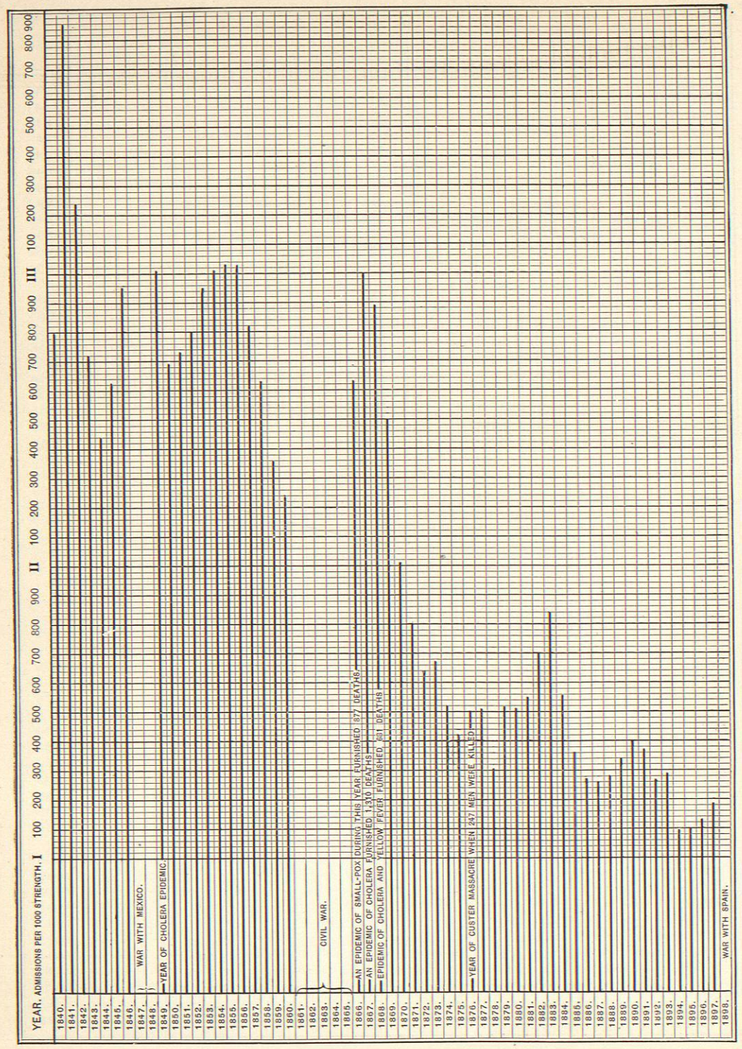


Chart Showing Reduction in the Rate, per Thousand Strength, for Admissions to Sick Report for All Causes, in the United States Army, during Conditions of Peace, for the Period 1840–1898. (The Roman numerals I, II, and III designate each thousand of admissions; the figures 100, 200, 300, etc., show each hundred admissions.)

Viry gives the following rates for mortality in the French army as illustrating the progress of military hygiene.

Period.	Mortality per 1,000 strength.	Period.	Mortality per 1,000 strength.
1812	27.9	1873–81	9.0
1820–25	21.4	1883	8.15
1846	19	1889	5.39
1846–58	16	1890	5.81
1862–72	13		

Dewey states that in the French service the average annual death rate was 8.43 per thousand strength for the seven years 1880–1886, and that it sank to a yearly average of 6.63 for the seven succeeding years. This decreased death rate is naturally consequent to a lessened amount of sickness, as the following figures from Marvaud illustrate.

Period.	1862–1865.	1866–1869.	1884–1887.
Admissions to hospital per 1,000 strength (admissions to infirmaries and cases treated in quarters not included)	264.5	259.5	177.0
Rate of constant non-effectives per 1,000 strength.	23.3	22.1	14.0

Lindley, writing in 1892, states that during the preceding forty years the death rates in the Prussian and Belgian armies had shrunk to two-fifths, the English and Russian rates had fallen to one-half, and the French rate had diminished to one-third. These figures may probably be accepted as being approximately correct.

The lamentable conditions revealed by the above statistics as existing until even within the present generation were undoubtedly largely due to ignorance of first causes of disease, by which measures for its prevention could not be intelligently applied, as well as to an insufficient knowledge of hygiene and lack of appreciation as to its value from a military standpoint. An additional factor of no mean importance, however, was to be found in the former anomalous and inferior condition of the medical officer, his lack of authority to recommend in sanitary matters, and his powerlessness to control or remedy existing conditions. It was long held that his duties were merely to care for the sick and wounded, and any recommendations bearing on the general care or management of the men were deemed intrusive and as such usually disregarded and resented. The comparatively recent conferring of advisary powers upon the surgeon for sanitary purposes has undoubtedly been a potent factor in the gradual betterment of the sanitary condition, and hence efficiency, of the soldier; and when the medical officer is invested with actual authority upon all matters bearing upon the health of troops, with executive powers as well as advisory privileges, a still further improvement in this direction may be expected.

