

Military Medical Service during and Immediately after the
Spanish-American War (1898-1901)

by

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Preface

From the beginning of the history of warfare disease has claimed more lives than battle. Even though medical science had been making progress during the latter decades of the nineteenth century, the Spanish-American War was not an exception to this general rule. At the beginning of the war there were certain diseases that still remained a mystery to the world, but there is more to a high death rate than just a lack of knowledge. When examining the causes for a high death rate one must check the knowledge of the period, the competency of the medical personnel, and the quality of the administrators to get a clear picture of the situation. One or even two of these fields will not give a clear and true picture to the reader.

This study undertakes to explore the medical service administered during the Spanish-American War and discover just who or what was responsible for the high death rate from disease present during that war.

Special acknowledgments must be accorded to those that have given advice, criticism, encouragement, and special service. The patience, advice, and constructive criticism of Professor Howard K. Beale will always remain as an incentive to the writer. Mrs. Gladys Jerome gave generously her time in explaining methods of English that a writer should use while writing a paper: methods that enabled the writer to improve his style and writing technique.

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G.W.L.

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General Condition of the Medical Service
from 1865 to 1898

One of the greatest tragedies of the Spanish-American War was that so many Americans died needlessly. Of those that were killed, 541 died either in combat or from wounds received in combat, while 3500 died from diseases contracted in either the United States, Cuba, Puerto Rico, or the Philippines.¹ Someone was certainly responsible for this latter figure and it is the purpose of this paper to discover who was to blame. As an introduction to the main thesis of this study, The Military Medical Service during and Immediately after the Spanish-American War (1898-1901), a brief history will be given of military medicine in the United States from the Civil War to the beginning of the war with Spain. This should help explain the condition of the military medical service at the beginning of 1898, just prior to war.

As compared with the Civil War, the mortality from wounds and disease among the troops during the war with Spain was low.^a The wounded had, to a large extent, the advantage of prompt treatment with antiseptic dressings and a considerable portion of those that were not killed outright recovered without any military operation or septic complications.² The mortality from disease was also comparatively

a. Antisepsis was unknown during the Civil War. The number of wounded during the Civil War was 318,200 and the percentage of wounded dying of wounds was 14.1. The number of wounded during the Spanish-American War was 1600 and the percentage dying of wounds was 6.7. The percentage of wounded during World War I that died was 6.1.

low, although the progress of disease, by months, was quite dissimilar.³ The amount of epidemic typhoid, for example, was greater during the first months of the Spanish-American War, but this rapidly decreased as a result of the active preventive measures that were instituted.⁴

In order to understand clearly the difference between the type of treatment administered during the two wars the state of medical care in the Civil War must be described. Also an explanation must be made to determine how much of the difficulty was due to inefficiency in the armed services and how much to the lack of medical knowledge. Since the mortality was lower during the Spanish-American War the question arises whether this decrease was adequate or could have been still greater.

When the Civil War started in 1861 there was "utter dis-organization, or rather a want of organization, of our entire Army at the beginning of the war."⁵ The Medical Department of the United States Army had not freed itself from the system of blind routine, which, while adequate in peace, failed utterly to meet the necessities of a gigantic war. Surgeon-General Finley, who was a strict believer in not modifying the current system, bound the surgeons with red tape. Whenever a change was deemed necessary through combat experience, it was Finley that fought it. The administration was so mixed up while he was in office, that after a couple months he was removed through the combined efforts of the surgeons.⁶

Even though a new surgeon-general assumed charge, the situation was not greatly improved. The Medical Department still lacked inspectors, and the right to build its own hospitals or

furnish its own food. Officers and enlisted men of the Quartermaster Corps treated medical supplies as secondary and this type of treatment resulted in a persistent shortage of supplies. If the Sanitary Commission and the Christian Commission had not appeared on the scene, there might have been more death and disease than there was during the war. These two commissions, which were run by private initiative, made memorable contributions in tending the wounded, furnishing supplies, raising the morale, and offering religious ministrations.⁷

Lack of knowledge was also an important problem at the beginning of the war. Many surgeons were well qualified, but as in other struggles of this nature there was always a shortage. To fill this gap men with one year's training in medical school and little practical experience were inducted into the Medical Corps. An excellent example of such a man was William W. Keen, who later as a writer emphasized the terrible conditions present during the Civil War.

In 1861 Keen was made assistant surgeon in the volunteer army. After the summer campaign he was mustered out, making it possible for him to finish his two-year medical course. One year later he successfully passed the military medical examination and entered the army as a surgeon. His first job was to obtain and equip sites for two hospitals in Washington, D.C.⁸ Such a responsibility should have indicated that he possessed a vast knowledge of organization and supply. This was not true because Keen was ignorant of the requisites necessary for such a task.⁹ At this time there was utter lack of knowledge of army supply, but practical experiences matured these

medical men so that by the end of the war they were excellent military medical men.

Medical men that had encountered these difficulties during the Civil War never lost sight of them. Keen, for example, lectured from the end of the Civil War until well into the twentieth century, always emphasizing the need for better medical schools. Few doctors believed in revealing their failures, but Keen believed that such experiences might eventually aid medical progress. Once during the Civil War he mentioned that in a period of a few hours he had had five men die of secondary hemorrhage,^a the cause of which was still unknown.¹⁰ In fact, during the Civil War nothing was known about germs. The surgeons performed their operations without antiseptics, which at that time did not exist. The result of the non-existence of the germ theory was that many cases of erysipelas,^b pyaemia,^c and hospital gangrene^d plagued the surgeons.¹¹ Years later when it was proven, by means of experiments, that secondary hemorrhage^e was caused by septic surgery, Keen was one of the first to encourage

- a. A secondary hemorrhage was bleeding which followed an accident after a considerable lapse of time.
- b. Erysipelas was an acute febrile disease associated with intense local inflammation of the skin and subcutaneous tissue, caused by a hemolytic streptococcus.
- c. Pyaemia was a type of blood poisoning in which multiple abscesses developed within the body.
- d. Hospital gangrene was the mortification of a part of the body caused by interference with the local nutrition. In hospitals the germs present caused this interference.
- e. The term septic surgery meant that a sterile field had not been kept during the surgery.

work in bacteriology. That one, short article on secondary hemorrhage may have been enough to influence someone to do research into the cause.

Difficulty in obtaining the necessary equipment and medical supplies was also encountered by the medical officers. One explanation given for this was the time it took almost any piece of equipment invented in Europe to be accepted and used in America. In some instances it took anywhere from five to fifteen years for a new piece of equipment to reach America. Two excellent examples were the ophthalmoscope(1851),^a and the laryngoscope(1858),^b which were almost unknown at the beginning of the war.¹² Such equipment as hemostatic forceps and retractors^c were completely absent at the beginning of the war,¹³ while hypodermic syringes and clinical thermometers began to make an appearance by the end of the war.¹⁴

Drugs, also difficult to obtain, were often outdated and no longer considered useful by many doctors. Two drugs being used excessively and that many doctors believed outdated were calomel^d and tartar emetic.^e As early as 1825 protests against their use were published by patients. One such article appeared in the Richmond

- a. An ophthalmoscope was an instrument for observing the interior of the eye.
- b. A laryngoscope was an apparatus for examining the larynx.
- c. A retractor was an instrument used to get a good view of the depth of a wound.
- d. Calomel was a mild mercurous chloride used as an antisyphilitic, a cathartic, and a diuretic.
- e. Tartar emetic was a vomiting producing drug.

Enquirer on March 5, 1825, in form of a poem. Surgeons of the Medical Department were startled in May of 1863 by Surgeon-General Hammond's circular removing both drugs from the supply table. A controversy arose that made it necessary for Hammond to defend his action. Immediately he stated that military surgeons had frequently used calomel and tartar emetic to excess. Both of these drugs, when thus used to excess were dangerous because of side effects: calomel because it caused profuse salivation and mercurial gangrene; tartar emetic because of the damage to the gastro-intestinal system. Hammond then stated "that more harm has resulted from the misuse of both these agents in the treatment of disease, than benefit from their administration." ¹⁶

A glance at the shortages in both equipment and drugs makes it easy to understand the type of treatment patients received. Temperature had to be taken by touch, which made it impossible for a doctor to be sure of the condition of body temperature. Drugs had to be administered orally, thus increasing the difficulties encountered in treating stomach wounds, throat wounds, and wounds accompanied by severe pain. ¹⁷ Even though these conditions were exposed to the public, many years passed before necessary equipment became widely used, and made an essential part of army supply. William Keen mentioned in his article on the Civil War that the thermometers he had used were large and dangerous, and that it was not until 1876 that he received one capable of being used without danger of breaking, and similar to those in present use ¹⁸ (1900).

Another system greatly improved by combat experience was the method of evacuation of the wounded. The army's method of evacuation

at the beginning of the war was cumbersome and impracticable. The reason for this inadequacy was that seriously disabled soldiers and bulky supplies were retained at the regiment and thus interfered with the mobility of the fighting units.¹⁹ Also there were no reserve sanitary organizations for bridging the gap, often very great, which intervened between the firing line and the division hospital, and between the latter and the advanced base, or for reinforcing the sanitary services attached to commands that were overwhelmed by a high proportion of casualties.²⁰ In 1862 Surgeon-General Hammond noticed this delay and confusion and submitted plans for an independent sanitary organization, but these plans were disapproved by the War Department.²¹

The first man to develop and carry out any great change in the system of evacuation was Medical Director Jonathan Letterman.²² Early in 1862 Letterman convinced General McClellan of the need for special aid of the wounded. Immediately Letterman ordered the establishment of an ambulance corps consisting of permanently detached men trained in their duties, commanded by line officers, and all under the control of the Medical Department. This system proved so successful that it was accepted by Congress, with few changes, on March 11, 1864. With this ambulance corps went a system of mobile field hospitals, which provided for the pooling of supplies and personnel, thus successfully co-ordinating the ambulance corps and field hospitals. The basic structure of our present-day system of evacuation is still modeled after Letterman's original, even though the methods of transportation have been completely mechanized.²³

Many lessons had been learned from experiences encountered during the Civil War, but it was destined to be many years before some of these lessons were actually adopted. Such improvements as vaccination against smallpox, organization of company funds so that proper diets could be adhered to, more strict and careful entrance examinations, and better education for hospital stewards had been accepted, but there was still room for improvement. For example, the Medical Department even at the end of the Civil War was hampered by red tape of the War Department and Congress. Also there was a constant jealousy between different departments in the War Department. Each tried to better the other and this resulted in difficulties that were due to the lack of co-operation between the armed services. Most of these difficulties could have been abolished merely by co-operation of the several departments.

Even though the procurement policy for medical officers had been improved and accepted, this program still left much to be desired. Since 1834 severe examinations testing both the mental and physical strength of a candidate had been followed. Any surgeon requesting admission into the Medical Department had to pass an examination in anatomy, physiology, surgery, theory and practice of medicine, obstetrics, materia medica, pharmacy, chemistry, and medical jurisprudence.²⁴ By 1866 the size of the Medical Department had been set by Congress and consisted of one surgeon-general with the rank of brigadier general: one assistant surgeon-general with the rank of colonel of cavalry: one chief medical purveyor and four assistant medical purveyors with the rank of lieutenant colonel of cavalry: sixty surgeons with the rank

of major of cavalry: and one hundred fifty assistant surgeons with
the rank of lieutenant of cavalry.²⁵ Restriction, such as this, always
leaves problems, since it is impossible to look ahead and know certainly
whether in case of aggression the number will be adequate.

On March 3, 1869, all promotions and appointments were
suspended, leaving the Medical Department with the predicament of
further shortage of personnel and rank. This suspension of appoint-
ments even for five years greatly disorganized the Medical Department.
By 1874 there were sixty vacancies left unfilled, and when the depart-
ment was short-handed to start with, this was a serious and important
problem. Between 1869 and 1898 further cuts were made, and with the
start of the Spanish-American War there were only fifty surgeons and
one hundred ten assistant surgeons on duty.²⁶

Living accommodations and hospital facilities during this
period were not of required qualifications. When A Report on Barracks
and Hospitals was published in 1870, such inadequacies as poor
ventilation, old-fashioned methods of waste disposal, dampness, and
overcrowdedness were exposed to the public. Overcrowdedness presented
the dangerous problem since it was especially true of depots for recruits
and moving troops, who were very susceptible to diseases brought from
civilian life. The hospitals were said to have shown improvement, but
the lack of permanent hospitals would have presented a serious problem
had the United States become involved in another war.²⁷

Five years later a similar report was published, and emphasized
the hygiene of the United States Army. The prevention of disease, rather
than stopping the spread, was emphasized as being the main objective.

The major problem encountered in carrying out this work was the lack of co-operation between the medical officers and some of the commanding officers. The effect of such conditions, setting aside injuries to which the soldier is especially liable, was a higher percentage of deaths from diseases among these picked men than among men of the same age in civilian life under the same conditions of climate. ²⁸ Nothing was mentioned on water purification, food-borne infections, causes of disease, insects, and infections in general, for the reason that modern hygiene was just being developed in Europe and was still unborn in America.

A physician in order to be superior in his work must have an education that will develop to the utmost all of his abilities. During the period between 1865 and 1898 the medical schools were not accomplishing this task. Many of these schools were commercial in nature, and very little effort was made by the boards of regents to obtain necessary materials, instructors, and equipment. Accordingly the type of students enrolled was of a low quality. Many of these medical schools did not even require a high school diploma, while others required only one or two years of college as an entrance requirement. ²⁹ Many years later these points were seconded by Doctor Erwin Ackerknecht who said, "Sometimes diplomas were issued by 'diploma mills', which did not pretend to give even the lowest grade of instruction." ³⁰

An important requirement necessary for an excellent medical education was the use of laboratories and clinics in instruction. A few schools had excellent laboratories and clinical facilities, but

most of the schools were completely lacking in these essential requirements. Some of those in operation were so small and disorganized that it was impossible to receive proper instruction. In some medical schools courses such as histology, pathology, bacteriology, chemistry, physical diagnosis, anatomy, and physiology were absent. The Philadelphia Medical Journal stated in 1900 that some or all of these branches were so slightly taught in some colleges that their graduates entered professional life practically halt and blind.³¹ Surgeon-General George Miller Sternberg stated, "It should be our aim to remedy this evil by elevating the standard of medical education, as we are doing in many parts of the country, by impressing upon the rising generations of physicians the importance of laboratory work not only as a means of instruction, but for the purpose of cultivating a scientific spirit of inquiry and just appreciation of the value of scientific evidence; and finally by instructing the public with reference to the present status of scientific medicine, the difference between fact and fantasy, between the vagaries of the imagination and the demonstrable results of scientific investigation."³²

The type of training received by the students greatly affected the amount of research and experimentation. The lack of enthusiasm on the part of most army and civilian doctors did not help to raise the standards of the medical service during the latter half of the nineteenth century. It is a logical conclusion that with understanding lacking about how particular diseases were communicated, it would be impossible to prevent or even combat the spread once it appeared.

To mention all of the examples of such a lack of knowledge

of the means of communication of diseases would be lengthy, because during this period the germ theory was just being developed and knowledge about the etiology^a of diseases was scarce or completely absent. Yellow fever was an excellent example of a disease whose etiology was still a mystery to physicians. Until the beginning of the twentieth century, the method in which yellow fever was spread was still practically unknown. It would be unjust to say that no-one was close to the right answer because as early as 1881 Doctor Carlos Finlay of Cuba had promulgated the theory of the transmission of yellow fever by the mosquito. Finlay even named the type of mosquito, which years later was discovered to be the correct type.³³

Many reasons may be given for people's refusing to believe what Finlay thought to be true. One was the utter confusion before 1881 on etiology. Up to this time people believed that yellow fever was transmitted by personal contact, articles, sexual excesses, and even the air. The question arises, why, if there was so much confusion, did not anyone back Finlay's theory? Finlay himself was responsible because in his experiments he failed to show definitely that the mosquito was the transmitter. Also the idea of an insect's spreading such a deadly disease seemed rather preposterous to the majority of people. The result of this rejection was that the world continued to suffer from the disease, and there was little research on the mosquito theory between 1881 and 1900.

a. Etiology is the study of diseases and their spread.

Throughout the nineteenth century in America there was a constant battle going on between two medical sects, the allopaths and the homeopaths. The term allopath had a loose meaning and meant members of the regular profession, as distinguished from the other schools of thought. Homeopathy was one of these schools of opposition that believed all diseases were curable by drugs, which produced pathological effects on the body similar to those produced by the disease (Like is cured by like), and that only infinitesimally small doses of drugs should be given.

Homeopathy grew in importance because of the large number of people that distrusted severe methods then in use. Bloodletting was still considered by allopaths an efficacious general treatment for sickness, and resulted in many people's changing from allopathy to homeopathy.

These two sects influenced the medical service in the army during the latter half of the nineteenth century. Both of these groups had practices that had been proven and accepted as excellent methods of treatment. Naturally, since they were the two most important groups, both would have some doctors accepted into the Medical Department, and these doctors would have used their beliefs as the methods of treatment. The ironic thing was that both of these sects had practices that could not be scientifically proven, and that lost out to the scientific method transposed from Europe at the end of the nineteenth century. Doctor William Osler, while writing on these sects, mentioned that "A new school of practitioners has arisen which care nothing for homeopathy and less for allopathy. It seeks to study,

rationally and scientifically, the action of drugs, old and new."³⁴

Surgeon-General Sternberg can be described as one of these early doctors that believed in and propagated the scientific method. His books on the value of commercial disinfectants, bacteriology, malarial fever, immunity, and serum therapy were some of the first of their kind in America. In 1897, because of his sincere devotion to the cause of scientific medicine and advanced medical education, he was elected president of the American Medical Association.³⁵ For many years General Sternberg considered it the function of the physician to popularize knowledge regarding infectious diseases and preventive medicine, and to this end he took infinite pains to make his lectures interesting and informative. His address to the American Medical Association in 1898 clearly explains his view of the new scientific medicine. While discussing the old sects Sternberg explained that "... while, therefore, we still have with us some 'old school doctors,' who have fallen behind the procession, the profession as a whole has been moving forward with incredible activity upon the substantial basis of scientific medicine. Not that our science is complete, for we have still many things to learn and many problems which have thus far resisted all efforts at their solution; but we have learned how to attack these problems."³⁶ It was Sternberg, during the last two decades of the nineteenth century, that played a leading role in the building of this new scientific school.

So far only shortcomings have been mentioned, but there were some major improvements during the seventies, eighties, and early nineties. When the problem of the importation of diseases'

by immigrants arose in the seventies, the National Board of Health was organized. This board consisted of seven members (one medical officer), whose job it was to obtain information concerning the matters of public health and to advise upon a plan of action to be followed. As one means of obtaining the necessary information, a medical officer was placed at all important ports to check incoming immigrants for signs of disease.³⁷ This was an excellent means of preventing many types of diseases from being brought into the country, and of gaining experience in detection and treatment.

Those medical men that served during the Civil War had never forgotten the importance of hospital stewards. They still remembered that when casualties were high, it was the stewards that were responsible for most of the work. Finally in 1887, the stewards were organized into the Hospital Corps of the Army and attached to the Medical Department. This organization of the stewards gave this group its chance to become efficient in knowledge and methods.³⁸

By 1893 recruits seeking to become hospital stewards were sent either to Fort D.A. Russell, Wyoming, or Fort Riley, Kansas. Here practical work such as first aid, principles of nursing, drill, and evacuation was taught the fresh recruits. When a student was graduated from this basic course he was transferred to a special field school, where he studied a specific job of interest to him.³⁹

Later in 1893 regulations were passed requiring the Hospital Corps to hold regular drills in marching, litter carrying, ambulance service, and improvised carries.⁴⁰ The major reason for enacting this law was the belief of superior officers that such practice would improve

the skill as well as the morale of the men. The Hospital Corps also had examinations, which could result in advancement from a private to an acting steward, and finally to the position of hospital steward. This method achieved much in the improvement of skill and treatment of the sick, because when a steward proved his value to the corps advancement quickly followed.

Lack of training of any sort had always been a problem with new medical officers. From the time of the Civil War to the 1890's nothing was done to alleviate this situation. Finally on June 24, 1893, Surgeon-General Sternberg organized the Army Medical School, first of the so-called "special service schools," at Washington, D.C.⁴¹ The objective was to instruct in their duties as medical officers candidates approved for admission to the Medical Corps.⁴² This type of training was an important requirement, because these men did not learn responsibilities of a medical officer in their college instruction.

At first candidates were required to spend four months at this school, and the instruction was the best the army could provide. Such men as Walter Reed, William Keen, and Surgeon-General George Miller Sternberg were included on the staff to give classes. Many famous physicians were invited to give classes in their special fields. The curriculum consisted of pathological and chemical laboratory classes, military surgery, hygiene, military medicine, and duties such as administrative organization, supply, and personal conduct. The army believed that if they trained these medical officers to be proficient in their duties, the men under them could not help but be influenced by them.

