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History of Pathology Society Meeting
Henry B. Gonzalez Convention Center,
San Antonio, Texas
Sunday, March 5, 2017, 3:30-5:30 p.m. CC 302-C
United States and Canadian Academy of Pathology Meeting

Pathology in the Wake of the Great War
 Moderator, James R. Wright Jr., MD, PhD
 University of Calgary, Calgary, AB, Canada

Course Description

2017 is the centenary of World War I, an event that changed the world and had a profound impact on the practice of pathology. This session will address the practice of pathology and laboratory medicine during and immediately after the War and describe medical museum specimens collected during the War as well as their use and fate after the War.

3:30

In the Wake of the Great War:
How Pathology Became a Clinical Discipline in America?
 James R. Wright, University of Calgary and Calgary Laboratory Services, Calgary, AB

4:30

Pathology Specimens from WWI
 Robin Cooke, MD, Royal Brisbane Hospital, Brisbane, Australia

5:05

Business Meeting

In the Wake of the Great War:

How Pathology Became a Clinical Discipline in America? ©

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World War I began during the summer of 1914 with the major European combatants entering the War over about a 6 week long period. On August 4, Great Britain declared war on Germany and the United States declared its neutrality. On April 6, 1917, the United States declared war on Germany and the arrival of the American Expeditionary Forces (AEF) in France greatly changed the balance of power. Between the Spring of 1918 and the Spring of 1919, the Great Influenza Pandemic struck North America and Europe in three waves; the worst was in the Fall of 1918, crippling war efforts on all sides. The hostilities ended with Germany signing the Armistice of Compiègne on November 11, 1918. Germany and the Allies signed the Treaty of Versailles in mid 1919. The United States involvement in the war lasted less than 18 months. However, this brief involvement in the War had dramatic effects on medicine and surgery at home. In this talk, I will focus on how the practice of pathology in North America changed drastically in the wake of the Great War. The “Roaring Twenties” was very good to pathology (1).

In the 19th Century, pathology was not a clinical specialty. One could not really make a living as a pathologist. North American pathologists were Professors of Pathology teaching in medical schools (2); they generally performed autopsy-related or bacteriological research trying to understand disease (n.b., in North America, pathologists led bacteriological research while in much of Europe, this was done by Hygienists and pathologists did only autopsies). On neither side of the Atlantic, were pathologists involved in patient care. In fact, for about the first seven decades of the 19th Century, laboratory tests did not even exist. Into the 1800s, internists relied extensively upon a century old technique, “uroscopy,” to make diagnoses. Here, physicians examined a flask of patient urine visually while holding it up to the light and comparing its color with a “uroscopy wheel”; when the color of the urine in the flask matched that of one of the colored flasks on the wheel, the diagnosis could be read off of the wheel. Well-trained internists also took into account urine smell, consistency, and even taste.

American involvement in late 19th Century conflicts at home and abroad began to change the practice of pathology in the United States. During the American Civil War (1861-1865), the Army Medical Museum was established in 1862 when the Surgeon General’s Office issued a circular telling medical officers to send it “all specimens of morbid anatomy, surgical or medical, which may be regarded as valuable ... in the study of military medicine or surgery.” (3) The Union Army leadership’s belief was that by collecting instructive pathological specimens from soldiers documenting war-related injuries as well as “camp diseases” like typhoid fever, diarrheas, parasites, etc., military physicians and surgeons could study these specimens and possess greater knowledge which would pay a dividend of enhanced troop readiness. 7,630 pathological specimens were collected during the Civil War.

By the time of the Spanish-American War in 1898, the Army Medical Museum's focus changed to the new field of bacteriology. In this War, there was a 7:1 ratio of deaths from infectious diseases compared to deaths from battle wounds. Typhoid Fever was the major culprit, but yellow fever and malaria were also major contributors. Research led by Walter Reed (Typhoid Commission of the US Army Medical Museum) eventually resulted in vaccines decreasing the incidence of typhoid fever by 800-fold. Reed also confirmed Cuban physician Carlos Finlay's theory of mosquito transmission of yellow fever. The Army Medical Museum not only continued collecting instructive pathological specimens, it was conducting epidemiological research and producing vaccines promoting American troop readiness (3).

