UNIVERSITY OF CALIFORNIA, SAN DIEGO

To Bind Up the Nation's Wounds: The Army Medical Museum and the Development of American Medical Science, 1862-1913.

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

History (Science Studies)

by

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2015

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2015

TABLE OF CONTENTS

Signature Page …… iii

Table of Contents ……... iv

List of Abbreviations …….. v

List of Figures …… vi

Acknowledgements …… vii

Vita ……. x

Abstract of the Dissertation …… xi

Introduction ……. 1

Chapter One: The Healer-Scientist—The French impulse in Nineteenth Century American Medicine …….. 21

Chapter Two: The Physician-Soldier—The Civil War and American Medicine …… 77

Chapter Three: Binding the Nation's Wounds—The Army Medical Museum and Reconstruction …….. 139

Chapter Four: Making Museological Medicine—The Evolution of the Army Medical Museum …… 192

Chapter Five: Forging New Frontiers—The Bacteriological Revolution of the Army Medical Museum ……. 258

Conclusion …… 324

Bibliography ……. 335

LIST OF ABBREVIATIONS

AMM	Army Medical Museum
BMJ	*British Medical Journal*
IHD	International Health Division (of the Rockefeller Foundation)
MSHWR	*Medical and Surgical History of the War of the Rebellion*
NMHM	National Museum of Health and Medicine
OHA	Otis Historical Archives

LIST OF FIGURES

Figure 2.1: R.B. Bontecou, "A Morning's Work," 1865 ……..……... 100
Figure 2.2: Alexander Gardner, "Confederate Dead at Bloody Lane" ……... 102
Figure 2.3: A Union surgeon prepares for surgery near the battlefield ……... 115
Figure 2.4: Private James E. Kelly illustrated during his recovery ……..... 117
Figure 2.5: Trephined skull of Private R. …… 119
Figure 2.6: Henry A. Barnum, Recovery after a Penetrating Gunshot Wound …..…. 121
Figure 2.7: Lieutenant Jarratt, 15th North Carolina Regiment ……. 134
Figure 3.1: Hermann Faber, "Sketch of the Deathbed Scene of Abraham Lincoln" ... 143
Figure 3.2: "The Main Hall of the Army Medical Museum—Washington"……..…. 152
Figure 3.3: Shattered lower right tibia and fibula of Major Daniel E. Sickles ……. 161
Figure 3.4: Portrait of Major Daniel E. Sickles ……... 162
Figure 3.5: Private Jason W. Joslyn …….……... 165
Figure 3.6: Corporal David D. Cole …… 166
Figure 3.7: Private Samuel H. Decker, Double Amputation of the Forearms ……. 172
Figure 3.8: "Sabre Wounds of the Head" ……. 189
Figure 4.1: View of the Army Medical Museum, circa 1870s……. 201
Figure 4.2: Army Medical Museum Building at Independence Avenue ……. 206
Figure 4.3: The vertebra of President Garfield ……..…….. 216
Figure 4.4: Zentmayer Microscope …….. 233
Figure 4.5: Woodward's apparatus for photomicrography …….. 235
Figure 4.6: a) Longitudinal section of bone b) Section of cartilage from the rib …… 241
Figure 4.7: Demonstration of the Frankfurt Horizontal Line …….. 253
Figure 5.1: The bacteriological laboratory of the Army Medical Museum ……. 269
Figure 5.2: Dr. F.F. Russell vaccinating a volunteer ……... 295
Figure 5.3: Dean Cornwell, "Conquerors of Yellow Fever," 1939 …….. 311
Figure 5.4: Compound monocular microscope …… 314

ACKNOWLEDGEMENTS

This dissertation is the result of many years of great adventures around the world, through libraries and archives, museums and medical colleges.

First, and foremost, I am indebted to my advisor and mentor, Cathy Gere, without whom this dissertation would not have been possible. Cathy encouraged and challenged me throughout this process, and patiently edited multiple iterations of each chapter. I am grateful for all of her hard work and guidance in making this accomplishment a reality.

I am appreciative of the intellectual and financial support of the History and Science Studies Departments at the University of California, San Diego. Each of the members of my committee contributed immensely to my growth as a scholar. Discussions with Martha Lampland kept me grounded and focused, classes and independent projects with Tal Golan challenged me to expand my fields of study, conversations with David Serlin helped me widen the scope of my project, and seminars with Luis Alvarez honed my research skills.

Writing a dissertation can be a demanding, isolating process, so I am thankful for the colleagues that helped me through the last seven years. My cohort provided levity, laughter, and commiseration as needed. Dance parties with Emily Baum and late night conversations with Ankit Jain kept me going in the early years of graduate school. Theodora Dryer constantly reinvigorated my intellectual curiosity and determination, and became a most dear friend. The faculty and teaching assistants with whom I worked in the Making of the Modern World program at Eleanor Roosevelt College became my family, and enriched my graduate experience immensely. Matthew Herbst

and Heidi Keller-Lapp have been not only pedagogical role models, but also supportive colleagues. Adventures in beer tasting, podcasting, grading, and movie going with Emily Elizabeth Goodman kept me sane. My conversations with Haleema Welji, Kiri Hagerman, and Laura Guttierez, in particular, kept me motivated during my final year of writing.

As is the case with any substantial historical research project, this dissertation was made possible only with the assistance of the librarians and archivists I encountered during my research. Annie Brogan at the Library of the College of Physicians of Philadelphia patiently accommodated my many requests over the years. Evi Numen facilitated a private tour of the Mütter Museum, providing me with enormous insight into the institution. Laura Cutter arranged for my long visits to the Otis Historical Archives and tour of the National Museum of Health and Medicine, and guided my research before and during this time. Many thanks to Marin Stein and Kristina Ogilvie for hosting me in Washington, D.C. during my research trips, and helping me work through my findings.

The staff of the Philadelphia Area Center for the History of Science, most especially Babak Ashrafi and Simon Joseph, helped make my research goals in Philadelphia a reality. The Social Science Research Council's Dissertation Proposal Development Fellowship encouraged the facets of interdisciplinarity present in this project. Under the guidance of Peter Galison and Caroline Jones, and with the feedback of Rebecca Uchill, Julia Yezbick, Christy Spackman, Tim Prizer, Eszter Polonyi, Stephanie O'Rourke, Whitney Laemmli, Fiona Greenland, Lee Douglas, Jeremy Blatter, and David Baylis, I was able to transform my dissertation from a loose collection of ideas into a significant contribution to the history of science, medicine and museums.

Finally, I am grateful to my family for the immeasurable support and encouragement they have provided me all my life, and especially these last seven years. My parents, Randy and Bridget Bevers, facilitated sabbaticals at home, where I could write in peace, and always gave me great feedback, as well as constant love and support. My brother, Ken Bevers, kept me company in the wee hours of the night as we both studied, sharing Hans Zimmer music and laughs to keep each other going. Our conversations helped me stay focused and determined to achieve my goals. My aunt, Michelle Cohen, supported me with love, apartment furniture and relaxing retreats at her house, which became my second home throughout graduate school. My great uncle Larry kept me on task whenever I got distracted. I started this journey with a 400-mile backpacking trip along the Camino de Santiago with my best friend Marin Stein, and our annual summer adventures indulged and reinvigorated my spirit after each school year. My own personal wordsmith, Marin edited countless papers and drafts of this dissertation. My husband, Troy Bristol, had the patience of a saint as I spent many late nights laboring over this project. Troy always provided me with the support and encouragement I needed to get to each next step, and I am beyond grateful to have such an incredible partner.

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ABSTRACT OF THE DISSERTATION

To Bind Up the Nation's Wounds:
The Army Medical Museum and the Development
of American Medical Science, 1862-1913

by

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Doctor of Philosophy in History (Science Studies)

University of California, San Diego, 2015

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This dissertation examines the history of the Army Medical Museum and its contributions to American medical science between 1862 and 1913. I argue that Army Medical Museum, built to commemorate, celebrate and critique the battlefield medicine of the Civil War, laid the foundation for the development of medical science in the American context. The staff of the Army Medical Museum pioneered a uniquely American museological science practice during and after the war, by collecting,

arranging, and analyzing specimens, case histories and statistics to produce cutting-edge medical knowledge. The Army Medical Museum facilitated the reconstruction of both a grieving nation and the bodies and medicine torn apart by war, through museological exhibits and a medical history of the war. In the last quarter of the nineteenth century, the staff of the Army Medical Museum demonstrated the usefulness of museological science practice through original research in microscopy, comparative anatomy, and anthropology. I argue that it was the Army Medical Museum's inherent accommodation of scientific investigation of medicine that allowed it to become more broadly an institution for medical research in the twentieth century, but this privileging of research over Museum work ultimately contributed the decline of the Army Medical Museum as a pathoanatomical museum.

This dissertation contributes to understanding the development of modern medicine in the nineteenth century, investigating how the Civil War provided the circumstances in which a uniquely American medical science could be created and tested over and over again. The Army Medical Museum took shape as a collection of medical material for pedagogical display. Its status as a national government institution, its connection with the Surgeon General's Library, and its staff of renowned physicians who had volunteered in the Civil War, all shaped the Army Medical Museum's scope and purpose from 1865-1913. This context set it apart from other medical museums, national museums, and research institutes. By tracing the development of the Army Medical Museum and the medical research, knowledge, and practice it shaped, we can come to better understand the impact of the Civil War on American medical practice and the trajectory of American medical science.

INTRODUCTION

This dissertation argues that Army Medical Museum, built to commemorate, celebrate and critique the battlefield medicine of the Civil War, laid the foundation for the development of medical science in the American context. The rise of clinical medicine in France during and after the Revolution radically restructured the way physicians understood, visualized, and discussed disease. By arranging patients in wards devoted to single ailments, by correlating symptoms with lesions on the internal organs discovered during autopsy, and by organizing specimens of pathological anatomy into categories and displaying them side by side to illustrate the progression of illness, physicians began the process of classifying and analyzing the natural history of disease, probing structure-function relationships and correlating symptoms with autopsy evidence. Historian of science John Pickstone characterizes this visual arrangement of disease in the Paris clinic through the use of analytical and empirical investigation as 'museological science', an organizing principle that facilitated the birth of both modern medicine and the modern museum.[1]

Museological science gave medicine hope that it could conquer disease. At the same time, some observers, most notably American medical students in post-revolutionary Paris, saw French clinical medicine as an inherently dehumanizing practice that transformed the patient into mere objects of investigation. The French had developed revolutionary approaches to medicine, but American physicians took issue with how they

[1] John Pickstone, "Museological Science? The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology, and Medicine," *History of Science*, Vol. 32 (1994): 112.

put these theories into practice, questioning their character as healers. Kentucky physician Charles Caldwell, for example, observed during his time in Paris that patients at Paris hospitals were received "but to be *auscultated* and otherwise *diagnostically* treated, die and be *post-mortemized,* for the instruction of [students], and the improvement of the profession by furnishing the *material* for writers and printers—and there the process ends."[2]

These contradictions created an important tension for American medical students who were eager to adopt this new science, but troubled by many aspects of it. In *Against the spirit of system: the French impulse in nineteenth-century American medicine*, John Harley Warner analyzes a variety of letters American physicians studying in Paris had written home, boasting of all they had seen and learned while also expressing their disdain for the way the French objectified their patients in the name of science.[3] Warner claims that on their return, the tension between "the physician's identity as healer and identity as scientist" was uniquely charged in the American context. This was the moment, Warner argues, when:

> The trope of the heartless medical scientist became established in American culture…and when concern over transforming patients from subjects of healing efforts into objects of scientific scrutiny started to become a central theme in anxieties over the conduct of American medicine.[4]

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[2] John H. Warner, *Against the spirit of the system: the French impulse in nineteenth-century American medicine* (Princeton: Princeton University Press, 1998), 258.
[3] Warner, *Against the spirit of the system*, 257.
[4] Warner, *Against the spirit of the system*, 254.

This dissertation examines one way that American physicians attempted to resolve this tension between objectivity and objectification, in their efforts to integrate French medical science with American therapeutic practice. The Army Medical Museum developed in the wake of the Civil War as a space for both the negotiation of medical knowledge through empirical and museological practices, and commemoration through case histories and historical narratives. This museum was made possible by the Civil War and the bodies it provided, and made indispensable by French developments in medical education that privileged observation of symptoms, post-mortem examination, preservation of the pathological specimen, and the analytical display of such specimens in a medical museum.

In many ways the Civil War halted the progress of modern medicine, as physicians and medical students across the United States left their homes to care for the soldiers fighting the war. At the same time, the war provided these medical volunteers with a practical, direct experience observing, diagnosing, and treating illness and injury that far outweighed experiences in the French clinic and morgue. Correlating signs and symptoms of sick soldiers with surgical specimens and postmortem examination, these physicians produced medical knowledge that transformed the diagnostic and operative capabilities of wartime medicine. The implementation of museological science in the context of the Civil War resulted in the development of a uniquely American scientific medical practice. By displaying both the medical knowledge that resulted from the Civil War and also the historical context of the deaths that made American museological medicine possible, the Army Medical Museum crafted a distinctive national idiom for medical science.

In the decades following the Civil War, the Army Medical Museum shaped the dual reconstruction of both a nation split in two by a divisive war, and the bodies torn apart in the conflict. Through the museological display of specimens, case histories, photographs and artifacts, the Museum commemorated the sacrifices made and the lives lost, building on the lessons of war as the foundation for a stronger medical science. At the same time, staff at the Museum began the process of analyzing the case histories, specimens, and reports collected during the war, in order to produce the *Medical and Surgical History of the War of the Rebellion*. Although its most basic purpose was to render the lessons of the war available for study by future generations, the *Medical and Surgical History of the War of the Rebellion* also demonstrated the utility of museological science in medical education. The juxtaposition of case histories with photographs and drawings of both soldiers and specimens, organized by disease category condensed the museum experience into an ambitious textbook of battlefield medicine. Together, the Museum and its accompanying medical history of the conflict provided a template for better understanding the illnesses, diseases, and injuries that plagued Union and Confederate troops during the Civil War, illustrating the value of museological science to modern medical practice.

After the Civil War, the Army Medical Museum carved out for itself a new identity as an institution for medical research. Seeking to become the clearinghouse of medical knowledge, the Museum established relationships and exchanges with physicians, professors, universities, museums and medical institutions around the world. Under the direction of its staff of physician-scientists, the Army Medical Museum developed extensive collections of specimens that were useful for both display and

research, contributing to growing fields in medicine. Museum staff published their research and participated in debates central to the development of these medical sciences, hoping to solidify the Army Medical Museum's position as the most important institution for medical research at that time. By the last quarter of the century, Curator John Shaw Billings claimed the Army Medical Museum had become not only a national archive of medical knowledge, but also a central medical institution contributing to national prestige through its "eminence in scientific work and teaching."[5] Relocated in 1887 to the national mall, next to the Smithsonian Institution, the Army Medical Museum had come to occupy an important space in the national medical landscape.

The enduring value of the Army Medical Museum rested in its ability to facilitate the development of medical knowledge through new modes of visualizing health and disease. The Army Medical Museum shifted its focus in the last third of the nineteenth century to microscopical investigations supporting bacteriological research. It was during this time that the staff of the Army Medical Museum definitively entered the annals of the history of science, contributing to the identification of the cause, prevention and treatment of a range of devastating infectious diseases—including malarial fever, typhoid fever, and yellow fever. With their groundbreaking research and discoveries, museum curator Walter Reed and his team of bacteriologists shifted the spotlight toward the Army Medical Museum as an institution for medical research. Although this shift marked the realization of the central goal of previous Surgeons General, it also signaled the end of the Army Medical Museum as a center for museological science. Despite the enduring

[5] J.S. Billings, "On Medical Museums: With Special Reference to the Army Medical Museum at Washington," *The Medical News* (Sep. 22, 1888): 36.

nature of the pathological specimen as a tool for medical education, the collections of the Army Medical Museum were deemed irrelevant to the development of medical research. The Army Medical Museum's greatest achievement—contributions to the eradication of infectious disease—ultimately precipitated its decline.

Medicine, Medical Museums and Medical History

In *The Birth of the Museum*, Tony Bennett documents the rise of the museum as a vehicle for educating the public in order to create a more sophisticated citizenry. By analyzing how the public was expected to use museums and how museums were given the power to educate this public, Bennett sheds light on the relationship between the forms of presentation and construction of knowledge in museums, and the meanings visitors were able to make from them. Bennett's analysis illustrates the important role museums play in public education, especially in shaping public understanding of history.[6] Eilean Hooper-Greenhill (1992) and others have similarly argued that museums are central to the processes of knowledge creation and historical narrative construction.[7] Scholars in the field of museum studies have lobbied for broader and more in-depth investigations of the creation, dissemination, and reception of knowledge within

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[6] Tony Bennett, *The Birth of the Museum: History, Theory, Politics* (New York: Routledge, 1995).

[7] Eilean Hooper-Greenhill explains the variety of roles modern museums perform in the production and shaping of knowledge, and how these museums contribute to broader social education in *Museums and the shaping of knowledge* (London and New York: Routledge, 1992); Gaynor Kavanagh provides a collection of museum-based histories that illustrate how museums help engage people with the past in *Making Histories in Museums* (London and New York: Leicester University Press, 1996); Sally Gregory Kohlstedt traces the history of public museums in North America and explains how the movement for a modern "new museum" in the twentieth century has often been overlooked by historians of science in "Thoughts in Things": Modernity, History, and North American Museums," *Isis*, Vol. 96, No. 4 (Dec., 2005): 586-601.

museums. While the field of museum studies has, in recent years, seen a wide variety of analyses respond to this challenge, scholarship on medical museums has remained sparse.

Michael Sappol argues in *A Traffic of Dead Bodies* (2002), that the expansion of the medical profession and the rapid increase in medical schools catalyzed the creation of museums of pathological anatomy supported by, and associated with, these institutions. The most competitive medical schools in the United States could boast advanced education in pathological anatomy through both empirical dissections and medicine on display at their anatomy and pathology museums.[8] These museums allowed students not only to study diverse pathological conditions, but also to see firsthand the objects, diseases and illnesses they had previously encountered only in pictures and textual descriptions in medical books.[9] Medical museums were a dynamic part of medical education in the nineteenth century, and by 1910, Abraham Flexner emphasized in his report on American medical schools to the Carnegie Foundation for the Advancement of Teaching that a "well-maintained museum" was an "indicator of a school's educational seriousness," stressing the importance of anatomy and pathology instruction within these museums.[10]

Erin Hunter McLeary has discussed the role of museums in medical education in North America, emphasizing their usefulness as active sites for the development of scientific knowledge. McLeary contends, however, that historians have largely denied the scientific mission of these museums, misunderstanding them as cabinets of curiosities or

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[8] Michael Sappol, *A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in Nineteenth-Century America* (Princeton: Princeton University Press, 2002), 276.
[9] Erin Hunter McLeary, "The Mütter Museum: Education, Preservation, and Commemoration," *Annals of Internal Medicine*, Vol. 132, No. 7 (Apr., 2000): 600.
[10] McLeary, "The Mütter Museum," 601.

antiquated pathology archives. McLeary's work certainly fills a gap in historical scholarship on the role of medical museums in the development of medical science and medical education in the nineteenth century. Although McLeary acknowledges the place of the Army Medical Museum alongside the great North American medical museums, such as the Warren Museum at Harvard, the Mütter Museum of the College of Physicians of Philadelphia, and the Pathology Museum of McGill University, in doing so she has overlooked the distinctions that set the Army Medical Museum apart from these institutions, thereby also discounting the centrality of the Civil War to the development of medical science and medical education in the United States in the nineteenth century.[11] While many of these medical museums were sufficiently stocked with anatomical and pathological material, the Civil War provided the Army Medical Museum with an unprecedented abundance of incomparable specimens of morbid anatomy and pathology.

One traditional narrative of the medical history of the Civil War contends that the conflict supplied no tangible advances in the theory or practice of medicine. In 1995, for example, Army Medical Department Historian Mary C. Gillett argued that the Civil War "had occurred too soon to be of great benefit to medical science, for the instruments and techniques that would make significant increases in understanding possible were only just being developed."[12] Ten years later, in *Bleeding Blue and Gray: Civil War Surgery and*

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[11] Erin Hunter McLeary, "Science in a bottle: The medical museum in North America, 1860--1940" (Ph.D. dissertation, University of Pennsylvania, 2001). While McLeary claims that historians have denied the scientific mission of medical museums in general, she herself oversimplifies the function of the Army Medical Museum as just another medical museum, rather than the national institution for medical education and research it became by the beginning of the twentieth century. McLeary relegates the Army Medical Museum to an iteration of the medical museum impulse in American medical education, ignoring the differences that set the AMM apart from other medical museums, which contributed to a distinctly different process and outcome of medical knowledge production.

[12] Mary C. Gillett, *The Army Medical Department, 1865-1917* (Washington, D.C.: Government Printing Office, 1995), 3.

the Evolution of American Medicine (2005), Ira Rutkow argued that there were, in fact, substantial medical achievements during the Civil War, but that they had nothing to do with medical science. Rutkow maintains that the accomplishments of the Army Medical Department during the war lay in the reorganization of the department itself and its increased efficiency in the evacuation of the wounded.[13]

More recently, the importance of Civil War medicine has been belatedly acknowledged. In her 2014 book *Learning from the Wounded: The Civil War and the Rise of American Medical Science*, historian Shauna Devine has claimed that "most studies on scientific development in the nineteenth century neglect to tackle the war directly despite the fact that most elite physicians at the time were connected in one way or another to Civil War medicine."[14] Devine argues that the Civil War provided the opportunity for American physicians to assess and explore the principles of medical science, contributing to new understandings of disease and injury that were the foundation of modern American medical practice. Devine explains that "as physicians gained experience performing surgeries or studying diseases, they also developed new ways to produce and record knowledge about the causes, treatment, management, and prevention of disease."[15] The *Medical and Surgical History of the War of the Rebellion* produced after the war also provided "a seminal study in American medicine," and reflected the perspective of physicians that the war functioned "as a

[13] Ira Rutkow, *Bleeding Blue and Gray: Civil War Surgery and the Evolution of American Medicine* (New York: Random House, 2005).
[14] Shauna Devine, *Learning from the Wounded: The Civil War and the Rise of American Medical Science* (Chapel Hill, NC: The University of North Carolina, 2014), 7.
[15] Devine, *Learning from the Wounded,* 2.

'natural experiment' that afforded large amounts of medical information to be amassed."[16]

In my dissertation, I contextualize the medical value of the Civil War experience for American physicians, arguing that the conflict provided the experiential knowledge that transformed American medicine. Going beyond Devine in my claim for the centrality of the Civil War to the development of American medicine, my project suggests that this experiential knowledge was otherwise unavailable to most physicians and surgeons at that time, and this provision of the Civil War therefore fundamentally structured the development of medical science in America. My argument for the criticality of the Civil War is indebted to John Pickstone's analysis of museological science, allowing me to theorize the significance of the Army Medical Museum to the story of American medicine. Moreover, I examine how the specimens used to build this new medicine would take on an entirely different meaning than their counterparts in European medical museums, because they were generated in the context of war that divided America both geographically and ideologically. Unlike other medical museums developed before the Civil War, the Army Medical Museum was situated to become a national medical museum with a deeply historical component. This historical component served both commemorative and scientific purposes, and gave American medicine much of its distinctive ideological character.

David Livingstone argues that despite its seemingly universal character, modern science is a culturally and geographically contingent construct, shaped by—and

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[16] Lenore Barbian, Paul S. Sledzik, and Jeffrey S. Reznik, "Remains of War: Walt Whitman, Civil War Soldiers, and the Legacy of Medical Collections," *Museum History Journal*, 5:1 (January 2012): 2.

shaping—the location in which it is produced.[17] Interrogating the sites where scientific inquiry and the production of scientific knowledge occur is an invaluable method for better conceptualizing and understanding both the conduct and content of science, and the ramifications of the knowledge produced. The Army Medical Museum was born in and shaped by the Civil War, as was the military museological methodology its physician soldiers produced. Many military medical officers accepted their ignorance and limitations in saving the lives of the soldiers under their care, and focused more on the acquisition of case histories, specimens and statistics for future medical study. The human remains removed from the battlefields and hospitals to the Army Medical Museum, were accompanied by case histories that provided not only the medically relevant circumstances of their existence, but also the historical context in which they were produced. This context was vital to the reconstruction of the American nation, its soldiers, and its medicine.

Throughout the nineteenth century, Civil War specimens remained primarily in the Army Medical Museum's Pathology Section, underscoring the centrality of the pathological specimen to museological science, especially during the war. As the Museum expanded, newer sections incorporated specimens from all over the United States, as well as Europe and South America. For many of these specimens, their location of origin was not particularly relevant. The universal body of the wounded battle veteran did not need to be situated in time or place. The Army Medical Museum also assembled a large collection of human skulls, however, in the name of a science of human difference,

[17] David Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: University of Chicago Press, 2003).

and in this context geographical information was of vital importance. Skulls from Peru, the Austro-Hungarian Empire, and U.S. Indian territories were compared with American and European skulls in craniometrical efforts to differentiate race. Knowledge of the origin of specimens was thus essential in studies of craniometry, as well as comparative anatomy.

In a rather different register, public health data was another context in which place mattered. Towards the end of the nineteenth century, the Army Medical Museum incorporated laboratory facilities. Water samples were regularly sent to the Museum for bacteriological investigation, and the places from which these samples were derived was necessary information to aid in analysis. As the Army Medical Museum expanded its collection and scope, it developed new spaces for scientific inquiry, which shaped and constrained the meaning of specimens displayed and investigated there. This study examines how the context of the medical specimen related to and was subordinated by, the milieu of medical science at the Army Medical Museum.

At the heart of this project is a consideration of the assumed and assigned meanings of medical specimens in the nineteenth century. Cultural and physical anthropologists have argued that the specimens produced during the Civil War, for example, were imbued with cultural as well as medical value. From specimens of morbid anatomy to the illustrations of medical practice, they were displayed in the Army Medical Museum and historicized in the *Medical and Surgical History of the War of the Rebellion*. As medical material, they helped pathologists navigate the development of medical science in America. As relics of the Civil War, they became *memento mori* for museum visitors who would see in a fractured bone the fractured nation that produced it.

In storage, these specimens were transformed into data—photographed, measured, and described, then made available to researchers for use as sources of scientific and historical information.[18]

During the last quarter of the nineteenth century, the laboratory revolution shifted the focus of medical science to bacteriological and immunological research. Bacteriological cultures and immunological serums replaced medical and surgical specimens as the materials of medical investigation. When laboratory experiments with these new materials failed to produce the desired medical knowledge, medical scientists turned to animal and human experimentation. As medical science disappeared behind the closed doors of the laboratory, Sydney Halpern argues, the emerging research community began to employ lesser-harm calculations as both a means for determining the relative benefit of their new experiments and "asserting the legitimacy of science as a public asset."[19] According to lesser-harm logic, Halpern explains, "use of an intervention is justified if the risks it entails are lower than the risks of the natural disease that the intervention is designed to prevent or treat."[20] Lesser-harm calculations emerged in the infectious disease research undertaken by Walter Reed and other medical officers in the United States and Cuba at the end of the nineteenth and beginning of the twentieth centuries. Through laboratory research and human experimentation, Reed and the officers of the Army Medical Department made significant discoveries in the field of tropical medicine. At the same time, this work earned them reputations as the heartless medical scientists so many American physicians had criticized in France.

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[18] Barbian, Sledzik and Reznik, "Remains of War," 2.
[19] Sydney Halpern, *Lesser Harms: The Morality of Risk in Medical Research* (Chicago: University of Chicago Press, 2004), 5, 25.
[20] Halpern, *Lesser Harms*, 4.

My research for this dissertation is based on archival materials at the College of Physicians of Philadelphia and the Otis Historical Archives at the National Museum of Health and Medicine. For the first century of its existence, the staff of the Army Medical Museum took great care to preserve historical records, correspondence, medical research and publications, and specimens and materials of medical knowledge as a national medical museum should possess. These materials provide valuable insight into the goals of the Surgeons General, curators, librarians, hospital stewards, laboratory assistants and other museum staff who directed the function of the Army Medical Museum in the nineteenth and early twentieth centuries. I also rely on the information, analysis, and illustrations in the *Medical and Surgical History of the War of the Rebellion* for much of this dissertation. I worked closely with curatorial staff at the National Museum of Health and Medicine and the Otis Historical Archives to select specimens and illustrations to highlight in my dissertation as exemplars of the medical and cultural material of the Army Medical Museum during the nineteenth century.

Chapter One examines the development of early medical education in the United States, and the context in which American medical students and physicians sought professional development in the medical Mecca that was nineteenth century Paris. This chapter considers how and why American medical education and medical practice was transformed through the experiences of American students in Paris. I argue that while most American medical students and physicians traveled to Paris for professional development and experiential knowledge that could not be found in the United States, it was the unfettered access to medicalized bodies and emphasis on visual practices such as observation and experimentation that became the lens through which they viewed modern

French medicine and envisioned the transformation of American medicine. American physicians in the antebellum period to struggled to build a system of medicine and medical education that provided the materials deemed necessary for the development of museological medicine, while at the same preserving the conservatism and moral respectability of American therapeutics. Ultimately, this project will show the way in which the Army Medical Museum exemplified the unique trajectory of the modernization of medicine in the United States.

Chapter Two considers the context in which the Army Medical Museum was first conceived by Surgeon General William Alexander Hammond, and the project of collecting case histories, specimens and statistics he set in motion. Hammond sought to reconcile the mistakes and failures of military medicine in the Civil War by using the experience itself as the basis for the development of a uniquely American medical science. I interrogate the process of transforming soldiers into histories, bodies into specimens, and wartime medicine into statistics, examining four sites where these practices developed—at the office of the Surgeon General of the Army, on the battlefield, in the hospital, and in the Army Medical Museum. The context of the medical knowledge created at each of these locations serves to illustrate the process of creating a distinctly American medical science through museological practice. Together, these components illustrate the story of the successes and failures of medicine during the Civil War, and the foundation on which American medical science was built. Ultimately I argue that the Civil War provided the hands-on medical experience, and access to bodies, specimens and statistics that Americans sought in Paris, but within an American context that facilitated the development of a uniquely American medical science. All the stories,

specimens, and statistics—whether Union or Confederate—would become the components of a national medical museum and history. As much as the Civil War shaped and made possible the development of an American medical science, this medicine also shaped the narrative of the war in American history.

Chapter Three traces the dissemination of medical knowledge in the years of Reconstruction, a word that takes on multiple meanings in this context. I examine how the Surgeon General's Office and Army Medical Museum constructed a narrative of the Civil War that helped facilitate the reconstruction of the American nation, the broken bodies of its soldiers, and the promise of museological medical science. During and after the war, the collection at the Army Medical Museum, and the stories, statistics, and analysis of wartime medicine in the *Medical and Surgical History of the War of the Rebellion*, helped account for the loss of so many lives, turning their sacrifices into both an unforgettable history *and* a better American medicine. I argue that the enduring legacy throughout the Army Medical Museum's history was the pathological specimen, the material at the heart of a new medical science and history of the war. The pathological specimen was central to this process of building and rebuilding, proving to be not only medically, but also historically, valuable. The Civil War gave birth to a particularly American medical science, one that would not have been possible without hundreds of dead bodies and scores of wounded soldiers.

Chapter Four examines the expansion and multiplication of spaces for the continued development of museological science at the Army Medical Museum. During this expansion, the Museum became a more dynamic institution for broader medical research, leaving its Civil War roots behind to serve as a clearinghouse for medical

knowledge. The staff of the Army Medical Museum sought to transform it into the largest, most complete medical museum in the world by housing the most varied medical collection possible, extending its influence and establishing relationships abroad, and becoming an international center of medical knowledge. Under the direction of John Shaw Billings, the Army Medical Museum Institution emerged as a hybrid of museum, library, and research institute.

For the last quarter of the nineteenth century, the staff of the Army Medical Museum petitioned the American medical community for the contribution of more varied specimens, especially microscopic preparations to add to those taken from existing specimens, animal material for comparative research, and human skulls for the growing anthropological collection. These materials were not only vital to the completeness of the Army Medical Museum's collection, they were also reflective of an expansion of the usefulness of museological science. By examining microscopic preparations together with pathological specimens, and by comparing animal with human anatomy, as well as crania from different "races", the comparative dimensions of museological science preoccupied the Army Medical Museum for the rest of the nineteenth century. During these decades, the limitations of museological medicine began to reveal themselves.

Chapter Five explores the dramatic shift in the Army Medical Museum's goals and function with the appointment of George Miller Sternberg as Surgeon General, and Walter Reed as curator of the Army Medical Museum. Sternberg and Reed established the Army Medical School, the final locus of museological inquiry under the purview of the Army Medical Museum. At the same time, Sternberg and Reed redirected Museum staff from collecting and organizing medical specimens and materials to analyzing

microscopical slides and bacterial cultures. While Billings oversaw the development of broad research capacities in the expanding collection and workrooms of the Museum, Sternberg and Reed insisted on the development of laboratory facilities for more cutting edge epidemiological research. During this period, the resources and focus of the Army Medical Museum and the newly instituted Army Medical School were redirected, and even subordinated, to support bacteriological research.

The Spanish American War in 1898 diverted the Army Medical Department's resources and personnel to Cuba and Puerto Rico in the Caribbean, and to Guam and the Philippines in the Pacific. Despite establishing field and ship hospitals to care for the sick and wounded overseas, the Army Medical Department found itself once again unprepared for the daunting challenges to health that this latest war presented. It was during this time that Sternberg and Reed oversaw seminal research on typhoid fever and yellow fever, paving the way for prevention and treatment of these infectious diseases and the development of international public health infrastructure. This progress in epidemiological research, however, came only after thousands of U.S. troops and medical students contracted and died from these diseases. The preponderance of infectious diseases in Army camps in the United States and occupied territories, together with the ineptitude of the Army Medical Department in the Spanish-American War, in many ways mirrored the experiences of the Civil War. Once again, while the Army Medical Department would fail in the overall prevention of disease and death, it would build on the casualties to produce medical knowledge.

While Reed and his colleagues were heralded as heroes for their research on typhoid fever and yellow fever, their discoveries had been facilitated through human

experimentation, a practice much debated by the American public and medical community alike. Their exercise of lesser-harm justified human experimentation research facilitated the development of the American cultural and scientific imperative of eradication programs and tropical medicine in the Americas and abroad. The Army Medical Department's involvement in tropical medicine would become Sternberg and Reed's legacy, as would the decline of the Army Medical Museum as an institution for medical education and research.

The majority of medical museums in the United States functioned as sites for medical inquiry within medical schools. In contrast, the Army Medical Museum developed its pedagogical dimensions around the core of its own program of museological science. Over the course of the nineteenth century, the institution of the Army Medical Museum expanded to include a medical library, research facilities, and a school for military medical education. While the museological science of Paris medicine coalesced around the clinic, the development of American museological practice came from within the Army Medical Museum itself. Funded by the government, focused on military medicine in particular, and developing spaces of medical inquiry around itself, the Army Medical Museum was the most distinctively American example of a medical museum in the United States. Built from the experiences and bodies of war, the Army Medical Museum was destined to be an international institution of medical research.

This dissertation contributes to understanding the development of modern medicine in the second half of the nineteenth century, investigating how the Civil War provided the circumstances in which a uniquely American medical science could be created and tested over and over again. The Army Medical Museum took shape as a

collection of medical material for pedagogical display. Its status as a national government institution, its connection with the Surgeon General's Library, and its staff of renowned physicians who had volunteered in the Civil War, all shaped the Army Medical Museum's scope and purpose from 1865-1913. This context set it apart from other medical museums, national museums, and research institutes. By tracing the development of the Army Medical Museum and the medical research, knowledge, and practice it shaped, we can come to better understand the impact of the Civil War on American medical practice and the trajectory of American medical science.

Chapter One: The Healer-Scientist—The French impulse in Nineteenth Century American Medicine

In the early nineteenth century, American physicians flocked to Paris for the experiential knowledge that was scarce in the United States, and brought back new ideas and problems that profoundly shaped the course of modern medicine in America. This chapter considers how and why American medical education and medical practice was transformed through the experiences of American professors and students in Paris, and the varied results of these transformations. I argue that while most American medical students and physicians traveled to Paris for professional development and experiential knowledge that could not be found in the United States, it was the unfettered access to medicalized bodies and emphasis on visual practices like observation and experimentation that became the lens through which they viewed modern French medicine, and subsequently negotiated the transformation of American medicine. American physicians in the antebellum period to struggled to build a system of medicine and medical education that provided the materials deemed necessary for the development of museological medicine, while at the same preserving the conservatism and moral respectability of American therapeutics. Ultimately, this project will show the way in which the Army Medical Museum exemplified the unique trajectory of the modernization of medicine in the United States.

Part I: Early Medical Education and Medicine in America

At the beginning of the nineteenth century, medical education in the United States could be characterized as an informal network of apprenticeships without cohesive standards or regulations. Medical training in the American colonies in the eighteenth century had begun through apprenticeships with experienced physicians and surgeons who had studied medicine in Europe. Medical apprentices accompanied physicians on their visits to patients' homes, observed the care provided, and hoped to gain enough experience and reputation to one day start a practice of their own. Many physicians gave private lectures in their home as an extension of the apprenticeship system, in the hopes that a solid following might justify the creation of a substantial medical school.[21] The lectures and experiences these mentors could provide their students were limited, making the need for formal medical schools increasingly apparent by the middle of the eighteenth century.

The development of medicine and medical education in America was most often parallel with the growth of cities. By 1760, Philadelphia was one of the largest cities in the United States, and well on its way to becoming the medical center of America. The founding of the Pennsylvania Hospital in 1751, modeled after British voluntary hospitals, was unique because while it was intended "primarily to care for the sick poor regardless of residence," it also treated private patients who could afford to pay doctors' fees.[22] It thus provided experience and profit to aspiring physicians, a rare combination at the time. The Pennsylvania Hospital was intended to be a training hospital, where the most

[21] Richard H. Shryock, *Medicine and Society in America: 1660-1860* (New York: New York University Press, 1960), 24.
[22] Shryock, *Medicine and Society in America*, 21-22.

accomplished physicians trained the new generations of medical practitioners, creating an informal standard in medical practice.[23] Although most posts for physicians in Philadelphia were unpaid, there was a certain prestige to working in hospitals and almshouses during the eighteenth century, bringing apprentices in contact with powerful philanthropists and patrons. The financial sacrifice of working in one of these public institutions eventually paid off in the development of lucrative private practice for the most promising physicians. After years of unpaid service and a wide variety of experience, the young medical apprentice could confidently set out to treat patients on his own, with considerable compensation.

It was not until the establishment of formal medical schools in the latter half of the eighteenth century that medical students were able to attain some semblance of a common medical education experience. Dr. John Morgan was one of the earliest critics of American medical education in the eighteenth century, and became an ardent advocate of formal medical education through the establishment of medical colleges partnered with hospitals.[24] Richard H. Shryock argues that Dr. Morgan's main objective in founding the first medical school was to give more aspiring physicians access to professional education, in addition to developing a strong medical faculty and curriculum. This access, however, was aimed primarily at students with some preliminary academic training, making medical education in the United States an elite experience.[25] By 1765, Dr. Morgan had successfully convinced the College of Philadelphia to establish a medical

[23] Shryock, *Medicine and Society in America*, 23.
[24] Shryock, *Medicine and Society in America*, 17.
[25] Shryock, *Medicine and Society in America*, 26.

faculty, and subsequently, a medical college.[26] The Philadelphia College of Medicine—precursor to the University of Pennsylvania—was established in 1765 as the first formal medical school in the United States. Kings College in New York City and Harvard Medical School in Cambridge, Massachusetts, were established shortly thereafter, but these three remained the only institutions for formal medical study in the United States until well into the nineteenth century.[27] As such, they constituted an elite and competitive group, determined to reform and elevate medicine through formalized medical education.

Examining the varied foundational and educational differences between these particular medical schools helps to shed light on how disputes over, and obstacles to, medical education developed in the late eighteenth century. Historian William Frederick Norwood argues that there was a "milder theological climate" in Philadelphia compared to other cities with large universities, as well as a more vigorous innovative energy.[28] These two factors combined to make Philadelphia a place of possibility and constant change, and the College of Physicians of Philadelphia became one of the primary institutions where possibilities were explored and changes precipitated. The medical school of the College of Philadelphia was founded in this very spirit, with the aim of becoming the biggest and best medical school in the country. Dr. Morgan, who had studied medicine in Edinburgh and belonged to several prestigious European medical societies, was elected Professor of the Theory and Practice of Medicine just a few weeks

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[26] Shryock, *Medicine and Society in America*, 24-25.
[27] Robert G. Slawson, "Medical Training in the United States Prior to the Civil War," *Journal of Evidence-Based Complementary & Alternative Medicine* 17:1 (2012): 12.
[28] William Frederick Norwood, *Medical Education in the United States before the Civil War* (New York: Arno Press & The New York Times, 1971), 1.

before delivering the new medical school's commencement address in May 1765.[29] Morgan explained his vision of a comprehensive program of medical education involving premedical education, a graded curriculum, practical experience, extensive examinations and prestigious licensing. With Morgan and his fellow medical faculty in control of this entire program, he secured the place of Philadelphia as the medical capitol of the colonies.[30]

In the decades following his commencement address, however, Morgan witnessed the rise of a number of promising medical schools in competition with Philadelphia, many of them also created under the guidance and passion of a singular physician. In 1763, Dr. Samuel Clossy, a graduate of Trinity College, Dublin, gave a series of lectures on anatomy at King's College in New York, which received such praise that the College contracted Clossy to continue lectures on a weekly basis throughout the school year. At first, Clossy's lectures were a profitable investment by the College, which was able to charge both students and community members for their attendance.[31] By 1767, however, Clossy and Dr. Samuel Bard—an Edinburgh graduate who had become a respected professor of theory and practice—along with a handful of notable physician professors, convinced the College to open a full-fledged medical school.[32] The opening of the King's College Medical School in November 1767 was particularly noteworthy for having in attendance the provincial governor and judges of the Supreme Court, in addition to nearly a dozen European-trained physician professors. This New York City-based medical school adopted a program similar to that of the medical school of the College of

[29] Norwood, *Medical Education*, 2-3.
[30] Shryock, *Medicine and Society in America*, 27.
[31] Norwood, *Medical Education*, 109-110.
[32] Norwood, *Medical Education*, 110.

Philadelphia, but with much larger political and financial support. By 1769, the King's College Medical School awarded its first students the degree of baccalaureates in medicine, and by 1771, those same students received their doctorates in medicine, making the College the first American school to grant an M.D. degree.[33] At a time when medical standards were becoming increasingly important, King's College Medical School became the model for medical education.

The legacy of the Warren Brothers shaped the development of the medical school at Harvard College in Massachusetts. Joseph Warren operated a large medical practice and worked to improve the apprenticeship system of medical education by offering to his pupils courses in various fields of medicine until he was killed in the Battle at Bunker Hill during the early years of the American Revolution.[34] John Warren, Joseph's younger brother and best pupil, followed in his brother's footsteps, establishing first a medical practice and then volunteering to serve in the Medical Department during the Revolution. By 1780, John Warren had become surgeon of the military hospital in Boston and started delivering a course of anatomical lectures designed to improve medical education and standards of hospital physicians, complete with dissections and demonstrations that had only been seen in Philadelphia or Europe.[35] The Harvard College community was deeply impressed by Warren, and it was with great community support that he submitted to the College in September of 1782 a plan for a medical department, and the Medical School of Harvard College was created. Warren, like his brother Joseph, had high hopes for transforming the apprenticeship system into more substantial medical education, although

[33] Norwood, *Medical Education*, 111.
[34] Norwood, *Medical Education*, 169.
[35] Norwood, *Medical Education*, 169.

he was not nearly as preoccupied with regulation and standardization as Morgan was. Thus Warren insisted that the public be allowed to attend his college lectures, and shared with his students his vast collection of anatomical specimens.[36] The Medical School of Harvard existed in its early years under Warren as an institution for a more organic study of medicine and medical practices.

The establishment of these formal medical schools with at least moderately parallel standards for matriculation and graduation was a slow process. Coupled with disagreements between professors in different departments within the medical schools, and between medical faculty and university administration, the obstacles to building a substantial and legitimate system of medical education in the United States were overwhelming. In particular, disagreements between university officials and the medical faculty over graduation requirements contributed to the development of other licensing programs and alternative medical schools in the region. There had already existed a number of medical societies in the colonies, the first in New Jersey in 1761, which served to solve disputes over licensing, research, and medical education. The medical societies of each state aimed to regulate the quality of medical practitioners through licensing laws and education standards.[37] Dr. Morgan and other like-minded physicians in Philadelphia began organizing a professional society to "lend cohesion as well as prestige" to the medical guild.[38] What Morgan hoped to develop was a medical society specific to the needs of the research-minded physician professors of Philadelphia.

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[36] Norwood, *Medical Education*, 170.
[37] Shryock, *Medicine and Society in America*, 31.
[38] Shryock, *Medicine and Society in America*, 34.

The Massachusetts Medical Society, founded in 1781, was a strong leader in medical standards, electing its own members, regulating practitioners' licensing, and designing examinations for licensing.[39] The Society accomplished precisely what Morgan envisioned for the College of Physicians of Philadelphia. While the societies in New Jersey and Massachusetts lasted for decades, Morgan's Philadelphia Medical Society began in 1766, but was later absorbed into the American Philosophical Society. Thanks to the efforts of Benjamin Rush, the College of Physicians of Philadelphia that Morgan envisioned was finally founded in 1787, admitting members only by election to build a prestigious, educated guild. The College soon began funding medical research and amassing materials for the second institutional library in the country, creating a reputation for itself as an elite center for scientific medical education.[40] The College of Physicians of Philadelphia was to be set apart from the universities and medical societies of the United States, an authentic replication of the societies that governed the medical profession in Europe.

The attempt to build substantial schools for medical education in the eighteenth century was, overall, successful. Both the College of Philadelphia and King's college were disrupted during the American Revolution, after which rival schools were created through the University of the State of Pennsylvania (1780s) and University of New York (1807), respectively. Later, the two Philadelphia medical colleges were joined as the University of Pennsylvania in 1791, and the two New York medical colleges were united as Columbia University in 1813.[41] Harvard's medical school remained intact longer,

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[39] Shryock, *Medicine and Society in America*, 34.
[40] Shryock, *Medicine and Society in America*, 30.
[41] Shryock, *Medicine and Society in America*, 25.

perhaps because it had been created later than the schools in Philadelphia and New York, and perhaps because it had such a strong following. Nevertheless, the first three medical colleges of the United States endured into the nineteenth century, a testament to the growing interest in advancing and regularizing medicine.

The North/South Divide in Early American Medical Education

There was, to a certain extent, a lag in the development of medical societies and medical schools in the southern states, and medical societies predated many of the medical schools there. The first medical society in the South was that of the Maryland Medical Society, created in 1799. Dr. John Beale Davidge, a graduate of Glasgow University in 1793, was shocked by the lack of a medical community in Baltimore, and subsequently instigated the creation of the aforementioned society and lobbied for the creation of a medical school.[42] In the meantime, Dr. Davidge delivered a course of public lectures on obstetrics and the surgical sciences, and eventually set up an anatomy class of his own, complete with human dissections visible by the public. There was substantial public protest, but Davidge nonetheless won considerable fame as a pioneer of the medical sciences. Through the popularity of this program, Davidge was able to attract physician professors from the North to support his endeavor to create a medical school in the South. Dr. James Cocke, a Pennsylvania medical graduate of 1804, and John Shaw, a former Pennsylvania and Edinburgh student without a degree, joined Davidge in his campaign and helped to found the College of Medicine of Maryland in 1807.[43]

[42] Norwood, *Medical Education*, 224.
[43] Norwood, *Medical Education,* 225.

Nevertheless, the public opposition to anatomical dissection, in addition to a distrust of the physician professors from the North, slowed the development of this new medical school. The College of Medicine of Maryland struggled to create a cohesive selection of courses and provide the resources necessary for the subjects Davidge, Cocke, Shaw, and the other professors wanted to teach, interrupting the availability of courses of lectures and leaving many students with gaps in their course for medical education.[44] The modest financial support of the college helped it survive this time of uncertainty, until it established itself as a more serious institution for medical education.

South Carolina was the second state in the Old South to begin the process of establishing medical schools. When the Medical College of South Carolina was established in 1823, Norwood argues, it "adhered to the standards of medical education customarily recognized throughout the country," which included three years of apprenticeship, two terms of lectures, and a twenty-one-year age limit.[45] Along with these standards, the College experienced the faculty unrest and conflict with its Medical Society that plagued so many other medical schools around the country. Nevertheless, the Medical College of South Carolina succeeded at establishing a respectable program for medical education, which it hoped would draw southern medical students away from northern schools and programs abroad. Norwood argues the College "made a very definite contribution to American medicine by providing within the state a center of medical education which trained hundreds of physicians for the South," nearly matching Baltimore as an important medical training center.[46]

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[44] Norwood, *Medical Education,* 227.
[45] Norwood, *Medical Education*, 251-53.
[46] Norwood, *Medical Education*, 258.

The development of medical schools in Louisiana illustrates the extent to which environment impacted medical perspective. Louisiana's location and environment were uniquely conducive to the spread of a variety of illnesses coming from Europe and Latin America, including yellow fever, cholera, and smallpox. These epidemics made the need for adequate medical care even more urgent in Louisiana than in other parts of America.[47] The Charity Hospital of New Orleans (1786) was the earliest institution to respond to these epidemics, and provided a unique educational opportunity for young students to observe at this teaching hospital the constant influx of sick patients. Thomas Hunt (a Pennsylvania graduate and Paris-trained physician) and Warren Stone (a graduate of the Berkshire Medical Institution in Massachusetts) were two friends in search of opportunities to study cholera when they arrived in New Orleans in 1832 and saw in the Charity Hospital a medical institution that rivaled those in the North. After several years working at the Charity Hospital, Hunt and Stone, along with newcomer John H. Harrison of the University of Maryland, developed plans for creating the first medical school to operate in conjunction with the Hospital. The Medical College of Louisiana would be an experiential medical school, providing students access to clinical instruction at the Charity Hospital, unique opportunities for surgical practice and dissection (owing to the preponderance of unclaimed bodies from boating accidents near the port city), and the ability to contribute to a pathological anatomy museum at the school.[48]

As promising as the Medical College of Louisiana was, it was seen by many as a nationalist project of the northern colonies, since northerners founded it and English was

[47] Norwood, *Medical Education,* 362.
[48] Norwood, *Medical Education,* 363-4.

to be the official language of instruction. French-speaking physicians, many of whom were long-time residents with established medical practices in New Orleans, objected to these conditions, and eventually convinced the school to provide instruction in French as well as English.[49] The bilingual Medical College of Louisiana officially opened in 1834, claiming to provide a course of medical education founded in European tradition, but with "the individualism of American democracy."[50] Many medical schools in the South claimed their counterparts in the North were far too rooted in British tradition, and viewed the ideals of French medicine as a vehicle for liberating and transforming American medicine. Disagreements between French- and English-speaking faculty continued, but the school grew steadily and was considered enough of a success to be absorbed into the University of Louisiana in New Orleans as its Medical Department.[51] As part of a larger educational institution, the Medical Department enjoyed even greater success, boasting in its 1859 catalogue that it could provide its students not only "access to one of the largest hospitals in the country," but also intimate clinical instruction, "from morning until night" at the Charity Hospital, with the ability to examine patients for themselves.[52] Warner argues that these opportunities set the Medical Department of the University of Louisiana apart from neighboring schools in the South as well as those in the North, and clinical education in the rest of the country was by comparison quite meager.[53]

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[49] Norwood, *Medical Education,* 364.
[50] Norwood, *Medical Education,* 365.
[51] Norwood, *Medical Education ,* 367.
[52] John H. Warner, *Against the spirit of the system: the French impulse in nineteenth-century American medicine* (Princeton: Princeton University Press, 1998), 27.
[53] Warner, *Against the spirit of the system,* 27.

Insofar as anatomy courses and dissection varied in medical schools throughout the country, the opportunities for clinical education differed as well. Not all medical schools had sufficient access to hospitals for student observation, and many of these schools objected to the very principle of clinical education. Medical schools in the countryside were particularly defensive. One medical professor in Lexington, Kentucky in 1825 denied that the lack of a hospital made his institution inferior to others, claiming that his students were better off not having to contend with the droves of patients crowding urban hospitals. Rather, he claimed, they could expect to gain "insight into practice from living with a skillful practitioner in the country, seeing diseases at the bedside, noting all changes, the effects of treatment—hearing the causes and history of the disease," which he considered "of incomparably more utility to [the medical] student."[54] For many medical institutions, the continued practice of preceptorships provided the same, if not more, experience as might be gained through clinical education. W.C. Whetstone wrote to his brother in 1855 boasting that through his apprenticeship he had seen a wider variety of diseases than he imagined possible, by examining every one of his preceptor's patients and taking on their care as his own.[55] However popular clinically based medical education was in the early nineteenth century in the United States, the prevalence of apprenticeship-oriented schools and independent preceptors prevented the standardization of American medical education.

No matter the strides made in medical education in the South, the medical community of the North remained critical. Richard Shryock claims that many northerners

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[54] Warner, *Against the spirit of the system,* 27.
[55] Warner, *Against the spirit of the system,* 26-27.

viewed the lack of urban cultural centers in the South as having "retarded the development of medical schools and other professional institutions," and intensified competition between the physicians that were there.[56] While medical students in the North had an abundance of schools from which to choose, medical students in the South were forced to travel long distances for a premier education, and often chose more willingly to study abroad in Europe than at a medical school in the North. Many of the easternmost cities in the South, Shryock argues, willingly exported their medical graduate students for training abroad, in order to avoid dependence on the North for advanced medical education.[57] The draw of Paris as an important center for modern medicine and medical education, then, was particularly strong for Southern medical students and physicians.

Despite growing tensions between the North and South in the early nineteenth century, the medical profession on both sides shared a fear that quacks would destroy their profession, and desperately sought to reinvigorate and legitimate American medicine. Historian Michael Sappol argues in *A Traffic of Dead Bodies* that the medical profession began encouraging formal study in Europe as a means for distinguishing the professional physician from the charlatan, as well as requiring anatomical instruction and dissection practice. This identification with anatomy in particular, Sappol argues, helped the American medical profession legitimate itself through "the authority and prestige of the most advanced European medical science," in order to distinguish itself from

[56] Shryock, *Medicine in America*, 56.
[57] Shryock, *Medicine in America*, 56-7

"midwives, folk healers, the clergy and other rivals."[58] The American medical profession, Sappol maintains, followed trends in Britain, France, and Germany and became "ever more attached to an anatomical understanding of the body and an increasing role for anatomy in the medical curriculum."[59] In the next section, I explore the politics of anatomical study and dissection in American education in order to set the stage for examining the role of Parisian medical training in part two of this chapter.

Negotiating the Anatomical Body

Much of the tensions about the dehumanizing tendencies of scientific medicine were played out in relation to practices of anatomical dissection.[60] Even by the beginning of the nineteenth century, topics like surgery and physiology were taught primarily through lectures, leaving students with a hunger for experiential knowledge. Anatomy was the first experiential subject included in medical education, and by the end of the eighteenth century students were able to watch a demonstrator dissect a body while explaining the process. While the community of Cambridge, Massachusetts was supportive and appreciative of Warren's anatomical demonstrations, the communities of Philadelphia and New York City were not as tolerant. The violent reaction of the public to this essential, scientific aspect of medical education can be most clearly seen in the notorious "Doctor's Mob" in New York City in 1788, when an enraged mob sought to lynch the physicians engaged in dissections.[61] Insofar as the public objected to public

[58] Michael Sappol, *A Traffic of Dead Bodies: Anatomy and Embodied Social Identity in Nineteenth-Century America* (Princeton: Princeton University Press, 2002), 2.
[59] Sappol, *A Traffic of Dead* Bodies, 2.
[60] Slawson, "Medical Training," 16.
[61] Shryock, *Medicine and Society in America*, 29.

anatomical dissection, many medical students were also anxious about desecrating human bodies and engaging in morally questionable practices in the name of medical science.

Just as an example of how enduring the sentiments against dissection proved to be, one Philadelphia medical student wrote in a letter to his father in 1853, that practicing anatomical dissection seemed, seemed to "render our hearts liable to be corrupted and hardened'."[62] Nevertheless, human dissection was not only "basic in medical education," Shryock stresses, but was also "essential to studies in pathologic anatomy—a field which was becoming by 1800 the medical science par excellence."[63] What is more, Sappol argues, anatomical dissection was considered a "potent method of producing and disseminating knowledge—a powerful technology for operating upon the human body—but also a powerful metaphor."[64] Through dissection the body was transformed into an object of knowledge that could be used to negotiate matters of life and death, the heart of medical power.[65]

While anatomical demonstrations were required at many schools, others lacked the facilities and means for providing these. The anatomy lab soon became a competitive factor in medical school selection. Different laws regulating bodies for dissection in each state prevented many schools from offering competitive anatomy courses. Some schools made up for the lack of anatomical instruction by offering greater access to patients, but this varied widely. In the early nineteenth century, basic hospitals were found mainly in large cities, leaving medical schools in more rural locations at a great disadvantage. At the same time, many smaller schools boasted that students had the opportunity to observe

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[62] Warner, *Against the spirit of the system*, 264.
[63] Shryock, *Medicine and Society in America*, 29.
[64] Sappol, *A Traffic of Dead Bodies*, 2-3.
[65] Slawson, "Medical Training," 17.

the treatment of patients in their home, an arguably more intimate and valuable practical experience.[66] Slawson argues that this difference between the city and the country schools motivated the relocation of many medical schools, as in the move of Harvard Medical College from Cambridge to Boston in 1810.[67] The competition over anatomical instruction and practical experience was one of the strongest factors motivating students to travel to Paris for access to experiential knowledge, which in turn motivated the development of more clinical opportunities in the United States.

Many medical faculties were concerned with opportunities for dissection almost as much as their students. Dr. Morgan fought tirelessly with the administration of the College of Philadelphia to provide adequate and continued funding for the empirical research he felt was essential to elevating the status of the medical faculty.[68] The research Morgan and his colleagues hoped to conduct was referred to simply as "occasional clinical or epidemiologic reports on certain diseases," but this inevitably involved human bodies. Shryock argues that the "popular aversion to human dissection" at the time made anatomical dissection—even for professional research purposes—controversial.[69] Without public support of this scientific endeavor, many physicians were forced to "rob graveyards for teaching purposes," jeopardizing their reputations in order to save their work.[70]

Michael Sappol argues in *A Traffic of Dead Bodies* that although most states held provisions for the dissection of executed criminals, there were not enough bodies

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[66] Slawson, "Medical Training," 17.
[67] Slawson, "Medical Training," 17.
[68] Shryock, *Medicine and Society in America*, 28.
[69] Shryock, *Medicine and Society in America*, 28-29.
[70] Shryock, *Medicine and Society in America*, 29.

resulting from these conditions to satisfy the need of medical school anatomy courses. This led to more widespread proliferation of medical grave robbery, or "bodysnatching" in the late eighteenth and early nineteenth centuries.[71] As the practice of bodysnatching for medical dissection increased, so also did the outrage of the American public, resulting in dozens of anatomy riots in major cities and even the storming of medical colleges. Sappol claims these incidents made real the public distress over the issue of anatomy and the threat of violence, leading many state legislatures to "pass laws instituting or increasing statutory penalties for grave robbery."[72] Beginning with Massachusetts in 1831, dozens of states began passing "anatomy acts" restricting medical schools to the use of bodies of the "unclaimed" (i.e. the poor) in an effort to decrease the prevalence of bodysnatching. Sappol argues that these anatomy acts aimed to abolish what he refers to as the trade and "traffic" of dead bodies, while simultaneously solidifying class distinctions and cutting down on funeral expenses for the poor by allowing paupers to "posthumously repay their debt to society."[73] Medical schools responded in kind, by arguing that anatomical knowledge was needed not only to improve medicine, but also to "educate and morally uplift the northern working class, young women, black people, savages, and American youth" and restore moral order to American society.[74] There was no legal resolution of this issue for much of the nineteenth century, and public opinion and politics would continue to affect the inclusion of anatomical dissection in programs of medical education in the North until the Civil War.

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[71] Sappol, *A Traffic of Dead Bodies*, 3.
[72] Sappol, *A Traffic of Dead Bodies*, 4.
[73] Sappol, *A Traffic of Dead Bodies*, 4.
[74] Sappol, *A Traffic of Dead Bodies*, 6.

Southern Bodies, Slave Bodies

After the first few decades of the nineteenth century, medical schools in America either accepted or rejected anatomical dissection as part of their curriculum, and students often chose which medical school to attend based on its policy towards dissection. Amongst those schools that included instruction in anatomy, competition increased based on the opportunities each school provided for the development of skills in this arena. The importance of anatomical dissection experience for the medical student was further leveraged in competition between medical schools in the North and South. The Medical College of Louisiana, for example, claimed in its annual announcement for the 1842-1843 school year that the advantages of the school and the city of New Orleans "for acquiring practical knowledge of Medicine and Surgery are not surpassed by those of any other city in the United States," while boasting that "subjects for dissection will be provided in any number free of charge."[75] The elite status many northeastern medical schools had gained through rigid standards for acceptance and matriculation, and the employment of well-known European-trained physician professors, was challenged by the opportunities for practical medical experience provided in the South.