Although the Army Medical School was a center of scientific interest, there were problems that affected the proficiency of its graduates. Length of instruction had been a predicament since the beginning in 1893. Instructors, through experience, knew that it was impossible to do their best work in only four months. This situation was somewhat corrected in 1897 when the course was extended to five months.⁴³ Crampedness of space was a problem ever present since the founding, because the school had been placed in a building already occupied by the library and museum of the Surgeon-General's Office. This situation remained difficult for many years because of a lack of funds to build necessary facilities. Also many of the students lacked initiative since rank in the class meant nothing in obtaining promotion.⁴⁴ Rank's being difficult to obtain caused many students at an early stage to show a disposition to do as little as regulations would allow.⁴⁵

Special classes dealing with first aid were also started for officers, hospital corpsmen, company bearers, and enlisted men. This type of treatment differed from regular medical treatment in that it was temporary assistance rendered by persons without medical training. During any war this type of treatment, which could be administered by anyone before regular medical attention was possible, proved to be just enough to save many lives. Instruction consisted of oral and text-book type, but emphasis was placed on practical demonstrations and applications.⁴⁶

Another subject that began to receive special attention was physical training. It was common knowledge that if a person was in

excellent condition he would be able to do more work, or even fight more vigorously. The point that had not been emphasized was that by increasing the physical training, the power of resistance to disease was also increased. By 1897 rifle drill, bar bell drill, calisthenics, and track were being emphasized as necessary for a healthy and efficient army.⁴⁷

Experimentation, which took place during the nineties, in methods of administration of drugs resulted in an interesting conclusion. Captain Kneedler, who was the officer in charge of experiments at San Diego Barracks, said, "...there is no question but that ignorance of the true nature and purpose of the tablet leads to administration of drugs in tablet form when such administration is hurtful alike to the welfare of the patient and the reputation of the practitioner."⁴⁸ Kneedler called attention to the use of certain drugs that illustrated this situation. First of all potassium bromide given in tablet form was slow in disintegration and irritating to the gastro-intestinal system; bicarbonate of soda disintegrated slowly and caused acute indigestion in the patient; and sulfonal was shown to pass through in the stools.⁴⁹ This report urged Doctor New of the Surgeon-General's Office to state in his report that if the integrity of the drug was not impaired, it would be wise to insert a clause in the circular making rapid solution or disintegration a requirement.⁵⁰

Work in bacteriology had started as early as the 1870's in Europe. About this time the germ theory began to take form. Robert Koch, famous German scientist, began to expound the theory that "One germ, one kind of germ only, causes one definite kind of disease--every

disease has its own specific microbe." ⁵¹ The problem encountered by the scientists in Europe was that so far everyone had failed to find a method of growing one species of germ away from all other contaminating ones that were always threatening to sneak in. Until this problem was solved it was impossible to do further investigation on the germ theory. Finally, Robert Koch, who was still unknown in the field of bacteriology, solved this problem. One day by accident he discovered that germs as they fell from the air had to stay where they landed, and there they multiplied into millions of their own kind. Now scientists began to study individual microbes and attempted to discover what germs were responsible for specific diseases.

Work in bacteriology and hygiene had their beginnings in the 1880's and 1890's in America. During these last two decades a few colleges began to introduce hygiene and bacteriology into their curricula. This movement was slow, but it was a beginning. True, most of the work in these fields had been done in Europe by such men as Louis Pasteur, Robert Koch, Joseph Lister, and many others, but America did have a few scientists that became noted in these fields. One such man was George Miller Sternberg of the United States Army Medical Corps. In 1893 Sternberg published his Manual on Bacteriology, which consisted of 900 pages on classification of micro-organisms and described nearly 500 species, including 158 pathogenic varieties. For many years this was the leading manual for students and teachers of medicine in the United States. Doctor Walter Reed, another well-known bacteriologist, congratulated Sternberg on writing such an excellent and "exclusive" work, but Reed could not understand how an army medical

officer, in the midst of daily routine, could have written such a
⁵² study. Energy and ability were the answers to this question.

Another man that gained world-wide fame was Theobald Smith. In the 1880's Smith began to study bacterial germs and immunity to them. When Texas fever threatened to destroy the beef-cattle industry, Smith was the scientist that began searching for the answer to this dreaded disease. In the end Smith discovered the cause of Texas fever in cattle and proved that the germ was carried by ticks. This research was important because it saved the beef-cattle industry and established the importance on insects in the spreading of diseases.

Medical development also took place in state volunteer and national guard outfits. Massachusetts, which was the first state to sponser schools for medical reserve officers, set up regulations dealing with the establishment of an emergency ration, the duties of medical officers, and the type of examinations to be given officers
⁵³ and enlisted men. These medical schools were established to create a close relationship between officers serving in the same departments, to familiarize officers with their duties, and to lead to discussions that in turn would result in necessary reforms.
⁵⁴ Classes consisted of oral and practical work in personal hygiene, use of clothing, heating and ventilation, keeping records, camp hygiene, selection of camp sites, litter practice, ambulance drill, holding sick call, sick reports, duties in examinations of recruits, horsemanship, superintending preparation of foods, and relationships that should exist between a medical officer and
⁵⁵ commanding officers. This work started by the state of Massachusetts spread rapidly to the other states; yet a serious problem remained because

of the shortage of medical officers in reserve units. In time of aggression many doctors would be needed immediately.

So far no mention has been made of the condition of nautical medicine. The reason for this is that the navy was far behind, because in the last century few battles had been fought on the seas. Since the time of the War of 1812 the American navy had been allowed to deteriorate, and it was only during the last decades of the nineteenth century that rebuilding was emphasized. Most of the advancements of nautical medicine were made during and immediately after the Spanish-American War, and as a direct result of the war.⁵⁶

With the coming of the war of 1898 many of the inadequacies mentioned were still present. First of all, the number of men in the Medical Department was inadequate. Since the Civil War the size of the Medical Department had remained almost stationary and this failure to look ahead and provide for expansion presented a serious and dangerous problem in event of a war. The medical reserve units, too, were undersized and this presented the possibility of drafting doctors that would be completely ignorant of military sanitation. Secondly, the medical officers lacked power just as had been the case in the Civil War.⁵⁷ The medical officers could make recommendations, but they were still helpless if the commanding officers refused to carry out these sanitary requests. Thirdly, the types of medical school in existence at this time were responsible for doctors that were lacking in adequate laboratory and clinical experience. In fact, it was not until the beginning of the twentieth century that the poor medical schools began to disappear,⁵⁸ and then it was only after men, such as Abraham Flexner and William

Keen, harshly criticized the states for allowing such schools to exist. Fourthly, the red tape that was encountered in appropriating funds and requisitioning supplies caused delay that in time of war could be extremely dangerous to human life. Finally, the problem that can be said to be the most serious was the lack of co-operation between the different divisions of the War Department. These divisions were constantly jealous of each other and co-operation was something that was necessary but lacking. An excellent example of such a feeling was the belief held by the Quartermaster Corps that the medical supplies in time of war were secondary in importance. This lack of co-operation had resulted in deaths and sickness during the Civil War and unless corrected would result in the same during any emergency.

The purpose of this thesis will be to show the conditions present during the Spanish-American War, the type of treatment administered by the surgeons and corpsmen, and the effects of this war on the Medical Department.

APPENDIX 1

24. Calomel: An Old Song, Altered and Enlarged

Physicians of the highest rank
To pay their bills we need a bank;
Nor talents bright, nor art, nor skill,
Preserve us safe from Calomel.

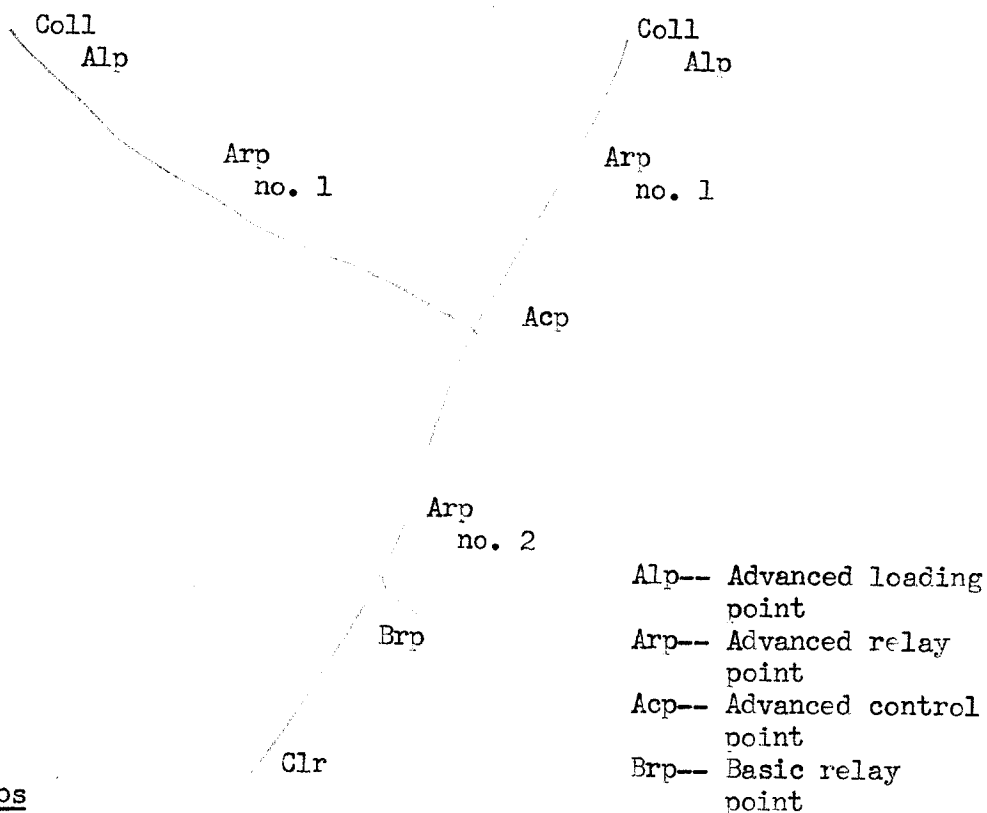
Howe'er their patients do complain
Of head, or heart, or nerve, or vein,
Of fever, thirst, or temper fell,
The Medicine still, is Calomel.

Since Calomel's become their boast
How many patients have they lost,
How many thousands they woke ill,
Of poison, with their Calomel.

Physicians, hear of friendly voice
Receive my counsel, take advice,
Be not offended, tho' I tell,
The dire effects of Calomel.

And when I do resign my breath
Pray let me die a natural death,
And bid you all a long farewell,
Without one dose of Calomel.

32. Model scale of evacuation plan(Medical Field Manual)

Primary Jobs

1. Transportation of evacuees from collecting to clearing stations
2. Transportation of evacuees from advanced ambulance points to collecting stations
3. Emergency care of sick and injured in route

Secondary Jobs

1. Transmission of messages from one unit to another
2. Transportation of supplies
3. Transportation of medical personnel

Procedure

1. The patients are picked up at the Alp and the ambulance starts to rear.
2. When the ambulance passes Arp no. 1 another ambulance moves to the Alp.
3. When the ambulance passes Arp no. 2 another ambulance moves to Arp no. 1.
4. The job of the Acp is to tell the ambulances which road to take.
5. When the ambulance passes the Brp another ambulance moves to Arp no. 2.
6. Ambulances take the wounded to Clr and return to Brp.

Footnotes

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Mobilization of the United States Medical Department:
Action in Cuba and Puerto Rico

When war was declared by Congress on the 25th of April, 1898, the United States Army Medical Department was totally unprepared. Until April 23, 1898, the Medical Department had been denied the privilege of endeavor.¹ Under President McKinley's interpretation of "national defense," fifty million dollars appropriated by Congress March 9, 1898, was withheld from the Medical Department's usage. They could not procure or order any equipment, clothing, tentage, or medical and hospital supplies, in excess of the ordinary supply of March 9, 1898.²

In time of peace the number of medical officers of the regular army (177) had been thoroughly inadequate. Surgeon-General George Miller Sternberg had attempted to increase the number of personnel prior to war, but Congress, absorbed in the subject of fiscal economy instead of increasing the Medical Corps, was determined to reduce its numbers.³ Immediately upon declaration of war Sternberg, anticipating possible difficulties, dangers, and far-reaching consequences incident to the enrollment of medical officers that had training in neither military hygiene, camp sanitation, nor medico-military administration, attempted to place the best men of his corps in a position where they could train and direct new appointees.⁴ To aid the medical men that had the job of instructing and directing new appointees, Sternberg issued two circulars concerning sanitation and duties.

Upon the arrival of the first volunteer soldiers, the shortage

of doctors became apparent. On May 12, 1898, Congress authorized the addition of fifteen assistant surgeons. This brought the total number of medical officers to 192, exactly the number authorized before 1894. But the number was still insufficient and Congress authorized Surgeon-General Sternberg to obtain as many contract surgeons as necessary. Services of over 650 contract surgeons were engaged by the Medical Department during the war. ⁵ These men performed excellent service, because most of them were thoroughly equipped physicians and surgeons with ample hospital experience. A few incompetent doctors were able to enter the service, but this was due to the great pressure of business of the Medical Department. Since it was impracticable to hold examinations because of the lack of time, Sternberg endeavored to choose from professional endorsements of each candidate.

It was necessary to instruct these contract doctors on the subjects of camp sanitation, personal hygiene, and army supply. Medical officers in charge of hospitals were given this duty, and information published by the Medical Department proved very valuable. ⁶

The Hospital Corps was also restricted at the beginning of the Spanish-American War. Previously the corps had been limited to one hundred hospital stewards and a set number of acting stewards and privates. These men in order to obtain promotion had to have at least twelve months of service in a specified grade. When war was declared Sternberg recommended that all laws restricting the number of hospital stewards to one hundred be changed, and that regiments of volunteers, infantry, or cavalry have one hospital steward, one acting steward, and five privates; and each division of the army one hospital

steward, one acting steward, and fifty privates to serve under the direction of the chief surgeon of the division.⁷ These recommendations were acted upon favorably and by the Act of June 2, 1898, Congress suspended during the existing war all provisions of law limiting the number of hospital stewards to one hundred, and requiring that a person to qualify as hospital steward, first demonstrate his fitness therefor, by actual service of not less than twelve months as acting hospital steward, provided that the increase of hospital stewards did not exceed one hundred.⁸ In addition to the two hundred hospital stewards, one hospital steward⁹ was provided for each battalion of a volunteer organization.

This was not even close to the number required. At the start of the war there were only 520 privates, or about one-twelfth of the number at the end of the war. Mustering officers had been recommended to enlist desirable men approved by medical officers, but a severe shortage still existed. On May 31, 1898, General Order No. 58, Headquarters of the Army, Adjutant-General's Office, authorized the transfer of men from the line of volunteers to the Hospital Corps of the regular army, upon the recommendation of the chief surgeon. Also when dealing with independent corps and brigades, commanding officers were charged with full control of the transfer from the line, enlistment and discharge of members of Hospital Corps, and selection of acting stewards and stewards. This procedure caused many serious problems because often the officers were not qualified to choose men for service in the Hospital Corps.¹⁰

During the war approximately six thousand men were transferred to the Hospital Corps, but owing to limited appropriations,

the body of trained hospital corpsmen was not sufficiently large. This necessitated the detail of enlisted men to help out in regimental hospitals, and the employment of female nurses.¹¹ Fore-seeing this necessity, Surgeon-General Sternberg applied to Congress on April 28, 1898, for authority to employ by contract as many nurses as might be required during the war. Permission was promptly granted¹² and the task of selecting those qualified began.

About the same time the National Society of the Daughters of the American Revolution offered its services as an examination board for female nurses. This offer was accepted and thereafter most of the female nurses employed were selected by this society. By June 30, 1898, over 1700 female nurses had been employed, at first in general hospitals, and later at field division hospitals when it became evident that more help was needed to treat the large number of sick and wounded coming from the regimental camps.¹³ The nurses did excellent work in relieving the pain and raising the morale of the sick and wounded.

Medical and hospital supplies, though sufficient in time of peace, were inadequate in war. Immediately after war was declared and money for purchasing became available, many purchases were made on the open market, but provisions necessary for establishing efficient camp or field hospitals could not be obtained.¹⁴ This was especially true of medicine chests, surgical instruments, hospital tents, and furniture. Surgeon-General Sternberg always argued that if the Medical Department had been permitted to use some of the fifty million dollars appropriated for offensive preparations, this situation would not have

15
resulted. By May 3, 1898, an emergency existed and Sternberg telegraphed governors of several states asking for authority to utilize medical equipment until regular supplies were ready for issue. Most of the governors responded promptly and offered their resources, but many states did not have any such equipment. 16

As the supply table was inadequate in time of war, a new one was prepared. This was approved by the Secretary of War on May 9, 1898. The intention was to provide the needs of units in active service, where only limited articles could be carried when being transported elsewhere. 17 Special authority was granted in case of emergencies. This new supply table was published and distributed throughout the army.

Promptly following the declaration of war, plans were made by the War Department to raise the combined strength of the regular and volunteer units to approximately 275,000 men. The age limit was lowered from twenty-one to eighteen and in Sternberg's opinion, "This reduction of the age limit had a notable influence in increasing the prevalence of diseases among the troops." 18 Medical examinations were given by qualified examiners, but afterwards many men on sick reports were discovered to have defects existing prior to enlistment. This predicament disclosed the necessity of stricter and more vigorous procedures for examining recruits.

From the induction center the recruits were sent to instruction camps, where, soon after the newly-raised recruits were aggregated into large camps, sickness began to appear. This sickness was caused by the lack of knowledge on the part of officers and enlisted men concerning

the elementary principles of camp sanitation, and complete ignorance on the part of officers of their duties and responsibilities in regard to the welfare of enlisted men in their commands.¹⁹ In most cases disease was caused by the manner of occupation of a camp site, not the site itself.²⁰

Surgeon-General Sternberg, foreseeing the likelihood of unsanitary conditions because of the lack of medical officers efficient in their duties, issued Circular No. 1 on April 25, 1898. This circular emphasized the responsibility of medical officers in sanitary matters and the importance of a strict sanitary police in preventing a camp site from being contaminated.²¹ If these recommendations had been heeded much of the sickness could have been prevented, but there were certain conditions that made sanitary camp sites impossible.

The primary evil was overcrowding a site.²² One medical officer assigned to duty at Camp Alger, Virginia, noted that on his arrival there were already a number of regiments in camp, and that more troops were arriving on every train, generally without previous announcement, and camped where they saw fit.²³ When a camp site was set up, wide streets, ample space for separation of tents, and a front that afforded room for needful sink accommodations, were necessary in order to prevent the area from becoming contaminated. Contrary to these rules, many officers believed that military quarters should be as compact as possible. At both Camp Alger and Chickamauga the companies of a regiment were crowded on an area insufficient for those of a battalion, and brigades were packed

together with scarcely any interval between them.²⁴ This resulted in tents being pitched adjacent to each other, and without sufficient room for the correct placement of sinks, both of which conditions constituted a serious danger.

Another problem that presented itself soon after the declaration of war was the immediate need of camps of instruction for new recruits. Many of the camps were small and had been used previously only for national guard training periods of only a week or two. In contrast, with such a density of troops, the continued use and occupation of the areas inevitably resulted in the breaking down of the commands by diarrhea, dysentery, and typhoid fever.

As soon as disease began to increase in camps situated in the United States, inspection teams were sent to investigate. These teams consisted of medical officers and doctors that had the job of inspecting all of the camps and discovering the causes for the prevalent diseases. One such team consisted of Major Walter Reed, Major Victor Vaughan, and Major Edward Shakespeare. This commission was recommended by Surgeon-General Sternberg and approved by Adjutant-General Corbin. The purpose was to spend time at each of the posts and discover why typhoid fever was so prevalent. Sternberg knew that great progress had been made since the Civil War on the knowledge of the etiology and prevention of typhoid, and he wanted to know why there were so many cases of typhoid fever present.

Camp Chickamauga, Georgia, was one of the first sites examined. Here an epidemic of typhoid fever was raging, and over

4500 cases had developed in a camp of 47,000 men.²⁵ The commission checked the site and said it was excellent with one exception: drainage was inadequate. This area had a hard layer of limestone, which prevented the digging of adequate sinks and resulted in poor absorption of liquids by the soil. Whenever it rained, water instead of seeping into the ground tended to remain on the surface and run from one group of tents to another. Sinks filled up with water, and excreta was spread over the entire area. Naturally this type of drainage eventually contaminated the water supply and was one of the causes given for the epidemic of typhoid.

Camp sanitation at Chickamauga was also lax. Because of an inadequate camp police, men never hesitated to defecate or urinate on the ground. Personal cleanliness was a serious problem. Captain John Olmstad criticized the distance to the water supply. The two miles men had to walk to bathe prevented many from taking baths regularly.²⁶ These conditions, coupled with the large number of flies present, accounted for the epidemic scale of typhoid, diarrhea, and dysentery.

In the inspection of Camp Alger, Virginia, the commission found the site to be excellent, since it was on elevated ground and had extremely good drainage. But the lack of a sufficient supply of good water was a serious problem at this camp. The commission said that this shortage should have prevented a rapid concentration of large numbers, but even though this problem existed, over 19,000 soldiers were stationed at this camp.²⁷ At first disease was not prevalent, but in a short time over 1800 cases of typhoid fever

had developed. Diarrhea and dysentery also began to appear among the troops.

Here, as at Chickamauga, the lack of camp sanitation was evident immediately upon arrival. The sinks on the average were good, but a few were not covered. Men were seen excreting on the soil, an excellent method of spreading intestinal germs from one person to another, especially with the large number of flies present.
28

Another procedure witnessed by this group took place in the hospital. The doctors during the Spanish-American War, unlike the doctors of the Civil War, knew that typhoid was infectious, and soldiers suffering with typhoid were isolated from the other patients. Difficulty arose when men, intrusted with the job of disinfecting clothing, excreta, and themselves, were careless in carrying out their job.
29 Many convalescing sick were also sent back to their companies before they had ceased being carriers of the germs. Their return greatly affected the spread of diseases prevalent in Camp Alger.
30

One of the camps considered superior in location and sanitation was Camp Meade, Pennsylvania. Here the site was perfect: the camp was situated on an elevated area and easily drained; water was abundant and the quality excellent; and sanitation measures were superior because of the strict police adhered to at all times.
31 One thing that puzzled the inspectors was that despite all of these preventive measures, some 1800 cases of typhoid prevailed in a unit of 15,000 men. Investigation proved that most of this disease was

spread by persons that had been transferred into this camp from
32
other infected areas.

From these camps of instruction the men were transferred to ports of embarkation. Thus far only one port on the east coast, Tampa, was considered a port of embarkation. Here the first expeditionary force was to be assembled and prepared for the coming conflict in Cuba.

Tampa, besides having inadequate port facilities, lacked an efficient transportation system. Only two railroads entered this port, each having a single track, and made impossible a continuous flow of supplies to the docks and storage areas. When supplies finally reached the docks, they had to be stored directly on the docks, because the port lacked warehouses. This type of storage resulted in damage from the elements and confusion from the lack of working space.

Troops stationed at Tampa were quartered either at the Port of Tampa, or in the pine woods directly back of the City of Tampa, which was nine miles from the port.
33
These troops began arriving the last two weeks in May and remained till the embarkation on June 14, 1898. While waiting for orders to invade Cuba, these soldiers spent most of their time on maneuvers and drills, which proved valuable while fighting the Spaniards. Exercise though necessary was done at a disadvantage, because these men had only their winter uniforms in which they were inducted. Since the weather
34
was extremely hot, kakhi uniforms were the issue, but supply did not have any kakhi uniforms at hand. Many soldiers from the northern

states wore their winter uniforms from the time of induction throughout the tropical battles in Cuba.