Meanwhile, in civilian America, pathology was evolving. Its scope was broadening from medical school-based autopsies into Pathology & Laboratory Medicine. In the 1880s and 1890s, the few laboratory tests that existed were simple enough that they could be performed on the wards by an internist or his resident. However by the turn of the century, the number of possible laboratory tests and the number of hospitals in North America were both increasing exponentially, and many of the new laboratory tests were too complex to be performed by an internist on the wards. By the mid 1910s, the magnitude of testing was sufficient to create a potential niche for a specialist to provide these services and two competitive models arose in large American cities: hospital-based clinical pathologists vs "mail in" private commercial laboratories. The former tended to be small and less efficient, but provided personalized service and ease of consultation with the clinical pathologist. The latter, tended to be larger and more widely available, provided faster turnaround times, advertized low prices in medical journals and elsewhere, but were often run by technologists with unknown qualifications. Quality assurance on lab tests was almost non-existent. While a large city like Chicago had at least 8 different private commercial laboratories competing for the clinician's laboratory testing business (1), it should be noted that neither model really met the needs of rural physicians (1, 2).

Ironically, even autopsy pathology, had not exactly flourished in the hands of academic pathologists during the last few decades of the 19th Century, as it was not uncommon for internists, such as William Osler, to perform autopsies on their patients who died, allowing them to obtain optimal clinic-pathological correlation and improve their patient care skills (4). While autopsy consent laws were fairly similar to those now in place, pathologists and internists alike sometimes circumvented these laws to obtain desirable teaching specimens; in fact, beginning in the 1880s, techniques to perform covert "arms-length" autopsies through the anus or vagina were published in the medical literature (5). To make matters worse, clinicians were sometimes at odds with institutional pathologists over who should perform autopsies when inpatients died. For instance, at Blockley Hospital (Philadelphia General Hospital), William Osler had ongoing battles with the two Blockley pathologists, E.O. Shakesphere and H.F. Formad (6). Part of the importance of autopsies was that instructive specimens were critical for teaching medical students. In 1907, the International Association of Medical Museums was formed to facilitate exchange of pathological teaching specimens between medical schools. While a basic understanding of pathophysiology was widely recognized as a necessity for physicians to practice scientific medicine and while it was recognized that teaching pathology to medical students was a critical element of medical education, pathology, as a medical specialty, was in a mess when America entered WWI.

In the early decades of the 20th Century, surgery was also in a mess and better trained surgeons wanted to begin policing surgical practice in North America. The American College of Surgeons (ACS) formed in 1913 as an elite guild with the goal of elevating the practice of surgery. At the time, there was an oversupply of medical practitioners and the quality of their training was highly variable. This was a time period before formal residency training programs and board examinations existed, and so there was no way for patients to carefully select a surgeon. Furthermore, the separation of surgical and medical practice was incomplete and many physicians also practiced surgery, often with very bad results. This oversupply of surgical practitioners resulted not only in the surgical profession having a very poor reputation, it also adversely affected incomes. The ACS was formed to rectify these issues. Membership in the ACS required a minimum level of competency which must be documented. Members of this elite guild naturally assumed that patients needing surgery would flock to them rather than “surgeons” of lesser ability and training. However, most hospitals allowed any medical practitioner to operate and the ACS desired to change this. The ACS wanted autopsies performed on patients who died and wanted all surgical specimens, which up until this time were usually thrown in the garbage can, to be examined as new forms of surgical quality assurance. Elite surgeons believed that this would eventually limit competition from poorly trained surgical practitioners. Pathologists had not recognized or seized this opportunity and in some top centers surgeons were taking on this role and it appeared as if surgical pathology might develop as a subspecialty within Surgery Departments rather than within Pathology Departments (1, 2).