The challenge the South provided to established medical schools in the United States was political as well as medical. In his petition to the Louisiana State Legislature for funding, the dean of the Medical College of the University of Louisiana in New Orleans claimed that it would be beneficial to invest in the school so that Louisiana might

[75] *Circular of the Medical College of Louisiana in the Ninth Session, 1842-3* (New Orleans: Office of the Bee, 1842), 4.

become elevated as a state for the dynamic production of medical knowledge. The dean's petition further illustrates the unique position of the school in the South:

> No place in the United States offers so great opportunities for the acquisition of Anatomical knowledge, subjects being obtained from among the coloured population in sufficient numbers for every purpose, and proper dissection carried on without offending any individual in the community…[since] those impediments which exist elsewhere in so many other place, to the prosecution of this study, are not here thrown in the path of the student, public feeling being rather favourable than hostile to the advancement of the Science of Anatomy.[76]

Warner explains that this petition handled the controversy over dissection delicately by using European language about science and reiterating the lack of controversy regarding the use of "coloured bodies" for advancing the science of anatomy.[77] The use of blacks as medical subjects was not necessarily restricted to the South; the increasing demand for bodies for the practice of anatomical dissection meant that it became "essential to use the poor and the enslaved," in the North as well as South. Yet in the South, white attitudes towards blacks "ensured the selection of patients of this group as specimens," more often than poor whites.[78]

Todd L. Savitt argues that "southern white medical educators and researchers relied greatly on the availability of Negro patients for various purposes" at a time when empirical observation and experimentation were central to the development of medicine.[79] "To train students in disease management," Savitt reasons, "the better southern medical schools either established infirmaries or arranged with local authorities

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[76] Qtd. in Warner, *Against the spirit of the system,* 26.
[77] Warner, *Against the spirit of the system,* 26.
[78] Todd L. Savitt, "The Use of Blacks for Medical Experimentation and Demonstration in the Old South," *The Journal of Southern History*, 48:3 (Aug., 1982): 333.
[79] Savitt, "The Use of Blacks," 331.

to treat patients in poor houses or city hospitals."[80]Atlanta Medical College even advertised in newspapers, encouraging owners to send their sick and injured slaves to the infirmary for treatment, guaranteeing no charge if the patient returned uncured. Medical colleges and infirmaries alike sometimes offered reduced fees for slave owners who would send their slaves for "clinical" care.[81] The Transylvania University Medical Department in Lexington struggled in the 1830s to procure material for clinical instruction, and as rumors of this disadvantage spread, the nearby Louisville Medical Institute was able to attract more students, "owing in part to the presence of a large black (as well as transient white) population, well suited to the needs of teaching institutions."[82] Likewise, the Medical College of the State of South Carolina had become well known by 1841 for its continued and dependable use of black patients for surgical demonstrations and clinical lessons, attracting students from near and far.[83]

Articles in the *Southern Medical and Surgical Journal* during this time illustrate further the attitude of the southern medical profession towards slaves, and the varied relationships between slaves and southern medicine. In Dr. Paul F. Eve's January 1849 "Report on the first day's Surgical Clinical," under his direction as Professor of Surgery at the Medical College of Georgia, he noted the usual variety of interesting cases, most of which involve "Negroes."[84] His third cases involved Winney, a "Negro girl of twenty", who originally presented with an ulcer on her right foot five years previously, after stepping on a portion of a cotton stock while plowing. Dr. Eve tried every remedy he

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[80] Savitt, "The Use of Blacks," 334.
[81] Savitt, "The Use of Blacks," 334.
[82] Savitt, "The Use of Blacks," 333.
[83] Savitt, "The Use of Blacks," 335.
[84] Paul F. Eve, "Report on the first day's Surgical Clinical of the present Session in the Medical College of Georgia," *Southern Medical and Surgical Journal*, 5:1 (Jan., 1849): 29.

could think of for over five years, and while some helped the wound heal moderately, her livelihood depended on her bearing weight on the foot almost daily while plowing, which prevented the foot from ever healing.[85] Cases like Winney's were common because of the strenuous nature of plantation work, and were recorded as typical slave injuries. Dr. Eve's fourth case was that of a Negro boy of nineteen with stricture of the urethra, which he relieved by inserting a catheter. The boy acknowledged a history of difficulty urination, but with "no other cause for it than the fact of his having been a *dirt-eater.*"[86] As with Winney, the boy had been to the clinic several times for the same condition, as remedies for slaves seemed rather difficult to secure.

The Southern Medical and Surgical Journal's issues were filled with wild tales of the strange habits and medical conditions of slaves. A gentleman of New Orleans reported that "his slaves were in the habit of eating alligators, which, invariably, made them sick," and although they denied it, he knew by their crazy behavior that it was true.[87] He was convinced that his slaves had an abnormal appetite and solicited medical advice in the matter. In a "Case of Doubtful Sex," Dr. Harris presented a detailed description of an effeminate, but beautiful, male slave called Ned, who possessed "two large and well protuberant mammae, having all of the characteristics of a healthy well-formed young woman."[88] Considering also the feminine nature of his frame, and his reluctance to show the doctor his genitals, which included a pubis "covered with hair as in the female," and a "dwarfish-looking penis," Dr. Harris concluded, "the creature would

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[85] Eve, "Report on the first day's Surgical Clinical," 30.
[86] Eve, "Report on the first day's Surgical Clinical," 31.
[87] John LeConte, "Dr. Bennet Dowler's Contributions to the Natural History of the Alligator," *Southern Medical and Surgical Journal*, 3:2 (Feb., 1847): 106.
[88] S.H. Harris, "Case of Doubtful Sex," *Southern Medical and Surgical Journal* 3:8 (Aug., 1847): 504.

at once be pronounced a woman."[89] The most disturbing aspect of the case, however, was that the creature seemed to have been menstruating for some time, but through the penis. Many cases like this one were presented in order to illustrate the abundance of medical abnormalities occurring within the enslaved black populations. The continued publication of these tales confirmed the body of the slave as a medical curiosity, on which experimentation or dissection would be less objectionable than the civilized white body.

Especially in the South, city authorities rarely investigated the sources of medical school anatomy demonstrations, despite the illegality of human dissection at the time. Southern blacks, Savitt argues, "because of their helpless legal and inconsequential social positions, thus became prime candidates for medical-school dissections."[90] Yet, some masters of slaves who expressed the fervent desire not to be dissected upon death honored their wishes. One Alabama planation master "released for postmortem examination the body of only one of eight slave children who had died during a violent dysentery outbreak in 1851 despite the request of the attending physicians for other cadavers."[91] Although only a small minority protested the poking and prodding that came with being the subject of clinical observation, attitudes towards the dissection of human bodies were less than tolerant. Affluent white patients as well as black slaves regularly objected to the idea of "having their bodies minutely investigated after death."[92] By the 1850's, many medical colleges in the South were hiring intermediaries to purchase bodies from slave masters or rob graves to supply their dissection tables.[93]

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[89] S.H. Harris, "Case of Doubtful Sex," 504
[90] Savitt, "The Use of Blacks," 337.
[91] Savitt, "The Use of Blacks," 338.
[92] Savitt, "The Use of Blacks," 337.
[93] Savitt, "The Use of Blacks," 339.

Although the supply of bodies in the South was never enough to satisfy the demand of its medical students, it far surpassed those available in the North, giving medical schools in the South for the first time a strong edge in provisions for anatomical dissection. Many schools in the North were forced to reconsider their programs and their curricula in order to meet the demands of their students and compete with schools in the South. At the same time, the North became increasingly critical of the medical program in the South, inciting public debate over the use of slaves in medical experimentation and dissection and casting aspersions on the morality of southern medicine. They called in to question the extent to which Southern practitioners actually achieved "a knowledge of such science as was then available" through their morally dubious practices, and to what extent they applied that knowledge "*pro bono publico*," or for the greater good of the public.[94] This debate over the use of slaves in medicine forced many in the medical community to choose to label themselves either abolitionist physicians or slavery physicians. The Civil War would bring a halt to this debate not only by ending slavery, but also by producing enough diseased and dead bodies and specimens to supply the American desire for experiential medical knowledge for years to come.

Part II: The Medical Mecca of Paris

Medical faculty in both the North and South agreed that experiential knowledge was central to the young physician's training. John Harley Warner argues that whether skilled in the clinic or at the private bedside, it was widely believed that young medical graduates should, and would have to, "find ways on their own of gaining practical

[94] Shryock, *Medicine in America*, 56.

experience before they could reasonably expect to build a practice of citizens able to pay for a doctor's services."[95] The competition between schools throughout the United States directly contributed to the exportation of medical students to Europe for study abroad. Even those schools that were considered to have an adequate clinical and anatomical program increased their competitive edge by advertising connections to famous teachers in Edinburgh, London or Paris that would facilitate study abroad opportunities for its students. The next part of this chapter considers in particular the opportunities for medical education in Paris, the experiences of Americans studying there, and the lasting impact of the Paris School on American medicine. I explore how many American physicians saw the solution to the troubles in American medicine in the program of the Paris medical school. When American physicians traveled to Paris to study the application of scientific principles to medical practice and to gain greater experiential knowledge, they found in French scientific medicine a means to standardize, regulate and improve American medical education and practice.

The French Revolution made a more sensory-based, empirical, and scientifically regulated modern medicine possible, reorganizing not only the methods, but also the spaces, of medical inquiry. The revolution had overturned traditions, dissolved barriers, and inspired innovation, facilitating the revolutionary government's funding and control of new public institutions, from colleges to botanical gardens, museums to hospitals.[96] Nowhere was this more visible and more significant than in the field of medicine. After the French Revolution, Warner explains, the hospitals of Paris emerged as "the most

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[95] Warner, *Against the spirit of the system,* 28.
[96] Dora B. Weiner and Michael J. Sauter, "The City of Paris and the Rise of Clinical Medicine," *Osiris*, 2nd series, Vol. 18, Science and the City (2003), 24.

vibrant center of Western medicine."[97] Paris did not pioneer clinical medicine, nor was it the only large city in Europe to produce medical innovation, but it was uniquely positioned to rebuild after the Revolution, privileging science and medicine and their profitable relationship with one another.[98] The new Paris Clinical School would come to be known for its "institutional arrangements, clinical techniques and teaching practices, modes of organizing knowledge, and structures of medical perception".[99] Historian John Pickstone argues that this "new form of social and political organization" in post-Revolutionary Paris produced "a particular form of medical knowledge-practice" that he calls 'museological science'.[100] An elite group of medical professors took charge of medical practice and education. They oversaw the operation of hospital wards, where they were able to collect, study, and display particular cases, which could later be dissected post-mortem, and the resulting specimens displayed in the museums of the hospital or medical school. The museological display of specimens was completed with drawings or paintings, and case history information.[101]As the biggest city on the European continent, Paris had not only the largest population from which an abundance of sick and deceased bodies might be available, but also the most medical facilities for these operations to take place. The Revolutionary government rendered the bodies of the ill and diseased poor available for examination, and dissection in the case of death, giving Parisian physicians and medical students the greatest access to bodies in all of Europe.[102]

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[97] Warner, *Against the spirit of the System,* 3.
[98] Weiner and Sauter, "The City of Paris," 26.
[99] Warner, *Against the spirit of the system,* 3.
[100] Warner, *Against the spirit of the System,* 112.
[101] Warner, *Against the spirit of the System,* 120.
[102] Weiner and Sauter, "The City of Paris," 25.

The Paris Clinic

In *The Birth of the Clinic*, Michel Foucault claims that modern medicine "has fixed its own date of birth as being in the last years of the eighteenth century", when the empirical was king and physicians were suddenly able to see, feel, hear, and begin to understand medical concepts which had gone undetectable for centuries.[103] Foucault views the development of modern medicine at the end of the eighteenth century as a result of a critical shift in the structure of knowledge as embodied in the Paris Clinic.[104] In contrast to the hospitals of the eighteenth century, the clinic consisted of wards organized by disease type, rendering pathology more clearly visible to the medical student and more easily explained by the physician. What is more, the rational organization of the clinic facilitated the development of new technologies for exploring these categorized bodies. Born in the wake of the French Revolution, the clinic, according to Foucault, functioned as an empirical space for the sensual investigation of disease and illness, through the visual arrangement of patients and the exploration of bodies with new technologies and instruments.

Built upon the foundation of experimentation and education so highly valued in the Enlightenment, the clinic in the nineteenth century differed from medical institutions of the previous century in its "scientific coherence…social utility and political purity" as well as "much broader theoretical teaching."[105] It was in the Paris clinic, Warner argues, that "the human body was converted into an object of knowledge like any other, setting

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[103] Michel Foucault, *The Birth of the Clinic*, trans. A. M. Sheridan Smith (New York: Pantheon Books, 1973), xii.
[104] Foucault, *The Birth of the Clinic*, xiv.
[105] Foucault, *The Birth of the Clinic*, 70-71.

scientific medicine on a trajectory it continues to follow today."[106] Together with the Anatomy Theater and morgue, the clinic systematized the observation, diagnosis, and confirmation of disease and illness. The birth of the clinic allowed for the development of modern medicine as a powerful, empirical tool for investigating the human body and its connection to nature. Clinical medicine of the nineteenth century became powerful precisely because it embodied both "encyclopedic knowledge of nature and knowledge of man in society."[107] This reorganization of knowledge and emphasis on empirical investigation in medicine profoundly influenced the development of modern medicine in the Western world, especially in the United States.

The uniqueness of the clinical medicine of Paris was due in large part to its roots in the Enlightenment 'sensualist' movement. Pierre Jean George Cabanis, considered the pre-eminent medical philosopher in revolutionary France, was among those who claimed eighteenth-century medicine needed more visual techniques in teaching.[108] Cabanis emphasized that the new French medicine should be based on empirical observation and a physiology of "sense impressions," coining the popular Enlightenment phrase, "when we feel, we are."[109] Philippe Pinel, perhaps the most innovative pioneer in clinical teaching in Paris in the early nineteenth century, was among those who stressed the importance of "picturing" diseases. Like Cabanis, Pinel believed the best way to study medicine was through empirical observation, which would be best accomplished in

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[106] Warner, *Against the spirit of the system*, 4.
[107] Foucault, *The Birth of the Clinic*, 72.
[108] Erwin H. Ackerknecht, *Medicine at the Paris Hospital, 1794-1848* (Baltimore, MD: The Johns Hopkins Press, 1967),
32.
[109] Ackerknecht, *Medicine at the Paris Hospital*, 3-4.

clinical schools.[110] The tool of empirical observation was rooted in sensualism and the search for a truth that could be seen and felt. It was this experience—observing with the eyes, examining with the hands and ears, hypothesizing with the mind, and confirming with the autopsy – that attracted scores of American medical students and converted them to the Paris school of empirical medical practice.

Foregrounding Pathological Anatomy

In *The Birth of the Clinic*, Foucault argues that quite early on, historians linked modern medicine with the development of pathological anatomy, "which seemed to define it in its essentials, to bear it and overlap it, to form both its most vital expression and its deepest reason."[111] Foucault argues that though pathological anatomy had been supporting medical developments for centuries, it was not until the nineteenth century that its value was acknowledged and its centrality established. As physicians examined, diagnosed, and then, in the case of death, dissected their patients, the pathological specimen was often all that remained of each case. Interest in pathological anatomy increased with the publication of autopsy results and realization of their usefulness for generating important statistics correlating symptoms with illness and treatments with healing.[112] Studying these specimens and recognizing patterns and characteristics in diseases soon proved fruitful in the construction of new medical knowledge.

In Paris after the spiritual and political upheavals of the Revolution, there was little objection to the use of destitute patients for medical teaching, nor to the use of

[110] Ackerknecht *Medicine at the Paris Hospital*, 4.
[111] Foucault, *The Birth of the Clinic* ,124.
[112] Ackerknecht, *Medicine at the Paris Hospital*, xi.

unclaimed corpses for dissection.[113] With access to diseased bodies and the facilities to investigate them, Paris became a hub for pathological anatomy in the late eighteenth century. Hôtel-Dieu chief surgeon Pierre Joseph Desault (1728-1795) taught the most renowned anatomy classes, but there were plenty more at the Hospice of the College of Surgery and the Practical Dissection School. As historians Dora B. Weiner and Michael J. Sauter have argued, it was the Paris Clinic, "with its thousands of approachable patients and available cadavers" that transformed and made visible on the body these "insights into the anatomo-clinical method."[114] By the nineteenth century, the demand for anatomy and pathology courses far exceeded those officially provided, and dozens of private dissection classes had begun in response.[115]

The use of pathological anatomy to correlate symptoms with illnesses relied on a system of statistical collection pioneered by the symbolic father of the Paris Clinic, Pierre-Charles-Alexandre Louis. Although Louis was never as famous in France as he was in America, he was still considered a great French empiricist, and the inventor of the numerical method—the collection of statistics based on observations during illness and post mortem examination, in order to correlate signs of illness with empirical evidence. Louis's most famous book on typhoid fever began with a Rousseau quotation: "I know that the truth is in the things and not in my mind which judges them. The less I put of my own into these judgments, the surer I am to approach the truth."[116] Although Louis was not the first clinician to propose the use of statistics in medicine, he was the first to make the collection of statistics in examination and autopsy the foundation of a more scientific

[113] Weiner and Sauter, "The City of Paris," 25.
[114] Weiner and Sauter, "The City of Paris," 26.
[115] Weiner and Sauter, "The City of Paris," 26.
[116] From Louis, *Typhoid Fever,* xxiii, in Ackerknecht, 9.

medicine in the nineteenth century. He explained that statistics were "the fundamental and only bases of all medical studies. The general facts are the laws of science; these general facts are but the collection of previously accumulated facts that have been distinguished, compared, and classified."[117] Without the practice of empirical observation, Louis emphasized, the previous collection of facts in medicine had been executed poorly, something the new medicine of the Paris Clinic aimed to remedy. To facilitate this, Louis founded the *Société d'Observation Medicale*, and became known as "the great systematizer" through his introduction of "systematic examinations and systematic autopsies [that were] systematically analyzed through statistics."[118] Louis saw in examination and autopsy the ability to produce useful statistics that assisted in the development of more successful treatments.[119]

The Paris Museum

Insofar as the French Revolution facilitated the birth of modern medicine, so also it facilitated the birth of the modern museum. John Pickstone describes this transformation as one from private to public, descriptive to analytical, and general to specific. By the beginning of the nineteenth century, the private collections of the Enlightenment era, arranged systematically according to "Encyclopedic schemes," became state-sponsored displays with a "new conjunction of objects, publics, politicians and professionals."[120] The state museum became a collection *of* the public, *for* the public,

[117] Ackerknecht, *Medicine at the Paris Hospital*, 10.
[118] Ackerknecht, *Medicine at the Paris Hospital*, 9.
[119] Ackerknecht, *Medicine at the Paris Hospital*, 9.
[120] John Pickstone, "Museological Science? The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology, and Medicine," *History of Science*, Vol. 32 (1994): 118, 119.

serving to broaden the public's ability to define and understand both objects and concepts.[121] Like Pickstone, David Murray argues that the modern museum could be distinguished by its features of "specialization and classification", the latter of course stemming from the Enlightenment tradition encyclopedic organization, and the former a product of the analytical turn in the early nineteenth century.[122] The modern museum developed as a result of the establishment of specialized areas within museums, tended to by specialists in those fields, which morphed into specialist museum types (of art, medicine, natural history, etc.) by the middle of the nineteenth century.[123] In *The Birth of the Museum*, Tony Bennett argues that these specialized museums also distinguished themselves as modern by arranging objects "in a manner calculated to make intelligible a scientific view of the world."[124] Following this consensus, the modern medical museum of the early nineteenth century existed as a scientific collection of medical artifacts and specimens arranged in order to facilitate a more analytical approach to the body, injury, and disease.

The centrality of pathology and the pathological specimen to the museological science practiced in the clinic eventually extended to the creation of dedicated medical museums. The most famous medical museum in Paris was the Musée Dupuytren, under the direction of the Medical Faculty of the University of Paris. Founded in 1834 with a bequest from celebrated surgeon Guillame Dupuytren, the Musée Dupuytren was primarily a museum of pathological anatomy. Like many other medical museums in

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[121] Pickstone, "Museological Science?" 119.
[122] David Murray, *Museums: Their History and their Use* (Glasgow: James MacLehose and Sons, 1904), 231.
[123] Murray, *Museums*, 231
[124] Tony Bennett, *The Birth of the Museum* (New York: Routledge, 1995), 2.

Europe, the museum's collection was based on contributions from many of the faculty of medicine.[125] Yet the Musée Dupuytren stood out amongst other medical museums in Europe not only because it was considered central to the practice of museological science in Paris, but also because it possessed the largest pathology collection. While anatomical collections were central to medical instruction before the nineteenth century, the preservation and preparation of specimens illustrating not the normal, but the pathological, was a central development of French museological science.

The museological arrangement of patients in hospital wards and the correlation of signs and symptoms with autopsy results provided the foundation on which modern scientific medicine was built. At the same time, the display of pathological specimens in the museum was central to the full visualization of the course of a disease, and the key to its understanding. While students regularly visited the Musée Dupuytren on their own, the museum's curators and staff frequently offered lectures to illustrate larger museological ideas.[126] During these lectures and visits, medical students and physicians could see more clearly the variation in the manifestations of illness and disease by studying the three-dimensional objects illustrative of those conditions. Pathological specimens promised to show the medical student and physician the manifestations of cases of illness and disease, in greater detail than could be found in the medical textbook.

Despite the caliber of the Musée Dupuytren, Warner argues, medical museums in Paris were "recurrently deemed weak" by visiting Americans, who believed the "museological strength" of medical Paris could be better found in the collection of living

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[125] Cathy Gere, "A Brief History of Brain Archiving," *Journal of the History of the Neurosciences*, 12:4 (Dec. 1, 2003): 401.
[126] Warner, *Against the spirit of the system*, 102.

specimens on display in its hospitals.[127] Indeed, the Paris Clinic was a living medical museum, as American physician Robert Peter observed on a visit to the asylum at Bicêtre in 1839, where physicians' lectures were "illustrated by skulls of idiots and by living specimens, which were interrogated in order to show the extent of their intellect."[128] Ashbel Smith wrote home in 1832 describing Paris itself as a living museum, where "science displays its cabinet and instruction opens its halls gratuitously to all who ask knowledge."[129] Nevertheless, the museological arrangement of patients and specimens in France was so central to the American understanding of modern medicine, that it transformed and elevated medical museums as important sites for medical inquiry and education in the United States by the middle of the nineteenth century.

While American medical students were impressed by what they heard and saw in the hospitals and museums of Paris, many desired an even more sensual experience—to "auscultate, and percuss, and touch for himself" as student David W. Yandell observed.[130] Most found the lecture halls and hospitals overcrowded with eager students, such that one could barely see, let alone hear, the lectures and demonstrations, and physical interaction was difficult. As a result, beginning in the 1820s, American medical students would contract interns for "private lessons," where they would point out interesting cases in the hospitals and facilitate access to patients. Private teaching had grown in the years after the Revolution, and although it could not compete with the clinical experience available to most French medical students, it was very familiar to

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[127] F. H. Hamilton, "Notes of an European Tour—No.3" *Buffalo Medical Journal*1 (1846): 26.
[128] Warner, *Against the spirit of the system*, 109.
[129] Warner, *Against the spirit of the system*, 93.
[130] David W. Yandell, "Clinical Instruction in the London and Paris Hospitals," *Western Journal of Medicine and Surgery* S.3, 3(1848): 396.

American medical students.[131] Indeed, Bichat, Broussais, Laennec and other famous French medical figures spent significant time as private instructors, contributing, Ackerknecht explains, to Paris's "impressive reputation as the best place on earth to study medicine."[132] Even more popular were private lessons in the dissecting rooms, where American medical students had access to the human body in a way that seemed unimaginable in the United States. Here students could themselves practice operations, dissect and explore the body, taking advantage of the sensory medical experiences Paris had to offer.[133] The largest schools could accommodate as many as 200 students at a time in their dissecting rooms, making practice on the human body a common medical course.

Still other students found private instruction preferable to the clinical experience, as they became increasingly disturbed by what they perceived as "a pervasive objectification of the sick" by many of the most noted Paris physicians and professors.[134] One American student described the clinical demonstration as more of a theatrical event than educational program, where interaction between the doctor and patient was dramatized as an "extravagant display rather than healing," an uncomfortable experience for many American students.[135] Over time, more and more American students began to see the intellectual achievements of the Paris Clinic as exactly that—sophisticated theories that rarely worked in application, and only then in the French context. In the wake of the American Revolution, Warner contends, American medical theorists had come to believe that "American constitutions and diseases were more robust than those of

[131] Ackerknecht, *Medicine at the Paris Hospital*, 43.
[132] Ackerknecht, *Medicine at the Paris Hospital*, 44.
[133] Warner, *Against the spirit of the system*, 111.
[134] Warner, *Against the spirit of the system*, 211.
[135] Warner, *Against the spirit of the system*, 258.

Europeans."[136] For example, one of Benjamin Rush's pupils, Benjamin Smith Barton explained to his students in 1815 that "the same disease that demanded depletion in Americans, to drain off excess energy, in enfeebled Europeans ordinarily required the opposite stimulation."[137] It was commonplace then, for American students in Paris to make note in lectures and in letters home of the French treatments of which they were skeptical of applying to the American context. Many even came to believe that just as they would not treat American patients in American hospitals the way the French treated French patients in their own hospitals, so also the knowledge they acquired in France would need to be reconsidered in an American context, and applied "to specifically American parameters for appropriate treatment" in America.[138] The very constraints on scientific exploration on the body in the United States that drove them to Paris, paradoxically, made the application of the alternative medical philosophies they learned in Paris nearly possible to execute—until the Civil War.

Part III: Negotiating an American scientific medicine

American medical students in Paris were selective in the subjects, techniques, and practices they took with them when they returned to the United States. This selectivity helped them rationalize the potentially dehumanizing facets of scientific medical practice, while also ensuring their dedication to their patients as healers. The development of scientific medicine in France found in American physicians and medical students its biggest supporters, and its harshest critics. On their return to the United States, physicians

[136] Warner, *Against the spirit of the system*, 255.
[137] Warner, *Against the spirit of the system*, 255.
[138] Warner, *Against the spirit of the system*, 255.

and medical students were eager to integrate the technologies they witnessed and utilized in Paris. Those medical schools that could afford them introduced the thermometer, the stethoscope, the microscope and principles of hygiene into their curricula. New instruments meant new lectures and many schools extended the number of required lectures in order to ensure that their students would be well versed in these new techniques.[139] Newly returned American physicians were also eager to pursue "practice and investigation along French lines at the American bedside," while hoping to simultaneously preserve "their integrity and reputation as healers." Warner contends that the choices these American physicians made under these constraints helps to reveal the complexity of the moral order of nineteenth century American medicine.[140]

After the first decade of American physicians returning from Paris, the demands for greater clinical access in medical education were heard, the loss of bright medical minds to study in Paris was deeply felt, and medical schools began acquiring clinical space more fervently. Clinical access quickly became one of the "chief devices" that medical schools used in competition with one another for the most motivated—and highest paying—medical students. Many professors participated in this competition by contributing the books and specimens they had collected from Paris to their schools' libraries and medical museums.[141] Many physicians cautioned their students that it would be a waste of their experience and skill to return to the smaller towns from which many of them came, as they often lacked the clinical access and medical schools that would allow them to expand on their Paris education. As a result, aspiring physicians flocked to

[139] Slawson, "Medical Education," 20.
[140] Warner, *Against the spirit of the system*, 11.
[141] Warner, *Against the spirit of the system*, 27, 140.

cities like Philadelphia, Boston, and Washington, D.C. for opportunities like the ones they had in Paris, and an intellectual atmosphere to which they might contribute.[142]

On their return to the United States from Paris, many of the disciples of the Paris School were convinced "that they had brought back an important message," but were not always satisfied with how this message was received. Some experienced physicians who had never studied abroad resented the superiority with which many of these Paris-returned physicians conducted themselves.[143] Still others rejected altogether the integration of French ideas into American medicine out of fear that they would continue to be reliant on Europe for new ideas, or that French science would corrupt American therapeutic practice.[144] There were also many other American physicians who embraced French medical theories but opposed the way American physicians themselves were disseminating them. Oliver Wendell Holmes complained that too many American physicians were preoccupied with translation of French medical works that they failed to contribute anything new or distinctly American. To Holmes, American medical literature was "simply a rewriting of European literature," solidifying American medicine's place in the shadow of the French.[145] Samuel Gross similarly admonished his fellow physicians that they could contribute more to American medical literature by using their own patients as case studies for articles they could write themselves.[146] These criticisms reflected the tensions many Americans felt regarding the extent to which their own

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[142] Warner, *Against the spirit of the system*, 22.
[143] Warner, *Against the spirit of the system*, 146.
[144] Warner, *Against the spirit of the system*, 11.
[145] Oliver Wendell Holmes, "Medical Writing in the United States" *Transactions of the American Medical Association*, 1856; 9: 368.
[146] Morris Fishbein, "History of the American Medical Association, Part VI" *Journal of the American Medical Association*, 1946; 132: 985-988.

research practices reflected an acceptance of French medical philosophies—including the objectification of the patient—or sought to build on or complicate French medical practices. Nevertheless, American medicine was undergoing such profound structural and philosophical changes that there had been little time for new medical research.[147]

One thing Americans agreed on when they returned home from Paris was their evaluation of the "performance of the Paris clinicians as healers," as both "insisted that the French were inferior as healers, and that their inferiority stemmed from a flawed value system."[148] In their letters home, American medical students in Paris often pointed out the evils of French medicine in their descriptions, denouncing French clinicians' "brutality, lack of interest in actively curing disease, objectification of the sick, and valuation of knowledge over healing."[149] According to Warner, it was upon their return to the United States that these students saw the distinction not only between the ideals of the Paris School and the realities of American society, but also between the French and American context. One student remarked, while "'French practice *may* cure *French men*, it *kills* Americans'," cautioning that French medicine could not be applied to American patients without some modification by the American physician.[150] Indeed, Warner argues, many American students in Paris acknowledged that while there were great opportunities for observation in the city's large urban hospitals, "the physical conditions and the socioeconomic class of patients bore little resemblance to the case of American patients attended in their own homes."[151] The practices of the French, whatever their ingenious

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[147] Slawson, "Medical Education," 20.
[148] Warner, *Against the spirit of the system*, 253.
[149] Warner, *Against the spirit of the system*, 254.
[150] Warner, *Against the spirit of the system*, 256.
[151] Warner, *Against the spirit of the system*, 255.

theories for transforming modern medicine, were cemented in American medical students' journals and letters as morally questionable, at the very least.

During their time in Paris, Warner argues, American medical students expressed disapproval and scorn towards the practices they deemed morally offensive or dehumanizing,.[152] French treatment of female patients incurred the most disgust. American medical student Edward Warren watched Antoine-Joseph Jobert de Lamballe at the Hôtel Dieu perform his obsession—cauterizing wombs—and recalled that:

> He kept a supply of hot cauteries with which, through an ivory or horn speculum, he seared the cervix of every woman who entered his wards…[and] twice each week he held his *grand clinics* in the amphitheater, at which he did this operation on so large a scale that the atmosphere of the room was rendered insufferable by the fumes and smoke of cauterized uterine tissues…We called his *clinics* the 'barbecues' and his *daily cauterizations* the 'small fry', while the surgeon himself was designated by the suggestive names of '*Le Chef*,' 'Old Griddle,' and Dr. Beelzebub.[153]

This demoralizing experience turned Warren against gynecology altogether. Other American medical students scoffed at such practices, confident that the American bedside manner would never resemble that of the French. Insofar as these students appreciated the role of the museological display of patients in clinical wards and pathological specimens in the gallery as essential to the paradigm of empirical medicine, many admitted to finding it as troubling as it was instructive. They protested the "objectification of the sick [and] the dead," claiming the French made a spectacle of the diseased.[154]

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[152] Warner, *Against the spirit of the system*, 274.
[153] Warner, *Against the spirit of the system*, 270 (fn 8.78).
[154] Warner, *Against the spirit of the system*, 270.

American Medical Museums

One area where American medicine proved productive in integrating French museological science with its own practices was in museums themselves. Bolstered by the influx of specimens from Paris, medical museums in the United States became an important selling point for medical schools. Warner argues that such collections as were found in these expanded museums were:

> Physical expressions of the emphasis on visual display of pathoanatomical lesions that was central to Paris medicine, while the specimens preserved in glass jars presented observers not only concrete lessons in morbid anatomy but also exemplifications of labor at the dissecting table—a virtual autopsy.[155]

Michael Sappol argues in *A Traffic of Dead Bodies* (2002), that the expansion of the medical profession and the rapid increase in medical schools catalyzed the creation of museums of pathological anatomy supported by, and associated with, these institutions. The most competitive medical schools in the United States could boast advanced education in pathological anatomy through both empirical dissections and medicine on display at their anatomy and pathology museums.[156] These museums allowed students not only to study diverse pathological conditions, but also to see firsthand the objects, diseases and illnesses they had previously encountered only in pictures and textual descriptions in medical books.[157] Whereas American anatomical and pathological museums had previously been "rooted in British medical traditions," Warner argues, the

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[155] The collections assembled in museums "became a form of Parisian experiences that that the same time captured in miniature the pathoanatomical enterprise of the Paris Clinic," Warner, *Against the spirit of the system*, 141.
[156] Sappol, *A Traffic of Dead Bodies*, 276.
[157] Erin H. McLeary, "The Mütter Museum: Education, Preservation, and Commemoration." *Annals of Internal Medicine,* Vol. 132, No. 7 (Apr., 2000): 600.

mid-nineteenth century also saw an influx in specimens American physicians brought back from Paris, as well as museological arrangement of these specimens in order to facilitate empirical investigation in medical education.[158] In this way, Sappol maintains, anatomical and pathological museums reflecting the new clinical medicine of Paris functioned as part of medical reform in the United States in the mid-nineteenth century.[159]

Medical school museums began from the personal collections of its lecturers and physicians from across the country. The Pennsylvania Hospital of Philadelphia contained the oldest museum collection in the United States and had benefitted from the donations of pathological specimens from doctors around the world. English anatomist Abraham Chovet settled in Philadelphia in 1770 and began an anatomical lecture series with his private collection of mostly dried specimens and wax models.[160] The famous anatomical model maker and University of Pennsylvania professor of medicine, Caspar Wistar, also donated his collection of anatomical and pathological collection to the college on his death. As the capitol of American medicine, Philadelphia abounded with medical colleges with vast medical museum collections. Erin Hunter McLeary argues that Pennsylvania College, the Homeopathic Medical College, and the Female College in particular "all had museums sufficiently interesting to merit mention in an 1860 guide to Philadelphia."[161] Through the collection and preservation of anatomical and pathological specimens, "medical museums instructed medical students in pathology, particularly pathological anatomy, and served as places in which physicians could increase their

[158] Warner, *Against the spirit of the system*, 141.
[159] Sappol, *A Traffic of Dead Bodies*, 304.
[160] McLeary, "The Mütter Museum," 599.
[161] McLeary, "The Mütter Museum," 600.

knowledge of this field."[162] These museums reflected the influence of post-revolutionary French medicine, "which promoted clinical observation correlated with postmortem investigation," and made pathology the center of nineteenth century medicine.[163] Wet specimens, dried specimens, specimens injected with wax, and models made of wax, wood, papier-mâché or plaster were used in the museological instruction of anatomy and pathology at a time in the United States when opportunities for human dissection—and 'fresh' material at that—were scarce. Many medical schools lacked the provisions to provide cadavers for dissection practice until late in the nineteenth century, making the medical museum central to medical education until well into the twentieth century. What is more, few states passed "Anatomy Acts" legalizing the dissection of available cadavers until the 1880s, many decades after the passage of similar laws in Europe. Even with the passage of these laws legitimizing dissection in some states, cadavers themselves remained rare.[164]

The preservation and educational functions of medical museums were closely intertwined. According to McLeary, museum curators "preserved specimens for use as educational objects" and often compared the museum to a library stocked with the educational basis for books.[165] Yet the museum was to be more than a virtual encyclopedia, it was to be a place where those interested in medicine could experience different manifestations of disease wrought on living beings. This sensory experience provided the medical student and researcher with something books could not—the intimate interaction with the specimen or object in three dimensions. The sheer quantity

[162] McLeary, "The Mütter Museum," 600.
[163] McLeary, "The Mütter Museum," 600.
[164] McLeary, "The Mütter Museum," 600.
[165] McLeary, "The Mütter Museum," 600.

of specimens and models that could be studied in a museum compared to a book tipped the scales in favor of the museum as the best educational tool. What is more, this variety on display at the medical museum illustrated clearly that the pathological was more than just an opposite of normal. Seeing so many pathological variations in contrast to the normal helped students understand the spectrum of disease they might encounter.

So strong was the museological impulse in America, that organizations outside of medical schools constructed their own medical museums. The Army Medical Museum and the Mütter Museum emerged as independent medical museums with broader and more complex goals than those of medical school museums. The Army Medical Museum was to be, from the start, a national medical museum. Based in Washington, D.C., it would educate and provide research materials to not only the nation's military medical officers, but also anyone that wished to utilize its collection. The Mütter Museum was a local source of pride in Philadelphia, named for the renowned physician and Jefferson Medical College professor Thomas Dent Mütter, who donated his pathological teaching collection, including pictures, calculi, bones, casts, wet preparations, skeletons, and models that he had collected for over two decades.[166] The Army Medical Museum and the Mütter Museum had different scopes and purposes, but nevertheless utilized one another's collections and resources, developing a bond that would last well into the twentieth century. This bond set them apart from their medical school counterparts and served as the foundation on which they built a unique medical philosophy based on emphasizing the historical context of their scientific displays of medical paraphernalia. I examine this relationship further in my third and fourth chapters.

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[166] McLeary, "The Mütter Museum," 599.

John H. Brinton, the first Curator of the Army Medical Museum, had gone to Paris for postgraduate studies after completing his education at Jefferson Medical College with his M.D. in 1852.[167] Brinton's mentor, Dr. Thomas Dent Mütter, had encouraged him to travel to Paris for medical experiences that could not be found in the United States. His own experience in Paris inspired Mütter to teach the students at Jefferson Medical College that empirical observation and collection and study of museologically arranged specimens were the best ways to learn the science and art of medicine. Brinton became one of many elite, motivated American medical students to follow Pierre Louis's demonstrations of "the importance of observation and, through it, the possibility of disease identification on the basis of extensive clinical and postmortem examinations."[168] On his return to Philadelphia from studying in Paris and later Vienna, Brinton found Jefferson Medical College to have made only a mediocre attempt to provide clinical resources for its students.[169] Brinton hoped to improve this by becoming a lecturer in operative surgery at Jefferson Medical College and starting his own practice as a general physician in Philadelphia. He was determined to deploy the wisdom and techniques of the Paris School in his course and through articles he edited for *The Science and Art of Surgery* (1854), which he believed would become "a useful reference to both students and practitioners." Brinton drew illustrations for the articles in the volume himself, as he was emphatic about the power of visualization as a tool of scientific medicine.[170] For

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[167] John H. Brinton, *Personal Memoirs of John H. Brinton: Civil War Surgeon, 1861-1865* (Carbondale, IL: Southern Illinois University Press, 1996), xvi.
[168] Brinton, *Personal Memoirs*, xviii.
[169] Brinton, *Personal Memoirs*, xvii.
[170] Brinton vxiii; *The Science and Art of Surgery* (1854) consisted of lectures of Sir John Eric Erichsen (1818-96), a professor of surgery at University College, in John Eric Erichsen, *Science and Art of Surgery: Being a Treatise on Surgical Injuries, Diseases, and Operations* (Philadelphia: Blanchard and Lea, 1854).

Brinton, the specimen, the case history, and the knowledge of success and failure were essential components to the science and art of modern medicine.

The North/South Divide in the Paris Clinic

The Army Medical Museum was important to the project of reunifying the nation after the great schism of the Civil War. The North-South divide was as evident in ante-bellum medicine as in any area of life, even extending as far as American medical education in Paris. Paris presented an abundance of opportunities for medical study and practical medical experience that appealed to American medical students and physicians from across the United States. Nevertheless, the Paris experience itself seemed to solidify divisions among and between Americans. Over time, the large population of Americans in Paris had contributed to the development of distinctly American communities where English was the predominant language spoken and American holidays were celebrated. Within this expatriate community, rivalries between North and South quickly appeared. In the decade just before the Civil War, these tensions grew, and disagreement over political issues like slavery overshadowed medical study, even in Paris. As a result, separate American student communities developed in Paris, based on their allegiance to the North or South.[171] According to these divisions and loyalties, many Americans avoided parts of Paris frequented by one side or the other. What is more, on their return to the United States from medical study in Paris, Americans from the North and South constructed different histories of their experiences abroad, although most

[171] Warner, *Against the spirit of system,* 116-17.

would accept and institute similarly the characteristics of French medicine they had experienced in Paris.

The most important difference between Northern and Southern narratives of French medicine can be found in their discussion of the rationale for empirical observation of disease that was generally agreed to be the "hallmark of the French impulse."[172] Both considered empirical observation the first in a series of scientific steps to follow in order to produce a more "scientific" medicine, but while physicians in the North claimed that the application of this technique in the American context would be profoundly different than in France, there were calls in the South for empirical observation of *southern* diseases in particular. Warner argues that Southern physicians argued according to the logic of French teachings that "authentic knowledge of the diseases of the American South could be derived only from close study of the peoples of that region pursued within the context of its peculiar environments."[173] Only direct observation of *southern* diseases on *southern* patients could generate medical knowledge useful for physicians in the South. Physicians in the South claimed that there was not only a lack of American case studies and research in American medical literature, but also a lack of environmentally specific medical histories detailing the diseases and conditions present in different regions of the United States. While reviewing Elisha Bartlett's *History, Diagnosis and Treatment of Fevers of the United States* (1847), one South Carolina physician lamented that there was no characterization of fevers specific to the South, and that the *History* reflected only conditions of the North.[174] The division

[172] Warner, *Against the spirit of the system,* 181.
[173] Warner, *Against the spirit of the system,* 181.
[174] Warner, *Against the spirit of the system,* 181.

between North and South, in particular, would continue to affect interpretations and uses of scientific medicine in the United States until well after the Civil War.

The most significant medical ideology in the South in the antebellum years was this theory of southern medical distinctiveness, or southern separatism. Separatism argued not just for a distinctly southern conceptualization of medicine, but, more importantly, a southern medical paradigm established on the basis of observing the conditions, illnesses, and diseases prevalent in the South and native to its environment and circumstances. Even before the southern separatist movement in medicine, many southern physicians claimed there was historical evidence of the uniqueness of the southern condition that merited a different medical program than that of the North. Students at the Medical College of the State of South Carolina described seeing regularly in the clinic "all the common diseases of the climate" of the South, in addition to the prevalence of injuries and infections relating to plantation work so common in the South.[175] Historian Steven M. Stowe argues that southern physicians practiced a sort of "country orthodoxy," that was shaped by the particular needs and traditions of the rural south, which often clashed with the practices of modern, scientific medicine. The southern physician, Stowe contends, might study modern medicine in northern schools or abroad, but ultimately his clientele would demand a familiarization with the environment and traditions of the South in exchange for confidence and good public opinion.[176]

For most of the first half of the nineteenth century, the South was plagued with repeated outbreaks of yellow fever and cholera that devastated the population quickly.

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[175] Savitt, "The Use of Blacks," 335.
[176] Steven M. Stowe, *Doctoring the South: Southern Physicians and Everyday Medicine in the Mid-Nineteenth Century* (Chapel Hill: University of North Carolina Press, 2004), 2, 79.

Despite the appearance of cholera in northern states, many in the North believed the environment of the South—its humidity, heat, and abundance of swampland—encouraged the spread of malaria, yellow fever, dengue, and typhoid, thus indirectly supporting the theory.[177] Although there were many cities in the South that could boast of excellent public health, those that did not earned even more publicity. New Orleans was popularly referred to as "the graveyard of the Southwest," with one of the highest mortality rates in the South by the middle of the nineteenth century.[178] Dr. Erasmus Darwin Fenner, one of the biggest proponents of southern medical distinctiveness and a native of New Orleans, argued nevertheless, that "the diseases and medical practice of the South were distinct from those of other areas," meriting an entirely different medical program.[179]

Historian John Duffy argues that Fenner was the most well-known and ardent proponent of southern separatism and was constantly involved in debates and controversies concerning scientific medicine and the separatist principle. Fenner helped establish the *New Orleans Medical Journal* (now the *Journal of the Louisiana State Medical Society*), in order to foster discussion of medicine and medical developments in New Orleans.[180] Frustrated with the journal's lack of support, he launched the *Southern Medical Reports*, for which he is best known and used as the primary medium for the discussion of southern separatism in medicine. Launched in 1849, *Southern Medical Reports* aimed to provide general and special reports on "the medical topography,

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[177] Shryock, *Medicine in America*, 15, 50.
[178] Shryock, *Medicine in America*, 51.
[179] John Duffy, "Erasmus Darwin Fenner (1807-1866): Journalist, Educator, and Sanitarian," *Journal of Medical Education,* 35:9 (Sep., 1960): 822.
[180] Duffy, "Erasmus Darwin Fenner," 820.

meteorology, and prevalent diseases" in southern states, including Louisiana, North Carolina, Arkansas, Alabama, South Carolina, Tennessee, Mississippi, Georgia, Florida, and Texas. Because of his association with Louisiana, it was the best represented of the states in the journal, but Fenner received contributions from the entire spectrum of states involved. Although there was a wide audience for the journal, Duffy claims that "the generally low academic standards of medical schools and the isolation of most rural Southern practitioners worked against Fenner's venture," and he was forced to cancel the journal after just two years due to a lack of funding.[181] Despite its cancellation, the *Southern Medical Reports* helped establish a clear foundation for southern separatism in medical thought and practice in the South in the middle of the nineteenth century. Journals were central not only to the legitimacy of the separatist cause, but also to the communication of their message. Through journals, the Southern faculties "increasingly stressed the need for local training; and as the state medical societies began to publish their transactions, the same propaganda appeared therein."[182]

Slavery, Medicine and War

Even before the first gunfire of war, the issue of slavery was a catalyst for conflict in the American medical community. Whether deployed as evidence to support abolitionism or to dispute southern explanations for the spread of epidemics, strong argument arose in the North that the prevalence of disease in the South was a result of the slave-owning, plantation-farming lifestyle. This type of argument in the North was not

[181] Duffy, "Erasmus Darwin Fenner," 822.
[182] Shryock, *Medicine in America*, 59.

uncommon, as it was widely thought that the South "failed to keep step in progress economically or culturally" with the North, while "Northerners blamed this on the South, in terms of climate and slavery…Southerners blamed it on the Yankees, in terms of tariff and abolitionism."[183] Nevertheless, it became clear by mid-century that many of the diseases affecting both parts of the country lingered longer in the South and affected it more deeply than the North. When new diseases like yellow fever and cholera developed, both reached pandemic proportions in the North as well as South, but yellow fever ultimately disappeared in the North just as the epidemics in the South intensified. Cholera in particular plagued the plantations as intensely as the cities, which was attributed to their large size and population density. When cholera struck Bishop Polk's Louisiana plantation in 1849, three-fifths of his slaves contracted the disease, and within two weeks, one-fifth of the total slave population had died."[184] In addition to the density of plantation populations, the diet of slaves living on plantations was considered by many in the North to be problematic, in that the institution of slavery "involved in some areas a routine diet which caused common parasitic infections," as well as conditions of malnourishment.[185]

Southerners responded to these criticisms in a variety of ways. The effect of climate and environment on the prevalence of disease could hardly be tied to slavery, an economic institution. Furthermore, the people of the South could hardly be expected to completely abandon the plantation system and their stable economic livelihood, for entirely new systems. At the same time, many plantation owners experimented with the

[183] Shryock, *Medicine in America*, 49.
[184] Shryock, *Medicine in America*, 54.
[185] Shryock, *Medicine in America*, 50.

increasing use of land drainage and transitioning from wet fields—where disease spread more rapidly—to dryer crops.[186] The widespread use of slaves for clinical studies, moreover, contributed to the generation of knowledge about epidemics from which they suffered the most. Many even considered the medical "care" of slaves "the most distinctive phase" of Southern medical practice, as slaves were technically the only group of poor workers "in whose health their employers had a direct property interest, and for whom they felt a direct personal responsibility.[187] Slaves in some parts of the South even received more care than did Southern "poor whites" or Northern laborers. Many physicians also argued that assigning medical students to slave patients gave the students invaluable experience that would in turn serve the slave patient over time. *The Southern Journal of Medicine* even claimed in 1847 that the mortality rates of free blacks were higher in the North than that of slaves in the South alone. Even in the supposedly civilized cultural centers of New York and Baltimore free blacks died more frequently than slaves in the South.[188] The medical impact of slavery, and the impact of slavery on medicine, then, varied a great deal throughout the South and the North.

Insofar as the issue of slavery divided the American medical profession, so also it divided the medical students aspiring to become part of it. As the medical mecca of America, Philadelphia had one of the largest populations of medical students, from the widest range of geographic regions in the country. Medical students in Philadelphia became increasingly divided between abolitionists and southerners in the 1850s as the American Anti-Slavery Society (based in Philadelphia) gained power. By December

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[186] Shryock, *Medicine in America*, 53.
[187] Shryock, *Medicine in America*, 63.
[188] Shryock, *Medicine in America*, 64-5.

1859, the tension erupted and nearly 250 pro-slavery Southern students withdrew from Jefferson Medical College and the University of Pennsylvania Medical School and transferred to "more politically sympathetic teaching environments below the Mason-Dixon line."[189] This dramatic secession in Philadelphia's medical school community was not entirely unanticipated, as the majority of Philadelphians were against slavery. In Washington, D.C., the scene was equally chaotic, but division in the medical community had more to do with the perceived instability of the government than over the issue of slavery. On John H. Brinton's first visit to D.C. in the early years of the war he noticed not only a lack of sympathy for the North, but also a "chilling state of despondency" that prevailed, as residents of the nation's capital seemed convinced the South would win and the country would be profoundly changed.[190] For Brinton and many of his colleagues, the most important issue at hand was the defense of the United States of America, but for many physicians who refused to join the war effort, the conflict over slavery was not enough to justify such violence. In his memoirs, Brinton recalls his mother telling him that while she was sad to lose him for so many years, she knew the war had to go on for a long time in order to really eradicate slavery.[191] In the end, historian Ira Rutkow argues, the issue of slavery was serious enough to be a catalyst for a national split of the American medical community as physicians across the nation were increasingly forced to choose sides.[192]

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[189] Ira M. Rutkow, *Bleeding Blue and Gray: Civil War Surgery and the Evolution of American Medicine* (New York: Random House, 2005), ix.
[190] Brinton, *Personal Memoirs,* 19.
[191] Brinton, *Personal Memoirs,* 26.
[192] Rutkow, *Bleeding Blue and Gray,* ix.

Even though medical communities in large cities like Philadelphia and Washington, D.C. experienced turmoil over the issue of slavery, they produced the largest numbers of medical volunteers for the war effort. Nearly one third of the members of The College of Physicians of Philadelphia, the oldest medical society in America, volunteered to serve in the Union army.[193] While many were sent to different units throughout the north, a large number were given positions under the U.S. Army Surgeon General William A. Hammond, who had ties to Philadelphia and Jefferson Medical College. On the one hand, Hammond recruited his medical school colleagues and friends to serve important positions on his medical staff; on the other hand, Hammond made use of these connections to tap into Philadelphia medical expertise and develop the Army Medical Museum and assist with the publication of *The Medical and Surgical History of the War of the Rebellion* (1870-1888), a history of medicine in the Civil War. In addition to Brinton, Hammond secured Philadelphia surgeons H.E. Brown, William Williams Keen, J.J. Woodward and others to procure specimens and develop the new museum.

Similarly, the largest medical centers in the South produced not only the most intense debate within the medical profession over the issue of slavery, but also the most enthusiastic responses when war came. Despite his position as a leader of southern separatism in medicine, Erasmus Darwin Fenner "deeply regretted the growing schism between North and South... believing that civil war was the greatest calamity that could befall his country."[194] He was against the secession of Louisiana, concerned for the impact both secession and war would have on medicine and the medical community.

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[193] Brinton, *Personal Memoirs,* 9.
[194] Duffy, "Erasmus Darwin Fenner," 823.

Nevertheless, he was loyal to his state above all else, and dedicated himself to service in the Confederacy, volunteering to aid the Louisiana sick and wounded after fighting broke out in Virginia in1861. While there, he helped organize the Louisiana Soldiers' Relief Association "for the purpose of establishing and supporting a hospital in Richmond to care for Louisiana volunteers." [195] The Association aimed not only to care for the sick and wounded, but also to keep record of dead, wounded, and missing, to receive and forward letters, and help in any way they could. When New Orleans fell to the North in the spring of 1862, however, Fenner pledged to care for the people of his city, but was expelled by the Union Army and worked at a military hospital in Mobile, Alabama, for the remainder of the war. [196] Fenner watched his hopes for a new southern medical program disintegrate as the war raged on.

On the eve of the Civil War, American disciples of the Paris School had taken important steps to integrate French scientific principles into American medical practice, yet in distinctly different ways in the North versus the South. Physician disciples in the North lobbied for wider clinical opportunities and increased use of museological science as an organizing principle in the clinic and pathoanatomical museums, while physicians in the South advocated understanding illnesses and diseases in the South as distinctly southern. By the time the Civil War broke out, there were 63 medical schools open in the United States. Of the schools in states that seceded, only the Medical College of Virginia in Richmond remained open during the war.[197] Although the majority of American physicians did not look to the military as a natural career choice, the outbreak of the Civil

[195] Duffy, "Erasmus Darwin Fenner," 823.
[196] Duffy, "Erasmus Darwin Fenner," 823.
[197] Slawson, "Medical Training in the United States," 12-13.

War on April 12, 1861 changed the landscape of the medical profession in both the North and the South. The conflict interrupted daily life and medical practice, and attracted scores of young, inexperienced medical students to serve in its ranks for patriotism and experience. Those that had traveled to Paris for access to bodies and clinical experience soon realized that war might afford them the same opportunities, while simultaneously giving them the chance to demonstrate their skill as healers in service to their country. After all it was the Napoleonic Wars from 1792-1815 that provided the materials and experience on which French clinical medicine had been built.

The American Civil War put on hold efforts to introduce new changes to medical education and practice in America. In halting this progress and closing medical schools, the American Civil War enveloped the American medical community in its devastation and halted the integration of new scientific medical philosophies into American medical education and practice. At the same time, the access to experiential knowledge and medicalized bodies the war provided was unparalleled, even compared to study abroad in Paris. The Civil War experience would fundamentally change the landscape of American medicine, providing not only experiential knowledge, but also valuable medical material on which to build a distinctly American scientific medicine. Insofar as the French Revolution would transform and elevate medicine, providing bodies for systematic investigation, so also would the Civil War transform and elevate American medicine, providing the same investigative opportunities while also ushering in a new era in medical thought and practice.

Chapter Two: The Physician-Soldier—The Civil War and American Medicine

As the majority of soldiers and medical officers in the U.S. Army in the early nineteenth century were from southern states, when the South seceded, the U.S. Army and its medical department were left incapacitated. The early years of the Civil War thus saw an influx of inexperienced soldiers and medical officers conscripted or volunteered to the Union's defense. Many of the physicians who volunteered to serve in the Civil War were well educated, but most were not, and nearly all were unprepared for the massive scale of the violence and trauma that occurred. For these reasons, historian Ira M. Rutkow argues, the story of medicine in the Civil War was not about big medical breakthroughs or developments, but about the restructuring of medical administration to make even the most basic medical care possible. Rutkow maintains that the "transformation in the administration and organization of military medical care, from an appalling lack of preparation and concern to readiness and sympathy for the patients in a war that was waged on a scale never before known" was the medical hallmark of the Civil War.[198]

Certainly the obstacles the Army Medical Department encountered during the early years of the war, the high proportion of soldiers who were incapacitated during the war, and the large death toll, all suggest that the singular medical accomplishment during the war could only have been a basic program of medical triage. In this chapter, however, I argue that the demands placed on the Army Medical Department during the Civil War,

[198] Ira M. Rutkow, *Bleeding Blue and Gray: Civil War Surgery and the Evolution of American Medicine* (New York: Random House, 2005), 318.

juxtaposed with a new medical paradigm that had itself developed in the wake of wartime illness, injury and death, situated the Army Medical Department firmly at the center of the development of a uniquely American medical science in the middle of the nineteenth century. Although the Army Medical Department could not anticipate, nor effectively treat, the majority of illnesses, diseases, and injuries experienced during the early years of the war, its ambitious medical officers employed components of the French paradigm of museological medicine to improve basic care and adapt to the medical demands of the war.

For example, in addition to the reorganization of the Army Medical Department and the development of effective battlefield evacuation and triage, Surgeon General Hammond launched a series of reforms that privileged the acquisition and analysis of case histories, specimens, and statistics, in order to improve medical practice continuously during and after the war. Hammond's Circular No. 2 required the documentation of medical and surgical cases in field and general hospitals, along with post-mortem examination and preservation of relevant specimens, which were compiled to generate useful wartime medical statistics on the efficacy of treatments and procedures, as well as an extensive medical and surgical history of the war. To cap it all, these materials would furnish a national museum for medical education. Under Hammond's vision, men of medical science helped not only to ease suffering, save lives and organize military medicine, but also to lay the foundations for a new national medicine built on the experiences and lessons of the Civil War.

In this chapter, I explore the implementation of Hammond's program for museological medicine by examining the processes of collecting stories, specimens, and

statistics that were central to the generation of medical knowledge, in the midst of larger and more immediate medical needs and challenges. In order to do this, I interrogate the process of transforming soldiers into histories, bodies into specimens, and wartime medicine into statistics, examining four spaces where these processes were negotiated—the office of the Surgeon General of the Army, the battlefield, the hospital, and the Army Medical Museum. Each of these spaces serves to illustrate the process of creating a uniquely American scientific medicine through museological practices. Together, these components tell the story of the successes and failures of medicine during the Civil War, and the foundation on which American scientific medicine was built.

Finally, by juxtaposing the experiences of Confederate medicine during the war with the aforementioned Union narratives, I hope to generate a clearer understanding of the possibilities for, and realities of, the kind of national museum and national history that could be produced after the war. Ultimately, I argue that the Civil War provided the hands-on medical experience, and access to bodies, specimens and statistics that Americans had pursued in Paris, but within an American context that contributed to the development of a uniquely American scientific medicine. All the stories, specimens, and statistics—whether Union or Confederate—would become the components of a national medical museum and history. As much as the Civil War shaped and made possible the development of an American scientific medicine, this medicine also shaped the narrative of the war in American history.

The Army Medical Department and War

When abolitionist John Brown led a small group of whites and several blacks—both slave and free—across the bridge from Maryland to Harper's Ferry, West Virginia late at night on October 16, 1859, he hoped to take control of the town's arsenal, incite an armed slave rebellion and finally put an end to slavery in America. Hayward Shepherd, a free black man working as a porter for the Baltimore and Ohio Railroad at Harper's Ferry was the first to encounter Brown and his men as they approached the town. When Shepherd ran to warn the town about the invaders in the early hours of the next morning, one of Brown's men shot him in the back.[199] The raid on Harper's Ferry became a catalyst for the Civil War, and the fact that the first casualty was a free black man was symbolic to both sides. While many in the North considered the raid an inevitable byproduct of the unnatural system of human slavery, those in the South supporting secession claimed that the violence used by these abolitionists was the real problem.

Confederate forces bombarded the U.S. Army stronghold at Fort Sumter for two days until Union troops surrendered on April 14, 1861, formally initiating the America Civil War. Military surgeon and first curator of the Army Medical Museum, John H. Brinton recalled that immediately after the siege at Fort Sumter, "the spirit of the North changed, discussion ceased, political arguments were at an end, and almost absolute unanimity prevailed, and the only question was how best to establish the supremacy of the Government, and how to vindicate its authority."[200] Brinton was one of many

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[199] Senate Select Committee, "Report on the Harper's Ferry Invasion," 36th Congress, 1st Session, June 21, 1860. John Brown Exhibit, John Brown primary sources, West Virginia Archives and History.
[200] John H. Brinton, *Personal Memoirs of John H. Brinton: Civil War Surgeon, 1861-1865* (Carbondale, IL: Southern Illinois University Press, 1996), 15.

northern physicians motivated by this spirit to volunteer time and service in the Union army during the Civil War. At the same time, Brinton was also one of the few well-educated physician volunteers participating in the war effort, as the majority of people responding to President Abraham Lincoln's call for medical assistance lacked his university education and study abroad experience. Paris-educated men like Brinton saw in the war not only the opportunity for gaining experiential knowledge, but also for implementing museological methodology in their practice of wartime medicine. In a somewhat paradoxical fashion, the Army Medical Department's disorganization and unpreparedness at the beginning of the war served facilitate these opportunities.