While the first expeditionary force was preparing at Tampa, marines on June 10, 1898, landed a force of 600 men at Guantanamo Bay. The objectives of this group were to make the outer harbor of Guantanamo Bay a secure place for the use of vessels when coaling, and a rendezvous and refuge in stormy weather.³⁵ Also cable communication was to be maintained between the United States and Guantanamo Bay so that dispatches of the military campaign could be quickly sent to the United States.³⁶

On June 11, 1898, the outposts were fired upon by the Spanish and the attacks lasted about three days. At first it seemed as if the entire force would be exterminated, but the unit valiantly held its ground.

Men wounded in this battle were treated either on shore or on the battleships in the bay.³⁷ On land, Josiah Gibbs, a well-known doctor from New York City, was constantly treating the wounded, even when in danger of being struck by enemy fire. On June 11, while dressing the wounds of the injured, he was hit in the forehead and died immediately.³⁸ By June 14, the Spaniards were repulsed and the wounded still on shore were evacuated to the ships.

After one false alarm on June 7, orders were received to prepare to sail immediately. Finally on June 14, the expeditionary force left Tampa for Cuba.

The loading of supplies on these transports was so disorganized that many of the supplies were never located when unloading

took place. No record or map was kept of the loading, so that when something was requested it was impossible to know where to look for the articles. Altogether thirty-six transports were used to transport over 16,000 men to Cuba, while the navy provided fourteen warships to act as a protecting escort.⁴⁰

These transports were built chiefly for freight and were not suited or properly ventilated for troopships. This argument was used by General Miles, commander of the United States Army, when he requested Secretary of War Alger to charter suitable ships for the transportation of the expeditionary force to Cuba. Alger's answer was that the ocean liners drew too much water, so that it was impossible to use such vessels at the Port of Tampa.⁴¹

Lack of space, or overcrowdedness, was another serious problem present on the transports. When men and animals are placed on the same ships, and care is not taken, serious sickness can prevail. Luckily the trip from Tampa to Cuba took only eight days and the weather was not rough.

Food and water were nauseating, and many men healthy when they left Tampa were weakened by the time they reached Cuba. Fresh meat and vegetables were absent, and the diet consisted of canned beef, beans, and tomatoes.⁴² This menu may sound sufficient, but when there was not any variety and the chance of everything being spoiled was common, it was easy to understand why the constitutions of many were lowered. Water on most of the ships was foul. The medical officers had examined the foul-smelling water before the embarkation, but their verdict was that the water, even though it

smelled foul, was not contaminated. Some officers even volunteered to purchase new water, but General Shafter said that the water on hand was good enough.⁴³ Also the Quartermaster Corps was responsible for placing improper wooden tanks on board the ships and for failing to keep them clean. A newspaper correspondent, Richard Harding Davis, said that water was so foul that it could not even be used for the purpose of shaving.⁴⁴ He described the smell as that of a frog pond or a stable yard.

General Shafter, commanding general in charge of the first expeditionary force, had ordered loaded only the supplies he thought would be necessary. Ambulance trains of all the divisions were left behind, and only three ambulances for over 16,000 men were at hand.⁴⁵ Baggage wagons and mules of the Medical Department were also left at Tampa and were never seen again by the Medical Department of the Fifth Corps.⁴⁶ A large part of each hospital's equipment and tentage was left in Tampa.⁴⁷ Even doctors were refused permission to take their medical and surgical chests.⁴⁸ Those that were permitted to do so were unable to find their chests when the convoy landed in Cuba.

When questioned about this gross incompetence in preparing properly for battle, General Shafter answered that he had taken as much equipment as previous experience had deemed necessary. Shafter never answered just what previous experience he had followed.

The fleet of transports and warships, carrying the Fifth Corps, arrived off Santiago de Cuba at noon on June 20. Immediately the headquarters transport Seguranca, with General Shafter and Admiral

Sampson on board, proceeded to Aserradera, which lies on the coast about eighteen miles west of Santiago. Here a conference was held with General Garcia and General Rabi, commanders of the Cuban resistance, at which all possible points of attack were discussed. General Garcia, knowing the strength of all the points, thought Daiquiri the best possible point of disembarkation. Shafter and Sampson agreed on Daiquiri, since it was only sixteen miles in a direct line from Santiago de Cuba, and was occupied by about 300 Spanish soldiers.⁴⁹

General Shafter then laid out his plan of campaign. The landing at Daiquiri was to start on June 22, and soon after another landing force was to land at Siboney, a port ten miles west. As soon as possible the land force was to proceed toward Santiago, which was the main objective of the campaign. Simultaneous with this plan were a series of bombardments on Aguadores, Ensenada de los Altos, and the Bay of Cabanas.⁵⁰ These attacks were meant to divert Spanish attention from the main landings.

Disembarkation began at Daiquiri on June 22: continued throughout the remaining part of the twenty-second and all day the twenty-third, and was completed by the evening of the twenty-fourth. The landing at Siboney began at noon of the twenty-third and continued for about one week. The fact came out later that it was not a complete landing because it did not include the large guns or the bulk of supplies. Critics of the campaign later said that this showed the confidence of Shafter that the campaign would be very short;⁵¹ others placed the blame on inadequate landing facilities.⁵²

There was no excuse for inadequate landing facilities, because on May 31, Secretary of the Navy John D. Long had asked Shafter what means would be employed for the landing of troops, artillery, horses, siege guns, and other bulky supplies when the pending military expedition arrived on the Cuban coast near Santiago. ⁵³ Shafter had answered that lighters, steam tugs, and barges would be used to unload heavy equipment.

When Shafter left Tampa several such crafts were included in the movement, but had been lost at sea. ⁵⁴ On June 25, when experience showed him that heavy equipment could not be unloaded without lighters and steam tugs, Shafter sent a telegram to the Adjutant-General asking for lighters and one steam tug for the purpose of unloading supplies. ⁵⁵ The Adjutant-General (Corbin) quickly sent these landing facilities, but rough weather prevented lighter after lighter from reaching the Cuban coast. ⁵⁶

Medical supplies were lacking from the beginning of hostilities because of the disorganization and lack of landing facilities. After an extensive search at Daiquiri, the transport Rio Grande was found to have medical supplies on board. The doctors and men of the Medical Department took ashore as many as possible in a rowboat, which was the only landing craft on the Rio Grande. ⁵⁷ Later when this rowboat was sunk it was impossible to unload any more supplies. Some doctors did not see their surgical chests throughout the Santiago campaign.

The first serious engagement took place on June 24. Spanish troops, which had been withdrawing since the landings at Daiquiri and Siboney, attempted to check the American advance at a point near

Sevilla that the troopers later named Las Guasimas, because of the
variety of trees in that vicinity.⁵⁸ Here the First United States
Cavalry and the First and Tenth United States Regular Cavalry, while
attempting to occupy a good position near Sevilla and wait for further
supplies and artillery to be landed, had a skirmish with the Spanish
force that occupied a strongly entrenched position.⁵⁹ After holding
ground for one hour and a half, the American force attacked and drove
the Spaniards from their position.⁶⁰

Although outnumbered by about 1000 men the Americans
suffered few casualties. Of the forces engaged, sixteen were killed
and fifty-two wounded.⁶¹ A small field hospital was set up at the
point where the column had been fired upon, and here Doctor Robert
Church administered treatment to the wounded. In the absence of
litters, litter bearers, and medical equipment Doctor Church and
his aides made repeated trips to the battle line looking for wounded
and carrying them back to the small field hospital. Doctor Church
even carried them on his back.⁶²

Cover was scarce at this dressing station, and many times
during the battle bullets fell around the personnel.⁶³ The red cross,
which was worn by members of the Medical Department, was considered
a prime target by most Spanish guerillas, and often attendents, doctors,
chaplains, hospital stewards, wounded, and litter bearers were fired
upon.⁶⁴ Many of the medical corps, in addition to the fighting force
wounded, were wounded or killed by this sniper fire.⁶⁵ After being
treated at this dressing station the wounded were immediately evacuated,
either as litter patients or walking wounded, to Siboney, a distance

of four miles from the battlefield.⁶⁶

During this battle enlisted men made good use of the first aid dressing, which was a uniform piece of equipment for every soldier.⁶⁷ This dressing, carried upon the soldiers person, consisted of anti-septic compresses and bandages for immediate use in emergency pending the arrival of the surgeon, and was the greatest factor in preventing infection that had been so rife during the Civil War.⁶⁸ Doctor Mona Lesser, who worked at the hospital in Siboney, said the following about the use of the dressings during the Santiago campaign: "I am sure that many hundreds would have died but for these little pads with which their wounds were dressed in the field."⁶⁹ Doctor Victor Vaughan noted that, "... for many wounds these dressings, applied by comrades on the fighting line, were all that was needed until the injured men reached the hospital."⁷⁰ Perhaps the most famous of the contract surgeons, Doctor Nicholas Senn of Chicago, summed up the value of this dressing when he said that the fate of the wounded rested in the hands of the one that applies the first dressing.⁷¹

When the wounded reached Siboney, most of them were sent to the battleships for treatment,⁷² because the hospitals were still lacking the facilities necessary for the role for which they were organized. Those that remained at Siboney were treated in a store room, which was the temporary hospital.⁷³ Here the lack of supplies, space, beds, and clothing resulted in terrible conditions.⁷⁴ This situation was corrected shortly by the arrival of Doctor La Garde's division hospital, and the transferring of the wounded to his care.⁷⁵

Medical equipment and supplies that had been left in Tampa

sailed on the Saratoga on June 18. This equipment consisted mainly of the material necessary to set up the Third Division Hospital at Siboney and included tentage, bedding, medical supplies, and stores for 200 men.⁷⁶ Personnel to operate this base hospital were sent from Tampa: three medical officers, one steward, two acting stewards, and seventeen privates.⁷⁷ The officer in charge was Major La Garde, a surgeon efficient in medicine and organization.

The base hospital at Siboney, when erected, was made up of six rows of tents, each row being five deep. These thirty tents were subdivided into four large wards, one supply tent, and one operating ward.⁷⁸ Each operating ward tent had a field operating table, dressing table, sterilized towels, aseptic dressings, silk and catgut ligatures, sterilized absorbent cotton, alcohol, carbolic acid, creolin, iodoform, bor-acetanilede powders, muslin, guaze bandages, splints, and bichloride of mercury.⁷⁹ Convalescing wards were provided with cots, blankets, and linen. While casualties remained slight this hospital was able to care for all the sick and wounded, but when the wounded began to arrive in large numbers chaos⁸⁰ resulted.

Major M.W. Wood, the surgeon in charge of the First Division Hospital, succeeded in landing his equipment and removing it to the front. In the absence of ambulances and wagons the hospital corpsmen carried the equipment to the front by hand, on litters, or by means of wheelbarrows.⁸¹ Even some of the nurses present helped to transfer the equipment to a position where it could serve the wounded soldiers.⁸² This hospital was a nobile unit that followed the fighting line.

Second Division Hospital was never taken off the ship Olivette, yet work of some value was done, because when casualties became great, many wounded were sent directly to the ship for treatment.⁸³ This hospital would have performed a better job if it had been close to the firing line where it was intended to be.

After the first battle at Las Guasimas, the infantry immediately moved forward toward Santiago. Actually there were no roads, for those shown on the maps were nothing but bridle paths or mountain trails.⁸⁴ Progress was slow because of these poor trails and the excessive heat of the tropics. Men threw away their blankets, ponchos, haversacks, coats, underclothing, and even the preserved meat they had been issued, rather than carry it through such unbearable conditions.⁸⁵ This rash judgment on the part of the infantrymen was partially responsible for the lowered resistance to sickness and disease that later overtook the command.

By June 30, front lines had extended northward to El Caney, a town about four miles northeast of Santiago. This hilltown, together with San Juan, which lies about two miles southeast of Santiago,^a was regarded as indispensable to the Spanish defense of the city. Both were so strongly intrenched that Spanish officers thought them impregnable against any ordinary assault.

The only way these two hills could be taken without bloodshed was by means of heavy siege guns, but at this time the American siege guns were still in the holds of the transports.⁸⁶ The loss of

a. See map of area

the lighters, which were to be used in the unloading of these guns, left the American forces in a dangerous situation. Commanding officers had a choice of waiting for the siege guns to be unloaded and moved to the front or attacking without them. Since time was of utmost importance, because of the deadly influence of the climate and exposure, plans were made to take the hills by direct assault.

At six o'clock on the morning of July 1 light artillery opened fire on El Caney. The shells, striking fairly, were not heavy or frequent enough to demolish the fortifications and drive out the defenders. ⁸⁷ Two hours later General Lawton's infantry began a slow but steady movement up the hill. As soon as El Caney was taken, which Lawton and other officers expected would take two hours, the command planned to take the road toward Santiago and aid the other divisions capture the Spanish positions east of the city. ⁸⁸

Contrary to expectations the little hamlet did not fall in two hours. It was not captured until eleven hours after the battle had commenced, and with heavy losses to both sides. American casualties numbered four officers and seventy-seven enlisted men killed and 360 ⁸⁹ men wounded.

The men wounded at this battle were treated at dressing stations near the line of battle. Surgeons and stewards roamed the battlefield looking for wounded that needed medical treatment. After treatment was administered, the wounded were evacuated by means of improvised carries to the First Division Hospital, which was located three miles to the south near El Poso Hill. Here the wounded were

properly cared for and evacuated to Siboney, where further treatment was administered.

Simultaneously the battle for San Juan Hill was taking place. At eight o'clock on the morning of July 1, Captain Grimes' battery opened fire on San Juan. The enemy's artillery immediately replied and the battle was on.

Infantrymen, under the cover of the artillery shelling, began the march from El Poso, where headquarters was located, to San Juan Hill. Orders had been to follow the trail through the woods, and this maneuver turned out to be one of the blunders of the war. Spanish officers had figured that instead of building a new road the Americans would use the old one. Thus the enemy was waiting for them to make their appearance. Soon the advance was detected and the Spanish opened fire with pitiless accuracy into the jammed and crowded trail. The effect became so deadly that the men were ordered to stop and await further orders.

It was during this period of waiting that the greater number of men were killed and wounded.⁹⁰ Behind these men hospital stewards, doctors, and corpsmen passed continually, removing the wounded to the slight cover afforded by the banks of the San Juan River and other streams.⁹¹ Here the wounded received emergency treatment from the doctors, who were working under constant danger of being hit by the sharpshooters hidden in the trees above the streams.⁹² The surgeons worked on the wounded with one eye constantly on the trees.⁹³

This situation called for a retreat, but in as much as the trail was wedged with men for two miles to the rear, the only thing

they could do was move forward and take San Juan by assault. To attack earthworks held by men with modern weapons before artillery had been used, and to attack head on and not in the flanks are two maneuvers against military rules of warfare. Yet that was what happened and even though success was attained many men were killed or wounded, men that would not have been if better preparations had been made for the battle.

A dressing station had been set up near a ford in the San Juan River, which was later called "Bloody Bend" because of the large number of men hurt there.⁹⁴ Here the wounded received emergency treatment before being evacuated to the First Division Hospital near El Poso Hill.

Evacuation facilities, like those at the battle of El Caney, were inadequate. Ambulances, of which there were only three for the whole expedition, and litters were lacking.⁹⁵ Men evacuated from the line of fire were usually carried on one's back or moved by means of improvised litters. The few ambulances and litters at hand provided indispensable service in relieving the pain and misery of the wounded.⁹⁶

Casualties at San Juan and El Caney from the beginning were enormous. By the end of the fighting on July 3, the casualties numbered twenty-four officers and one hundred thirty-one enlisted men killed, eighty officers and 1203 enlisted men wounded, and eighty-one missing in action.⁹⁷ Most of these casualties occurred during the first day of fighting, but progress to the rear was slow, and the effects were felt at the hospitals for about three days

98

after the fighting had ceased.

Major M.W. Wood, chief surgeon of the First Division Hospital, received over one thousand patients in the three days of fighting.⁹⁹ This field hospital, which was located three miles east of Santiago and near El Poso Hill, received wounded from the battles taking place at El Caney and San Juan. At first the facilities, consisting of three tents, one each for operating tables, pharmacy, and a dispensary, and smaller tents for the wounded, were adequate, but soon after the battles had begun a need arose for more space and supplies. Here is where the Second Division Hospital that was left on the Olivette would have been invaluable in lessening misery and saving lives. The shortage of cots, clothing, food, and medical supplies was constant, and was not due to the failure to unload supplies, but to the practice of considering medical supplies secondary in importance in time of war.¹⁰⁰ The medical officers were always complaining about their supplies' being left at Siboney and not being brought to the line where they were urgently needed.

The personnel at this hospital consisted of five surgeons and twenty stewards, while the number required to give adequate service to the number of men wounded in the battles was about fifty surgeons and two hundred stewards.¹⁰¹ Surgeons and stewards worked constantly for a period of around forty-eight hours, yet hundreds of wounded remained untreated. Many spent the night under the open sky without blankets and food. This was not due to an inadequacy on the part of the medical personnel, but to a shortage of food, supplies, and personnel.¹⁰² Many of the corpsmen assisted in operations and acted

as nurses, besides doing their own tasks, which consisted of applying dressings, feeding the wounded, and transferring the patients to
103
and from the operating tables.

A majority of the cases were gunshot and shrapnel wounds, and a fewer number of paralysis, fever, and sunstroke. Even though many were wounded only a few died in comparison to Civil War figures,^a because the antiseptic measures used on the battlefield and in the hospitals were strictly enforced.
104
Precautions were taken that had been unknown during the Civil War since bacteriology was still undiscovered.

Doctor Nicholas Senn gave the causes of wound infection as inadequate supply of first dressings, faulty application of first dressings, and unnecessary change of dressings.
105
The inadequate supply was caused by the rapidity with which the invasion took place, difficulties in transporting, and the large number of wounded in such a short period of time. Faulty application consisted of not completely covering the wound and failing to immobilize adequately the injured part. Some doctors believed that the oftener a wound was dressed, the sooner would be the healing. Senn said the unnecessary changing of dressings caused many cases of infection.
106
Compared to the Civil War, infection was lowered greatly by the following of antiseptic measures, which had been completely absent during the earlier war.

By means of army wagons, which were not easily obtained
107
from Quartermaster, wounded were transferred to Siboney, where

a. See footnote on page one

further medical treatment was administered. Wounded first appeared at Siboney on July 1, and by July 4 over five hundred men had arrived at Siboney. Here amputations were performed if necessary, and serious injuries received the type of treatment required.

Chaos soon resulted in the Third Division Hospital, because of the lack of personnel required to maintain sanitary conditions. Surgeon Greenleaf solved the problem by ordering the entire 24th Infantry to the base to help perform these duties. ¹⁰⁸

The arrival of the Red Cross vessel, State of Texas, at Siboney on June 27 aided greatly in alleviating suffering. Clara Barton offered to help in anyway possible and this offer was quickly ¹⁰⁹ accepted. Willing hearts and hands were given by surgeons and nurses that were under contract to the Red Cross Society. Provisions, including hospital supplies, malted milk, ice, food, clothing, and bedding were given to army hospitals, which were in dire need of supplies.

General Shafter, recognizing the seriousness of the situation, telegraphed Adjutant-General Corbin explaining that casualties had been underestimated, and that a minimum of forty additional medical officers were needed. Also a hospital ship and steam launches for conveying the wounded from land to the hospital ship were required ¹¹⁰ at Siboney.

Immediately the hospital ship Relief left New York for Cuban waters. Its orders from Surgeon-General Sternberg consisted of transporting supplies for the troops in the field, and remaining near the scene of active operations, unless it was absolutely necessary

for the purpose of landing sick and wounded at a home port.¹¹¹ On arrival at Siboney the Relief began immediately to treat the sick and wounded. Most wounds had been caused by bullets, and these proved to be slight because the Spaniards used small caliber Mauser bullets that resulted in small tubular wounds, which were minor compared to the huge wounds caused by the ball bullet during the Civil War.¹¹² The Civil War use of the probe as a diagnostic instrument in locating bullets was almost entirely superseded during the Spanish-American War by dissection and the employment of the X-ray. If from the nature of the injury and the symptoms presented the bullet was located in a part of the body readily and safely accessible to the knife and it was deemed advisable and expedient to remove it, this was done by enlarging the track made by the bullet. If, as was often the case, the whereabouts of the bullet was not known, its presence and exact location could be determined without any pain or additional risk to the patient by use of the X-ray. All bullets removed on the Relief were located by X-ray and this instrument proved of the greatest practical utility in showing the presence of fragments and injury done by these fragments.¹¹³

On July 19, when all available accommodations were filled, the Relief sailed for New York with 254 sick and wounded. However, this was not the first hospital ship to leave Cuba: the Olivette, which had been present off shore during the battles, left Siboney on July 6 with 279 sick and wounded.¹¹⁴

Men transported on regular hospital ships received excellent treatment, but many sick and wounded were transported on ships

that were hospital ships in name only. The Cherokee, for example, which had a medical personnel consisting of one doctor, two stewards, and no nurses, transported hundreds to the United States. John Bigelow, a soldier wounded at San Juan, reported that he spent eight days on this ship and never had a clean dressing applied to his wound.
115

After the heavy fighting of the 1st and 2nd of July there was a period of truce. From July 4, when Admiral Cervera's fleet was destroyed while attempting to leave the Bay of Santiago, to July 17 there was a cessation of hostilities. Finally on July 17, General Toral, commander of the Spanish land forces at Santiago, surrendered his troops to the American army.

Although the fighting had ceased, the health of the army was slowly deteriorating to a position of danger. Throughout the campaign men were exposed to the tropical climate. Very few had blankets and tents, and were forced to sleep on the bare ground, helpless to protect themselves against the climate. Food was lacking throughout the campaign and men found their resistance to disease lowered because of this lack of nutrition. Many men to satisfy their hunger had eaten tropical fruits, which they had been warned about repeatedly, while others to satisfy their thirst drank water that had not been boiled and native drinks. Some of these circumstances were corrected following the truce, but the condition of many was already beyond help.
116

The Fifth Army Corps was invaded by malarial fever, yellow fever, dysentery, and typhoid fever.
117 Little was known about any of

these diseases and by the end of July seventy-five percent of the
118
command was sick or slowly recovering.