WWI was transformative. It was the first war in which Clinical Pathology played a major role (3). Before continuing, I should digress and highlight that the term “Clinical Pathology” had a different meaning a hundred years ago than it does now. As alluded to previously, pathology in the 19th Century was not a clinical specialty and it played no role in patient care. By the early 20th Century, both surgical pathology (discussed below) and laboratory tests were becoming critical components for the provision of science-based medical and surgical care. In this context, “Clinical Pathology” simply meant “patient-oriented pathology” and its scope included both anatomical pathology and what we today call clinical pathology. Related to the War, in addition to providing many thousands of Wasserman complement fixation tests for syphilis and Widal agglutination tests for typhoid fever (i.e., the two most important tests promoting troop readiness), pathologists were providing bacteriologic cultures, examinations for parasites, a number of chemistry tests, hematocrit and iron measurements, differential blood counts, blood morphology assessments, microscopic examination of urine and sputum, urine glucose measurements, surgical pathology, autopsies, and many other tests. In fact, Clinical Pathology was deemed to be so important in WWI that all of the major warring factions created and utilized mobile laboratories, allowing laboratory testing to be done to support troops near the front (7). The quality of the laboratory services provided to AEF physicians and surgeons was outstanding! Colonel Joseph Siler was the director of the Division of Laboratories and Infectious Diseases for the AEF. He appointed Colonel Louis B. Wilson (8), who was on leave from his position as Director of Laboratories at the Mayo Clinic, as his Assistant Director (Fig. 1). Over a one year period, they organized 300 efficient laboratories which provided high quality services. Because of the rapid expansion in numbers of hospitals in the early decades of the 20th Century and the relatively small numbers of hospital-based clinical pathologists, many AEF physicians had never worked with a pathologist in their earlier civilian lives and did not know the scope of services that pathologists could provide until they had enlisted. AEF physicians and surgeons were

suddenly encountering types of trauma that they had never seen before as well as dealing with the consequences of chemical warfare and a deadly influenza outbreak. Wilson's surgical pathology service and his autopsy service helped physicians and surgeons learn from their mistakes. Wilson set high standards and was a stickler for providing personalized services directed at helping clinicians address clinically important problems. Wilson considered every interaction between his pathologists and AEF clinicians to be a consult, which proved to be an exceedingly different level of service than most AEF physicians were accustomed to prior to enlisting. After the War, both Siler and Wilson were awarded Distinguished Service Medals, which were first authorized by Congress and then personally presented by the President, for organizing and providing outstanding laboratory services that were of "inestimable value to the medical and surgical services" and were delivered "in a manner not believed possible." (3) AEF physicians and surgeons had much higher expectations related to laboratory services when they returned home.

North American surgical and hospital care changed quickly in the wake of the War. At the beginning of the 20th Century, typical patient encounters with surgeons and hospitals could generally be described as highly unsatisfactory and some were abysmal (9). The ACS had begun to roll out its plans to introduce Minimum Standards for Hospitals just as the United States was entering the War. This ACS Minimum Standards for Hospitals campaign went into full swing immediately after the War, when several top ACS surgeons (ACS Board of Trustee members) who had played major roles in establishing efficient AEF hospitals in France, brought home additional practical knowledge. However, the ACS leadership had no authority to impose any kind of regulations on hospitals and so it needed to tread lightly at first. The ACS had initially approached the American Medical Association (AMA), which also recognized the need to improve hospitals, but the AMA did not want to participate as this might alienate its membership, leaving the ACS to do take on this tricky task on its own. The ACS conducted an internal fund-raising program raising approximately \$1 Million from its membership and then hired John Bowman, the former Secretary of the Carnegie Foundation for the Advancement of Teaching, to oversee the project (n.b., shortly after this, the Carnegie Foundation also provided financial support for the project). Next, the ACS, by developing a massive and expensive engagement process, sought input from a wide variety of stakeholders (internists, other specialists, medical societies, hospital administrators, hospital trustees, hospital organizations, etc.) and then asked these stakeholders to help develop the standards. By taking this highly consultative approach, the ACS Minimum Standards were so reasonable (i.e., the general focus was on working together to achieve better patient care) that it was difficult for any parties to publically oppose them and they were widely adopted throughout the United States and Canada throughout the 1920s. Even though it was almost impossible for anyone to oppose the intent of the Minimum Standards, only 89 of the 692 large (100+ bed) hospitals in the United States and Canada, met the Standards in 1918 and several of North America's most prestigious hospitals failed; however, the pressure (mostly competition with hospitals who could advertise that they had met the ACS Standards) was so great that the percentage of compliant large hospitals exceeded 80% by 1922 and approached 100% before the end of the 1920s. While the initial 1918 version of the Standards cited the importance of laboratories in a vague way, this was not its major focus and it was clear that surgeons did not have sufficient content knowledge to really know what they wanted related to clinical laboratories. Clinical pathologists were very happy to provide input as to what constituted an "adequate laboratory" (n.b., this term reflects that the

ACS was establishing Minimum Standards). This will be addressed in detail below. Regardless, the development and implementation of the ACS Hospital Standardization program is perhaps the best example of successful continent-wide change management initiative in the history of health care, and it is worthy of study even today (9).