In the years leading up to the Civil War, the Army Medical Department had grown from a hospital service to a permanent military medical institution. According to Army Regulations No. 40-5 (December 31, 1924), the Medical Department of the Army established in 1818 was designed "to conserve man power and preserve the strength of the military forces, a duty which is accomplished by advice as to the proper selection of the personnel of the Army, the maintenance of health, and by the furnishing of adequate medical and hospital facilities to those who become disabled."[201] The large-scale Civil War challenged each component of this stated purpose, and the constantly changing landscape of the battlefield added the new obstacle of evacuating soldiers suffering from camp sicknesses or gunshot wounds downrange. In the face of overwhelming violence and destruction, Army Surgeon General Clement Finley's primary goal in the early years of the war was to overcome this obstacle of transportation, building a satisfactory

[201] James A. Tobey, *The Medical Department of the Army* (Baltimore, MD: Johns Hopkins Press, 1927), 2.

ambulance corps, improving the delivery of camp necessities and medical supplies, and developing a system of triage for those who could not feasibly be evacuated.

These transportation goals were themselves a form of triage in the eyes of Brigadier General William Alexander Hammond, who replaced Clement Finley as Surgeon General of the Army in April 1862. One of the most ardent proponents of empirical investigation and scientific practice in medicine, Hammond saw the war as an unprecedented opportunity for experiential medical knowledge for the physicians and surgeons involved in it, and a powerful lesson for future generations. But the damage wrought by the First Battle of Bull Run made it clear to Hammond that the reorganization of the Army Medical Department and improvement of transportation of the wounded and of supplies that Finley had begun would need to be completed before loftier goals could be realized. Shortly after he became Surgeon General, Hammond set Major Jonathan Letterman—who would later become known as the "Father of Battlefield Medicine"—to this task, appointing him Medical Director of the Army of the Potomac. Letterman quickly devised a plan for an Ambulance Corps that he presented to the medical officers of the Army of the Potomac as Special Order No. 147 on August 2, 1862. This new system consisted of a hierarchy involving a captain for each Army Corps, a first lieutenant for each division, a second lieutenant for each brigade, and a sergeant for each regiment, trained in emergency services and equipped with different ambulance and transport carts according to size and need.[202] This new system was first implemented at

[202] Jonathan Letterman, *Medical Recollections of the Army of the Potomac* (New York: D. Appleton & Co, 1866), 24-30.

the Battle of Antietam on September 17, 1862, and considered a success after over 10,000 wounded were "collected promptly" after the battle's end.[203]

Letterman augmented the Ambulance Corps with a new evacuation system that involved three stations—the battlefield tent (for immediate triage), the field hospital (near the battlefield, but with larger treatment and surgery capabilities), and the general hospital (away from the field, for long-term care and complex operations). Army Medical Department historian P.M. Ashburn claims that the whole of Letterman's new battlefield recovery system "received its baptism of fire" at the Battle of Fredericksburg from December 11-15, 1862, "where the confusion of defeat" complicated an already exhausting engagement, but the efficiency of this new system nevertheless prevailed.[204] The new Ambulance Corps and Letterman model for evacuation were soon found in other Union armies, and were officially sanctioned by law in the Act of March 11, 1864. Ashburn claims that the Prussian Army even adopted this system in the Franco-Prussian War, and it soon became the "basis of the systems of all modern armies for the rescue of the wounded."[205] Historians like Ashburn and Rutkow agree that the most significant achievement of the Army Medical Department during the war was its "increased organizational proficiency…and improvements in the care of the sick and wounded," thanks in large part to the Letterman model system of ambulance corps and field hospitals.[206] Yet, the system Letterman implemented had its roots in French military

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[203] P.M. Ashburn, *A History of the Medical Department of the United States Army* (Boston and New York: Houghton Mifflin Company, 1929), 16.
[204] Ashburn, *A History of the Medical Department*, 16.
[205] Ashburn, *A History of the Medical Department*, 16-17.
[206] Stanhope Bayne-Jones, *The Evolution of Preventive Medicine in the United States Army, 1607-1939* (Washington, D.C.: Office of the Surgeon General of the Army, 1968), 97.

medical tradition. French military surgeon Baron Dominique-Jean Larrey pioneered modern military trauma care and triage during the Napoleonic Wars (1792-1815), organizing surgical teams near the front lines in order to expedite immediate treatment, the creation of horse-drawn ambulances to evacuate injured soldiers quickly, and the prioritization of injuries according to the need for treatment. Larrey's program reduced morbidity and mortality during the war, and he was later tasked with the reorganization of medical care for the French Army.[207] Insofar as American physicians sought to imitate and implement French clinical medicine in the United States, so also American military physicians replicated French military medical care.

The development of a more efficient system of battlefield evacuation contributed to more successful treatment of the sick and wounded as the Civil War progressed. Yet, this treatment remained in the hands of mostly unskilled physicians and surgeons, unfamiliar with the conditions of war and inexperienced in the treatment of so many diseases and injuries. The training of many of medical officers of the Union Army was trial by fire on the battlefield and in field hospitals, through experiential knowledge that had been so coveted by pilgrims to Paris. This experiential knowledge, however, afforded opportunities for ambitious physicians and surgeons to hone their craft and conduct useful medical research. The reforms initiated by Surgeon General Hammond provided the tools for the application of museological science techniques in wartime medicine.

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[207] M.M. Manring, Alan Hawk, Jason H. Calhoun, and Romney C. Andersen, "Treatment of War Wounds: A Historical Review," *Clinical Orthopaedics and Related Research* 467 (2009): 2169.

Part I: The Office of the Surgeon General of the U.S. Army, the Army Medical Museum and the *Medical and Surgical History of the War of the Rebellion*

Recognizing the bureaucratic shortcomings of the Army Medical Department—as well as the unique opportunities the war provided for experiential knowledge and medical study—Surgeon General Hammond left Major Letterman to the work of battlefield evacuation and focused on more long-term reforms. One of these reforms involved overhauling the Army Medical Department's system of reports and returns submitted by medical officers in the field, creating more condensed and precise forms for collecting data on sickness, disease, injury and operations, in order to generate insightful statistics for improving medical practice. Hammond saw the collection of this data as serving two purposes—for assessing the army's medical and surgical needs during the war, and for statistical, clinical and historical analysis after the war. The scale of the Civil War and the diseases, injuries and death that resulted was such as could not have been imagined. Coupled with the lack of experienced physicians, and the development of new weapon technologies, the Army Medical Department had virtually no way of anticipating the medical complications it would encounter during the war. Thus, the collection and analysis of data during the war was necessary to continued evaluation of the medical and surgical needs of the Army and improvement of practice.

The collection of this data served not only to facilitate broader medical conclusions, but also to inspire Army medical officers to conduct individual research. Hammond's revision of the methods by which medical information and case histories were gathered helped systematize medical treatment and research during the war. The system of registers and served as a training guide for surgeons and physicians, instructing

them in analytical techniques of examination, diagnosis, and treatment of illness and injury. Registers suggested a standard classification of illness for physicians to use in their work, and reports also categorized illness and injury for surgeons at general hospitals. In the early years of the war, this information, reported to the Surgeon General's office, guided the allocation of medical supplies to regiments and hospitals based on the needs exhibited in the reports.

Hammond's second major reform aimed to provide better medical research and education through the development of a national medical museum for the display of pathoanatomical specimens and historical medical artifacts and exhibits, with the capacity for clinical instruction and medical lectures. Viewed together, the specimens from injuries and casualties of war, the case histories of those specimens and their contributors, and the statistics derived from both provided the basis for American museological medicine. Hammond put John H. Brinton—a passionate disciple of the Paris School and colleague at Jefferson Medical College before the war—in charge of collecting and organizing specimens for the national museum and overseeing the preparation a surgical history of the war.[208] Civil War biographer John Y. Simon argues that Brinton believed as much as Hammond that these projects would "immensely benefit medical science", and Hammond knew Brinton was the man to make it happen because of Brinton's organizational talents.[209] Brinton was dedicated to the Army Medical Museum, "devoting his whole heart to it and all its functions," and even loaning the Museum specimens and surgical instruments from his own personal collection to catalyze

[208] Brinton, *Personal Memoirs*, xxii.
[209] Brinton, *Personal Memoirs*, ix.

its growth.[210] Together, Hammond and Brinton would use the experience of war to transform American medicine.

Hammond conceptualized the Army Medical Museum very early on as a new temple of medical science. The experience of war, the disease- and injury-ridden bodies it produced, and the sacrifices of so many soldiers would be studied and immortalized within the walls of this museum, representing the processes of diagnosis and treatment in the clinic and autopsy in the morgue to improve medical practice. Collecting, preserving and displaying specimens and medical paraphernalia of the U.S. Civil War served a dual function for Hammond—he hoped that the large collection of specimens "illustrating injuries and diseases that cause[d] death and disability during war" could be later utilized to support the writing of his medical and surgical history of the war.[211] Army Assistant Surgeon H. E. Brown claimed that Hammond saw very early on the "great advantage that would accrue to the cause of scientific medicine and surgery by rendering the enormous experience of the war available for future study" through the collection and analysis of statistics, the institution of the museum and the publication of *Medical and Surgical History of the War of the Rebellion* (hereafter abbreviated as *MSHWR*).[212] The medical experiences of the Civil War could not have occurred during a time of peace, and thus the analysis of medical knowledge derived from this enormous experience was valuable to both civilian and military medicine.

Hammond's focus on generating useful statistics from the war necessitated reconfiguring the system of reports of the Army Medical Department, which consisted of

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[210] Brinton, *Personal Memoirs*, xxii.
[211] Daniel S. Lamb, *A History of the United States Army Medical Museum 1862 to 1917, compiled from the Official Records* (Washington, D.C.: U.S. Army Medical Museum, 1917), 3.
[212] Lamb, *A History of the United States Army Medical Museum*, 7.

quarterly reports of the sick and wounded, sanitary reports for regimental and hospital surgeons, and patient registers and case books for patient histories. In his second circular as Surgeon General in May of 1862, Hammond announced the changes to the system of reports, requesting that Army Medical Officers take greater care in their preparation of reports of the sick and wounded by providing detailed case histories where they had previously included only basic patient information. In conjunction with that effort, the officers were also to gather and submit to his office specimens of morbid anatomy and pathology—both surgical and medical—useful for military medical study, as well as "projectiles and foreign bodies" removed from soldiers during the war, and other medical paraphernalia that could serve to enhance military medical education.[213]

Hammond stressed that all materials submitted should contain the specimen's identity and circumstances of injury or death, as well as the details of the submitting officers.[214] With a complete history of the specimen, it could be used as both a contextualized object of medical study and a historicized artifact. Knowing the context in which the specimen occurred was necessary for accurate classification and appropriate museological display; likewise, preserving the donor's identity ensured that the specimen did not become a mere object of science, but, rather, a patient's story and legacy. Hammond hoped the additional case information in the monthly reports and specimens with detailed case histories would simultaneously facilitate the writing of *MSHWR*, and the construction of medical and historical exhibits in the Army Medical Museum.

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[213] Lamb, *A History of the United States Army Medical Museum*, 2.
[214] Lamb, *A History of the United States Army Medical Museum*, 1-2.

On July 23, 1862 an Army Board composed of Surgeon Lewis A. Edwards, U.S. Army, Surgeon J.H. Brinton, U.S. Volunteers, and Assistant Surgeons J.J. Woodward and M.J. Asch, U.S. Army determined—on Hammond's recommendation—that the reports of the quarterly reports of the sick and wounded should occur monthly instead, and that copies should be forwarded to the Surgeon General's office in place of the time-consuming consolidated reports submitted by the Medical Directors. Both Hammond and the Board hoped these changes might make the work of these reports easier, and their value more transparent. The new monthly reports of the Sick and Wounded specified one hundred and forty-three diseases, classified mainly according to system, as follows:

> Fevers, eruptive fevers, diseases of the organ connected with the digestive system, diseases of the respiratory system, diseases of the circulatory system, diseases of the brain and nervous system, diseases of the urinary and genital organs and venereal affections, diseases of the serous exhalent vessels, diseases of the fibrous and muscular structures, abscesses and ulcers, wounds and injuries, diseases of the eye, diseases of the ear, and all other diseases.[215]

The switch to monthly, rather than quarterly, reports, meant that the Surgeon General's Office could calculate which diseases occurred most often according to month, season, and environment.

The Army Board later recommended the adoption of a classification system similar to that devised by Dr. William Farr of London. Dr. Farr's classification system was employed not only in the statistical reports of the English Army, but also in other countries in Europe. Dr. Farr presented this system to the Congress of European Statisticians which met in Paris on September 10, 1855, and at subsequent meetings the

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[215] United States Surgeon General's Office, *Medical and Surgical History of the War of the Rebellion (1861-1865)*, *Part 1, Volume 1* (Washington, D.C.: Government Printing Office, 1870), xv.

years after.[216] The Army Board thought that medical statistics of the Civil War "would possess the most general utility if they were collected and published in such a form as would permit them to be compared readily with similar publications issued by other nations."[217] Hammond was likewise concerned that the information collected during the war and published in *MSHWR* would be not only easily comparable, but also medically and historically useful.

In addition to desiring more detailed histories of the cases Army Medical Officers encountered, Hammond had the specific goal of acquiring more information on the nature, prevalence, and treatment of gunshot wounds during the war, illustrated by statistics and what he hoped would be the largest collection of specimens of gunshot injury in the world. In order to achieve this, Hammond added a "tabular statement of gunshot wounds" to the monthly report of sick and wounded. The Surgeon General's Office compiled this information for the months of September, October, November, and December of 1862 for use in *MSHWR* and for publication to be distributed to medical offers throughout the Army.[218] Hammond felt strongly that the physicians and surgeons in the field should have access to the statistics compiled, in order to make more informed decisions in their treatment of the sick and wounded. On March 25, 1863, Hammond announced in his Circular No. 4 the creation of the "Classified Return of Killed and Wounded in Battle," and by November 4, 1863 made available to medical directors of armies in the field duplicates of their reports of killed and wounded for further study and

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[216] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, xvi-xvii.
[217] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1,* xvi.
[218] Otis, George A. and Joseph Janvier Woodward, *Report on the Extent and Nature of the Materials Available for the Preparation of a Medical and Surgical History of the Rebellion* (Washington, D.C.: Surgeon General's Office, 1865), 4.

comparison.[219] From the shortcomings of the information supplied, the Surgeon General determined that a revision of registers was needed and after a board of medical officers made significant changes, "small portable registers" were devised to make transcription on the battlefield easier.[220] The implementation of these registers facilitated the collection of medical information and, in turn, the independence of the wartime physician. With their portable registers, physicians could more easily document, compare, and analyze their own medical cases, contributing to the ad hoc production of medical knowledge on an individual scale.

The records detailing the treatments and operations involved in gunshot injuries to the femur would provide the archetypal example of what Hammond hoped to accomplish by gathering data specific to gunshot injury. Hammond anticipated, and Otis later confirmed, that "the instances afforded by the war of the removal of the head, or of the head, neck, and trochanters of the femur, on account of the immediate or remote effects of gunshot fractures of the upper extremity of the bone [would be] numerous."[221] By keeping track of, and later analyzing, the variety of circumstances that generated these fractures, and the variety of operations or treatments performed as a result, the Surgeon General's Office hoped to produce information that would have "great weight in the determination of one of the most important questions of modern military surgery."[222] Through the reports of the sick and wounded, case histories could be singled out for further discussion, specimens might be obtained for illustration, and statistics would be

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[219] Otis and Woodward, *Report on the Extent and Nature*, 4.
[220] Otis and Woodward, *Report on the Extent and Nature*, 4.
[221] George A. Otis, *A Report on the Excisions of the Head of the Femur for Gunshot Injury* (Washington: Government Printing Office, 1869), 5.
[222] Otis, *A Report on the Excisions of the Head of the Femur*, 5-6.

generated, providing the three components necessary for Hammond's Army Medical Museum exhibits and *MSHWR* stories. By analyzing the successes and failures, and learning from trial and error during the war, the best course of action regarding gunshot injuries of the femur might be determined, and this information compared with that of other countries, in order to advance the science of treatment of gunshot injuries more broadly.

Following the wounded soldier to the hospital, Hammond published Circular 26 on November 26, 1863, reiterating to medical officers in charge of general hospitals "the importance of preserving representations of the results of surgical operations for the Army Medical Museum."[223] The Surgeon General's Office also revised the system of registers for general hospitals, providing a register of sick and wounded and a register of surgical operations to each hospital, along with new bed-cards to facilitate the recording of more detailed case histories.[224] By January of 1864, the new registers were in place in all the general hospitals, and all medical officers were required to submit a quarterly transcript from "the registers of all cases of wounds or of operations." The staff of the Surgeon General's Office worked for most of the year to organize and classify the information from the reports into a form "more convenient for reference and study."[225] The hospital would prove to be the place where case histories, specimens and statistics could most often be acquired together, as the records they kept followed the patient through treatment and recovery, or death. The case histories reflected observations and diagnosis, as well as recovery or post-mortem information, the specimens became the

[223] Otis and Woodward, *Report on the Extent and Nature*, 4.
[224] Otis and Woodward, *Report on the Extent and Nature*, 4.
[225] Otis and Woodward, *Report on the Extent and Nature*, 5.

visual representation of the case, and the statistics compiled from the monthly reports helped make sense of the medical value of the case. Together, they took the observer through the clinic and morgue and into a virtual library of medical knowledge that would be used to write a medical and surgical history of the war, and to display for students of future generations the medical lessons of the conflict.

Collecting Medicine

Insofar as the revision and submission of reports and the return of statistics to medical officers in the field was an ongoing process throughout the war, so also was the collection of specimens and artifacts for the Army Medical Museum. One of Hammond's first goals in launching the Army Medical Museum project was to collect enough specimens so as to have the most complete collection of pathological and anatomical specimens in the world. Nearly half of the specimens submitted to the Army Medical Museum from physicians and surgeons at Union Army Hospitals were from, or in addition to, the personal collections of these physicians and surgeons. Letters accompanying boxes of specimens from hospitals throughout the Union suggest that physicians and surgeons had already been collecting case histories and specimens for their own collections for posterity and teaching purposes. Most of these letters indicated the great honor they felt would come of contributing their collections to the national medical museum project.[226] Drs. Brinton and Woodward spent the early years of the war

[226] OHA 13: Curatorial Records, Incoming Correspondence, Loose, contains hundreds of letters of communication from physicians and surgeons at U.S. Army General Hospitals—as well as non-Army hospitals—accompanying specimens contributed to the Army Medical Museum from their personal collection. Nearly all of the letters of contribution include some description of pride in the contribution of their personal collections to a national medical museum project.

sorting through these boxes and letters in a small office below the War Department on Pennsylvania Avenue until 1863, when the Army Medical Department secured the nearby Corcoran art building for the temporary storage and exhibition of specimens until the war's end.[227]

Hammond published numerous Circulars not only requesting the compliance of medical officers in this collection effort, but also modifying requests based on the types of specimens that had been submitted each quarter.[228] In Brinton's *First Annual Report of the Army Medical Museum in May* 1863, he boasted that the collection comprised 1,349 objects of an impressive variety, presenting a catalogue with preliminary classification of the specimens for easy reference. *The American Medical Times* reviewed the Army Medical Museum project and its newly released catalogue in its 23 May 1863 issue, praising the efforts of the Surgeon General's Office and the establishment of the Army Medical Museum as:

> One of the noblest enterprises to utilize the results of the present war, and render its sad lessons instructive and useful to future generations, which has yet been undertaken. It will remain an enduring monument to the enlightened zeal and energy of Surgeon General Hammond and all associated with him in laying its present broad foundations.[229]

The journal went so far as to advertise for the Surgeon General's Office, imploring "every surgeon connected with the army or with its hospitals…to carefully preserve all

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[227] Brinton, *Personal Memoirs*, 182-84.
[228] Otis and Woodward, *Report on the Extent and Nature*, 7.
[229] *American Medical Times*, Vol. 6, May 23, 1863, page 249, Box 1, Folder 11, OHA39: Museum Records and Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

pathological specimens, and forward them with accurate histories to the Curator."[230] No doubt the publicity surrounding the Museum by the middle of the war certainly helped increase awareness about the project in civilian communities, and encouraged those army medical officers who had not been collecting to start.

The positive reception of the Army Medical Museum project in the early years of the war by the civilian medical community brought praise to Hammond and his staff, and generated wider interest in the contribution of specimens to the Museum. In January of 1864, the Surgeon General's Office boasted a considerable assortment of specimens, and the largest collection of gunshot wound specimens in the world, except for in Britain. By the end of 1864, the number of specimens contributed had quadrupled, and nearly every category Hammond devised had been filled with a variety of iterations.[231] Building on this positive reception, Brinton lobbied the government to provide funding to the Museum, emphasizing "the value of a national medical museum…[Whose] claims to usefulness are recognized by the civil profession throughout the country."[232] Brinton declared that in two short years, the Army Medical Museum's collection had already influenced the Army in developing better treatment for wounded soldiers, as exemplified by the study of specimens illustrating injuries to the joint from conoidal balls, "a class of injuries previously almost unknown, and the treatment of which, at the commencement of

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[230] *American Medical Times*, Vol. 6, May 23, 1863, page 249 Box 1, Folder 11, OHA39: Museum Records and Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[231] Otis and Woodward, *Report on the Extent and Nature*, 7.
[232] Letter from John H. Brinton to J.K. Barnes, August 23, 1863, Box 1, Folder 13, OHA39: Museum Records and Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

this war was unsettled," but had since come to be better understood.[233] The result of Brinton's efforts was a small appropriation of $5,000 from Congress in support of the Museum, which was used to secure larger quarters at the Corcoran School House in Washington, D.C.[234] In this larger facility, the Army Medical Museum staff were finally able to correlate specimens and case histories in displays for medical study.

Visualizing Medicine

One of the most important components of museological science and empirically-based medicine was the new technique of visualization—seeing illness and injury manifested on the body or specimen, comparing different manifestations with one another, and witnessing the context of the occurrences. Hammond wanted the visualization of disease and injury through museological arrangement of specimens to be as accurate and educational as possible. Near the end of 1862, he enlisted the help of German physician Frederick Schafhirt—who had worked as an assistant to renowned paleontologist Joseph Leidy at the University of Pennsylvania—as the Army Medical Museum's first Hospital Steward. Schafhirt was tasked with overseeing the preservation and preparation of specimens, and development of museological displays for every type of disease and injury. Meticulous with his materials, Schafhirt prepared a guide to specimen preservation that detailed the best alcohols, jars and wood for preservation and display, as well as the proper concentrations and measurements, in order to protect the

[233] Letter from John H. Brinton to J.K. Barnes, August 23, 1863, Box 1, Folder 13, OHA39: Museum Records and Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[234] Letter from John H. Brinton to J.K. Barnes, August 23, 1863, Box 1, Folder 13, OHA39: Museum Records and Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

structural integrity of the specimen and the scientific integrity of the Museum. Schafhirt used materials and methods for preserving, mounting and displaying specimens that were most conducive to their educational and museological display, a hallmark of the early Army Medical Museum. Brinton was particularly appreciative of Schafhirt, noting that the skill and quality of his work were invaluable to the Museum as an institution of visual culture, and a large factor in its success.[235]

Frederick Schafhirt's son Adolph also made a career working as an artist for the Museum. Adolph painted battlefield scenes depicting the injuries and deaths that produced the Museum's specimens, inspiring Brinton to hire more artists and photographers to provide visual enhancement of museum exhibits and the historical publication. Adolph had first worked alongside his father and Brinton to open the Army Medical Museum's first exhibit, and later replaced his father as Hospital Steward for the Museum.[236] Adolph also demonstrated talent as a bone connoisseur and artist, accompanying Brinton on trips throughout the field in order to help free bone specimens from injured and slain soldiers and sketch those could not be secured for display at the museum. Brinton took Adolph with him to the battlefield to gain more experience, and soon added German artist Hermann Faber, who became the Museum's first official artist in residence.[237] Faber would go on to draw hundreds of specimens, injuries, injured soldiers and medical paraphernalia for display in the Museum. With increased funding from Congress in 1864, the Museum was able to employ several artists, including "a colorist to prepare illustrations of surgical pathology and representations of remarkable

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[235] Lamb, *A History of the United States Army Medical Museum*, 4-5.
[236] Lamb, *A History of the United States Army Medical Museum*, 7, 15.
[237] Lamb, *A History of the United States Army Medical Museum*, 16.

injuries; a draughtsman to make maps and plans; and two engravers."[238] Brinton subsequently hired more artists to visit battlefields and general hospitals, in order to capture the context of suffering, as well as conditions that could not be witnessed through specimen or case history. Hammond also encouraged medical officers to include drawings and models with their submissions of specimens and case histories.[239]

Although the pathological specimen was itself a useful visualization of disease, capturing the context of illness, injury and death during the Civil War was an important way of negotiating the meaning of suffering experienced during the conflict. Photography and modern medicine were born in the same era, and so it was logical that the new way of seeing that photography provided would become an important medical tool. Shirley Samuels argues that medical practitioners in the antebellum period "were entranced by the supposed accuracy of magnified images captured on daguerreotype places" that Louis Jacques Mande Daguerre presented in 1839.[240] The medical community viewed the daguerreotype as a technological development that could facilitate recording and negotiation of visual evidence in medical research. Alan Trachtenberg argues that photography played a central role in making sense of the difficult realities of the Civil War and the physical devastation it wrought on soldiers' bodies.[241] Photography was used by both the Army Medical Department and civilian journalists to document, study, and depict the realities of war, but to two very different ends.

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[238] Otis and Woodward, *Report on the Extent and Nature*, 7.
[239] Otis and Woodward, *Report on the Extent and Nature*, 1.
[240] Shirley Samuels, *Facing America: Iconography and the Civil War* (Oxford: Oxford University Press, 2004), 38.
[241] Alan Trachtenberg, *Reading American Photographs: Images as History, Mathew Brady to Walker Evans* (New York: Hill and Wang, 1989), 115.

Hammond and Brinton developed a photography studio at the Army Medical Museum, where renowned photographer William Bell and a handful of hospital stewards photographed injured soldiers and specimens for documentation and display. Photographing injured soldiers proved far more expedient than sketching them, and photographs of specimens could be preserved for educational, scientific and historical purposes.[242] Photography would also complement many cases where no specimen or visual evidence was preserved, and many of the photographic prints taken at the Army Medical Museum would be used in the *Medical and Surgical History of the War of the Rebellion.* In the decades before the war, many individual physicians and surgeons had employed both artists and photographers to depict the conditions they encountered, in order to preserve them for further study. During the war, this practice continued, as many physicians and surgeons utilized photographers sent to the field by the Museum to visually document the cases about which they wrote in their portable registers.

One of the most enthusiastic supporters of the Army Medical Museum project, surgeon R.B. Bontecou was well known for photographing many of his cases himself. "Armed with a camera [and] his saws and scalpels," Samuels notes, Bontecou took the time to document on paper and through photographs, "the recovery process of sample wounds he treated. These wounds, very much displayed in relation to the soldiers who bore them, appear in representative sections of their own: head, foot, hand, thigh, arm, and torso wounds are clustered together."[243] While the majority of Bontecou's photographs exhibited an analytical organizing principle, many were more artistic. "A

[242] Lamb, *A History of the United States Army Medical Museum*, 33-37.
[243] Samuels, *Facing America*, 62.

Morning's Work" became one of the most potent images of the war (Figure 2.1). In this photograph of a pile of amputated feet, Bontecou captured the gritty reality of medical practice during the Civil War, where amputations were standard in "a morning's work."[244]



Figure 2.1: R.B. Bontecou, "A Morning's Work," 1865.
Stanley Burns, *A Morning's Work: Medical Photographs from the Burns Archive & Collection* (Santa Fe, N.M.: Twin Palms Publishers, 1998).

Bontecou's research and photographs formed a substantial collection at the Army Medical Museum and contributed important medical insights to the *MSHWR*. Whether on the battlefield, in the hospital, or at the Army Medical Museum, the soldier subjects of medical photography were carefully posed, often exhibiting little or no emotion, somber in the military uniforms that would symbolize the broader cause of their injury.

[244] Stanley Burns, *A Morning's Work: Medical Photographs from the Burns Archive & Collection* (Santa Fe, N.M.: Twin Palms Publishers, 1998), introduction.

The devastation of the Civil War was captured not only in the photographs taken by Army Medical Museum photographers and individual surgeons, but also in the popular battlefield photography of Mathew Brady, Alexander Gardner and George Bernard. Mathew Brady made a name for himself photographing politicians and other famous people, but also pioneered the production of *cartes-de-visite* for soldiers heading off to war.[245] During the Civil War, Brady established himself as the first photojournalist, traveling from battlefield to battlefield documenting the war with his team of photographer, which included Gardner. On August 17, 1861, shortly after the Battle of Bull Run, the *New York Times* published Brady's account and accompanying photographs of the early battles of the war. Brady's description of the devastation of Bull Run and Manassas presented for the American reader the first accounts and images of war.[246] In October 1862, Brady debuted his New York gallery exhibit "The Dead of Antietam," displaying a series of photographs taken after the Battle of Antietam by his assistant Alexander Gardner. *The New York Times* review of the exhibit reflected somberly, "If [Brady] has not brought bodies and laid them in our dooryards and along the streets, he has done something very like it."[247] Figure 2.2 below, "Confederate Dead at Bloody Lane" is an example of the photographs featured in this exhibit. Two men stare at the bodies of Confederate soldiers who died in the battle of Antietam, and were gathered at Bloody Lane for disposal.

[245] Trachtenberg, *Reading American Photographs*, 33-34; Samuels, *Facing America*, 71.
[246] Trachtenberg, *Reading American Photographs*, 71-2.
[247] "Brady's Photographs: Pictures of the Dead at Antietam," The New York Times (Oct. 20, 1862).



Figure 2.2: Alexander Gardner, "Confederate Dead at Bloody Lane," 1862.
U.S. National Park Service Archives

Brady's exhibit transformed the battlefield from a remote idea to a stark reality that confronted spectators in the gallery. The dismal environment and dead bodies left in the wake of Civil War battles took shape through these exhibits. Shirley Samuels argues that photographic narratives presented in exhibits like "The Dead at Antietam," and in collections like *Gardner's Photographic Sketch Book of the Civil War*, "sought to reproduce, as if through photographic development, the blurred outlines of bodies and to bring them into focus."[248] There was even more at stake in this recording activity: photography was central not only to the process of understanding the harsh truth of war,

[248] Samuels, *Facing America*, 58.

but also to the process of constructing museological analysis of the diseases and injuries that produced those piles of dead bodies.

The Medical and Surgical History of the War of the Rebellion

Surgeons George A. Otis and J.J. Woodward completed the trio of Surgeon General Hammond's most trusted staff working on his projects for reform. Like Brinton, they had served in the field and distinguished themselves as both excellent surgeons and dedicated collectors for the proposed Army Medical Museum. Together, Otis and Woodward were in charge of the assembly and publication of *MSHWR*; Otis directed the surgical portion of the work, while Woodward directed the medical portion. In parallel, Hammond had both men assigned to duty at the Army Medical Museum, with Otis in charge of the surgical and photographic sections, and Woodward in charge of the medical and microscopical sections.[249] Otis served as Brinton's assistant until his departure from the Army at the end of 1864, when he took over the position of Curator of the Army Medical Museum.[250] Both Otis and Woodward worked hard to fill Brinton's shoes after his departure, nevertheless following the detailed instructions he'd left behind for organizing the museum and the history of the war.

In the meantime, Otis began work on an atlas of Civil War injuries and wounds, which he later developed into the four-volume *U.S. Army Medical Museum Photographic Series*. Woodward, who had worked closely with Brinton and accompanied him on his visits to battlefields and hospitals, focused on publishing articles of medical cases he'd

[249] Lamb, *A History of the United States Army Medical Museum*, 31.
[250] Lamb, *A History of the United States Army Medical Museum*, 29-30.

observed. When the Civil War ended, the Surgeon General directed Otis and Woodward to oversee the collection of specimens, artifacts and literary works from evacuated military hospitals.[251] Both men then returned to their work on the history of the war, and published a preliminary military version, *A Report upon the Extent and Nature of the Materials Available for the Preparation of a Medical and Surgical History of the War* in 1868, together with Secretary of War Stanton soliciting more government funding and support for the completion of the project. In 1870, they published the first five thousand copies of Part 1 of the *Medical and Surgical History of the War of the Rebellion*, accomplishing the last of William A. Hammond's many goals for the Medical Department of the U.S. Army.[252]

By the end of the war, the Surgeon General's Office had collected a vast array of data from the reports of medical officers and submitted pathological specimens, military artifacts, illustrations, and models. In the *Report on the Extent and Nature of the Materials Available for the Preparation of a Medical and Surgical History of the War of the Rebellion* (1865), these materials were organized into three categories: numerical returns, nominal returns, and miscellaneous reports.[253] Then Surgeon General Joseph K. Barnes boasted that the extent of the materials collected was "simply enormous," and demonstrated the "commendable diligence and promptitude" in submitting the required reports with zeal "more deserving of praise when the engrossing nature of their field duties is considered."[254]

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[251] Lamb, *A History of the United States Army Medical Museum*, 34.
[252] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, viii.
[253] Otis and Woodward, *Report on the Extent and Nature,* 1.
[254] Otis and Woodward, *Report on the Extent and Nature,* 2.

The result of their hard work was a "mass of facts and observations in military surgery of unprecedented magnitude".[255] At the war's end, the surgical specimens of the Army Medical Museum numbered 5,840 and included not only specimens of injury during the war, but also specimens illustrative of the reparative process after injury, of morbid processes, of the results of operations, and of surgical apparatus and appliances. The collection was believed to be larger than that of any medico-military museums in Britain or France.[256] The staff of the Surgeon General's Office determined that the specimens helped inform surgical processes under development as well as illustrated solutions to a great many surgical problems. The collection of medical specimens donated to the Museum was even greater than that of the surgical specimens, requiring several years after the war's end to tabulate and classify, postponing the completion of Museum exhibits and the publication of the medical portion of *MSHWR*.

Part II: The Battlefields and the Army Medical Museum

"If ever an event served as a harbinger of medical misery, it was this July 21, 1861 First Battle of Bull Run," claims historian Ira M. Rutkow. The appalling statistics of 750 killed, 2,494 wounded, and more than 1,500 missing, suggest that neither the American military nor its medicine were prepared for such a serious conflict. The Battle of Bull Run was a decisive moment in the Civil War not only because it served as a wake-up call for the North, but also because it revealed how untrained and unequipped Northern soldiers and physicians were when the war began. From the "wretched state of

[255] Otis and Woodward, *Report on the Extent and Nature,* 2.
[256] Otis and Woodward, *Report on the Extent and Nature,* 3.

the wounded to the disorganized scattering of surgeons over the rolling battlefield," Bull Run became a "tragic lesson in military medical hubris."[257] The Battle of Bull Run made clear that no matter the enthusiasm, patriotism, or scores of volunteers the North had, the South was better organized and prepared for the onslaught of war. It was after these initials losses that the Surgeon General came to realize that perhaps the best medical outcome of the war would be to learn from the failures.

Richard A. Gabriel and Karen Metz argue that the United States and its Army Medical Department were unprepared for "the magnitude of the slaughter that accompanied the American Civil War." The scale of the battles fought was larger than any previous war, the weapons used were more damaging and deadly, and the injuries and death toll were unlike any before experienced.[258] As these terrifying revelations ambushed the Army's Medical Department, it was hampered by disorganization and a lack of properly skilled medical officers. The Army Medical Department struggled with inefficient provisions for transport of the wounded from the battlefield to the hospital, hastily constructed camps with poor hygiene, and insufficient supplies of antiseptics, anesthetics, and other drugs.[259]

Although well-educated physicians—many of whom had just returned from study in Paris—volunteered for the war effort, the majority of the 13,000 existing medical officers and physician volunteers lacked the experience and the resources to facilitate successful medical treatment on the battlefield.[260] All of these factors contributed to the

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[257] Rutkow, *Bleeding Blue and Gray,* 5.
[258] Richard A. Gabriel and Karen Metz, *A History of Military Medicine*, *Vol. 2 From the Renaissance through Modern Times* (New York: Greenwood Press, 1992), 181.
[259] Gabriel and Metz, *A History of Military Medicine*, 186-187.
[260] Gabriel and Metz, *A History of Military Medicine*, 182, 191.

development of a system of triage on the battlefield, prioritizing treatment of soldiers by the severity and treatability of their conditions, transport only those in need of, or likely to die without, more sophisticated treatment to Army General Hospitals. Through this system of triage, Army physicians and surgeons gained practical and analytical experience in a way they never imagined. The prevalence of triage also contributed to the increased availability of specimens from the casualties of war.

A distinction can be made regarding the improvement of medical practice versus the development of a system of triage. Hammond and his Medical Department acknowledged early on not only the lack of preparedness of the Army's medical system, but also the crippling disorganization and lack of infrastructure that made improving military medicine, and even adequately treating disease and injury, a difficult task. The best they could hope to do was triage in medical treatment and in medical operations, allotting supplies and services to the geographic regions and battles that required it most. They would, however, work simultaneously to lay the foundation for the improvement of military medicine through the collection of medical and surgical statistics, case histories and specimens. Together these would be used to commemorate the war and make its lessons available for future generations, through their display at the Army Medical Museum, and their use in the publication of the *Medical and Surgical History of the War of the Rebellion*.

One of the most medically damaging military advancements seen in the war was "the improved kinetic power of the rifle bullet," and the increased use of the cylindro-conoidal bullet, which Gabriel and Metz argue made amputation the most frequently

performed battlefield operation during the Civil War."[261] For years, Rutkow argues, amputation had been the hallmark of operative surgery, "a speed event in which a surgeon's ego and a patient's suffering were intimately bound up with how fast the former could relieve the latter of his extremity."[262] While many of the surgeons and medical students who volunteered for the war effort had never or rarely practiced amputation, they gained considerable experience during the war, making it the most studied and improved military medical operation during and after the war.[263] In turn, it was the practice of amputation that bridged the gap between the educated and uneducated military surgeons, generating a more feasible ground for mentorship and illustrating what little skill many of the younger surgeons did have. Amputation was one of the few areas in which disciples of the Paris school and other more experienced surgeons were able to employ recent scientific developments in antisepsis and anesthesia—when they were available.[264]

Surgeon Charles Tripler, the first medical director of the Army of the Potomac, was one of a few surgeons who tried to singlehandedly tackle the Army Medical Department's problems. He set about trying to remedy deficiencies in sanitation, hygiene, disease prevention, evacuation and hospitalization, but found that much of the problem was due to incompetence at all levels, and a lack of accountability.[265] In his reports to the Surgeon General, Tripler noted that there seemed to be an unbreakable cycle of incompetence. Tripler's reports helped convince Surgeon General Hammond to revise the

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[261] Gabriel and Metz, *A History of Military Medicine*, 182.
[262] Rutkow, *Bleeding Blue and Gray*, 30.
[263] Rutkow, *Bleeding Blue and Gray*, 30.
[264] Gabriel and Metz, *A History of Military Medicine,* 149.
[265] Mary C. Gillett, *The Army Medical Department, 1818-1865*, *Army Historical Series* (Washington, D.C.: Center of Military History, United States Army, 1987), 166-67.

aforementioned reports of the sick and wounded, in order to hold medical officers and their staff responsible for more organized treatment and at the same time collect statistics on the sick and wounded. Hammond was also inspired to ensure that the medical officers receive the results of these reports in order to learn from the failures and successes of others. In addition to increased responsibility, Tripler saw the benefit for medical staff of the experience of war in and of itself, and believed that with the right guidance, military surgeons might become more skilled through increased exposure to trauma and practice with treatment.[266] Hammond and Tripler were staunch believers in the educational value of the experience to be gained in the practice of medicine and surgery during the war, and both encouraged the medical surgeon to repeatedly reflect on his experience and lessons learned, and then submit these reflections to the Surgeon General's Office for statistical and historical purposes.

Tripler facilitated improvements in the organization of the Army Medical Department and its officers, but he remained frustrated by the prevalence of disease among Union troops. Although better sanitation and hygiene would help prevent the so-called camp diseases such as diarrhea, dysentery, malaria, and typhoid fever, there was considered little to be done to combat the outbreak of "acute infections of childhood"—such as measles, mumps, scarlet fever, diphtheria and chicken pox—that physicians had failed to track during the enlistment process.[267] Historian Paul Steiner argues that the combination of ignorance of "the existence and importance of the pathogenic microbes" and the inability to control infectious disease contributed to more deaths from disease

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[266] Gillett, *The Army Medical Department, 1818-1865*, 167.
[267] Paul E. Steiner, *Disease in the Civil War: Natural Biological Warfare in 1861-1865* (Springfield, IL: Charles C. Thomas, 1968), 3; 13-14.

than battle injuries during the Civil War.[268] Hammond and Tripler encouraged brigade surgeons to assess sanitary and environmental dangers for disease in a given area, but many of the Civil War's leading generals ignored the recommendations of medical officers when they came into conflict with their military strategies. Nevertheless, the decision to camp near swamps or in inclement weather most often negatively affected the military outcome of battles when a large number of soldiers became too ill to fight.[269] The connection between disease and the success of military operations became increasingly clear by the end of the war, but it was a lesson that cost the lives of thousands.

During his visits to the battlefields surgeon and curator of the Army Medical Museum John H. Brinton observed, as Tripler had, the overwhelming number of deaths as a result of disease, especially in the case of those wounded left on the battlefield for days on end. Like Tripler, Brinton believed strongly in the valuable experience to be gained on the battlefield, and by interacting with so many diseased and injured bodies. Brinton visited dozens of battlefields over the course of the war, curious to observe the injuries from battle and the treatment performed on them. He noted in his journal that there was no other condition besides war where one might observe the slow, agonizing death of the wounded soldier left untreated.[270] The system of triage itself provided experience in the observation of infection and death. Never having observed death outside of the operating room, Brinton was curious to see its character on the battlefield. After the Battle of Antietam, Brinton observed several cases of "instantaneous rigor" of

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[268] Steiner, *Disease in the Civil War*, 4-5.
[269] Steiner, *Disease in the Civil War*, 127-9.
[270] Brinton, *Personal Memoirs*, 94.

death (rigor mortis) on the battlefield, noting the characteristic rigidity of the deceased frozen in their last human action. He later compiled his observations on the subject and published his study of rigor mortis in the *American Journal of the Medical Sciences* in January, 1870.[271] Gabriel and Metz argue that the experiences like Brinton's and those of other Army physicians and surgeons on the battlefield over the course of the war "heightened the overall competence of surgical procedures and stimulation solutions to problems that had become recognized through common military experience."[272] As with the rest of his duties, Brinton credited Hammond and his bold plan for broadening medical knowledge with the opportunity to observe medical conditions in military cases that could serve to enhance civilian medical knowledge.

Historian John S. Haller claims that Brinton, wanting to set a good example for medical officers, collected specimens of mutilated limbs and gross anatomy at the battlefields (sometimes digging them out of the trenches where they were buried, packed them in kegs of alcohol, whiskey, or salt and water") and then shipped them to Washington to be properly cleaned, tagged, and preserved under his own care or that of his assistant curator. Brinton was confident the collection "would serve to instruct future generations of military surgeons," and shared this lofty goal to the soldiers he encountered.[273] Brinton had begun to amass his own collection of specimens and artifacts. Detailing their cases in his journal—which would later serve as the basis for his memoirs—Brinton saw great commemorative and educational value in the specimens he collected. While some were remnants of surgeries he performed, others were spoils of

[271] Brinton, *Personal Memoirs*, 207-208.
[272] Gabriel and Metz, *A History of Military Medicine*, 151.
[273] Brinton, *Personal Memoirs*, xxii.

war on the battlefield. Brinton recalled that men buried in the trenches after battles provided the most opportune situation for specimen collection. In one particular case he removed from the body of a southern soldier a "breast plate of soft steel, in two halves, intended to be worn under the coat or vest. One ball had struck it and indented or bent it without perforation."[274] Brinton would later see to it that the breastplate was on display at the Army Medical Museum as the singular example of defensive armor from the Civil War.[275]

In his memoirs, Brinton admitted that the process of collecting specimens for the Army Medical Museum could be disheartening at times, especially when one witnessed the injury or death of the soldier whose specimen would later be retrieved. In the case of major battles like Antietam and Gettysburg where the casualties were high, medical officers sifted through piles of bodies on the battlefield, and were frequently overwhelmed by the variety of injuries they found. In his Circular #5, Hammond carefully reiterated the purpose of the project, "to advance the science which we all have so much at heart," encouraging them to take part in the "opportunity of advance the honor of the service, the cause of humanity, and his own reputation."[276] Hammond was careful to emphasize that the injuries and deaths of the war could be made even more meaningful through the vehicle of display and commemoration at the Army Medical Museum.

Insofar as gathering specimens from the battlefield proved difficult, recording the identities and "procuring truthful and full histories" of the specimens that were collected

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[274] Brinton, *Personal Memoirs*, 245.
[275] Brinton, *Personal Memoirs*, 245.
[276] William A. Hammond, *Circular No. 5* (Washington, D.C.: Surgeon General's Office, 1862).

was even more problematic.[277] Determining identity and case history of specimens from fallen soldiers on the battlefield was difficult, especially after the larger battles. Field hospitals were also unhelpful in this regard; understaffed and overworked, their surgeons could barely keep up with the number of operations needed, and maintaining case histories for all patients was almost impossible. During one of his many field hospital visits, Brinton remarked that mutilated limbs were "usually buried in heaps" without identity or other pertinent information.[278] Brinton made it his goal to establish a more efficient system for specimen collection and labeling at field hospitals, as well as incentives for physicians and surgeons to be more diligent about collecting useful information on their patients. Hammond made sure this system was incorporated in the revisions of the monthly report of the sick and wounded and the returns of killed and wounded in battle, formalizing the inclusion of case histories in the request for specimens. Brinton was not the only medical officer to collect specimens, but he was one of a small number of officers who forwarded the entirety of their specimen and artifact collections to the Surgeon General's Office for inclusion in the Army Medical Museum.

Medical Officers were not the only ones contributing specimens and artifacts to the Army Medical Museum. Major General Daniel E. Sickles was wounded while commanding his troops on horseback on the second day of the Battle of Gettysburg when a 12-pound cannonball struck his right leg. Sickles remained on the battlefield, leading his troops to victory before being taken to a hospital tent where surgeons amputated his leg. Knowing of Surgeon General Hammond's request for specimens for the Army

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[277] Brinton, *Personal Memoirs*,186.
[278] Brinton, *Personal Memoirs*, 187.

Medical Museum, Sickles had his amputated leg "placed in a wooden box and taken back to Washington to be presented to the Museum with his calling card that read, 'Compliments of Major General D.E.S.'"[279] The shattered lower leg bones of Major Sickles were later displayed in the Museum with his name, his photograph, an account of his story, and a cannonball similar to the one that wounded him at Gettysburg. Displays like this combining interesting specimens and complete case histories tended to come from high-ranking officers. The contributions of the masses of ordinary soldiers would be in the collection of anonymous material primarily for pathological study and for general display of diseases and their manifestations in different exhibits at the museum.

While the practice of medicine in war, exposure to diseased and injured bodies, and collection of specimens made visual the experience of war for the military surgeon and physician, Surgeon General Hammond wanted to make sure this visualization was complete. By the third year of the war, the Surgeon General's Office had established a substantial crew medical photographers and illustrators to document scenes of war, injuries and deaths on the battlefield, and operations on the battlefield and in the hospital, to visually enhance the exhibits of the Army Medical Museum and the stories and statistics in *MSHWR*. Photography was used to capture medical and surgical processes on the battlefield for education and posterity. In this photograph (Figure 2.3) a Union Army surgeon and his assistant administer chloroform to a patient in preparation for his amputation to be performed on a simple table "in an open air setting."[280]

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279 "To Bind Up the Nation's Wounds: Trauma and Surgery," exhibit at the National Museum of Health and Medicine, Silver Spring, Maryland.

280 "To Bind Up the Nation's Wounds: Trauma and Surgery" exhibit at the National Museum of Health and Medicine, Silver Spring, Maryland.

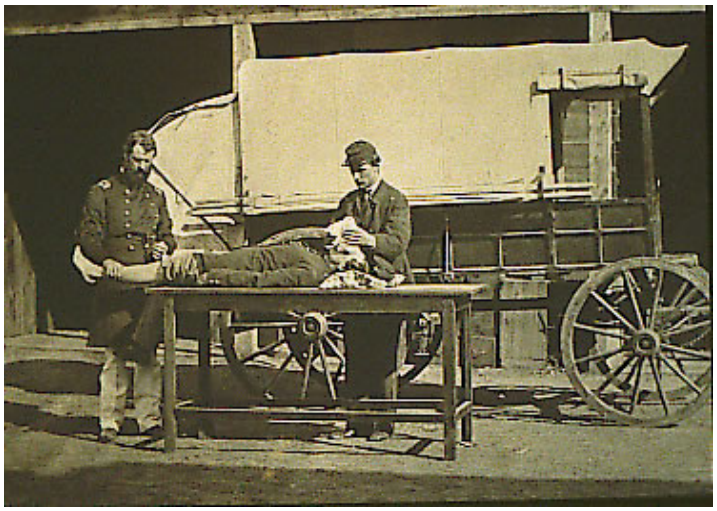


Figure 2.3: A Union surgeon prepares for surgery near the battlefield
"To Bind Up the Nation's Wounds: Trauma and Surgery" exhibit
National Museum of Health and Medicine

This photograph illustrates not only Army battlefield surgery, but also the constraints of war on the performance of medicine. Chemical advancements might have eased the soldier's pain during the operation, but the success of open-air battlefield operations was poor.

Perhaps the most well known case involving a battlefield operation that was traced in its entirety through the war is that of Private James E. Kelly. In the "Case of successful primary amputation at the Hip Joint" of twenty-eight-year-old Private James E. Kelly, company B, 56th Pennsylvania Volunteers, wounded on the morning of April 29, 1863, in a skirmish of the First Division, First Corps, on the Rappahannock. The cause of injury was from a conoidal musket ball, fired from three hundred yards, which shattered his left femur. Several senior surgeons consulted on the matter, and determined that "exarticulation" of the femur was urgently necessary that same day. Surgeon Edward Shippen, U.S. Volunteers, performed the operation at a nearby house, using the single

flap method to amputate the limb at the hip joint with minimal blood loss. Kelly convalesced in a hospital tent near the field then was transferred to the Corps hospital a few weeks later, where his stitches were removed and he appeared to be fully recovered. Through the cross-referencing of medical and military reports, it was later possible to update his case history with the information that he had been captured by Confederates in Richmond on June 15, 1863, and spent nearly a month in Libby Prison there, until he was exchanged on July 14 and sent to the Annapolis U.S.A. General Hospital. At Annapolis, it was discovered that while the "internal portion of the wound had united," the external portion had become gangrenous. Physicians at U.S.A.G.H. Annapolis tried unsuccessfully the standard application of bromine for treatment, but it was the experimental use of chlorinated soda lotion that helped cure Private Kelly. By December 23, 1863, he was considered entirely healed, and obtained both an honorable discharge from the service and a pension. The same day, Hospital Steward Stauch—one of the Army Medical Museum's artists—drew the picture whose photographic form is displayed in Figure 2.4, as well as at the Army Medical Museum.

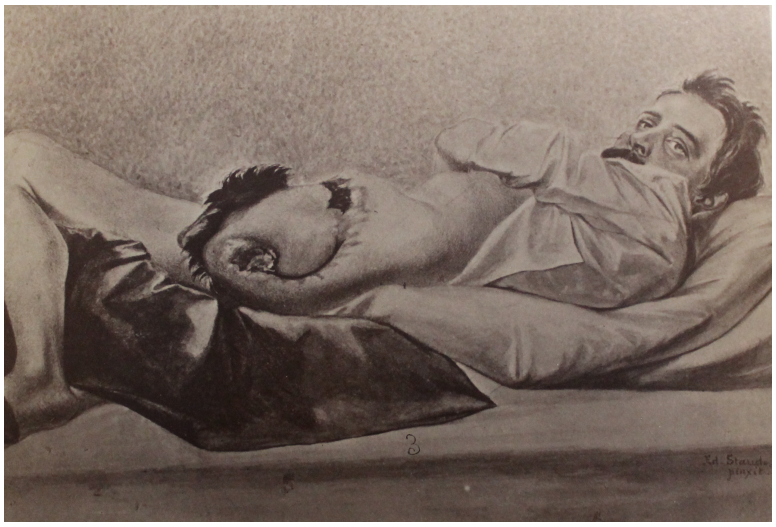


Figure 2.4: Private James E. Kelly illustrated during his recovery on December 23, 1863.
United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens, Volume 1* (Washington: Surgeon General's Office, 1865).

Private Kelly updated the Army Medical Museum in January, 1865 that he was in excellent health, and in the spring of 1868 he finally had an artificial limb adapted by Dr. E.D. Hudson, with which he was finally able to walk reasonably well. On March 4, 1874, Kelly's disability was formally rated second grade and his pension was finalized.[281] Private Kelly's story and photographs would become part of the *Photographs of Surgical Cases and Specimens,* and his specimen was labeled No. 1148 in the Surgical Section of the Museum, alongside other remnants of amputation surgery.

While the combination of case history, specimen, and photograph of the soldier—as in the case of Private Kelly—was the ideal formula for powerful displays in the Army Medical Museum, the reality in light of so many deaths during the war was that only a small fraction of soldiers would make it back to Washington, D.C. to be photographed. The majority of "cases" displayed at the Museum would involve only the case history

[281] United States Surgeon General's Office. *Photographs of Surgical Cases and Specimens, Volume 1.* (Washington: Surgeon General's Office, 1865), 3.

transcribed by the hospital surgeon and the specimen. Private Joseph R., Company E, 151st New York Volunteers, was one of many soldiers whose identity would be preserved only through the specimen he left behind. Private R. suffered a gunshot wound to the scalp while on a reconnaissance mission near the Rapidan in Virginia on November 27th, 1863. He was removed to Fairfax Seminary General Hospital, and there inspected for cerebral symptoms, which did not appear. He appeared to recover well, but two weeks later he was seized with convulsions and lapsed into a coma. Surgeon D.P. Smith examined his skullcap and thought it to be diseased, so he applied the trephine and found matter beneath the bone and "oozing from the diploe." Surgeon Smith made a total of five trephine perforations to allow the drainage of pus, and no further convulsions occurred, though Private R. remained in a coma for another half day before he died. The autopsy revealed there was "diffused inflammation of the arachnoid and dura mater," indicative of fatal trauma to the brain. His skull – including the pieces that were trephined out – was saved in the Surgical Section of the Museum (Figure 2.5).

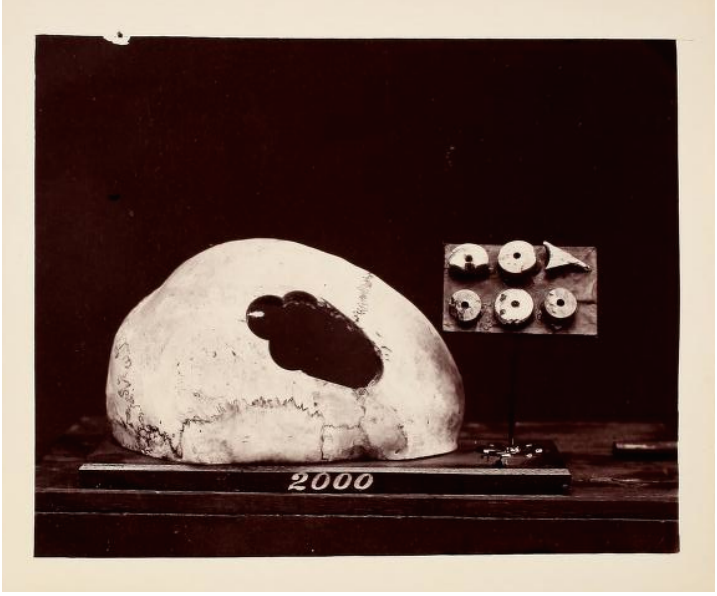


Figure 2.5: Trephined skull of Private R., Surgical Specimen #2000,
United States Surgeon General's Office. *Photographs of Surgical Cases and Specimens, Volume 1.*
(Washington: Surgeon General's Office, 1865).

Skulls like that of Private R. were displayed in series demonstrating the usefulness of trephining in surgery or the trauma of gunshots to the cranium.[282] Insofar as it was available, the identity and case history of the person from whom the skull came would accompany their specimen, ensuring they would be remembered on the shelves of the Army Medical Museum.

The use of photography by Army Medical Museum staff preserved interesting cases where specimens were lost or nonexistent. Major-General Henry A. Barnum of the 12th New York Troops was injured at the Battle of Malvern Hill on July 1, 1862, when a musket ball entered one side of his left lower abdomen and exited from the other side. Under the system of triage, abdominal wounds were considered almost always fatal, so Barnum was left on the battlefield, where he was captured by Confederate troops. He was

[282] United States Surgeon General's Office. *Photographs of Surgical Cases and Specimens, Volume 1.* (Washington: Surgeon General's Office, 1865).

able to make it back to the North over two weeks later, but doctors at the field hospital where he was treated had to remove part of his intestine. His wound never fully healed, and several months after he'd returned to service, a doctor inspected the wound and found bone fragments. Barnum later developed an abscess at the wound site, which another physician drained using rope thread. Barnum would wear the rope thread contraption until the wound healed over it.[283] Since there were no specimens or objects to accompany his case history, Museum photographers documented Barnum's injuries with a series of photographs. The photograph below shows Barnum in his military uniform, with his shirt parted to reveal the hole made by the musket ball just above his left hip bone and the drainage string tied in a bow at his side (see Figure 2.6). Although Barnum's uniform concealed his injury, this photograph provides tangible proof of the physical impact the war had on him.

[283] United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens, Volume 2* (Washington: Surgeon General's Office, 1865), 93.



Figure 2.6: Henry A. Barnum,
Recovery after a Penetrating Gunshot Wound of the Abdomen, Photograph #93
United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens, Volume 2*
(Washington: Surgeon General's Office, 1865).

Barnum's case would later be included in *Photographs of Surgical Cases and Specimens*, comprising unique cases photographed for the Army Medical Museum. What is more, photographs like Barnum's in the *Photographss* and other photographic publications would serve as evidence to both the injured soldier and the government of the devastation that occurred on the battlefield, especially in cases where incomplete documentation or a lack of specimen could serve as physical proof of injury or death. This evidence would be useful not only for government records and statistics, but also for family members of the diseased and for the pension requests filed by the thousands of injured soldiers seeking to rebuild their lives after the war.

Part III: The Army General Hospital and the Army Medical Museum

In the weeks after the Battle of Bull Run in the summer of 1861, Union forces were overwhelmed with the transportation of injured troops and the burial of the dead. The influx of sick and wounded to Washington inundated military hospitals and necessitated the transformation of other buildings to serve as hospitals for the war effort as well.[284] In this sense, the Battle of Bull Run demonstrated two more deficiencies in the North—a poor ambulance system and a lack of proper military hospital facilities. Untrained troops and physicians were certainly problematic, but even more so was the lack of facilities and supplies to provide for proper medical treatment. U.S. Army Surgeon General Hammond made ambulance services and hospital facilities a top priority in his plan for medical reform in the early years of the war, and Major Joseph Letterman facilitated the reorganization of evacuation procedures, conversion of buildings into hospitals, and the creation of an Ambulance Corps through Congress in 1863.[285] Yet even as training for soldiers and surgeons improved, the development of medical transportation and hospitals lagged behind.

The U.S. Army had repaired its few existing ambulances and introduced two new ambulances in 1859, measures that were considered sound preparation for war. The early casualties of the Civil War, however, greatly outnumbered the ambulances available for evacuation of the dead and wounded. During the first weeks of the war, Surgeon Tripler found ambulances so lacking that "the relatives and the friends of the wounded searched

[284] Rutkow, *Bleeding Blue and Gray*, 35.
[285] Rutkow, *Bleeding Blue and Gray*, 297.

the fields for them, and if they were fortunate, took them away in carriages."[286] What is more, Tripler claimed, most of the ambulances that were available were poorly cared for or misused to such an extent as they might as well have been nonexistent. Tripler reported to General McClellan that he had witnessed the ambulances under his watch "in general use as pleasure carriers for idlers and accommodation cabs for conveying officers and men from their camps to the city of Washington," while others were left broken down and unrepaired.[287] The disruption of ambulance service to hospitals meant that hospitals with adequate supplies were underutilized, while hastily constructed battlefield hospitals tents would most certainly ensure wounded soldiers' death from disease. Through the creation of the position of brigade surgeons in charge of ambulances in 1862, the Medical Department of the Army hoped to better control the existing ambulance system, while also soliciting these positions to help reform the current system. Many contributed new designs for ambulances, which were tested and found moderately successful, until General William Rosecrans proposed a design that was found most satisfactory and introduced throughout the Medical Department as the "Wheeling Ambulance".[288] The wagon-styled ambulance was a lighter model with four wheels instead of six, and boasted a smoother ride for the injured it transported. Improving the ambulance system of the Army Medical Department was one of Hammond's earliest goals, and like the majority of his projects, it was accomplished thanks to the skill and dedication of a select few.

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[286] Ashburn, *A History of the Medical Department,* 71.
[287] Ashburn, *A History of the Medical Department*, 69.
[288] Ashburn, *A History of the Medical Department*, 69.