Although during the past one or two generations a marked diminution has occurred in the sickness, mortality, and non-efficiency among the troops of the United States and those of European nations upon the home stations, the same unfortunately cannot be said with regard to white troops doing colonial duty in tropical climates. For them these rates continue to be high, and no great improvement in their sanitary state, as evidenced by statistics, appears to have resulted for many years. Since the hygienic requirements for each military establishment, wherever its troops may be stationed, must be accepted as being the same for all circumstances, the conclusion is obvious that climatic conditions in the tropics furnish a potent obstacle against a constant reduction in rates proportionate to those which have occurred on the home stations. While undoubtedly much has been done during the past generation to render military service in hot countries less inimical to life and health, the fact none the less remains that sanitary progress in the low latitudes has fallen far short of that obtaining in more temperate climates. It is evident that figures illustrating this point are best furnished by the records of the British service, and these are briefly compared as follows:

	Period.	Admissions to hospital per 1,000.	Deaths per 1,000.	Days lost per man.
West Indies	Decade 1875–84.	885.0	15.36	16.26
	Decade 1886–95.	1115.7	9.23	22.67
	Year 1896	1190.2	6.19	28.69
Ceylon	Decade 1875–84.	1085.4	14.51	20.97
	Decade 1886–95.	1004.1	11.38	21.10
	Year 1896	1321.1	8.23	23.76
China	Decade 1875–84.	1030.4	10.53	18.07
	Decade 1886–95.	1256.0	11.44	22.41
	Year 1896	1856.5	7.48	32.05
India	Decade 1875–84.	1482.9	17.43	23.06
	Decade 1886–95.	1453.5	15.52	30.26
	Year 1896	1386.7	15.29	34.35
Egypt and Cyprus	Decade 1875–84.	No figures given.		
	Decade 1886–95.	1069.7	16.30	24.56
	Year 1896	822.3	13.28	23.11
Straits Settlements	Decade 1875–84.	No figures given.		
	Decade 1886–95.	1079.4	7.27	25.58
	Year 1896	1074.7	8.88	26.46

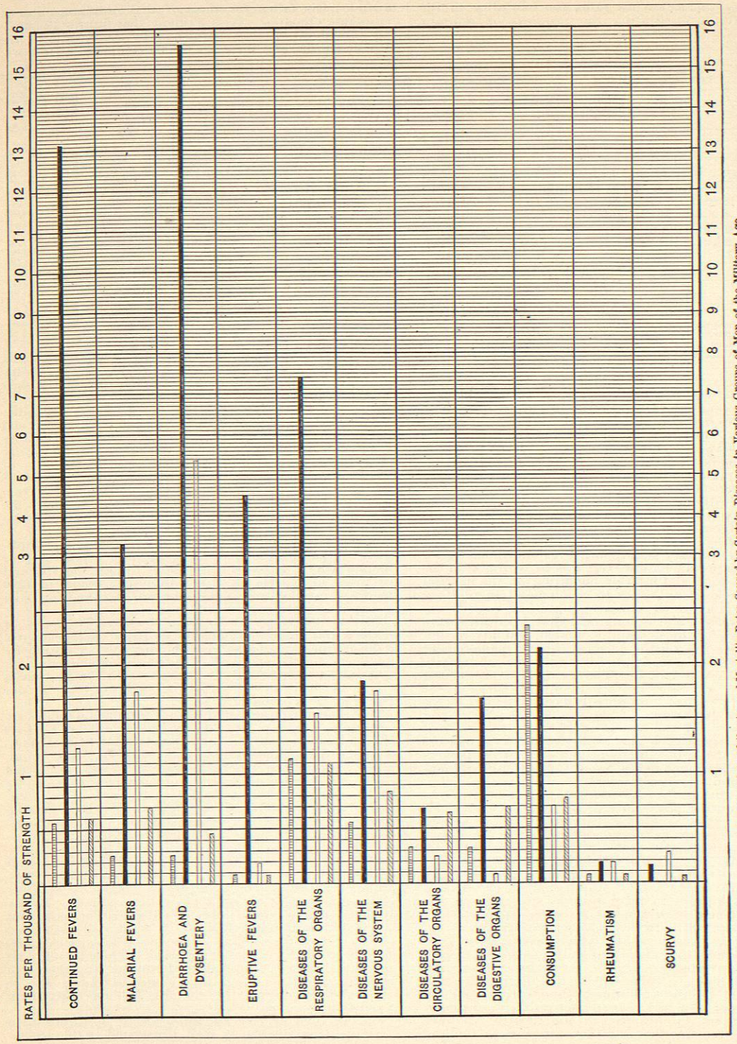
From these figures it is evident that while there was a considerable diminution in the morbidity and mortality rates for the West Indies and Ceylon during the past twenty years, but little improvement has occurred in the general rates for China, Egypt, and Cyprus. In India, a country long occupied by a large military force and one in which the greatest improvement might reasonably be expected to have occurred, the rates are practically what they were two decades ago—the death rate of British troops at home having fallen from 7.20 to 3.58 per thousand, while the same rate for India only fell from 17.43 to 15.29 during the same period. Further, the several rates for the Straits Settlements have actually increased during the past ten years.