At the same time, the new profession of clinical pathology was struggling for its very survival. Hospital-based clinical pathologists were in a fight for their professional lives with private commercial laboratories. There were only about 450 clinical pathologists practicing in the United States in 1922 and many of these believed that hospital-based pathology practice would soon be extinct. In large American cities, there were often multiple commercial laboratories which advertised their low prices. Some of these laboratories were run by unsupervised technologists, others were run by technologists who advertised meaningless associations with famous academic pathologists (honorary directorships), and others were well run legitimate operations where the work was directly overseen by well-trained clinical pathologists. Therefore, it was not easy for physicians at the beginning of the 1920s to know which commercial laboratories offered high quality services. To make matters worse, the AMA allowed commercial laboratories to advertise their services and prices in the *Journal of the American Medical Association*. When questioned about this, the AMA Advertising Committee deemed that these laboratory tests were “commodities” rather than medical services, that these services could be provided by any competent person with minimal training (i.e, did not require medical training), and that, as commodities, it was not unethical, in fact was appropriate, to advertise prices. The Advertising Committee further alienated laboratory physicians saying they were “not the same as internists and surgeons,” and by calling them “manipulators of test tubes and inanimate substances” (1, 2).

Starting in 1922, two Denver pathologists Philip Hillkowitz (Fig. 2) and Ward Burdick (Fig. 3) organized pathologists in the City of Denver, followed by the State of Colorado, and finally the whole country over a period of only 13 months. They established the American Society of Clinical Pathologists (ASCP) in 1923 (n.b., the organization changed its name to the American Society for Clinical Pathology in 2001). Hillkowitz became first president, and Burdick became the ASCP's Secretary for the rest of his short life. Their first task was to fight the powerful AMA over its advertising practices which prevented hospital-based clinical pathologists from earning a decent living, because without winning this battle the new specialty of clinical pathology appeared rapidly to be on its way to extinction. Hillkowitz, Burdick, and the ASCP Executive quickly and astutely recognized that they had a potential powerful partner. Therefore, they worked hand in hand with the ACS helping them in their quest to standardize hospitals. The ACS leadership knew that their standardized hospital should have adequate laboratories, but they had not the slightest idea what this should look like. ASCP pathologists were heavily involved in shaping the adequate laboratory for a standardized hospital, and their strategic involvement explains how pathology evolved in the 1920s to resemble what we practice now. In 1922, Louis B. Wilson was asked by ACS leadership to serve on a five person ACS standardization of laboratories committee tasked with designing laboratory services for the standardized hospital.

The ACS initial 1918 Minimum Standards for Hospitals document was only one page long. Related to laboratories, it simply stated that diagnostic facilities “under competent supervision be available for the study, diagnosis, and treatment of patients, these to include, at least, (a) a clinical laboratory providing chemical, bacteriological, serological, and pathological services; (b)

an x-ray department ...” It should be noted that there was no requirement that the supervision be a physician, let alone a trained clinical pathologist. There were also no staffing requirements or the minimum qualifications for staff (n.b., since there was an educational requirement at that time for interns to learn to perform basic laboratory tests, laboratories could theoretically be staffed only by interns).

As alluded to earlier, routine surgical pathology did not exist. Specimens removed at surgery were normally discarded rather than examined. However, if a surgeon wanted a particular specimen examined, he could either send it to a mail order commercial laboratory, which typically charged \$5, or he could, in most states, send it to the state public health laboratory, which provided the service for free but with much slower turnaround times (10). The ASCP leadership, although most were primarily chemists, hematologists, and bacteriologists, astutely recognized that what the ACS really wanted was anatomic pathology -- especially surgical pathology with intraoperative frozen section support (2, 11) and autopsies, both services that mail order commercial laboratories could not easily provide from a distance (1). By 1926, the Minimum Standards document was much more detailed. Related to laboratories, there were now a page and a half of explicit standards addressing qualifications for the laboratory director, types of testing, mandatory examination of surgical specimens, laboratory and hospital record keeping, and mandatory pathologist participation in quality assurance by attending monthly medical staff conferences. The 1926 document’s proclamation that “all tissue removed at operations shall be examined in the laboratory and reports rendered thereon ...” essentially created the field of surgical pathology. While the 1926 standard did not require a minimum autopsy rate, the ACS forcefully stated that modern standardized hospitals should have high autopsy rates, suggesting that this was a quality indicator for modern hospitals. Prior to 1926, it was difficult to pay for autopsies as it seemed indelicate to ask the family of the deceased to pay. However, now, autopsies could be subsidized by the more lucrative clinical laboratory testing and surgical pathology.