Much direr than the state of the ambulance system was the Army's hospital system at the start of the war. Surgeon General's Office historian P.M. Ashburn details in *A History of the Medical Department of the United States Army* that there were effectively no general hospitals at the start of the war, primarily because there had been no need for them in the past. The slow removal of the wounded and dead from the battlefield resulting from a poor ambulance system hid this deficiency for a short while. After the first few months of war, when it became clear the end of the conflict was nowhere in sight, the overwhelming need for permanent facilities for the treatment and recovery of the sick and wounded became top priority. Tripler had observed that while the "hotels, halls, and other unsuitable buildings" that housed the sick and injured were better than tents on the battlefield, they contributed to the spread of illness and disease and counteracted the life-saving treatments and surgeries that had been performed.[289] After developing an efficient ambulance system, Major Jonathan Letterman, Director of the Army of the Potomac, tasked Army Medical Department officers with helping to fix the hospital problem, making the arrangement of hospital facilities the main focus of each brigade surgeon as well. For example, in the midst of his work collecting specimens for the Army Medical Museum, Brinton took leave to assist Surgeon Summers with the development of hospitals in Virginia, particularly in expanding those in Alexandria. After the battle of Harrison's Landing, Brinton was appalled to find the wounded overcrowding what hospital accommodations were available, and worked to secure more facilities for the sick and injured.[290]

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[289] Ashburn, *A History of the Medical Department*, 70-71.
[290] Brinton, *Personal Memoirs*, 195-6.

To make matters worse, Brinton was just one of many medical officers to witness the capturing of Union hospitals by the Confederate troops. When he saw access to some of the hospitals south of Alexandria cut off, Brinton lamented, "the ordinary humane considerations as to the wounded were therefore unfortunately disturbed and it became hence a matter of difficulty to render very efficient aid to our own wounded, who had been left on the field."[291] Brinton detailed events he witnessed in his memoirs, hoping to preserve in memory the stories of so many killed in battle. The frustration arising from such unexpected and unfortunate loss of life and victory reiterated to Brinton, Hammond and the Army Medical Department officers the value of collecting observations, stories and specimens to preserve these moments and lessons in history.

Hospitals proved the best location for the collection of these observations, stories and specimens that would be used in writing the history of the war and building the Army Medical Museum. What is more, these hospitals often provided the most "complete" specimens—i.e. those with a thorough case history in an approved container for transportation. As early as the autumn of 1862, Brinton began receiving letters and boxes of specimens from hospitals around the country eager to contribute to the national museum project. Many of these contributors were like surgeon W.W. Keen of U.S. Army General Hospital Frederick, who sent hundreds of specimens over the course of his career. In his December 11, 1862 package to Brinton, Keen included a letter several pages long providing thorough details about the specimens, even dividing them into categories of soft and hard specimens. Keen proudly explained to Brinton that he "worked pretty hard on them," and hoped he would be satisfied, especially since Peters

[291] Brinton, *Personal Memoirs*, 197.

lacked assistance and tools to facilitate the endeavor. What is more, Keen boasted, the collection contained a wide variety of examples of fractures, resections, and amputations from all over the human body. In honor of the scientific endeavors of the Museum, Keen included a specimen of chloroform he'd been using in his operations, to weigh in on the debate at that time concerning the death rate associated with chloroform. He also sent Brinton notes from his more curious cases, asking him to comment on them at his leisure.[292] Many like Keen sent in samples and case descriptions along with specimens to contribute to what they saw as a national endeavor to improve medicine through science.

Most successful wartime disease treatments, surgeries and amputations were performed in these Army General Hospitals, where sanitation facilitated better results. More successful amputations also meant more viable limbs for display in the Army Medical Museum. The amputated bone parts could also be preserved more successfully, as these hospitals had the resources to clean, label, preserve, and store the specimens until they were sent to the museum for final preparation and display.[293] The display of bones by injury type would help physicians and medical students better understand bone trauma and the factors necessitating amputation. By 1863 there was a growing population of "disease-afflicted and disabled" Union veterans that were receiving "both a federally funded disability pension and an additional monetary allowance to obtain artificial limbs."[294] The increasing numbers of wounded veterans in particular intensified pressure on the U.S. Army Medical Department not only to improve preventive military medical

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[292] W.W. Keen (USAGH Frederick) to John H. Brinton, December 11, 1862, Box 2, Folder 12, OHA13: Curatorial Records: Incoming Correspondence Loose, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[293] Lamb, *A History of the United States Army Medical Museum*, 14.
[294] Rutkow, *Bleeding Blue and Gray*, 255.

care and amputation techniques, but also to develop better prosthetic technology.[295] Surgeon volunteer W.W. Keen argued that "if any fault was committed, it was that the knife was not used enough."[296] Keen submitted to the Army Medical Museum the bullet-penetrated hip joint and pelvis of a Private Connor, as evidence of his argument in support of amputation. Private Connor, whose bones became Specimen 622 in the gunshot injury exhibit at the Army Medical Museum, had died from lack of amputation according to Keen.[297]

During the early years of the war Hammond and his staff struggled with aspects of the specimen collection process that objectified the patient—from the morally questionable removal of body parts of deceased soldiers to the display of amputated parts from still living patients—and so Hammond was constantly in search of less dehumanizing ways of collecting and displaying specimens in his museum. He suggested using plaster casts of amputations—which he claimed could be "readily made without subjecting the patient to the slightest inconvenience"—to facilitate the illustration of amputation procedures and to suffice for representation of peculiar cases where amputated parts could not be preserved.[298] Often patients would request photographs of these casts in the Army Medical Museum's possession, as proof of their injury and disability when applying at the Pension Office in the years after the war. In his updated June 24, 1864 Circular to Medical Officers of the U.S. Army, Hammond emphasized the need for more and varied specimens illustrating both successful and unsuccessful

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[295] Rutkow, *Bleeding Blue and Gray*, 255.
[296] Rutkow, *Bleeding Blue and Gray*, 239.
[297] Rutkow, *Bleeding Blue and Gray*, 239.
[298] Lamb, *A History of the United States Army Medical Museum*, 25A.

amputations, so that this medical science could be finally improved.[299] At the war's end, Brinton boasted that the Army Medical Museum's collection of gunshot wound specimens and artifacts was the largest in the world.[300] In the years after the war, U.S. Army physicians and visiting surgeons from around the world used these specimens to develop more efficient amputation procedures and better prosthetics.

U.S. Army General Hospitals provided not only the best access to bodies and specimens, but also the medical stations most conducive to practicing museological science in correlating symptoms with autopsy evidence and producing complete case histories. Here physicians and surgeons could observe patients for longer, establishing more detailed case histories and indulging professional interest in specific cases, thereby documenting more useful medical information.[301] Often Hospital Stewards working for the Museum would visit U.S. Army General Hospitals in order to supervise the temporary preservation of specimens, or even to perform autopsies for the purpose of acquiring specimens. Hospital Stewards Bond, Schafhirt and Lamb, under Woodward's direction, performed a considerable number of autopsies at the Freedman's Hospital to acquire specimens, and subsequently dissected them.[302] Several of the General Hospitals farther than a day's journey from the Museum took it upon themselves to send visual aids in addition to specimens, responding to the Surgeon General and the Museum's request for donations that reiterated the experience of war. Over the course of the war James H.

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[299] Lamb, *A History of the United States Army Medical Museum*, 28
[300] Lamb, *A History of the United States Army Medical Museum*, 19.
[301] Brinton, *Personal Memoirs*, 186.
[302] J.J. Woodward, "Introductory Note," *Catalogue of the Medical Section of the United States Army Medical Museum*. Prepared under the direction of the Surgeon General, U.S. Army, by Brevet Lieutenant Colonel J.J. Woodward, Assistant Surgeon, U.S. Army, in charge of the Medical and Microscopical Sections of the Museum. (Washington: Government Printing Office, 1867), OHA69: Museum Records, Publications, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

Armsby, a surgeon at Ira Harris General Hospital, transmitted to Barnes and Otis hundreds of photographs, specimens and plaster casts for display in the Army Medical Museum. He was meticulous about including histories of his submissions, so as to ensure the completeness of their contextualized display. In fact, by the end of 1865, Armsby communicated that he was sending one last shipment of specimens, which were from his private practice before he became a U.S. Volunteer, having transmitted thus far every single specimen he obtained during his treatment of patients at Ira Harris General Hospital during the war.[303] The Army Medical Museum owed a substantial portion of its collection to the personal donations of physicians and surgeons at Army General Hospitals, in particular.

Part IV: The Confederate Army and American Medicine

While the project to build an Army Medical Museum and to write the medical and surgical history of the war primarily focused on the experiences and medicine of the Union Army, there was, nevertheless, a clear interest in including the same components from the Confederate Army. Medicine seemed to transcend the barriers between North and South during the war, as Confederate medical officers often exchanged advice with Union medical officers, sent specimens and case histories to the Office of the Surgeon General of the Union Army, and were even recorded in captured Union soldiers' personal reflections on the war. Ultimately, there was nothing like *MSHWR* for the Confederate army, as most of their medical records were lost when the two buildings home to the

[303] James H. Armsby (Ira Harris GH) to J.K. Barnes, November 8, 1865, Box 1, Folder 2, OHA13: Curatorial Records: Incoming Correspondence Loose, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

Confederate Medical Department were destroyed in a fire during the Confederacy's evacuation of Richmond in April of 1865.[304] The history of the Confederate army, then, was preserved in the case histories, specimens, statistics and records of battles from the Confederate side, that were displayed at the Army Medical Museum and detailed in *MSHWR*. That the history of the Confederacy's efforts during the Civil War was written by Union medical officers in a publication that emphasized the Southern rebellion and defeat, reiterated the North's victory over the South. The monopoly of the North on medical histories and statistics also allowed the Union not only to encompass the full, official medical history of the Civil War, but also to lay claim to the only truly national medical museum afterwards.

Historians have looked to personal memoirs for information about southern medical history during the Civil War. Perhaps the most useful author in this regard has been Joseph Jones, a Princeton graduate and medical student at the University of Pennsylvania under Joseph Leidy. After receiving his medical degree from Penn in 1856, Jones pursued scientific research and teaching at a number of medical schools in Georgia, including Savanna Medical College, University of Georgia in Athens, and the Medical College of Georgia in Augusta, until the Civil War.[305] Jones was well known for his in-depth research into Southern diseases—especially fevers—and a staunch supporter of Southern medical separatism. At the outbreak of war, he saw the great value in a politically and economically independent South, and vowed to support the Confederacy through his medical talents. In the first year of the war, Jones traveled throughout

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[304] James O. Breeden, "Joseph Jones and Confederate Medical History," *The Georgia Historical Quarterly*, Vol. 54, No. 3 (Fall, 1970): 357-8.
[305] Breeden, "Joseph Jones," 358.

Georgia, researching the resources available to troops on the move, and noting the "medicinal value of indigenous plants, herbs, and trees."[306] After Jones enlisted as a private in the Confederate Army—rather than abstaining or accepting a commission—his wife pleaded with him to "heed the advice of a close family friend who suggested that Jones could best aid the South by caring for the sick and wounded rather than risking his skill and knowledge as a target for a sharpshooter."[307] Jones was nevertheless determined to serve the Confederacy, and his letters to his wife during his service became one of the few preserved Confederate medical perspectives on the war.

Although Jones performed the tasks of a common soldier for the first few days of his service, word soon spread of his background as a physician, and since there was no regular surgeon in his unit, he began to informally provide advice and consultations. When he helped cure Captain Abdiel Winn's daughter, Winn promoted him surgeon of the Liberty Independent Troop, which consisted of 80 men and 40 slaves and he was soon tasked with treating the families and slaves in the surrounding country side, exceedingly busy every day. Jones saw this work as a great opportunity for studying Southern diseases further, and made note of the effect of environment, climate, etc. on the cases that he worked.[308] He served from October, 1861 to March 1862, and treated 420 cases of disease—116 soldiers, 47 camp slaves, 90 of soldiers' families, and 167 of their slaves. Although his records for soldiers are much more detailed than for the camp slaves, this was also common practice in the North, as evidenced in the lack of detail in the cases of

[306] Breeden, "Joseph Jones," 359-361.
[307] Breeden, "Joseph Jones," 361.
[308] Breeden, "Joseph Jones," 364-5.

free blacks in the Union Army records.[309] Jones's records suggest the Confederate Army also saw value in monthly reports, and through these Jones was able to make educated guesses concerning the cause of disease based on the month of occurrence. Jones reflected that there was a high of 25 cases of disease in October and a low of 16 in January and March, suggesting not only a relatively low disease rate for the command overall, but also that the warmer months produced more incidence of disease. Jones was later able to correlate their environment and location to the outbreak of disease, as the weeks spent in swamps and marshes tended to produce more instances of malaria, while those spent on dry, tall hills showed a lower rate of disease.[310] Jones's figures depicted health problems typical of other volunteer units serving "on the southern coastal plain in the opening days of the war," suggesting that season and environment played a large role in the spread of disease during the Civil War.[311]

Overall, historian James O. Breeden argues that Jones's records provide rare insight into the medical history of the Confederate Army during the Civil War, and the medical statistics generated from these records has revealed "striking parallels with those for the large Northern and Southern armies."[312] From these and other Confederate army records, as well as the statistics collected for *MSHR,* it became clear that the leading diseases of the Civil War were typhoid fever, malaria, diarrhea and dysentery. Although a problem for both armies, malaria was considered more troublesome for the Confederacy because it was "endemic and often epidemic in the ante-bellum South," which the

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[309] Breeden, "Joseph Jones," 361; The Introduction to the *MSHWR, Part 1, Volume 1,* attributes the lack of detail for cases of black soldiers to the insubordination or incompetence of their medical officers.
[310] Breeden, "Joseph Jones," 365-369.
[311] Breeden, "Joseph Jones," 368-9.
[312] Breeden, "Joseph Jones," 370.

Confederate Medical Department officially explained by "climatic changes, poisoned camp air, and sleeping in damp blankets," although most often medical officers thought it resulted from miasmas or vapors from decomposition of animal and vegetable matter.[313] The most abundant and difficult to cure diseases were diarrhea and dysentery, claiming more lives than the injuries of battle.[314] According to the monthly reports of the sick and wounded in the Union army, diarrhea and dysentery were also the most prevalent and problematic diseases in the North, suggesting that poor sanitation was more hazardous than the development of new technologies to wound and disable soldiers.

In the years after the Civil War, the Office of the Surgeon General sought out Confederate medical officers to donate specimens and provide their records for the *MSHWR*, so that it could be complete in representation of both sides, and thus exist as a national medical history. Assistant Surgeon E.W. Latimer was one such medical officer, who sent a number of case histories, specimens, and photographs to Union surgeons they knew to pass on to the Army Medical Museum. A.S. Latimer sent Acting Staff Surgeon W.H. Palmer, U.S.A. the case history and photograph entitled "Recovery after Excision of the Head and Upper Portion of the Shaft of the Left Femur shattered by a Musket Ball" (Figure 2.7).

[313] Breeden, "Joseph Jones," 370.
[314] Breeden, "Joseph Jones," 371.



Figure 2.7: Lieutenant Jarratt, 15th North Carolina Regiment, Confederate Army
Photograph #41, United States Surgeon General's Office,
Photographs of Surgical Cases and Specimens, Volume 1
(Washington: Surgeon General's Office, 1865).

Lieutenant Jarratt of the 15th North Carolina Regiment, Confederate Army, was struck by a musket ball, which fractured the upper extremity of his left femur. Dr. Read, formerly of the Savannah Medical College, performed an excision of the head, trochanters, and several inches of the shaft on January 9, 1864, in Richmond, Virginia, to alleviate pain and close the wound. Lieutenant Jarratt recovered well enough six weeks later to return home to North Carolina, and by September 1864 was able to bear weight on the injured limb.[315] This photograph of Jarratt, naked and without any background or props, starkly contrasts with the uniformed, staged photographs of Union soldiers depicted in the

[315] United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens, Volume 1*, 41.

Photographs of Surgical Cases and Specimens published at war's end. In the six volumes in this series, Jarratt was one of only a few injured Confederate soldiers photographed, and the only one pictured nude. The photograph makes the vulnerability of the soldier secondary to the pedagogical value of the case history, an important tension in the display of the medical and surgical successes and failures of the war.

Part V: The Museum and History at War's End

By November 1864, the Army Medical Museum contained some 3500 surgical specimens, 500 medical specimens, 150 plaster casts and missiles, 100 drawings and paintings, and 1,100 microscopical slides.[316] Working closely with Chief Anatomist Frederick Schafhirt was William Moss, the first Assistant Curator of the Museum. Moss was in charge of cataloguing specimens by injury type and location while Schafhirt prepared them, together organizing the Museum to be a prime example of museological science. Brinton boasted to Hammond of their work at the Museum's opening to the public:

> …every object in the Museum has been appropriately and permanently mounted—the dried preparations on stands, and the wet ones in glass anatomical jars, of the most approved patterns, and constructed for the purpose. Every specimen bears a label, on which is inscribed its Catalogue number and the name and rank of the medical office from whom received.[317]

Thanks to the diligence of Assistant Curator Moss, both the specimens themselves and the Catalogue contained case history information, which provided not only medical

[316] Lamb, *A History of the United States Army Medical Museum*, 31.
[317] Lamb, *A History of the United States Army Medical Museum*, 11.

relevance but also commemoration of the specimens.[318] Through this process the Army Medical Museum considered itself a model of scientific preservation and display with a rich historical foundation rooted in the Civil War.

Convinced of the emotional power of the visualization of the case history, the Army Medical Museum produced a *Photographic Atlas of Civil War Injuries*, from the photographs of injuries collected during the final years of the war. This "wound atlas" consisted of hundreds of photographs of wounded soldiers posed to make clear the nature of their injury and the character of their recovery. These photographs were labeled with biographical information and case histories. For example, photograph #92 shows Private Jonathan Wallace, wounded in the battle at Fort Steadman, March 25, 1865. Wallace suffered a fracture of his left femur from a conoidal musket ball, and in the picture is posed standing up in order to illustrate how the fracture cause a slight shortening in his limbs.[319] Injuries like Wallace's were common because of the underdeveloped nature of orthopedic medicine in America during the Civil War. Many of the photographs in the wound atlas illustrated American medicine's worst weaknesses, as well as made tangible the physical and psychological suffering the war inflicted. The Army Medical Museum displayed these photographs as both part of museological medical education and commemoration of the human sacrifices of the Civil War.

In this chapter I have argued that Surgeon General Hammond's program for collecting and analyzing case histories, specimens and statistics during the Civil War

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[318] Lamb, *A History of the United States Army Medical Museum*, 11.

[319] Gretchen Worden, *Mütter Museum of the College of Physicians of Philadelphia* (New York: Blast Books, 2002), 81. The Army Medical Museum donated a substantial collection of Civil War specimens to the Mütter Museum during the last third of the twentieth century. Many of these specimens were on display in exhibits similar to those of the Army Medical Museum, and some were used for medical research.

constituted the practical application of French museological medical science. While American physicians debated the therapeutic integrity of French practitioners of modern medicine, they understood the practical possibilities museological science promised. Until the Civil War, however, there had been insufficient opportunity for the development of American medical science. The manifestations of disease, injury and death and practical experience the war provided finally allowed ambitious physicians to implement the methodologies of French medical science, conducting the research they had only dreamed of in Paris. In turn, the Army Medical Department acted as a central authority, collecting, collating, and analyzing the information physicians provided through reports, case histories and specimens, in order to generate broad conclusions about the mechanism and manifestation of disease and injury on the hundreds of thousands of soldiers who were wounded or killed during the Civil War. Finally, through the institution of the Army Medical Museum and the publication of the *Medical and Surgical History of the War of the Rebellion*, the medical knowledge generated during the war would be preserved for further scientific medical research, medical education and historical commemoration.

Through their work in the Civil War, U.S. Army Surgeon General William A. Hammond, and his Medical Department laid the foundations for a new, scientific medicine in America. During the process of collection and display of specimens, they were concerned with the historical value of medical specimens as much as the scientific value. The creation of the Army Medical Museum was therefore constrained by the desire to test the methodologies of the new French museological science in a specifically American context, and to resolve tensions inherent in the decontextualized display of

scientific specimens. In writing the history of medicine and surgery during the Civil War, this museum also produced a manual for a distinctly American museological science whereby scientific medicine and historical context complemented one another in powerful educational exhibits. What is more, the historical value of their specimens ensured their survival amidst the decline of the medical museum in the twentieth century, when laboratories replaced university medical museums and made traditional museological science obsolete in medical education.

Chapter Three: Healing the Nation's Wounds—The Army Medical Museum and Reconstruction

> With malice toward none, with charity for all, with firmness in the right as God gives us to see the right, let us strive on to finish the work we are in, to bind up the nation's wounds, to care for him who shall have borne the battle and for his widow and his orphan, to do all which may achieve and cherish a just and lasting peace among ourselves and with all nations.[320]

In his Second Inaugural Address, President Lincoln asked the American people for help in the process of healing and treatment of both the physical and metaphorical wounds of war. The reconstruction of the war-torn American nation was a national project precisely because it sought to reconcile two seemingly irreconcilable factions. Nevertheless, white and black, North and South, slave and free, had all been deeply impacted by the war. This chapter examines how the Surgeon General's Office and Army Medical Museum constructed a narrative of the Civil War that helped facilitate the reconstruction of the American nation, the broken bodies of its soldiers, and modern American medicine. During and after the war, the collection at the Army Medical Museum, and the stories, statistics, and analysis of wartime medicine in the *Medical and Surgical History of the War of the Rebellion*, helped account for the loss of so many lives, turning their sacrifices into both a commemorative history *and* a better American medicine.

In Part I, I examine how the core material of the Army Medical Museum and *MSHWR* contributed to national mourning and understanding of the value of life and limb

[320] Abraham Lincoln, "Second Inaugural Address," *The Collected Works of Abraham Lincoln, Volume 8*, ed. Roy P. Basler (New Brunswick, N.J.: Rutgers University Press, 1953).

sacrificed during the war. I investigate in Parts II and III the ways in which the Army Medical Museum and *MSHWR* assisted the reconstruction of the American people—soldiers and their families—and the medicine that both failed to save those soldiers and built successes out of those failures. I reflect in Part IV on the national medical museum that emerged at the end of this period of reconstruction.

This chapter traces the dissemination of knowledge—both medical and historical—in the years after the Civil War. The knowledge embedded in the case histories, specimens and statistics gathered by Army medical officers and surgeons offered an explanation for the death of each soldier that fought in the war. Moreover, these materials served as proof of the sacrifice of those who died and those who lost parts of themselves on the battlefield. The Army Medical Museum displayed this material proof in exhibits not only for public mourning, but also for medical instruction. The enduring legacy throughout the Army Medical Museum's history was the pathological specimen, the material at the heart of a new scientific medicine and history of the war. The pathological specimen was central to this process of building and rebuilding, proving to be not only medically, but also historically, valuable. The Civil War gave birth to a uniquely American scientific medicine, one that would not have been possible without hundreds of dead bodies and scores of wounded soldiers.

Part I: "We Must Not Be Enemies"—Reconstructing the Nation

After former Surgeon General Hammond's publication of Circular #2 on May 21, 1862, the creation of the Army Medical Museum inspired Army medical officers to work toward a better medical future amidst the shortcomings of American medicine during the Civil War. The medical authority of the Surgeon General's Office and the Army Medical Museum was solidified and publicized after President Lincoln's death on April 15, 1865, and in the months that followed. The collection of case histories, specimens and statistics that would form the basis of the Army Medical Museum—and the *Medical and Surgical History of the War of the Rebellion*—gave the Army Medical Department and its medical officers hope that something constructive—if not good—could come out of the war. This collection occurred alongside the process of political and social reconstruction begun during the war, and many times they facilitated one another. By the end of the war, the American government relied heavily on the Army Medical Department for the material and information it collected during the war. Both the federal government and the Army Medical Department sought to account for the lives lost, to explain the carnage, to assign a meaning to the war, and to rebuild a divided nation

War and Death

After Confederate General Robert E. Lee surrendered to Union General Ulysses S. Grant in Appomattox, Virginia on April 9, 1865, the Civil War and its devastating death toll seemed to come to a close. As weary troops from both sides returned home, the North celebrated victory with parades through the streets of Washington, D.C. Less than

one week later, on the evening of April 14th, southern rebel John Wilkes Booth shot President Abraham Lincoln in the back of the head while attending a play at Ford's Theater, bringing victory celebrations to a shocking halt. As commotion erupted in the theater, Charles A. Leale, a young Army surgeon in the audience, rushed to the president's side, and helped transfer him to Peterson's boarding house across the street from the theater, where the president's personal physician, Dr. Robert King Stone, and a group of Army doctors attended him through the late hours of the night. Among those at Lincoln's side was Army Surgeon General Joseph K. Barnes, who used a probe to locate the bullet and fragments of Lincoln's skull embedded deep inside his brain.[321] With the bullet and skull fragments in his hands, Barnes held tangible proof of the president's death. Army Medical Museum illustrator Hermann Faber was the only artist allowed to depict the scene of Lincoln's death, and his painting of the "Lincoln Death Scene" was later displayed at the Army Medical Museum with the other medical and historical objects commemorating the event (Figure 3.1). The role of the Army Medical Museum in the treatment, depiction, and commemoration of Lincoln's death solidified its position as a national institution for both medicine and medical history.

[321] Helen R. Purtle, "Lincoln Memorabilia in the Medical Museum of the Armed Forces Institute of Pathology" *Bulletin of the History of Medicine*, 32:1 (Jan-Feb, 1958): 68.



Figure 3.1: Hermann Faber, Sketch of the Deathbed Scene of Abraham Lincoln, 1865
Photograph #29719, National Museum of Health and Medicine, Silver Spring, Maryland

President Lincoln's death was the last casualty of the nearly five-year-long civil war. Confederate Episcopal Bishop Stephen Elliot observed in his 1862 sermon "We all have our Dead—we all have our Graves," and it was the task of every generation to confront "like miseries," and search for "like consolation."[322] While the Union and the Confederacy had many disagreements, they certainly shared in common the loss of hundreds of thousands of young men during the Civil War, and both sought to understand, measure, and commemorate this loss in the years that followed. Historian Drew Gilpin Faust argues that the significance of death for the Civil War generation lay not simply in the sheer number of lives lost, but also in "the way it violated prevailing assumptions about life's proper end—about who should die, when and where, and under

[322] Quoted in Drew Gilpin Faust, "The Civil War Soldier and the Art of Dying," *The Journal of Southern History* 67:1 (Feb., 2001): 3.

what circumstances."[323] The majority of Civil War soldiers—Confederate as well as Union—were Christians, sharing in a faith that tasked them to live a moral life and seek an honorable death. The Civil War represented a conundrum for the faithful as they sought to understand and explain the deaths of so many. For some, the end of slavery and the restored unity of the country was justification enough for war, but deaths from illness and injury, and in such large numbers, were harder to understand. Considering the fact that more soldiers died of disease than battle injury—and a large number of battle injuries would prove fatal because of subsequent infection and disease—the significance of the number and cause of dead soldiers would be redeemed by men of medicine in the construction of a medical and surgical history of the war

For many Civil-War-era Americans, Faust argues, "perhaps the most distressing aspect of death…was that thousands of young men were dying away from home… [as] Civil War soldiers experienced an isolation from relatives uncommon among the free white population."[324] While it usually took several weeks for supplies to reach camps and for camp reports to reach headquarters, it often took months for soldiers' letters to make it back to their loved ones. Even more disheartening, most family members learned of their soldiers' deaths months later, often through informal channels, or not at all. Faust points out that "the assumption that the government has an obligation to name and count the military dead only emerged in the United States as a result of the Civil War experience," when families began demanding this and other information from their local

[323] Faust, "The Civil War Soldier," 4.
[324] Faust, "The Civil War Soldier," 12.

Army offices.[325] In neither the North nor the South did the military have a policy of notifying family members of the injury or death of their loved ones. Although the Union Army had a basic system in place for keeping track of the captured, killed, wounded, and missing for each battle, the lists often ended up in boxes in storehouses where they would be analyzed only years later. Even after the war there was no protocol for contacting family members with information, or securing organized and labeled burial sites.[326]

When the war ended, state governments, local societies and individual citizens all sought to document the lives sacrificed during the Civil War. Yet, Faust argues, whether North or South, officials or private citizens, no one could determine a reliably accurate count. What these attempts provided was a specificity that consoled Americans looking for numbers to measure the pain and losses they suffered. These numbers, whatever they meant statistically, were important in constructing memory of the war. "A name upon a list," Faust contends, "was like a name upon a grave, a repository of memory, a gesture of immortality for those who had made the supreme sacrifice."[327] These numbers mattered because of the certainty they offered during a period of great uncertainty; they helped America begin to understand the difference between the loss of one particular soldier and the loss of many. At the same time, some physical relic of the person and the details of their death most often accompanied the lists the Army Medical Department provided; information like this was gathered for medical purposes, but would also serve as the foundation for memory of each soldier it described.

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[325] Drew Gilpin Faust, "'Numbers on Top of Numbers': Counting the Civil War Dead," *The Journal of Military History* 70:4 (October 2006): 995.
[326] Faust, "'Numbers on Top of Numbers'," 996, 999.
[327] Faust, "'Numbers on Top of Numbers'," 1006.

To a certain extent, it was the Medical Department that compensated for the Army's inefficiency in keeping track of injured or killed soldiers and notifying their families. Many hospital nurses and doctors wrote condolence letters on behalf of those dying, detailing their final words and the circumstances of their death in order to "make absent loved ones virtual witnesses to the dying moments they had been denied, to mend the fissures war had introduced into the fabric of the Good Death."[328] The staff of the Surgeon General's Office more formally compensated for the Army's inefficiency by maintaining a system of reports of the soldiers injured or killed in battles and collecting specimens and case histories from the battlefield. The staff at the Army Medical Museum subsequently collated this information to develop a register of injuries and casualties, displayed specimens and case histories with soldiers' names listed, and published a medical and surgical history of the war that would preserve their names and the details of their sacrifice in perpetuity. Faust contends, "In an era of increasing preoccupation with statistics, an enumeration of the dead came to seem imperative to understanding the Civil War's unanticipated scale and destructiveness."[329] Through registers and displays at the Army Medical Museum and stories and statistics in *MSHWR*, the Surgeon General's Office facilitated not only an enumeration of death, but also a clear explanation of the contributions of those deaths to the nation and to modern medicine. Each specimen and case history laid the foundation for greater medical knowledge, essential building blocks in a distinctly American medicine that would be remembered as having been built by

[328] Faust, "The Civil War Soldier," 17.
[329] Faust, "'Numbers on Top of Numbers'," 995.

those who laid down their lives for their country. In turn, this medical project preserved the history of their struggle and sacrifice through its exhibitions and publications.

In his article "The Army Medical Museum at Washington" in *Lippincott's Monthly Magazine* after the war, curator of the medical section and contributing author of *MSHWR*, J.J. Woodward reflected:

> It may be regarded as one of the large compensations of human history that periods of pestilence and war…serve generally to give a fresh impulse to the genius of those who have devoted themselves to medical pursuits, enabling them to make new discoveries, and to accumulate stores if knowledge which serve to increase their usefulness in ordinary times.[330]

According to Woodward, the Surgeon General's Office took advantage of the medical pursuits, new discoveries, and knowledge the Civil War provided by gathering statistics, specimens and case histories and turning them into exhibits in the Army Medical Museum and a medical and surgical history of the war. The Civil War, Woodward argues, was a war from which American medicine would derive such a fresh impulse of genius, and the institution of the Army Medical Museum, the subject of the article, was "the obvious offspring of the war", illustrative of a national effort to build medical knowledge from the tragedies of war.[331] In the decade after the Civil War, the museum's exhibits and the *Medical and Surgical History of the War of the Rebellion, 1861-1865* reflected on the experiences and lessons the war provided, and helped the young American nation understand and memorialize the devastating conflict. The numbers and faces that were part of a larger project to improve medical education would, in turn, help the nation cope. This chapter considers the role of the Army Medical Museum in the

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[330] J.J. Woodward, "The Army Medical Museum at Washington," *Lippincott's Magazine of Popular Literature and Science* 7 (March 1871): 233.
[331] Woodward, "The Army Medical Museum at Washington," 233.

negotiation of national memory of the Civil War and the advancement of a uniquely American medicine and medical education in the decade following the conflict.

Constructing a National, Medical Museum

After Lincoln's assassination, Ford's Theatre closed to the public, as the capital city mourned the loss of the Great Emancipator. In the meantime, the Surgeon General's Office was preoccupied with creating displays of the many specimens collected for medical study, and piecing together a medical-historical narrative of the conflict. The Army Medical Museum seemed uniquely poised not only to display *material medica* from the war for scientific study, but also to help the nation memorialize the lives lost during the war, including that of the president. To this end, the government purchased Ford's Theatre and renovated and repurposed it to house the Army Medical Museum and the Surgeon General's Library. Here the Museum finally had enough room to display not only medical and surgical specimens from the war, but also historical artifacts, paintings and photographs. The Army Medical Museum's new, historically significant location, facilities and scope, and $5,000 annual funding from Congress, helped make it a well-known Washington landmark in the years following the Civil War.[332] For two years after Lincoln's death, the theater was renovated while Army Medical Museum staff pieced together case histories, prepared specimens, and collated statistics. On April 13, 1867, the

[332] Michael Rhode, "An army museum or a national collection? Shifting interests and fortunes at the National Museum of Health and Medicine," In *Medical Museums: Past, Present, Future*. Eds. Samuel JMM Alberti and Elizabeth Hallam (London: The Royal College of Surgeons of England, 2013), 190.

two-year anniversary of Lincoln's assassination, the Army Medical Museum opened once again to an enthusiastic public.[333]

Upon entering the new Army Medical Museum, journalist Louis Bagger reflected, one was immediately struck by the massive iron staircase leading to the upper floors, and the walls crowded with "sketches and plans of the battlefields of Gettysburg, Antietam, and other of the hard-contested fields of our civil war" mounted in imposing black-walnut frames, interspersed with swords and sabres from both Union and Confederate armies.[334] From the ceiling hung artistically arranged flags and standards from various ambulances during the war, with models of the ambulances, as well as stretchers and hospital-tents, placed on top of cases of specimens running the perimeter of the room.[335] On the northwest wall of the room there was a small collection of framed watercolor paintings illustrating particularly "dangerous and difficult surgical operations that have been performed successfully."[336] The Army Medical Museum also put on display photographs of ambulances, surgical apparatuses, and medical instruments, crediting these technologies with the improvement of battlefield medicine and scientific medicine in America.[337]

With all these historical artifacts and moving reminders of war, battles, and death, Bagger noted, that there was little indication of the presence of a large collection of medical and surgical specimens and curiosities hidden on the top floor of the building. In

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[333] Mary Clemmer Ames, *Ten Years in Washington: Life and Scenes in the National Capital as a Woman Sees Them* (Hartford, CT: A.D. Worthington & Co, 1874), 476.
[334] Louis Bagger, "The Army Medical Museum in Washington," *Appleton's Journal: A Magazine of General Literature* 9:206 (March 1, 1873), 294.
[335] Bagger, "The Army Medical Museum in Washington," 294-5.
[336] Bagger, "The Army Medical Museum in Washington," 296.
[337] Daniel S. Lamb, *A History of the United States Army Medical Museum 1862 to 1917, compiled from the Official Records* (Washington, D.C.: U.S. Army Medical Museum, 1917), 35.

the basement of the new Army Medical Museum were offices devoted to the work of specimen preparation and compilation of the medical and surgical history of the war, with offices for clerks of the Surgeon General's Office as well as museum staff. Here the Surgeon General's Office staff handled records of military hospitals, sorting out the monthly sick-reports received during the war and after. They were regularly consulted by the pension office to supply evidence of death or disability for applications to that office, and quickly became known as central mediators in the pension process.[338] The first floor also provided several rooms for the storage of specimens and materials for their preparation, as well as the extensive reports, case histories, photographs, and historical documents collected during the war. Although the first floor was generally closed to the public, researchers, government staff, and soldiers seeking pensions would frequent the offices there for reasons discussed later in this chapter.

The second floor housed the Medical and Surgical Library, a modest collection of books from the private collections of past surgeons general. When he replaced Hammond as Surgeon General in 1864, Joseph K. Barnes assigned Lieutenant John Shaw Billings—a former medical inspector of the Army of the Potomac—the job of Director of the Surgeon General's Library. Army Medical Museum historian P.M. Ashburn claims that Billings not only modernized the library, but also ensured it would become one of the most respected in the world, preparing its first printed catalogue, publicizing its collection and goals, and helping to secure funding from Congress in order to expand it."[339] With the money, Billings purchased valuable books from around European countries, and

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[338] Woodward, "The Army Medical Museum at Washington," 234.
[339] P.M. Ashburn, *A History of the Medical Department of the United States Army* (Boston and New York: Houghton Mifflin Company, 1929), 87.

generated publications to exchange with similar institutions in order to solicit donations to the library.

In addition to the library, the second floor was also home to the microscopical collection of the museum, which contained over four thousand specimens, most of which had been prepared at the museum itself. J.J. Woodward, the medical curator as well as museum microscopist, boasted that the collection contained "numerous thin sections of diseased tissues and organs, suitably mounted for microscopical study, as well as a great variety of preparations exhibiting the minute anatomy of normal structures…[including] a reasonable number of test objects and miscellaneous microscopical preparations of general interest."[340] Woodward emphasized that the greatest care was taken in the preservation of the microscopical collection, with special attention to ensuring the permanency of the preparations, in order to prevent their deterioration. Delicate preparations were usually "mounted in Canada balsam, in such a way as to retain their most minute details and to secure their indefinite preservation," which would prevent the most valuable of the microscopical objects from deteriorating within several years, "as has happened in so many collections where less stable methods of mounting have been employed."[341] Woodward kept strict control over the microscopical section of the museum, treating it like a special library to which only the serious medical student and practitioner had access.

Although visitors and researchers inquired about the offices on the first floor and wandered through the impressive Medical and Surgical Library on the second floor, their

[340] Woodward, "The Army Medical Museum at Washington," 237.
[341] Woodward, "The Army Medical Museum at Washington," 237.

main interest was the medical museum on the third floor (Figure 3.2). Bagger describes a typical experience of an everyday visitor to the museum:

> Upon entering the large hall in the third story, with its long rows of glass cases, in which are exhibited to the glance of the curious the prepared specimens of anatomy and osteology, one is first made aware of the character of the collection by the peculiar, prevalent odor of carbolic acid, which is placed, enclosed in small phials, in all the cases, to assist in preserving the specimens.[342]

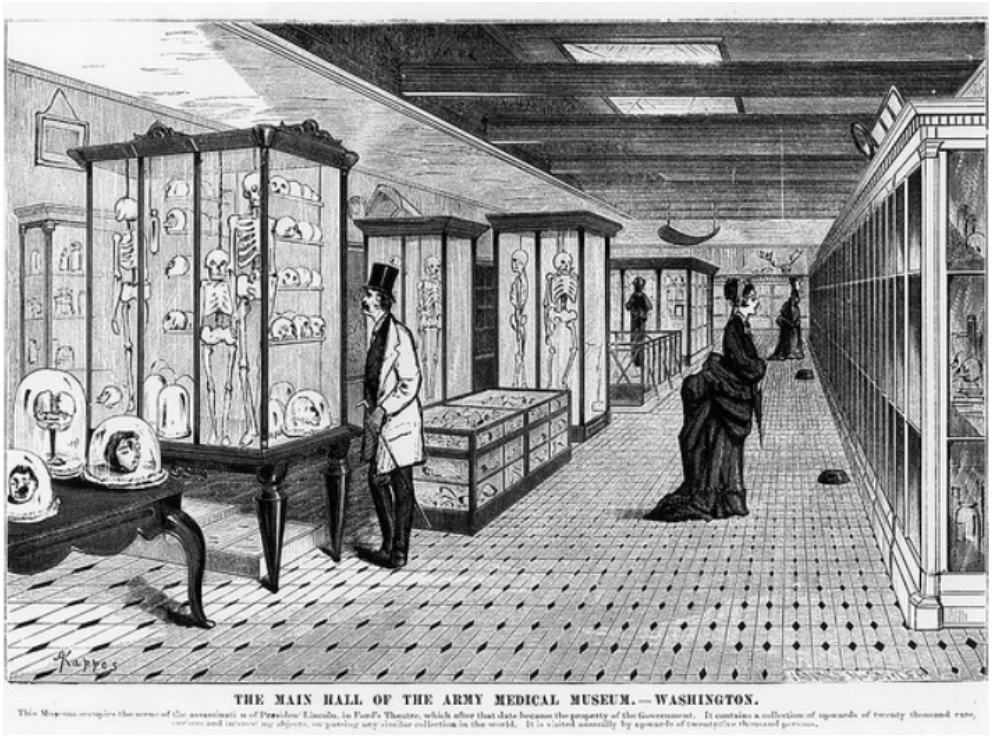


Figure 3.2: "The Main Hall of the Army Medical Museum – Washington," 1873. Mary Clemmer Ames, *Ten Years in Washington: Life and Scenes in the National Capital as a Woman Sees Them* (Hartford, CT: A.D. Worthington & Co, 1874), 475.

On display were three vertebrae from the neck of a human being, dried, mounted and labeled number 4086. Next to it was number 4087, "a glass phial, filled with alcohol, in which is suspended a piece of cylindrical, white, cloudy matter, much jagged and torn on

[342] Bagger, "The Army Medical Museum in Washington," 294.

one side."[343] The significance of the objects was that they were "all that remains above-ground of John Wilkes Booth," which Bagger pronounced a "strange freak of fate that these few mortal remains of the assassin should find a last resting-place under the very roof where his foul deed was perpetrated—not a hundred yards from the spot where the fatal shot was fired!"[344] The Museum considered these specimens not only historically meaningful, but also important as medical evidence—proof that the assassin was caught and killed, and an illustration of the medical authority of the Museum.

Constructing a History of the War

Ultimately, the Army Medical Museum not only rewrote the history of the Civil War and battlefield medicine, but also helped write the history of scientific medicine in America. At the core of this historical project was the *Medical and Surgical History of the War of the Rebellion*, a compilation of the case histories and reports of the war, along with narratives submitted by both soldiers and specimens, and summaries of every battle fought during the war. The case histories of individual soldiers who lost life and limb to the war were preserved in this official medical and surgical history of the war, making it the ultimate commemorative project. Because the medical officers that treated sick and wounded soldiers were very often by their side in the heat of battle, they inadvertently became historians of each battle.

Constructing the history of the Civil War was itself considered a lofty and necessary task. "I would like to see truthful history written," famed Union General

[343] Bagger, "The Army Medical Museum in Washington," 295.
[344] Bagger, "The Army Medical Museum in Washington," 295.

Ulysses S. Grant asserted after the war, because such a history would give "full credit to the courage, endurance, and ability of the American citizen soldier, no matter what section he hailed from, or in what rank."[345] The federal government approved the writing of an official history of the war in 1864, with the goal of publishing "the complete records (battle reports, telegraph messages, and so on) of all armies."[346] The history was to be "as nonpartisan and nonpolitical as possible," and to this end General Henry Halleck even "ordered Confederate records retrieved from the burning ruins of Richmond, declaring them to be important to the conflict's history."[347] To be considered a truly complete history of the war, both the Union and Confederacy was to be represented. These efforts "to locate and include Confederate military records and publish them alongside the more voluminous Union records," [348] were less than fruitful, and historian Joan Waugh argues that military officers like Grant wrote personal memoirs of the war not only to "advance a larger truth, that of Union moral superiority," but also to "remind Americans of Grant's contribution to the victory that remade America."[349] In this context, *MSWHR* would come to provide the most thorough history of the war from both sides, a statement about the ideological neutrality of science.

The inclusion in *MSHWR* of case histories, reports, and analysis from both Union and Confederate sources suggest that medicine transcended national politics. While the majority of Confederate medical records were destroyed in a fire at the end of the war,

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[345] Ulysses S. Grant, *The Personal Memoirs of U.S. Grant*, ed. Mary Drake McFeely and William S. McFeely (New York: Library of America, 1984), 169.
[346] Joan Waugh, "Ulysses S. Grant, Historian," in *The Memory of the Civil War in American Culture*, Eds. Alice Fahs and Joan Waugh (Chapel Hill, NC: The University of North Carolina Press, 2004), 21.
[347] Waugh, "Ulysses S. Grant, Historian," 21-22.
[348] Waugh, "Ulysses S. Grant, Historian," 22.
[349] Waugh, "Ulysses S. Grant, Historian," 8.

many Confederate physicians and surgeons had communicated their case histories and research during the war to Confederate publications and medical institutions in the North, both for comparison and legitimation. Union and Confederate medical officers were even known to exchange pleasantries and advice in the neutral arena of the field hospital from time to time. Surgeon J.B. Peale, U.S. Volunteers, reported agreeable exchanges with Confederate medical officers during his time at Post Hospital in Winchester, Virginia. Peale recalled that Surgeon Black, acting medical director of the Confederate force, allowed him to care for the sick and wounded, even after Confederate forces took over the town and hospital. Black left Peale in charge of the hospital, and even provided food for the wounded Union soldiers, until the Confederate forces eventually evacuated.[350] When the staff of the Surgeon General's Office reached out to former Confederate medical officers for contributions to *MSHWR*, the latter eagerly supplied the histories and statistics. The project of elevating American medicine to a European standard united them in the endeavor to glean as much medical insight as possible from the Civil War.

In addition to providing the medical and surgical histories of the South as well as the North, the authors of *MSHWR* sought to narrativize the overarching medical lessons of the war, explaining the sacrifice of so many bodies for the improvement of modern medicine in America. In nearly every category of illness, disease, injury, and surgical operation, there was not only a reflection of the meaning of medical and surgical statistics about mortality and quality of life, but also broader analysis of the cases in comparison with studies in the South and in Europe. For example, in the conclusion for the section

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[350] Surgeon J. B. Peale, U.S. Volunteers, "Report of the Post Hospital at Winchester, Virginia, in May and June, 1862," Appended Documents, Valley of Virginia, CLXXV, in *Medical and Surgical History of the War of the Rebellion*, *Part 1, Volume 1* (Washington, D.C.: Government Printing Office, 1870), 228.

on "Injuries of the Upper Extremities Necessitating Amputations of the Arm," it was noted as a "remarkable fact that the determined operations on the left side, while the most numerous, had a less proportionate fatality than those on the right," which, incidentally, was also the case for excisions at the shoulder.[351] This study also claimed that the "influence of age on the result of amputation of the arm for injury," was considerable, as the mortality rate of those under twenty years of age was 18.4 percent, those from twenty to twenty-four years was 19.6 percent, those from twenty-five to twenty-nine years was 23.8 percent, those from thirty to thirty-four years was 21.4 percent, those from thirty-five to thirty-nine years was 27.3 percent, and those over forty years was 24.9 percent.[352] Understanding the relationship between age and mortality rate was critical in determining the success of procedures and treatments. Even "the Confederate surgeons who have published their views on the subject, generally advocated conservatism in dealing with shot fractures of the humerus, except in most aggravated cases," the study concluded.[353] The lessons to be learned from the war, while produced in a distinctly American context, could also contribute to broader, more universal discussions of medicine.

As the staff of the Surgeon General's Office and Army Medical Museum prepared the materials for the publication of the six large books that would become *MSHWR*, they considered a number of questions. They sought to analyze and explain the statistics compiled during the war, in order to determine the prevalence and nature of illness and disease, the best methods of treatment, and how scientific practices like experimentation, observation, and post-mortem examination were essential to improving medical practice

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[351] United States Surgeon General's Office, *Medical and Surgical History of the War of the Rebellion*, *Part 2, Volume 2* (Washington, D.C.: Government Printing Office, 1876), 806.
[352] United States Surgeon General's Office, *Medical and Surgical History…Part 2, Vol. 2*, 806.
[353] United States Surgeon General's Office, *Medical and Surgical History…Part 2, Vol. 2*, 810.

both during and after the war. The medical insights into sickness, injury and death of Civil War soldiers provided in these histories served to redirect attention from the brute quantity of Civil War dead to an understanding of the causes of their death. Medical statistics help doctors to understand that more soldiers died of disease than battle injury, and which diseases were most prevalent and where. The Army Medical Department's negotiation of the statistics and lessons learned in the Civil War would help not only prevent more instances of sickness, injury and death in future military campaigns, but would also help to reinvigorate the civilian community with new knowledge and methods for the study of medicine. The *Medical and Surgical History of the War of Rebellion* was not only a thorough medical and surgical history of the war, but also the ultimate statistical project to account for and contextualize disease, injury and death during the war. It was the complete ledger of soldiers whose injuries, illnesses, and deaths laid the foundation for a museum of medical education and the suturing of a wounded nation.

Part II: "A Limb for a Life"—Reconstructing Bodies

The Army Medical Museum attracted great attention for its extensive Civil War collections, and was frequented by members of the public as well as the military. Brinton claimed that the reception of the Army Medical Museum was, for the most part, very positive. While the public was fascinated with the display of bones, specimens, and artifacts, many officers and soldiers who had lost a limb to amputation "would come to look up its last resting place."[354] Brinton recalled a particular case where a Colonel found

[354] John H. Brinton, *Personal Memoirs of John H. Brinton: Civil War Surgeon, 1861-1865* (Carbondale, IL: Southern Illinois University Press, 1996), 189.

his amputated leg bone on display and "shouted to his wife with glee to come see it."[355] Whole families would often come to see the bones and specimens of their loved ones, seeing the Museum as something of a memorial for those lost or injured in the Civil War. Nevertheless, there were also negative reactions to the displays. On one occasion, after the Assistant Curator helped a young soldier locate his amputated limb on display, the soldier became furious, and "noisily and pertinaciously" demanded it be returned to him. Brinton intervened by reminding the soldier that his service to the United States entitled the government to his body and all its parts, whether attached or not. The soldier remained unconvinced and stormed out of the museum angrily.[356] Some soldiers would hide their amputated parts from hospital staff, and many families were known to bury the bodies of their loved ones before museum staff could obtain the diseased or amputated parts, arguing that they deserved a proper and complete burial.[357] Nevertheless, the Army Medical Museum reiterated—as Hammond had in his circulars during the war—that the sacrifices of life and limb during the Civil War would be most honorably justified if given in the service of both the nation and the future of medicine. The process of commemoration proved to be just as complicated an endeavor for Hammond's staff as the process of collection and display of specimens had been.

Although there were a substantial number of anonymous specimens, preserved from men without their knowledge, the majority of specimens at the Army Medical are labeled with information that suggests the soldier-donor's complicity. The Museum's displays featured specimens with the name of the person from whom it came, their

[355] Brinton, *Personal Memoirs,* 190.
[356] Brinton, *Personal Memoirs*, 190.
[357] Brinton, *Personal Memoirs*, 190.

regiment, circumstances and location of disease, injury or death, and the date the specimen was donated or acquired. The Surgeon General's Office was adamant about acquiring this information at the time of the specimen's procurement, and when this proved impossible, the specimen was labeled as completely as possible and put aside for storage. There were, however, hundreds of wounded soldiers who eagerly contributed their specimens and detailed case histories to the museum during and after the war, ensuring that it was never lacking in material. The majority of specimens donated by regular soldiers were displayed in the general collection, while the more interesting specimens and those contributed by museum staff and military officers were more prominently highlighted in smaller cases. After a musket ball shattered his humerus, one of the attachés to the Army Medical Museum had the splintered bone from elbow to shoulder removed and allowed it to be displayed at the museum, along with a post-operative photograph and details of his recovery. Visitors learn that he recovered well, with muscles and integuments taking the place of the lost bone, so that he claims to be "strong enough to enable him to lift a two-hundred-pounds' weight without difficulty."[358] The attaché was able to update his case history and visit his specimen regularly.

An example of the type of interesting case from an ordinary soldier to merit prominent display located near the attaché's arm bone is a five-inch piece of the hip-bone of a soldier of Company C, Eighth New Jersey Volunteers, who was wounded in the battle of the Wilderness on May 5, 1864. The shattered bone was excised a few weeks later, and within a year the patient was released from the hospital, somehow able to use the mutilated limb without the bone. In 1868, he updated the museum, communicating

[358] Ames, *Ten Years in Washington,* 484.

that he was well, could walk without a cane, and was employed as a hod-carrier, grateful to also be receiving his pension.[359]

Case histories were important for establishing not only the historical context of specimens to be put on display at the Army Medical Museum, but also the educational relevance of the specimen with regards to medical knowledge. For example, the display of the shoulder joint of soldier George Fisk illustrates a number of lessons regarding postoperative infection. After a bullet struck Fisk in the arm in the spring of 1862, physicians at the field hospital at Savage Station removed Fisk's upper arm bone and sent him to Washington's Judiciary Hospital, where he remained all summer bleeding from the wound. Postoperative infection at this time was commonplace, so doctors ignored it when Fisk's wound became infected and the surrounding area riddled with gangrene.[360] Over time, however, the infection in Fisk's arm worsened, causing his original wound to open and deepen, exposing his muscles and making them decay. Fisk writhed in pain constantly, but doctors could deduce little about his condition through the constant bleeding and spreading gangrene, and so Fisk died that summer.[361] As the cause of Fisk's death was still a mystery, his body was sent to the hospital's makeshift morgue where inexperienced medical cadets performed a basic autopsy. After dissecting Fisk's body, they discovered a large ulcerous opening in his axillary artery, from which he had bled to death. Upon receiving the shoulder specimen belonging to Fisk, Army Medical Museum curator John H. Brinton labeled it Case No. 1062, and placed it along with other specimens illustrating the tragic results from surgical inexperience, mistakes during

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[359] Ames, *Ten Years in Washington,* 484.
[360] Brinton, *Personal Memoirs,* 164-5.
[361] Brinton, *Personal Memoirs*, 155-156.

surgery, and inattention to antiseptic procedures.[362] The museum was soon filled with enough specimens to illustrate each of these patterns in military surgery, as educational warning signs for future generations of medical students.

Specimens donated by medical officers were also displayed prominently, as much for their complete case histories and accompanying artifacts as for the prominence of their owners. One of the most popular displays at the Army Medical Museum was that of the leg bone of Major General Daniel E. Sickles, briefly mentioned in the previous chapter. Sickles was wounded at the battle of Gettysburg on July 2, 1863, and after undergoing amputation of the lower third of the thigh on the battlefield, he ensured that his amputated leg bones were preserved and sent it personally with a note conveying the context of the injury to the Army Medical Museum. The bones were propped on a black stand bearing the number 1335 and the details of his case (Figure 3.3).

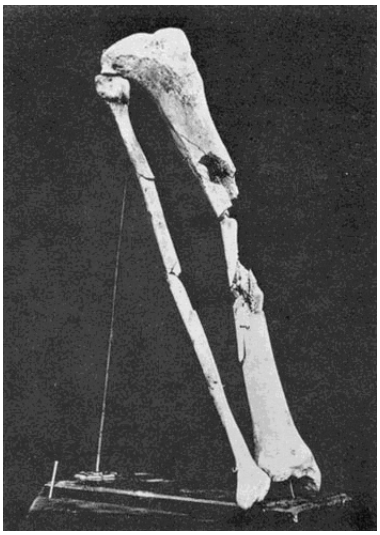


Figure 3.3: Shattered right tibia and fibula of Major Daniel E. Sickles
Otis History Archives 82: Surgical Photographs, Specimen #1335

[362] Brinton, *Personal Memoirs*, 167.

Sickle updated the Museum after the war that the stump healed rapidly, and on several occasions sat for photographs at the museum. William Bell's 1865 photograph of Sickles (Figure 3.4) was displayed next to his leg bone and case history at the Museum.[363] In addition to sitting for photographs at the Museum, Sickles was known to visit his leg on display, oftentimes bringing family and friends with him to witness his sacrifice for his country and his contribution to medicine.



Figure 3.4: Portrait of Major Daniel E. Sickles, taken at the Army Medical Museum
"To Bind Up the Nation's Wounds: Trauma and Surgery" Exhibit
National Museum of Health and Medicine

One would think, "the fact of having a portion of one's body put on exhibition here before the wondering gaze of casual visitors and critical scrutiny of medical students," Journalist Louis Bagger observed, must be "torturous," yet it seemed, seemed "not to

[363] Ames, *Ten Years in Washington,* 481.

affect some of the 'subjects' who have contributed 'bone of their bone and flesh of their flesh' to the museum."[364] On any given day, even if there were no contributors visiting their own specimens, one could surely meet one of the orderlies of the museum who was lacking the bone of his right arm, from the shoulder to the elbow, and would happily point out where his specimen was displayed.[365] In the years immediately following the Civil War, having one's body parts on display at the museum was considered an honor, tangible evidence of individual sacrifices in defense of the nation.

In addition to specimens without case histories, there were case histories without specimens, illustrated by photographs instead of objects. The Army Medical Museum's first curator, surgeon John H. Brinton, believed very strongly in the use of photography not only to preserve fleeting images, but also to more accurately, quickly and efficiently depict specimens and people. Brinton hired William Bell to replace the previous museum photographer whose work he disliked, and together they worked on creating photographs for display at the museum. Many of the images were also distributed as individual *Surgical Photographs* to the soldiers featured in them, and to medical colleges and institutions in the United States. In his final year as museum curator, John H. Brinton oversaw the creation of the U.S. Army Medical Museum Photographic Series, completing four volumes by the time he left in 1864.[366] This "wound atlas" consisted of hundreds of photographs of wounded soldiers posed to make clear the nature of their injuries, with a short summary of the nature of their recovery. Replacing Brinton as curator, surgeon George A. Otis, continued the work of pairing photographs with case histories, sending

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[364] Bagger, "The Army Medical Museum in Washington," 296.
[365] Bagger, "The Army Medical Museum in Washington," 296.
[366] Lamb, *A History of the United States Army Medical Museum,* 35.

individual *Surgical Photographs* to interested parties and publishing a selection of these photographs in 1865, finally completing the project in January 1869.[367] Otis also had Bell produce 8x10 photographs for display in a photographic series at the museum "illustrating the outcomes of interesting surgical operations or difficulties," most often depicting damaged bones or soldiers presenting their wounds.[368] In 1871, Otis oversaw the formal publication of the first five volumes of *Photographs of Surgical Cases and Specimens*, making the visual evidence of the horror of war more widely available for audiences in America and abroad.

Photography was central to the reconstruction of the Civil War soldier's body. Those who felt they lost their manhood in the war could reassert their masculinity by posing in gentlemen's clothes, or with the weapon they carried during the war. Those who lost limbs could pose proudly without assistance, or confidently with the help of a prosthesis. Many others would not seek to restore the mental or physical image of themselves, but, rather, would pose humbly for the camera, as if admitting defeat in proud service of the nation. Whatever the motivation or pose, photography captured this crucial struggle to rebuild the broken bodies the Civil War had produced. The Army Medical Museum's *Photographs of Surgical Cases and Specimens* revolutionized not only the visual culture of the museum, but also the process by which wounded soldiers made sense of their sacrifice and reconstructed their identity. Figures 3.5 and 3.6

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[367] Lamb, *A History of the United States Army Medical Museum*, 52. The first collection of photographs was published as United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens* (Washington, D.C.: Surgeon General's Office, 1865).

[368] J.T.H. Connor and Michael G. Rhode, "Shooting Soldiers: Civil War Medical Images, Memory, and Identity in America," *Invisible Culture*, Issue 5 (2003): 5.

demonstrate some of the variety of poses and depictions of young Civil War veterans in the *Photographs of Surgical Cases and Specimens.*



Figure 3.5: Private Jason W. Joslyn,
Successful Excision of the Upper Portion of the Shaft of the Right Femur, Photograph 107
United States Surgeon General's Office. *Photographs of Surgical Cases and Specimens, Volume 3* (Washington: Surgeon General's Office, 1865).

In Figure 3.5, Private Jason W. Joslyn, I Company, 7th New York Heavy Artillery, poses in hospital garb with prosthesis, illustrating the indomitable spirit of the young soldier who sought to make himself whole after the war destroyed his youth. Injured in 1864 at the Battle of Cold Harbor, Joslyn underwent an excision of the head and four inches of the shaft of the femur, one of the most common operations performed during the war.[369]

[369] United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens Volume 3* (Washington, D.C.: Government Printing Office, 1865), Photograph 107.



Figure 3.6: Corporal David D. Cole
Application of Artificial Leg, Photograph #199
United States Surgeon General's Office. *Photographs of Surgical Cases and Specimens, Volume 4.* (Washington: Surgeon General's Office, 1865).

Figure 3.6 shows Corporal David D. Cole, A Company, 2nd New York Cavalry, with the most fashionable prosthesis of the time. Injured at the Battle of Amelia Court House in the final weeks of the war in April 1865, Cole chose to sit for his Surgical Photograph in a suit and prosthesis, without providing an particulars of his injury, to remember himself—and be remembered—as a man who was not emasculated by war.[370]

The photographs depicting soldiers as amputees functioned as "rhetorical expressions of extreme patriotism (for both Northern and Southern veterans) distilled into visual form."[371] David Serlin argues that for many of these disabled Civil War veterans, "the amputation stump, the artificial limb, and other physical markings that proved sustained injury were visual shorthand for military service. Disability, then, became their

[370] United States Surgeon General's Office, *Photographs of Surgical Cases and Specimens Volume 4* (Washington, D.C.: Government Printing Office, 1865), Photograph 199.
[371] David Serlin, "Engineering Masculinity: Veterans and Prosthetics after World War Two" in *Artificial Parts, Practical Lives: Modern Histories of Prosthetics*, ed. Katherine Ott, David Serlin, and Stephen Mihm (New York: New York University Press, 2002), 52.

permanent uniform."[372] Soldiers could see their bravery and patriotism manifest in their portrait on display in the Army Medical Museum, gaining reassurance that their sacrifice was meaningful. Outside of the Museum, these photographs served a variety of purposes, as centerpieces in memorial services and displays in local Civil War exhibits. Perhaps most importantly, medical photographs provided evidence of disability that could be turned into currency in the Pension office and in the street. Private Alfred Stratton, who underwent the amputation of both arms in 1864, had his picture taken at the Army Medical Museum, then used it to secure his pension of twenty-five dollars a month, and later sold *cartes-de-visite* of himself in uniform as a disabled soldier.[373] The wounded soldier used the Surgical Photograph to grieve over his loss and rebuild his identity, while also providing the government with proof of his sacrifice in order to secure his compensation in the form of a pension, and sometimes even charity.