Malarial fever turned out to be the real foe of the soldiers.
Even though this type of malaria was mild, it so weakened the victims
119
that they were easily susceptible to other diseases. General
Joseph Wheeler of the volunteers said in his request for more physi-
cians, stewards, and corpsmen: "We have among the troops a great deal
of what we call four or five day fever, which needs careful medical
120
treatment to prevent relapses." These relapses so weakened a
person that his resistance to disease was completely broken down.

Plans were made to remove the men to higher ground, where
they would be out of danger from these diseases. But most of the
men were too weak to make the march, and the transportation system was
so inadequate as to require about one month to transfer the men to
121
high ground. Even if the men were removed to higher elevations,
the supply of food and water presented a serious problem, a condition
122
that would further affect the health of the command.

Only one course was left open: the complete evacuation of
the Fifth Corps to the United States. On August 3 at a meeting of
general officers General Shafter read the message of Secretary of
War Alger ordering him to remove the army to the interior. Immediately
following Shafter's speech Theodore Roosevelt read a letter advising
Shafter that the only path open was to return the men to the United
123
States. This speech caused a chain reaction, and soon all general
officers present united in a "Round Robin" addressed to Shafter. It
read as follows:

We, the undersigned officers commanding the various brigades, divisions, etc., of the Army of Occupation in Cuba, are of the unanimous opinion that this Army should be at once taken out of the island of Cuba and sent to some point on the Northern seacoast of the United States; that can be done without danger to the people of the United States; that yellow fever in the Army at present is not epidemic; that there are only a few sporadic cases; but that the Army is disabled by malarial fever to the extent that its efficiency is destroyed, and that it is in a condition to be practically destroyed by an epidemic of yellow fever, which is sure to come in the near future.

We know from the reports of competent officers and from personal observations that the Army is unable to move into the interior, and that there are no facilities for such a move if attempted, and that it could not be attempted until too late. Moreover, the best medical authorities of the island say that with our present equipment we could not live in the interior during the rainy season without losses from malarial fever, which is almost as deadly as yellow fever.

This Army must be moved at once, or perish. As the Army can be safely moved now, the persons responsible for preventing such a move will be held responsible for the unnecessary loss of many thousands of lives.

Our opinions are the result of careful personal observations, and they were also based on the unanimous opinion of our medical officers with the Army who understand the situation absolutely.¹²⁴

Concurring Major M.W. Wood, the chief surgeon of the First Division, said, "The Army must be moved North, or it will be unable to move
125
itself."

This incident in the hands of American newspapers caused much excitement at home. Immediately parents, wives, and loved ones began asking why this situation had been allowed to develop, and why the sick were not being returned to the United States immediately. Public opinion was so strong that Secretary of War Alger ordered the Fifth Corps to return to the United States as soon as possible.

Between August 7 and August 25, the command under Shafter was evacuated to the United States. All available transports were hired by the government to accomplish the removal, many of which

unfit for such an undertaking. Most of the steamship lines completely stripped their vessels of carpets, seats, chairs, sheets, blankets, cots, and furniture before turning them over to the government.

Shafter complained of such conditions as being unfit for transporting human beings, but the evacuation was completed by the time repairs were made.¹²⁶

Returning soldiers were taken to Montauk Point, Long Island, for a rest period. Orders issued to remove the men from Cuba to the United States stated that these seasoned troops would prepare for the campaign against Habana, in which they would probably take part.¹²⁷

Late in July plans were made to invade the Spanish-held island of Puerto Rico. Vessels carrying General Wilson's division and General Ernst's brigade had sailed from Charleston, and General Schwan's brigade was leaving Port Tampa to join the invading force off the coast of Puerto Rico.¹²⁸ At Newport News about 5500 men were ready, and on July 28 this detachment, under the command of Major General Brooke, sailed for Puerto Rican waters.¹²⁹ Meanwhile General Nelson Miles, commanding general of the expedition, was making final preparations at Guantanamo Bay in Cuba.

Preparations for the invasion were excellent compared to those for the Cuban campaign. Doctor Nicholas Senn put it perfectly when he said that "War is a great educator."¹³⁰ All the supplies, hospital stores, and medical officers that were lacking in Cuba, were in abundance in Puerto Rico. Also management and generalship were of a better quality. Prior to the invasion, Captain Whitney, at great personal risk had carefully studied the entire island, its

roads and harbors, so that not only the army but the navy relied upon and used his drawings and notes with great success.¹³¹ With these maps the commanding generals planned their attacks ahead of time and used this knowledge of the surroundings to their advantage.¹³² Medical officers also looked at these maps and determined the best possible location for a hospital or dressing station. Knowledge of the surrounding land formations was necessary in order to place a station out of danger of enemy fire.

Certain unwholesome conditions were, however, still present during this campaign. One was the poor preparations at ports of embarkation in the United States. Buildings for housing soldiers in movement were still lacking. At Charleston, South Carolina, the soldiers were cramped in cotton warehouses along the wharves.¹³³ These buildings were damp, foul-smelling, and beneath them was stagnant water. John W. MacCauley, an officer of one of Wisconsin's volunteer units stationed at Charleston, said that it was really a wonder that more were not sick.¹³⁴

Another problem arose when so large a number of troops were being transferred from one base to another. In as much as it was impossible to supply these men with regular bulky rations, travel rations, which were compressed in size, were issued.¹³⁵ When these troops arrived at ports of embarkation there was an oversupply of travel rations, but no supply of regular rations. Travel rations were sufficient while men were not doing regular camp duty, but when men were taking part in drills, parades, and exercises, more nourishment was needed. Many officers complained to the people in command

136

without avail. Captain Elmstad of the Third Wisconsin Infantry reported that on July 18, while at Charleston port of embarkation, Company "C" fell in for dinner and then sent for the colonel and showed him what they were expected to eat. In the mess hall was enough bacon, tomatoes, and hardtack for ten men, and eighty stood
137
in ranks.

Conditions on the troop transports were open to criticism. The danger experienced by overcrowding the men had not been understood by the officers in charge. Most of the transports were so crowded and poorly ventilated that conditions gave rise to the spread of
138
whatever diseases were present. These ships lacked means for protection if they had to be evacuated. There were never enough boats to carry all the men, and life preservers were completely lacking.

The diet on board the transports was still unbalanced. It consisted, as earlier, of canned beef, tomatoes, and baked beans, and there was a deficiency of fresh meat, potatoes, and vegetables.
140
Many men were weakened by this diet and the ordeal of the boat trip, and some were in poor condition by the time they reached Puerto Rico.

The first landing was made by the force under General Nelson Miles at Guanica on July 25. Spanish resistance was slight, and shortly the town was in the hands of the American force. After spending three days unloading supplies, General Miles proceeded down the coast to Port of Ponce. Early on Thursday, July 28, General Miles and General Wilson arrived at Ponce. The city had already surrendered to the navy, and now it was up to the army to occupy it. Captured

lighters were used in landing the troops and supplies. So far only
 141
 one life had been lost.

On August 3 a landing was made at Arroyo, under the command
 of General Brooke. Again the troops met slight resistance, and un-
 loading was started immediately. There was some confusion during
 142
 unloading and some supplies were lost.

Two days later General Brooke's command after a slight
 skirmish captured Guayama, whose strength was estimated at about
 500 men. Now the American troops were in command of the southern
 portion of Puerto Rico. Plans were now made to move north from
 the positions held toward San Juan the capital.

In all, the fighting in Puerto Rico lasted only twenty
 days. Cease fire orders were sent out by the President of the
 United States on August 12, and the Puerto Rican campaign was
 143
 ended. All told there five major engagements in this campaign
 and these took place at Guanica, Guayama, Coamo, Hormiguero, and
 144
 Las Marias. The casualties in all the engagements numbered three
 145
 men killed and forty wounded.

At Guanica on July 25 one soldier was killed and fifteen
 were wounded. These wounded were immediately sent to the ships in
 the bay for treatment, since this skirmish occurred before equipment
 had been unloaded.

The second skirmish took place at a point between Arroyo
 and Guayama. Here eleven were wounded, and they were evacuated to
 the brigade hospital set up near Arroyo, where they were treated
 and prepared for immediate evacuation to the hospital ships in the
 146
 area.

Those wounded in the other skirmishes were taken directly aboard the hospital ship Relief for treatment. ¹⁴⁷ At this time the Relief was sailing along the shores of Puerto Rico searching for sick and wounded soldiers.

Soon after the landing at Ponce, Secretary of War Alger ordered General Miles to build a general hospital. An old Spanish building was selected, and preparations were started at once. Doctor Richard Cabot, a member of the Massachusetts Welfare Society's hospital ship Bay State, described the hospital as a splendid institution which "Stands on a hill behind the town--a very large square, one-storied building, the wards opening into a central courtyard, and containing over three hundred beds. It was cool, clean, and airy, no bad smells anywhere, good beds, plenty of doctors and nurses (male and female) among whom I found several friends; records and charts orderly, and patients apparently contented." ¹⁴⁸

Red Cross personnel also set up a hospital at Ponce, and here the officers were sent for treatment. They received the same excellent care as those soldiers quartered at the general hospital. ¹⁴⁹

The health of the command in Puerto Rico for the first week appeared excellent, but suddenly typhoid fever cases developed in large numbers. At first it was difficult to diagnose the sickness, because of a complete lack of microscopes and clinical records. Consequently it was impossible to differentiate between malaria and typhoid, and diarrhea and dysentery. ¹⁵⁰ By August 8 there were over ¹⁵¹ 250 cases of typhoid around Ponce, and 145 at Guayama.

With the arrival of the hospital ship Relief at the beginning

of August, Doctor Nicholas Senn began to study the cases of fever. Over two hundred were examined and these were broken down into the following categories: two were gastric fever; six were the effects of sunstroke; nine were malaria; 162 were typhoid fever; and twenty-¹⁵²one were doubtful.

In all cases of typhoid fever the contraction took place before leaving the United States.¹⁵³ Through this careful study made by Nicholas Senn it was shown that eight men had first symptoms before leaving the states, eighty-six showed the first symptoms before leaving the transports, and sixty-eight developed during the first ten days after landing.¹⁵⁴ General Miles in his telegram of August 10 to Secretary of War Alger said, "... the command is in good health thus far, with the exception of the cases that brought the germs from Chickamauga and other camps."¹⁵⁵

Other diseases that began to make an appearance were diarrhea, dysentery, and malarial fever. All of these diseases were spread easily among the troops. First of all the men were in a state of exhaustion and fatigue because of the conditions of camplife experienced in the United States and the poor facilities on board the troop transports.¹⁵⁶ Secondly, this time of year was the rainy season in Puerto Rico, and exposure to rain and dampness for an extended period of time lowered the resistance to disease.¹⁵⁷

Causes of the spread of disease were many. General Brooke in his report to the Surgeon-General attributed the troubles that affected his command to the excessive indulgence of the men in tropical fruits of the island.¹⁵⁸ There was no excuse for this

situation because the men had been warned repeatedly against the danger by medical officers, commanding officers, and government circulars. Captain Olmstead, officer of the Third Wisconsin Infantry, said that "The main trouble is that the boys have no judgment on what to eat and experience does not seem to do them any good. Speaking to them seems to be advice thrown away, for they think they are safe to eat anything they crave. I have done all that I could and some of them have realized too late what was told them was true." 159

In some cases men and even officers boasted of not drinking boiled water. After preaching and preaching a surgeon found it very demoralizing to find even the officers, who were expected to set 160 examples, did not follow his advice.

Still at no time was the percentage of those unfit for 161 duty over twenty-three per cent. Other than the typhoid cases, the diseases were of a mild type, which if treated correctly cleared 162 up within a short time.

Evacuation of the sick and wounded to the United States took place in authorized hospital ships. On its first trip, the Relief carried 255 sick to the United States. During this trip fourteen died, but this was not bad in view of the fact that almost everyone was a fever patient in serious condition. They were taken 163 to New York, where they were distributed throughout the city hospitals. The Relief returned immediately to Ponce, where on September 6 she 164 left for Philadelphia with another load of nearly 250 sick.

Patriotism was high in the state of Massachusetts and the result was that the hospital ship Bay State was purchased and equipped

to lessen suffering during the war. After transporting the sick and wounded from Cuba to the United States, the Bay State proceeded in late September to Puerto Rico to pick up the sick and wounded, if possible those from the state of Massachusetts. ¹⁶⁵ On the first trip from Ponce 277 men were evacuated to Boston. The remarkable feat was that not one single life was lost during this trip. A second trip was made on October 22 and 175 soldiers were taken to Boston hospitals. During this trip two men died, but over all the work of this ship was excellent and deserving of praise. ¹⁶⁶

On July 1, 1898, B.K. Baker, president of the Atlantic Transport Line, had tendered the Missouri to the government, in order to alleviate the suffering. Immediately the vessel was converted into a hospital ship and sent to Cuba, where sick and wounded were picked up and evacuated to the United States. With the start of hostilities in Puerto Rico, the ship was sent to Ponce. Early in October she picked up 270 patients and transported them to Josiah Simpson Hospital at Fort Monroe, Virginia. ¹⁶⁷ Her service was short but greatly commended by the government.

The sick and wounded, when returned to the United States, were either taken directly to the hospitals or left off at another port and transferred to the hospitals in hospital trains. At first these army general hospitals were nothing but a plan on paper, but necessity developed them into complex and adequate hospitals. Major Donald McClean, surgeon in charge of the United States General Hospital at Fort Monroe, Virginia, erected the hospital in the short period of seven days. When questioned about why he erected it so swiftly,

he answered, "Well, we had too." ¹⁶⁸ McClean had received orders stating that sick and wounded were on the way, and that he could expect them any day. Within a short period over 441 patients were ¹⁶⁹ being treated at Fort Monroe.

Fort McPherson Army Hospital came into existence the same way. During the month of May a telegram was received by the surgeon in charge saying that at 4 p.m. on a certain day 235 sick and wounded ¹⁷⁰ were to arrive. No arrangements had been made, but soon all available space was taken. Little by little everything was organized, until the hospital was a thoroughly organized and equipped affair. This hospital consisted of four buildings, with a capacity of 525 men.

One of the largest systems of hospitals was set up at Montauk Point, Long Island. Here there was one general hospital, which consisted of fifty wards, two division field hospitals, a ¹⁷¹ cavalry field hospital, a detention camp, and a quarantine station. At first there was much confusion because of the lack of physicians, nurses, hospital corpsmen, policing, an index of patients, cots, supplies, and discipline, but experience and time straightened out these difficulties.

At Camp Wikoff the best doctors, including Doctor Nicholas Senn, were sent for duty. Their duty consisted of performing operations and examining the returning men. Upon examination these doctors considered only about half of the men to be in fighting or working condition. Complications suffered by the soldiers and noted by the doctors were the result of malnutrition, disease, and exposure. Many of them had emaciated forms, sunken eyes, hollow cheeks, pale bronzed

faces, and staggering gaits. Hernias were prevalent, resulting
 172
 from the relaxation of tissue caused by disease.

Because it was impossible to land all sick and wounded at ports where army hospitals were operating, the army hospital train came into existence. Its objective was the transportation of sick and wounded from the ports used as landing points to general hospitals.

This train consisted of ten hospital cars, one dining car, one baggage car, and one private car to be used as sleeping quarters for the men in charge. Equipment was adequate and included field chests, surgical chests, operating equipment, and bedding supplies. Each train had one surgeon, one assistant surgeon, one hospital steward, twenty privates, and three civilians that were the cooks and waiters.
 173
 The capacity was 270, but this number was never completely utilized.

At first this system was hampered by the lack of power on the part of the surgeon to issue transportation requests. Delay was common, until the assistant surgeon was made acting assistant quartermaster, with the authority to issue direct requests to the rail-
 174
 roads.

By the end of August, 1898, over 2000 patients had been transported to general hospitals, with only four deaths.
 175
 When the train was abolished on March 4, 1899, over 4700 patients had been transported and only five deaths had occurred.
 176
 Considering that many were fever patients and wounded this number of deaths was extremely small for such a trip.

So ended the warfare and distress in Cuba and Puerto Rico.

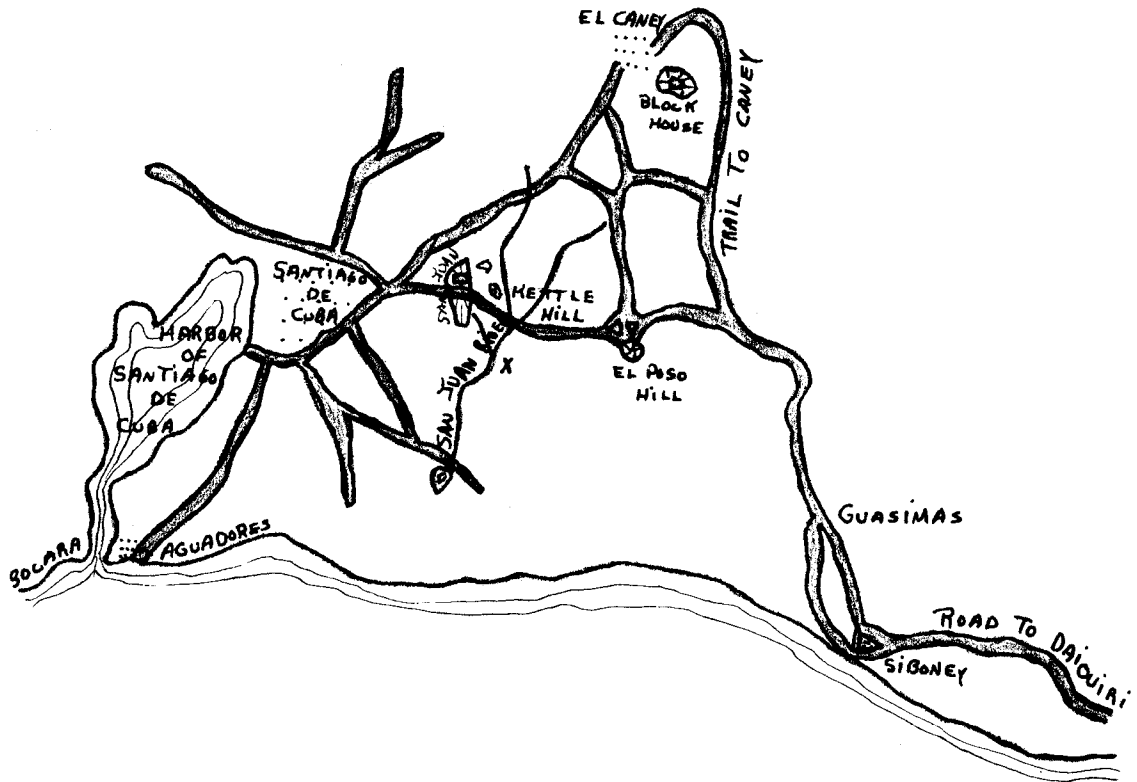
The fighting was finished, but the medical lessons learned during the campaign were not forgotten. First of all the value of the antiseptic first-aid dressing had been proven. This dressing had proved so valuable in the prevention of infection that had been so widespread during the Civil War. Now infections were considered something that would be prevented if the proper treatment was administered. Secondly, the X-ray proved its value in diagnosing injuries. Prior to the invention of this piece of equipment the doctors were hampered when it came to the treatment of closed injuries and bullet wounds. They were never sure how much injury had been done and exactly where the bullet was lodged. Now with the X-ray these problems were a thing of the past. Thirdly, the Medical Department knew that the lack of a trained reserve created a serious and dangerous problem in event of a war. Even though the doctors accepted by the Medical Department were intelligent, the Medical Department knew from experience that surgeons had to be competent in army matters such as field hygiene, field sanitation, supply, records, and discipline, because the lack of knowledge in any of these fields would eventually break down a unit.

Many of the lessons learned from the campaigns were the result of inadequacies present in the War Department. To place the blame on any particular department is impossible because all of them were partially to blame. Prior to the declaration of war most of the departments did not receive any of the fifty million dollars appropriated for defense, and the result was that they could not cope with the increase that took place. For example, the Quartermaster

Department, which was responsible for clothing and transporting the soldiers, was neither physically nor financially prepared for the tremendous labor of suddenly equipping and transporting an army over ten times the size of the regular army of the United States. Another problem that plagued the War Department was the placement of power. Most of the departments found it impossible to carry out necessary changes because of the red tape of the War Department. The Medical Department found itself unable to carry out necessary regulations because it still lacked the power to enforce sanitary regulations, rules, and instructions. All the medical officers could do was recommend and hope that the officers in charge would carry out their recommendations. In the preparation for the Cuban campaign commanding officers completely ignored the pleas from medical officers to take necessary equipment, and the result was disastrous. Supplies of the Medical Department were still considered secondary by the Quartermaster Corps, and since the Medical Department depended on the Quartermaster for transportation facilities the result was a constant shortage of supplies that ended in unnecessary misery and death.

Lessons learned from the mobilization of the troops and the Cuban and Puerto Rican campaigns were valuable, but still changes were necessary in the War Department so that in case of another war these problems would not be encountered. Time was necessary to bring about such changes.