Pathology and laboratory medicine became a highly dynamic field in the 1920s. Tumor grading, introduced by Mayo pathologist Albert C. Broders in the early 1920s, had become state-of-the-art for cancer prognostication (12). Many new chemistry tests were introduced; test sensitivities improved and volumes of blood required per test decreased (e.g., in 1910 it required 20 ml to measure blood glucose; by the early 1920s, it required only 0.2 ml – which actually was a fundamental enabler for the discovery of insulin by Banting and Best). The War had resulted in important advances in transfusion technologies which soon evolved into new roles for clinical pathologists (13). By the late 1920s, after a 60 year hiatus, a new era in the use of exfoliative cytology had begun (14).

The ACS Minimum Standards for Hospitals was an important regulatory framework for hospitals for 32 years and then evolved into the Joint Commission on Accreditation of Hospitals in 1951, the Joint Commission on Accreditation of Healthcare Organizations in 1987, and the Joint Commission in 2007.

In less than a decade, Hillkowitz and Burdick transformed the practice of pathology and laboratory medicine in America; by the end of the decade, private commercial laboratories had largely been driven out of business and the hospital-based mode of practice had prevailed (1). Surprisingly, other than brief obituaries, not much had been written about either of them. While

Ward Burdick's name is known within the ASCP because there has been a Ward Burdick Award Lecture at the annual ASCP meeting for the past 80+ years, few pathologists even know the name Philip Hillkowitz. However, from attending some of the Ward Burdick Award lectures, it seems clear to me that even his award recipients have trouble saying much about him. Burdick, early in his career, was Director of Laboratories at the National Jewish Hospital for Consumptives in Denver and, later (i.e., when the ASCP was formed), was Director of Laboratories at the Children's Hospital of Denver. Burdick was neither a teacher nor a researcher, but he was an outstanding organizer, and his contemporary professional colleagues deemed his contributions to the profession so great that the ASCP named its first and most prestigious annual award after him. I have just published a brief biographical sketch about Ward Burdick (15) and am writing one on Hillkowitz.

Philip Hillkowitz is a much more substantial figure than Burdick. Yet, his name has been totally forgotten within the ASCP. He developed a symbiotic relationship with the ACS and helped broker a truce with the AMA. After he finished his presidency of the ASCP, Hillkowitz established the ASCP Registry of Medical Technicians and ran this out of his office for more than a decade. Hillkowitz and Charles Spivak were Denver-based prominent Jewish-American physicians of Russian origin and they co-founded the Jewish Consumptives' Relief Society (JCRS), a TB sanatorium on the outskirts of Denver which became a nationally leading sanatorium in the first half of the 20th Century. Hillkowitz was JCRS President for over 40 years and became a celebrity in New York City, where the Denver-based JCRS had its second office. Hillkowitz was an outstanding organizer and fund-raiser; the JCRS grew from a few tents in 1904 to a campus with 30+ modern buildings while he was president. The JCRS had Ladies Auxiliaries raising funds for new buildings and expansion of the Denver campus in almost every major city around the country. During the 1940s, the New York Giants NFL football team played an annual fundraising game for the JCRS. The JCRS clinical laboratory was interesting as well. Hillkowitz established it in 1908 and this laboratory was totally state of the art for its time. The JCRS met ACS Minimum Standards for Hospitals standards from their inception in 1918 (n.b., even some of the major academic hospitals on the east coast could not do this). Amazingly, even though many of the patients were orthodox Jews whose beliefs should have precluded the performance of autopsies, the ratio of autopsies to patient deaths at the JCRS were actually triple that of the average secular American hospital at the same time. Hillkowitz and Spivak did everything they could to make their sanatorium an ethnically sensitive but totally modern American hospital. After antibiotics brought tuberculosis under control, the JCRS fell into obscurity (its campus buildings are now the Rocky Mountain College of Art + Design and much of the rest of its campus became a shopping mall in the Denver suburb of Lakewood).