Compensating for Broken Bodies

Historian Donald Schaffer argues that the Civil War challenged each man, Yankee or Southerner, slave or free black, in one similar way—by providing the opportunity to assert their manhood on the battlefield, in defense of their beliefs. For soldiers of the Union and the Confederacy, the war challenged their manhood, and for the black men on both sides, the war provided the first opportunity to establish their manhood alongside their white counterparts.[374] Volunteering to fight in defense of either the Union or the Confederacy was noble enough, but dying for this cause was the

[372] Serlin, "Engineering Masculinity," 52.
[373] Connor and Rhode, "Shooting Soldiers," 9.
[374] Donald R. Shaffer, *After the Glory: The Struggles of Black Civil War Veterans* (Lawrence, KS: University Press of Kansas, 2004), 1.

ultimate expression of masculinity. The Civil War demanded bodies for this sacrifice, and produced a generation of maimed and disabled veterans, disillusioned and vulnerable. The Army Medical Museum provided the materials, narrative, and support necessary to help the Civil War soldier reconstruct his body and identity. Central to this reconstruction was the photograph, which helped injured soldiers consolidate their identities in the post-war era, providing some continuity between the experience of war and the return to peace. There was also a more tangible aspect to this act of commemoration. These photographs, were not only a symbolic proof immemorial of their sacrifice, they also secured their pensions and aided in employment.

It was the duty of the American people, President Lincoln declared in his Second Inaugural Address, not only to facilitate the rebuilding of the nation, but also "to care for him who shall have borne the battle."[375] Before the Civil War there had not existed a formal federal pension system in the United States. James Marten contends that this was a time when most Americans "favored a limited role for the federal government," and so few Americans received compensation of any kind for their service during the war. Nevertheless, Marten argues, there was fierce debate over "the responsibilities of the republic to men who had fought for it," and key values were at stake: "What did a democratic nation owe the men who *volunteered* to risk their lives for their country? What should be expected of the veterans as symbols of Union, honor and sacrifice?[376] Due in large part to the popularity of these medical photographs—and in no small part to its proximity to the Claims Office—the Army Medical Museum found itself at the center

[375] Lincoln, "Second Inaugural Address."
[376] Marten, "Not a Veteran in the Poorhouse," 204.

of disability and death claims resulting from the Civil War. The Pension Office, the Office of the Adjutant-General of the Army, and other government offices, requested information and verification documents from the Army Medical Museum almost daily.

The creation of the pension system for Union veterans made systematic and accurate data about military service necessary, and the Army Medical Museum fulfilled that need. The array of muster rolls, strength reports, hospital records, and casualty lists kept during the war did not create a coherent personnel record for any individual soldier and thus left no easily accessible file to support a pension claim.[377] Very soon after the war ended, it became clear that the records and reports compiled by the Army Medical Department of the injuries and deaths of soldiers might be useful in establishing soldier records and validating pension claims. Woodward developed alphabetic registers to index the names of the nearly two hundred thousand discharges for disability, and three thousand deaths, to be used to confirm or deny requests made to the Pension Office. The Civil War records office in the first floor of the Museum, with its records, case histories, and photographs documenting death and disability, was quickly overwhelmed with requests from not only the Pension Office, but also injured soldiers themselves.[378] Many soldiers went directly to the Army Medical Museum before filing their pension claims, having heard that it was more efficient than waiting for the Pension Office to do so. Medical photographs, then, verified identity as well as injury through this process.

After having their injuries documented in photographs and pension reports, many wounded soldiers' next steps were to seek out replacements for what they had lost. The

[377] Faust, "'Numbers on Top of Numbers'," 1002.
[378] Woodward, "The Army Medical Museum at Washington," 234.

loss of limbs to disease and injury during the Civil War was of an unprecedented magnitude, for which there had been no established system of accommodation. The prosthetics industry in the United States was virtually nonexistent until the Civil War, when, Jennifer Davis McDaid argues, prosthetics were for many amputees the only solution to their problems of physical mobility and economic stability.[379] As with the pension system, "navigating the bureaucracy of state governments," in order to receive funds for prosthetics "proved frustrating for most veterans," and money for and supply of prosthetics often ran out well before many veterans had finished the application process.[380] The need for so many prosthetics, of so many varieties unheard of before the war, made them even more difficult to acquire and to use. Although many amputees could not wear prosthetics because their stumps were ill fitted for them, many simply preferred their pinned sleeves to the clumsy substitution of their missing limb. Nevertheless, Jennifer Davis McDaid argues, for those who could, "filling an empty sleeve or trouser leg with a functional, lightweight artificial limb became an imperative" for their economic livelihood.[381] The use of a prosthesis was often more a matter of economic necessity than personal pride, as many injured veterans could no longer function in their previous occupations.

Just as it secured the pensions and disabilities of veterans, so also the Army Medical Museum assisted in the development and distribution of prosthetic technologies. Developers from around the country contacted the Museum with their ideas and

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[379] Jennifer Davis McDaid, "'How a one-legged rebel lives': Confederate veterans and artificial limbs in Virginia," in *Artificial Parts, Practical Lives: Modern Histories of Prosthetics*, eds. Katherine Ott, David Serlin, and Stephen Mihm (New York: New York University Press, 2002), 119.
[380] McDaid, "'How a one-legged rebel lives'," 127.
[381] McDaid, "'How a one-legged rebel lives'," 122.

prototypes. Dr. J.H. Pooley of Younkers sent the Museum a photograph of a child on whom the only recorded case of Litton's operation for artificial arms had been performed, and many others sent similar communications of unique prostheses.[382] Prosthetic maker E.D. Hudson of New York took photographs for the Army Medical Museum in the years after the war, and in turn, learned from the subjects of his photographs about the different needs they had for prosthetics. Hudson worked closely with Otis to produce an album of amputees, many of whom Hudson fitted with prosthetics himself. By the time of the Philadelphia Centennial Fair of 1876, Hudson had become well known through his association with the museum as an innovative prosthetic maker.[383] The development of prosthetics was slow, and until nearly a decade after the war ended, they could be acquired only in the larger cities and for a heavy price. Yet, through the *Surgical Photographs* the Army Medical Museum distributed, and the imitations it inspired, the need for a prosthetics industry became clear.

One such case where all of the above converged is that of Private Samuel H. Decker, of Company I, 4th U.S. Artillery, pictured in Figure 3.7. The premature explosion of a gun at the battle of Perryville, Kentucky on October 8, 1862, injured Decker and resulted in the loss of portions of both forearms and burns to his face and chest. An Assistant Surgeon amputated his forearms at the middle, by the circular method, and Decker recovered at the field hospital in Perryville until his wounds had become "partially cicatrized."[384]

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[382] J.H. Pooley, Box 2, Photography, OHA 26: Records of the Curator, Special Correspondence. Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[383] Connor and Rhode, "Shooting Soldiers," 10.
[384] Photograph 205, OHA 82: Surgical Photographs. Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.



Figure 3.7: Private Samuel H. Decker, Double Amputation of the Forearms
Photograph #205, OHA 82: Surgical Photographs, Otis Historical Archives,
National Museum of Health and Medicine, Silver Spring, Maryland.

When he recovered from amputation of his mid-forearms, Decker was discharged from the Army on November 3, 1862, and later reported to the Museum that his stumps had completely healed by January 1863. Decker received a pension of $300.00 per year, and obtained work as a doorkeeper at the House of Representatives. After some time struggling with his disability, Decker began in the autumn of 1864 to "make experiments for providing himself with artificial limbs," and the following spring produced what the Surgeon General's Office called "an apparatus hitherto unrivaled for its ingenuity and utility," pictured in the previous figure. This apparatus enabled him "to write legibly, to pick up any small objects…to carry packages of ordinary weight, to feed and clothe

himself" Even more impressively, "in one or two instances of disorder in the Congressional gallery [Decker] has proved himself a formidable police officer."[385]

While many soldiers found wholeness in their photograph or with a prosthetic limb, a significant portion of Civil War amputees experienced a condition never before documented in the United States, the pain of which prevented them from ever recovering from the war both mentally and physically. Dr. Silas Weir Mitchell, who would become the most well known neurologist of his time, observed this condition during his time at Turner's Lane Hospital in Philadelphia. During his tenure running the ward for diseases of the nervous system, Mitchell found that a large number of amputees exhibited sensitivity of the nerves at the ends of their amputated parts, even after the stumps had healed.[386] Mitchell created the story of Captain George Dedlow—a surgeon and eventual quadruple amputee—based on his experiences during the war, not simply as an archetype of the practice of amputation so common during the war, but also as a painful journey into the condition of neuralgia that plagued so many Civil War amputees. Mitchell's story of how Dedlow came to lose all of his limbs occupied nearly two dozen pages in the *Atlantic Monthly* in 1866, published anonymously following the war. Reiterating the importance of the case history, Mitchell tells of Dedlow's military assignments, the conflicts in which he was wounded, the pain he experienced because of his injuries, and the trauma of injury and recovering from the amputation of all of his limbs. Mitchell's description of the loss of Dedlow's right arm included every minute detail that might be relevant to the surgeon treating him or the medical student studying his case afterword.

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[385] Photograph 205, OHA 82: Surgical Photographs, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[386] Lauder Brunton, "Dr. Weir Mitchell," *Nature* 92 (8 January 1914), 534.

Dedlow recalled having heard a rifle fire, felt a blow to his arms and subsequently lost consciousness. When he awoke he discovered that a ball "had passed right through the left biceps, and directly through the right arm just below the shoulder emerging behind. The right hand and forearm were cold and perfectly insensible… [and he] began to understand the nerves had been wounded and that part was utterly powerless."[387]

In Mitchell's story, Confederate forces captured the injured man and transferred him to a camp hospital for treatment, where his right arm was amputated and he remained for several months. Through an exchange of prisoners, Dedlow finally made it back to the North, but was wounded shortly thereafter in the battle of Chickamauga in September, 1863, and lost his left arm and both legs to amputation. When he awoke in a hospital tent following his injuries, he experienced neuralgia for the first time, crying out from the pain emanating from all of his amputated limbs.[388] Mitchell had Dedlow transferred to the very same hospital ward where he worked in his previous life as a surgeon, and there Dedlow suffered the neuralgia experienced by so many amputees like him, who "for many months felt the consciousness that they still had the lost limb…it itched or pained, or was cramped," with painful sensations almost constantly.[389] Silas Weir Mitchell's tale of the quadruple amputee Captain George Dedlow described the conditions of war, the practice of triage, the fate of amputees, the experience of hospital recuperation, and living with the war's history wrought on one's own body.

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[387] S. Weir Mitchell, "The Case of George Dedlow", *The Atlantic Monthly*, Volume XVIII, No. CV (July 1866): 2.
[388] Mitchell, "The Case of George Dedlow," 3-5.
[389] Mitchell, "The Case of George Dedlow," 11.

Part III: "A Morning's Work"—Reconstructing Medicine

The Army Medical Museum was created to serve a "need experienced at the commencement of the late war." Because there were "but few persons in the United States who had any experience whatever of military surgery, and there was no place in the country to which the surgeon about to devote himself to the military service could turn for definite information or guidance beyond what he could obtain from foreign works," Woodward explained, the American military had to create a homegrown scientific medicine in the form of a medical museum.[390] Through a collection of military medical and surgical specimens, the nation would "offer a rich field for the acquisition of the peculiar knowledge necessary to fit medical men for service with troops in the field." The *Medical and Surgical History of the War of the Rebellion* would complement the Museum by providing in print the statistical and contextual medical and surgical information, the illustrations of disease and injury, and thousands of case histories for further study. Furthermore, it was settled that "the experience acquired should not remain merely the individual property of the participants, but should be handed down in a tangible form for the benefit of the future."[391] As discussed in Part II, once a man became a soldier of the U.S. Army, his body also became the property of the Army, and any parts lost during service would also become Army property.

Perhaps the most abundant and damaging category of injury during the Civil War was that caused by gunshot. The improvement of shotguns, development of the conoidal ball, and military surgeons' lack of experience with gunshot wounds all converged during

[390] Woodward, "The Army Medical Museum at Washington," 241.
[391] Woodward, "The Army Medical Museum at Washington," 241.

the war to make gunshot injuries the most common kind of battle wound, which in turn dramatically increased the rate of amputations. Hammond saw early on the significance of gunshot injuries in the Civil War, and introduced reports of gunshot wounds into standard military medical paperwork, requesting that as many and wide a variety of gunshot wounds be collected for the Army Medical Museum as possible. Although Hammond's goal for the statistics and specimens of gunshot injury was to serve in educating future generations, he also hoped to develop the largest collection of gunshot wounds in the world, solidifying Washington, D.C. as the center of authority on the study and treatment of gunshot wounds.[392]

When the new Army Medical Museum opened to the public in 1867, it boasted one of the largest collections of specimens illustrating gunshot wounds in the world. Dozens of glass cases exhibited a vast variety of types of gunshot injury. In the *Reports on the Extent and Nature of the Materials Available for the Preparation of a Medical and Surgical History of the War of the Rebellion*, J.J. Woodward divided the thousands of cases of gunshot injury into six categories: fractures of the cranium, fractures of the bones of the face, fractures of the vertebra, scalp wounds, flesh wounds of the face, and flesh wounds of the neck.[393] Through the compilation of case histories, specimens and statistics, Woodward and his staff were able to determine the most serious manifestations of each of these conditions, and the success rate of corresponding treatments and surgeries. The majority of these conditions were enumerated further in *Part 1, Volume 2, Surgical History* of *MSHWR*, under the heading "Wounds and Injuries of the Face, Neck,

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[392] Otis, George A. and Joseph Janvier Woodward*, Reports on the Extent and Nature of the Materials Available for the Preparation of a Medical and Surgical History of the Rebellion* (Philadelphia: J.B. Lippincott & Co., 1865), 4.
[393] Otis and Woodward, *Reports on the Extent and Nature,* 6.

Spine and Chest." For example, it was concluded, "gunshot fractures of the bones of the face are, when we consider larger averages, graver than writers of military surgery have, heretofore, admitted," primarily because they resulted in death more often than the other types of fracture, and because "a large portion of those who recovered were disabled, and invalided."[394] These conclusions led to the prioritization of treatment of gunshot fractures according to mortality and disability, as well as the categorization of recovery from these injuries.

The museum subsequently used these categories to organize gunshot injury specimens in display cases, making it possible not only to study the different kinds of impact gunshot injuries had on the body, but also to visibly discern the distinction between fractures to the bone and flesh wounds produced by gunshot injury. What is more, the museum provided exhibit cases full of missiles of all types and sizes that had been extracted from soldiers—as well as a small number of civilians—during the Civil War. Journalist Louis Bagger noted that the Museum possessed eight examples of what the guide called "rare and interesting" specimens exhibiting gunshot fractures of the cranium, where the external table was unbroken while the vitreous table was fissured or sometimes depressed. This type of fracture—with little to no visible evidence of trauma—was rarely diagnosed before the war, owing both to the lack of knowledge on the subject, and the restrictions on post-mortems. One of the most perfect of these specimens, Bagger remembered, showed "only a slight discoloration on the outside of the head, on the place struck or touched by the bullet… [with] no fracture or depression

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[394] George A. Otis, "Wounds and Injuries of the Face," in *Medical and Surgical History of the War of the Rebellion*, *Part 2, Volume 2* (Washington, D.C.: Government Printing Office, 1876), 381-382.

visible; while on the inside the bone is splintered."[395] These crania were useful in comparison not only with other gunshot fractures and gunshot fractures of the cranium specifically, but also with fractures of the cranium resulting from trauma in civilian circumstances, specimens of which multiplied as the collection of the Museum expanded.

In addition to having the largest collection of specimens illustrating gunshot wounds in the United States and perhaps the world, the Army Medical Museum boasted a cutting edge exhibit on gunshot wounds and injuries of the nerves, made possible by the creation of special wards for treatment of diseases and injuries of the nervous system at U.S. Army Hospitals towards the end of the war. S. Weir Mitchell, the aforementioned pioneer of neurology, had offered his services to his Jefferson Medical College colleague Surgeon General Hammond when war broke out, and, after several years as an Army physician, found himself in charge of the first ward for treatment of diseases and injuries of the nervous system at the U.S. Army Hospital, Christian Street, Philadelphia in the spring of 1863. Together with Drs. George R. Morehouse and William W. Keen, Mitchell recorded case histories, performed treatment experiments and surgeries, and documented observations in *Gunshot Wounds and Other Injuries of Nerves* published in 1864, and subsequently circulated amongst military hospitals.

During their time in this new ward, the doctors encountered "representatives of every conceivable form of nerve injury—from shot and shell, from sabre cuts, contusions, and dislocations," such that "phenomena which one day seemed rare and curious, were seen anew in other cases the next day, and grew commonplace," as more

[395] Bagger, "The Army Medical Museum in Washington," 295.

and more patients came to these wards.[396] They urged consideration however, that whatever the variety of cases these notable doctors studied and treated, there was no instance of death, so that "thus far no opportunity for the study of pathological anatomy has been presented."[397] The proud declaration of a zero percent mortality rate is juxtaposed with the doctors' disappointment in not being able to take their study to the next level—from the bedside to the morgue, or from the operating table to the pathological museum—what was considered a necessary step in the development of scientific medicine in Paris and, increasingly, in America. Most of the patients had been to multiple hospitals, and seen multiple physicians, without any luck in terms of diagnosis or treatment, as their conditions were rare or unknown. What is more, the doctors found that many of their conditions could not even be found described in medical books abroad, so that it was thought they might have been creations of the Civil War.[398]

Through their studies, they determined to narrow the field of Nerve Injuries into more manageable categories as follows: injuries of nerve centers, injuries of the sympathetic nerve, wounds of fifth and seventh nerves, and injuries of nerve trunks or branches.[399] The doctors discussed one hundred and twenty cases covering these divisions, based on their studies, in hopes of producing "a very faithful clinical study of nerve injuries," and a foundation for "lessening the inevitable calamities of warfare."[400] Although these conditions were most prevalent in the contemporary military context, *Gunshot Wounds and Other Injuries of Nerves* gave considerable attention to non-

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[396] S. Weir Mitchell, George R. Morehouse, and William W. Keen, *Gunshot Wounds and Other Injuries of Nerves* (Philadelphia**,** PA: *J.B. Lippincott, 1864),* 9.
[397] Mitchell, Morehouse, and Keen, *Gunshot Wounds*, 10.
[398] Mitchell, Morehouse, and Keen, *Gunshot Wounds*, 10.
[399] Mitchell, Morehouse, and Keen, *Gunshot Wounds*, 11.
[400] Mitchell, Morehouse, and Keen, *Gunshot Wounds*, 12.

military incidences of nerve injuries—the *Other* in the title— suggesting the information was applicable more widely than just to war.

In its early years, the collections of the museum were divided into the following six sections: I. The Surgical Section; II. The Medical Section; III. The Microscopical Section; IV. The Anatomical Section; V. The Section of Comparative Anatomy; VI. The Section of Miscellaneous Articles. The majority of the six thousand specimens in the surgical section belonged to the category of military surgery, though other categories were represented. There were an impressive number of specimens

> exhibiting the effects of missiles of every variety on all parts of the body; specimens which show the different stages of the processes of repair, and the several morbid conditions which may interfere with their favorable termination; specimens derived from surgical operations of every character—calculi, tumors, and the like. [401]

Most of the osseous specimens were preserved dry, neatly cleaned, mounted on little black stands, "that they may be handled without injuring them, and duly ticketed with their catalogue numbers," while the specimens requiring wet preparation had been "neatly dissected, and are preserved with clear alcohol in glass jars similar to those used in the medical section."[402] The medical section contained eleven hundred and fifty specimens, "the majority of which illustrate morbid conditions of the internal organs in fever, chronic dysentery and other camp diseases." Since the war, Woodward observed, the amount of specimens "which exhibit the morbid anatomy of diseases of civil life had been constantly increasing, and a number of pathological pieces have been received which relate to the disorders of women and children, malformations and monstrosities,"

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[401] Woodward, "The Army Medical Museum at Washington," 235.
[402] Woodward, "The Army Medical Museum at Washington," 235.

and they were "carefully dissected and arranged with a view to the most advantageous display of the several points which each is designed to exhibit, they are preserved in alcohol in ground-stoppered glass jars."[403]

Woodward argued in favor of stoppered jars because they permitted the removal of specimens for examination while at the same time halting the loss of alcohol to evaporation, claiming that the Army Medical Museum was on the cutting edge of specimen preservation and display for educational purposes.[404] According to the orders of the Surgeon General, surgeons connected with the army contributed most of the specimens in the medical and surgical sections of the museum. But since the war, Woodward claimed, as the Army Medical Museum gained popularity and prestige, physicians and surgeons outside of the military began sending specimens.[405] By the end of 1867, its first year at the Ford's Theater location, the staff of the Surgeon General's Office had published and widely circulated the *Catalogue of the Army Medical Museum* so that those interested might come to visit the Museum, and even donate or exchange specimens with it, helping it grow.[406]

Former Surgeon General Hammond envisioned the Army Medical Museum would become a tangible encyclopedia for medical education, exhibiting all conceivable varieties of medical conditions and phenomena, making visible the mechanisms of disease from within the body. Variety and visuality were the key components in the development of exhibits in the museum, as specimens were grouped together by damage

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[403] Woodward, "The Army Medical Museum at Washington," 236.
[404] Woodward, "The Army Medical Museum at Washington," 236.
[405] Woodward, "The Army Medical Museum at Washington," 237.
[406] The Library of the College of the Physicians of Philadelphia contains several copies of this initial *Catalogue of the Army Medical Museum* (Washington: Government Printing Office, 1867), including John H. Brinton's personal copy with extensive notes.

type and area of the body, and where variety of specimen was lacking, an artifact, case history, photograph or some other visual representation of the disease or injury type would suffice. The specimens produced from soldiers injured or killed during the war provided the Museum with a large bank of materials for scientific medical investigation for many years to come.

Part IV: Manifesting Medicine— A National Medical Historical Museum

In his 1871 review of the Army Medical Museum, Woodward estimated that since the war, some twenty thousand people had visited annually, according to the Museum's visitor registration book. Woodward claimed that the majority of visitors were medical students and practitioners looking to enhance their medical knowledge, but there were also plenty of "ordinary sightseers" and even more soldiers and officers, who visited the Museum. Military visitors, he acknowledged, seemed to have taken "the deepest interest in the museum, as a storehouse of knowledge which may at any moment prove of service in connection with questions involving their own lives or limbs, and many of them have already shown their appreciation by contributing valuable specimens."[407] As previously discussed, the Army Medical Museum functioned for many veterans as a shrine to their former selves, as a memorial to their sacrifices, and as a tomb for their fallen brothers.

Of the medical visitors, Woodward emphasized there were a substantial number who had traveled from abroad just to visit the Army Medical Museum. He even boasted, "most of the civilized countries of the world have sent medical commissioners to study the museum… [and] these gentlemen have spoken in the most flattering terms of its

[407] Woodward, "The Army Medical Museum at Washington," 239.

importance, both during their visit and in writings published after their return to their native lands."[408] In addition to the "access there willingly afforded to those who desire to study its collections," the Museum catalyzed the Army Medical Department's participation in the exchange of specimens, photographs of specimens, and publications with other such institutions and schools, both at home and abroad.[409] The Army Medical Museum, Woodward claimed, had won American medicine the recognition it sought. Woodward noted that the museum project, its collection, and the exchanges of knowledge it catalyzed had not only been well received abroad, but also highly praised. For Woodward and the staff of the museum, there was no nobler monument to erect in the memory of President Lincoln, "than this somber treasure-house, devoted to the study of disease and injury, mutilation and death."[410]

Medical History, Data and Memory

By 1871, the Army Medical Museum was certainly one of the biggest accomplishments of the Surgeon General's Office, and the *Medical and Surgical History of the War of the Rebellion, 1861-1865* soon emerged as an important medical achievement on its own terms. Begun by Hammond and Brinton, and later finished by Surgeons Otis and Woodward, the book was lauded for its commemorative, educational, and medical value.[411] It also garnered widespread acclaim for the Army Medical

[408] Woodward, "The Army Medical Museum at Washington," 239.
[409] Woodward, "The Army Medical Museum at Washington," 242.
[410] Woodward, "The Army Medical Museum at Washington," 242.
[411] Michael G. Rhode and James T. H. Conner, ""A Repository for Bottled Monsters and Medical Curiosities": The Evolution of the Army Medical Museum." In *Defining Memory: Local Museums and the Construction of History in America's Changing Communities*, ed. Amy K. Levin (Lanham, MD: AltaMira Press, 2007), 178.

Museum, on whose collection many of its statistics and case histories were based. Many at the time considered the publication a "remarkable scientific achievement that listed and described tens of thousands of Union soldiers' wounds, injuries, and diseases."[412] *MSHWR* provided much of the history and analysis of the materials on display at the Army Medical Museum, conveying the data Brinton and his team had collected through thousands of case histories and statistics to use in exhibits at the museum. The ultimate commemorative project, the book documented not only the battles and campaigns of the war, but also the stories of injured soldiers and the physicians and surgeons who treated them, in the greatest detail.

Compiling the data, transcribing the case histories, and acquiring the illustrations necessary to produce a history of such epic proportions preoccupied Army Medical Museum staff for over a decade. Visitors to the museum knew of the project, and inquired so often about its completion that one of its main contributors, J.J. Woodward, assured the readers of his 1871 summary of "The Army Medical Museum at Washington," that the project to generate a surgical and medical history of the war, underway at the Museum and in the early stages of publication, was so massive and important that it necessarily required many years of tedious, hard work.[413] Such a project had yet to be attempted after any war or conflict, but Drew Gilpin Faust argues that a compulsion for "compiling statistics about losses would become a postwar preoccupation," as both Union and Confederate forces struggled to account for and honor

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[412] Ira M. Rutkow, *Bleeding Blue and Gray: Civil War Surgery and the Evolution of American Medicine* (New York: Random House, 2005), 249.
[413] Woodward, "The Army Medical Museum at Washington," 242.

their dead.[414] Insofar as the numbers of dead varied by the group reporting, so also did the meaning of the numbers. Many sought to define one side's valor by reporting to have killed more soldiers than it lost in a given battle, while others attempted to rationalize victory or loss according to these numbers.[415] Whatever the motivation or explanation, numbers very often did not add up when tabulated in the reports and case histories collected by or submitted to the Surgeon General's Office, so it took Woodward, Otis and their clerks years to sort through and reconcile the immense amounts of data.

In 1870, Woodward Otis published the first two volumes of the six volume history project. *Part 1, Volume 1: Medical History* contained a series of statistical tables summarizing the information contained in the monthly reports sent to the Surgeon General's office on a regular basis during the war. The reports focused on sickness, deaths, and discharges from service of "White Troops," with the same information concerning "Colored Troops" featured in the second part of the history. Otis explained that the division of the history into parts based on race, was considered the most scientifically and historically useful way of presenting the information, "in the form most likely to render them serviceable as a contribution to our knowledge of the influence of race-peculiarities on disease."[416] Whatever the Union's position regarding slavery, statements like this suggest that both Union and Confederate medical officers considered there to be at least a medical distinction between whites and blacks. Symptomatic of the medicalization of the politics of race after the Civil War, these kinds of questions also

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[414] Faust, "'Numbers on Top of Numbers'," 1001.
[415] Faust, "'Numbers on Top of Numbers'," 1006.
[416] United States Surgeon General's Office, *Medical and Surgical History of the War of the Rebellion, 1861-1865, Part 1, Volume 1, Medical History* (Washington, D.C.: Government Printing Office, 1870), xiii.

attest to the way that the *MSHWR* was a work of scientific enquiry, tabulating battlefield data in order to advance the cause of basic physiology. This combination of racial science, historical commemoration and medical enquiry constitutes a distinctively American iteration of museological medicine.

The first medical volume of MSHWR included templates of all the forms used within the Army Medical Department during the Civil War to report disease, injury, death, and discharge, numbering in the hundreds. Although the Army Medical Department was considerably disorganized and unsuccessful in its medical goals during the war, the sheer quantity of forms and their constant revision suggests that the gathering of data about its failures might contribute to widespread and long-lasting improvements. The reports specified one hundred and forty-three diseases for which soldiers might be diagnosed, in categories as follows:

> Fevers, Eruptive Fevers, Diseases of the organs connected with the Digestive System, Disease of the Respiratory System, Diseases of the Circulatory System, Diseases of the Brain and Nervous System, Disease of the Urinary and Genital Organs and Venereal Affections, Diseases of the Serious Exhalant Vessels, Disease of the Fibrous and Muscular Structures, Abscesses and Ulcers, Wounds and Injuries, Diseases of the Eye, Diseases of the Ear, and All Other Diseases.[417]

These categories were then grouped into larger categories (zymotic or infectious, constitutional, local, and parasitic diseases, and wounds, accidents, and injuries) based on a modified version of the system of classification devised by Dr. William Farr of London, which was used in statistical reports of the English army. The U.S. Army Board believed that the medical statistics produced during the Civil War "would possess the most general utility if they were collected and published in such a form as would permit them to be

[417] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, xv.

compared readily with similar publications issued by other nations."[418] In this way, the medical history of the war would be not only a narrative of the nation's greatest conflict, but also the basis for comparing disease and death in the United States to other countries, in hopes of facilitating a greater exchange of medical knowledge.

MSHWR nevertheless demonstrated particularly American contexts for medical knowledge, reinforcing antebellum claims by physicians in the South for the need for southern medical distinctiveness. Army medical reports were divided geographical regions—Atlantic, Central, and Pacific—not simply because these were preexisting military divisions, but also because there was deemed value in the "view of collecting data for the study of the special influences" of each region, in addition to the health of the armies within them.[419] The tables within the departments of the armies were arranged by year and month, so as to address "the influence of Season on the diseases of the several Regions."[420] While these divisions and categories were created to serve future studies, the reports were originally designed to indicate the severity of disease or injury, in order to facilitate quicker triage decisions. As much of the Army Medical Department's system of triage developed in the context of the Civil War, these reports were the most often revised in order to achieve greater rates of success.[421] The majority of information in the first volume of the medical history was very clearly statistical information, which the author indicated would be further analyzed and categorized in subsequent volumes. Yet, many of the contemporary reviews of *Part I, Volume I* were critical of the sheer mass of information, suggesting that the number of tables and overall size of the volume were so

[418] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, xviii.
[419] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, xx.
[420] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, xxii.
[421] United States Surgeon General's Office, *Medical and Surgical History…Part 1, Vol. 1*, xxv.

large that it was nearly impossible to read, or analyze. Nevertheless, the book reviewer for the August 1873 issue of *The Lancet* acknowledged that such a mass of statistical information was necessary to further the scientific transformation of medicine.[422]

The qualitative counterpart to the aforementioned medical history, *Part 1, Volume 2: Surgical History* contained the work of both John H. Brinton, originally assigned to write the surgical history, and his successor, George A. Otis. The first part of the surgical history detailed Brinton's account of each campaign, including "the troops engaged, the mode of transporting the injured, and the available hospital accommodations, the wounds and operations of each engagement…the reports of medical directors, and all other reliable sources of information."[423] The surgical volume provided the reports used in army hospitals for recording injury, disease, and death, as well as a chronological list of engagements and battles. Perhaps the most useful information, in terms of practical application, was the categorization of wounds and injuries and listing of soldiers within these categories by alphabetical order. The ease of access of this information was useful for clerical staff at the Army Medical Museum when soldiers or family members requested information. The most appreciated aspect of the first surgical volume, however, was its collection of illustrations of wounds and injuries, as exemplified in Figure 3.8.

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[422] "Review & Notices of Books: *The Medical and Surgical History of the War of the Rebellion, Part 1. Two Vols*." *The Lancet*, 30 August 1873, Box 2: Loose Letters, OHA18: Curatorial Records, Notices of Medical and Surgical History, Publications, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

[423] United States Surgeon General's Office, *Medical and Surgical History of the War of the Rebellion, 1861-1865, Part 1, Volume 2, Surgical History* (Washington, D.C.: Government Printing Office, 1879), xiii.



Figure 3.8: "Sabre Wounds of the Head"
United States Surgeon General's Office, *Medical and Surgical History of the War of the Rebellion, Part 1, Volume 2*
(Washington, D.C.: Government Printing Office, 1879), 198.

Privates Butcher, Howard, and Rogers were all injured in different battles at different times during the war, but their wounds from sabre injuries could be compared in the work of the *Medical and Surgical History of the War of the Rebellion*. Illustrations like this one juxtaposed medical and historical interest together, and occurred throughout *MSHWR*.[424]

Moving Forward

The Civil War gave birth to the Army Medical Museum and, through it, an American scientific medicine. The military museological methodology employed by physician and surgeons in the war was tangibly exhibited in the Museum and *MSHWR*. By the end of Reconstruction, the Army Medical Museum had established itself as a

[424] United States Surgeon General's Office, *Medical and Surgical History of the War of the Rebellion, 1861-1865, Part 1, Volume 2* (Washington, D.C.; Government Printing Office, 1879), 3, 20, 22.

national, medical museum with a significant historical collection. For the public it had provided a means for counterbalancing their devastating losses with the accomplishment of a greater good. For soldiers who had fought in the Civil War it memorialized and medicalized their sacrifices through the display of specimens and photographs. The primary material for establishing the value of lives lost and sacrifices made was the pathological specimen. While the pathological specimen held considerable importance in the new clinical medicine of the Paris School, its role in American medicine was made possible by the Civil War. In turn, the pathological specimen paid homage to the losses of war in its display at the Army Medical Museum and in the *Medical and Surgical History of the War of the Rebellion*. The Museum's exhibits and MSHWR's history helped reconstruct the American nation by piecing together the battles fought, the medical lessons learned, and the histories of those who lost life and limb. In turn, the specimens of the dead and the photographs of injured soldiers helped those affected by the war to remember and move forward. From injury, to post mortem, to museum display, the pathological specimen was part and parcel of the experiential knowledge gained during the Civil War, and the medical knowledge created afterwards.

In the decades after the war, Museum staff would continue to employ museological methodologies in the organization and analysis of specimens, while expanding the scope of its collections and research. Privileging the microscope that medical officers had only begun to utilize in the Civil War, Museum staff in the postbellum era analyzed and compared microscopical slides to produce more useful diagnoses of conditions that plagued both the soldier and the civilian. Drawing on their collection of specimens from the western frontier and exchanges with medical museums

in Europe, they demonstrated the value of museological methodology in comparative anatomy and craniometry. They participated in larger medical debates and facilitated the development of other American medical museums through specimen exchange. After using the Army Medical Museum's collection of specimens, case histories, and statistics to commemorate and educate, Museum staff established the usefulness of the application of museological science to modern medicine more broadly just as the locus of medical investigation began to shift from the clinic to the laboratory.

Chapter Four: Making Museological Medicine—The Evolution of the Army Medical Museum

The Army Medical Museum played an important role in the Reconstruction of the American nation, its soldiers, and its medicine in the years after the Civil War. Through the display of specimens, case histories, and artifacts of the war, and the preliminary publication of the *Medical and Surgical History of the War of the Rebellion*, museum staff employed museological science to both illustrate the manifestation and course of disease on the human body, and commemorate the loss of so many bodies to the diseases and injuries that occurred during the war. The six volumes of the *Medical and Surgical History of the War of the Rebellion* took nearly two decades to assemble and publish. During this time, a substantial portion of the specimens and artifacts collected from the Civil War were requisitioned and displayed according to this purpose. As Museum staff analyzed and compared specimens, case histories and statistics for the production of *MSHWR,* they continued work on improvements and innovations derived from the knowledge and techniques developed in this process of rendering the lessons of the war available to the medical community and future generations. It was during this time that the Army Medical Museum's fundamental goals of developing a complete and varied medical collection, conducting medical research to contribute to the development of modern medicine, and forging a new identity as a national institution for medical knowledge and research emerged.

When he first conceived of the Army Medical Museum, Surgeon General Hammond envisioned the creation of a *complete* national medical museum, where all

illnesses, diseases, medical conditions, surgical operations, and anomalies could be illustrated and studied. The more examples of illness and disease that could be traced from the clinic to the morgue, and then displayed on the shelves of the Army Medical Museum, the better would be the understanding of the character and mechanisms of disease. At the same time, the more medical material available for analysis, the greater the educational and research capacity of the institution. Hammond's immediate and longest-serving successor as Surgeon General, Joseph K. Barnes, along with the curator John Shaw Billings continued this mission to create a comprehensive national medical museum in the postbellum era in two important ways. First, Barnes and Billings sought to combine the Museum and the Surgeon General's Library in a larger, more prominent space on the National Mall, where it could grow alongside other national museums. In this new building, the Army Medical Museum and Library would distinguish itself as an institution for medical research, serving as both a temple for medical education and clearinghouse for medical knowledge. Second, Barns and Billings worked to expand the size and variety of the museum's collection by soliciting donations, utilizing the medical officers of the Army Medical Department as collectors, and purchasing valuable specimens and models.

As the Army Medical Museum connected to medical and scientific societies in the United States and abroad, its staff saw more clearly the challenges and opportunities it faced in the future. Although nationally recognized for its unique collection of specimens and photographs illustrating injury, disease, and death during the Civil War, and shaping national memory of the conflict, the Museum gradually saw its collection fading into history. The war-specific injuries, the weapons, the artifacts, the photographs had become

more of a historical collection than a medical one. It was Curator John Shaw Billings who first realized the Army Medical Museum could be a historical museum and a medical research institute, with the addition of an anthropological dimension. Billings' plan for the future was clearly elucidated in the *Medical News* of Philadelphia in 1886:

1. To illustrate the effects, both immediate and remote of wounds and of the diseases that prevailed in the Army.
2. To illustrate the work of the Army Medical Department; models of transportation of sick and wounded, and of hospitals; medical supplies; instruments, etc.
3. To illustrate human anatomy and pathology of both sexes and of all ages.
4. To illustrate the morphological basis of ethnological classification, more especially of the native races of America; including anthropometry and craniology.
5. To illustrate the latest methods and apparatus for biological investigations and the various methods of preparing and mounting specimens.[425]

Billings was the first to fully envision an entire institute of pathology, utilizing the museum's extensive collection for study, instruction, and experimentation.[426] Ultimately, it would be part museum and research institute, with staff trained specifically in the skills necessary for each, contributing to a common goal of improving the human condition through the advancement of medicine and appreciation of its history.

From 1873 to 1893, the staff of the Army Medical Museum launched efforts to obtain not only more and more varied specimens, but also more microscopic preparations to add to those taken from existing specimens, more animal material for comparative research, more crania for the growing anthropological collection, and more objects from the western territories of the Army, including Native American skulls, weapons and

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[425] Daniel S. Lamb, *A History of the United States Army Medical Museum 1862 to 1917, compiled from the Official Records* (Washington, D.C.: U.S. Army Medical Museum, 1917), 89.
[426] Robert S. Henry, *The Armed Forces Institute of Pathology: Its First Century,1862-1962* (Washington, DC: Office of the Surgeon General, Department of the Army, 1964), 88.

artifacts. Although these materials were vital to the completeness of the Army Medical Museum's collection, they also reflected an expansion of the usefulness of museological science. By examining microscopic preparations together and with pathological specimens, and by comparing animal with human anatomy, crania from different races and the weapons and artifacts of other cultures, the comparative power of museological science was revealed. This comparative, and subsequently diagnostic, work preoccupied the Army Medical Museum for the rest of the nineteenth century.

This chapter examines the Museum's transition from its original purposes—a medical and historical collection of the war, rendering the lessons of the war available to the medical profession and the historical, memorial value of those specimens open to a grieving nation—to a broader, national function as an institution for medical research. During this time, the laboratory revolution in medicine and the rise of the "new museum" movement challenged the efficacy of the French model of museum of pathological anatomy which had proved so important to the legitimation of American medical schools. The Army Medical Museum survived these challenges not only because it was a federally funded institution that functioned a national medical museum distinct from those of medical schools, but also because of the way in which it used the tools of museological science—analysis, comparison, and diagnosis—to continue to produce medical knowledge. The Army Medical Museum expanded its focus from the pathological specimen to microscopy, comparative anatomy, physiology, and craniometry, illustrating the usefulness of museological science in the development of a national medical museum. Under the direction of John Shaw Billings, the Army Medical Museum Institution would

emerge by the end of the nineteenth century as a hybrid of museum, library, and research institute.

The Laboratory Revolution, the "New Museum Movement" and the Medical Museum

The last quarter of the nineteenth century saw not only the gradual reconstruction of the American nation, but also the laboratory revolution in medicine and the beginning of the "new museum" movement in the United States and Canada, all of which impacted American medical museums. Historian Roy Porter argues that by 1850, "laboratories were creating a new physiology and pathology and beginning to reshape medical education."[427] Although laboratory medicine was not exactly new, medical researchers in the second half of the nineteenth century considered their work in the laboratory as creating "a distinct scientific medicine based on microscopy, vivisection, chemical investigations, and everything else measurable, weighable and testable in its uniquely controlled environment."[428] Andrew Cunningham and Perry Williams argue that the rise of the laboratory as a site for the scientific investigation of medicine shifted the locus of medicine away from the clinic. While the clinic functioned as the starting point for analytical medicine, the laboratory facilitated all of the practices central to experimental medicine—conducting tests, preparing medical substances, studying and teaching medicine, and performing medical research—in one location.[429] As laboratories and laboratory medicine became more prevalent in Europe, universities and medical schools

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[427] Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (New York: W.W. Norton & Company, 1997), 320.
[428] Porter, *The Greatest Benefit to Mankind*, 320.
[429] Andrew Cunningham and Perry Williams, "Introduction," *The Laboratory Revolution in Medicine* (Cambridge: Cambridge University Press, 1992), 1.

across the United States began developing these new sites for medical research, displacing the medical museum from the center of knowledge production.

Just as the laboratory revolution was taking over modern medicine, powerful public figures began to initiate a revolution in modern museums as well. Sally Gregory Kohlstedt explains that the period from 1875 to 1920 was considered the "golden age" of American museum building, when museum administrators "became self-conscious about their mission, more publicly accountable, and attuned to the ideal of progress in which scientific method played a key role."[430] In the 1880s, George Brown Goode, director of the Smithsonian Institution, began advocating educational reform in the United States, through the vehicle of the modern museum. Believing that visits to the modern museum had the potential to stimulate scientific observations and experiments, Goode called for the development of a "new museum" with a "versatile, rational, and scientific template" to better educate the American public.[431] This "new museum" was to be "large, architecturally distinctive, and publicly supported" with the goals of "preservation, research, and education."[432] Edward P. Alexander argues that a group of "museum masters" ultimately spearheaded this movement to construct the modern museum. These "museum masters" dictated the function of, and construction of knowledge in, museums built between 1880 and 1920, under the premise of a rational "search for order" that had become the regulatory ideal for progressive change in American society at this time.[433]

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[430] Sally Gregory Kohlstedt, ""Thoughts in Things": Modernity, History, and North American Museums." *Isis* Vol. 96, No. 4 (Dec., 2005), 592.
[431] Kohlstedt, ""Thoughts in Things","586.
[432] Kohlstedt, ""Thoughts in Things","587.
[433] Edward P. Alexander, *Museum Masters: Their Museums and Their Influence* (Nashville, Tenn.: American Association for State and Local History, 1983).

The Army Medical Museum possessed both the space for research disconnected from the clinic, and the scientific template and goals of the "new museum." Yet, during the last quarter of the nineteenth century, the Army Medical Museum emerged as a fundamentally different institution from those at the center of these movements. The laboratory revolution in medicine not only shifted the site of scientific inquiry in medicine, but also necessitated that this new site was dynamic enough to provide for all of the functions of this experimental science. According to John Pickstone, by exerting control over nature, rather than analyzing it, the experimentalists of the laboratory revolution "downgraded the museological/diagnostic" and subordinated the analytical method to experimental ends.[434] In contrast to this model of one mode of knowledge being replaced by another, the work of Army Medical Museum staff in microscopy, comparative anatomy, and craniometry privileged the analytic and diagnostic methodologies of museological science. At the same time, the transformation of the Museum into a national institution for medical research provided the resources and space in which to conduct these varied methodologies of museological science, recreating the Museum as a laboratory unto itself. And while the Army Medical Museum became a national institution for preservation, research, and education that kept its work transparent for the public, the staff of the Museum was not held publicly accountable for the work they did there. Surgeon General Barnes, Curator Billings, and Museum staff all worked to establish the Army Medical Museum as the premier museum for medical education, the

[434] John Pickstone, "Museological Science? The Place of the Analytical/Comparative in Nineteenth-Century Science, Technology, and Medicine" *History of Science*, Vol. 32 (1994): 132.

model institute for medical research, and a federally supported arbiter of scientific medicine.

Part I—Building a National Institution for Medical Research

Ten years after the Civil War ended, the Army Medical Museum had established itself as a national museum of medicine and medical history. Museum microscopist Joseph Janvier Woodward claimed that it was "beginning to be very generally felt that there is no place in the country where [medical] objects are more likely to be permanently preserved, or where they can be more serviceable for future comparison and study."[435] The fame that had come with the display of Civil War memorabilia, alongside medical and surgical specimens of the war, had elevated the Army Medical Museum from the ranks of university medical museums to more of a national medical collection. Physicians and surgeons across the country were eager to contribute to this national collection, and Museum staff widely publicized their need for specific contributions in order to achieve a more "complete" medical collection. As the staff of the Army Medical Museum began to develop exhibits and displays outside the purview of civil war medical history, they were struck by the excess of some types of specimens—for example, nondescript tumors and monstrosities—at the same time as becoming aware of their lack of what they considered more necessary specimens, such as microscopical slides and specimens of comparative anatomy. There was a clear need for selectivity and specificity in the growth of the Museum's collection, as well as a need for a larger space in which to house this

[435] J.J. Woodward, "The Army Medical Museum at Washington," *Lippincott's Magazine of Popular Literature and Science* 7 (March 1871): 237.

collection, if it was to become a national medical museum and research institution. In this way, the Army Medical Museum assimilated some of the techniques of the laboratory – such as microscopy -- into an essentially museological framework.

During the 1880's, efforts to secure a new building, where the Army Medical Museum and Library of the Surgeon General would be joined together with research facilities, worked in tandem with Barnes's and Billings's goal to expand and organize the collections of the Museum and Library. The American Medical Association expressed its support for the new building to house "a museum of unrivaled completeness and excellence…and a medical library, which is believed to the largest and most valuable in the world.[436] The completeness of the museum's collection, the AMA emphasized, was of "the highest importance for the promotion of medical science, literature, and education" in the United States.[437] Nevertheless, many in Congress had suggested that the Army Medical Museum could achieve these goals without requiring a larger (and more expensive) space to be shared with the Surgeon General's Library. The AMA, along with the majority of the American medical community, reiterated that it was absolutely necessary to keep the two institutions together.

Constructing the New Army Medical Museum and Library

As the Army Medical Museum approached its third decade "its shelves, cases, and storage rooms housed an ever-expanding collection of skeletal remains, mounted surgical specimens, anatomical examples, medical instruments, and volumes upon

[436] Ex. Doc. No. 12, "Fire-Proof Building for Public Records," *The Executive Documents Printed by the Order of the Senate of the United States for the First Session of the Forty-Eighth Congress* (Washington, D.C.: Government Printing Office, 1884), 3.
[437] Ex. Doc. No. 12, "Fire-Proof Building," 3.

volumes of literature."[438] While the Museum's central exhibits displayed Civil War specimen and artifacts, the majority of materials most relevant to the study of medicine had been crowded onto shelves on the walls surrounding these exhibits. Figure 4.1 shows the cabinets of medical specimens and instruments flanking portraits of Civil War heroes and tables of medical and surgical specimens of the war.

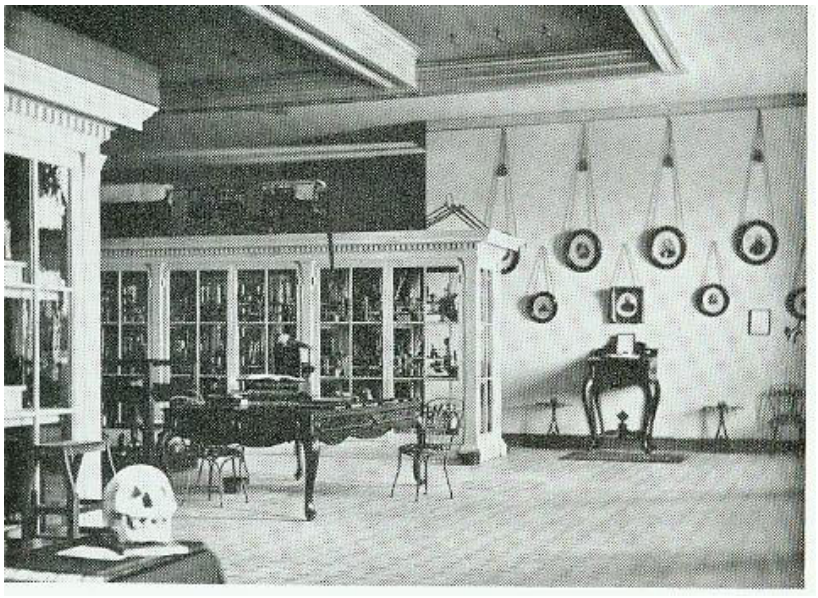


Figure 4.1: A view of the Army Medical Museum as it was when housed on the third floor of the former Ford's Theatre, circa 1870s. Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

The Ford's Theater building was clearly an inadequate home for the Museum, the Library, and the historical records of the Surgeon General's Office. What is more, the building was considered a fire hazard due both to its weak structure and the crowding of materials inside.[439] By 1880 the Museum itself had outgrown it, and Major Charles

[438] Paul Stone, *Legacy of Excellence: The Armed Forces Institute of Pathology, 1862-2011 (*Fort Detrick, MD: Borden Institute, 2011), 29.
[439] Henry, *The Armed Forces Institute*, 73.

Smart, assisting with the medical volumes of *MSHWR* reflected, "there came to be no room for even the storage of books and specimens, not to speak of facility of reference or advantageous display."[440] In his annual report of 1880, Surgeon General Barnes called attention to the overcrowding at Ford's Theater, spurring President Rutherford B. Hayes to publicly support appropriations for the Museum's expansion. Hayes claimed "The collection of books, specimens, and records constituting the Army Medical Museum and Library are of national importance, [such that] their destruction would be an irreparable loss not only to the United States but to the world," making clear that a larger, fireproof building was absolutely essential for the Museum.[441] Before the measure could be introduced to Congress, Surgeon General Barnes was forced to estimate the value of "that part of the Government property collected in the old building 'which could be replaced by money'" as not less than $250,000, although he admitted "'much of it could never replaced, either by time or money.'"[442] While the public had seen a great deal of the Civil War specimens collected and displayed at the Museum in the years after the war, only a small portion of the medical community had been able to study the larger, irreplaceable collection of medical and surgical specimens and instruments that were crowded onto its shelves and in its storerooms.

On December 28, 1883, the Museum and the Library were consolidated into one division, "known as the Museum and Library Division of the Surgeon General's Office,"

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[440] Charles Smart, "The Army Medical Museum and the Library of the Surgeon General's Office," *Journal of the American Medical Association*, 24:577 (20 April 1895).
[441] "Documents with Reference to Proposed Building for the Army Medical Museum and Library of the Surgeon General's Office"—Copy of Report No. 1991, annex B, Committee on Public Buildings and Grounds, on H.R. 7681, 47th Congress, 2nd session, February 1883.
[442] Quoted in Henry, *The Armed Forces Institute*, 75.

over which Major John Shaw Billings presided as both Curator and Librarian.[443] Billings also played a key role in the acquisition of funding from Congress in 1885 for the construction of a new landmark Army Medical Museum and Library building located at what is now 7th street and Independence Avenue, SW, in the nation's capital. The new location of the Army Medical Museum had a profound impact on its collection and direction. Where and how specimens could be prepared, displayed and studied shaped the production of medical knowledge from these objects.

Before the 48th Congress began, Henry argues, the medical profession expressed its support for a new building for the Museum and Library. Renowned professors of medicine Samuel D. Gross of Philadelphia, Austin Flint of New York, and Oliver Wendell Holmes of Boston collaborated on a letter to the American Medical Association in order to gain attention and support for the new building project. The authors described the conditions of the Museum and Library up to that point, emphasizing the need for their fellow physicians to explain to Congress "the great importance of these collections of books and specimens, the propriety of granting the funds necessary for their maintenance and preservation, the inexpediency of separating them, or removing them from the management under which they have so successfully been conducted, and the necessity of a fire-proof building, that they may be handed down safely to coming generations."[444] Local, county and State medical societies in at least 19 states took action to support the request for a new building, emphasizing not only the value of the collections in the

[443] Henry, *The Armed Forces Institute*, 79-80.
[444] From Henry, *The Armed Forces Institute*, 76, and the H.R. Report 1995 (H.R. 7681), 47th Congress, 2nd session.

Museum and the Library to the medical profession, but also subsequently to the communities they served.[445]

There was substantial opposition to the new building project from the very beginning, ranging from objections to the preservation of human specimens to displaying relics of a divisive war so prominently in the nation's capital. Ultimately, the greatest objection to the larger building centered around the heart of the Museum's claims to importance—the housing of so many functions within one institution, and one building. The opposition argued that the Medical Museum itself could be absorbed into the Smithsonian Institution, that the medical library should become part of the Library of Congress, and that the medical records of the Civil War belonged in the Pension Building or the new State, War, and Navy Building. If all of the components of the Army Medical Museum Institution could be housed in existing structures of similar purposes, what need was there for a larger, newer and more expensive building? The Surgeon General's Office argued that all of these seemingly disparate spaces not only belonged together, but more importantly, complemented one another in content and function. While the museological display of specimens, models, instruments and photographs illustrated the usefulness of analytical medicine, the nearby access of thousands of important publications on medicine and medical history contextualized and expanded on the development of this new medicine.

Moreover, the medical records of the Civil War, together with thousands of specimens yet to be catalogued, were essential to compiling the medical and surgical history of the war, developing more complete displays of illness and injury, and forming

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[445] Henry, *The Armed Forces Institute*, 77.

the basis of future medical research. The specimens on display in the Museum were catalogued with greater detail in the Library and the Records Office, and could be better utilized for study if they were all in the same location.[446] What is more, the museum-library-records project that began with small personal collections was destined to become a larger, broader institution. Every Surgeon General since Hammond envisioned not only an expansion of the museum-library-records components, but also the incorporation of newer specimen preparation quarters, laboratory facilities, an Army Medical School, and eventually a pathology institute.

While the medical community rallied in support of the bill, it was the backing of members of Congress that proved most crucial to its success. Representative Lyman of Massachusetts claimed that even someone outside of the medical profession could see that the greatest progress in medicine and surgery had taken place in the nineteenth century, and there would certainly be even more in the future, if given the right amount of support. The studies that contributed to past progress and were essential to future progress, and the welfare of society as a whole, Lyman argued, "are carried on under the fostering care of our National Medical Museum, whose library, now the first in the world, and whose not less admirable collection of military pathology are placed at the disposal of all investigators."[447]

The provision for a new building for the Army Medical Museum and Library was passed shortly after Lyman's debate in Congress, and the project to expand the national medical museum moved forward. By the time Congress finally approved the funding for

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[446] Henry, *The Armed Forces Institute*, 78.
[447] Congressional Record, 48th Congress, 2nd Session, pp. 1767-1770, 2117, 2177, 2569, taken from Henry, *The Armed Forces Institute*, 79.

the new building in 1885 and determined its location on 7th Street SW and what is now Independence Avenue, Woodward had died and Billings was forced to act in his place, working with architect Adolph Cluss to draw up plans for the new building. In 1887, Surgeon General John Moore finalized provisions to ensure the records, museum, and library holdings could be moved into the new building by early 1888.[448] In the new building (Figure 4.2), the Army Medical Museum Institution took its place among the great institutions of science on the National Mall, near its proud partner, the Smithsonian Institution.[449] This move symbolized not only the national value of the museum itself, but also the slowly increasing prestige of scientific medicine in the United States.



Figure 4.2: The Building at Independence Avenue and 7th St SW,
on the National Mall housed the Army Medical Museum and
the Library from 1887-1947.
Historical Medical Sites in the Washington, D.C. Area virtual exhibit,
U.S. National Library of Medicine.

[448] Henry, *The Armed Forces Institute*, 81-82.
[449] "A Medical Palace," *New York Herald* (Sunday, June 30, 1889), OHA38: Museum Articles, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

The new museum building consisted of a large center building with two main wings and a pleasant courtyard. The clerks of the Surgeon General's Office Record and Pension Division occupied the center and west wing of the first floor, while the east wing was used for museum business, including a dissecting room, an anatomy room, a darkroom, and a room for "genitourinary specimens considered unsuitable for public display."[450] The east wing of the second floor contained stored museum specimens, while west wing held library shelf stacks. The central area of the second floor contained library offices and reading rooms.[451] The library and museum wings were built to form "fireproof compartments separated from the other parts of the building…both were open from the second story to the roof, forming halls 31 feet high to the eaves and 47 feet to the ridge of lantern skylights."[452] On the third floor there were offices, a microscopy room, and a room for anthropometry. The fourth floor of the central building held the photographic gallery and several storerooms, some of which displayed "examples of stretchers and other devices for transporting the sick and wounded in combat."[453] The storerooms housed the Museum's first truly historical medical exhibits, utilizing the specimens, case histories and statistics of the Civil War, alongside instruments and models, to characterize wartime medicine in contrast to the scientific medicine that developed in its wake. Billings worked with the architect "to ensure that the structure would fulfill his vision of a multifunctional facility that could incorporate exhibits, research, and education."[454] "Old Red Brick" as the building came to be called, was

[450] Stone, *Legacy of Excellence*, 36.
[451] Stone, *Legacy of Excellence*, 36.
[452] Stone, *Legacy of Excellence*, 37.
[453] Stone, *Legacy of Excellence*, 37.
[454] Stone, *Legacy of Excellence*, 29.

opened and in full operation by 1888, just as the sixth and final volume of the *Medical and Surgical History of the War of the Rebellion* was published.

As the Surgeon General's Office librarian and an avid collector himself, Dr. Billings expanded the Library and made it an invaluable part of the Army Medical Museum Institution. Dr. Billings' four years of wartime service as "a brilliant operating surgeon and medical administrator" made him a prime candidate to work in the Surgeon General's Office, where he was given charge of the small library of less than 2,000 volumes.[455] After 30 years in charge of the Library, Billings had helped enlarge its collection to 115,000 bound volumes and 184,000 unbound pamphlets and papers, the majority of which were available to the public and searchable via an Index Catalogue. Billings envisioned specifically an *Index Catalogue of the Library of the Surgeon General's Office* to comprehensively catalog "the world's medical literature organized alphabetically by subject and author," but because this was such a large project, he and Dr. Robert Fletcher developed a smaller, current monthly catalogue that became known as the *Index Medicus.*

Towards a Complete Collection

Although the Museum's collection had drawn thousands of visitors by the 1870's, Billings, along with Surgeon General Barnes, Woodward, Otis, and other prominent museum staff, felt that more could be done to transform it into a truly national institution for medical research. Billings and Barnes addressed the medical community and the government repeatedly during the last third of the nineteenth century, lobbying for more

[455] Henry, *The Armed Forces Institute*, 80.

assistance in expanding and completing its collection. Central to this expansion was the acquisition of materials from abroad, by American physicians, and through exchange with other credible medical institutions. Completeness would be an ongoing project for the Army Medical Museum, a testament to its larger goal of becoming the foremost institution of medical education and knowledge in the country.

The American medical community valued the Army Medical Museum and its goal of completeness because they saw it as the fundamental medical museum, developed in support of clinical medicine, and essential to medical research. Philadelphia surgeon and Professor of Medicine Samuel D. Gross, together with Oliver Wendell Holmes, discussed the importance of the museum to the medical community at the American Medical Association Meeting in 1883. Gross emphasized that the Army Medical Museum was the largest and best of its kind, and "deserved to be preserved," especially since the American medical community had only recently begun to take advantage of its resources. What is more, Gross argued, the importance of expanding the collection of specimens and publications was that even "the least valuable of these…may contain new and valuable facts not to be found elsewhere, and that such facts are made accessible to practitioners all over the country, by means of the admirable *Index Medicus*, the value of such a storehouse of medical information is sufficiently obvious."[456] That the storehouse would rely on the contributions of American physicians and surgeons only increased its significance as a national institution for medical science.