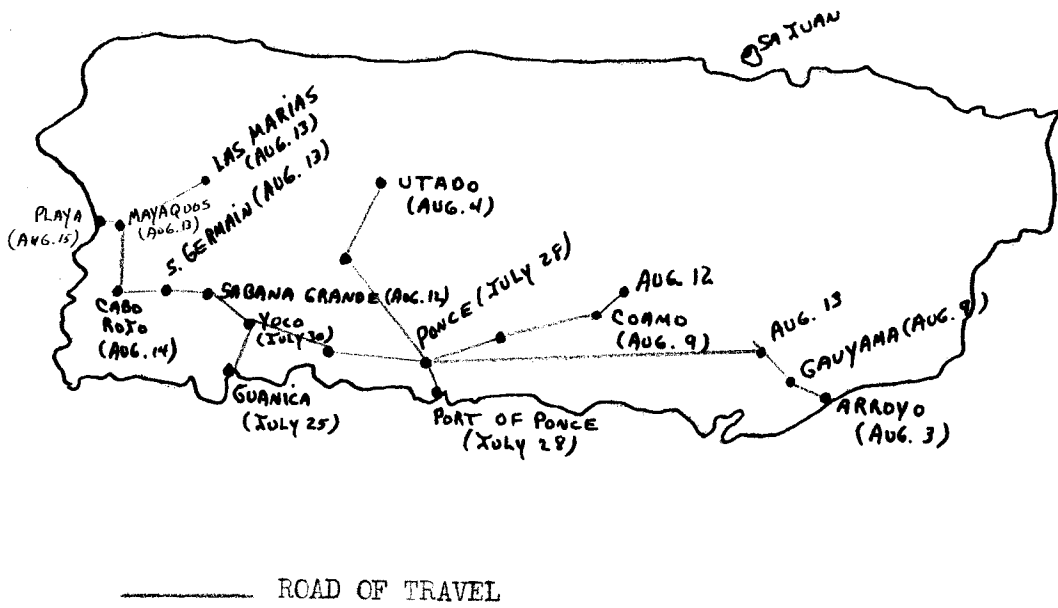
WAR MAP OF SANTIAGO CAMPAIGN



LEGEND

- | | | | |
|-------|--------------|------|-------------|
| X | BLOODY ANGLE | ==== | ROAD (RED) |
| | TOWN | (H) | HILL |
| — | RIVER | □ | BLOCK HOUSE |

CAMPAIGN MAP OF PUERTO RICO



Footnotes

1. Martha L. Sternberg, George Miller Sternberg (Chicago: American Medical Association, 1920), 159.
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Chapter Three

Philippine Expedition-Insurrection

The first battle of the Spanish-American War was not fought in Cuba, but in the Far East. Early in 1898, when relations between the United States and Spain became strained, the "Asiatic Naval Squadron" was dispatched to the Far Eastern waters. Explanation for such a move rested on the argument that American interests must be protected in case of a war.

Upon the declaration of war, John D. Long, the Secretary of the Navy, sent the following telegram to Commodore George Dewey, in command of the American Asiatic Squadron then at Hong Kong, China: "War has commenced between the United States and Spain. Proceed at once to the Philippine Islands. Commence operations particularly against the Spanish fleet. You must capture vessels or destroy. Use utmost endeavor."

Immediately Admiral Dewey proceeded toward Manila Bay. Dewey upon his arrival on the first of May engaged the Spanish squadron and destroyed them in the battle of Manila Bay. The victory was completed with the occupation of the Spanish Naval Base at Cavite by the American bluejackets. Brilliant as had been the victory over the Spanish, Dewey was impotent to carry his success further. His nearest home base was on the Pacific coast, and he knew that if he was forced to fight another naval engagement his position would be precarious. Dewey also knew that without ground forces the bombardments of Manila would be useless, because the city could never be claimed as a possession until American armed forces actually occupied

it. Since these forces were completely missing, Dewey sent a telegram to the Secretary of the Navy asking for 5000 soldiers to take and hold the city.

Plans were immediately made to raise volunteer regiments² from the western states and assemble them at San Francisco. A large majority of the first troops to arrive at San Francisco were sent to Camp Merritt, one of the mobilization camps. This camp was pitched on sand dunes in a bleak area on the edge of Golden Gate Park, unprotected from the winds of the Pacific Ocean.³ Cold breezes, damp fog, and wet sand caused an epidemic of pneumonia and bronchial diseases. Improper construction and an insufficient number of latrines led to defecation on the ground. Since many of the methods of the possible spread of typhoid fever, such as flies, tent infection, and dust, were still unknown, typhoid fever began to make an appearance soon after such occupation by the troops.⁴ Conditions at Camp Merritt became so terrible that a board of medical officers investigated the camp and ordered that it be moved to the Presido of San Francisco.

Lieutenant-Colonel Henry Lippincott, chief surgeon, Department of the Pacific and Eighth Army Corps, laid the blame for these diseases on the position of Camp Merritt, and the lack of experience and supervision on the part of the responsible officers. He said the area was exposed to winds and mists that prevail in the early months in that locality, that the subsoil water was but a few feet under the surface, and that the officers in charge were not familiar with their duties and responsibilities, which were necessary for the

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maintenance of the health of the men under their control.

As volunteer units began to arrive at San Francisco from California, Oregon, Nebraska, Colorado, Wyoming, Minnesota, Idaho, Kansas, Utah, South Dakota, and Montana it became apparent that the nation was not prepared for a war. These units were expected to arrive fully uniformed, but this was not the case. Most of the men arrived dressed in civilian clothes, and because the War Department had permitted the moderate supplies usually kept on the Pacific coast to be sent East for the Cuban campaign, it took around two weeks before clothing and equipment was issued to incoming soldiers.⁶ In some cases a full quota of clothing was not received until after six weeks in camp.⁷ At the same time there was a shortage of food for the incoming soldiers. Many had not received any rations from the time they left their states to the time they arrived at San Francisco. Even after their arrival meals were skimpy because of the lack of rations.⁸ Still the men did not starve because the civilians were always bringing food and fruits for the soldiers. This action did not make the job of the medical officers any easier because most of the men were guilty of gormandizing that resulted in upsetting the gastro-intestinal system. With such conditions present it is clearly understandable why so many succumbed to pulmonary and intestinal diseases even before they encountered actual warfare.⁹

Duty at Camp Merritt consisted of many exercises set down by the Medical Department to build up the minds and bodies. Each day the men took part in drills dealing with the rifle and bayonet. Calisthenics and marching were also used to create a sense

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of discipline and strengthen the body.

Since the government lacked necessary transportation facilities to transport the first expedition to the Philippines, the army was forced to charter commercial vessels and modify them to facilitate the conveyance of large bodies of troops. Each vessel before sailing was inspected by a board of medical officers that examined into and reported upon the number of men to be carried, cooking and messing arrangements, bathing facilities, lavatories and water closets, general sanitary conditions, and her adaptability for the purposes intended.

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On May 25 the first expedition to the Philippines left San Francisco. Three ships, which were the City of Peking, the City of Sydney, and the Australia, were given the task of transporting over 2500 men to the Philippine Islands. These transports like many others had been hastily prepared and many discomforts were present. Overcrowdedness was one of the most serious problems. Usually too many men were placed on a transport and this resulted in cramped sleeping space, lack of space to adequately exercise, and an inadequate number of latrines to service the men. Inadequate messing facilities also presented a serious problem on these transports. The type of food, which included beef, pork, potatoes, hardtack, and coffee, was usually poorly cooked because of the lack of cooking facilities. Galleys were too small for the number of men to be fed and sometimes it took as long as two hours to serve a meal to the troops. The result of this slow service led often to the serving of only two meals a day. Other conditions that caused discomforts

were the lack of bathing facilities and hospital facilities. Showers on the transports were entirely inadequate because of the large number of men and the shortage of water for bathing.¹⁶ The hospital facilities were usually entirely lacking because the contractors had not made the improvements that the government had requested. Brigadier-General Thomas M. Anderson, commanding general of the first expedition, upon his arrival at Cavite had sent a telegram to Attorney-General Corbin stating that promises of agents to make changes and improvements should not be taken for granted.¹⁷

Disease on the transports was kept at a minimum.¹⁸ The only disease that created a serious problem was the measles.¹⁹ This disease had been brought into San Francisco by incoming recruits. Although the cases were immediately isolated, a few cases had escaped from the hospital and were successful in boarding the ships leaving for the Philippines.²⁰ This action presented a dangerous problem, because the trip from San Francisco to Manila lasted around thirty-six days. Also the lack of hospital facilities on the transports presented a serious situation. The patient in certain types of disease had to be isolated from the rest of the men. Most ships lacked separate sick-bay quarters, but the medical officers were proficient in improvising to meet the needs. On the first expedition the number of measles cases was held to thirty-nine, which was small considering that over 2500 men were transported at that time.²¹ Other expeditions encountered the same conditions, but the work of the medical officers in improvising to meet these conditions kept the number of sick at a minimum.

Day to day activities on board ship consisted of physical training exercises, inspections, and lectures pertaining to many subjects. Medical officers knew the importance of physical training for the maintenance of a healthy body and raising one's resistance to disease. Early in the morning the men were instructed to clean their compartments and remove themselves to the main deck. On deck they were given physical drill, which was beneficial in keeping the men healthy.²² The problem encountered in carrying out the exercises was the lack of space. Most of the men were crowding each other, and this coupled with the unbalancing motion of the ship did not aid in²³ correctly performing the exercises. Inspections started as soon as the men were removed from their compartments. These inspections were performed by both medical and line officers, and if the officers were not satisfied with the cleanliness of the compartments, the men were given the task of re-cleaning the compartments and facilities.²⁴ When physical training and inspections were finished, the men were assembled into small groups and given lectures. These lectures pertained to sanitation, hygiene, and how best to preserve health in the tropics.²⁵ Most of the soldiers were ignorant of the conditions that they would encounter in the Philippines, and these lectures gave them some preparation for the coming conflict with climate and country.

The first expedition arrived at Manila Bay on June 30, 1898. Immediately General Anderson, commanding general of the expedition, met with Dewey and discussed the possible landing points. From the conversation, Anderson decided that Cavite was the most logical place

to land his troops, because this port contained a small dock that was accessible to the shallow-draught native cascos, which constituted the only landing facilities for landing men and supplies ashore.²⁶ These cascos, which were towed by native launches, brought Anderson's command ashore on July 1.

Quarters at Cavite were fairly comfortable. Spanish barracks and government buildings had been chosen, and after a thorough scrubbing they provided excellent living quarters.²⁷ Even though there was a shortage of cots, there was an abundance of bamboo that made excellent beds.

As soon as the troops were landed, they were put to work collecting equipment, supplies, and means of transportation. It was their job to unload the transports and this turned out to be a difficult and dangerous undertaking. Many loads of supplies were lost because of inadequate landing facilities.²⁸ Those men that were not unloading the transports were drilling and conditioning themselves for an attack on Manila.

Two weeks after landing and establishing camp at Cavite, Anderson moved part of his command across the bay to Tambo, which was a small hamlet on the eastern shore of Manila Bay, and established Camp Dewey. This was done to move his men closer to Manila and between some of the Insurgent and Spanish forces.

Two days after this movement had been made, General Greene and his command of 3586 men arrived. They were landed at Tambo and marched to Camp Dewey. Again the landing of troops and supplies was a dangerous undertaking. The beach was not protected by a

breakwater and so the beach at Tambo received the full force of the sea. Also landing facilities were completely lacking. ²⁹ The Quarter-master Department had to obtain barges and cascos from the natives and this was a difficult job because Aguinaldo, who was the Filipino commander-in-chief, had issued orders that the natives should not sell without his permission. ³⁰ Already Aguinaldo was suspicious of the American intentions.

Life in Camp Dewey was decidedly uncomfortable compared to Cavite. The rainy season prevented the men from sleeping on the ground, and so platforms of bamboo were made to protect the men against the rain. Even these platforms did not give complete protection because the rainfall was so heavy that a platform did not keep the beds dry. ³¹ There was also a shortage of good drinking water and wood. In order to obtain water suitable for drinking, it had to be boiled for at least fifteen minutes. This problem was further complicated by the lack of wood. Wood was scarce, but necessary for cooking meals and boiling water. One merit of Camp Dewey was its proximity to the beach. This closeness facilitated bathing and the washing of clothes, both of which were necessary for good hygiene and sanitation.

In the midst of these uncomfortable conditions, army regulations asserted their prerogative by stating that rations became the responsibility of troop organizations at ship-side. ³² This meant if a ration was lost enroute to shore, the organization for which the supplies were intended, received no more rations until a board of officers could act. In some cases regiments went hungry waiting

for the board to meet.

Hospital facilities were established at Cavite by Captain H.E. McVay, assistant surgeon United States Army. The hospital itself was divided into two sections with a capacity of one hundred fifty beds. One section was located in the arsenal, and the other was in the town of Cavite.³³ Both of these sections served an excellent purpose, which was the receiving and caring for the sick from the various transports on their arrival at their point of debarkation.³⁴ Another purpose was to act as post hospital for commands on duty in Cavite.

Field units at Camp Dewey had two brigade field hospitals. These hospitals were set up by Major W.D. Crosby and Major George H. Penrose with the intention of forming them into division hospitals as soon as the strength was sufficient to warrant such a change.³⁵ Tentage was never a problem to these hospitals because one hundred tents were on hand and full use was never necessary.

At first the health of the command was not too good. This condition was due to bad hygiene on board the ships, improper food supply, climatic change, and poor discipline. Immediately upon landing the medical officers had attempted to correct these faults. Orders were prescribed that dealt with cleanliness of person and surroundings, proper diet, and caution as to climatic changes. A sanitary circular, which was issued July 25, 1898, clearly explained to all officers their responsibilities. This circular started by mentioning that "During the Civil War for every man killed by bullets there were two who died and probably five who had their health permanently destroyed

by camp disease, which we know now are preventable. We expect to prevent a repetition of this slaughter by modern sanitation, but it is positively impossible to do this without the co-operation of each soldier, who must be made to understand the necessity of obeying simple rules of health. Company commanders must see that each of their men is properly instructed in the following general rules and the reasons for them, that the rules are enforced, and that each man must be plainly told that if through his own ignorant recklessness he becomes sick, he is a load on the Army, and weakens its fighting strength by that much, and is positively needed, and must not be allowed to make himself sick." ³⁷ Following this declaration was a series of sanitary measures to be enforced, and through a rigid enforcement of these set rules the health of the ³⁸ command steadily improved.

During the month of July the men had spent their time ³⁹ preparing for an attack on Manila. Each day they would drill and practice field exercises, but there was not any action because the American forces did not possess any front lines. Finally on July 29, Aguinaldo was persuaded by the American generals to allow the Americans to occupy that portion of the line in front of Camp ⁴⁰ Dewey. Shortly after midnight some two days after the Americans had moved into the trenches, the Spaniards had opened fire on the American lines. The American forces had been told to return fire only in case of an attack. Some officers thinking that the Spaniards were attacking, ordered their men to open fire. Immediately the rest of the line was returning the fire. The lines were so disorganized

that a message was sent to General Greene stating that the troops were "whipped" and help was needed at once. Reinforcements were immediately sent, and these men received the full force of the Spanish shots, which were aimed too high.⁴¹ The next day revealed that the Spanish force had never left their trenches, but were merely indulging in the form of attack in which the attacker remains in his trenches and sends a fusillade of bullets toward the enemy.

American casualties included ten killed and forty-three wounded.⁴² The wounded were immediately given first aid at the dressing stations established in the trenches.⁴³ From these dressing stations they were evacuated to the brigade hospitals located at Camp Dewey. Evacuation was accomplished by litter bearers or carromattas.^a The litter bearers searched the trenches for wounded, and when they discovered any they carried them back to the brigade hospitals. Ambulances were lacking, but good use was made of carromattas. These small native wagons were used to deliver ammunition to the front, but some drivers on their own initiative had picked up wounded on their way back.⁴⁴ Private J.F. Finlay, Company C of the First California, was the first to pick up wounded with his carromatta and turn them over to the surgeons at Camp Dewey. The surgeons immediately recognized the value of such vehicles and ordered Finlay to return to the front and bring back more wounded.⁴⁵ All the surgeons at the hospitals were kept busy throughout the night, and many were at the operating tables constantly even though they had to stand ankle deep in water that flooded the hospital tents.⁴⁶

a. A carromatta was a small native vehicle drawn by small beasts of burden.

Between July 31 and August 13 there were not any pitched battles. Life in the trenches was not pleasant for the American soldier, because this was the rainy season and each day the trenches would fill up with water. The men had only leather boots, because as yet rubber boots were looked at with superstition and not accepted as a part of army supply. The result was that their feet would remain wet for twenty hours at a stretch, and before long many of the men's leather boots rotted away. At this time the health of the command was excellent, but the hardships to which the men were constantly subjected began to lower their resistance.⁴⁷

The attack on Manila was carefully planned and supervised. At 9:35 a.m. August 13, Dewey's squadron opened fire on Manila. When this bombardment had ceased, the soldiers began their advance toward Manila. The battle was short lived, but it was hot while it lasted.⁴⁸ The American casualties included six killed and forty-four wounded.⁴⁹

General Merritt prior to battle had issued orders for the general hospital to remain at Camp Dewey, and that it was not to advance unless ordered.⁵⁰ The distance between Camp Dewey and Manila was four miles, and so ambulance stations were established on the beach in the rear of the left flank, one at Pasay in the rear of the right flank, and one at Camino Real near the reserve.⁵¹ The wounded were carried by litter bearers from the front lines to these ambulance stations.⁵² From these stations they were evacuated in carromattas to the tent hospitals at Camp Dewey. These vehicles were not ideal for the transportation of wounded, but ambulances were too large and heavy to be used in jungle country. An excellent

description of carronattas being used as ambulances in the battle of Manila was published by the Surgeon-General in his report for the year of 1898. A medical officer explained that "The litters, two in number, were placed on the top of the carriage box of the carronatta from the front to rear, the legs being on the inside of the box, and thus preventing the litters from sliding out of their positions. In this manner we conveyed the wounded who required transportation in the recumbent position, except those seriously injured, whom we could not trust to the jolting carronatta and had to carry the entire distance by hand litter."⁵³ Excellent service was performed by these vehicles during the battle of Manila.⁵⁴

Treatment was administered to the wounded shortly after their injury had been sustained. The wounds were dressed either by the injured person, hospital corpsmen, or someone close by when the injury occurred. Again the first-aid package had proven its value in preventing infection and saving lives.⁵⁵ This compact package was considered a lifesaver, and its prompt and intelligent use prevented much of the infection that had been so common during the Civil War.⁵⁶ Infection that was now preventable because of the advances in the field of bacteriology. Since the casualties had been held at a minimum the hospitals at Camp Dewey had never been pressed for more supplies and space.

Four days after the fall of Manila the brigade hospitals were moved from Camp Dewey to Manila and were consolidated for administration purposes into a division hospital, which afterwards became known as the First Reserve Hospital.⁵⁷ The sick and wounded

of Camp Dewey were transferred to this hospital, which was established in buildings formerly occupied by the Spaniards as a military hospital.⁵⁸ The buildings were arranged on two sides of a rectangular inclosure, which was closed at one end by the guardhouse and at the other by the kitchens. The storehouses, laundry, and morgue were located east of the main buildings and between these and the Pasig River, while the smallpox hospital was 1200 yards to the south.⁵⁹ With tents, which were placed on platforms, accommodations were for around eight hundred.

The Second Reserve Hospital, with Major Keefer in command, was established September 23 in Ermita, because of the lack of space at the First Reserve Hospital. This hospital also had an excellent location, because it was located in a building that was formerly a seminary and that was ideal for a convalescent hospital. The task of this hospital at first was to serve as a place for convalescents,⁶⁰ but when sickness rose the hospital was used as a treating place. Another convalescent hospital was established November 25 at Corregidor Island because of the increase in sickness.

When the army entered Manila many sanitary problems had to be solved. Major Frank S. Bourns of the Army Medical Corps had attempted to take over duties as president of the Manila Board of Health, but he discovered that no sanitary service worthy of the name appeared to have been maintained by the Spanish regime.⁶¹ The sewage disposal system consisted of a network of surface drains and esteros, which was utterly inadequate for a town the size of Manila.⁶² If a surface drain or estero was not conveniently located nearby, many

natives did not bother to move refuse away from their houses. Medical inspectors began making weekly inspections to make sure that this waste was correctly disposed. The garbage removal system was entirely missing. During the Spanish regime the garbage was hauled to the edge of the town where it was dumped and left to rot.⁶³ After the Americans had captured Manila they discovered that the larger number of the animals, which had been used to haul this refuse, had been eaten during the siege. Limited as they were in the matter of transportation, the sanitary men improved on the system by loading the garbage in cascos, which were hauled into the bay to a point where the current was off shore and there emptied.⁶⁴ Eventually municipal incinerators were installed for the disposal of garbage. According to Doctor George D. McIllwaine the clean-up of Manila took about ten months.⁶⁵

After the occupation of Manila the sick lists of the regiments had increased week by week, due chiefly to intestinal, malarial, and venereal diseases.⁶⁶ Many of the men had been weakened by the rainy season and hardships encountered in the trenches, but other causes of disease were common in Manila. The chief surgeon of the Pacific in referring to the prevalence of diarrhea and dysentery, had attributed these diseases to the eating and drinking of unwholesome articles.⁶⁷ The men had been lectured about the dangers of eating native foods and drinking native spirits, but these lectures seemed to have been forgotten by the soldiers. Whenever liquor, bananas, mangos, duhats, and wild guavas could be located, they were indulged in by the soldiers.⁶⁸ Malaria was another sickness that threatened the health of the army. The only protection that the soldiers

possessed was quinine. At this time Ronald Ross, the English scientist, was expounding the mosquito theory of transmission of malaria, but because the theory was new and not yet fully accepted netting was scarce during the latter part of the year. It was during the latter part of the year that the mosquitoes were the thickest. One soldier from Wisconsin mentioned in a letter to his hometown newspaper that the "Weather is pleasant here in the dry season but hot and the mosquitoes are fierce. When I am not fighting mosquitoes at night I am chasing flies by day." ⁶⁹ The malaria was of a mild type, but many of the men that had suffered with the disease had relapses and thus were unfit for duty. From the standpoint of military authorities, the paramount health problem was the prevalence of venereal diseases. An outbreak in venereal diseases would result in widespread discussion back home, and such an outbreak could do much harm to the army both in an immediate and a secondary sense. The immediate results would be the increasing sick rate and the lowering of the fighting strength of a unit, while the secondary results could be the lowering of the morale back home and the possibility of a decrease in enthusiasm about the retention of the Philippines. Following the occupation of the Philippines by the United States Army, swarms ⁷⁰ of prostitutes came to the Philippines. Soon the verereal rate among American soldiers reporting on sick call was near twenty-five ⁷¹ per cent. The American authorities attempted to protect the soldiers by enforcing a rigid control on the traffic. Loose women were registered and examined weekly. If discovered to be infected they were hospitalized at their own expense until they were cured. Many people

said that this was condoning prostitution, but the medical authorities said that it was the most satisfactory solution to a difficult problem. It reduced the rate to a level comparable with that in the United States,⁷² but this was still high compared to that in the armies of other nations.⁷³ For instance, the amount of admissions to sick report, per thousand strength, in the German army was near thirty, while that in the United States army was near seventy-five.⁷⁴ Even France, a country that officially recognized prostitution, had a lower rate than the United States.⁷⁵ The only army that had a rate higher than the army of the United States was Great Britain, which had a rate of around 174 per thousand strength at home stations and 522 per thousand strength at stations in India.⁷⁶ In the armies of France, Germany, Austria-Hungary, Russia, Italy, and Holland some special regulations were in force for preventing the spread of venereal infections. These generally consisted of weekly or fortnightly examinations of the men for the detection of venereal diseases, and the registration and periodical examination of all women ascertained to be leading a life of prostitution, with compulsory isolation of such as were found to be diseased. The only major armies that did not have any special regulations were those of the United States and Great Britain.⁷⁷ Except for a few local attempts during the Civil War, no systematic effort had been officially made, within the limits of the United States, to decrease venereal disease in the military service by the control of prostitution. In fact, the first attempt to regulate prostitution was the attempt made by the medical officers in the Philippines.