Pathology societies and journals thrived in the wake of the Great War. In addition to the ASCP, there were three major pathology societies. The American Association of Pathologists and Bacteriologists established in 1901, the International Association of Medical Museums established in 1907, and the American Society of Experimental Pathologists established in 1913. The *Bulletin of the International Association of Medical Museums* was edited by Maude Abbott throughout the decade. Two new pathology journals were formed: the *American Journal of Pathology*, edited by F.B. Mallory and the *Archives of Pathology and Laboratory Medicine*, edited by Ludvig Hektoen. The ASCP's first "affiliated" journal was the *Journal of Laboratory*

and Clinical Medicine, edited by Victor C. Vaughan, but in 1931 the ASCP established the *American Journal of Clinical Pathology*, as it wanted its own journal (1).

The profession of Clinical Pathology was established on firm footing in the Roaring Twenties. By the end of the 1920s, the ASCP and the AMA had even made friends and were now working together. Although the ACS expressed concern that autopsy rates were too low in standardized hospitals, the ACS Hospital Standardization process had shied away from setting a minimum autopsy rate, as it wanted hospitals to quickly succeed in meeting their standards and believed that requiring a specific autopsy rate might prevent many hospitals from meeting the Standard. By 1920, the AMA, regretting that it had not played a role in Hospital Standardization, renamed its Council on Medical Education; the new name was the AMA Council on Medical Education and Hospitals, foreshadowing their intent to move into the hospital accreditation arena. The renamed Council required hospitals wanting to train interns or residents meet their own standards. In 1927, this Council announced that no hospital could continue to be approved as a training site if they did not perform autopsies on at least 10% of hospital deaths starting in 1928 and 15% in 1929 and thereafter. This drastically increased autopsy rates (in 1927, it was projected that >36% and >55% of training hospitals would not meet the 1928 and 1929 requirements). Finally, in 1929, the ASCP and AMA agreed to a brief AMA document entitled *Essentials of an Approved Clinical Laboratory* which required Laboratory Directors to be physicians who have “specialized in clinical pathology ... for at least three years subsequent to graduation.” The AMA, which took credit for putting many technician run laboratories out of business, issued a list of 174 approved laboratories. Although the AMA never publically reversed its earlier decision favoring the advertisement of prices for laboratory tests, the *Essentials* required that “publicity of an approved clinical laboratory should be in professional good taste.” (1)

In summary, the decade in the wake of the Great War was very good to Clinical Pathology and it was during this period that Pathology and Laboratory Medicine evolved into a model similar to what we practice today.

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Fig 1. Col. Louis B. Wilson Credit: Arch Pathol Lab Med 2015: 139(9):1163

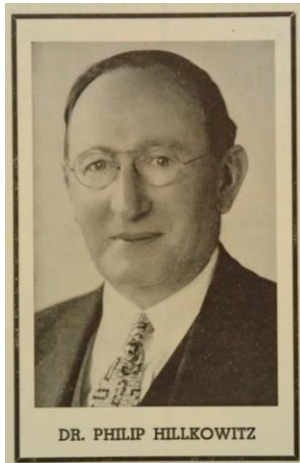


Fig 2. Philip Hillkowitz credit: JCRS Bulletin 18(2) Feb 1948 (Beck Archives, Univ. of Denver)



Fig 3. Ward Burdick Credit – J Lab Clin Med 1925; 10:678–690.

A Cooke's tour to find the remaining pathology specimens collected during WW1 by the pathologists in the various combatant countries

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Introduction

I first became aware of the existence of WW1 pathology specimens about 10 years ago when I met a pathologist who had a specimen of 'trench foot' in his Museum.

Trench foot

(This condition is now called "non freezing cold/immersion injury.")

Trench foot occurred in the first few months of WW1 when the trench warfare began. It was caused by immersion in cold water that flooded the trenches.

The soldiers had tight boots and putties and did not take their boots off for days on end.

The feet became numb and swollen.

The skin blistered and ulcerated.

Ulcers became infected.

The feet then became black and the skin ulcerated down to bone.

Examples of trench foot from various museums:

Recently I found what I think is the best description of this condition that I have seen. It was by a nurse

'Putties encrusted with mud had to be cut off.

Then heavy service boots removed – a terrible task with feet so blistered and painful.

Finally come the socks - socks almost taking root in the charred and broken flesh.

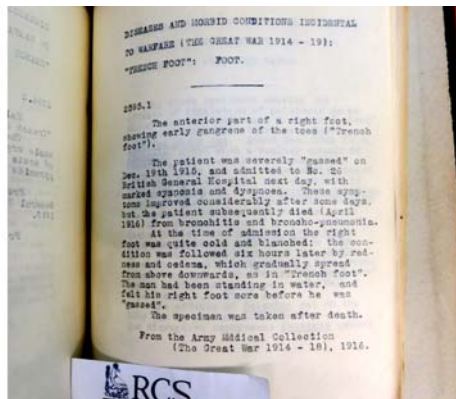
Some black, swollen and shapeless, covered with huge blisters as if they had been severely scalded.