In solicitation of these contributions, Billings pleaded with the medical community, "If each medical man who devises a stethoscope, a pessary, a speculum, an

[456] Ex. Doc. No. 12, "Fire-Proof Building, 3.

ophthalmoscope, or an electro-therapeutic appliance with which he is well pleased, would send a specimen to the collection, its increase would certainly be rapid, and it could always show the latest improvement."[457] In addition to the pathological specimens it had solicited since its inception during the Civil War, the Museum was in particular need of examples of new technologies of scientific medicine. He stressed also the importance of bringing together collections of crania from around the world, to one central place—the Army Medical Museum—where "a very much better average representation of the majority of tribes or groups would be obtained than can be furnished," the science of craniometry might advance more rapidly."[458] In addition, the Museum required even more material for its developmental anatomy and comparative anatomy collections. From human embryos to injuries and diseases common to both man and animal, the museum hoped to offer a collection substantial enough for significant comparative analysis.

Anything the Army Medical Museum lacked in the way of specimens, Surgeon General Barnes instructed acquisition officers to purchase, most often from abroad. The Museum purchased an impressive collection of wax models "illustrative of the human anatomy and the functions of certain organs," made by Vasseur of Paris, who had "acquired a world-wide reputation for the skill, minuteness, and exact semblance to Nature," in his preparations.[459] In addition, the Museum purchased dissected and mounted crania and whole skeletons mounted according to Blanchene's method—which allowed every portion of the specimen to be taken apart and put together again—and

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[457] J.S. Billings, "On Medical Museums: With Special Reference to the Army Medical Museum at Washington," *The Medical News* (Sep. 22, 1888): 21.
[458] Billings, " On Medical Museums," 22.
[459] Louis Bagger, "The Army Medical Museum in Washington," *Appleton's Journal: A Magazine of General Literature* 9:206 (March 1, 1873): 297.

wowed visitors with their "cleanness and whiteness," characteristics that brightened an otherwise dark display of human remains and reiterated racial divides.[460] Otis justified the purchase of "elaborate preparations of the human skeleton in its various stages of development and of demonstrations of the muscles, blood vessels, nerves, lymphatics, viscera and organs of special sense" from skilled manufacturers in Paris, as the techniques required for their preparation were not yet mastered by anyone in the United States.[461] These were considered necessary for "the convenience of examining boards or students, and for other purposes of reference," as well as for use in replicating similar specimens for the Museum.[462] The acquisition of materials from Paris also enabled the Museum to display comparative techniques for the presentation of human development and the course of disease on the body.

Although museum staff preferred to obtain wax models and skeletons from Paris for the pathoanatomical collection, much of the rest of the purchased collections in the Museum came from the United States. The surgical section contained a larger variety of American-made surgical instruments than those from foreign countries, not only for convenience, but also to illustrate the increasing skill of American instrument makers in the development of new medical technologies. In his review of the Museum, journalist Louis Bagger observed that it was clear to even the untrained eye that the American-made instruments "compare very favorably with those from other countries," and existed satisfactorily for "every variety known to the arts of surgery and dentistry."[463]

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[460] Bagger, "The Army Medical Museum in Washington," 297.
[461] George A. Otis, *Checklist of Preparations and Objects in the Section of Human Anatomy of the United States Army Medical Museum* (Washington, D.C., 1876), 135.
[462] Otis, *Checklist of Preparations and Objects*, 135.
[463] Bagger, "The Army Medical Museum in Washington," 297.

An International Struggle

Although the completeness of the Army Medical Museum's collection was important, it meant little if the medical communities in the United States and abroad did not value the Museum's contributions to medical science and research. To put the museum on the map of the international medical community, Surgeon General Barnes welcomed medical and scientific societies to hold meetings at the Museum, and invited guest lecturers to speak on important topics. The city's Philosophical Society—the oldest scientific society in Washington—and the newly created Cosmos Club held meetings at the Museum. The Museum also hosted receptions for the 1868 Meeting of the American Medical Association and the 1870 Meeting of the National Academy of Sciences, among others.[464] In December of 1872, Barnes held a reception at the Museum for Professor John Tyndall of London, a physicist known for building on the work of Pasteur in heat sterilization that had "begun to destroy the theory of spontaneous generation," a topic of great debate at the Museum.[465] Woodward, a well-known skeptic who, through his extensive work under the microscope at the Museum, had not found substantial proof enough that bacteria could in some way produce or be responsible for disease, engaged Tyndall in a lively debate that caused quite a stir. Although he was aware of "the presence of inconceivable numbers of bacteria," Woodward maintained his doubt of the "disease-producing effects" of what he referred to as "those convenient bacteria, which have played so conspicuous a part in modern pathological speculation."[466] That

[464] Stone, *Legacy of Excellence,* 18.
[465] Henry, *The Armed Forces Institute*, 66.
[466] Henry, *The Armed Forces Institute*, 67.

Woodward and so many of his colleagues felt emboldened to debate the most important medical topics of the day at an international level was a testament to their conviction that the Army Medical Museum was a to be regarded as locus of cutting-edge knowledge production.

In keeping with these aspirations, at both the 1876 International Medical Congress and the 1876 Centennial Exposition in Philadelphia, Otis and his staff prepared a variety of exhibits of specimens and photographs for display, from those illustrating the sacrifices made during the Nation's bloody civil war, to those highlighting the medical achievements since the war's end. At America's centennial celebration, the Army Medical Museum displayed for a much larger audience the photographs of wounded soldiers that had hung on its walls for over a decade, as a "celebration of national identity," in the words of cultural historians J. T. H. Connor and Michael Rhode.[467] With fig leaves placed over their genitalia, hundreds of medical photographs of wounded soldiers were put on display for a broad, amateur audience, who had never encountered such graphic images of the ravages of war and the destruction of the body.[468] Certainly, the graphic quality of Brady and Gardner's battlefield photographs published during the war brought spectators face to face with the brutality of the conflict, but the Army Medical Museum's portrait collection of thousands of naked soldiers exhibiting the trauma they suffered was an even more startlingly raw display.

The *British Medical Journal* published a review of the exhibit the following year chastising the Museum for the "singular inappropriateness," of many of the specimens on

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[467] J.T.H. Connor and Michael G. Rhode, "Shooting Soldiers: Civil War Medical Images, Memory, and Identity in America," *Invisible Culture*, Issue 5 (2003): 8.
[468] Connor and Rhode, "Shooting Soldiers," 8.

display. According to the *BMJ*, the privileging of examples of "the intestinal lesions of typhoid fever and dysentery, and pyaemia," was offensive to the audience.[469] Moreover, it seemed ironic to the *BMJ* to suggest that three preventable diseases were at all relevant to "an exhibition devoted to the *industry* of all nations."[470] Although the reviewer mocked what Woodward considered to be an "elegant" presentation, he conceded that the portion of the exhibit focusing on specimen preservation reiterated the Army Medical Museum's value as a scientific institution. According to the reviewer, too often medical museum staff took for granted the training and skill necessary for specimen preparation, and "large numbers of valuable specimens are yearly lost by careless manipulation in the fresh state."[471] Representation of the Army Medical Museum at medical congresses and international expositions ensured that wider audiences would see the scientific medical work done there.

The Army Medical Museum was put in the national spotlight once again after the assassination of President James Garfield in 1881. Just as staff of the Army Medical Museum were on hand to mediate and authenticate the assassination and death of President Abraham Lincoln in 1865, so also they were intimately involved in the aftermath of Garfield's assassination. Woodward and Barnes in particular were among the physicians attending Garfield when he was shot and wounded by Charles J. Guiteau on July 2, 1881. Charles J. Guiteau, a failed preacher and wanderer who had stalked the President for months, shot Garfield in the waiting room of the Baltimore & Potomac

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[469] "A Description of Selected Specimens from the Medical Section of the Army Medical Museum at Washington, Exhibited in the Philadelphia Exhibition, 1876," *The British Medical Journal*, Vol. 2, No. 886 (Dec. 22, 1877): 889.
[470] "A Description of Selected Specimens," 889.
[471] "A Description of Selected Specimens," 889.

railroad depot in Washington, where Garfield was waiting to take a train to meet his wife on the New Jersey seashore. Guiteau managed to shoot Garfield twice; while the first bullet only grazed his arm, but the second bullet lodged in his back and was not located for several months. The President was transported to a seaside cottage at Elberton, NJ, "to escape the heat of Washington and the miasmas of the swamplands south of the White House."[472] Historian Robert S. Henry argues that the attending physicians tried every remedy known to them in 1881, but there was nothing that could have been done to save the President's life.[473] Although the most accomplished physicians and surgeons attended to both Lincoln and Garfield, they could not be saved. While the importance of the gunshot wound as a condition for military medical study was established during the Civil War, the assassinations of two American presidents reiterated the importance of the Army Medical Museum's focus on gunshot wounds.

When President Garfield died, the privilege of performing his autopsy went to the Army Medical Museum's pathologist, Dr. Daniel Smith Lamb, while Dr. Woodward observed and recorded. The autopsy elucidated "the course and location of the fatal bullet, which had entered the president's back about 4 inches to the right of his spine, broken the eleventh and twelfth ribs, passed through the first lumbar vertebra, grazed the splenic artery, and stopped behind the pancreas, about 10 inches from the point of entrance."[474] From the autopsy Lamb produced several of the President's vertebra for preservation as specimens at the Medical Museum, "with the course of the bullet traced

[472] Henry, *The Armed Forces Institute*, 68.
[473] Henry, *The Armed Forces Institute*, 68.
[474] Stone, *Legacy of Excellence*, 18.

through them by a plastic rod," (Figure 4.3) so that the President's injury could be fully visualized.[475]

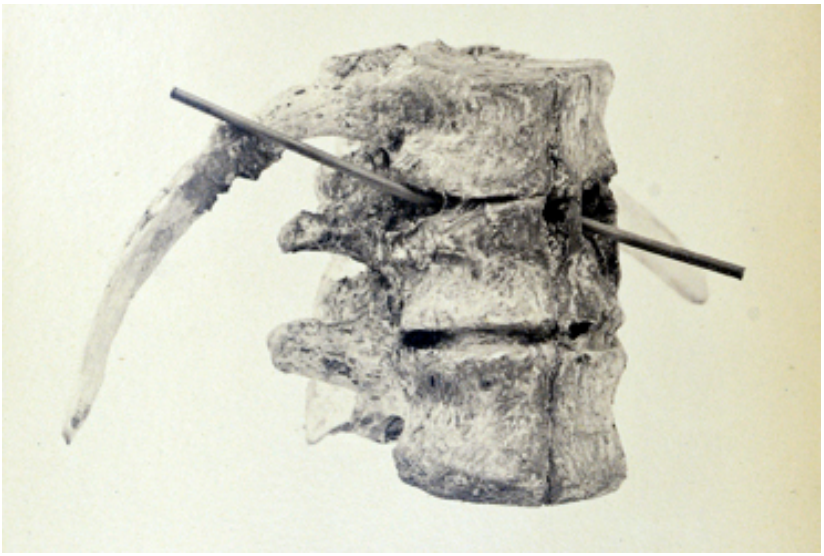


Figure 4.3: The vertebra of President Garfield, removed by Dr. Lamb during his autopsy.
"The President is Somewhat Restless": Aftermath, Online, U.S. National Library of Medicine

After having been called upon to participate in the activities growing out of the assassinations of two Presidents of the United States, and the Army Medical Museum itself became "the repository of the melancholy medical memorability of two great national tragedies."[476] In this way, the Museum began to establish itself as a truly national American institution, displaying not only the contributions of American physicians and surgeons, but also specimens and artifacts of both national and medical significance.

In the years that followed Garfield's assassination, however, the Army Medical Museum came under fire not only for its failure to help save the president, but also for its conspicuous involvement in the autopsies of both Garfield and Guiteau. The controversy

[475] Henry, *The Armed Forces Institute*, 68-9.
[476] Henry, *The Armed Forces Institute*, 72.

was due in part to the suspected insanity of Guiteau, a debate that had not been settled during his trial, and was thus left to his autopsy. "The assassination of the chief magistrate of the nation," George F. Edmonds wrote in *The North American Review* in 1882, "without any provocation, and without any motive that intelligent minds can view in any other light than of the utter and reckless depravity of the culprit, or his insanity, has natural made the trial of Guiteau a *cause célèbre* in the annals of jurisprudence."[477] Drs. Lamb, Hartigan, and Sowers were chosen to perform the autopsy of Guiteau. While all of the doctors involved took notes, Dr. Lamb prepared the official report and submitted it for publication in a Philadelphia medical journal, which upset the other doctors. Dr. Sowers is reported to have scoffed at Lamb's report, claiming "this paper cannot be termed in any sense a report. I think the public, understanding that three of us were appointed to make a report, will scarcely be willing to accept the conclusions of one man as a true statement of the facts ascertained," and since the autopsy was conducted jointly by three doctors, they "ought to have been able to reach a harmonious conclusion."[478] Dr. Sowers explains that by publishing his report independently, Dr. Lamb prevented such a conclusion, and necessitated a revision produced by all those involved in the autopsy. Lamb denied Sowers's allegations, claiming instead that he conducted the autopsy alone and with the sole authority to produce the official report.[479]

Despite the bad feelings between Lamb and Sowers, it was ultimately agreed that there were no signs of mental unsoundness in Guiteau, an unsatisfying conclusion they

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[477] George F. Edmunds, "The Conduct of the Guiteau Trial," *The North American Review*, Vol. 134, No. 304 (Mar., 1882), 221.
[478] "The Guiteau Autopsy: Dr. Lamb Prepares a Report to Suit Himself, Ignoring the Other Physicians," *The New York Times* (July 6, 1882).
[479] "The Guiteau Autopsy."

were reluctant to announce. This announcement was soon overshadowed by the news that after the autopsy, Lamb had taken Guiteau's spleen and bits of his brain to be displayed at the Army Medical Museum, alongside Garfield's vertebrae. Although Sowers and several other physicians expressed outrage at this scandal, the specimens Lamb had acquired soon became a popular attraction at the Museum, and the controversy ultimately proved to be more of an advertisement for the Museum than a legitimate complaint. While the display of specimens and artifacts relating to the Army Medical Museum's intervention in the assassination of President Lincoln was central to commemoration efforts after the war, the display of specimens and artifacts from President Garfield's assassination served to reinforce the Museum's growing control over national medicine.

Expansion and Exchange

The Army Medical Museum's primary goal of housing the world's largest and most complete collection of medical and surgical specimens was precisely the reason for its invaluable position in the middle of a large system of exchange of medical materials and artifacts in the nineteenth century. After the Civil War, four main groups participated in regular exchange with the Army Medical Museum. The first group, naturally, was American physicians. A large majority of physicians serving in the Civil War had established personal collections of specimens from the war, and most of these physicians submitted specimens to the Museum during the war and for decades after. Medical schools and societies also saw the benefits of working with the Army Medical Museum, as they too, endeavored to expand their collections and educational opportunities. Government entities—from scientific institutions to exploring expeditions—very

regularly interacted with the Army Medical Museum because it was a governmental institution itself. Finally, medical schools and societies from abroad were eager to compete with and benefit from the national project that was the Army Medical Museum.

First and foremost, the Army Medical Museum was to be an institution *for* the people, as well as *by* the people—people of the medical community, that is. During his closing address for the Congress of American Physicians and Surgeons in Washington in 1888, John Shaw Billings stressed that the growth of the Army Medical Museum had always relied on the medical community. "The most practically valuable" specimens at the Museum, Billings declared, were from the collections "formed by individual professors to suit their own specialties and methods of teaching."[480] A national medical museum, Billings contended, was one that was built on the work of its medical community. Such a museum required "the intelligent interest and friendship of the medical profession of this country." Billings credited physicians who had already contributed to the Army Medical Museum for helping to make it successful, and encouraged physicians who had not contributed to do so. "Every medical man in this country should help a little, and provide for the perpetuation of his name as that of a physician interested in the progress of the profession, by sending at least one specimen" to the national medical museum, Billings concluded.[481] Each specimen on display at the Army Medical Museum was labeled with case history information and the name of the contributing officer or physician. The Catalogue of the Army Medical Museum also contained a complete list of contributed specimens and their donors. The growth of the

[480] Billings, " On Medical Museums," 12.
[481] Billings, " On Medical Museums," 31.

Army Medical Museum's collection was thus contingent on the desire of physicians and surgeons to have their names enshrined in perpetuity at the Museum.

The most significant and substantial institutional relationship the Army Medical Museum had was with the Smithsonian. In 1868, the Smithsonian Institution and the Army Medical Museum agreed to a formal arrangement "by which it was thought mutual convenience and harmonious cooperation would be promoted."[482] According to the terms of the arrangement, the Smithsonian Institution would transfer to the Museum its collection of human crania, as well as specimens pertaining to anatomy, physiology, medicine, and surgery, for which the Army Medical Museum would exchange its ethnological materials. The overarching goal of this agreement and establishing a continuous relationship was:

> To render the various collections in Washington, which have been made under the direction of the government and the Institution, definite parts of one harmonious system, and at the same time to avoid the loss of labor and of means, in duplicating and preserving articles of a similar character in separate establishments.[483]

Insofar as this agreement was mutually beneficial for both institutions, it also strengthened the power and reputation of the government in the fields of developing sciences. Through this partnership, the government made clear its commitment to "the immediate advancement of knowledge," while simultaneously demonstrating its power by bringing together two important institutions, and solidifying the capital as "a center of scientific activity."[484]

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[482] *Annual Report of the Smithsonian Institution for the year 1868* (Washington, D.C.: Government Printing Office, 1869), 15.
[483] *Annual Report of the Smithsonian Institution for the year 1868*, 15.
[484] *Annual Report of the Smithsonian Institution for the year 1868*, 16.

The Army Medical Museum's relationship with the Smithsonian Institution not only contributed to its growth, but also facilitated the diversification of its collections and purpose. The agreement expanded the Army Medical Museum's network, as the Smithsonian Institution used its connections to secure more material from a wider variety of institutions, which it could exchange for artifacts of natural history and ethnology from the Museum. As the agreement grew to include both exchange and temporary loan of specimens, the Smithsonian Institution contributed to the Army Medical Museum's reputation as a clearinghouse of medical knowledge.

Although it seemed only natural that two national museums should work together, their cooperation was actually inspired by the overlap of their collections. Both institutions had employees in every part of the United States, often collecting very similar specimens and artifacts—such as human crania— and other times stumbling onto very different discoveries. As Army Medical Officers in the Dakota Territories and elsewhere sent to the Museum an abundance of Native American cultural items, geological specimens, and fossils for which it had no place, the Smithsonian Institution received from its employees hundreds of medical specimens for which it had no use. For most of this twenty-year exchange relationship Smithsonian secretaries Joseph Henry and Spencer Baird corresponded with Curator Otis and Surgeon General Barnes about their institutions' needs and duplicates for exchange. The correspondence and catalogues indicate, however, many more requests from the Smithsonian to the Army Medical Museum than vice versa. The mutual exchange and overlapping collections attest to the shifting boundary between anthropology and medicine, during a period characterized by the medicalization of race in the life sciences more broadly.

Through this relationship both institutions gained greater access to sources of specimens and artifacts than they had had on their own. On December 8, 1869, Henry wrote to Otis about a gentleman in New York who had offered the Smithsonian Institution "a series of valuable Indian relics, provided we can obtain for him a collection of the photographs of injuries to bones, and other surgical illustrations prepared under the direction of the Army Medical Museum."[485] The Army Medical Museum possessed such an abundance of duplicate type specimens and easily duplicated photographs that Otis and Barnes were happy to oblige, especially in exchange for greater exposure and access to other collections. For much of the relationship, the Smithsonian Institution was in debt to the Army Medical Museum. Henry wrote to Surgeon General Barnes on January 14, 1869, expressing his appreciation for the opportunity to work with such a renowned institution as the Army Medical Museum and reiterating his desire for "harmonious cooperation, in order that the collections of the government in the City of Washington may be complementary to each other, or, in other words, each as perfect as possible in definite lines."[486] Naturally, Henry followed his praises with a request for any specimens relative to Indian archaeology and anthropology in exchange for the specimens relative to human and comparative anatomy in the Smithsonian Institution.

Despite its agreement with the Smithsonian, the Army Medical Museum often sent excess or duplicates of ethnographical specimens and artifacts to other museums around the country, in order to instigate exchange relationships. The Museum regularly

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[485] Henry to Otis, December 8, 1869, Loose Letters, OHA25: Curatorial Records: Smithsonian Correspondence, 1867-1868**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

[486] Henry to Barnes, January 14, 1869, Loose Letters, OHA25: Curatorial Records: Smithsonian Correspondence, 1867-1868**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

sent Native American artifacts to the Peabody Museum in Cambridge, Massachusetts.[487] The Illinois State natural History Society also relied heavily on the Army Medical Museum's collection of Native American specimens and artifacts collected by Army medical officers in Illinois. William McAdams, the Society's president, maintained regular correspondence with Billings, in order not only to secure specimens, but also to ask for the Museum's help with identifying and classifying mysterious specimens he had collected.[488] McAdams promised to send the Museum duplicates or excess specimens the Society collected as part of this exchange relationship.

Through its system of exchange, the Army Medical Museum also helped facilitate the growth of other military medical museums. The Bureau of Medicine and Surgery established a 'laboratory for research in naval hygiene' in October 1879, and after several years in existence it had accumulated a considerable collection of valuable and interesting objects that the Bureau deemed worthy of classification and display in a museum. The Naval Museum of Hygiene was created for this purpose, and officially recognized on August 7, 1882, when Congress issued an appropriation of $7,500 for space, preservation of collection, transportation of contributions for exhibition, preparation models and drawing for display "to be used in the illustration of sanitary science and its progress."[489] In his efforts to build up the Naval Museum of Hygiene's collections, director J.M. Browne communicated regularly with D.L. Huntington at the Army Medical Museum,

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[487] Lamb, *A History of the United States Army Medical Museum,* 84.
[488] Letter from William McAdams to John Shaw Billings, October 9, 1888, Box 3, Folder M2, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[489] N. L. Bates, Medical Director, USN, "Fifteenth Annual Report of the United States Naval Museum of Hygiene," *Special Reports, Annual report of the Surgeon General of the United States Navy to the Secretary of the Navy* (Washington, D.C.: Government Printing Office, 1896), 217.

soliciting donations and loans of specimens and artifacts. Given that the Naval Museum of Hygiene was founded decades after the Civil War, it relied entirely on the Army Medical Museum to provide it with historical medical material of this era. The Army Medical Museum sent models of stretchers and ambulance wagons, illustrations of hospital wards and ships, and war photographs, as well as pathological and anatomical specimens to help its younger sibling build exhibits.[490] The Naval Museum of Hygiene owed much of its growth to the generous loans and donations of the Army Medical Museum.

This continued flow of specimens into and out of the Museum contributed to its reputation as a clearinghouse for educational materials. Pictures and models set aside for class demonstration at the Army Medical School, vetoed by Secretary Stanton because of his distrust of Hammond's projects, were exchanged for a cabinet of pathological specimens that had been collected by professors of the National Medical College of Washington.[491] Another source of specimens came from the medical staff of the Bureau of Refugees, Freedmen, and Abandoned Lands, or the Freedmen's Bureau. Officers of the Freedmen's Bureau contributed enthusiastically to the Museum's collection, as they had greater access than many of the Army Medical Officers to the wonders and curiosities of the western territories.[492] By 1875, over four-fifths of the objects in the

[490] Letter from J.M. Browne to D.L. Huntington, January 8, 1883, Box 001, Folder 6, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[491] Mary C. Gillett, *The Army Medical Department: 1818-1865* (Washington, D.C.: U.S. Government Printing Office, 1987), 201-203; Henry, *The Armed Forces Institute of Pathology,* 60.
[492] Henry, *The Armed Forces Institute of Pathology,* 60.

Army Medical Museum had been exhibited, exchanged, or stored for exchange, and the museum continued to receive specimens from all across the country.[493]

The desire of so many physicians, professors and medical institutions to donate specimens from their practices or collections, and to exchange them for pathological and anatomical specimens and long-sought-after examples of medical conditions or surgical operations, fueled a unique system of exchange with the Army Medical Museum and transformed it into a clearinghouse of medical knowledge. In many ways, it was the fundamental goal of having the most complete collection of medical, surgical, anatomical, microscopical, and comparative-anatomy specimens—as well as medical and surgical publications and historical artifacts—of any institution in the United States that made the Army Medical Museum so valuable. The goal of completeness was central to the growth, longevity and efficacy of a museum, George Brown Goode argued. In one of his frequently cited aphorisms, Goode stated that "a finished museum is a dead museum, and a dead museum is a useless museum."[494] The drive of the staff of the Army Medical Museum for completeness ensured the Museum's durability despite changes to medicine and museums in the nineteenth century.

Part II—Advancing the Sciences of Medicine

In 1862, William A. Hammond conceived of transforming the Surgeon General's cabinet into the premier medical museum in the world, privileging the pathological specimen as an enduring material for medical investigation. At the same time, Hammond

[493] Bagger, "The Army Medical Museum in Washington," 297.
[494] Kohlstedt, ""Thoughts in Things"," 586.

envisioned a national institution for medical research, which necessitated the continuous collection of materials for analysis, comparison and diagnosis. At this juncture, the museum embodied an interesting compromise between the old French museological science, and the new experimental space of the physiological laboratory. Billings reflected that the specimens at the Museum were the tangible results of natural "causes acting on the human body, from one point of view, nature's experiments, with poisons cunningly elaborated in the tissues of the body or with the viruses coming from without upon the blood, and bone, muscle and brain."[495] To a certain extent, the Museum's attempt at completeness in collections of normal and pathological specimens, of nearly every disease type known to man, functioned as a sort of visual laboratory, where students could observe not only the expression of health and disease, but also the results of nature's own 'experiments' on the body. Army Medical Museum historian James A. Tobey observed that many of the medical professionals that visited the museum published their observations of these natural experiments as they were analytically guided through the museological arrangement of exhibits.[496] The Army Medical Museum's growing collections formed the basis of a unique program of medical research, where visual materials fostered analytical and comparative investigations, which helped structure the very exhibits themselves. In this chapter, I examine how the Army Medical Museum facilitated medical research utilizing the analytical, comparative, and diagnostic practices of museological science.

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[495] Joseph T. Smith, "The Blood in Disease," *Maryland Medical Journal*, Vol. 25, No. 24 (Apr. 9, 1892): 510.
[496] James A. Tobey, *The Medical Department of the Army* (Baltimore, MD: Johns Hopkins Press, 1927), 22.

From 1873 to 1893, the Army Medical Museum became an authority on microscopical technology and science, pioneering microsopical experiments and diagnosis, as well as photomicrographic technology. Drawing on its extensive anatomy and pathology collections, Museum staff focused on advancing the sciences of pathology and comparative anatomy, and illustrated their varied usefulness. They aimed to establish the Museum as the most authority on the preservation and presentation of pathological and anatomical specimens, which it simultaneously exhibited and instructed in the space of the Museum itself.

Medicine Under the Microscope

The microscope had been a central analytical and diagnostic tool in understanding and treating illness and disease during the Civil War. While many of the microscopical specimens collected during the war were eventually discarded because of their poor preparation, the Army Medical Museum entered the last quarter of the nineteenth century with a substantial collection of microscopical preparations illustrating normal and pathological histology. In the years after the Civil War, Barnes and Billings solicited microscopical specimens not only for the museum's growing collection, but also for practical use in microscopical research. While preparing the first two medical volumes of *MSHWR*, Museum microscopist Joseph Janvier Woodward also published a staggering number of articles on the use of microscopy in diagnosing medical conditions of the Civil War and spearheaded new research using microscopical slides and techniques. Woodward also curated both the Medical and microscopical sections of the Museum, conducted research at the Museum that led to the facilitated new techniques for aniline

dye staining in microscopic sections, and developed a photomicrograph apparatus that revolutionized American photomicroscopy. From 1873 to 1893, in particular, the Army Medical Museum privileged microscopy as a central diagnostic technique for medical research.

Historian Mark Harrison argues that it was during this period that the improved magnification of microscope technology "enabled doctors to observe the processes of disease at a cellular level, the most important development being the emergence of what became known as cellular pathology," a practice central to the laboratory revolution.[497] German scientist Rudolf Virchow, considered by many the father of pathology, developed the idea that the cells were the primary locus of disease and site of pathology "because they were also units of normal functions."[498] Virchow's *Die Cellularpathologie* (1858) proposed that pathological conditions "came from abnormal changes within the cells, and abnormal cells in turn multiplied through division—diseases were thus the result of disturbances in the body's cellular structures."[499] Virchow's cellular pathology privileged the microscope as the best means for analyzing, comparing and diagnosing disturbances to cellular structures in the body. Woodward had followed Virchow's work closely, and after he had produced a substantial body of work in microscopy at the Army Medical Museum, Woodward began corresponding with Virchow regarding research in microscopy. Historian Shauna Devine argues that the institutional support the Army

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[497] Mark Harrison, *Disease and the Modern World: 1500 to the Present Day* (Cambridge, UK: Polity Press, 2004): 119.
[498] W.F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge: Cambridge University Press, 1994), 123.
[499] Porter, *The Greatest Benefit to Mankind* 331.

Medical Museum provided physician researchers like Woodward was central to the development of medical expertise of American physicians.[500]

While the focus of the Army Medical Museum's collection policy changed from the Civil War through the years of Reconstruction, there remained a continued emphasis on the value of specimens to be used in microscopic preparations and microphotographs. At the same time, the Surgeon General's Office—and Billings in particular—had been collecting microscopes not only for use in investigating microscopic preparations, but also as part of a program of developing advanced technological instruments for scientific investigation. The technology of the microscope was central not only to the collection's completeness, but also to the Museum's museological work. The Museum focused on developing and using the latest microscope technology, and as they developed newer models and techniques, the older microscopes became valuable artifacts for the Museum's historical collection. Under Woodward's direction, the Museum also boasted a central contribution to medical education and research "through the introduction and development of such techniques as photomicrography and the use of aniline dyes in staining slides for microscopic study."[501]The use of specimens for microscopic preparations, the collection of microscopic slides and microscopes, the diagnostic research derived from the preparations, and the development of new technologies ensured the value of laboratory space at the Army Medical Museum, and contributed to its reputation as a leader in medical research.

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[500] Shauna Devine, *Learning from the Wounded: The Civil War and the Rise of American Medical Science* (Chapel Hill, NC: The University of North Carolina, 2014), 75-6.
[501] Henry, *The Armed Forces Institute*, 5.

By the end of the Civil War, the Army Medical Museum had collected roughly 1100 microscopical slides of conditions specific to war.[502] After more strenuous efforts on the part of the Surgeon General's Office to solicit more varied slides for the collection, the microscopical department of the Army Medical Museum in the early 1870's boasted over six thousand "carefully mounted and labeled" specimens of great value, "affording a wide field for the study of histology and medical and surgical pathology" that many soon compared to collections and opportunities available only in Paris.[503] Dr. Woodward quickly became a respected authority for his work developing, and researching in, the microscopical section of the Museum. In his correspondence with Professor Henry, President of the National Academy of Sciences, Woodward detailed the increasing variety of work he had undertaken at the Museum from 1874-1875. Woodward boasted the acquisition of 53 medical specimens, 537 microscopic specimens, and 118 comparative anatomy specimens, as well as the completion of the second part of the *Medical History of the War of the Rebellion, 1861-65*. In addition, Woodward had begun special studies in microscopy, including a series of investigations concerning "the diffraction phenomena observed in the field of the microscope," which Woodward suspected might have contributed to distortions in medical research.[504]

In terms of collecting, the Surgeon General's Office staff realized very early that while microscope preparations were time-consuming to prepare, they were more compact and much easier to transport than pathological and osteological specimens. Physicians and pathologists from all over the United States sent microscopical slides to the Museum

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[502] Lamb, *A History of the United States Army Medical Museum,* 31.
[503] Henry, *The Armed Forces Institute*, 257.
[504] Lamb, *A History of the United States Army Medical Museum,* 71-72.

for display and even examination. In one case, Doctor W.F. Hoyt of Grand Rapids Michigan sent Billings a package of microscopic slides to be examined by Museum staff and microscopists.[505] Doctor H.G. Burton sent the Surgeon General one half dozen microscopic specimens that he proudly prepared himself, and requested not only evaluation of their preparation quality, but also their display in the microscopic section of the Museum, should they be found worthy.[506] The display of microscopic preparations at the Museum, appreciated by hundreds of visitors each month, earned the Museum's microscopists a reputation for their exquisite skill.

Some of the most valuable and interesting microscopic preparations came to the Museum from Medical Officers in the western territories. Army Surgeon S.M. Horton sent to the Museum from Fort Douglas ten microscopic sections from the liver and kidney of famed musician Rinaldo Eldridge, a member of the Band of the 14th Infantry whom he suspected had died from a cancerous mass on his liver. Horton sent two sections from the main part of the liver, four sections of a modular mass he had found in the right lobe of the liver, and four sections of renal tissue, all carefully prepared according to the instructions of the Army Medical Department.[507] While microscopic preparations sent to the Army Medical Museum were put on display in the microscopical section, an increasing number were diverted to the small laboratory at the museum for diagnostic investigation. Over time, the Museum became a sort of master laboratory,

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[505] Letter from W.F. Hoyt to John Shaw Billings, 17 June 1886, Box 2: Folder 8, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[506] Letter from H.G. Burton to Surgeon General, 22 September 1882, Box 2: Folder 7, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[507] Letter from S.M. Horton to the Surgeon General, 15 March 1881, Box 2: Folder 8, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

receiving microscopic slides from Medical Officers around the United States who either lacked the training or the equipment for proper diagnosis of their patients or conditions they observed. As late as 1886, one Army Surgeon from Fort Henshaw sent the Surgeon General a package containing dozens of glass slides with a note requesting their microscopical examination at the Museum, since he lacked the instruments and laboratory space to adequately "determine the presence of the suspected bacilli."[508] Although the Surgeon General had hoped to equip Army Medical Department Officers in the western territories with microscopes and other essential laboratory tools, this matter remained bureaucratically unresolved until the end of the nineteenth century.

As the museum entered the age of laboratory medicine, it did not abandon its commemorative function, which shifted from memorializing and making sense of battlefield sacrifices to documenting historical change in medical practice. Even before the Civil War had ended, the staff of the Surgeon General's Office had begun collecting microscopes for historical display as well as diagnostic research. In October of 1864, Surgeon J.J. Woodward, a microscopist by training, was assigned by the Surgeon General to the medical and microscopical sections of the Army Medical Museum. It was under the direction of Woodward that the display of microscopical preparations and microscope apparatuses grew, and that the microscopical laboratory of the Museum expanded. Woodward purchased the most advanced microscopes for the Museum's microscopy laboratory, brought in Doctor Edward Curtis to help him conduct research, and together the two developed a new microscope and a new method of staining microscopic

[508] Letter from Paul R. Brown to Surgeon General, 15 April 1886, Box 1: Folder 5, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

specimens.[509] The caliber of specimens, instruments and research in the microscopical section of the Museum soon came to be well-known and respected.

Before the Civil War, the Surgeon General's Office issued the Zentmayer microscope (see Figure 4.4) for use in U.S. Army Hospitals, and it remained in wide use until 1876.[510] Dr. Woodward was said to have disliked the Zentmayer microscope so much that he donated his to the Museum's historical display of older microscopes and set about building one of his own. The circulation of artifacts from practical use in medical research to historical display was a distinctive feature of the Army Medical Museum, underscoring some of the epistemic complexities of 'museum science' in the age of the laboratory.



Figure 4.4: Zentmayer Microscope
Displayed at the National Museum of Health and Medicine

[509] Lamb, *A History of the United States Army Medical Museum,* 31-36.
[510] Stone, *Legacy of Excellence*, 22.

Though not a microscopist himself, Billings supported the Microscopical Section of the Museum by donating his own collection of microscopes and securing new technologies. Billings developed a working relationship with John Mayall, Jr., a microscope collector in London who provided him with many of the models he desired. In his December 1887 letter to Billings, Mayall boasted the discovery of a valuable collection of microscopes that would truly set the Army Medical Museum apart. The collection included a rare 1835 achromatic microscope by A. Pritchard, a large binocular dissecting microscope by Smith and Beck that was considered "one of the earliest applications of the binocular system to a simple microscope," and an experimental achromatic microscope developed by Abraham of Liverpool that illustrated "the transition period when the opticians hardly knew what they were really aiming at in the application of focusing adjustments."[511] These microscopes presented a wide range of apparatuses in the history of microscopy, and their display at the Army Medical Museum illustrated both the development and centrality of microscopy to scientific medical research.

Great success had also been achieved in photomicrography, as Woodward and Museum staff had developed a method for photographing "the most delicate microscopical preparations," making possible "enlargements to a magnifying power of four thousand five hundred diameters" of even the most difficult objects, with "sufficient distinctiveness to permit the photographs themselves to be again enlarged five or six diameters, attaining thus a magnifying power of over twenty thousand diameters."[512] In the early photomicrographic experiments by Woodward and his collaborator Major

[511] Letter from John Mayall, Jr. to John Shaw Billings, 29 December 1887, Box 3: Folder M2, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[512] Woodward, "The Army Medical Museum at Washington," 237.

Edward Curtis, "the source of illumination was the sun itself… harnessed to ensure a perfectly steady and intense light."[513] The experiments took place in a dark room:

> With a window facing south as the 'shutter,' through which the direct rays of sun, caught in the mirror of a heliostat mounted outside the window, were reflected upon the plane mirror of a microscope mounted horizontally just below the window. From the mirror, the reflected rays of the sun were thrown upon the object to be photographed, placed upon the stage of the microscope. Light passed through the barrel of the microscope to the object-glass, where it was magnified. The magnified image was brought to a focus upon a sensitive photographic plate, mounted on a stand that was moved back and forth along a 10-foot track, which was provided with a scale for measurement of distances from the microscope. Pictures were taken by opening an aperture in the light-tight shield fitted onto the window.[514] (See Figure 4.5)

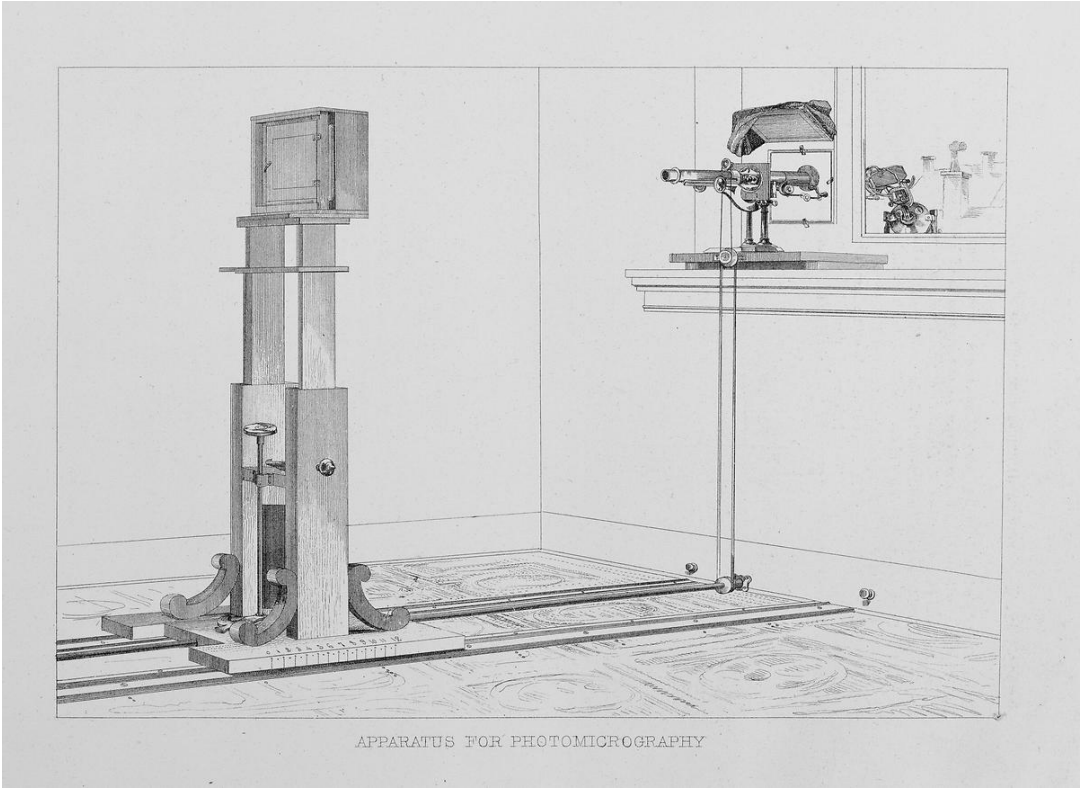


Figure 4.5: Woodward's apparatus for photomicrography, 1867
"Visible Proof: Forensic Views of the Body—Laboratory Views" exhibit online
U.S. National Library of Medicine

[513] Stone, *Legacy of Excellence*, 23.
[514] Stone, *Legacy of Excellence*, 23.

Later, Woodward and Curtiss conducted experiments with artificial light and by January of 1870 Woodward reported to the Surgeon General that "an electric lamp, powered by a 50-unit battery, gave better results with less trouble than sunlight," after which he claimed for the Museum and for himself "the credit of having demonstrated the serviceability of artificial lighting as a source of illumination for making negatives of high powers."[515] What is more, Woodward and Curtis eventually tailor-made their own microphotograph apparatus suited to the specific needs of the Museum. Insofar as the staff of the Army Medical Museum sought to position it on the cutting edge of developments in medical science, so also they hoped to contribute to these developments themselves. William F. Bynum argues that, "like so much other science of the period, microscopy encouraged doctors to think about the dynamics of disease, about the genesis of lesions rather that their gross, end-stage structures."[516] For the Army Medical Museum, this did not mean the subordination of the analytical epistemology of museological science; rather, the microscope functioned as a form of analytical seeing, whose visual results could be compared to facilitate understanding and diagnosis of disease. The laboratory revolution not only overlapped with museological science, it was completely assimilated into it during this period in American medical history.

Understanding the Human Body

The collection and study of specimens during the Civil War focused on producing useful military medical knowledge as quickly as possible in order to help wounded

[515] Henry, *The Armed Forces Institute*, 41.
[516] Bynum, *Science and the Practice of Medicine*, 123.

soldiers. The organization and display of specimens in the decades after the war focused on negotiating national memory of the war and illustrating the historical and medical value of the specimen and the Museum. The display and study of specimens in the years after Reconstruction focused on creating more dynamic visualizations of disease, in order to facilitate more in-depth study of more complex diseases, both military and civilian. What is more, through the expansion of its anatomy collection and the development of a comparative anatomy section, the Museum hoped to illustrate the fullest range of the human and animal bodies, in both health and illness. Comparative museological studies of these specimens could shed light on not only the differences in structure, but also the differences in function. John Pickstone argues that the practice of museological science facilitated "the understanding of the process (and of the history) as well as the form," suggesting, for example, "If the relationship between two species of animal is understood in terms of the relative development, say, of the nervous system, then this will have consequences for the behaviours expected."[517] In this way, comparative investigations in the Museum of human and animal structure and development could provide greater insight into processes that were still unseen.

Billings's third goal for the Museum was to have a substantial collection of specimens of human anatomy and pathology of both sexes and of all ages, in order to facilitate "the correct understanding of the structure, development, abnormities and diseases of man."[518] By the 1880's, the Anatomical Section of the Museum had grown to include three main exhibits illustrating the development of the human body, the

[517] Pickstone, "Museological Science?" 130.
[518] "A Medical Palace."

anatomical structure of man, and examples of anatomical variation and developmental anomalies. For example, there was a substantial collection of specimens illustrating the abnormality of an extra, eighth sternal rib in man, a condition that fascinated Museum staff at the time.[519] Billings consulted with physicians and museum curators around the United States and Europe to construct an Anatomical Section that was museologically useful. The 'beginning' of the Anatomical Section consisted of displays of embryology, followed by illustrations and specimens demonstrating "the laws of development, normal and abnormal" of the human species.[520] The structure of the human body was illustrated through a series of skeletons and wax models that suggested the 'normal' in contrast to a series nearby of specimens illustrating abnormal developments and variations in the human body. The Army Medical Museum brought in French 'manikins' manufactured by Auzoux of Paris, which confirmed the scientific caliber of the Museum and emphasized the international quality of the exhibits. In addition to manikins, wet preparations and wax models illustrated "the various systems of the body, muscular, circulatory, lymphatic, nervous, respiratory, digestive, etc.," as well as the organs of the senses.[521]

In the decade after the Civil War, the Army Medical Museum had "only so many specimens of comparative anatomy as [were] necessary to the proper illustration of the human."[522] Billings hoped to expand the Museum's Comparative Anatomy collection further, since cabinets of comparative anatomy were found in the majority of medical museums in Europe, and considered essential for medical science. The Comparative Anatomy Section of the Army Medical Museum's purpose was "not to make comparative

[519] Lamb, *A History of the United States Army Medical Museum* 104.
[520] "A Medical Palace."
[521] "A Medical Palace."
[522] "A Medical Palace."

anatomy an end to itself," but to illustrate the usefulness of its application to medical science "by exhibiting all known variations in structure throughout the animal kingdom as a basis for their study in relation to development and environment, causation and results," supporting a broader medical museum.[523] Both the Anatomical Section and the Comparative Anatomy Section of the Museum contained a large number of human skulls and skeletons; displayed in the former case to illustrate differences between races of men, and in the latter to illustrate differences between man and animals. I discuss the Museum's skull collection in the next part of this chapter.

However valuable a Comparative Anatomy Section of the Museum was thought to be, it had been limited to "the animals attainable by the officers…at various military posts."[524] Woodward claimed that such materials could easily be secured, "but the work is limited by the fact that the cleaning and mounting of the skeletons and crania is the duty of the same assistant whose business it is to prepare and mount specimens for the surgical and anatomical sections."[525] To his credit, this assistant had skillfully preserved and displayed many skeletons, including those of buffalo, deer, grizzly bear, walrus, sea-lion, and a number of other mammals, birds, reptiles, and fish. Woodward believed that even with the small steps taken, the collection would soon become an "important aid to the study of comparative anatomy in America."[526] The comparative anatomy project, as with many of the Museum's projects, required more space and resources in order to develop. It was the Museum's move to a new building in 1887 that ultimately facilitated further development of the comparative anatomy section of the Museum.

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[523] Billings, " On Medical Museums," 12.
[524] Woodward, "The Army Medical Museum at Washington," 238.
[525] Woodward, "The Army Medical Museum at Washington," 238.
[526] Woodward, "The Army Medical Museum at Washington," 238.

In its quest to be the largest and most complete medical museum in the world, the Army Medical Museum could hardly afford to ignore the science of physiology. The inherent problem with exhibiting physiology at the Museum, Billings claimed, was that "but little can be done by museum specimens to illustrate function as distinguished from form and structure."[527] Although the Hunter Museum in England boasted such a collection, Billings clarified that, "the so-called 'physiological series' in the Hunterian collection [was simply] a series of organs illustrating variations in different families of the animal kingdom, or at different ages: in other words, it illustrates ontogenic and phylogenic developments.[528] This type of series at the Army Medical Museum was displayed in the Comparative Anatomy Section, a museological choice Billings felt made their Museum much more scientific than those abroad. What Billings thought students and physicians were more eager to see at the museum were "specimens of instruments and apparatus employed in experimental physiology, or in the measurement of the special work of different organs or in illustrating lectures on physiology."[529] Billings believed that the instruments and apparatuses, together with illustrations from lectures, could provide the most complete understanding of physiological processes available. This preference for displays of methods and equipment used in physiological investigations, rather than physiological specimens themselves, shows how fine the line could be between the commemorative, pedagogical and research functions of the museum.

The practice of photomicrography at the Army Medical Museum proved helpful in the visualization of physiology as well. The powerful gaze of the microscope enabled

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[527] Billings, " On Medical Museums," 14.
[528] Billings, " On Medical Museums," 14.
[529] Billings, " On Medical Museums," 14.

the visitor to see into the body through photomicrographs of sections of bone, cartilage, and organs. Figures 4.6a and 4.6b exemplify drawings from photomicrographs displayed at the Army Medical Museum. Figure 4.6a provides insight into the inner structure of the humerus, while 4.6b makes visible the cartilage of the ribs.

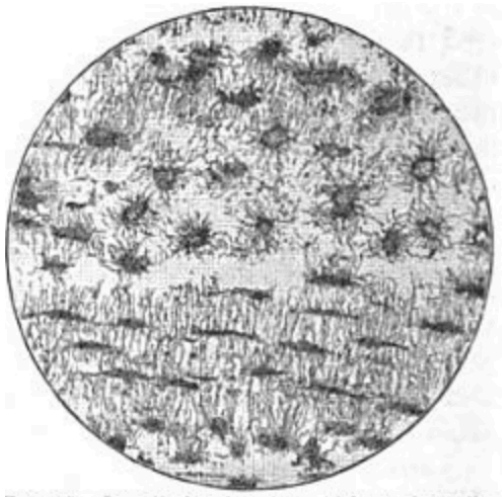


FIG. 159.—*Longitudinal section of bone, from the shaft of the human femur; magnified 180 diameters* (from a photograph taken at the United States Army Medical Museum).

Figure 4.6: a) Longitudinal section of bone
Austin Flint, *A Text-Book of Human Physiology*
(New York: D. Appleton and Company, 1889): 482.



FIG. 163.—*Section of cartilage from the rib of the ox, showing the homogeneous fundamental substance, cartilage-cavities and cartilage-cells; magnified 370 diameters* (from a photograph taken at the United States Army Medical Museum).

Figure 4.6: b) Section of cartilage from the rib
Austin Flint, *A Text-Book of Human Physiology*
(New York: D. Appleton and Company, 1889): 486.

These magnifications of the inner components of the body served as a guide for understanding how the body functioned. Photomicrographs like these were displayed in both the Anatomical and Microscopical Sections of the Museum, and became so popular that they were often included in textbooks on physiology.[530]Although the physiological material at the Army Medical Museum was sparse, it was still considered an important component of a national medical museum. When Walter Reed took over as curator in 1893, he would see to it that the collection grew even more exponentially, as physiology became increasingly useful for studies in experimental pathology.

Within these expanding sections of the Museum, two overarching themes were clear. First, the sheer number and variety of specimens suggested to the public the completeness of the collections at the Army Medical Museum. Second, the arrangement of specimens and instruments related to their acquisition brought the practice of research and medicine to the forefront of visualization. One of the Army Medical Museum's most enduring contributions to the age of the laboratory revolution in medicine was the transparency of its research. While the majority of medical laboratories produced medical knowledge behind closed doors, the Army Medical Museum displayed the materials and conclusions from laboratory work in its exhibits, and also allowed medical researchers to use its collections and facilities. Billings reiterated that one of the fundamental aims of the Museum was, necessarily "to show methods of research and of instruction for the benefit of the investigators and teachers of the country."[531] This meant not only the

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[530] Both images were credited to the Army Medical Museum, taken from Austin Flint, *A Text-Book of Human Physiology* (New York: D. Appleton and Company, 1889): 482, 486.
[531] Billings, " On Medical Museums," 24.

informative display of specimens, but also their juxtaposition with the instruments and apparatuses that facilitated that work, as well as illustrations of uses and results. Billings and his colleagues believed there was a clear and urgent need for this kind of exhibition of medical knowledge. After the publication of Koch's research became well known in America in the 1880's, Billings noticed that physicians and medical teachers visiting the museum asked to see "the apparatus used by Koch and Pasteur in bacteriological work, and eagerly examined the few specimens of cultures on solid media which we were able to exhibit."[532] The Army Medical Museum's large, unique collection contributed to its central position in American medicine, as it became the gatekeeper of medical knowledge.

The Science of Making Specimens

The arena of medical science in which the Army Medical Museum could make perhaps the most important contribution at this point in its history was that of the science of specimen preservation and preparation. "The anatomist," Billings reflected, "comes to the museum quite as much to see methods of mounting and preservation as to see the specimens themselves."[533] The science of specimen preservation was a constantly changing one. Billings claimed that the preparer of specimens struggled first with the fact that "the great majority cannot be preserved in such a manner as to retain their natural color, size and texture," and so it was up to him to determine the best means of preserving the specimen and its character.[534] This was no easy task, and certainly

[532] Billings, " On Medical Museums," 24.
[533] Billings, " On Medical Museums," 24.
[534] Billings, " On Medical Museums," 18.

required a great deal of skill, as well as narrative authority over the collection in which the specimen would be displayed. From its inception, the Army Medical Museum—and its sponsor, the Surgeon General's Office—was designed to be the foremost authority on the preservation and preparation of specimens to be used not only in protected museum display, but also in more interactive contexts for medical education.

From Hammond's Circular No. 2 announcing the Army Medical Museum project to Barnes's updates on requested material for the Museum, two important messages were clear: 1) that the Army Medical Museum relied on the contributions of army medical officers, and 2) that only Museum staff had the skill and resources necessary to properly preserve and prepare all specimens sent to the Museum. In his *Instructions for Medical Officers to whom a Microscope is furnished*, on July 1, 1868, Surgeon General Barnes even reiterated the skill necessary in any type of specimen preservation to medical officers who were expected to contribute significant material to the Microscopical Section of the Army Medical Museum. Barnes emphasized that they had only to send raw material, since the microscopical laboratory at the Museum was no doubt better equipped to properly prepare and mount materials for microscopical investigation and exhibit display.[535] By the beginning of the 1880's, the Museum had established a solid reputation in the science of specimen preservation and preparation. In addition to the thousands of visitors who marveled at the specimens frozen in time, a large group of professionals—from physicians to medical professors—consulted the Museum about this science weekly. Professor D.J. Cunningham—who would later become Professor of Anatomy at

[535] J.K. Barnes, *Instructions for Medical Officers to whom a Microscope is furnished* (Washington, D.C.: War Department, Surgeon General's Office, 1868).

Edinburgh and Chair of Anatomy of the Royal College of Surgeons of Ireland—consulted regularly with Billings on the best methods for preserving and preparing anatomical and pathological specimens, as well as modes for transporting them.[536]

In his efforts to ensure the Army Medical Museum was the leader in the science of specimen preservation, J.J. Woodward published his established techniques and preferred materials, and continuously researched alternative techniques and materials to use. After reading a publication by Dr. Lionel S. Beale—a microscopist and professor at King's College London—which argued that glycerine was the best long-term preservative, Woodward "hastened to adopt it." He used the "best Price's glycerine from England," and then "filled blood-vessels with Prussian blue, stained nuclei with carmine, and followed the plan proposed in all details with the utmost good faith." Although the preparations resulting from this process were "very pretty," Woodward found that they "obstinately refused to keep."[537] Woodward published these findings in *The Lens: A Quarterly Journal of Microscopy and the Allied Natural Sciences* in April 1872, and Dr. Beale published his strongly worded rebuttal in the same periodical by July, 1872, challenging Woodward to send a representative to England with specimens from the Army Medical Museum to be tried using his method. Woodward's October 1872 reply in *The Lens* acknowledges that while glycerine was "the most useful reagent in the examination of fresh specimens," and therefore frequently used at the Army Medical

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[536] In addition to the 1886-7 correspondence between Professor D.J. Cunningham and J.S. Billings, there are hundreds of letters in OHA 13: Curatorial Records, Incoming Correspondence, detailing the questions and concerns of physicians, professors, colleges and private institutions regarding the preservation and presentation of specimens, as well the answers and advice Billings, Barnes, Woodward, and other prominent staff provided in response.

[537] "Dr. J.J. Woodward in Reply to Dr. Lionel S. Beale," *The Lens: A Quarterly Journal of Microscopy and the Allied Natural Sciences*, Vol. 1, No. 4 (October, 1872): 208.

Museum, "for the permanent preservation of the soft tissues," he concluded glycerine was not nearly the best preservative. In the end, Woodward denounced Beale's methods as scientifically unsound, something he felt justified in doing because of his extensive experience researching the best methods of specimen preparation at the Army Medical Museum.

Craniometry and Skull Collecting

The skull collection at the Army Medical Museum has already found a place in history of science. The Philadelphia physician Samuel George Morton has gained some unhappy posthumous notoriety because of his starring role in Stephen Jay Gould's 1977 book on the pseudoscience of craniometry, in which Gould argues, "the most extensive data compiled before Darwin to rank races by the sizes of their brains," was developed using Morton's skull collection.[538] According to Gould, Morton was over-keen to prove his hypothesis "that a ranking of races could be established objectively by physical characteristics of the brain, particularly by its size."[539] Gould analyzes the manifold shifting criteria, miscalculations, and omissions deployed by the doctor to make the results accord with his prejudices. Physicians, anatomists, anthropologists, and museum curators across the United States sent Morton skulls for his growing collection, but the most reliable and largest contributions came from the U.S. Army Medical Department and the Army Medical Museum.

[538] Stephen Jay Gould, *The Mismeasure of Man* (New York: W.W. Norton & Company, 1981), 25.
[539] Gould, *The Mismeasure of Man*, 51.

Morton relied heavily on the cooperation of U.S. Army medical officers stationed in western territories, who had unprecedented access to the skeletons and skulls of Native Americans buried throughout the region. In his 1867 circular, Surgeon General Joseph K. Barnes requested that all medical officers—and especially those stationed in the western territories—submit to the Army Medical Museum "typical crania of Indian tribes" for its growing collection.[540] Many medical officers complying with this request would send additional crania to the Morton when they mailed sufficient specimens to the Museum.[541] At the same time, Morton maintained a close relationship with Barnes—whom he credited in some of his earlier publications—and their friendship facilitated the exchange of crania between Morton and the Army Medical Museum. Morton's relationship with both the U.S. Army and Barnes influenced the work done at the Museum in the field of craniometry, catalyzing greater interest and connecting it to wider debates in the field.[542]

Insofar as the science of craniometry developed rapidly in the nineteenth century, the collecting of skulls on which it relied was also widely popular. R.W. Shufeldt, a passionate anatomist and one-time clerk at the Army Medical Museum, noted that it was common practice for medical students to preserve and keep skulls from the bodies they dissected in school. Shufeldt considered the collecting of skulls by medical students justified by the fact that the majority of cadavers belonged to criminals or the poor. [543] In his memoir "Personal Adventures of a Human Skull Collector," Shufeldt remarked that

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[540] Lamb, *A History of the United States Army Medical Museum,* 43.
[541] Emily S. Renschler and Janet Monge, "The Samuel George Morton Cranial Collection: Historical Significance and New Research," *Expedition*, Vol. 50, No. 3 (Winter 2008): 31-2.
[542] Ann Fabian, *The Skull Collectors: Race, Science, and America's Unburied Dead* (Chicago: University of Chicago Press, 2010), 10-11.
[543] R.W. Shufeldt, "Personal Adventures of a Human Skull Collector," *The Medical Council*, Vol. 15 (April 1910): 123.

while he considered his own penchant for skull collecting unique, he later realized that human skulls were a fascinating mystery to both anatomists and a wider public.[544]

Long before Morton, physicians around the United States had been collecting skulls for their personal collections as well. The Civil War increased both the availability of skulls and physicians' access to them. In time, historical societies and museums would include skeletons and skulls in their collection as well. Perhaps the leading establishment in this regard was the Smithsonian Institution, which developed a large collection of human remains as part of what historian Samuel Redman calls "a growing project to understand humanity through a changing kaleidoscope of ideas about race and prehistory."[545] Joseph Henry, the Smithsonian Institution's first secretary, hoped it would become premier institution for the study of anthropology and ethnology. During his three decades at the Smithsonian, he oversaw the preservation and cataloguing of thousands of artifacts and remains, especially those of American Indians. It was Henry who helped establish a precedent for government-sponsored exploring expeditions to collect anthropological and ethnographic materials on behalf of the Smithsonian in the second half of the nineteenth century.[546]

Although museums with substantial collections of skulls, such as the Smithsonian Institution, tended to be museums of natural history and anthropology, two medical museums in particular became well known for their collections. The Mütter Museum

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[544] Shufeldt, "Personal Adventures,"123.
[545] Samuel James Redman, "Human Remains and the Construction of Race and History, 1897-1945" (Ph.D. dissertation, University of California, Berkeley, 2012), 2.
[546] See Curtis M. Hinsley, Jr., *Savages and Scientists: The Smithsonian Institution and the Development of American Anthropology 1846-1910* (Washington, D.C.: Smithsonian Institution Press, 1981); Robert E. Bieder, *Science Encounters the Indian, 1820-1880: The Early Years of American Ethnology* (Norman and London: The University of Oklahoma Press, 1986); Adrienne Kaeppler, "Anthropology and the US Exploring Expedition, 1838–1842," in *Magnificent Voyagers: The US Exploring Expedition, 1838–1842,* Herman J. Viola and Carolyn Margolis, eds., (Washington, DC: Smithsonian Institution Press, 1985), 120.

developed a substantial collection from the personal cabinets of the members of the College of Physicians of Philadelphia, as well as through exchange with the Army Medical Museum and purchasing collections from abroad. In 1874, the Mütter Museum acquired Viennese anatomist Joseph Hyrtl's collection of 139 skulls. In contrast to Morton and Broca, Hyrtl focused on studying the variety of cranial anatomy that existed in the Caucasian population of Europe. Not to be outdone in terms of completeness of collection, the Army Medical Museum also purchased a collection of skulls from Hyrtl, which he reassured would contain examples of "all the tribes living in the Austrian Empire," which he considered more difficult to obtain than those of Islanders of the Pacific, as well as skulls from the Ottoman Empire and a number of historical artifacts.[547] Since both museums had considerable collections of Native American and South American skulls, Hyrtl's collection was particularly important for more complete displays of human craniology.