Besides the diseases mentioned above there were other infections that plagued the soldiers. Late in 1898 smallpox and bubonic plague swept Manila. The spread of these two diseases to the American troops caused the Army Medical Corps to begin to view the general health and living conditions of the civil population as being pertinent to the well-being of the American command.⁷⁸

Even though the men had received smallpox vaccinations many were infected with this disease. Investigations showed that many of the men had been examined for enlistment by civilian physicians and were undoubtedly less thoroughly vaccinated and protected against the disease than the members of the regular army. This was shown by the fact that of the regulars and volunteers serving in the Philippines during 1899, the admission rate for smallpox was 4.80 per thousand strength among the regulars, and 9.60 among the volunteers.⁷⁹

A vaccine farm was established, and smallpox virus was made from caribou and water buffalo.⁸⁰ All together over 80,000 natives received smallpox vaccinations. Strict enforcement of sanitary measures was followed, and the result was creditable work in the management of both smallpox and bubonic plague. Typhoid fever was also a problem in Manila. Any city that lacks an adequate sewage or garbage disposal system will be plagued with typhoid fever. At first there were many cases of typhoid, but as the city was cleaned up the number of new cases began to drop. Of course certain modes of spread that were still unknown prevented the medical officers from completely eradicating the spread of this disease.

Several types of skin disease had developed with the arrival

of the troops in the Philippines. One such dermatitis was pemphigus. This ailment was caused by the wearing of clothing that had not been boiled when it was washed. The first sign was the formation of blisters on the body. Treatment of such a disease was the job of a skin specialist, but because there were not any on hand experimen-⁸¹tation took place. Many drugs were tried without success, but when a shipment of hypo-sulfite of sodium arrived the search was ended. This drug proved to be excellent for the treatment of pemphigus.⁸² Another skin trouble encountered during the Philippine campaign was the "dhobie itch." This skin infection was fungus in nature and tended to spread rapidly if it remained untreated. Regular treatment consisted of wet bichlorid dressings, and in the old cases a ten per cent solution of resorcin salicylate in vasoline or bland ointment was administered. Pemphigus was fatal if the necessary treatment was not administered in time, but the "dhobie itch" merely caused discomfort. Yet, both were new types of diseases to the medical officers and treatment at first was merely experimentation. Later on when a specific treatment was set down, the amount of time that the soldiers were off duty was shortened, but still both resulted in the loss of manpower and hampered the effectiveness of the fighting force.

From the time of the American landing in the Philippines there had been a feeling of resentment present among the Filipinos. This resentment was not against the aid that the Americans were giving the Filipinos, but against the measures that the American army was enforcing. Aguinaldo, the Filipino leader, always maintained that

Admiral Dewey had promised that after the Spaniards had been defeated the American force would leave. Such was not the case and the President's orders to occupy the islands created a feeling of hostility. This feeling of hostility grew and finally on February 4, 1899, the inevitable clash between the American force and the Insurgents took place at Manila: a clash that was destined to last from February 4, 1899 to July 4, 1902. During this period there were 2811 engagements with the enemy, and the American casualties from these battles included fifty-four officers and 741 enlisted men killed in action; seventeen officers and 225 enlisted men that died of wounds; and 204 officers and 2818 enlisted men that were wounded in action.⁸³ These figures do not include over four thousand deaths that resulted from disease, accidents, drownings, suicide, and homicide.⁸⁴

General Otis, commanding general of the Eighth Corps, employed the "thrust idea" throughout the entire campaign. Each expeditionary force was given an objective, and once that objective was accomplished all the troops were recalled to Manila. This was a policy of caution, and the disadvantage was that it permitted the insurgent forces to reorganize and re-occupy territory without molestation.

While the fighting took place in the outskirts of Manila, the wounded were evacuated directly to the general hospitals in ambulances. This service was well organized and the wounded reached the hospitals shortly after being wounded.⁸⁵ When fighting began to spread to towns outside Manila, the system of evacuation encountered problems. Each expeditionary force that left Manila had an adequate

supply of ambulances, but the roads were not always passable. Major Henry F. Holt, a surgeon in the second division, described the problem perfectly when he said, "As the topography of the country prohibits ambulance service except on established roads, which are scarce, the situation often compelled the transportation of men killed or wounded for a long distance on litters, which labor in this climate is extremely arduous upon the bearers-- privates from the ranks or Hospital Corps." ⁸⁶ His recommendation was that since Chinese coolies could perform strenuous duties in this climate, they should be substituted as litter bearers. This was acted upon by the Quartermaster Corps, and 150 Chinese coolies were employed and distributed throughout the regiments. ⁸⁷

During all of the expeditions the personnel of the Medical Department performed their duties meritoriously. To mention all of these expeditions would be repetitious because all of them were similar in preparation and procedure. A typical expedition was General Lawton's Northern Luzon campaign, which lasted from April 22, 1899, to May 29, 1899. ⁸⁸ This expedition was planned to be swift moving and only four ambulances and one cart were taken by the Medical Department. ⁸⁹ On April 22, General Lawton with his command left La Loma, which had been the rendezvous point. From La Loma they proceeded to Novaliches. Difficulty had been encountered in getting the vehicles over the Tuliahan River, which was not bridged and had steep approaches to its rocky banks. ⁹⁰ At Novaliches a field hospital was set up to care for six men that were incapable of proceeding. Meanwhile General Lawton telegraphed Manila to send an ambulance to

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pick up these sick men.

Leaving Novaliches the command moved north. No enemy was met, but the difficulties of the road, combined with the intense heat, slowed progress to a standstill. It had taken the command over ten hours to march four and a half miles. On April 27 the command reached Angat. Here fresh supplies were brought by the Quartermaster Corps, and ten sick soldiers were returned to Manila in the supply vehicles.⁹²

The first major engagement of the expedition took place at San Rafael on May 1. Here over 1000 Insurgents were routed and the American loss was only one killed and seven wounded.⁹³ The sick and wounded were removed with the command to Baliwag. On May 4, a wagon train left Baliwag with 95 sick and wounded.⁹⁴ The destination was Malolos, because there was located a railroad. From Malolos the sick and wounded were evacuated in box-cars to Manila. The train's personnel consisted of one surgeon and a few corporals. Accommodations were inadequate because nothing had been done to make the box-cars comfortable, or especially suitable for hospital purposes.⁹⁵

The expedition proceeded around Candaba Swamp engaging the Insurgents whenever possible. The sick and wounded were left in temporary field hospitals, which were usually established in towns occupied by the command.⁹⁶ Throughout the expedition the hospital corporals had acquitted themselves nobly and fearlessly. Joseph McManus, a soldier that fought in the Philippines, said that "It was something inspiring to watch how recklessly they faced all kinds of fire to attend the wounded and dying and carry off the dead."⁹⁷

These men were not free from danger just because they wore the red cross. From the beginning of the Insurrection, the Filipino sharpshooters seemed to take particular pains to hit the wounded and those that were attending them.⁹⁸

In this campaign as in others the Americans received a clear picture of the devastating effects of a tropical climate on the health of the troops operating in the field. The total number of casualties in Lawton's division was 515. Of those only nine were killed and thirty-five wounded by Insurgent bullets.⁹⁹ Nearly 40% or 187 of the casualties were caused by dysentery or diarrhea, and 20% or 108 were caused by malaria.¹⁰⁰ Mosquito bars had not become an article of issue, and a soldier sleeping in the open had absolutely no protection against the mosquito,¹⁰¹ which at this time was officially the vector of malaria. Heat exhaustion disabled thirty-seven men and proved to be just as dangerous as Insurgent bullets.¹⁰² In a later campaign Lawton had over nine hundred men drop out of a forced march because of heat exhaustion.¹⁰³ Throughout the campaign in the Philippines certain diseases constantly threatened the fighting strength of the army. These prevalent injuries were malaria, dysentery, diarrhea, typhoid fever, and heat exhaustion.

Sick and wounded that were evacuated to Manila received excellent treatment. Of course a few diseases, such as beri-beri and pemphigus, were new to the medical officers, but experimentation did take place in an attempt to find solutions to these infections. This experimentation combined with practical experience resulted in new methods of treatment for certain infections. The hospitals

were equipped with many modern conveniences that made possible this excellent treatment. Soon after the hospitals had been organized, electricity was included. Other conveniences included laboratory apparatus, X-ray machines, distilling apparatus, ice plants, and excellent sewage disposal systems. ¹⁰⁴ All of these changes increased the efficiency of the hospitals and resulted in the speedy recovery of many sick so that they could be returned to their units. Those cases that were disabled were evacuated by means of hospital ships to San Francisco. ¹⁰⁵ At San Francisco the general hospital was expanded to take care of all the sick and wounded that were returning from the Philippines.

Many lessons were gained by the Medical Department from the experiences encountered during the war in the Philippines. First of all the Medical Department recognized the necessity of having a large number of reserve medical officers always on hand. Much of the early discomfort was due to a shortage of officers and the lack of military knowledge on the part of those that were contracted to work for the army. ¹⁰⁶ Secondly, the necessity of having an adequate stock of supplies on hand was deemed necessary. ¹⁰⁷ Experience had proved that a shortage of clothing, equipment, and medical supplies was dangerous and could result in serious damage to the fighting efficiency of a force. Thirdly, the difficulties encountered due to the lack of army transports showed the Medical Department the necessity of an army transport service. ¹⁰⁸ Such a fleet of equipped transports would always keep the nation in readiness and prevent many of the unwholesome conditions encountered

during the transportation of men to Cuba, Puerto Rico, and the Philippines. Other lessons learned from battle experiences in the Philippines were the necessity for a perfect sympathy and desire for co-operation between officers and men of the Medical Department and the rest of the line and staff,¹⁰⁹ the necessity of more medical officers and corpsmen on the line,¹¹⁰ and the need of instruction on the dangers to be encountered in a tropical climate. The isolated condition of the battles rendered it necessary to have complete co-operation and an adequate number of surgeons on the line to treat the wounded, and the heat of the tropics rendered it necessary for the men to be extremely careful so that they would not over-exert themselves.

The service of the medical personnel was worthy of praise throughout the war in the Philippines. Of course there were deaths resulting from typhoid, malaria, smallpox, beri-beri, dysentery, diarrhea, and skin infections, but these were small compared to figures of the Civil War.^a For example, during the Civil War the average rate of admissions on sick report for dysentery, per thousand strength, was 120.68, and the death rate for the cause and period was 3.67. During the year 1898 and including the first war since the Civil War the average rate of admissions on sick report for dysentery, per thousand strength, was 28.09, and the death rate was 1.86. No single point more clearly shows the value of military hygiene and sanitation, which were both absent during the Civil War,¹¹¹ than the great and progressive reduction of the rates for dysentery. The same reduction was true for the rates of diarrhea. During the

a. The figures for the Philippines were slightly higher than average.

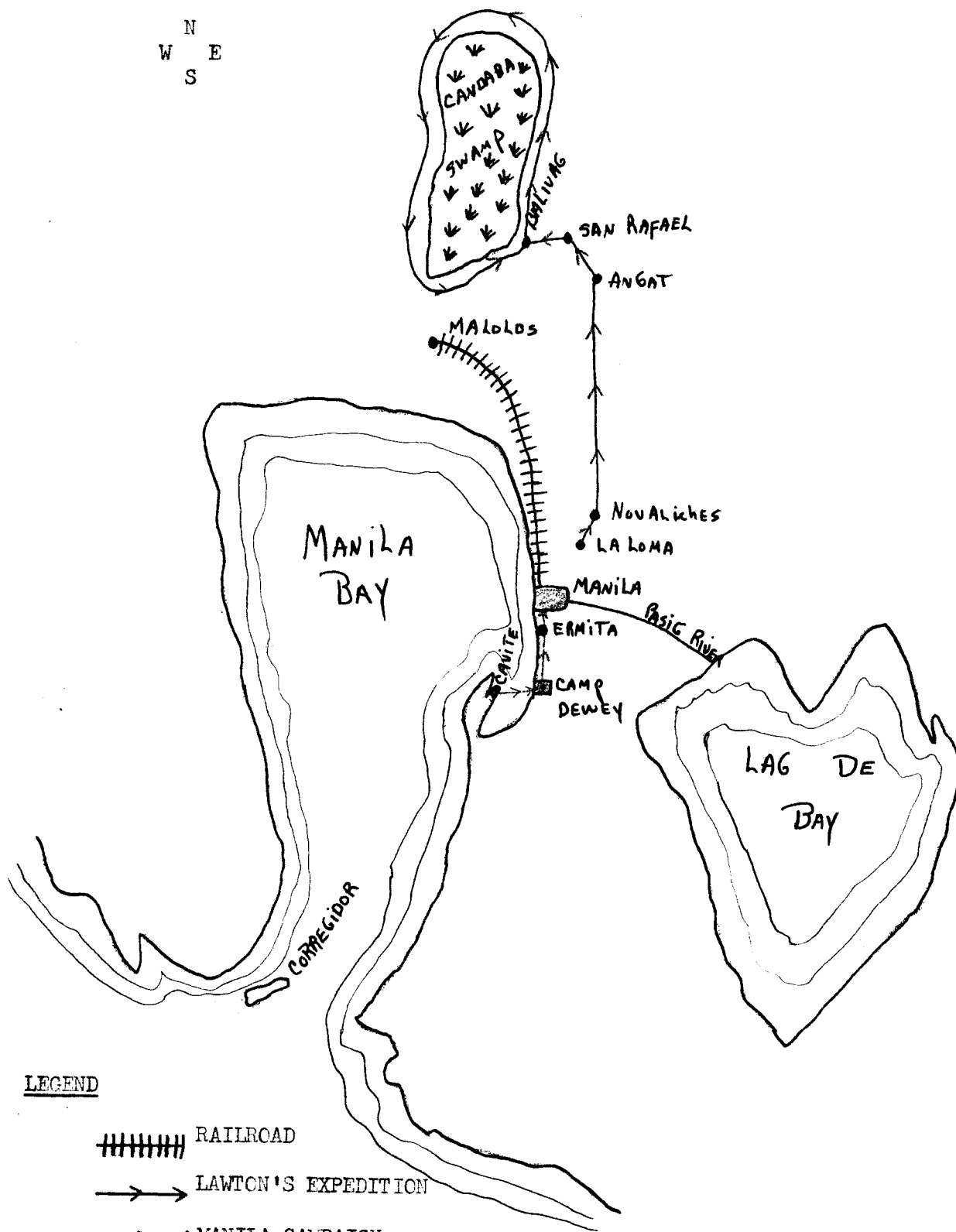
Civil War the average rate of admissions on sick report for diarrhea was 608.84, per thousand strength, and the death rate was 13.70. The figures for the year 1898 included 274.49 admissions per thousand strength, and .27 deaths. Of course there was a rise from the 1897 figure, but this was due to the increased size of the army and the multitude of men ignorant of military sanitation and hygiene.¹¹² The disease that had always been the scourge of an army in war was typhoid fever. This disease between 1861 and 1866 steadily increased because of the lack of knowledge about the disease. The average rate of admissions during this period was 57.71 per thousand strength. With the start of the war with Spain typhoid again broke out in epidemic form. The admissions were reported as 88.55 per thousand strength, but the Typhoid Commission appointed by the Adjutant-General said it was closer to 192.65.¹¹³ This figure is a great deal larger than the Civil War, but unlike the Civil War the number dropped rapidly when sanitation measures were carried out. The same situation was true in the Philippines. At first the civilian sanitation was poor and the number of cases high, but when sanitary measures were enforced by the medical officers the number of new cases dropped. Another fact to remember about the action in the Philippines was that many new diseases were encountered: diseases about which there was little knowledge.

One also has to remember that there were some inadequacies, but that these were partially due to the poor preparations of the various departments prior to war. It has already been mentioned in the previous chapter that the poor condition of the Medical Department

prior to the Spanish-American War was due to the refusal of funds to remove the department from the system of peace-time routine. Many of the problems of the Medical Department grew out of the fact that other departments also were not prepared for the war. The Quartermaster Corps, for example, at the start of the war lacked clothing, medical supplies, and means of transportation,¹¹⁴ and these shortages were partially responsible for many cases of disease and death. By the end of the war in the Philippines many of these inadequacies had been corrected, but this was too late for many that had died prior to these corrections.

PHILIPPINE MAP (MANILA AND CANDABA SWAMP CAMPAIGNS)

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LEGEND

- ||||| RAILROAD
- LAWTON'S EXPEDITION
- MANILA CAMPAIGN

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Chapter Four

Typhoid and Yellow Fever Commissions

During the Spanish-American War many diseases plagued the Medical Department of the United States Army, but two in particular were typhoid fever and yellow fever. These diseases had presented serious problems from the beginning of the settlement of America, and during the war of 1898 the lack of knowledge about these diseases again presented serious situations. For example, before the year 1900 it was universally believed by physicians and people that yellow fever was carried from person to person and spread generally by a germ, which up to that time had not been discovered. The germ was supposed to travel from person to person by contact with those sick with the disease, or by means of clothing or other articles that had been near the sick, and the development of yellow fever was believed to be greatly favored by all conditions that increased filth.¹ Such beliefs about the etiology of yellow fever resulted in a great number of cases and complete failure in the prevention of this deadly disease. Knowledge about the spread and prevention of typhoid fever was not as lacking as in the case of yellow fever, but still all of the possible means of spreading the infection were not known. The possibility of the disease's being contagious^a as well as infectious^b was not developed

- a. A contagious disease was one that could be transmitted from one person to another.
- b. An infectious disease was one caused by parasites, such as bacteria, protozoa, or fungi, and it may or may not be contagious.

at this time and because of this the dangers of tent infection and other modes of transmission were not discovered until too late.

On August 18, 1898, while typhoid fever was still in epidemic form in the various camps,^a Surgeon-General George Miller Sternberg requested the Adjutant-General of the army to constitute a board for the purpose of visiting the various camps within the limits of the United States, and making a searching investigation with reference to the cause of the extensive prevalence of typhoid fever. Sternberg also recommended that this board be directed, while pursuing their investigations, to call the attention of the proper authorities to any unsanitary conditions existing at the camps visited by them, and to make recommendations with a view² to prompt correction of any unsanitary conditions found.

The three men recommended by Sternberg and accepted by the Adjutant-General were Major Walter Reed, Surgeon United States Army, Major Victor C. Vaughan, Division Surgeon United States Volunteers, and Major Edward O. Shakespeare, Brigade Surgeon United States Volunteers. Major Walter Reed, chairman of the board, was eminently suited for this type of work. Past experience in pathology and bacteriology at The John Hopkins University had prepared Reed for research of this kind. In as much as he alone of the members was a member of the regular army, all questions concerning the application of sanitary measures for the abatement of the epidemics in different

a. The number of typhoid fever cases by August 18, 1898, was approximately 13,770. By the end of the war the numbers had reached 20,738 cases and 1580 deaths.

camps were referred to and decided by him. The problem in the studies of this board, to which Major Reed gave most of his time and attention, was that of the relation of typhoid fever to the short diarrheas and so-called malarias.³ Major Edward C. Shakespeare was notably fitted for the work of an epidemiologist,^a whose job it was to trace the effect to its cause. To Doctor Shakespeare this type of research was not new, because as early as 1885 he was doing research into the causes and conditions under which cholera thrived in Europe and India. Major Victor C. Vaughan, former president of the medical school at the University of Michigan, was efficient in the fields of bacteriology and hygiene. When Shakespeare died in 1900 and Reed in 1902, the report was still unfinished and the task fell on the shoulders of Vaughan, who completed it in 1904.⁴

Two days after the orders instructing the board to investigate various camps had been issued, the members began their tour of the posts.^b At each of these posts the members endeavored to see for themselves everything that might have a bearing on the origin and spread of typhoid fever. They acquainted themselves with the water supply, the nature of the soils of the camp site, the space allotted regiments, the arrangement and size of the tents, the number of men occupying each tent, the disposal of excreta, the

- a. An epidemiologist was a person that studied the science of epidemics.
- b. The camps included on the itinerary of the tour of inspection were Camp Algers in Virginia, camp at Fernandina in Florida, Camp Cuba Libre in Florida, camp at Huntsville in Alabama, Camp George H. Thomas in Georgia, camp at Knoxville in Tennessee, Camp Meade in Pennsylvania, and Camp Wykoff in New York.

location of sinks with reference to mess tents, the disposition of garbage, the care given to the conditions of sinks and cesspools, and the thoroughness with which the camps were policed.⁵ The sole endeavor of the board was to get as near the absolute truth as possible.⁶

One of the first things noticed by Reed, Vaughan, and Shakespeare was that many of the medical officers failed to recognize typhoid fever in its early stages.⁷ Many cases of typhoid were mistakenly diagnosed as malaria and the board recommended that the Surgeon-General send to each encampment an expert properly equipped to make blood examinations for the plasmodium of malaria and to apply the Widal test for typhoid fever.⁸ The failure of the regimental surgeons to diagnose properly many cases of typhoid fever was easily explained. Orders required, very properly, that every man sick for forty-eight hours should be sent to the division hospital, and this was not a sufficient time for the regimental surgeon to observe the patient and make a proper diagnosis.⁹ There was also some excuse for the division surgeon's failure to recognize all cases of typhoid fever. Many of those suffering from the less severe of these cases remained hospitalized for a short time and were furloughed home or forwarded to some general hospital.¹⁰ This prevented the division surgeons from observing the patients and arriving at the correct diagnosis. Also the use of the microscopic examination of the blood and the application of the Widal test were so modern that the profession generally depended upon specially trained experts for their application to the diagnosis of doubtful cases. It was hoped,

however, that the time was not far distant when every qualified practitioner of medicine would be prepared to apply these invaluable means of diagnosis.¹¹

The conclusion of the Typhoid Commission was that in recognizing nearly half of the cases of typhoid fever the army surgeon showed no greater incapacity than that which was daily shown by physicians in many of the larger cities in our country.¹² This conclusion resulted from the fact that in such cities as New York, Cleveland, and Philadelphia the percentage of deaths among those recognized cases was between 15 and 30 per cent, while in the army the percentage was near 17 per cent, which was close to those arrived at in civilian life. Yet, this failure to recognize typhoid fever, especially in its earlier stages and in its milder manifestations, was not peculiar to American physicians, but had occurred in all parts of the world where the two diseases (typhoid and malaria) prevailed in the same area.

