considered in connection with other rates, particularly that for admissions. As between services, for the reasons already given, it is evident that non-efficiency rates are not susceptible of proper comparison.

The death rate alone, as a means of comparison between several armies, is wholly unreliable and merely productive of error; since, as above stated, it can be markedly reduced by the removal from the service of those subject to or predisposed to disease.

Of all the ratios which go to determine the healthfulness of an army, as shown by statistics, that giving the discharge for disability is of the greatest importance. In its relation to military morbidity it is at once evident that the admissions to hospital will be largely furnished by the physically less sound, and that a prompt and proportionate diminution in the sick rate must follow the elimination of these weaklings by their discharge from the service. In addition, the number of men withdrawn from the aggregate strength of the command, the rate of non-effectiveness from disease or injury, is not a factor of equal importance in all armies and cannot be justly used for purposes of comparison. It undoubtedly embodies the number of admissions and the gravity of the cases so admitted; but it is obvious that the constant non-efficiency as well as the admission rate varies inversely with the rigor of the system of discharge. As to mortality, this too depends upon the physical standard maintained, and, as shown in the German army, a low death rate is naturally consequent to the early elimination of those soldiers who are predisposed to or actually affected with disease. Hence the rate of discharge for disability is the controlling factor in the determination of the rates of admissions, deaths, and constant non-efficiency; while it is itself largely dependent upon the physical standards to which the recruit, before enlistment, is required to conform. To institute accurate comparisons, therefore, a constant, unvarying standard for discharge for disability should obtain in the several military forces

to be compared; and such a constant standard does not—and practically cannot—exist. Requirements as to discharge for disability necessarily vary with the customs of each military service, and, to a certain degree, with the personal equation of each medical officer. As an instance of the former, it may be noted that the Germans are especially assiduous in promptly removing the tuberculous from their armies; we, on the other hand, maintaining a sanitarium for soldiers affected with this disease; and this single source of error, to which might be added many other less aggravated instances, prevents a comparison of sick rate, mortality, and non efficiency upon anything like equal premises. If it be admitted, however, that the physical requirements for the recruits of various armies are approximately the same, the total losses, irrespective of either non-efficiency or admission rate, should afford a somewhat inaccurate, but still the most available and satisfactory method of determining the comparative health and physical efficiency of various services.

The following figures, taken from Marvaud, show the annual sick rates, mortality, loss by discharge, and total losses in various European armies for a period about ten or twelve years ago:

Name.	Year or period.	Admissions to hospital or infirmary per 1,000 strength.	Death rate per 1,000 strength.	Discharges for disability per 1,000 strength.	Total losses per 1,000 strength.
Belgium	1887-88	338 *	3.9	17.0	20.9
Austria	1887	995 +	6.9	15.0 †	21.9
Great Britain (home stations)	1884-85	877	5.2	20.0	25.2
France (home stations)	1888	500	6.1	21.0	27.1
Germany	1883-84	849	3.9	29.0	32.9
Italy	1887	760	8.7	28.0	36.7
Russia	1880-84	845	8.9	31.3	40.2
Spain	1886	...	13.5	30.8	44.3

* General hospitals only. + Including detention in barracks. † Not including temporary invalids.

During the year 1888 the total admissions per thousand strength in the United States army amounted to 1,270.73, the deaths were 8.15 per thousand, the constantly non-effectives were 41.91 per thousand, the discharges for disability 27.75 per thousand. These figures give a total annual loss of 35.90—thus making our sanitary showing for that time inferior to that of the above-named nations except Italy, Russia, and Spain; all countries notoriously the least advanced in matters pertaining to hygiene. It can, however, scarcely be believed that our men, under equal conditions of selection, broke down nearly twice as readily as the Belgian or Austrian soldiers and half again as rapidly as the British soldiers, and hence the conclusion would seem to be inevitable from the above figures that our troops were at that time examined on enlistment with a laxity as to their physical condition which did not obtain in foreign services. This idea is further strengthened by the fact that during the same year (1888) out of 742 men discharged on certificates of disability, in 129 instances the disability was specifically declared to have existed prior to enlistment. About this time the large number of discharges for disability attracted the attention of the authorities, and recruiting officers were warned to be more strict in their examinations for enlistment; while a general order required that all men recommended for discharge on account of disability be sent to the headquarters of each military department for observation by the chief surgeon pending final action in their cases. As a result of these requirements the rates for discharge were decreased by nearly one-half in a single year, since which even further diminution has taken place. For the year 1897 the rate for discharge on account of disability was only 9.61 per thousand as compared with 27.75 during 1888. On comparing the statistics of the above armies for a more

recent period—excluding France and Spain, for which countries no later figures are obtainable—the relative status of the United States service is found to be as follows:

Country.	Year.	Admissions to hospital or infirmary per 1,000 strength.	Death rate per 1,000 strength.	Discharges for disability per 1,000 strength.	Total losses per 1,000 strength.
Germany	1895	819.0	2.6	9.0	11.6
Belgium	1897	429.3	2.0	12.4	14.4
United States	1897	1,186.61	5.11	9.61	14.72
Great Britain (home stations)	1897	640.6	3.42	19.87	23.29
Italy	1897	684.0	4.2	21.2	25.4
Russia	1896	314.6	5.40	24.9	30.30
Austria	1897	332.7	4.0	37.5	41.5

It is evident from the above that much has been accomplished during the past decade toward improving the sanitary condition and effectiveness of our army, and it is safe to assume that at the present time the United States soldier is better cared for than is the man-at-arms of nearly every other military service.

Although, as stated, attempts at the comparison of statistics of different armies are at best necessarily inaccurate and unsatisfactory, within the limits of the same service such action is both feasible and desirable; the standard for the health of an army, as expressed by Smart, being its own best annual record. Outside of unusual vicissitudes, exposure, and epidemics, and of the unsanitary conditions which bring disease and death into the ranks of a military command during campaign, the sanitary surroundings of the soldier do not vary much from year to year except as they are modified by intelligent efforts for their improvement. What has been accomplished in the past should therefore be effected in the present; or satisfactory explanation should be given of the cause of failure, which would thus be converted into a source of protection for the future.

As to military rates as affected by the geographical distribution of troops, the following table shows the relative sickness among the forces stationed in the various military departments within the limits of the United States during the year 1897:

Department.	Annual death rate per 1,000 strength.	Annual discharge rate per 1,000 strength.	Duration of treatment among patients who died.	Duration of treatment among patients who were discharged for disability.	Average number of sick daily.	Average duration of treatment.	Total losses by death and discharge for disability.	Admission rate per 1,000 strength.	Constantly non-effective per 1,000 strength.
East	5.61	5.85	17.80	83.40	287.28	10.38	11.46	1,290.04	35.83
Missouri	5.30	6.91	16.78	86.06	157.36	11.13	12.21	1,188.89	36.25
Dakota	4.77	9.55	28.17	109.54	85.28	12.70	14.32	975.33	33.93
Platte	4.27	4.59	22.37	119.67	96.61	10.43	11.86	1,294.41	36.99
Texas	6.24	7.38	5.27	100.38	69.88	9.51	13.62	1,522.14	39.65
Colorado	3.56	13.93	73.45	115.81	110.07	10.21	17.49	1,274.05	35.66
California	3.15	6.30	24.40	66.40	41.81	11.81	9.45	813.90	25.33
Columbia	6.20	10.33	36.56	75.47	37.25	11.94	16.53	788.44	25.65

From the above it is seen that the Department of California is the most healthful, with the Department of the Columbia and Dakota closely following. The Department of Texas has long been recognized as the most unhealthful military division.

The statistics for the entire British army in time of peace are of particular importance, covering as they do a large number of geographical divisions under diverse climatic conditions and enabling the making of accurate comparisons through the similar sanitary, military, and administrative conditions prevailing throughout the whole. The figures for that service, for the ten years 1887 to 1896, are given below.

RATIO PER 1,000 STRENGTH.