In this respect the experience of Great Britain is duplicated by that of the French service; in which in 1862 the mortality for troops throughout France was 9.42 and for those in Algeria 12.21 per thousand; while in 1890 the death rate for troops at home was 5.81 and for those in Algeria 11.94 per thousand.

War as Affecting the Health of Armies.—The rates of sickness and death of troops in campaign, independently of the circumstances which accompany conflict, are chiefly influenced by the standard of hygiene maintained; and, as is stated elsewhere, it is difficult to cite campaigns in which the death rate from sickness has not been greater than that from casualty.

The diseases observed during continued warfare, according to Laveran, are largely brought about by four chief influences: atmospheric, exhalations from the soil, evil condition of the latrines, and poor food. The atmospheric exposure to which the soldier is often subjected is one of the greatest hardships of a campaign. Sleeping on the bare ground and often drenched with rain, standing in trenches exposed to snow and cold, or making long marches under a tropical sun, are a few of the influences by which he is debilitated and his constitution impaired. Service in a malarious country is notoriously productive of disease, while illy-policed sinks are potent factors in the occurrence of typhoid and dysentery. The influence of insufficient or improper food in lowering the resisting powers of the soldier is well recognized. Excessive fatigue and moral influences also play an important part in determining the sick rate, it being well established that victorious forces have less sickness than armies which have been beaten and demoralized. The endemic and epidemic diseases of an occupied country, together with the influence of a change of climate, aggravate also to a considerable degree the sickness and mortality of an expeditionary corps.

For our own service the influence of hostilities upon mortality from disease is well illustrated in the accom-



A Comparison of the Annual Mortality Rates Caused by Certain Diseases in Various Groups of Men of the Military Age.

United States civilians
United States army before the civil war
United States army during the civil war
United States army after the civil war

(Adapted from the "Medical and Surgical History of the War of the Rebellion.")

panying chart (p. 508), showing, as it does, the rates for certain affections in the United States army, during the civil war, for periods before and subsequent to that war, and also as compared with the death rates for the corresponding class in civil life. As compared with the mortality from continued fevers—which affections may be considered, in the light of present knowledge, as of typhoid nature—war brought about an increase of tenfold. Malarial diseases were doubled and diarrhœa and dysentery tripled. Deaths from eruptive fevers became about twenty-two times as frequent as they were before the war, while those from diseases of the respiratory organs were more than quadrupled. Camp life appeared to have little influence in affecting the mortality from nervous affections. Deaths from diseases of the circulatory and digestive organs were practically doubled in frequency, as was also the mortality from consumption. Rheumatism, as regards a fatal termination, and contrary to expectation, was not increased; but scurvy—the former bane of armies in the field—was doubled. The average annual death rate from disease during the entire war was 53.48 per thousand strength among white troops, while it was 18.98 for these troops during the eighteen years before the war, excluding the two years of hostilities against Mexico, and somewhat over 6 per thousand for the decade subsequent to the war.

The following table shows the influence of the war with Spain upon the rates for sickness and death, as regards the prevalence of certain classes of diseases:

progress of disease, by months, is quite dissimilar. It is particularly noticeable that not only was the death rate during the war with Spain reduced by 43.9 per cent. as compared with the struggle of the previous generation, but the amount of epidemic typhoid, largely resulting from the inexperience of the volunteer troops, rapidly decreased as a result of scientific sanitary measures enforced as soon as the magnitude of the typhoid outbreak was fully understood.

Comparison of Monthly Death Rates (per 1,000) from Disease.