At all of the camps inspected there were certain unsanitary conditions present. True, some camps were more sanitary than others, but on the whole both the hygiene and sanitation were inadequate.¹⁴ One common failing was that the sinks, which were used for the disposal of garbage and excreta, were seldom erected in a proper location, and those that were erected had never been properly policed.¹⁵ Sinks should never have been located near a company area or kitchen. Also sinks should have been erected so that the drainage was always away from the water supply. These rules had not been followed and sinks were discovered to be near company areas, kitchens, and water supplies.¹⁶

In one case at Chickamauga the sinks of the Sixth Ohio regiment were only twelve or fifteen feet from the kitchens of the First West Virginia Volunteer Infantry. Many sinks inspected by the board were discovered to be in a disgusting condition, which was due to the lack of discipline on the part of the soldiers. In some instances the sinks were filled to the top, and the fecal matter was never covered with earth. This carelessness left the excreta open to flies that spread typhoid germs throughout the units either by personal contact or as a result of their excrement.

Not all of the soldiers bothered to use the sinks. It was not uncommon to see the ground of a camp site polluted because of the fecal matter deposited on the surface. In some camps the ground was so covered with fecal matter that it was almost impossible to walk without soiling the feet. This pollution was important in the spread of the typhoid germs at the camps of instruction.

The Typhoid Commission concluded "That the sink must no longer be permitted in permanent encampments," but, when a sink was the only possible method of disposal, care should be taken to place, ditch, and shelter the sink. The board stated that anyone using a sink should cover his own feces, and recommended that sanitary regulations should be placed upon the level of military discipline, and that an infraction of any of them be as severely punished as any other breach of discipline.

Prior to the investigation by the Typhoid Commission the majority of doctors and people believed that typhoid in the army was primarily due to infected water. The attention of the profession

had been largely attracted to the propagation of this disease through contamination of the water supply and to the distribution of the typhoid bacilli by the milkman, and there had in consequence always²⁴ been a tendency to overlook other modes of infection.

The conclusion of the board after an extensive investigation was that infected water had not been the great factor in the causation²⁵ of typhoid fever in the national encampments. They mentioned that in a few cases the local water supplies had become contaminated. They showed, however, that regiments that did not drink this infected water also became widely infected with typhoid fever. They demonstrated furthermore that the spread of typhoid continued after some regiments left Chickamauga and had been moved to Knoxville, Tennessee, and Lexington, Kentucky, at both of which places the water supply was²⁶ above suspicion. In the few cases in which the water supply had become contaminated, this contamination was attributed to surface drainage. This condition was the result of either the poor location²⁷ of sinks or the type of sub-soil found at the encampment. For example, at Chickamauga the sub-soil consisted of layers of limestone that caused rain water to rush over the surface of the land rather than be absorbed by the soil. Since the camps were in poor sanitary con-²⁸dition this surface drainage swept the filth to the water supplies. The board recommended that the sinks be properly located and that the grounds be policed every day. Such actions as these would prevent the water from becoming contaminated and thus insure protection against the spread of typhoid bacilli by the water supply.

The method followed in many of the camps of detailing men

from the ranks to act as orderlies at the hospital was condemned by
the commission.²⁹ It was customary to detail men from the line to
serve as orderlies in the hospitals. In some places these details
were daily; in others, a detail was made for a week. At the ex-
piration of the time for which the detail was made the men were
returned to their respective regiments and other men were detailed
for like purposes to the hospital. In a hospital it was necessary
that the most thorough disinfection of the stools and urine of all
patients under treatment in the hospital and of all bedclothing
and personal linen be required as a matter of routine.³⁰ Most of
the detailed men were wholly ignorant of the nature of infection
and methods of disinfection. At some hospitals these attendants
failed to disinfect the stools, urine, and equipment used by the
infected patients.³¹ In fact, at one of the division hospitals
the commission saw orderlies of this kind go from the hospital
and partake of their mid-day meal without even washing their hands.
These men not only handled the food which they ate, but passed
articles to their neighbors.³² To the commission this type of
attendant seemed a major cause in the dissemination of typhoid among
the men.

In answer to these evils found in the hospitals the board
recommended that every article that came in contact with a sick person
be disinfected. Also the board believed it important that female
nurses be secured immediately in order to guarantee proper care and
attention to the sick. Any person selected to work in a hospital
the board insisted should have a sufficient knowledge of the nature

of infection and the methods of disinfection.³³

At many of the camps the board noticed that the medical officers knew the location, sanitation, and discipline were inadequate, but that nothing appeared to have been done to correct these situations. Upon further investigation they discovered that many of the medical officers had made recommendations to the regimental and company officers, but that these recommendations were not always heeded by the officers in charge.³⁴ The situation was the same as it had been during the Civil War and the period between that war and 1898. The medical officer had the right to recommend, but he was unable to control the sanitary situation unless the line officers enforced the necessary measures for protecting the health of the command.³⁵ In many cases the line officers resented being told how to perform some act correctly, even though they were totally unprepared to deal with sanitary situations. One illustration was the Fifth Pennsylvania. Upon arrival at Chickamauga it had been located on low ground. Requests for a change in location were repeatedly sent to the officers in charge, but these requests were unheeded. Soon the soil became muddy, the camp received the washings from other camps above, the sinks rapidly filled with water and overflowed, and still permission was refused to change the location. In fact it took three months before the Fifth Pennsylvania was finally moved to higher ground that was suited for occupation.³⁶

Reed, Vaughan, and Shakespeare thought it unfortunate that hygiene was not taught in the national military school. It seemed to them that a line officer should be able to recognize the importance

of reasonable requests and recommendations made by the medical
officers. ³⁷ Since many of the line officers were lacking in
knowledge about hygiene, the board requested that the medical
officers be granted more authority in all matters pertaining to
the hygiene of camps. ³⁸

Of all the work accomplished by the board, the discovering
and proving of new theories of the spread of disease and the repudiation
of obsolete theories were the most important. Reed, Vaughan, and
Shakespeare had discovered intelligent medical officers that believed
in the miasmatic ^a and pythogenic ^b theories of the origin of typhoid
fever. ³⁹ Both of these theories were controverted conclusively by
the investigations of the board. First of all, the investigations
showed that the miasmatic theory was unsupported because many
regiments located in undesirable positions had developed less typhoid
fever cases than those regiments located in desirable positions. ⁴⁰
Secondly, the investigations showed that the typical colon bacillus
was swallowed by thousands of people in drinking water without the
occurrence of a case of typhoid fever and that all known facts of
experimental bacteriology were at variance with the pythogenic
theory. ⁴¹

- a. The miasmatic theory was the belief that typhoid fever was due to a poison or miasm given off from the earth in a gaseous form.
- b. The pythogenic theory was the belief that the colon germ undergoes a ripening process by means of which its virulence was so increased and altered that it became the active agent in the causation of typhoid fever.

Since these old theories had been disapproved and water had been eliminated as the major cause of the spread of typhoid, the board began to look for new causes of the epidemics of typhoid fever. The board, by emphasizing the fact that the amount of disease decreased in the fall, explained the important part played by the fly in the spread of typhoid.⁴² They said that it was possible for a fly to carry typhoid bacillus on its body and thus spread the disease throughout a unit. At all of the camps visited flies had been seen swarming over fecal matter in the sinks. In some instances where lime had recently been sprinkled over the contents of the pits, flies with their feet whitened with lime were seen walking over the food in the kitchens.⁴³

Throughout the investigations the board had kept charts showing the distribution of typhoid fever among the companies of different regiments. These charts showed that men closely associated developed typhoid fever simultaneously, and that tent infection was a means by which typhoid fever was spread.⁴⁴ Certain tents were badly infected and the majority of their inmates developed the disease, while other tents wholly escaped. Because of the widespread development of disease among small units, the board believed that personal contact was an important factor in the spread of the disease.⁴⁵

The Typhoid Commission demonstrated that typhoid fever was not only an infectious disease, but also a contagious disease; that it might be transferred from one person to another by contact, and that the clothing, bedding, and rooms of typhoid patients needed to be disinfected with as much care as was given to these matters in

cases of diphtheria and scarlet fever. ⁴⁶ Also the commission showed that because typhoid was contagious, a command badly infected with typhoid fever would not lose the infection by simply changing ⁴⁷ location.

The value of this report rested in its advancement of the knowledge concerning the epidemiology of typhoid fever. This work revealed a number of points concerning the disease not before known, and emphasized others that had been little appreciated. The board as soon as it noticed unsanitary conditions made recommendations to the officers in charge. When these scientific sanitary measures were enforced the amount of typhoid fever rapidly decreased, which was completely the opposite of the situation during the Civil War. Now medical officers and commanding officers could not excuse themselves because of a lack of knowledge on the subject.

II

Unlike the Typhoid Commission that had been organized during the Spanish-American War, the Yellow Fever Commission was not organized until 1900. The reason for this was that yellow fever, although a threat during the short war, never established a strong foothold among the troops in Cuba and Puerto Rico. When the situation in Cuba began to look serious the War Department ordered the men back to the United States and away from the danger zone of yellow fever.

Since an army of occupation had to be stationed in Cuba and Puerto Rico, a unit of supposedly immune men had been selected

to carry out the occupation of the islands. For a year and a half the American authorities in Cuba endeavored to diminish the disease and mortality of the Cuban towns, by general sanitary work, but while the health of the population showed distinct improvement and the mortality had greatly diminished, yellow fever apparently had been entirely unaffected by these measures. ⁴⁸ In fact, owing to the large number of non-immune foreigners, the disease was more frequent than usual in Habana and in Quemados near the camp of American troops, and many valuable lives of American officers and soldiers had been lost.

In order to take advantage of this opportunity for investigating the etiology of the disease, a commission of medical officers from the United States was appointed on the recommendation of Surgeon-General Sternberg in May, 1900, to meet at Camp Columbia, Quemados, Cuba, for the purpose of pursuing scientific investigations of the infectious diseases ^a prevailing in the Island of Cuba, with special reference to yellow fever. ⁴⁹ The board was composed of Dr. Walter Reed, Dr. James Carroll, Dr. Jesse W. Lazear, all non-immunes, and Dr. Aristides Agramonte, a Cuban immune. Drs. Agramonte and Lazear were already in Cuba and Drs. Reed and Carroll joined them at Habana in June, 1900.

The work of the commission was divided among its members as follows: Dr. Walter Reed, the chairman, was at the head of affairs; Dr. James Carroll had charge of the bacteriological investigations;

- a. The group of infectious diseases included yellow fever, malaria, leprosy, and unclassified febrile conditions.

Dr. Jesse W. Lazear had the mosquito work, for he was, at this time, the only member of the board acquainted with the mosquito; and Dr. Aristides Agramonte was in charge of the autopsies and of the patho-
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 logical work.

At first the board had spent its time investigating the alleged discovery by Dr. Guiseppe Sanavelli of a specific "bacillus icteroides" that caused yellow fever. Blood samples were taken from people suffering with yellow fever and also those that had died as
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 a result of the disease. Over forty blood samples were tested and not one "bacillus icteroides" germ was discovered.
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 This positively demonstrated that Sanavelli's claim was without foundation and established beyond any doubt that it should be excluded from
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 further consideration.

The board met at the beginning of August, 1900, and discussed possible avenues of investigation. The point was brought up that if malarial fever, which was a disease affected by temperate conditions, required the agency of a special genus of mosquito for its propagation, as had in recent years been so brilliantly worked
 a
 out by Ross, Grassi, Bastianelli, Bignami, and others, it did not seem unreasonable to suppose that yellow fever, which also was plainly controlled by seasonal conditions, might also depend on
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 some such agent for its spread. The work of Dr. Henry R. Carter, United States Marine-Hospital Service, on yellow fever in Mississippi

a. Ronald Ross was the Englishman that succeeded in proving that the Anopheles mosquito was the vector of malaria(1897). His work was verified by 1898 by the others mentioned above.

in 1898 also intrigued the commission. The circumstances under which Carter worked had been favorable for recording with considerable accuracy the interval between the time of arrival of infecting cases in isolated farmhouses and the occurrence of secondary cases in these houses. According to Carter the period from the first case to the first group of cases infected at these houses was generally from two to three weeks. He also inferred that the difference between incubation and the infection of the building was due to the fact that the infective agent passed through a stage of development while in the body of some biting insect.

Influenced by these lines of reasoning the commission chose Dr. Carlos Finlay's theory of transmission as the next line of investigation. As early as 1881 Dr. Carlos Finlay had propagated the theory of the transmission of yellow fever by the bite of a special kind of infected mosquito.⁵⁵ Finlay suggested that yellow fever was principally due to an inflammation of the endothelium and intima of the blood vessels, and that the penetration of the proboscis of the mosquito into the vessels resulted in infection of the proboscis, and then an infected mosquito might, by biting a non-immune, mechanically transfer the infection to the party thus bitten.⁵⁶ These suggestions had never been supported by Finlay's scientific experiments. In all of the experiments of Finlay and others that took place between 1881 and 1900, not one case of yellow fever had resulted.⁵⁷ This failure resulted in many people's doubting the validity of the mosquito theory of transmission.⁵⁸

Major Walter Reed at the beginning of August, 1900, was

recalled to the United States to complete work on the publication of the report of the typhoid commission. During his absence the other three members of the board continued their work on the mosquito theory. Two of the members, Drs. Jesse W. Lazear and James Carroll, who had voluntarily submitted themselves to experimentation, had come down with yellow fever. Dr. Carroll suffered a severe attack of the disease and recovered, but Dr. Lazear, who had allowed himself to be bitten by an unknown mosquito, fell victim to the disease on September 25, 1900. These early investigations had proved that the mosquito served as the intermediate host for the parasite of yellow fever, and this conclusion was presented by Dr. Walter Reed on October 22, 1900, at the annual meeting of the American Public Health Association at Indianapolis.⁵⁹

Reed upon his return to Cuba in November, 1900, immediately met with General Leonard Wood, military commander of Cuba, and requested money and aid for the establishment of an experimental station. General Leonard Wood gave his approval and work was started on the camp.⁶⁰ The station, which had been dedicated Camp Lazear, was located four miles from Habana. This distance afforded a means by which perfect control could be exercised over the movement of the individuals subjected to inoculation, and excluded all possible sources of infection.⁶¹

At Camp Lazear the major experiments dealt with the mosquito theory. The experiments were conducted at a season when there was the least chance of naturally acquiring the disease, and the mosquitoes used were kept active by maintaining them at summer temperature.⁶² Dr. Walter Reed had obtained several Americans and Spaniards that

were willing to be bitten or receive blood injections.⁶³ Twelve of these volunteers were allowed to be bitten by infected mosquitoes, and the result was that ten of the twelve experienced attacks of yellow fever.⁶⁴ Then two volunteers were injected with blood from a patient suffering with yellow fever. Within two to four days both of these men had developed attacks of yellow fever.⁶⁵ All of these cases were examined by civilian doctors of Cuba that had treated yellow fever cases, and every one was diagnosed as yellow fever. Because of the excellent treatment administered by the doctors and hospital corpsmen no fatality other than Dr. Lazear's occurred among the brave men that willingly exposed themselves to the infection of this dreaded disease.⁶⁶

These experiments proved beyond a doubt that the mosquito was the vector of yellow fever. Still the board knew that it was their job to test other theories accepted by the doctors and people. One such theory was the belief that yellow fever was spread by fomites.^a At Camp Lazear a building was set up and furnished with infected articles. Every attempt was made to infect individuals by means of bedding, clothes, and other articles that had been used and soiled by patients suffering with virulent yellow fever. Volunteers slept in the buildings and handled the most filthy articles for twenty days and nights, but not a symptom of yellow fever was noted among them, nor was their health in the slightest degree affected.⁶⁷ Nevertheless they were not immune to the disease, because

a. A fomite was considered any article capable of retaining and spreading disease germs.

some of them were afterwards purposely infected by mosquito bites. This experiment indicated at once the uselessness of destroying valuable property for fear of infection.⁶⁸

One reason why Dr. Carlos Finlay had failed in his experiments was because he had never suspected that yellow fever was spread by one of that group of strict parasites that in nature necessarily pass through two distinct and alternating cycles of development, one within the body of a vertebrate, the other within a blood sucking invertebrate host. The board concluded from the observation of yellow fever cases that Finlay's statement that a mosquito could spread the disease two to six days after it had bitten a yellow fever patient was false.⁶⁹ In a paper read to the Pan-American Medical Congress in February, 1901, the board stated that they had always failed to induce an attack even of the mildest description when they used mosquitoes within less than twelve days from the time of contamination, and that this definitely showed that the parasite was one that required development, while in the stomach of the vector, before it could be spread to another person.⁷⁰

While on the subject of the danger period of the mosquito, the board experimented as to the length of time during which the mosquito was capable of conveying yellow fever. Through a thorough set of investigations the board showed that some of the mosquitoes were capable of spreading yellow fever as long as seventy-one days after an infected person had been bitten.⁷¹ Thus for the first time an explanation of the fact, several times noted in the literature, that the contagion of yellow fever may cling for several months to

a building that has been vacated by its occupants, or to the infected area of a town, even though this latter had been entirely depopulated,⁷² was explained to the world.

The work of the commission was not ended with the discovery of the mosquito as the intermediate host. The members knew that all of this work was to no avail if steps toward the prevention of this dreaded disease were not taken. To the board the best methods effectively to control yellow fever were to destroy the mosquitoes and protect the sick against the bites of these insects.⁷³ Thus the board began to consider the insect from the point of view of its identification, its habitat, its breeding places, the length of its generation, its hours of feeding, and the influence of temperature upon both its propagation and stinging. It began to seek the measures that should be used not only to protect the sick against the bites of these insects, but also to prevent the latter from infecting the healthy individuals. Finally it considered the several agents that might be successfully employed to prevent the breeding of mosquitoes and to destroying them in the adult stage.⁷⁴

Answers to all of these questions were handed over to Dr. William Gorgas, sanitary officer of Cuba, who immediately declared warfare on the mosquito. Many people said that this was an impossible task, but this talk did not discourage Gorgas. He merely remarked in his quiet way, "Perhaps we can not, but we shall try."⁷⁵ Work toward the destruction of the mosquito was started in Habana, Cuba. This work consisted of placing screens on all buildings, fumigating houses with sulphur, tobacco, and insect powders, placing

oil on the water where the insects were breeding, and draining marshy areas whenever possible. ⁷⁶ Within a year the decrease in yellow fever was so noticeable that many believed the long dread disease was ⁷⁷ completely conquered.

The practical value of this work was proved by the eradication of yellow fever from areas that down through the ages had constantly been scouraged by this much feared disease. The Secretary of War in 1901 said that "The brilliant character of this scientific achievement, its inestimable value to mankind, the saving of thousands of lives, and the deliverance of the Atlantic seacoast from constant apprehension, demand special recognition from the Government of the ⁷⁸ United States."

Both the Typhoid and Yellow Fever Commissions had much to do with the development of the Army Medical Department. The work of these two commissions had been practically the first chance at scientific research for the Medical Department. Prior to these investigations scientific research in the Medical Department was a rarity and these two boards justly showed that the army possessed some brilliant doctors. The result was that from this time on more original research continued regularly to be done by the Medical Department of the Army.

Footnotes

1. William Gorgas, "A Few General Directions with Regard to Destroying Mosquitoes, Particularly the Yellow Fever Mosquito," Documents of House of Representatives, 58th Congress, 2nd Session, Volume 50, Document 756, Serial No. 4676, p. 4.
2. Martha L. Sternberg, George Miller Sternberg (Chicago: American Medical Association, 1920), 196.
3. Walter Reed, Victor C. Vaughan, and Edward C. Shakespeare, Report on the Origin and Spread of Typhoid Fever in U.S. Camps during the Spanish War of 1898 (Washington: Government Printing Office, 1904), XIV.
4. Ibid., IV.
5. Walter Reed, ed., Abstract of the Report of the Origin and Spread of Typhoid Fever in U.S. Military Camps during the Spanish War of 1898 (Washington: Government Printing Office, 1900), 6.
6. Ibid., 9.
7. Ibid., 8; Grenville M. Dodge, Report of the Dodge Commission (Washington: Government Printing Office, 1899), 74.
8. Reed, Vaughan, and Shakespeare, op. cit., XVIII.
9. Ibid., 674.
10. Ibid., 299.
11. Sternberg, op. cit., 200.
12. Reed, Vaughan, and Shakespeare, op. cit., 300. There were 10,428 out of 20,738 typhoid cases diagnosed correctly.
13. Sternberg, op. cit., 200.
14. Dodge, op. cit., 98-118.
15. Reed, Vaughan, and Shakespeare, op. cit., 665.
16. Ibid., 664.
17. Loc. cit.
18. Sternberg, op. cit., 194.
19. Reed, Vaughan, and Shakespeare, op. cit., 666.

20. Ibid., 293.
21. Ibid., 270.
22. Ibid., 293.
23. Ibid., 294.
24. Sternberg, op. cit., 195.
25. Reed, Vaughan, and Shakespeare, op. cit., 665.
26. Loc. cit.
27. Ibid., 286.
28. Loc. cit.
29. Ibid., 666.
30. Ibid., 294.
31. Ibid., 293.
32. Ibid., 666.
33. Ibid., 295.
34. Sternberg, op. cit., 193.
35. Reed, Vaughan, and Shakespeare, op. cit., 664.
36. Loc. cit.
37. Loc. cit.
38. Loc. cit.
39. Ibid., 663.
40. Ibid., 662.
41. Ibid., 663.
42. Ibid., 666.
43. Loc. cit.; Dodge, op. cit., 104.
44. Reed, Vaughan, and Shakespeare, op. cit., 667.
45. Loc. cit.