The Army Medical Museum participated in the development of sciences surrounding the human skull in the second half of the nineteenth century in several important ways. Since its inception, the Museum had relied on a variety of collectors, means of collection, and specimens themselves in this quest for greater understanding of the human race and the conditions that affected its health. The Civil War provided a substantial number of crania for the museum's collection, though mainly exhibited as examples of cranial injuries experienced during the war—i.e. gunshot fractures of the skull and sabre wounds to the head. Yet, while Union medical officers collected

[547] Letter from Joseph Hyrtl to Surgeon General, 4 March, 1867, Box 2: Folder 8, OHA13: Curatorial Records, Incoming Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

specimens and skulls during the war, U.S. Army surgeons posted in the West were sending packages of Native American remains to the Army Medical Museum. "One rarely imagines that the somber work of reburying the Civil War dead and the scientific work of unburying and collecting Native American remains ran on parallel tracks," historian Ann Fabian reflects, "but the two drew on the same personnel and employed the same ideas and the same tools, albeit to very different ends for communities of survivors."[548] While the Army Medical Museum created commemorative displays of body parts of Union soldiers sacrificed in defense of the nation, it was simultaneously collecting the body parts of Native Americans for broader scientific investigations. The Army Medical Museum's position as a government institution and national medical museum, its staff of influential physician scientists and enthusiastic military medical officers, and its vast, long-established, but also ever-growing, collection of human skulls positioned it squarely in the middle of debates over the scientific value of the human skull and its relationship to understanding human variation.

The postbellum collection of crania for the Army Medical Museum was initiated in response to Circular No. 2, issued April 4, 1867. The Museum desired mainly American Indian skulls, "together with specimens of Indian weapons, dress, implements, diet, and medicines," for the chief purpose of aiding "the progress of anthropological science by obtaining measurements of a large number of skulls of the aboriginal races of North America."[549] Assistant Surgeon General Charles H. Crane further explained that it was necessary, "to procure sufficiently large series of adult crania of the principal Indian

[548] Fabian, *The Skull Collectors,* 5.
[549] Henry, *The Armed Forces Institute*, 57-59.

tribes to furnish accurate average measurements."[550] In addition to contributing to the progress of anthropological science, the Museum hoped to develop the most complete collection of human skulls in the world for research, analysis and display.

As hundreds of packages of Native American remains arrived at the Army Medical Museum in the decade after the war, it became clear that sufficient space for research and display would be necessary. By 1871, Woodward attested to the Museum's dedication to improving the science of craniometry, boasting that a room in the Museum had been "fitted up well provided with balances, calipers, goniometers and other instruments of precision used in investigations of this class," and Museum staff had already measured eight hundred and ninety-seven of these crania, recording their peculiarities and preparing a report of such for publication, so that they might be compared with those in other collections, and "thus to serve as an important addition to our knowledge of this interesting subject."[551] Woodward's public announcement of the collection and research regarding human skulls solidified its position not only as a clearinghouse for such desirable materials, but also as an institution for medical research, broadly conceived.

On January 18, 1873, Surgeon General J.K. Barnes characterized the Museum's collection and research further to John Coburn, Chairman of the Committee on Military Affairs of the House of Representatives:

> The Medical Officers of the Army have collected a much larger series of American skulls than have ever before been available for study. The collection embraces many ancient crania from caves and tumuli, from Greenland and Alaska, to Florida and Arizona, and specimens from the

[550] Henry, *The Armed Forces Institute*, 59.
[551] Woodward, "The Army Medical Museum at Washington," 238.

> majority of the existing tribes of Indians, and of the extinct races of the historic period. These as well as a sufficient series of skulls of the white and black races, have been carefully measured and figured by orthographic drawings so that the dimensions may be verified. Anthropologists in different parts of the world are anxious for the data thus accumulated for comparison with similar data published in Sweden, Russia, Germany, Italy, France and England."[552]

Although Morton collected and analyzed the most skulls of any single craniometrist, the Army Medical Museum surpassed Morton in the size of their collection. Ann Fabian observes that the collection of more than three thousand human skulls the Army Medical Museum displayed dominated public attention. Catalogued as "crania (all the bones of the head and face), calvarium (bones without the lower maxilla), and calvaria (bones of the skull alone)," some were fully intact, while others had been reconstructed as best as possible, and some lay in pieces to demonstrate the mode of destruction.[553] The skulls on display attracted greater numbers and a wider variety of visitors to the Army Medical Museum, while at the same time illustrating the breadth of the institution's scientific work.

After Army Medical Museum staff catalogued the collection of intact skulls, they measured them, in an effort to log and correlate origins with sizes of skulls. In order to ensure that the data collected might be easily compared, the staff working with skulls tried to stay abreast of methodological developments in craniometry. Up until the 1880's, museum staff used Broca's method of filling the crania with lead shot to measure cranial capacity. After he became Curator in January 1884, J. S. Billings reviewed the collection of crania and determined they should be remeasured for capacity against international

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[552] Lamb, *A History of the United States Army Medical Museum,* 81.
[553] Fabian, *The Skull Collectors*, 176.

standards. Billings advocated the use of the German "Frankfurter Verständigung" method, which he'd read about in the *Archiv für Anthropologie* in December, 1883.[554] In 1882, the 13th General Congress of German Anthropologists development the "Frankfurter Verständigung," or Frankfurt Agreement, wherein it was determined that the Frankfurt Horizontal Plane would be the reference point for craniometrical measurements. The Frankfurt Horizontal Plane could be established "by the lowest point on the margin of the right or left bony orbit and the highest point on the margin of the right or left bony auditory meatus."[555] (See Figure 4.7 below)

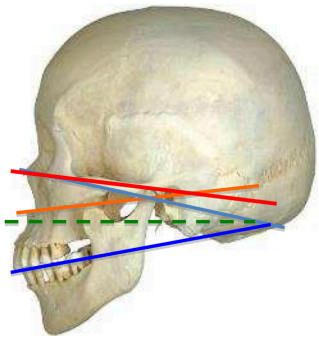


Figure 4.7: The horizontal reference plane of the skull is depicted by the green line, while the Frankfurt Horizontal Plane is indicated by the red line.
Laura H. Lux, "A Comparison of Two Methods to Articulate a Maxillary Cast with Lateral Cephalometry," (master's thesis, Marquette University, 2014), 3.

Billings thought that the measurements made with calipers, as in the "Frankfurter Verständigung," were more precise, and that Broca's methodology was outdated. Dr. Washington Matthews, an Assistant Surgeon in the U.S. Army began work in the

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[554] F.W. Hodge, editor, *Proceedings of the Nineteenth International Congress of Americanists, December 27-31, 1915* (Washington, D.C., 1917): 629.
[555] Laura H. Lux, "A Comparison of Two Methods to Articulate a Maxillary Cast with Lateral Cephalometry," (master's thesis, Marquette University, 2014), 3.

anthropological office of the Museum in April 1884, and soon after proposed sealing the skulls with putty and filling them with water in order to measure their capacity.[556] Dr. Matthews found that the results did not appear to contradict established findings, but published his work in the *Memoirs of the National Academy of Sciences* in 1885.[557] After developing descriptions for specimens in the Museum's collection of gunshot wounds, clerk R.W. Shufeldt tried his hand at craniometry, indulging his passion for working with skulls. He first tried Matthews's method of measuring skulls with water, but decided he preferred "fine 'dust shot,' pellets smaller than common twelve-gauge shot."[558] Shufeldt's research was never published because he was discovered to have been photographing the Museum's skulls and sending the photographs to other museums, and was fired soon after.

In the meantime, Billings worked on composite photographs and corresponded with Francis Galton about comparing crania in different collections through these photographs.[559] The composite photographs would allow for not only the conveyance of data through thorough labeling, but also the visualization of the skulls that was often missing in catalogues sent between institutions. So valuable was the information that the Military Affairs Committee created a bill to fund the publication of a catalog of the collection, but the bill failed and the catalog was never created. Aside from composite photography, Billings found the science of cranionmetry increasingly fruitless. Although most of the crania in the museum had been measured, and the data published, Billings complained that "many other measurements are desirable to permit of comparison with

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[556] Hodge, *Proceedings of the Nineteenth International Congress of Americanists*, 629.
[557] Lamb, *A History of the United States Army Medical Museum,* 88.
[558] Fabian, *The Skull Collectors*, 215.
[559] Hodge, *Proceedings of the Nineteenth International Congress of Americanists,* 629.

series taken elsewhere, and even measurements already made must be repeated by later and better methods."[560] Despite—or perhaps, because of—his extensive work with the collection of crania, Billings ultimately concluded that the collection itself was "not actually half large enough to permit of drawing definite scientific conclusions from it."[561] By the 1890's research in craniometry at the Museum began to decline. By the beginning of the twentieth century, after decades of "medically unfruitful measurement of the cubic capacity, the length and breadth, the facial angle, and other characteristics of skulls," the Surgeon General determined the work more appropriate to anthropological, than medical, study.[562] The Army Medical Museum transferred the bulk of its comparative collection of human crania to its neighbor the Smithsonian Institution, which had purportedly better resources for transforming skulls into pedagogical tools.

Conclusion

The Civil War shaped and made possible the Army Medical Museum, providing it with an emotionally compelling national purpose and scientific value. Yet, in the decades following the Civil War, the Museum carved out for itself a new identity and place in American scientific medicine, as an institution for medical research. In seeking to become the clearinghouse of medical knowledge by housing a complete collection of specimens, models and displays representing all of the medical sciences, the Museum established relationships and exchanges with physicians, professors, universities, museums and medical institutions around the world. Under the direction of its staff of

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[560] Billings, " On Medical Museums," 22.
[561] Billings, " On Medical Museums," 22.
[562] Henry, *The Armed Forces Institute*, 59.

physician scientists, the Army Medical Museum developed extensive collections of specimens that were useful for both display and research, contributing to growing fields like microscopy, pathology, anatomy, physiology, and craniometry. Museum staff published their research and participated in debates central to the development of these medical sciences, hoping to solidify the Army Medical Museum's position as the most important institution for medical research at that time.

Despite this growing reputation, Army Medical Museum was overextended in finances as well as resources by the end of the nineteenth century. It had not only provided the essential components of medical education to the U.S. Army Medical Department, but also participated in wider debates in medicine, and though with little success in the latter. What is more, Billings reflected, although the Army Medical Museum had what seemed "a large amount of material relating to human osteology, and especially craniology, in its relations to North American ethnology or the history of the development of different varieties of man on this continent," the collection was actually not "half large enough to permit of drawing definite scientific conclusions from it."[563] The work of Museum staff in microscopy, comparative anatomy, and craniometry at this time was contingent upon the use of museological science and the production of reliable information through analysis, comparison, and diagnosis. In the absence of definitive scientific conclusions in craniometry, the size and scope of the materials used for analysis were blamed. Thus, the Army Medical Museum's commitment to expanding its collection for the benefit of medical research was inherently tied to the demands of museological science. By the end of the nineteenth century, the promise of laboratory

[563] Billings, " On Medical Museums," 22.

medicine to provide the answers that analytical research could not yield finally persuaded Museum staff to more directly accommodate the laboratory revolution. When George Miller Sternberg took over as Surgeon General and Walter Reed became Curator of the Museum in 1893, they decisively shifted the Museum's focus away from museological science and refocused its resources towards that of medical laboratory. Reed had the bulk of the Museum's collection of crania and comparative animal specimens transferred to the Smithsonian Institution, where a more complete collection could be established.

Chapter Five: Forging New Frontiers—The Bacteriological Revolution of the Army Medical Museum

Under the curatorship of John Shaw Billings, the Army Medical Museum grew into a large, national institution for medical research. J.J. Woodward published the results of his work with microscopy and photomicrography, a technology he pioneered. Museum staff developed and organized sections on developmental anatomy and comparative anatomy, as well as craniometry. They presented specimens and research at medical conventions and national exhibitions. Yet, despite the vast number of publications resulting from investigations at the Army Medical Museum, and the widespread publicity of its valuable collection, there were few tangible achievements that could be attributed to the national research institution in the 1880's. W.F. Bynum explains that up to this point in the nineteenth century most American doctors "were more consumers than producers of scientific ideas," and it was not until the turn of the century that American medicine truly emerged on the world stage.[564] That emergence took place at the Army Medical Museum, underscoring the tremendous epistemic gains made by the decision to transition from the hybrid museological and laboratory techniques of the Billings directorship to more fully experimental methods and protocols.

In his 1907 address to the Congress of American Physicians and Surgeons, renowned physician and professor William Osler reflected on the development of experimental methods since the birth of the clinic. "Life is an experiment in nature's laboratory," he suggested, and disease and the methodologies employed in understanding

[564] W.F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge: Cambridge University Press, 1994), xiii.

and combating disease were part of that experiment. What is more, Osler claimed, the treatment of disease had always been experimental, and even with the refinement of discoveries in the nineteenth century, physicians could not escape that each dose of medicine was truly an experiment unto itself.[565] Osler's speech was aimed at American antivivisectionists who accused the medical profession of subverting patient welfare to the goals of scientific experiment—by suggesting that life itself was an experiment, he claimed that no such subversion could take place.[566] Experiments relying on vivisection had become central to achievements in medical science in the nineteenth century. Without it, Jenner, Pasteur, and Koch might not have accomplished their important work with smallpox, rabies, anthrax, and tuberculosis. Given the new parameters of their work, Sydney Halpern argues, medical scientists in Europe and America determined to "select a course of action that minimized overall harm from both illness and medical treatment."[567] Thus, Osler declared, "the limits of justifiable experimentation upon our fellow creatures are well and clearly defined. The final test of every new procedure, medical or surgical, must be made on man, but never before it has been tried on animals."[568]

The rise of experimental sciences and controversy over human experimentation were at the heart of U.S. Army Medical Department work during the late nineteenth and

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[565] William Osler, "The Evolution of the Idea of Experiment in Medicine," *Transactions of the Congress of American Physicians and Surgeons*, Seventh Triennial Session (New Haven, Conn.: The Congress of American Physicians and Surgeons, 1907): 7.

[566] I use 'vivisection' in this chapter according to the late nineteenth century definition, "used to denote any experimental manipulation." In *Subjected to Science: Human Experimentation in America Before the Second World War* (1995), Susan Lederer notes that many Americans used vivisection and experimentation interchangeably, while "human vivisection, on the other hand, was used to describe only those experiments on human beings undertaken not to benefit an individual subject but to provide medical information." (Lederer, *Subjected to Science*, xiv).

[567] Sydney Halpern, *Lesser Harms: The Morality of Risk in Medical Research* (Chicago: University of Chicago Press, 2004), 4.

[568] Osler, "The Evolution of the Idea of Experiment in Medicine," 7.

early twentieth centuries. The appointment of Lieutenant Colonel George Miller Sternberg as Surgeon General of the Army, and Major Walter Reed as Curator of the Army Medical Museum, in 1893 marked a fundamental shift in the goals and function of the Army Medical Museum and Library. It was under Sternberg and Reed that the work of the Army Medical Department and the Army Medical Museum would finally privilege the scientific progress over the wellbeing of the patient. Sternberg was keen on transforming the Army Medical Museum into a center for the study of infectious diseases, and Reed was determined to ensure that the most precise, scientific work was being done there. Like Hammond and Brinton, Sternberg and Reed conceived of the Army Medical Museum as central institution for medical education and research. Sternberg and Reed saw to it that Hammond's educational goals of the Army Medical Museum were finally realized in the Army Medical School, created in 1893. As well-established bacteriologists, Sternberg and Reed focused the Army Medical Museum's resources on determining the characteristics and causal agents of some of the nineteenth century's most insidious infectious diseases.

The development of germ theory, bacteriology, and other important experimental medical sciences coincided with, and became part of, late nineteenth and early twentieth century colonial and imperial projects. It was during this time that the field of tropical medicine emerged, coalescing around the Spanish-American war in 1898.[569] The conflict diverted the Army Medical Department's energy and resources to establishing field and ship hospitals to care for the sick and wounded overseas. The Army Medical Department

[569] Alexandra Minna Stern, "Yellow Fever Crusade: US Colonialism, Tropical Medicine, and the International Politics of Mosquito Control," in *Medicine at the Border: Disease, Globalization and Security, 1850 to the Present*, ed. Alison Bashford (London: Palgrave MacMillan, 2006), 41-43.

mobilized medical officers to Cuba and Puerto Rico in the Caribbean, and to Guam and the Philippines in the Pacific. Just over two decades after the Civil War ended, the war with Spain challenged once again the Army Medical Department's organization and resources. Yet, insofar as the Spanish-American war presented new challenges, it also provided new opportunities for the study of infectious diseases. It was during this time that Sternberg and Reed oversaw seminal research on typhoid fever and yellow fever, paving the way for prevention and treatment of these infectious diseases and the development of public health infrastructure. At the same time, their efforts were part and parcel of a growing trend towards human experimentation entangled with the American program of imperial expansion in the name of science and human welfare.

The international crusade against yellow fever was sparked by the Spanish-American war, but had its roots deep in American history. This chapter examines the long legacy of yellow fever in the United States, as well as the role of the Army Medical Department and Army Medical Museum in the development of bacteriology, immunology, and tropical medicine. I trace the development of bacteriological studies at the Army Medical Museum and Library, alongside the formation of the Army Medical School. I examine the role of the Army Medical Museum and the Army Medical School in the advancement of bacteriological research, focusing on the diagnostic functions of the bacteriological laboratory, and the work of Sternberg, Reed, and other staff on diphtheria, malarial fever, typhoid fever, and yellow fever. The zeal with which the staff of the Army Medical Museum and the Army Medical School conducted bacteriological research was widely publicized in the early nineteenth century. The discoveries these men made, however, often came long after the damage of disease outbreak had been

done, and were swept up in the controversies surrounding tropical medicine and U.S. imperialism.

Part I: The Transformation of Medical Research Under Sternberg and Reed

President Grover Cleveland appointed Lieutenant Colonel George Miller Sternberg Surgeon General of the U.S. Army in 1893, at the recommendation of Sternberg's mentor, John Shaw Billings. Sternberg had taught himself bacteriology in the late 1870s, before it had become a discipline, and was considered by many the father of American bacteriology.[570] Historian Patricia Peck Gossel argues that Sternberg's early work was crucial to the acceptance and diffusion of the germ theory of disease toward the end of the nineteenth century. After surviving typhoid fever during the Civil War and losing his wife to cholera, Sternberg focused on the study of infectious disease, testing disinfectants in his home laboratory and volunteering to go wherever there was a typhoid or yellow fever outbreak.[571] He made exhaustive studies of a bacillus he thought to be the cause of yellow fever, but eventually disproved his own theory and was never able to find the causative bacterium himself.[572] Sternberg is also credited with independently discovering the pneumococcus that caused pneumonia in 1881, only months after Louis Pasteur had made the same discovery in France. In 1882, Sternberg photographed the tubercle bacillus for the first time, the same year it was discovered by Robert Koch. Just one year before his appointment as Surgeon General, he published *A Manual of*

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[570] James Bordley and Abner McGehee Harvey, *Two Centuries of American Medicine, 1776-1976* (Philadelphia: W.B. Saunders Company, 1976), 328.
[571] Patricia Peck Gossel, "Pasteur, Koch and American Bacteriology," *History and Philosophy of the Life Sciences*, Vol. 22, No. 1, Selected Papers from a Conference Held at the Dibner Institute: 'Pasteur, Germs and the Bacteriological Laboratory,' 22-23 November 1996, Part I (2000): 88.
[572] Bordley and Harvey, *Two Centuries of American*, 198.

Bacteriology in 1892, the first American textbook on bacteriology. While many of the previous Surgeons General had achieved renown in medical fields after their military career, Sternberg was the first to have attained scientific prominence beforehand.[573] It was Sternberg's personal experiences and vast accomplishments that made him determined to utilize the Army Medical Department and the Army Medical Museum to solve the mysteries of infectious diseases and add even more glory to his name, whatever the price.

Central to Sternberg's plan for medical greatness was Walter Reed, a clever physician who graduated from the University of Virginia as M.D. when he was just seventeen years old. After pursuing advanced studies at Bellevue Hospital Medical College, New York, Reed joined the U.S. Army Medical Department in 1875, and spent eight years "with the usual varying fortunes of a young medical officers of the army," serving in Arizona, Nebraska, the Dakota territory, and in the Southern and Eastern States.[574] In 1890 he was sent to Johns Hopkins in Baltimore, where he pursued research in bacteriology and pathology under the distinguished Dr. William H. Welch.[575] His work under Welch earned him a reputation as a skilled researcher, with unparalleled accuracy and judgment.[576] Soon after Reed joined the faculty of the George Washington School of Medicine in 1893, he was appointed Curator of the Army Medical Museum and Professor of Bacteriology at the Army Medical School, leaving little time for his own research. Reed became Sternberg's chief assistant, directing bacteriological research at the Army

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[573] Robert S. Henry, *The Armed Forces Institute of Pathology: Its First Century, 1862-1962* (Washington, D.C.: Office of the Surgeon General, Department of the Army, 1976), 92.
[574] Walter Drew McCaw, *Walter Reed: A Memoir* (Washington, D.C.: Walter Reed Memorial Association, 1904): 3-4.
[575] McCaw, *Walter Reed*, 4.
[576] McCaw, *Walter Reed*, 5.

Medical Museum, teaching at the Army Medical School, and conducting field research through investigative commissions at army camps in the United States and Cuba.

The Rise of American Bacteriological Science

Gossel notes that although few Americans directly imitated Louis Pasteur's work on immunology, his work "influenced their faith in the potential of bacteriology as a solution to the problems of infectious disease."[577] It was Pasteur's "germ theory of putrefaction," discussed in the context of Joseph Lister's work on antisepsis, that appealed to American medical scientists.[578] One example of how these two concepts worked together can be seen in the work of Arthur T. Cabot of Boston, who devised "a way to test the effectiveness of an antiseptic by determining the length of exposure necessary to stop putrefaction."[579] Army Surgeon George M. Sternberg conducted similar experiments in his home laboratory, publishing results favorable to Pasteur's theory in "Experiments Designed to Test the Value of Certain Gaseous and Volatile Disinfectants," in the *National Board of Health Bulletin* of 1879.[580] Gossel argues these research practices demonstrated that Americans had "conceptually tied the effectiveness of antiseptics to the destruction of micro-organisms and were actively engaged in research to identify the best antiseptics."[581] Lister's practical application of Pasteur's theories provided American physicians with a useful method for investigating the principles of germ theory through a "complex process of scientific debate." Historian of Science

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[577] Gossel, "Pasteur, Koch and American Bacteriology," 81.
[578] Gossel, "Pasteur, Koch and American Bacteriology," 86.
[579] Gossel, "Pasteur, Koch and American Bacteriology," 86.
[580] Gossel, "Pasteur, Koch and American Bacteriology," 87; Martha L. Sternberg, *George Miller Sternberg: A Biography* (Chicago: American Medical Association, 1920), Bibliography.
[581] Gossel, "Pasteur, Koch and American Bacteriology," 88.

Nancy J. Tomes argues that these debates, detailed in journals like the *Boston Medical and Surgical Journal*, the *New York State Medical Journal*, the New York *Medical Record*, and the *Philadelphia Medical Times* in the early to mid-1870s, produced "a more clearly articulated and persuasive germ theory" based on American, as well as European research by the 1880s.[582]

The debates concerning the germ theory of disease in America relied not only on the work of Pasteur and Lister, but also on that of Robert Koch, a German microbiologist considered the founder of modern bacteriology. A significant turning point in the debates concerning the germ theory of disease was reached with Koch's discovery of the causal agent of anthrax in the late 1870s. This discovery, together with Pasteur's development of the anthrax vaccine, completed the "cycle of proof" that opponents of the germ theory of disease demanded.[583]Although much of his work had not been translated into English, Tomes explains that Koch's "demonstrations concerning anthrax in the late 1870s, followed by his investigations of wound infection, cholera, and tuberculosis in the early 1880s, were widely summarized and commented upon in American journals."[584] In 1882, Koch formalized the series of procedures and techniques he developed through his research—referred to as Koch's Postulates—making his work even more accessible to wider audiences. Koch's Postulates suggested that, in order to prove an organism was the cause of a disease, it was also necessary to demonstrate:

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[582] Nancy J. Tomes, "American Attitudes toward the Germ Theory of Disease: Phyllis Allen Richmond Revisited," *Journal of the History of Medicine and the Allied Sciences*, Vol. 52, No. 1 (January 1997): 24-5.
[583] Tomes, "American Attitudes toward the Germ Theory of Disease,"41.
[584] Tomes, "American Attitudes toward the Germ Theory of Disease," 41

> That the organism could be discoverable in every instance of the disease; that…the germ could be produced in a pure culture, maintainable over several microbial generations; that the disease could be reproduced in experimental animals through a pure culture; and that the organism could be retrieved from the inoculated animal and cultured anew.[585]

Historian Mark Harrison suggests that Koch's Postulates, "gave shape to the emerging discipline of bacteriology."[586] By insisting on the use of pure cultures, and formalizing his methodology in the identification of organisms behind diseases, Porter argues, Koch had "elevated bacteriology into a regular science."[587] By the late 1880s, Gossel claims, Koch's discoveries and methods "had generated enough support for bacteriology and germ theory that the American medical community could grasp the broader implications of Pasteur's work on immunity," and this combination "convinced Americans that bacteriologists had the potential to solve many of the problems of health and disease."[588] To be sure, Sternberg, Reed, and the staff of the Army Medical Museum were among those persuaded by the promise of this new germ theory of disease.

Students interested in the new field of bacteriology traveled to Koch's laboratories in Germany to witness his Postulates in action. John Harley Warner argues that with the laboratory revolution in medicine, Vienna and Berlin had eclipsed Paris as the locus of scientific medical study abroad. The opportunities for the study of microscopy, chemistry, and bacteriology in Germany were particularly attractive to American and European medical students and physicians influenced by Pasteur and

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[585] Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (New York & London: W.W. Norton & Company, 1997), 436.
[586] Mark Harrison, *Disease and the Modern World: 1500 to the Present Day* (Cambridge, UK: Polity Press, 2004), 120.
[587] Porter, *The Greatest Benefit to Mankind*, 436.
[588] Gossel, "Pasteur, Koch and American Bacteriology," 93.

Koch's work.[589] Paul Ehrlich, a student at the Charité, had come to Berlin to continue hematological research, but was inspired by Koch's work in immunology. Ehrlich, along with physiologist Emil von Behring, began work at Koch's Institute for Infectious Diseases in Berlin, and together they worked investigating the development of toxins and antitoxins.[590] Ehrlich's chemical theories of antigen-antibody interactions became a cornerstone in immunology research and his results set the standards by which Americans judged their own researches.[591] For the most part, American students observed experimental practices in Germany and were eager to replicate them in the United States. Yet, as Susan Lederer argues, many American students and physicians were critical of the laboratory practices they witnessed in Berlin and Vienna. Like the Paris School in the mid-nineteenth century, the laboratories of Berlin and Vienna appeared to many Americans temples of science where the art of healing was lost on the cold, calculated experimentalist.[592]

Nevertheless, it was Koch's American disciples who returned to home to open the first bacteriological laboratories and begin teaching bacteriology.[593] By 1886 there were "medical laboratories equipped for the study of bacteria" at Johns Hopkins University in Baltimore, Harvard University in Boston, and at the College of Physicians and Surgeons (later Columbia University Medical School) and Bellevue Hospital Medical College in New York City. These laboratories were central to bacteriological research and

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[589] John H. Warner, *Against the spirit of the system: the French impulse in nineteenth-century American medicine* (Princeton: Princeton University Press, 1998), 304-5.
[590] Bynum, *Science and the Practice of Medicine,* 162-164; Porter, *The Greatest Benefit to Mankind*, 450-51.
[591] Porter, *The Greatest Benefit to Mankind*, 451.
[592] Susan Lederer, *Subjected to Science*: *Human Experimentation in America before the Second World War* (Baltimore, MD: Johns Hopkins University Press), 7.
[593] Gossel, "Pasteur, Koch and American Bacteriology," 93.

education, but also functioned as diagnostic centers that serviced the needs of city officials and local physicians.[594] Surgeon General Sternberg and Army Medical Museum Curator Walter Reed saw to it that the Museum developed a sophisticated bacteriological laboratory, with more resources than typically available at civilian or public laboratories. The bacteriologic laboratory was perhaps the most important investigative space in the Museum during the end of the nineteenth, and beginning of the twentieth century, functioning as both a diagnostic center and research facility. What is more, this bacteriological research, paired with the opportunities for epidemiological investigations in Army camps, gave the Army Medical Museum a unique advantage in making bacteriological discoveries and developing treatments.

The Bacteriological Laboratory of the Army Medical Museum

When he became Curator of the Army Medical Museum in 1893, Walter Reed's main focus was the expansion and improvement of the bacteriological laboratory (see Figure 5.1), rather than the Museum itself, as he believed it would have the most to contribute to modern medicine.

[594] Gossel, "Pasteur, Koch and American Bacteriology," 94.



Figure 5.1: The early bacteriological laboratory of the Army Medical Museum
AMM1155, Box 7, OHA74: Army Medical Museum Photographs, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland

Although typhoid fever was his research specialty, Reed soon drew on relationships he had established with medical institutions through his work on typhoid fever to assist the Museum with studying and combating other diseases, such as malaria, tuberculosis, and yellow fever.[595] His reputation as a keen scientific researcher benefitted the bacteriological laboratory of the Army Medical Museum in a number of ways. Reed maintained correspondence with Dr. Paul Gibier, Director of the Pasteur Institute in New York, who often sent him bacteriological cultures and vaccines. When, in 1895, the diphtheria bacillus Reed was working with failed to produce "a toxin which compares with the requirements of Ehrlich," Reed turned to Gibier for a culture of the diphtheria

[595] Walter Reed to Dr. Paul Gibier, 2 February 1895, Series 3-12-1, Folder 490-512, OHA19.F3-12-1.490-512 OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

bacillus that might produce a more powerful antiserum.[596] Reed also oversaw the shipment of bacteriological cultures for research, to post surgeons throughout the United States. The Army Medical Museum shipped a wide variety of cultures, including the bacillus of diphtheria, bacilli found in the colon, and the typhoid bacillus, as well as those which seemed to produce varying symptoms, like *staphylococcus aureus* and *streptococcus pyogenes*.[597] That Reed and the workers of the Army Medical Museum saw little risk in the shipment of these cultures illustrates an underdeveloped knowledge of germ theory common at the time. Susan Lederer claims that many bacteriological investigators doubted that "a microscopic organism alone could cause complex human disease," and were therefore ignorant of many of the risks involved in their research.[598] This doubt would play a large role in the work Reed and other physicians pioneered in typhoid fever and yellow fever research in the early twentieth century.

Although Reed preferred to conduct the bulk of bacteriological research at the Army Medical Museum himself, he often enlisted the help of more senior post surgeons in the tedious laboratory work of examining bacterial cultures and developing counteragents. In drawing on the Army Medical Department's manpower across the country, Reed inadvertently facilitated the energetic spread of bacteriological research, as Army post surgeons quickly recognized in this experimental science an opportunity for medical breakthroughs. Captain Charles B. Erwing, Assistant Surgeon at the Jefferson

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[596] Walter Reed to Dr. Paul Gibier, Director of the Pasteur Institute, NY, 2 February 1895, Box 3-12-1, Folder 490-512, OHA19: Curatorial Records, Numbered Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland. Reed was referring to Paul Ehrlich, the German scientist who had recently co-developed an antiserum for the treatment of diphtheria.
[597] Walter Reed to Major J.V. Lauderdale, Post Surgeon, Fort Omaha, 2 July 1895, Box 3-12-2, Folder 751-773, OHA19: Curatorial Records, Numbered Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[598] Lederer, *Subjected to Science*, 3.

Barracks in Missouri, was one of a number of medical officers tasked in 1893 to establish a diphtheria antitoxin "plant" at his military post, where he would work to produce both the bacteria and its antitoxin. Erwing regularly submitted samples of the antitoxin to Reed for further analysis.[599] Drawing on Sternberg's work on the application of disinfectants to microorganisms, Reed also tested the application of a number of disinfectants to typhoid bacillus cultures, hoping to determine the strength of solution at which the bacillus might be killed.[600] Brigadier General Charles Smart, Professor of Hygiene at the Army Medical School and an expert sanitary chemist, assisted Reed in the comparative analysis of disinfectants to be used in the Army Medical Department. Reed and Smart worked to determine the best disinfectants not only for sanitation and hygiene in the Army, but also for the management of infectious diseases.[601] As the Spanish-American War would demonstrate, neither endeavor was very successful.

Just like the bacteriological laboratories in Baltimore, Boston, and New York, the facilities for the study of bacteriology at the Army Medical Museum functioned as a diagnostic resource for civil and military medical institutions and army outposts around the country. Regardless of the extent of their resources to conduct bacteriological investigations themselves, civilian medical researchers often deferred to Army Medical Museum as the best equipped to handle more important investigations, as well as the final authority on bacteriological discoveries. Dr. G.N. Acker was one of the many

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[599] Charles B. Erwing, A.S. Jefferson Barracks, to Reed, 7 June 1895, Box 3-12-2, Folder, 710-723, OHA19: Curatorial Records, Numbered Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland. See also *Southern Practitioner*, Vol. 17, p. 79.
[600] Walter Reed to Surgeon General Sternberg, 26 November, 1894, Box 3-12-2, Folder 333-377, OHA19: Curatorial Records, Numbered Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[601] Charles Smart to Walter Reed, 5 September 1894, Box 3-12-1, Folder 136-143, OHA19: Curatorial Records, Numbered Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

Washington, D.C. physicians who availed themselves of this resource, when he submitted the spleen from a 9-year-old boy, which he lacked the means to properly diagnose. Major Reed responded to Dr. Acker personally with the results just a few weeks later, indicating "congestion and hyperplasia of splenic trabeculae," and concluding that it was likely a case of "lympho-adenoma or lympho-sarcoma originating primarily in the splenic glands."[602] Reed considered providing these diagnostic services central to the scientific authority of the Army Medical Museum and the Army Medical Department.

For many military medical officers, it was considered standard practice to submit to the Museum specimens of camp infection for bacteriological examination, in order to prevent an outbreak and determine how best to improve camp hygiene and sanitation. Surgeon J.W. Ross, U.S. Navy, frequently sent tumors from his patients to the Medical Museum laboratory for diagnosis and further characterization.[603] Ross and many other surgeons also expressed their concern that any preliminary diagnoses be vetted by the Museum, as a respected institution for scientific work.[604] Captain Henry H. Pipes of the Medical Corps frequently sent in specimens for bacteriological analysis, so as to consistently maintain the superior health of soldiers at his post.[605] In sending these specimens, postmasters like Pipes utilized the scientific medical resources of the Army

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[602] Letter from Reed to Dr. G.N. Acker, Washington, D.C., 24 April 1895, Series 3-12-3, Folder 605-628, OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[603] AMM to Surgeon J.W. Ross, 22 September 1894, Series 3-12-1, Folder 245-264, OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[604] AMM to Surgeon J.W. Ross, 22 September 1894, Series 3-12-1, Folder 245-264, OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[605] AMM to Captain Henry H. Pipes, 2 April 1909, Series 3-13-1, OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

Medical Museum not only to ensure the maintenance of health at their posts, but also to ensure they would receive a thorough and positive review in the Surgeon General's yearly report on the prevalence of illness in military camps. What is more, as many of these specimens were preserved for museum display after their diagnostic functions ceased, the large influx of bacteriological material permeated the Army Medical Museum's exhibits. In contrast to the Museum's early pathological material, which showed disease manifestations visible to the visitor, bacteriological specimens made visible characteristics of disease that had been previously unseen by the naked eye.

Perhaps the most peculiar iteration of this diagnostic service the Army Medical Museum offered was that of bacteriological examination of water. The Army spearheaded efforts to clean up water supplies in order to improve overall camp sanitation, using military posts and hospitals around the country as testing sites. Sometimes they focused on testing public water supplies that affected military posts, as in the case of Fort Monroe, Virginia and the Peninsula Pure Water Company.[606] Other times, they tested the wells and water supplies of military stations themselves, as in the case of Fort Ontario, New York. Captain R.M. Gilbie, Medical Corps Surgeon at the Post Hospital, regularly sent the Army Medical Museum samples from the wells of Fort Ontario, so that they might undergo bacteriological examination.[607] In addition to determining the bacteriological content of the water, these samples were used in comparison with one another, and with case histories sent from their respective posts, in order to assess the development of bacteriological conditions in relation to the water

[606] Series 3-13.1.F11001 OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[607] Series 3-13.1.F11001 OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

supply. The analysis of water supply was particularly relevant to the occurrence of malarial fevers in Army camps, an all too common disease that was thought to result from water contamination.

The prevalence of malarial fevers in 1894 and 1895 at Army posts in the area surrounding Washington, D.C. had become cause for concern, so in August, 1895, Sternberg sent Reed to investigate. At that time, Cuban physician Carlos Finlay's theory that the disease was spread through mosquitoes had not gained much traction in the United States, so the cause of malarial fever remained a subject for research. Sternberg wanted Reed to document the "clinical features of the malarial fever prevalent at these posts and their etiology," as well as examine blood samples from troops and inspects surrounding areas "from a hygienic point of view."[608] Reed set off with Dr. W.M. Gray, who worked at the Army Medical Museum, and Dr. Carroll, who was then Hospital Steward at the Museum and an assistant in the pathological laboratory of the Army Medical School. Together, they surveyed first the conditions at Fort Myer in Virginia, and the Washington Barracks, and then launched a substantial investigation into the occurrence of malarial fevers at each post. Reed and his team reviewed health records from both posts as far back as 1871 in order to understand the historical prevalence of the disease at each post.

Overall, Reed concluded that the prevalence of malarial fevers at the Washington Barracks was due to the marshlands surrounding it, from the Potomac flats on the west to the Anacostia River on the east. At the same time, Reed also attributed instances of

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[608] Surgeon General George M. Sternberg to Major Walter Reed, 30 August 1895, Box 006, Folder 006, OHA39: Museum Records, Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

malarial disease at Fort Myer in part to the marshlands of the Potomac flats. In both cases, he concluded that the water supply—which taken from the main supply of the city of Washington—was not the culprit.[609] Furthermore, Reed found that "intermittents" and aestivo-autumnal (or acute) fevers were present at both Fort Myer and the Washington Barracks, although microscopical examination of blood samples demonstrated that there was a significantly higher instance of aestivo-autumnal fevers at the Washington Barracks. Reed's report to the Surgeon General in August 1896 was over ten pages long, with detailed descriptions of the work done each month, as well as charts illustrating the occurrence of the disease and monthly averages of disease occurrence, and a thorough review of the relationship of the camps' water supplies to the disease.[610] Although Reed and his team were able to determine that the sanitary conditions at the Washington Barracks were particularly deplorable, and that the surrounding marshlands encouraged malarial fever, they came to no broader conclusions about the nature of malarial fever. Reed's report joined many other in-depth studies on the shelves of the Army Medical Library, as pieces of the puzzle of malarial fever, a puzzle that would not be solved until the twentieth century. Although the Army Medical Museum would facilitate great strides in the combat against infectious diseases, malaria was not one of those diseases.

Typhoid fever had plagued both Union and Confederate armies during the Civil War, and the medical departments on both sides sought to better understand its cause and mechanism through reports and case histories. *The Medical and Surgical History of the War of the Rebellion* detailed its characteristics observed during the Civil War, but the

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[609] *Report of the Surgeon General of the Army to the Secretary of War for the Fiscal Year ended June 30, 1896* (Washington, D.C.: Government Printing Office, 1896), 66.
[610] *Report of the Surgeon General*, 65.

cause and mechanism remained unknown. In 1880, German pathologist and bacteriologist Karl Joseph Eberth discovered the bacillus causing typhoid fever, but his research was not widely accepted until fellow German bacteriologist Georg Theodor August Gaffky developed typhoid bacillus cultures on his own, proving Eberth's discovery in 1884.[611] By 1884, Army Medical Museum staff published the results of several decades studying typhoid fever, describing the "typical lesions of typhoid fever" in the *Proceedings of the Medical Society of D.C.* and the *Maryland Medical Journal*.[612] Before he was Surgeon General, Sternberg delivered a presentation of his work on "The Bacillus of Typhoid Fever" at the first meeting of the Association of American Physicians, held at the Army medical Museum in June 1886. He discussed the availability of proof of Eberth's theory that the bacillus bore an "etiological relation to enteric fever," based on experiments he had conducted on mice and rats. From his experiments, he concluded that bacillus of typhoid fever was a pathogenic organism that could survive in all animals, and was capable of "multiplication external to the human body in a variety of organic media at comparatively low temperatures."[613] Both Sternberg and Reed were determined to use the Army Medical Department and Army Medical Museum's resources to continue typhoid fever research in hopes of gaining greater understanding of the disease. The war with Spain in 1898 would provide a unique platform for the field research and experimentation they sought.

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[611] George M. Gould, "The Bacillus of Typhoid Fever," The Philadelphia Medical Journal, Vol. 6 (June 6, 1900): 612.
[612] Lamb, *A History of the United States Army Medical Museum*, 88.
[613] "The Association of American Physicians: First Meeting, held in the Army Medical Museum, Washington, June 17 and 18, 1886." *Journal of the American Medical Association* VII:2 (July 10, 1886): 50.

Part II: The Foundation of the Army Medical School

For much of its existence, the Army Medical Museum had fulfilled the purpose Hammond envisioned, illustrating the manifestations of disease on the body in a national medical museum for the education of medical students and physicians. As the nineteenth century drew to a close, it added the functions and spaces of bacteriological investigation and experiment. Yet, one facet of Hammond's goal in this medical education project remained unrealized—that of an Army Medical School to formally train Army medical officers, drawing on the collections of the Army Medical Museum and Library to produce an unparalleled medical education program. The Army Medical School had been conceived of decades before its creation, but was only made possible in the new, larger building at 7th and Independence Avenue, and through the broader goals of the Museum Institution itself in the last decade of the nineteenth century. The appointment of a Surgeon General who could see the project through was also essential, and George M. Sternberg was that Surgeon General. During his first month in office in May 1893, Sternberg issued a general order to set the wheels in motion to make the Army Medical school a reality. Under Sternberg's plan, the school term would consist of a four month course of lectures and laboratory work supervised by senior Army medical officers as the faculty, taking place in newly developed lecture rooms at the new Museum and Library building, which conveniently housed specimens for medical study and "the accumulation

of material for bacteriological and chemical study" that would be essential for laboratory work.[614]

Nearly as essential to the Army Medical School project was Sternberg's Assistant Surgeon General, Charles H. Alden, a Philadelphia native who joined the Medical Corps of the Army as a surgeon, and eventually became Brigadier General in the Office of the Medical Directors of the Potomac. After working at Turner's Lane General Hospital, he became increasingly focused on medical education and training, especially that of the medical officer. In August 1892, he reported for duty in Washington, D.C. as the Assistant Surgeon General, and in 1893, Sternberg appointed Alden the President of the Faculty of the Army Medical School and charged him with its oversight. Alden considered the school a national endeavor from the beginning, claiming the medical profession of the United States and military officers were equally interested in the establishment of a formal school of training for military surgeons, who would later give back to the broader community. In *Special Training of the Medical Officer,* Alden describes the Army medical officer as a well-trained physician lacking in the required skills and training to properly respond to the calls of military duty. The Civil War also illustrated the need for trained military medical officers in times of peace, as well as war, so that the Army might be better prepared for future conflict. [615]

In addition to medical knowledge above and beyond that of the average medical student, the Army medical officer required training in the enlisting and commissioning of healthy men for duty, in watching over their health and preventing health hazards, in

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[614] Henry, *The Armed Forces Institute*, 92-3.
[615] Charles H. Alden, *Special Training of the Medical Officer, with Brief Notes on Army Medical Schools Abroad and at Home* (PAM5281, History Medical Library of the College of Physicians of Philadelphia, 1964), 1.

knowledge of a wider variety of diseases that might befall a soldier, and in managing field and Army hospitals, which were subject to different protocols than civilian hospitals.[616] Just as civilian medical schools modeled themselves after, and competed with, the schools of Europe, so also should the American Army Medical School emulate its European counterparts, and in this Alden found the United States lacking significantly. He considered best the British model of creating a post-graduate school for advanced medical students who would conduct themselves as officers on probation while receiving military medical instruction.[617]

The required courses consisted of: the duties of the medical officers, military surgery, military medicine, military hygiene, sanitary chemistry, clinical and sanitary microscopy, bacteriology, laboratory chemistry and microscopy, hospital corps drill and first aid. [618] The course on the duties of medical officers was considered essential for introducing the student to the typical duties of the medical officer, "to give him sound notions as to the military discipline and his true relations to the commanding officer and others in the military service, as to his proper position as a sanitary officer, the obligations involved in the care of his patients, and correct ideas as to his responsibility for the care of public property entrusted to his charge."[619] Medical Officers of the Army were responsible not only for diagnosing and treating illness, but also for maintaining sanitation and hygiene at camps and hospitals, and assisting soldiers with disability discharges and transition to civilian lives. Given these responsibilities, the format of the

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[616] Alden, *Special Training of the Medical Officer,* 2.
[617] Alden, *Special Training of the Medical Officer,* 3.
[618] John H. Brinton, "Closing Exercises of the Session 1895-96, Army Medical Museum," *The Journal of the American Medical Association* Vol. 26, No. 13 (March 28, 2896): 599.
[619] Brinton, "Closing Exercises," 599.

Army Medical School as a post-graduate institution made sense because it was considered much easier to train medical students in military protocol than the reverse. What is more, at the core of this training were improvements in the execution of sanitary measures, a skill on which many of the medical colleges in America did not focus, but would prove valuable in the face of outbreaks of infectious diseases.

In preparation for war, the course on military surgery focused on "the care of wounded on the battlefield, their transportation from the scene of action, hospital administration, an account of modern weapons, the wounds they cause and their appropriate treatment, according to the latest and most approved methods."[620] The Civil War had made clear the need for specific courses in military surgery to develop these skills. What is more, knowledge about treating physical trauma was also valuable for the development of trauma surgery in civilian hospitals. Outside of war, there were very few opportunities for experiential knowledge of trauma to the body. Building on the knowledge embodied in the *Medical and Surgical History of the War of the Rebellion*, the Army Medical School presented comprehensive training in military surgery. The course in military medicine focused on the treatment of diseases "due to the aggregation of men in armies, camps and garrisons, to exposure to climatic extremes, and to infectious diseases and the mode of prevention and treatment," while the course on military hygiene, concentrated on "the subjects of pure air, water and food, their impurities and the source of them, the dangers resulting from their contamination, and the methods of detecting and remedying the evils resulting therefrom."[621] There was also

[620] Brinton, "Closing Exercises," 599.
[621] Brinton, "Closing Exercises," 599.

discussion of the "disposal of sewage, of climatology, quarantine and public health," subjects which were not usually part of medical education of the late nineteenth century.[622]

Lectures took place each day from 3-4pm, while time in the pathologic and chemical laboratories was allotted a longer period from 9am to noon, "covering the study of the forms and life history of the more important disease-producing bacteria, so as to enable the medical officer to recognize the existence of the germs of infectious disease and to apply the most approved methods of destruction or exclusion."[623] The development and acceptance of germ theory suggested that diseases could be identified by the specific germs that produced them, and thus the eradication of disease-producing bacteria became a central focus of both army medicine and training at the Army Medical School. Brinton argued that this knowledge contributed to better understanding the most devastating diseases, like tuberculosis —which caused more deaths than any disease known at the time.[624] Thus, there was an increased focus on laboratory study as a central part of medical education—military or otherwise. In addition, students took a course on sanitary chemistry, which included "an analysis of air, water and food, the detection and estimation of their impurities and adulterations, the detection of poisons and the study of the animal fluids," designed to cultivate a "sanitary expert" and future inspector of the medical officers there.

The school's faculty was comprised mainly of medical officers stationed in or near the city, who taught in addition to their regular duties, as well as some of the most

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[622] Brinton, "Closing Exercises," 599.
[623] Brinton, "Closing Exercises," 599-600.
[624] Brinton, "Closing Exercises," 600.

elite of those medical officers who recently graduated from the Army Medical School themselves.[625] Walter Reed served as professor of clinical and sanitary microscopy and the director of the pathological laboratory, while the previous Curator Major Billings worked alongside him as professor of military hygiene and sanitation. Colonel Alden lectured on "the military duties of medical officers, including property responsibility, examination of recruits, certificates of disability, reports, rights and privileges, custom of the service, and like topics."[626] Lt. Col. William H. Forwood, attending surgeon at the Soldiers' Home, served as professor of military surgery, lecturing on care and transportation of the wounded as well.

There were also special short courses with prominent guest lecturers. Sternberg delivered a series of lectures on bacteriology, and Captain J.C. Merill covered comparative anatomy. Lieutenant Colonel G.B. Davis, Deputy Judge Advocate, Professor of Military Law, U.S. Military Academy, West Point, N.Y. taught a short course on military law. Dr. Robert Fletcher, F.R.C.S., principal Assistant Librarian, Surgeon General's Office, lectured on medical jurisprudence and the Army Medical Library. Professor Stiles of the Department of Agriculture delivered his well-known lecture on "Parasites in Men", and the renowned Dr. W.W. Keen, professor of surgery at Jefferson Medical College lectured on head surgery. Students also visited a variety of medical institutions, such as the Government Hospital for the Insane in Washington, D.C.[627] These short courses and visits aimed to broaden and enhance their education in order to

[625] Brinton, "Closing Exercises," 599.
[626] Henry, *The Armed Forces Institute*, 93.
[627] Brinton, "Closing Exercises," 600; Henry, *The Armed Forces Institute*, 94-5.

prepare them for the varied and sometimes unpredictable demands of military medical practice in times of war.

After a successful first session from November, 1893 to March, 1894, enrollment declined and there was no session for the '94-'95 term. Committed to its educational goals, the School kept the chemical and bacteriological laboratories open to eager medical officers who wanted to study. The following year saw greater enrollment, and John H. Brinton marked the occasion by detailing the closing exercises of the 1895-1896 school year in an article for the *Journal of the American Medical Association* in 1896. Held in the library of the Surgeon General's Office on Friday, March 13, 1896, the ceremony was considered a large affair, and the medical profession of Washington D.C. was "well represented in the audience with many War Department officials and a large contingent of ladies."[628] Charles H. Alden, President of the Faculty of the Army Medical Museum, introduced the school in his opening address, characterizing it as a "post-graduate institution designed to teach the young medical officer on his entrance into the service, and before he goes out to his first duty, branches that are of especial importance to him as an army medical officer."[629] The branches to which Alden was referring were those specific to military medicine, not available at the medical schools from which most of the officers had come. Time and wars had shown the Medical Department of the Army that advanced medical training beyond civilian medical school was an absolute necessity and the curriculum and training of the school was designed to prepare the military medical officer for their duties in times of peace, as well as war.

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[628] Brinton, "Closing Exercises," 599.
[629] Brinton, "Closing Exercises," 599.

John H. Brinton had delivered the opening message at the inauguration of the Army Medical School in 1863; he was given the opportunity to deliver a similar message at the close of the school term of 1895-96. In Brinton's address, he reflected that the military medical officers present in the graduating class would serve under considerably different circumstances than their predecessors, Brinton's colleagues, and "these conditions have doubtless been bettered to some extent by the lessons of a past experience," most likely "due to the practical and varied teaching of the great war through which our nation passed thirty years ago."[630] After tracing the history of the Army Medical Museum, and reflecting on its role in the success of the Army Medical School, Brinton urged the graduates to consider it "not as a collection of curiosities or objects of historical interest, but rather as a teaching school of the first grade," where there are valuable lessons in medicine and surgery to be learned, "which nowhere else in this country can be so fully illustrated."[631] The Museum was considered an essential part of the Army Medical School's resources for medical instruction, from its "exhibitions of pathologic conditions of most of the diseases and injuries met with in the warfare of the past," to its laboratory facilities for investigations into medical developments of the future.[632]

The Army Medical School drew heavily on the educational medical materials on display and archived at the Army Medical Museum, and contemporary materials developed in the laboratories of the Museum, on which it modeled its own laboratory facilities. Although the Army Medical School functioned well on these resources alone,

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[630] Brinton, "Closing Exercises," 600.
[631] Brinton, "Closing Exercises," 602.
[632] Brinton, "Closing Exercises," 602.

the rapidly changing nature of medicine at the turn of the century made the acquisition of specimens and microscopical slides exhibiting new diseases a necessity. The Army Medical School in turn, relied on the Army Medical Museum's connections when these new specimens and slides could not be secured at home. On the occasion that the Museum ran out of slides and materials for Army Medical School laboratory investigation or special courses, the Curator was usually able to secure them through this network.[633]

The Army Medical School relied on the Library of the Surgeon General's office not only for reference to classics in medical education, but more importantly for study of contemporary medical concerns and developments. Particularly helpful were the Library's vast collection of contemporary journals on cutting-edge medical research. The Surgeon General's Office also maintained a subscription to dozens of medical journals, which it then forwarded to the Army Medical School to enhance the research collection there. These journals included the *Journal of the American Medical Association*, *New York Medical Journal*, *American Medicine*, *Journal of the Association of Military Surgeons*, *American Public Health Reports*, and the *British Medical Journal*, among others. The Army Medical School also directly received the *Journal of Medical Research* and the *Journal of Infectious Diseases*, as these were considered essential to educational

[633] Captain/Curator of the Army Medical Museum to Head Surgeon of the U.S. Army General Hospital at the Washington Barracks, December 16, 1908, Series 3-13-1, Folder 11007, OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

instruction.[634] The Museum and Library were thus essential resources for the Army Medical School.

Walter Reed is credited with developing the laboratories of pathology and bacteriology at the Army Medical Museum that proved so useful in investigating diseases of special concern to the U.S. Army, like typhoid fever and yellow fever. Reed and his successors—James H. Carroll in 1902, and later Frederick Fuller Russell in 1907 —all took advantage of the relationship between the Museum and the Army Medical School in their research on these diseases. Under Reed, working in these laboratories was essential to the curriculum of the Army Medical School, and Carroll and Russell both utilized the student population of the school to conduct experiments as well as to be the subject of experiments themselves.[635] Yet, during his term as Curator of the Museum from 1907-1913, Russell served as the primary instigator for the separation of the Army Medical School from its host the Army Medical Museum. Although he himself appreciated the proximity of these spaces to one another for purposes of laboratory research and clinical instruction, he thought the school would be better suited to a larger space of its own. Nevertheless, he recommended that a branch of the Army Medical Museum be established in the new Army Medical School building he proposed, considering it an essential facet of schooling.[636] In 1910, Russell's hopes were fulfilled when the Army Medical School was relocated north of the Mall.

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[634] Letter from Surgeon General's Office to Army Medical Museum, 20 December, 1906, Series 3-13,Folder 1, OHA19 Curatorial Records, Numbered Correspondence, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[635] G.H.F.N. "In Memoriam: Walter Reed," 293.
[636] "Frederick Fuller Russell," Box 7, Folder 1, OHA39: Museum Records, Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

Part III: The Spanish-American War and Infectious Disease

At the outbreak of the Civil War in 1861, the Army Medical Department found itself ill equipped to handle the medical and surgical demands of such large-scale conflict. Infectious diseases decimated camps on both sides and the lack of evacuation transport and triage practice meant that many died on the battlefields from otherwise nonfatal injuries. Ira M. Rutkow argues that the most notable achievement of the Army Medical Department during the Civil War was how it remedied these shortcomings. By the end of the war, the Army Medical Department's bureaucratic reorganization, development of triage and organization of a system of ambulances for battlefield evacuation had helped reduce the number of sick, wounded, and killed by a substantial percentage.[637] Then Surgeon General Hammond created the Army Medical Museum for the study and display of specimens and artifacts gathered during the war, in order to render the Civil War's many lessons available to future generations of military medical officers. The severe price of the Civil War in terms of lives lost, displayed on the shelves of the Army Medical Museum, would serve as a constant reminder of the need for a well-prepared Army Medical Department in times of war.

For three decades after the end of the Civil War, the Army Medical Department carried out routine military medical work in relative peace, with only the occasional Indian campaign to put its medical officers to the test.[638] As the lessons of the Civil War faded, and the training of the military medical officer became more mundane, the Army

[637] Ira M. Rutkow, *Bleeding Blue and Gray: Civil War Surgery and the Evolution of American Medicine* (New York: Random House, 2005), 318.
[638] James A. Tobey, *The Medical Department of the Army* (Baltimore, MD: Johns Hopkins Press, 1927), 20.

Medical Department found itself approaching the twentieth century once again ill prepared for the challenges of war. When the United States went to war with Spain in 1898, the Army dispatched soldiers overseas, traveling long distances on naval ships to fight in Cuba, Puerto Rico, Guam and the Philippines. This war at sea and on foreign lands presented new obstacles for the Army Medical department through the greater need for hospital facilities on ships and the inundation of tropical diseases on its troops.[639] Those injured on land were most often evacuated to the ship hospitals for treatment, since the Army Medical Department lacked both the time and ability to establish satisfactory medical facilities in the Pacific. Typhoid fever was the disease most prevalent in the hastily organized and unsanitary Army camps in Cuba, Puerto Rico, Guam and the Philippines, and it spread more quickly than most American physicians had witnessed during the Civil War. Despite the knowledge many medical officers had that typhoid fever spread through lack of proper sanitation, it was widely prevalent, and one of the main causes of death during the Spanish-American War. Historians James Bordley and Abner McGehee Harvey argue that the lack of physicians to properly care for troops, and the fact that most were contract surgeons without training in bacteriology and camp sanitation severely limited the work of the Army Medical Department in preventing and treating typhoid fever.[640] A large-scale war had once again served to illustrate the Department's shortcomings.

The biggest conflict since the Civil War—and the first international war for the Army Medical Department—the Spanish-American War presented to Sternberg and his

[639] Tobey, *The Medical Department of the Army*, 25-26.
[640] Bordley and Harvey, *Two Centuries of American Medicine*, 335.

medical officers new opportunities for the acquisition of pathological material, the collection of comparative military medical equipment, and the investigation of disease. Like Hammond in the Civil War, Sternberg saw in the Spanish-American War possibilities for the acquisition of experiential medical knowledge by military medical officers and for the expansion and enhancement of the Army Medical Museum, updating the collections and the knowledge that they exemplified. One particular advantage Sternberg had over Hammond was the increasingly widespread use of photography. It was mostly civilian photographers who documented battles and injured soldiers during the Civil War, but during the Spanish-American War, photographers from the Army Medical Museum were sent to capture images of the war that would be most particularly helpful for display in the Museum and use in the Army Medical School.

Just as photography helped capture the gruesome reality of the Civil War, so also it was useful in the Spanish-American War. Photographers documented activities of the Army Medical Department and Army Medical Museum staff working in Army camps in the Philippine Islands, Puerto Rico, and Cuba. Loose photographs were sent back to the Museum, and a bound volume was eventually created of *Medical Department Activities in Puerto Rico*. The photographs of Medical Department activities in the Philippine Islands depicted not simply wartime medical activities, but detailed the proper methods of carrying the wounded from the battlefields in blankets and stretchers, including variations based on type of injury. The visual instructions these photographs provided were most helpful in courses on battlefield medicine at the Army Medical School. Just as hospital ships expedited the removal of wounded during the Civil War, so also they proved invaluable in the evacuation of U.S. Army from Puerto Rico. This removal

required a large system of ambulances and personnel, which were well documented in photographs. On the hospital ship *Relief* there were facilities not only for long-distance transport of the sick and wounded, but also for medical activities, from taking X-ray photographs to performing surgical operations.[641] The photographs of Army Medical Department activities on land and sea during the Spanish-American War functioned as visual guidelines of practice for the military medical officer, as well as memories of the war, frozen in time and displayed in the Army Medical Museum.

In addition to photographs, the Army Medical Museum was able to display a wide variety of specimens and artifacts acquired from the Spanish-American War. In January 1900, Surgeon General Sternberg sent Dr. E.R. Hodge, Pathologist at the United States Army Medical Museum, and a team of bacteriologists to Manila to retrieve pathological specimens resulting from "active hostilities and the occupation of a tropical country," as well as to purchase "any articles relating to the practice of medicine or surgery which might be of value to the museum."[642] Hodge was to be based at the First Reserve Hospital in Manila, and "equipped with a complete outfit for the preservation of specimens." *The British Medical Journal* praised this expedition, speculating that "having a trained representative of the Museum on the spot, [would] undoubtedly result in the accumulation of a large amount of valuable material and data which would otherwise have been lost to science."[643] During his time in Manila, Dr. Hodge obtained a large quantity of pathological material, including specimens illustrative of dysentery, malarial

[641] This description of photographs is a summary of the materials in OHA 313 Spanish-American War Photographic Collection, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.
[642] "Investigation of Tropical Diseases at Manila," *The British Medical Journal*, Vol. 1, No. 2036 (Jan. 6, 1900): 38.
[643] "Investigation of Tropical Diseases at Manila," 38.

fever, and of course, typhoid fever, as well as examples of native diseases, medicines, poisons, instruments, weapons and crania for the display at the Army Medical Museum.[644] Although the Museum had continued to grow in the decades after the Civil War, the Spanish-American War enhanced its collection with new examples of disease and photographs documenting medical practice during the war. These specimens and photographs would also serve to illustrate the damage caused by particularly insidious diseases like typhoid fever and yellow fever.