Others completely gangrenous. The gangrene in cases extending far up the leg.'



This amputated trench foot illustrates what the nurse described.

The gram negative organism, *Pseudomonas aeruginosa* is a very common cause of wound infection. In culture it produces a pale green colour, and the green colour in this foot probably indicates the presence of this organism.



This is a medical description of a trench foot in a catalogue from the War Collection at the RCS.
'At the time of admission the right foot was blanched: the condition was followed six hours later by redness and oedema, which gradually spread from above downwards, as in 'trench foot.'
The man had been standing in water.

Simple treatment was not always effective and amputation of affected feet was usually needed.

At one stage there were 20,000 British soldiers with trench foot.

Other examples of trench foot that I found in different museums. They illustrate what the nurse and the medical observer described.



Black, gangrenous foot wax model



Two feet showing ulceration down to bone (Museum specimens)

Prevention

Dry the feet each day and change into dry socks.

Boots were supplied a few sizes too big to allow for shrinkage and to wear more than one layer of socks.

Soldiers were instructed to inspect their neighbour's feet each day to ensure that the feet were dried and socks were changed.

If an abnormality was found a medical orderly would be asked to inspect it and advise on evacuation.



A medical orderly inspecting a black (gangrenous) foot



This soldier and others being transported to a casualty clearing station.

In Australia, the UK and in other countries of the then “British Empire” women members of the Red Cross Society organised social groups for knitting socks “for the boys” and these were transported to the front.



The finding of the trench foot kindled in me an interest in pathology specimens from soldiers who fought in WW1. It has taken me many years of fossicking to find the specimens that remain. When I got my first glimpse of what was available, I thought that it might be useful to try to find what if any, similar specimens remained in the other combatant nations.

With the 100 year commemorations coming up, I thought that it might be useful to try to get contributions from pathologists from each of the combatant Nations, and to have a presentation of these results at an International Meeting of Pathologists. As a result of my fossicking I found that the Medical Corps from all the combatant nations had collected specimens from soldiers during the War with a view to collecting data that could be used for treatment 'now' and for teaching and research 'After the War is over.'

Some of my Army Medical colleagues suggested that I should consult the 3 volume 'Official History of the Australian Army Medical Services in the War of 1914-18' by AC Butler Vols 1-3 published by the Australian War Memorial, Canberra, 1943.

I did this and it formed the basis of some of my next searches.

Medical conditions amongst the British soldiers

In the early stages of WW1 in 1914 there was very little attention paid to the medical conditions confronted by the soldiers on either side of the conflict, and there was little knowledge of what these medical conditions were. In Nov 1914 Sir Alfred Keogh in his capacity as Director General of the Army Medical Services based at the War Office in London, convened a committee to plan a medical history of the War that had been going for four months. The committee's earliest recommendations were that pathological specimens and clinical data would be collected from casualty clearing stations and hospitals so that relevant education and research could be conducted 'after the war is over.'

The arrival of specimens was slow at first. The first specimens were those showing the devastating effect of the first gas attack at Ypres at 5 pm on April 22, 1915. In 1916 pathologists came onto the scene and the quality and quantity of the specimens greatly improved.

A central mortuary was established in Etaples-sur-Mer in Northern France where a pathologist, Thomas HG Shore performed autopsies on about 3000 Allied soldiers between 1915 and 1918. He also prepared many dry specimens of bones. These were all sent back to the War Collection of the Royal College of Surgeons in London whose Professor and Conservator at that time was Sir Arthur Keith (1866-1955). This channel provided specimens from the battle fields.



The Royal College of Surgeons, London fronting on to Lincoln's Inn Field. (Black arrow)



Entrance to the RCS Hunterian Museum on level 2 of the building. Portrait of William Hunter on the left and John Hunter on the right.

To cover the second source of potential specimens, Keith appointed the surgeon/pathologist John Bland Sutton from the Middlesex Hospital in London to collect specimens from hospitals throughout Britain that had received specimens from soldiers repatriated there from the battle fields. Bland Sutton had already proven his ability to collect specimens and cases from colleagues by his publication in 1893 of a book 'Tumours Innocent and Malign,' that contains numerous accurate drawings of a wide variety of tumours. Later he became curator of the RCS specimens.