46. Loc. cit.
47. Ibid., 670.
48. Yellow Fever - A Compilation of Various Publications (Washington: Government Printing Office, 1911), 9.
49. Sternberg, op. cit., 213; Howard A. Kelly, Walter Reed and Yellow Fever (Baltimore: Norman, Remington Co., 1923), 140.
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61. Kelly, op. cit., 153.
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63. Sternberg, op. cit., 222.
64. Kean, op. cit., 17.
65. Sternberg, op. cit., 226; Kelly, op. cit., 173.
66. Yellow Fever * A Compilation of Various Publications, 10.

67. Reed, "Recent Researches Concerning the Etiology, Propagation, and Prevention of Yellow Fever by the U.S. Army Commission," Journal of Hygiene, II (1902), 16.
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69. Ibid., 81.
70. Loc. cit.
71. Reed, "Recent Researches Concerning the Etiology, Propagation, and Prevention of Yellow Fever by the U.S. Army Commission," Journal of Hygiene, II (1902), 18; Yellow Fever - A Compilation of Various Publications, 102.
72. Ibid., 118.
73. Kean, op. cit., 19.
74. Yellow Fever - A Compilation of Various Publications, 134.
75. Marie Gorgas and Burton J. Hendrick, William Crawford Gorgas (New York: Doubleday, Doran and Co., 1935), 113.
76. William Gorgas, "A Few General Directions with Regard to Destroying Mosquitoes-Particularly the Yellow Fever Mosquito," Documents of the House of Representatives, 58th Congress, 2nd Session, Volume 50, Document 756, Serial No. 4676, pp. 8-14.
77. Yellow Fever - A Compilation of Various Publications, 33.
78. Ibid., 20.

Chapter Five

Work of the Dodge Commission: Resulting Advancements

Throughout the Spanish-American War charges of neglect had been printed by the press and medical journals. These charges had been so persistent that, whether true or false, they made a deep impression upon the country.

On September 8, 1898, General Russell A. Alger, Secretary of War, submitted a letter to the President, wherein he requested that the President appoint a board, consisting of from five to seven members, with full power to investigate every bureau of the War Department and everything connected with the army during the recent war with Spain. In pursuance of this request President McKinley appointed a commission to investigate all charges of criminal neglect of the soldiers in camp, field, hospital, and on transports; and to make the fullest examination of the administration of the War Department in all of its branches with the view of establishing the truth or falsity of the accusations of neglect and incompetency that had been made in the public press and elsewhere. The President also impressed upon the commission in the strongest manner his wish that the investigation should be so thorough and complete that the final report should, when made, fix the responsibility for any failure or fault by reason of neglect, incompetency, or maladministration upon the officers and bureau responsible, if it should be found that the evils complained of had existed.

The commission in preparation for its labors resolved

that the Secretary of War, the Adjutant-General, the Quartermaster-General, the Commissary-General, and the Surgeon-General transmit to them all complaints received by them since April 1, 1898, touching the conduct of the war. Also all persons that had any complaints were requested to put them in writing, stating facts that the party might know of his own knowledge precisely and in detail, giving names of officers or enlisted men that were charged with misconduct or incompetency, and that such communications be addressed to the secretary of the commission at Washington, D.C.

Next the commission requested the head of each department to furnish to the commission, as soon as possible, information as to the condition of his department at the time of the declaration of war with Spain, and the operations of the same from that time until the war ended. To aid in complying with this request a list of special questions, addressed to the head of each department, was attached to the formal request.

The next step was the examination of the witnesses. During the hundred and nine days that the commission was in session, over 495 witnesses were examined. All of these were sworn or permitted to make an affirmation; only one declined to take the oath.¹ The chief examination was conducted by the member of the commission designated for that purpose, but each witness was interrogated by every member that desired to question him. The people examined included: the Secretary of War, the Commanding General of the Army, the heads of the departments, officers of corps, divisions, brigades, regiments, and companies, non-commissioned officers and privates, and nurses

and persons from many employments in private life. No man or woman that stated to the commission that he or she possessed any material matter touching the subject of inquiry was refused a hearing.

The Dodge Commission, as it was later called, when interrogating witnesses about the Medical Department centered its inquiry around the following list of questions: (a) Were the hospitals in good condition? (b) Were the medical officers aware of their duties, and did they carry them out? (c) Were the ships used to transport the men to and from foreign soil in good condition? (d) Were the contract surgeons and nurses efficient in their work? and (e) Were the armies sent to Cuba, Puerto Rico, and the Philippines fully supplied with surgeons, stewards, hospital corpsmen, ambulances, and supplies?

Soon after war had been declared the regimental hospital was abolished, and in its place was established a division hospital. The commission said this plan in theory was an excellent one, as it permitted a more perfect classification of the sick, better attendance upon them with fewer doctors, and a more economical administration, but as it was carried out it worked poorly.² Because of the scarcity of medical officers those connected to the regiments were detailed for duty in the division hospitals. This action aroused regimental pride and the result was poor co-operation between the regimental medical officers and the division hospitals. The regimental surgeon tended to keep the sick as long as possible. Also the field and company officers excused the neglect of sanitation by saying that it was the medical officers' business to look after sanitation, and

since two-thirds of their doctors had been taken by the division hospitals this was impossible.³

Brigade and regimental surgeons that were put in charge of these new divisional hospitals as they were organized were as a rule discovered to know nothing of their duties. This lack of military knowledge resulted in a constant shortage of supplies, the overcrowding of the hospitals, the frequent change of the officers in charge, the laxity of discipline, and an inadequate police.⁴ The commission concluded that the division-hospital plan in order to succeed must have enough well-trained surgeons to fill the positions of officers in charge and executive officers, and a full number of competent medical men to discharge ward duties, and this without depleting the regiments.⁵ A large share of the responsibility for the existing conditions was placed upon the chief surgeon of camp and corps and the commanding officers of the same, because they should have known the state of affairs and compelled a change.

The general hospitals that came into existence at Key West, Fort McPherson, Fort Thomas, Fort Monroe, Chickamauga, and Washington, D.C. were organized and administered by regular medical officers, and these hospitals were relatively free from the troubles of the division hospitals.⁶

Dealing with the awareness of medical officers of their duties, the commission stated that the medical officers of the volunteer units were, with few exceptions, unacquainted with the military duties that would necessarily devolve upon them in the

field, however well fitted they might be to care for the sick and wounded.⁷ Since there was a shortage of regular army medical officers, who were specially trained in military duties, many of these volunteer medical officers were detailed duties that necessitated a knowledge of army affairs. In some cases where an emergency existed and there was a special provision to deal with the situation, these medical officers were completely ignorant of this authority.⁸ The conclusion of the commission was that all medical officers should be made aware of their duties and how to perform these correctly, and then and only then would the situations encountered during the war be eliminated.

Due to the lack of an army transport system the War Department found it necessary to charter ships for the transportation of troops to and from foreign soils. Frequently very serious complaints were made of the unfitness of the vessels, the lack of cleanliness and sanitary provision, the bad quality of the water supply, and the want of doctors, nurses, medicines, and hospital stores.

From evidence submitted to the commission, the conclusion was that many of the complaints about the transportation facilities were well founded.⁹ The Quartermaster Corps was held responsible for the lack of cleanliness, the bad quality of the water supply, and any existing deficiencies, while the Medical Department was held responsible for the want of food and medicines, the lack of doctors and nurses, and for any avoidable failures to care properly for the sick. The commission recognized however that there were conditions for which these departments could not be held responsible. These conditions included the unexpected number that became sick in transit,

the civilians that boarded unprovided for and added to the difficulties of caring for the sick, and the fact that it was desired that every sick or wounded soldier be sent back to the United States as soon as possible, even at the cost of a few days' inconvenience.¹⁰

The efficiency of the contract surgeons was also questioned by the commission. Many complaints about the competency of contract surgeons had been received by the War Department, and so the commission set out to examine these complaints and either verify or prove them false. Most of these complaints were proven false, but the commission noticed that many of the contract surgeons lacked wide experience, mature judgment, and knowledge about a soldier's life.¹¹ Even though these men were earnest workers, it was the belief of many experienced physicians that no physician that was a recent graduate of any college in the land was capable of taking care of thirty-five to fifty typhoid fever patients.¹² Also many of these contract surgeons had not been trained in military hygiene and army administration, and both of these subjects were necessary to keep a camp sanitary and running efficiently.

In the years between 1875 and 1898 the value, the efficiency, and the availability of well-trained nurses had been demonstrated, and it was much to be regretted that these facts were not fully realized by the medical officers of the army when the war commenced. At the beginning of the war many nurses volunteered their service, but since the surgeon-general was unwilling to send female nurses, except when they were asked for by surgeons in charge of hospitals, few were placed under contract before July 1. When disease became prevalent female

contract nurses were sent to the major hospitals. These nurses were all graduates of nurses' training schools and all had had experience
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in hospital work. The military surgeons in charge of the hospitals highly recommended them, and the soldiers never complained as to a lack of personal courtesy.

The last question, on which the commission spent a great deal of time, was whether the armies sent to Cuba, Puerto Rico, and the Philippines had enough surgeons, stewards, hospital corpsmen, ambulances, and supplies. Dealing with the question of the number of surgeons, stewards, and hospital corpsmen, the commission concluded that an unexpectedly high casualty rate in Cuba and the breaking down of physicians and medical personnel on duty led to
14
a shortage of medical personnel. Also the commission noted that doctors and hospital personnel had been stripped from the regiments and sent to the rear to work in the hospitals. This action left the fighting men with little if any medical attention, and the result was an increase in the sick report.
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In Puerto Rico the fighting was short lived and the medical personnel were never tested as had been the case in Cuba, but the battles in the Philippines again demonstrated the necessity of more surgeons, stewards, and hospital corpsmen at the fighting line. In the Philippines most of the battles took place in isolated regions away from the established hospitals. This necessitated immediate treatment and the only way this could be accomplished was to have surgeons and other medical personnel with the fighting force. The conclusion of the commission was that all rear units should be adequately supplied with medical

personnel so that the line units would not be stripped of their personnel.

During the Spanish-American War severe criticism was published about the lack of supplies. Examples were given of times in the United States, Cuba, Puerto Rico, and the Philippines when soldiers were lacking clothing, food, ambulances, and medical supplies. After a complete investigation the Dodge Commission concluded that the shortages in the United States were due to the unpreparedness of the Medical Department and other departments at the outbreak of war,¹⁶ but that the shortages overseas were not due to a lack of supplies but to improper preparations by certain departments. First of all the Medical Department had officers that were ignorant of army supply and this ignorance resulted in unnecessary delay. In some cases the medical officers knew nothing of emergency provisions that could have alleviated dangerous situations encountered by them. Next the Quartermaster Corps was held responsible for the lack of supplies.¹⁷ In loading the transports no specific system had been followed, and the result was that no one knew exactly where certain supplies were stored. Upon arrival in Cuba the Quartermaster Corps lacked adequate landing facilities and this caused a delay in landing the supplies. In fact many of the ships were not unloaded until the end of July.¹⁸ Even when the medical supplies reached shore transportation facilities were so inadequate that the supplies remained at Siboney and Daiquiri until necessary vehicles could be obtained. Landing and transportation facilities were also lacking in Puerto Rico and the Philippines.

The only thing that kept the medical force from completely breaking down was the brilliant improvisation rendered by the medical officers in charge.

The Dodge Commission ended its report by stating what was needed by the Medical Department of the United States Army. The changes that were expounded as necessary in the future were the establishment of a larger force of commissioned officers, the authority to establish in time of war a proper volunteer hospital corps, the forming of a reserve corps of selected trained women nurses that were ready to serve when necessity should arise, the keeping on hand a year's supply for an army of at least four times the actual strength, the command of transportation to such extent as would secure prompt shipment and ready delivery of all medical supplies, the simplification of administrative paper work, and the securing of such legislation as will authorize all surgeons in medical charge of troops, hospitals, transports, trains, and independent commands to draw from the Subsistence Department funds to purchase such articles of diet as may be necessary to the proper treatment of soldiers too sick to use the army ration. ¹⁹ The Dodge Commission did not content itself with pointing out faults. Its criticism was constructive, and its recommendations as to the Medical Department became what Colonel Jefferson R. Kean so happily designated ²⁰ the department's "charter." Fulfillment was years in coming, but improvements began at once.

The limited size of the Medical Department had been a serious problem during the Spanish-American War. A constant shortage of medical

officers had presented problems that could have been averted. Finally in 1901 Congress passed a bill that increased the number of medical officers from 192 to 321. This increase was not sufficient because of the increased size of the army resulting from the Philippine Insurrection, but it was a beginning toward necessary reform. Also this bill raised the number of hospital stewards from 200 to 300, and stated that in case of an emergency the Medical Department could appoint as many contract surgeons as were deemed necessary. Two new features that were added to the Medical Department were the addition of thirty dental surgeons to care for the dental problems of the soldiers, and the addition of an Army Nurse Corps.²¹ The bad point of this act was that, although it raised the number of medical officers, it failed to set down regulations for promotion and the result was that prospects for advancement were poor.

During the period between the Civil War and the Spanish-American War the nursing profession had gained a strong foothold in the field of medicine. A nurse was not longer just a person to care for the sick, but a systematically educated and trained person that insured expert attendance on the patients during the absence of the physicians and surgeons.²² One reason why nurses had not been quickly accepted by the medical officers during the war with Spain was because few of the military doctors had come in contact with them and did not know of their worth and ability.²³ The result of this lack of experience was that Sternberg's innovation in 1898 was not viewed with enthusiasm by many of the medical officers. When the health situation at the camps became dangerous, many of the officers

finally accepted the help of nurses. This was the chance the nurses had been waiting for and they quickly made use of it to prove their value to the medical officers, Medical Department, and Congress. The care administered by them was excellent and the effect of their presence greatly raised the morale of the sick. In 1901 Congress authorized the Medical Department to organize an Army Nurse Corps, and the only restriction on the size was the immediate necessity.

No further changes in the size of the Medical Department were made until 1908, when Congress passed a bill similar to that of 1901. This bill raised the number of medical officers from 321 to 444, but the important part of the bill was the formation of the Medical Reserve Corps. The program as set down by Major Jefferson R. Kean, who was a surgeon in the regular army, consisted of the commissioning of graduates of recognized schools of medicine. Any doctor that wished to become a member of the Medical Reserve Corps was welcomed to take an entrance examination, which consisted of both a mental and physical examination. If the candidate passed this examination he became a member of the Medical Reserve Corps and all he had to do to remain a member was to keep in contact with the Medical Department and have a physical every so often. The purpose of this group was to keep the Medical Department prepared in case of an emergency, and this change was outstanding because no other branch of the army had such a reserve before 1916.²⁴

Experimentation was one change that resulted directly from the Spanish-American War. The Typhoid and Yellow Fever Commissions had instilled the value of research in combating diseases, and this

feeling was not forgotten after the war. Typhoid fever, which was considered the scourge of any army, was still as prevalent as ever during wartime. Experience had proven that sanitation during combat could not always be adhered to, and so the Medical Department began searching for a new method of prevention. The English at the end of the nineteenth century had developed a vaccination against typhoid,^a but during the Boer War this treatment did not prove successful. Even though the vaccination was not successful, it was encouraging enough to cause further research by British scientists. The serum was further developed and in 1909 Frederick Russell, a medical officer of the United States Army, obtained permission to start vaccinating the United States Army. By 1911 vaccination was made compulsory and the value of this treatment can be judged by the drop in the number of cases in the peacetime army. In 1909 there were 282 cases and 22 deaths, while in 1912 there were 16 cases and only one death from typhoid fever.²⁶ Another example of the success of the vaccination was shown when General Pershing's division was sent to the Mexican border. This campaign was carried out without any spread of typhoid fever.²⁷ Other experiments were carried out dealing with the purification of water and diseases new to the Medical Department. For example, Major Carl R. Darnall of the Medical Corps experimented with different methods of purifying water, and the result was his discovering the method of chlorination. Other medical officers studied diseases such as hookworm, plague, beri-beri, and dysentery. In some cases the officers discovered the causes of the disease and how it could

a. The British Army had 31,000 cases and 5,877 deaths resulting from typhoid fever.

be prevented, but even if they were not completely successful their work helped advance the scientific branch of the Medical Department.

Although dental surgeons were authorized by Congress in 1901, it was not until 1911 that an act was passed that made the Dental Corps a separate part of the Medical Department. The act of 1911 authorized the formation of the Dental Corps and stated that one dentist was authorized for every 1000 men in service. The reason given for not accepting the dentists sooner was that they formerly had been trained only to pull and replace teeth, but now dentists were being trained to be specialists of diseases of the mouth and to perform surgery of the mouth and face. ²⁸

Throughout the Spanish-American War the lack of transportation facilities had presented serious problems. Necessary medical supplies could not be swiftly moved to the units that needed them, and wounded men could not be immediately evacuated because of the lack of ambulances. Of course much of this confusion was due to inadequate preparation, but some was due to the facilities' being unsuitable for the situation. With the invention of the internal combustion engine the automobile and airplane loomed as possible answers to the problems caused by inadequate transportation facilities. A conservative advance, which was due to the lack of funds, was followed by the army in the adoption of these two vehicles. By 1906 a few motor ambulances had been purchased and stationed at Washington Barracks. Eight years later motor ambulances were in use at fourteen posts and hospitals, but it was their use in World War I that insured permanent use in the military medical service. The first airplane was purchased by

the government in 1912 and little advancement took place before World War I. American aviation medicine came into existence during the combat participation of the American expeditionary force in France.

An important transportation problem that presented itself during the war with Spain resulted from the belief held by many that medical supplies were secondary in importance in time of war. This belief presented serious problems because without necessary medical supplies some units broke down and were unable to remain in the combat zone. In answer to this problem and many others that presented themselves ²⁹ as a result of poor administration, the General Staff was organized. This staff was composed of a member from each of the departments of the War Department, and the task of this group was to investigate problems and see that the necessary reform was accomplished. Before this General Staff had been organized the Medical Department suffered from neglect and lack of co-ordination of its work with that of the line of the army, but with the establishment of the General Staff the Medical Department had the opportunity to present its needs, to talk them over, to co-ordinate them with other needs of the army, to see that the needs were met, and to obtain recognition as an essential and important part of the military machine. ³⁰

Since the Spanish-American War had shown the nation the importance of a fleet, the navy had the chance to expand its Medical Department after the war. ³¹ Actually most of the improvements obtained were stated as necessary by Surgeon-General James R. Tryon (Navy)

many years before the war, but as in the army many of these changes came about during and immediately after the war. For example, Tryon expounded the need of a Naval Medical School, a hospital ship, a hospital corps, additional hospitals, and an increase in the number and rank of medical officers. ³² In the long run the navy obtained all of the reforms the army obtained, but since the navy started later than the army progress was slower. With the end of the war innovations did not cease, because the navy had the task of keeping vessels at foreign ports occupied by American troops. Since tropical diseases were prevalent in these areas the navy, like the army, was constantly searching for causes and cures of these diseases. Such an occupation of a foreign land necessitated an increase in the size of the Medical Department, the training of men to perform the experiments, and the establishment of a corps of female nurses that could expertly care for the sick. In 1902 the United States Naval Medical School was founded in Washington, D.C. This school taught new medical officers their duties and attempted to instill an interest in laboratory work and carry out a plan of experimentation. Also a training school for the Hospital Corps was established in 1903 at Norfolk, Virginia. Later the Nurse Corps and Dental Corps were established within the Navy Medical Department. All of these innovations greatly advanced the type of service that could be administered by the Naval Medical Department, and by the beginning of World War I the navy was prepared for almost any situation that would arise.

All of these above advancements can be attributed to the

Spanish-American War and it is important to remember that the medical value of any war must be measured not alone by the services performed during the war, but by those, too, that result from the war-time experience, since these will be just as important. Thus when looking at the Spanish-American War one can say that the military medical service, although inadequate in many ways, advanced as a result of the war, and continued to advance until it became the intricate system we have today.

Footnotes

1. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain (Washington: Government Printing Office, 1899), 6.
2. Ibid., 76.
3. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain (Senate Documents, 56th Congress, 1st Session, Volume 4, Document 221, Serial No. 3862), 1307. Testimony of Major J.D. Griffith, chief surgeon, Third Division, First Army Corps.
4. Ibid., 1362. Testimony of Major James M. Jenne, chief surgeon of volunteers, Second Division, Third Army Corps.
5. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain, 77.
6. Ibid., 77.
7. Ibid., 66.
8. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain, loc. cit., 1176. Testimony of Major E.S. Helburn, surgeon of volunteers, Second Kentucky Volunteer Infantry.
9. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain, 82.
10. Ibid., 83.
11. Ibid., 66.
12. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain, (Senate Documents, 56th Congress, 1st Session, Volume 3, Document 221, Serial No. 3861), 400. Testimony of Major Royce D. Fry, brigade surgeon, U.S. Infantry.
13. Ibid., 155.
14. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain, 67.

15. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain (Senate Documents, 56th Congress, 1st Session, Volume 5, Document 221, Serial No. 3863), 1631. Testimony of Major Stephen Baker, Fourth U.S. Infantry.
16. Report of the Commission Appointed by the President to Investigate the Conduct of the War Department in the War with Spain, 84.
17. Ibid., 70.
18. Loc. cit.
19. Ibid., 85.
20. P.M. Ashburn, A History of the Medical Department of the U.S. Army (New York: Houghton Mifflin Co., 1929), 204.
21. William Owen, A Chronological Arrangement of Congressional Legislation Relating to the Medical Corps of the U.S. Army from 1785-1917 (Washington: Government Printing Office, 1918), 34.
22. Ashburn, op. cit., 205.
23. Ibid., 208.
24. Edgar Hume, Victories of Army Medicine (New York: J.B. Lippencott, 1943), 32.
25. Papers of Officers of the Medical Corps (Washington: Government Printing Office, 1913), 11.
26. Loc. cit.
27. Ashburn, op. cit., 236.
28. Ibid., 210.
29. "Some of the Lessons of the War," Medical Record, LIV (1898), 485.
30. Ashburn, op. cit., 245.
31. Louis H. Roddis, Short History of Nautical Medicine (New York: P.B. Hoeber Inc., 1941), 237.
32. Ibid., 232.

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