Months.	1861–1862.			1898–1899.		
	Mean strength	Number of deaths.	Ratio per 1,000 of M.S.	Ratio per 1,000 of M.S.	Number of deaths	Mean strength.
May	16,161	18	1.11	0.26	42	163,726
June	60,950	55	.82	.44	90	245,326
July	71,125	106	1.49	1.72	451	362,613
August	112,359	242	2.15	5.21	1,400	268,507
September	165,126	365	2.21	5.89	1,541	261,824
October	256,884	725	2.82	3.17	809	255,000
November	301,848	1,145	3.79	1.51	365	242,000
December	343,184	1,471	4.29	.84	201	240,000
January	352,760	1,593	4.52	.85	180	211,000
February	327,734	1,346	4.11	.87	156	180,000
March	328,878	1,575	4.79	.90	123	136,000
April	410,416	1,881	4.58	.71	80	113,000
Annual	220,452	10,522	45.96	25.73	5,438	211,350

As already intimated, so many factors combine to determine mortality from sickness in campaign that any

Table Giving Figures for the Comparison of the Year of Peace, 1897, with the Year of War, 1898.

Group.	Admissions per 1,000 Strength.		Constantly Non-Effective per 1,000 Strength.		Deaths per 1,000 Strength.		Discharges for Disability per 1,000 Strength.		Total Losses per 1,000 Strength.	
	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.
Infectious diseases, general and local	326.10	1,034.97	12.59	57.90	1.35	15.99	1.28	2.14	2.63	18.13
Diseases of nutrition	2.05	3.49	.19	.21	....	.09	.29	.13	.29	.22
Diseases of the nervous system	56.94	52.81	1.63	1.33	.33	.32	1.79	.86	2.12	1.78
Diseases of the digestive system	244.05	505.71	3.75	7.01	.55	3.11	.55	.58	1.10	3.69
Diseases of the circulatory system	4.68	5.73	.41	.60	.37	.49	.95	.96	1.32	1.45
Diseases of the respiratory system	77.74	144.50	1.64	2.04	.32	.96	.40	.26	.72	1.22
Diseases of the genito-urinary system	9.76	11.77	.80	.67	.32	.24	.44	.43	.66	.67
Diseases of the lymphatic system and ductless glands	2.36	3.22	.17	.17	.04	....	....	.02	.04	.02
Diseases of the muscles, bones, and joints	72.52	77.34	2.85	2.70	....	....	.31	1.33	1.31	1.33
Diseases of the integument and subcutaneous connective tissues	72.55	60.57	1.70	1.06	....	.30	....	.04	....	.34
Diseases of the organs of special sense	24.47	17.39	.92	.79	.04	....	.58	.62	.62	.62
Unclassified	2.44	19.17	.09	.59	.04	....	....	.02	.04	.02
Total for diseases	896.53	1,937.74	26.73	69.09	3.14	24.94	7.60	7.40	10.74	32.34
Total for injuries	290.08	209.23	9.12	13.74	1.97	8.41	2.01	4.18	3.98	12.59
Total for all causes	1,186.61	2,146.94	35.85	82.83	5.11	33.35	9.61	11.58	14.72	44.93

All things being considered, it is safe to assume that the outbreak of hostilities will be followed by a vast increase in the death rate, probably from six to twelve or more times that normally occurring in peace; the proportion naturally varying with the character of the campaign, the climatic conditions to be encountered, the local diseases to be undergone, the efficiency of the commissary and transportation departments, the employment of seasoned or unseasoned troops, and many other factors. The rate of admissions to sick report from disease in time of war is not, however, increased proportionately to the death rate—a fact sufficiently proving the more serious nature of diseases when affecting troops in the field. As to the rate for non-efficiency, this is largely dependent upon the ratio for admissions, and naturally bears in its fluctuations a close relationship to the prevalence and character of disease. If the records of the Spanish-American war be accepted as typical in this respect, no great difference in the rates for discharge by reason of disability, in peace or war, may be anticipated. (See chart, p. 510.)

In comparing the results of the Spanish-American war with the corresponding period of the civil war the advantage is much in favor of the former, although the attempt at the close comparison in this respect of different wars—carried on under entirely different conditions—can yield only misleading results. General deductions can of course be drawn, and hence the following figures may be of advantage as well as interest:

Deaths from Disease During Certain Wars of the Present Century. (After Bradford.)

Name of War.	Nation.	Year or period.	Mortality from disease per 1,000 strength.
Walcheren expedition	Great Britain	1809	346.9
West Coast of Africa	Great Britain	1824	630.0
Mexican	United States	1846–48	100.0
Crimean	Great Britain	1854	230.0
Chinese	France	1862	118.0
Civil War	United States	1862	40.0
Civil War	United States	1863	60.0
Franco-Prussian	Germany	1870–71	18.6
Cape Coast	Great Britain	1873	173.0
Afghanistan	Great Britain	1878–80	93.7
Egypt	Great Britain	1882	72.1
Soudan	France	1883–86	280.0
Madagascar	France	1895	300.0
Chino-Japanese	Japan	1895	14.8
Spanish-American	United States	1898	25.0