Typhoid Fever

During the course of the Spanish-American War, 289 soldiers were killed or wounded in battle, while 3,700 died of disease. Typhoid fever alone counted for nearly half of the deaths from disease. Those who did not die after contracting typhoid fever usually suffered "a debilitating illness last several weeks and followed by a long period of convalescence," which was enough to severely handicap Army forces during the war.[645] By the 1890's, the officers of the Army Medical Department knew that the typhoid bacillus caused the disease, and that it spread through contaminated drinking water and poor sanitation. At that time, it could be diagnosed either through testing the patient's blood or post mortem examination. Microscopical analysis of the blood to rule out malaria was also used to facilitate the diagnosis of typhoid fever. The provisions available to the medical officers overseas during the Spanish-American war, however, were limited, and certainly did not include the means for any sophisticated forms of

[644] Daniel S. Lamb, *A History of the United States Army Medical Museum 1862 to 1917, compiled from the Official Records* (Washington, D.C.: U.S. Army Medical Museum, 1917), 118.
[645] Bordley and Harvey, *Two Centuries of American Medicine,* 334-5.

diagnosis other than post mortem examination.[646] There were no facilities for bacteriological analysis, nor were there microscopes and trained microscopists to operate them, and there was no means for administering the Widal serum test, which Reed particularly regretted since it had become the easiest diagnostic practice.[647]

As there was little to be done in the diagnosis and control of typhoid fever in foreign territories, Surgeon General Sternberg decided that studying and controlling the disease in army camps in the United States was the best method for attacking the scourge. When news of war broke, thousands of soldiers volunteered to serve, crowding army camps around the United States. During the 113-day conflict, however, only 1 in every 6 soldiers was sent to combat, while the rest languished in the poorly constructed camps. By the end of the war, 2,500 soldiers died from contracting typhoid fever, but only 385 of those deaths occurred outside of the United States.[648] After the number of deaths in American camps from typhoid fever rose sharply in the early months of the war, Sternberg appointed a Board of Medical Officers to investigate "the cause and extensive prevalence of typhoid fever in the various military camps within the limits of the United States." The Board formed on August 16, 1898, was comprised of Walter Reed as President, along with Dr. V.C. Vaughan of the University of Michigan and Dr. E.O. Shakespeare of Philadelphia, who were also volunteer surgeons for the war with Spain.

The Typhoid Fever Board determined that hundreds of patients in the camps were suffering from typhoid fever, but had been diagnosed with and treated for malaria. Camp

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[646] Bordley and Harvey, *Two Centuries of American Medicine,* 335.
[647] Walter Reed, Victor C. Vaughan, and Edward O. Shakespeare, *Report on the Origin and Spread of Typhoid Fever in U.S. Military Camps During the Spanish War of 1898*, *Volume 1*(Washington: Government Printing Office, 1904), xiv.
[648] Molly Caldwell Crosby, *The American Plague: The Untold Story of Yellow Fever, the Epidemic That Shaped Our History* (New York: Berkeley Books, 2006), 97.

doctors often disagreed with the Commission's claim, but as there were limits on performing postmortem examinations, and no microscopes nor materials for performing the Widal test or malarial smears, the Commission often had no way to prove their theory of misdiagnosis. As a result of this difficulty, Surgeon General Sternberg had diagnostic laboratories established at each camp, and groups of 50 patients at each camp were tested for both typhoid fever and malaria. Laboratory tests proved that all the so-called malaria patients were actually suffering from typhoid fever. When camp doctors again challenged these findings, groups of 150 patients were sent to leading hospitals in Baltimore, Philadelphia, Boston, and New York, where hospital laboratories confirmed all patients had typhoid fever.[649]

The Commission then began an epidemiological study to determine the origin and spread of typhoid fever in army camps. They discovered it was most often introduced to camps through soldiers who lived in an area where typhoid fever was prevalent, and that it spread through poor hygiene and sanitary conditions of the camps. The rudimentary camp hospitals were also found to be prime sites for the spread of the disease. The Commission concluded that "the most important factor in the spread of typhoid in the camps was personal contact between a well soldier and a sick soldier," as well as contaminated food and water supply, and perhaps even spread by the common house fly.[650] The Board completed their report on September 7, 1898 and sent it to the Surgeon General.[651] As a result of the Commission's findings the Army Medical Department

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[649] Bordley and Harvey, *Two Centuries of American Medicine*, 336.
[650] V. C. Vaughan, *A Doctor's Memories* (Indianapolis: Bobbs-Merrill Co., 1926).
[651] Lamb, *A History of the United States Army Medical Museum*, 121.

instituted new sanitary measures in camps, but typhoid fever continued to plague the U.S. Army into the twentieth century.

Reed, Vaughan and Shakespeare's *Report on the Origin and Spread of Typhoid Fever in U.S. Military Camps During the Spanish War of 1898*, outlined preventive measures and methods of diagnosis to facilitate the eradication of typhoid fever. When, in the early 1900s, another wave of typhoid fever appeared in the U.S., the Army Medical Museum served as the diagnostic laboratory for blood samples run through the Widal test. Through this systematic typhoid work using the Widal method of diagnosis, bacteriological researchers at the Army Medical Museum hoped to develop a weapon against the disease, but it continued to elude them. Nevertheless, the progress the Typhoid Fever Commission had made in understanding and diagnosing the disease laid the groundwork for investigations by the Yellow Fever Commission two years later.

As American troops were recovering from the typhoid fever that plagued the Spanish-American War, British troops had begun to experience significant outbreaks of the disease during the Second Boer War (1899-1902). British bacteriologist Almworth Edward Wright experimented with immunizing the soldiers by injecting them with weakened typhoid bacilli cultures.[652] In 1908, Surgeon General Robert M. O'Reilly sent Captain Frederick Fuller Russell—a bacteriologist and Curator of the Army Medical Museum at the time—to Europe to investigate methods of developing a typhoid vaccine. When he returned to the United States, Russell worked for several months perfecting a typhoid fever vaccine, testing it out on volunteers from the Army Medical Museum and Army Medical School (See Figure 5.2).

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[652] Bordley and Harvey, *Two Centuries of American Medicine*, 338.



Figure 5.2: The first typhoid inoculation at the Army Medical School in March 1909.
Dr. Frederick Fuller Russell vaccinates a volunteer, while Dr. John Neate fills a syringe.
AMM#6093, Box 12, OHA74: Army Medical Museum Photographs, Otis Historical Archives,
National Museum of Health and Medicine, Silver Spring, Maryland

By 1911, the typhoid fever vaccination was compulsory in the United States military, just in time to protect the troops fighting in the war with Mexico.[653] Despite these accomplishments, the typhoid vaccine was not introduced into the civilian population for over two decades, due in part to the wars that interrupted work at the Army Medical Museum, and the questions arising from the use of human subjects in experiments to perfect the vaccine. In this case, the centrality of the Army Medical Museum to American

[653] Frederick Fuller Russell biographical information, Box 7, Folder 1, OHA39: Museum Records, Biographical Files, Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

medicine actually resulted in an important therapeutic breakthrough being restricted to military personnel, raising questions about the dissemination of medical technologies developed in the context of war.

After the Spanish-American war, President William McKinley appointed the Dodge Commission to investigate not only military conduct, but also the performance of the Army Medical Department, during the war. The Dodge Commission's report, while criticizing the lack of preparedness of the Army Medical Department, also recommended a number of important reforms that would greatly benefit it. As a result of this report, the Army Medical Department was granted funds for establishing a larger force of commissioned medical officers and a Reserve Corps of trained nurses to serve in the case of war. The report also granted the Army Medical Department a year's supply of medicines, hospital furniture and wartime supplies in advance of future conflicts. The Dodge Commission also suggested the Army Medical Department have the authority to establish a proper volunteer hospital corps in time of war, and that it be in charge of all transportation deemed necessary to "secure prompt shipment and ready delivery of all medical supplies."[654] Although Surgeon General Sternberg was pleased with these proposed reforms, he remained more focused on the investigative work to be done in the wake of the war.

Robert Maitland O'Reilly succeeded Sternberg as Surgeon General in September 1902 and set about implementing a series of reforms to better prepare the Medical Department of the Army for future conflicts. In particular, he conceived of the Army Medical Reserve Corps acting as an emergency military medical unit in the event of war.

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[654] Tobey, *The Medical Department of the Army*, 26-28.

While the training of military medical officers was considered more than adequate during this time, there were simply not enough of these well-trained officers to be medically effective in the Spanish-American war. O'Reilly considered the Army Medical Reserve Corps necessary to the proper functioning of the Army Medical Department during wartime, but Congress was not convinced by his 1905 proposal. After several years of petitioning, O'Reilly's Army Medical Reserve Corps was finally created, just in time for the outbreak of hostilities between the U.S. and Mexico in 1911, where it proved essential.[655] The Army Medical Department fared much better during this smaller scale conflict with Mexico, and this valuable experience, combined with greater efficiency thanks to the addition of the Army Medical Reserve Corps, better prepared it for World War I, where sanitation and medical treatment were considerably improved from wars past.[656]

Conquerors of Yellow Fever

Perhaps the most notorious infectious disease to plague the Army Medical Department in the nineteenth and early twentieth centuries was yellow fever. Since the first outbreak in Philadelphia in 1793, yellow fever proved to be the most mysterious and dreaded disease in nineteenth and early twentieth century America. Although it did not claim as many lives as cholera or smallpox, yellow fever perplexed American physicians for over a hundred years, causing panic and fear wherever it surfaced.[657] Early on, yellow fever was attributed to the weather, immigrants, sin, and poverty. During the 1793

[655] Tobey, *The Medical Department of the Army*, 30-33.
[656] Tobey, *The Medical Department of the Army*, 34.
[657] Molly Caldwell Crosby, *The American Plague: The Untold Story of Yellow Fever, the Epidemic That Shaped Our History* (New York: Berkeley Books, 2006), 11.

epidemic in Philadelphia, Dr. Benjamin Rush posited that yellow fever resulted from the growing poor population, whose unsanitary lifestyle was polluting the city. When he observed that African immigrants coming into Philadelphia as slaves seemed to have a "natural immunity" to the disease, Rush showed many of them his bloodletting and stomach purging techniques, then sent them into the community to treat the infected.[658] "In an effort to prove themselves to the white residents," James Dickerson argues, as many white residents fled, "the city's nearly three thousand blacks, under the impression that they were immune to the disease because of their African ancestry, decided to remain behind to care for the sick and dying."[659] Eventually Rush realized that African immigrants were as susceptible to the disease as white citizens, but not before a substantial number fell ill and died from the disease while carryout out medical service.[660] The yellow fever outbreak in Philadelphia in 1793 had profound social, economic, political and medical consequences for the rest of America. The explanation that immigrants and poverty had fueled the disease would recur during outbreaks in other parts of the country in the nineteenth century, and the debates over slavery and the origin of the outbreak in Philadelphia influenced the decision to relocate the nation's capital to Washington, D.C. The medical community of Philadelphia was never able to agree on the cause of the yellow fever outbreak, and this debate continued throughout the nineteenth century.

By the middle of the nineteenth century, instances of yellow fever had declined in the North, while increasing in the South. Many historians attribute this decline to the

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[658] James L. Dickerson, *Yellow Fever: A Deadly Disease Poised to Kill Again* (Amherst, NY: Prometheus Books, 2006), 14-15, 23.
[659] Dickerson, *Yellow Fever*, 25.
[660] Dickerson, *Yellow Fever*, 26.

1807 ban of the Atlantic slave trade in the North, and the rise of cities and international commerce in the South.[661] The sharp contrast in yellow fever epidemics between the North and the South, Dickerson argues, led to the preconception in the North that the South was "disease-ridden and backward, incapable of sustaining a thriving economy." While the North referred to yellow fever as the 'Strangers Disease', suggesting that travelers to the South were more likely to become infected, the South used the term to associate yellow fever with the influx of immigrants.[662] The rise of industry and growth of cities in the North had catalyzed sanitary movements in response to developing health problems and infectious diseases, but the slower growth of the South meant that many cities could not cope with new industry and immigrants. During the yellow fever outbreak in the summer of 1853 in New Orleans, the city's newspapers rationalized that most of the victims of the outbreak had been Irish and German immigrants in poor health, reassuring the city's native-born residents that the disease was clearly related to ethnicity and poverty.[663] Regardless of the different conditions in the North and the South, there was no real infrastructure for handling yellow fever outbreaks in America until well after the Civil War.[664]

Despite the gruesome experiences on both sides during the Civil War, there were very few instances of yellow fever, and the disease seemed to have finally disappeared. As tensions mounted in the defeated South during Reconstruction, however, recurring

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[661] See Crosby, *The American Plague,* and James L. Dickerson, *Yellow Fever: A Deadly Disease Poised to Kill Again* (2006).
[662] Dickerson, *Yellow Fever*, 38.
[663] Dickerson, *Yellow Fever*, 43.
[664] John Ellis, *Yellow Fever and Public Health in the New South* (Lexington, KY: University Press of Kentucky, 2015), 11.

yellow fever epidemics heightened racial prejudice.[665] In his study of yellow fever outbreaks in New Orleans, Memphis and Atlanta in the nineteenth century, historian John Ellis illustrates how three common factors ensured the persistence of yellow fever and a racial explanation for it. All three cities "labored under difficulties peculiar to the region's agricultural and slave labor economy," which caused racial tension after the Civil War.[666] Much of the growth these cities experienced after the war was attributed to their reliance on their ports for industry, which also brought in immigrants whose presence often coincided with yellow fever outbreaks. Finally, this growth was accompanied by "steadily worsening environmental conditions…these conditions were related in one way or another to an absence of provision for adequate drainage."[667] Ellis uses New Orleans, Memphis and Atlanta as parallel examples of how cities in the United States were simultaneously susceptible to yellow fever and incapable of understanding it.

Perhaps the most disastrous yellow fever outbreak occurred in the lower Mississippi Valley in 1878. Historians have attributed the wide spread and intensity of the epidemic to "rains in West Africa, the El Nino cycle that made the American South's winter particularly moist, influx of immigrants…and improved transportation."[668] The epidemic affected so many states that representatives from the hardest hit cities began lobbying to congress for assistance and relief. The Yellow Fever National Relief Commission was created in response, lobbyists from all over the South appealed to President Rutherford B. Hayes to appoint "a special commission of the ablest physicians and chemists in the country for the purpose of scientifically investigating the cause,

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[665] Dickerson, *Yellow Fever*, 50.
[666] Ellis, *Yellow Fever and Public Health in the New South*, 15.
[667] Ellis, *Yellow Fever and Public Health in the New South*, 27.
[668] Crosby, *The American Plague*, 13.

nature, treatment, and future prevention of the fearful epidemic now raging." With this commission, businessmen and physicians of the South "sought to reduce the economic and social costs of the South's long-standing reputation for sickliness and high mortality through sanitary reform, thereby ushering in a new era of health, prosperity, and progress."[669] By December of that year, Hayes announced that "the great southern yellow fever epidemic" had become a matter of national concern, requiring both an investigative committee and a sanitary oversight committee.[670] Despite the antebellum calls for Southern independence in medical practice and the many reasons for Southern secession, most Southern states agreed that a strong national board of health with quarantine powers, run by the federal government, was the only solution to the problem of yellow fever. Many in the North were opposed to political, social and financial responsibility that would come with this federal board, suggesting instead locally funded entities for the management of infectious diseases.[671]

Along with the Marine Hospital Service, the National Board of Health was granted partial quarantine authority in 1878, and announced its efforts to coordinate information between states, publish a weekly bulletin of health, and "to prevent the introduction of contagious and infectious diseases into the United States from foreign countries and their spread from one State into others."[672] Although the board appointed by Congress to investigate yellow fever had come to very few conclusions about the disease, it supported the assumption that yellow fever was coming to the United States

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[669] Ellis, *Yellow Fever and Public Health in the New South*, 61.
[670] Ellis, *Yellow Fever and Public Health in the New South*, 72.
[671] Ellis, *Yellow Fever and Public Health in the New South*, 79-80.
[672] National Board of Health, *Annual Report of the National Board of Health, 1883* (Washington, DC: Government Printing Office, 1884): 223, 61.

from other countries, and should be dealt with as "an enemy which imperils life and cripples commerce and industry."[673]

When the disease reappeared in Florida in 1897, sanitary officials quickly quarantined the sick, fumigated known sites of infection, and disinfected clothing, bedding and other objects suspected of contamination. The efficiency of these efforts in quashing the epidemic in Florida seemed to demonstrate that yellow fever could be controlled.[674] The acquisition of territories in tropical areas like Cuba and the West Indies—where yellow fever was endemic—as a result of the Spanish-American War in 1898, made the disease once again a medical priority. When American physicians first landed in Cuba and attempted to purify the water supply and broadly sterilize objects and sites of contamination, they were puzzled that the measures failed to keep the disease at bay. Though yellow fever was not fully understood by the turn of the century, there was widespread agreement in the medical community that it was both endemic and epidemic, associated with ports and the arrival of new ships, involved some transmittable "germ," was transmitted indirectly, and recovery from it conferred immunity.[675] As U.S. troops occupied Cuba for three years after the war, the constant threat of a yellow fever outbreak in the American camps motivated Surgeon General Sternberg to create a special commission to study the disease.[676]

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[673] "Conclusions of the Board of Experts Authorized by Congress to Investigate the Yellow Fever Epidemic of 1878," *Transactions of the Medical Association of the State of Alabama*, *Volume 32* (Montgomery, AL: Barrett & Brown, 1879), 65.
[674] Stern, "Yellow Fever Crusade," 44.
[675] J. Gordon Frierson, "The Yellow Fever Vaccine: A History," *Yale Journal of Biology and Medicine*, 83:2 (June 2010): 77.
[676] Bordley and Harvey, *Two Centuries of American Medicine,* 198.

Surgeon General Sternberg had been a part of the Havana Yellow Fever Commission in 1879, along with New Orleans physician Dr. Stanley E. Chaillé, and Cuban-born Dr. Juan Guitéras of the Marine Hospital Service. Chaillé studied the conditions of yellow fever in Cuba, Sternberg searched for a pathogen in the blood samples, and Guitéras looked for microorganisms and pathogenic changes in the tissue of yellow fever cadavers.[677] Together with Cuban physicians Carlos Finlay, the Commission determined that there was an airborne agent involved in the transmission of yellow fever. At a conference in Washington, D.C. in 1881, Finlay went so far as to propose that yellow fever was transmitted from one individual to another by the bite of a mosquito, and cited the experiments he had performed on volunteers to prove his theory. His experiments, however, were poorly controlled and his theory was considered radical, failing to convince other scientists—including Sternberg—that a mosquito was truly behind the spread of yellow fever.[678] In 1897, Italian bacteriologist Giuseppe Sanarelli, who had been looking for the bacterial cause of yellow fever while conducting research in South America, claimed to find it in the Bacillus *icteroides*.[679] Owing to the complete dominance of germ theory, his claim was initially widely accepted. That same year, however, British physicians Ronald Ross proved "beyond question" that malaria was transmitted by anopheles mosquito, renewing interested in Finlay's theories. It was Ross's work that ultimately convinced the United States Yellow Fever Commission to investigate the possibility that a mosquito transmitted yellow fever.[680]

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[677] Crosby, *The American Plague*, 83.
[678] Dickerson, *Yellow Fever*, 142.
[679] Giuseppe Sanarelli, "A Lecture on Yellow Fever, with a Description of the Bacillus Icteroides," British Medical Journal, Vol. 2 (1897): 7.
[680] Bordley and Harvey, *Two Centuries of American Medicine, 1776-1976*, 198.

The failure of the Havana Commission to make significant progress on the yellow fever problem was a thorn in Sternberg's side. Despite his many achievements, he was said to have believed at the time that his "place in medical history was in no way secure," and desired his own "definitive discovery." He hoped that discovering the cause and cure for yellow fever would be his legacy. When it came to the Spanish-American war, however, Sternberg came under fire for his lack of action. He refused to send more troops to occupy Cuba during the wet season when yellow fever thrived, and he even sought to send primarily medical officers who had an established immunity to the disease.[681] The racist theories of the nineteenth century that rationalized the source and spread of the 'Stranger's Disease' were very much alive at the turn of the century. The U.S. military chose to send the Twenty-fourth and Twenty-fifth Infantries to Cuba, because they were all-black regiments, and it was thought they were naturally immune to the disease.[682] After a shocking number of these troops died of yellow fever, Sternberg finally decided to send a group of medical officers to Cuba to study the disease.

Walter Reed headed the Yellow Fever Commission, along with his Museum Assistant and Army medical officer James Carroll (who, like Reed, had a background in pathology and bacteriology); Jesse W. Lazear, who had worked on malaria and the anopheles mosquito under William S. Thayer at Johns Hopkins; and Aristides Agramonte, a Cuban physician who had had his medical training in the United States, was knowledgeable about the pathology of yellow fever, and, perhaps most importantly, had previously contracted yellow fever and was therefore immune to the disease.[683] From

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[681] Crosby, *The American Plague*, 104.
[682] Dickerson, *Yellow Fever*, 153.
[683] Bordley and Harvey, *Two Centuries of American Medicine*, 198.

June to August 1900, the Yellow Fever Commission launched bacteriological studies of the blood of yellow fever patients and post-mortem examinations of those who died from the disease. They were eventually able to prove that Sanarelli's bacillus did not cause yellow fever, identifying *icteroides* in patients who were not suffering from yellow fever. They also concluded that the incubation period for the disease seemed to be five days, and deduced that an airborne carrier had to be involved.[684] Reed then returned to Washington to present their findings and finish his work for the Typhoid Fever Board, while the rest of the Commission continued work in Cuba.

Central to the next step of the Commission's investigation was the 'voluntary' participation of non-immune persons in a series of experiments to determine the validity of the carrier theory, as well as the etiology and mechanism of yellow fever. They sought primarily American soldiers and Spanish immigrants for volunteers, and offered them monetary compensation for participating and for contracting the disease. Sanarelli's work on yellow fever had drawn criticism and protest from antivivisectionists in the late nineteenth century, and so the Commission developed the first consent form for human experimentation, which read:

> The undersigned understands perfectly well that in the case of the development of yellow fever in him, that he endangers his life to a certain extent but it being entirely impossible for him to avoid the infection during his stay on the island he prefers to take the chance of contracting it intentionally in the belief that he will receive from the said Commission the greatest care and the most skillful medical service.[685]

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[684] McCaw, *Walter Reed: A Memoir*, 6.
[685] Crosby, *The American Plague*, 162.

Many American soldiers initially volunteered willingly, some even rejecting compensation and claiming, "we are doing it for medical science."[686] Despite this willingness, there were not nearly enough volunteers for the Commission's liking, and in the fall of 1900 Agramonte—the only Board member who could speak Spanish—was sent to the Immigration Station across the Bay of Havana for recruits. Agramonte developed a system whereby on each visit he would hire around ten newly arrived immigrants to work as day laborers for housing, food and compensation. After some time, he would ask them questions related to laboratory research, and eventually approach them to participate in the yellow fever experiments for more money.[687] Although they were lured to the camp under false pretenses, most of these immigrants signed consent forms and agreed to participate, rationalizing that they were likely to contract the disease at some point, so at least they were getting paid for it and had access to healthcare in the meantime.

In an effort to "confront anticipated ethical criticism about using human subjects," members of the Commission themselves volunteered for the experiment.[688] Dr. Lazear allowed himself to be bitten by mosquitoes carrying yellow fever several times in early August 1900, but failed to contract the disease. Dr. Carroll, who had remained skeptical of the mosquito vector theory, volunteered at the end of August, if only to disprove the theory. Ironically, Carroll developed symptoms of yellow fever and suffered a terrible bout of the disease for several weeks, before recovering. In the meantime, Lazear proceeded with the mosquito experiments on the volunteers they had recruited, and after

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[686] Crosby, *The American Plague*, 175-176.
[687] Crosby, *The American Plague*, 176-77.
[688] Akhil Mehra, "Politics of Participation: Walter Reed's Yellow-Fever Experiments," *American Medical Association Journal of Ethics*, Vol. 11, No. 4 (April 2009): 327.

a Private Dean developed yellow fever, the board considered the trials confirmation of the mosquito vector theory. Nevertheless, Lazear subjected himself to the experiment one last time on September 13, 1900, contracted the disease, and died one week later. Akhil Mehra argues that whether it was guilt, sympathy, or heroism that motivated Lazear, historical record suggests than in Reed's absence, "the pressure of scientific competition, and the lack of any guidelines or protocol during this disorganized experimental phase produced the circumstances that resulted in Lazear's death."[689] Lazear's was the only death that occurred in the early years of the Commission's experiments, and the camp where they conducted experiments near Havana was named Camp Lazear in his honor.[690] Lazear's death left a shadow on the research, however, as many volunteers who had previously doubted the viability of the mosquito theory—and thus considered little risk in the experiments—came to understand the danger to which they were being exposed.[691]

After Lazear's death, Reed returned to Cuba to review the procedures of the Commission, create safer protocols, and supervise the experiments. Reed revised the guidelines for the selection and role of the volunteers according to the understanding that the mosquito was, in fact, capable of transmitting yellow fever.[692] At Camp Lazear, the Yellow Fever Commission kept complete health records of all participants in the experimental investigation, in order to ensure that no other diseases would complicate the study of yellow fever. The mosquitoes were also strictly controlled, bred in a separate building and taken to the yellow fever hospital to feed on patients when necessary. The building where the experiments took place was divided into two sections; in one room the

[689] Mehra, "Politics of Participation," 327.
[690] McCaw, *Walter Reed: A Memoir*, 7.
[691] Mehra, "Politics of Participation," 327.
[692] Mehra, "Politics of Participation," 327.

patients slept in bedding and wore clothes used by patients infected with yellow fever, and the other room full of the mosquitoes, where individual patients would subject themselves to bites to become infected.[693] This arrangement was considered "the simplest and most certain manner" in which to demonstrate that "the infectiousness of the building was due only to the presence of the insects."[694] The volunteers who slept in the room with the bedding and clothing exposed to yellow fever exhibited no symptoms of the disease after twenty nights. After they were exposed to mosquitos and contracted yellow fever, it became clear that the bedding and clothing also did not confer immunity to the disease.[695]

The Commission also had volunteers live directly with patients infected with yellow fever, in order to see if personal contact was necessary for the transmittal of the disease. Although they "drank the same water, ate the same food, handled the same articles, and used the same bed sheets that had been used by the patients…as long as mosquitos were excluded from the environment, yellow fever was not transmitted to these volunteers."[696] They also studied four cases where patients were infected by injecting them with the blood of yellow fever victims, and when they exhibited symptoms of the disease afterward it became clear that there was "an infectious agent" in the blood of those suffering from yellow fever.[697] From these experiments, the Commission was able to prove that "factors such as personal contact, hygiene, sanitation, water supply, and

[693] McCaw, *Walter Reed: A Memoir*, 7-8.
[694] McCaw, *Walter Reed: A Memoir*, 8.
[695] McCaw, *Walter Reed: A Memoir*, 8.
[696] Bordley and Harvey, *Two Centuries of American Medicine,* 200.
[697] McCaw, *Walter Reed: A Memoir*, 9.

disposal of excreta, which had been found to be so important in the control of typhoid fever in Army camps, were not involved in the case of yellow fever."[698]

By August of 1901, the Commission had begun a new phase involving blood-injection experiments and investigation into a yellow fever antiserum. American volunteer John Bullard said in an interview that volunteering gave him access to good medical care and immunity to yellow fever, which was a valuable asset in his work starting a farm in Cuba. Although he acknowledged it was a rather "cold-blooded business proposition" he figured since he would likely contract the disease at some point, it made more sense to contract it "under favorable circumstances."[699] Despite testimonials like these, when three of the ten volunteers in this new phase died of yellow fever, the experiments ceased. One of the victims and the only female volunteer, American nurse Clara Maass, had previously contracted and recovered from yellow fever, so her lack of immunity and death were even more unexpected.[700] These uncontrolled outcomes damaged the credibility of the Commission's work, and Sternberg ordered them to return to the United States to avoid further criticism. Historian of Medicine Akhil Mehra argues that Reed's team pursued a program of human experimentation "by intentionally exposing human subjects, team members included, to potentially deadly virulent material" that profoundly changed the way the modern world viewed health and risk in the development of scientific medicine.[701] Yet, despite the "prominent fatalities" that ensued, Mehra notes, Reed's experiments were deemed "a scientific success and

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[698] Bordley and Harvey, *Two Centuries of American Medicine,* 199-200.
[699] Mehra, "Politics of Participation," 328.
[700] Mehra, "Politics of Participation," 328.
[701] Mehra, "Politics of Participation," 326.

instrumental in establishing that yellow fever was a mosquito-borne illness," and the mosquito-control programs developed from the findings were very successful. [702]

As a result of their work in Cuba from 1900-1901, the Yellow Fever Commission ultimately concluded that the causal agent remained in the infected person's blood for only three days, that the species of mosquito *Stegomyia fasciata* (later renamed *Aedes aegypti*) spread yellow fever and could only infect via bite approximately once every twelve days, and that this mosquito was the only means for spreading the disease. After the Commission presented its findings to General Leonard Wood, who was in charge of the American troops in Cuba, he ordered a "vigorous campaign to eradicate mosquitoes in the region of Havana" which he claimed resulted in zero cases of yellow fever in the region in 1902.[703] Colonel William C. Gorgas, the Chief Sanitary Officer at Havana, oversaw the initiative, dividing Cuba into sanitary districts, which were overseen by medical teams that kept data on housing and water sources. He also oversaw the quarantine of infected patients, fumigation of contaminated buildings, and drainage and removal of all outdoor sources of standing water.[704]

When they returned to the United States, Reed, Carroll, and Agramonte presented their findings to Congress in a report called "The Etiology of Yellow Fever."[705] They were given a hero's welcome and praised for their scientific work in the field of medicine. Dubbed "The Conquerors of Yellow Fever," Reed, Carroll, Agramonte, and

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[702] Mehra, "Politics of Participation," 326.
[703] Bordley and Harvey, *Two Centuries of American Medicine, 1776-1976*, 199.
[704] Stern, "Yellow Fever Crusade," 45.
[705] Walter Reed, James Carroll, Aristides Agramonte, "The Etiology of Yellow Fever -- An Additional Note," *Journal of the American Medical Association* 36 (16 February 1901): 431-440.

Lazear were later depicted in a series of paintings highlighting the contributions of Americans to advancing public health in the twentieth century (See Figure 5.3).



Figure 5.3: Dean Cornwell, "Conquerors of Yellow Fever," 1939. Philadelphia, Wyeth Laboratories. Painting illustrates Dr. Lazear administering an infected mosquito to Dr. Carroll.

Historians James Bordley and Abner McGehee Harvey argue that the work of the Yellow Fever Commission "was one of the great achievements of medicine," demonstrating not only how yellow fever spread, but also "that an infectious disease could be caused by an agents that is invisible under the ordinary microscope and small enough to pass through a

very fine filter."[706] The work of Army medical officers in these endeavors served to reinforce the importance of the Army Medical Department in the advancement of medical science in the nineteenth and twentieth centuries. Moreover, they had demonstrated the power of laboratory science to solve the mysteries that had puzzled practitioners of medicine for much of human existence. This advancement in preventive medicine came through the scientific research, experiment and technology that had been facilitated by, and encouraged through, the cutting-edge resources of the Army Medical Museum.

Yet, the scientific work of the Yellow Fever Commission had necessitated human experimentation, which resulted in the deaths of volunteer soldiers and some of their own colleagues, and illustrated the precarious nature of the science they had developed. In their program to combat infectious disease, the Army Medical Department had succeeded in finally transforming the patient into an object of scientific inquiry just as the Paris Clinic had in the early nineteenth century. The nineteenth century tension between therapeutic intervention and scientific objectification that so many American physicians had struggled with was slowly disappearing as the trope of the heartless scientist reemerged with the development of tropical medicine. After Reed had presented preliminary findings at the Pan-American Medical Conference in 1901, the Washington Post acknowledged the Yellow Fever Commission's findings, but questioned, "Why not devote themselves to the eradication of the medium instead of killing more people by way of academic demonstration?"[707]

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[706] Bordley and Harvey, *Two Centuries of American Medicine*, 199.
[707] Crosby, *The American Plague*, 192.

At a time of increasing concern on the part of the public and some of the medical community over the ethics of human experimentation and the degree of justifiable risk therein, the work of the Yellow Fever Commission intensified the controversy. In the early years of the Commission's work, none but Lazear and Finlay seemed to believe a mosquito could be the culprit for yellow fever, and the human experiments they undertook to prove this were therefore perceived as having little risk. Renowned physician William Osler later reflected on the work of the Commission as having been as ethically sound as could have been expected in the early development of tropical medical science. The first volunteers had virtually the same knowledge as the members of the Commission about the risks involved with the experiments, and gave their consent, which were all that Osler claimed was necessary for the legitimacy of the project.[708] Whatever its scientific contributions, the Yellow Fever Commission ultimately set a precedent for future human experimentation by developing the first consent form. Whether or not the volunteers in the Commission's experiments fully understood the risks they were taking would be up for debate in the early decades of the twentieth century.

The work of the Yellow Fever Commission had so thoroughly consumed the resources of the Army Medical Department that the operation of the Army Medical Museum had virtually ceased. On November 21, 1913, Army Medical Librarian Colonel Walter D. McCaw reflected on the condition of the Army Medical Museum, noting "the Museum feature…has for many years been almost at a standstill," due in large part to the momentum behind bacteriological research and the development of the Army Medical School. The energies of the Museum staff were divided between "making original

[708] Osler, "The Evolution of the Idea of Experiment in Medicine," 8.

investigations, principally bacteriological," and teaching classes.[709] The results of this work—the development of anti-typhoid prophylaxis and "the education of a host of valuable young medical offers," among other achievements—necessarily suspended the progress of the Museum.[710] The future of the Army Medical Museum as a medical museum was put on hold, in the interest of the future of medicine.

Perhaps the most interesting specimen the Army Medical Museum acquired during this time was that of the compound monocular Carl Zeiss microscope used by Walter Reed from 1893 to 1902 (See Figure 5.4).



Figure 5.4: Compound monocular microscope by Carl Zeiss, 1891.
MM#49148, National Museum of Health and Medicine.

[709] Lamb, *A History of the United States Army Medical Museum*, 140-41.
[710] Lamb, A History of the United States Army Medical Museum, 141.

When this microscope was placed on a shelf amidst the Museum's microscope collection in November 1910, it signaled the end of an era. Reed's personal microscope, once vital to crucial research on yellow fever, had become an historical artifact of medicine's past. It was Reed and the Yellow Fever Commission's work in Cuba that solidified the shift in medical research away the medical museum and into the laboratory, while expanding it to the field, and sometimes, to foreign lands.

Part IV: The Legacy of Yellow Fever

The Spanish-American war and the work done by Walter Reed and the Yellow Fever Commission set a number of important precedents for twentieth century medical research. First and foremost, the war brought several territories under the control of the U.S. government, expanding the reach and goals of American scientific and cultural hegemony. Second, through their fieldwork research in Cuba, Reed and his colleagues provided justification for American scientific and cultural intervention, and the development of the trope of the 'white man's burden' through tropical medicine. In particular, they built a framework for what would become a global campaign to eradicate yellow fever, establishing the imperative for disease eradication. Finally, the Commission's use of human volunteers in scientific experimentation catalyzed debate surrounding the extent of acceptable harm or risk in medical research. Just as Americans believed yellow fever to have been imported to the United States by immigrants—especially those from Africa—so also they tended to perceive the peoples of Cuba, Panama and other tropical countries as both the source and catalyst of the disease. Through the work of the Yellow Fever Commission to quell the disease ravaging both

Americans and Cubans, eradication of the of the vector and sanitation of the host developed as the most efficient way of ensuring U.S. economic, political, and scientific interests around the world.

Although the medical achievements of the Yellow Fever Commission in Cuba centered on the discovery of the mosquito as the vector of the disease, an important tertiary outcome was the development of eradication as a strategy of both public health and colonial hegemony. Nancy Leys Stepan argues that the history of eradication began with "the experimental proof by U.S. physicians in Havana in 1900 that yellow fever is transmitted by mosquitos," a discovery "that led almost immediately to the suggestion that getting rid of the insects would get rid of the diseases."[711] When coupled with the U.S. Army's occupation of Cuba, this discovery facilitated the "prompt move from research to application."[712] In the case of yellow fever, prevention and control of the disease necessitated vector control through eradication. Cuba proved merely a starting point for the convergence of American colonialism and tropical medicine, as Panama soon became "the epicenter…of interest in enlarging the U.S. navy and a push for commercial expansion."[713] After the United States gained control of the Philippines, Guam, Puerto Rico, and—to a certain extent—Cuba, taking over the economically lucrative Panama Canal project seemed more within its reach.

From the moment the United States gained control of the Panama Canal Zone in 1904, Alexandra Minna Stern argues, the U.S. military sought to institute and manage "a highly paternalistic occupational and social order in which the government was

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[711] Nancy Leys Stepan, *Eradication: Ridding the World of Diseases Forever?* (London: Reaktion Books, 2011), 21, 35.
[712] Stepan, *Eradication*, 35.
[713] Stern, "Yellow Fever Crusade," 46.

responsible for everything."[714] This new order was secured through the US-Panama treaty, which bound Panama to comply with U.S. mandates in the Canal Zone, including "sanitary ordinances, whether of a preventive or curative character, prescribed by the United States."[715] The United States's political and economic motives to quickly complete the project were reason enough to forcibly improve sanitation in the Canal Zone and surrounding areas, and thus the health of the project workers.[716] After his appointment by Sternberg later that year as Chief Sanitary Officer of the project, Colonel Gorgas developed a wide-reaching program for the eradication of typhoid fever and yellow fever in the region. Initially, this program mirrored his work in Cuba, involving drainage projects, fumigation, and quarantine. Stern notes that the U.S. Public Health service under Gorgas's control began work first in the areas occupied by whites, in part because they believed the local population to be immune to the disease, and in part because the white workers were considered more valuable to the canal project. After little success with these measures, however, Gorgas revised his plan and approached the problem different.

Whereas the eradication program in Cuba relied on mosquito control, Gorgas's new strategy in Panama would focus more on control of the human host.[717] This new program was both founded on, and itself perpetuated, the American prejudice that natives of the tropics lacked not only basic sanitation, but also the means and knowledge to battle their own endemic diseases. Gorgas ordered the Yellow Fever brigade to conduct house-

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[714] Stern, "Yellow Fever Crusade," 47.
[715] Stern, "Yellow Fever Crusade," 47.
[716] Vincent K. Cirillo, *Bullets and Bacilli: The Spanish-American War and Military Medicine* (New Brunswick, N.J. Rutgers University Press, 2004), 119.
[717] Stern, "Yellow Fever Crusade," 48-51.

to-house inspections in the Canal Zone, and authorized them to remove gutters and destroy unsanitary areas and even structures. He mandated the use of mosquito covering and netting in all households, and the strict quarantine of infected neighborhoods and districts.[718] James C. Perry, one of the U.S. Public Health Service officers executing these policies, reflected that there was a clear difference in cleanliness and sanitation between the races living in the Canal Zone, and the local population would clearly benefit from the sanitary engineering they had performed, as well as education on hygiene.[719]

Stern argues that while it was in control of the Canal Zone, the U.S. perpetrated what amounted to Jim Crow racism, subjecting the local population to unnecessarily invasive measures and maintaining a stranglehold on public health that hindered the growth of the Panamanian health system. The narrow focus of typhoid fever and yellow fever eradication meant that more important local diseases like dysentery and pneumonia were ignored, and continued to ravage the population.[720]After both civilians and the private contractors working on the canal protested the invasive and sometimes punitive preventive measures Colonel Gorgas enacted, Sternberg personally asked President Theodore Roosevelt to "intervene and insist that Gorgas's sanitary orders be obeyed."[721] By 1906, Gorgas claimed to have completely eradicated yellow fever from the Canal Zone. By the time the Panama Canal was finished in 1914, the death rate from yellow fever in Panama was lower than in any American city.[722]

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[718] Stern, "Yellow Fever Crusade," 50.
[719] Stern, "Yellow Fever Crusade," 50-51.
[720] Stern, "Yellow Fever Crusade," 52-53.
[721] Bordley and Harvey, *Two Centuries of American Medicine*, 339.
[722] Bordley and Harvey, *Two Centuries of American Medicine*, 340.

Despite the success of Gorgas's program from the American perspective, when the Canal opened in 1914 there was still considerable concern about the threat of "disruptive diseases" spreading from and through the Canal. Whether the United States was more concerned about the threat to its economic interests in the region or the threat to public health—or both—is unclear, but Stern argues it was enough to "embark on a major yellow fever campaign that lasted over 20 years and expended nearly 6 million dollars."[723] Funding for this endeavor would come from the Rockefeller Foundation's International Health Division, shifting the purview of yellow fever eradication from the U.S. military to U.S. philanthropy. In 1915, the Rockefeller Foundation launched and international campaign against yellow fever and hired Gorgas to head the IHD's yellow fever eradication team, sending him throughout the Americas.[724] The IHD established a "residual endemic center" in Guayaquil Ecuador, with hopes that it would serves as the basis for implementing control measures in South America, and expanded similar efforts to Africa after World War I, establishing the Second West African Yellow Fever Commission.[725] Central to these efforts was the belief that the United States had a responsibility to improve sanitary conditions of populations in the Americas and Africa, in order to eradicate yellow fever and prevent it from affecting American citizens and U.S. interests. The prejudices and problems underlying efforts to eradicate yellow fever from the Panama Canal Zone are important to consider because despite advancements in medicine and public health in the decades after the Panama Canal opened, they still formed the basis for broader global eradication campaigns after two world wars.

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[723] Stern, "Yellow Fever Crusade," 41.
[724] Stern, "Yellow Fever Crusade," 35.
[725] Frierson, "The Yellow Fever Vaccine," 78.

Alexandra Minna Stern argues that the story of yellow fever eradication in the early nineteenth century "reveals important aspects of the emergence of key paradigms, patterns, and problems of modern global health," while also demonstrating "the extent to which U.S. health entities and professionals, belonging both to military and federal agencies and to philanthropic institutions, influenced the development of tropical medicine through unwavering attention to yellow fever."[726] That Reed and Gorgas were essential instruments to American expansion in the early twentieth century is clear. Both men and both projects leveraged considerable harm to human subjects in the face of a great scientific achievement. While Reed and his colleagues on the Yellow Fever Commission combined laboratory science principles with questionable human experimentation protocols to produce scientific knowledge, Gorgas and his team implemented what Stern calls an "un-holistically narrow" model of disease eradication based on problematic presumptions about the health and immunity of people living in the tropics.[727]

Although the work of the Yellow Fever Commission arguably catalyzed the program of eradication spearheaded by Gorgas, the Commission's focus was the etiology of yellow fever, rather than its control. Yet, Stern argues that while waiving "the banner of scientific success," both Reed and Gorgas were "entrusted with quelling disease in order to facilitate U.S. political dominion and commercial interests."[728] While their motivations were important, so also were there methodologies. The Yellow Fever Commission employed rigorous scientific protocols to ensure the efficacy of their

[726] Stern, "Yellow Fever Crusade," 41.
[727] Stern, "Yellow Fever Crusade," 55.
[728] Stern, "Yellow Fever Crusade," 55.

medical research on the etiology of a disease that plagued both whites and non-whites. Gorgas and his team focused their efforts more on controlling the hosts of the disease by imposing radical measures based on racist ideologies. Both their questionable—and sometimes fatal—human experiments exercised with patient consent and their scientific discoveries form an important part of the legacy of the Yellow Fever Commission and the Army Medical Department in the nineteenth and twentieth centuries.

Historians have demonstrated that public health and sanitation in the United States was most definitely shaped by yellow fever.[729] The disease plagued American soldiers in particular through all of the major wars of the nineteenth and twentieth centuries. Yellow fever also contributed to increasing division between the North and South, hindered industrial and economic development in the South, and fostered xenophobic sentiment in the United States. Discovering the mechanism and cure for yellow fever was important to military medical officials for all these reasons and more. That the discovery of the mosquito as the vector of yellow fever was made through experiments on and Spanish immigrants during the Spanish-American war of 1898, certainly suggests that American political and economic interests motivated the campaign against yellow fever. Nevertheless, I argue, the resources of the Army Medical Museum and the motivation of its staff to solve the problem of yellow fever were equally important in the campaign. Insofar as American military medical work on yellow fever

[729] See Alexandra Minna Stern, "Yellow Fever Crusade: US Colonialism, Tropical Medicine, and the International Politics of Mosquito Control," in *Medicine at the Border: Disease, Globalization and Security, 1850 to the Present*, ed. Alison Bashford (London: Palgrave MacMillan, 2006); John Ellis, *Yellow Fever and Public Health in the New South* (Lexington, KY: University Press of Kentucky); John Duffy, *The Sanitarians: A History of American Public Health* (Urbana-Champaign, IL: University of Illinois Press, 1992); Margaret Ellen Warner, "Public Health in the New South: Government, Medicine and Society in the Control of Yellow Fever (Ph.D. diss., Harvard University, 1983).

catalyzed broader public health initiatives and the development of tropical medicine, so also it had a profound impact on the Army Medical Department itself. The Army Medical Department's focus on infectious disease research in the laboratory and developing tropical medicine in the field not only diverted energies away from the Army Medical Museum, but also illustrated a paradigmatic shift in modern medicine from museological science to a more experimental laboratory science.

Since its inception, the Army Medical Museum privileged the methodology of museological science for transforming raw data into medical knowledge. With the rise of bacteriology, however, the experimentalism of the laboratory became increasingly attractive to the men of medical science who operated the Army Medical Museum. Outbreaks of typhoid fever, yellow fever, tuberculosis, and diphtheria earlier in the nineteenth century had caused significant concern for public health, but it was not until the end of the century that bacteriology provided the lens through which these infectious diseases could be understood. At the same time, it was the threat of these diseases to the American soldier that ultimately catalyzed the rapid development of military bacteriological research, which proved fundamental in understanding and preventing these diseases. While training the American medical officer in the new Army Medical School, bacteriological researchers utilized them as test subjects in their experiments. Just as the fervor of scientific medicine transformed the patient into an object for microscopical analysis, so also it transformed the patient into a test subject for bacteriological analysis.

This chapter illustrates the important ways in which the Army Medical Museum facilitated the advancement of experimental research by the end of the nineteenth century, subordinating itself to the laboratory while its collection stagnated. The growth of military bacteriological research depended on the resources and institutionalization of the Army Medical Museum, while at the same time, redirecting its energies away from collecting and towards experimenting. Bacteriology contributed not only new medical knowledge to the stores of the Army Medical Museum, but also a new visuality through the display of bacteriological specimens, instruments and illustrations. Under Sternberg and Reed, the Army Medical Museum and Library and the Army Medical School were requisitioned to the purposes of the bacteriological laboratory. I argue that the privileging of bacteriological research over Museum work contributed the decline of the Army Medical Museum itself. At the same time, the orientation of the Army Medical Museum and Army Medical School around laboratory research also fundamentally altered their future usefulness. As the Army Medical Museum became historicized along with the specimens it displayed, its enduring characteristic was that of the pathological specimen, which determined its future as a pathology institute.

CONCLUSION

Major James Carroll, of the Yellow Fever Commission, took Major Walter Reed's place as Curator of the Army Medical Museum in 1902. Four years later, he organized a meeting at the Army Medical Museum to discuss the formation of an international association for pathology to ensure the protection of the discipline and its museums. Maude Abbott, curator of the McGill University Pathology Museum claimed that Virchow's Pathological Museum of Berlin provided a good example of "the extensive use to which a large collection of fine specimens can be put in teaching," such as "illustrating conditions studied for the first time, in groups for comparison and differential diagnosis, and also…in large numbers for purposes of rapid review."[730] Surely the importance of the pathology museum could be appreciated around the world, and an international organization that gathered these institutions together might ensure the longevity of these museums in the twentieth century.

The result of the meeting was the formation of the International Association of Medical Museums, which promoted the anatomy and pathology museum as an essential method for medical instruction, while at the same time working to "facilitate cooperation among medical museums through the exchange of information and pathologic specimens and promoted the use of medical museums for diverse audiences."[731] Adopting many of the goals for change promoted under the program of the "new museum" movement of the

[730] Maude E. Abbott, "On the Classification of Museum Specimens" Reprinted from *American Medicine*, Vol. 5, No. 14 (April 4, 1903): 2.
[731] Daniel S. Lamb, *A History of the United States Army Medical Museum 1862 to 1917, compiled from the Official Records* (Washington, D.C.: U.S. Army Medical Museum, 1917): 125-133; Erin H. McLeary, "The Mütter Museum: Education, Preservation, and Commemoration." *Annals of Internal Medicine* Vol. 132, No. 7 (Apr., 2000), 601.

late nineteenth century, the International Association of Medical Museums aimed to keep medical professionals and pathologists in control of the modern medical museum, whatever challenges might arise.

Subsequently, the First World War profoundly affected medical museums. Those capable of mobilizing their resources around active laboratory research—such as the Army Medical Museum—became considerably more successful than those with merely historical objects and cabinets of curiosities—like the Mütter Museum. As those medical museums with large pathological research collections and capacities mobilized for the war effort, the specialized medical museums with less to contribute to the national war effort were encouraged to consolidate their collections around the more general theme of public health. While the specializations constructed in the field of organized medicine were seen as useful, the specialized collections of medical museums rooted in the nineteenth century were considered outdated and useless for the American public. World War I fueled a spirit of both nationalism and cooperation, encouraging museums to adopt a more public service ideology.[732] As Ken Arnold explains, medical museums were encouraged to "cover a far broader social terrain," and expand their collections and exhibits to consider "health in general" as would best serve the American public.[733] The work of Reed and the Yellow Fever Commission in Cuba facilitated greater interest and progress in the development of public health and tropical medicine in the United States, which many museums came to reflect.

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[732] McLeary, "The Mütter Museum," 602.
[733] In Gaynor Kavanagh, ed., *Making Histories in Museums* (London and New York: Leicester University Press, 1996), 21.

By World War I, the Army Medical Museum had developed a substantial public health and tropical medicine collection, but its primary focus had become contemporary military medical research, publicizing its efforts as those of a truly national institution in the service of the country.[734] Contributing to the war effort became far more important than medical collecting, preserving and educating. William C. Gorgas, the well-known architect of infectious disease eradication programs in Cuba, Panama, and the tropics, became Surgeon General in 1914, and immediately mobilized the resources of the Army Medical Museum to assist with the practical application of medical research to the changing demands of twentieth century war. Surgeon General Gorgas mimicked many of the programs Hammond had initiated during the Civil War, but this time in the context of a more global war. Gorgas initiated the collection of specimens, case histories and statistics for the preparation of a medical and surgical history of the First World War that would serve as an extension of Hammond's *The Medical and Surgical History of the War of the Rebellion*. At the same time, Gorgas's view of the Army Medical Museum's utility during this international conflict was as an institution for pathological research to provide practical solutions to wartime illness and injuries. Michael G. Rhode and James T. H. Connor argue that it was this view during World War I set the Army Medical Museum "firmly on the road to becoming a pathological institute of national importance."[735]

In the meantime, the Army Medical School had expanded considerably by the eve of the First World War, training men of the Army Hospital Corps and Army Medical

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[734] Michael G. Rhode and James T. H. Conner, ""A Repository for Bottled Monsters and Medical Curiosities": The Evolution of the Army Medical Museum." In *Defining Memory: Local Museums and the Construction of History in America's Changing Communities*, ed. Amy K. Levin (Lanham, MD: AltaMira Press, 2007), 189.
[735] Rhode and Connor, "A Repository for Bottled Monsters," 189.

Reserve Corps, in addition to the standard Army medical officer. Although the primary purpose of the widening of the school's student body was to produce better-trained soldiers and officers throughout the Medical Department of the Army, the school board soon realized that more students facilitated greater research efforts. Students were soon employed in the preparation and study of specimens in the Museum, as well as research and experimentation in the Museum's laboratories. Although the Army Medical School was designed to train a well-rounded military medical officer, it became increasingly advantageous during this time to encourage students to develop a specialized interest, which could contribute to elevating the scientific practice in the laboratories of the Museum. Thanks to the work of Reed and Gorgas in the field, many students were interested in specializing in bacteriology. Men of the Hospital Corps were especially eager to train in the highly technical work of investigating and experimenting with "active, virulent germs of disease." Still other students chose to specialize in specimen dissection and preparation, microscopical preparation and study, X-ray photography, photomicrography, and many others.[736] Although the fruits of their specialized labor were not immediately recognized, the Army Medical Department considered such work the foundation for improvements in experiential education for future generations.

By the late 1930's, many of the country's most prominent medical museums were managed by public health educators, rather than pathologists or medical professionals. War had disrupted the work of the International Association of Medical Museums, which had originally lobbied for the medical community's continuing control over medical

[736] Memorandum on Hospital Corps men on duty at Army Medical School, 1 April 1909, Series 3-13-1, Folder 11008, OHA19: Curatorial Records: Numbered Correspondence**,** Otis Historical Archives, National Museum of Health and Medicine, Silver Spring, Maryland.

museums, and by the end of World War II, the Association had resolved itself simply to pathological research, rather than the promotion of medical museums. In the years following World War II, many of the museums associated with hospitals and medical schools were no longer used for medical education and research.[737] With a sharp decrease in museum visitors during the interwar years and the post World War II era, the medical museum fell into decline.

Medical museums such as the Army Medical Museum, which were originally central to education at medical schools, have mostly disappeared from the "medical landscape," while the collections that have survived have are no longer conceived of in the same way.[738] The importance of pathological, bacteriological, and genetic research allowed laboratories to edge medical museums out of the picture by the middle of the twentieth century. Most medical museums were transformed into history museums and libraries, useful mainly as public institutions for understanding the history of medicine, rather than sites for the exploration of modern medical knowledge.[739] This period of dormancy contributed to the trend in many medical museums to reorient themselves in the second half of the twentieth century around more cutting edge medical topics, as well as to construct more historically situated narratives of the strange and curious medical collections they housed. While the war years contributed significantly to making medical museums obsolete, the rise of laboratory-based medical research and new paradigms in the history of medicine also facilitated a transformation of the modern medical museum into the museum of medical history. As medical museums have disappeared, Erin Hunter

[737] McLeary, "The Mütter Museum," 602.
[738] McLeary, "The Mütter Museum," 599.
[739] McLeary, "The Mütter Museum," 602.

McLeary maintains, the functions they fulfilled have been forgotten. The artifacts displayed for medical education in medical museums have now become a part of newly constructed narratives for public education in museums of medical history.[740]

The Army Medical Museum was one of the few medical museums to survive the rise of the laboratory and the subsequent explosion of public health during the first half of the twentieth century in the United States. Its endurance was linked to its position as a military institution, supported by the government, and its collection of materials that could be deployed in medical research. Thus, the Army Medical Museum existed in the early twentieth century not as a medical museum, but as a storehouse of medical research materials with an historical collection. Whereas World War II had sealed the fate of medical museums with declining attendance, it "confirmed the Army Medical Museum's primary role in pathology consultation."[741] By 1944, the museum had become a division of the Army Institute of Pathology, expanding its collection of pathological specimens exponentially, while no longer focusing on more historically situated medical acquisitions. At the same time, the museum's exhibits were often moved to the background, or relegated to specialized topics reflecting the trends in pathological research.

In the 1950's, the museum showcased exhibits such as "Distinctive Tumors of the World" and "Urologic Antiquities," reflecting its increasing international and military focus.[742] In 1968, the museum finally moved to the Walter Reed Army Medical Center campus, where it functioned as a clinic for the Army Medical School and a laboratory for

[740] McLeary, "The Mütter Museum," 602.
[741] Rhode and Connor, "A Repository for Bottled Monsters," 190.
[742] Rhode and Connor, "A Repository for Bottled Monsters," 190.

pathological research. Though the Army Medical Museum avoided the more general period of extinction that affected so many medical museums in the United States, it was kept alive only as a pathological institute until 1988.[743]

In 1988, the Army Medical Museum relocated to officially become the National Museum of Health and Medicine (NMHM), hoping to attract a wider range of both national and international visitors under the auspices of providing both an overview of modern health and a history of medicine. The NMHM created new exhibits from their vast collection of specimens and artifacts, focusing on the cellular and anatomical structure of human beings. The exhibit "From a Single Cell" documents human development from the embryonic state to childhood, generating awe at the cellular basis for the human body. "Human Body, Human Being" takes this one step further, providing plastinated torsos, organ specimens, and technological developments that illustrate not only the physical essence of the body, but also different medical conceptualizations of the body in the modern era. The NMHM also praises advancements in medical technology that have had a profound impact on military medicine in particular. The special exhibit "Resolved: Advances in Forensic Identification of U.S. War Dead" illustrates how modern medicine and technology have worked together to provide the means for identifying diseases soldiers with very little information. In addition, the NMHM provides several historically focused exhibits, including "To Bind Up the Nation's Wounds: Medicine During the Civil War" (providing a visual medical and surgical history of the war) and "Battlefield Surgery 101: From the Civil War to Vietnam"

[743] Rhode and Connor, "A Repository for Bottled Monsters," 191.

(illustrating advancements in the field of military medicine over the last century).[744] These exhibits in particular allow the NMHM to function as a museum of medical history.

In 1984, a few years before the change in status of the Army Medical Museum, J. L. Turk argued that medical museums in the United Kingdom and the United States especially provided a valuable resource. Turk elucidated seven ways in which medical museums should be considered useful in modern times. First, they act as a record illustrating the history of medical thought and discovery, and can be used to speculate as to the future of medical thought and discovery. They also provide archival collections that characterize diseases existing in the past, using texts, models, specimens, and artifacts to illustrate medical history. Their collections of technological devices provide not only appreciation for past advancements in medicine, but also useful tools for future technological developments. Turk argued additionally that anatomical displays, pathological specimens, and collections of medical instruments are also central for both conceptualizing medicine in the past, and developing new understandings of, and techniques for, modern medicine. This attempt to rehabilitate the medical museum's scientific usefulness as well as to celebrate its commemorative functions attests to the complexities of the status of the Army Medical Museum during the rise and fall of museological science.[745]

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[744] All information concerning museum exhibits taken from the National Museum of Health and Medicine Audio Tour script, found online at: www.nmhm.washingtondc.museum.

[745] J. L. Turk, "The medical museum and its relevance to modern medicine," *Journal of the Royal Society of Medicine*, Vol. 87 (January 1984): 42.

The Legacy of the Army Medical Museum

The Civil War experience fundamentally changed the landscape of American medicine, providing not only experiential knowledge, but also valuable medical material on which to build a distinctly American medical science. Insofar as the French Revolution transformed and elevated French medicine, providing bodies and methodologies for systematic investigation, so also the Civil War transformed and elevated American medicine, providing the same investigative opportunities, while also ushering in a new era in medical theory and practice. Through their work in the Civil War, U.S. Army Surgeon General William A. Hammond, and his Medical Department laid the foundations for a new medical science in America. During the process of collection and display of specimens, they were concerned with the historical value of medical specimens as much as the scientific value. The Army Medical Museum was constrained by the desire to test the methodologies of the new French museological science in a specifically American context, and to resolve tensions inherent in the decontextualized display of scientific specimens. In writing the history of medicine and surgery during the Civil War, this museum also produced a manual for a distinctly American museological science whereby medical science and historical context complemented one another in powerful educational exhibits. What is more, the historical value of their specimens ensured their survival amidst the decline of the medical museum in the twentieth century, when laboratories replaced university medical museums and rendered traditional museological science obsolete in medical education.

The Museum's exhibits and the enormous paper museum represented by the *MSHWR* helped reconstruct the American nation by piecing together the battles fought, the medical lessons learned, and the histories of those who lost life and limb. In turn, the specimens of the dead and the photographs of injured soldiers helped those affected by the war to remember and move forward. On a more practical level, these records became pivotal in the securing of pension benefits for disabled veterans. From injury, to post mortem, to museum display, the pathological specimen was part and parcel of the experiential knowledge gained during the Civil War, and the medical knowledge created afterwards. The work of Museum staff in microscopy, comparative anatomy, and craniometry at this time was contingent upon the use of museological science and the production of reliable information through analysis, comparison, and diagnosis. In the absence of definitive scientific conclusions in the practice of newly developing sciences like craniometry, the size and scope of the materials used for analysis were often to blame. Thus, the Army Medical Museum's commitment to expanding its collection for the benefit of medical research was inherently tied to the demands of museological science. By the end of the nineteenth century, the promise of laboratory medicine to provide the answers lacking in analytical and diagnostic research finally persuaded Museum staff to more directly accommodate the laboratory revolution.

When George Miller Sternberg took over as Surgeon General and Walter Reed became Curator of the Museum in 1893, they decisively shifted the Museum's focus away from museological science and refocused its resources towards that of medical laboratory. Sternberg and Reed oversaw seminal research on typhoid fever and yellow fever, paving the way for prevention and treatment of these infectious diseases and the

development of international public health infrastructure. I argue that it was the Army Medical Museum's inherent accommodation of scientific investigation of medicine that allowed it to become more broadly an institution for medical research in the twentieth century, but this privilege of research over Museum work contributed the decline of the Army Medical Museum as a pathoanatomical museum itself.

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