European Troops.	Admitted.	Died.	Sent home as invalids.	Discharged as invalids.	Constantly non-effective from sickness.	Average sick each soldier.	Average duration of each case of sickness.
Troops at home and abroad	997.4	8.81	23.65	14.52	58.57	21.38	21.47
United Kingdom	735.9	4.68	16.27	42.51	15.32	15.04	21.04
Gibraltar	708.8	4.01	15.23	8.25	46.65	17.02	24.01
Malta	666.9	7.53	19.20	10.53	44.29	16.17	24.25
Egypt and Cyprus	968.8	11.08	19.04	12.09	65.48	23.90	23.33
Canada	499.1	4.37	14.54	11.90	25.54	9.32	18.68
Bermuda	532.2	10.07	12.65	8.14	29.58	10.80	19.31
West Indies	1,119.3	8.43	20.23	13.40	64.48	23.54	21.08
West Africa*	2,652.7	45.02	237.94	12.86	84.89	30.98	11.68
South Africa and St. Helena	868.3	6.63	23.97	14.54	55.85	20.39	23.48
Mauritius	1,364.4	15.04	35.94	17.42	73.76	29.32	19.37
Ceylon	1,028.0	11.10	20.35	11.42	58.29	21.37	20.69
China	1,324.7	11.31	33.34	14.28	64.97	23.71	17.91
Straits Settlements	1,072.1	6.73	18.14	9.27	72.48	26.46	24.68
India	1,443.9	15.50	25.17	13.24	84.87	30.98	21.45
On board ship	1,132.8	6.41					

* For eight years only, 1889 to 1896.

It is readily seen that the total losses vary from the minimum of 12.26 per thousand at Gibraltar to the maximum of 57.88 on the west coast of Africa; while the death rate of troops at home is only about half that of the entire army. The discharges for disability in the latter instance are slightly higher, the constant non-effective considerably lower, as is also the number of days lost by each soldier.

The mortality among the European troops of the French army on foreign service per thousand strength is, according to Gayet, thus proportioned among the following stations:

Algeria	11 to 12
Antilles	18 to 22
Senegal	about 73
Réunion before the Madagascar expedition	28 to 30
Réunion after the Madagascar expedition	80 to 90
New Caledonia	9 to 10
Cochin China	22 to 24
Tonkin	about 75

While statistics with regard to our own troops on foreign service are not as yet available, it is probable that they will not greatly differ from the rates of the British

troops at the nearest of the tropical stations noted above.
Edward L. Munson.

REFERENCES.

Billings: Hygiene. American Text-Book of the Theory and Practice of Medicine, Philadelphia, 1893.
Bradford: The Expansion of Medicine. Boston Medical and Surgical Journal, June 29, 1899.
Dewey: Sanitation in the French Army. Popular Science Monthly, December, 1895.
Gayet: Guide sanitaire, à l'usage des officiers et chefs de détachements de l'armée coloniale, Paris, 1897.
Laveran: Traité d'hygiène militaire, Paris, 1896.
Lindley: Transactions of the Association of Military Surgeons, 1892.
Marvaud: Les maladies du soldat, Paris, 1895.

Notter and Firth: Treatise on Hygiene, London, 1896.
Paget: Address on the National Value of Public Health, London, 1884.
Rawlinson: Hygiene of Armies in the Field, London.
Reports of the Army Medical Services of Austro-Hungary, Belgium, France, Germany, Great Britain, Italy, Russia, and the United States.
Ross: Army Diseases. Reference Handbook of the Medical Sciences, vol. 1. (First edition.)
Smart: Medical and Surgical History of the War of the Rebellion.
Sternberg: Sanitary Lessons of the War. Journal of the American Medical Association, June 10, 1899.
Viry: Principes d'hygiène militaire, Paris, 1896.

ARMY NURSE CORPS.—In the days of peace, between the civil and the Spanish wars, nursing in the army was done entirely by men. At the end of March, 1898, there was a body of 520 hospital corps men in all degrees of training as nurses for army work, as well as 203 hospital stewards and acting stewards who may be considered the equivalents of graduate nurses in civil hospitals. This number, barely adequate for an army of 25,000 men in time of peace, was, of course, wholly inadequate in time of war for an army of ten times that size, and although it was planned greatly to increase the hospital corps, it was evident that the raw material obtainable could not do the work of trained nurses. Therefore, to supply the approaching necessities of the army, the United States Congress, in April, 1898, at the request of the surgeon-general, authorized him to employ nurses under contract and made an appropriation for their payment. No restriction was made as to sex, but at that time it was the opinion of the War Department that but few women nurses would be needed and that their services would be limited to the general hospitals. Several hundred women, largely untrained, had already applied, but the force of the surgeon-general's office was too limited to permit of any examination of their qualifications.

Knowing these facts, the writer suggested to the National Society of the Daughters of the American Revolution (of which she was a vice-president-general) that that organization should act as an examining board on women nurses for the Government. The surgeon-general of both the army and navy promptly accepted this offer of the Daughters, and in April the "D. A. R. Hospital Corps" was organized, with the writer as director.

The standard adopted for appointment to army service was that of graduation from a training school, combined with suitable indorsements, the chief reliance being placed on a recommendation from the superintendent of nurses under whom the applicant had graduated. Women physicians were also considered eligible, although but few were appointed.

The first nurses were appointed on the 10th of May, 1898, and ordered to the general hospital at Key West, and before the 15th of July, forty-seven nurses had been asked for by surgeons at different general hospitals and had been selected by the "Daughters" for appointment by the surgeon-general. About this time yellow fever appeared among the Santiago troops, and nurses were urgently needed there. The surgeon-general, therefore, employed the wife of the superintendent of a Washington hospital and sent her to New Orleans to secure the services of immunes, both male and female. The majority of the nurses so appointed were colored women without hospital training, a considerable number of whom were sent to Santiago in July and August. The "Daughters" also supplied a few trained immune nurses for this service.

During the month of August an epidemic of typhoid fever broke out in the camps which had been established as temporary places of instruction for the volunteer troops. It also became evident at that time that these camp hospitals had lost their original character and become practically stationary, and consequently the objection to the employment of women nurses in them had disappeared. During that month, therefore, and especially in its latter half, the demands for women nurses grew to an entirely unexpected amount, and the roll of army nurses reached about a thousand names. Not only did they go to general and field hospitals, but whenever the surgeon in charge of a division or post hospital so requested, trained nurses were assigned to duty under him. During the

fall it became not uncommon for regiments or larger divisions of troops, when they moved to Southern camps or to Cuba, to take with them the trained nurses attached to their hospitals, and no inconvenience or difficulty has been reported as having ensued.

It is needless to refer to the great value of the work rendered by these trained assistants to the medical department of the army, since surgeons, patients, and the public at large have been most enthusiastic in their expressions of appreciation. There was scarcely a training school in the United States which did not send some of its best representatives for this work, and the women adapted themselves to camp conditions and to many sorts of discomfort in a manner that quite altered many preconceived opinions.

During the greatest stress of the work valuable assistance in securing the services of nurses was rendered to the government, through the "Daughters," by a number of organizations. The Sisters of Charity merit prominent mention in this connection, as they furnished from their order two hundred Sisters, many of whom had much hospital experience. A few of the Sisters from four other Catholic organizations and from one Protestant Episcopal Sisterhood also served for a time. The Society for the Maintenance of Trained Nurses, which was Auxiliary No. 3 to the American National Red Cross Relief Committee of New York, in August, and for a month or two thereafter, examined the credentials of a large number of applicants, and certified to their having conformed to the standard established by the "Daughters." This society was unique in its work of furnishing money for the transportation of many nurses and for their comfort while waiting orders in New York City and while serving at certain army hospitals. Much valuable aid was rendered by the superintendents of training schools, although it is an interesting fact that no organization of trained nurses has rendered any noteworthy assistance. In spite of the overcrowding which had previously been complained of in the nursing profession, there was much difficulty at the time of greatest stress and need in securing enough suitable applicants to fill the demands from the camps. The chief surgeons at Montauk, Jacksonville, Lexington, and San Francisco were therefore authorized to secure women nurses without regard to training, and in this way a few undesirable appointees unavoidably crept in.

In addition to the army nurses temporary help was accepted at a few hospitals from women who were not connected with the medical department. That such should have been the case is much to be regretted, as irregular nurses are not subject to control and discipline and do not hold the same honorable position as do women who have governmental authority for their presence with the army.

As the women who were assisting the government on behalf of the Daughters of the American Revolution, and of the societies which were co-operating with them, held no official positions, their work was necessarily limited to the selection of nurses for appointment. By the end of August, 1898, it became necessary to establish an army nurse corps division of the surgeon-general's office, and Mrs. Anita Newcomb McGee, M.D., was therefore appointed an acting assistant surgeon and assigned to duty in charge of that division.

After the middle of September, at which time about twelve hundred nurses were in service, there was a gradual decrease resulting from the control of the typhoid fever, and later from the mustering out of the volunteer army. At the close of 1898 there were nearly seven hundred women nurses in the army, the largest number at any one place being one hundred with the Seventh Army Corps, near Havana, Cuba. A large number had also been taken to Matanzas and a few to Puerto Principe, Cuba, and many others were scattered through the camps in the Southern States in preparation for possible transfer to that island. About thirty nurses were in the province of Santiago, including the remnant of the untrained immunes sent there in July and August, 1898.