From 1916 artists were recruited to draw injuries, treatments and results of treatments. Some wax models were made as well. These were placed with specimens to help illustrate in better detail and in colour, the features that needed to be demonstrated. Three of the very talented artists to be recruited to do this were Sydney A. Sewell who illustrated the 1913 edition of Gray's Anatomy, A. Kirkpatrick Maxwell who illustrated the 1940 edition and Henry Tonks (1862-1937) a surgeon who gave that up to be a full time artist. His main contribution to recording in WW1 was the pastel drawings he did of the facial injuries that were being treated by the pioneer plastic surgeon Harold Gillies (1882-1960).

A modern demonstration of an artist's contribution to recording war injuries

In 2016 Eleanor Crook, artist in residence at the Gordon Museum at Guy's Hospital, London made the following collection of wax models for the Museum. They depict soldiers who survived their war injuries from the Crimean War (1853-1856), WW1 (1914-1918), WW2 (1939-1945) and the Afghanistan war. Each model is dressed in a uniform of the time. (photographed with permission of the artist and the Museum Curator, William Edwards.)



A series of full size wax models that demonstrate war injuries. The modeller Eleanor Crook called it 'and the band played on.'



These models illustrate injuries sustained during WW1.

Philosophy behind the War Collection at the RCS

The British Government took the view that the deceased soldier had already made the ultimate sacrifice for his nation and in death he would continue to serve. The Government decided that dead bodies would be buried where they fell, but the body parts would be anonymised and returned to the UK. The pathology specimens were identified by a serial pathology number and given the name of the donating doctor or health worker. By doing this the Government overruled the rights of relatives for the overall benefit of the community. The anonymous specimens would represent all the soldiers who had suffered such wounds or diseases and they would be the subjects of further teaching and research.

Sir Arthur Keith was keen to have all the specimens remain in London, but the Australian pathologist Keith Inglis was adamant that he wanted the Australian specimens to be returned to Australia. He was supported in this by the Canadian representative.

Keith was in a quandry because both the Australians and the Canadians had been very active contributors of specimens, and more importantly Keith Inglis and Morton Hall from Canada had given him valuable assistance in curating the specimens that were banking up in the RCS. He was finally persuaded to allow both pathologists to take specimens to their homelands.

An audit of the War Collection in 1923 showed that there were 2000 wet specimens showing the nature and sequence of wounds and diseases of modern warfare, 600 dry specimens of bone injuries and drawings, Xrays and 150 wax models showing the results of facial plastic surgery.

Virtually all the specimens were destroyed by a German bomb that hit the College on the night of May 10, 1941. This destroyed two centuries of careful collecting and cataloguing, and the knowledge that went with that. Similar destruction was caused to the collections in Germany during the bombing of Germany.

WW1 pathology specimens in the UK

During a visit to the Royal College of Surgeons Hunterian Museum in Oct 2010, Martyn Cooke, the Curator and I tried to track down the remaining WW1 specimens.

Martyn did not know off hand whether there were any specimens at all. He thought that he might have one or two lungs in the Museum. He also had a recollection that the RCS had sent the specimens to the Royal Army Medical College in Millbank. I contacted Iain Stewart the pathologist there for the last 30 years and his predecessor, Trevor Betteridge. (Trevor was a contemporary of mine at Hammersmith in 1964. There are some advantages in being older). Neither of them had any knowledge of any such specimens.

A year later Martyn was responsible for removing all the remaining museum specimens from Millbank and he confirmed that there were no WW 1 specimens there. Meanwhile in his own records he had found 3 lungs from soldiers who had been gassed, and two trench feet.

The newly appointed Director of Museums and Archives, Royal College of Surgeons of England, Sam Alberti did not know about the WW1 specimens, but he conducted a detailed search through the records of the Hunterian Museum, and this culminated in the article 'The "regiment of skeletons": A First World War medical collection,' from which I was able to obtain much of the information about the WW1 specimens that I have included in this report.

It was suggested that I should try the Imperial War Museum in London. I visited Mark Whitmore the Deputy Director of the Museum. He had just begun a big project to examine all the material they had from WWI. He was searching their archives for material relating to WW1 for a big display they were planning on this subject. He assured me that there were no medical archives in the Museum. This has been

confirmed from their research in the subsequent years. They did have their WW1 display ready for the centenary commemorations and it is now on display there.

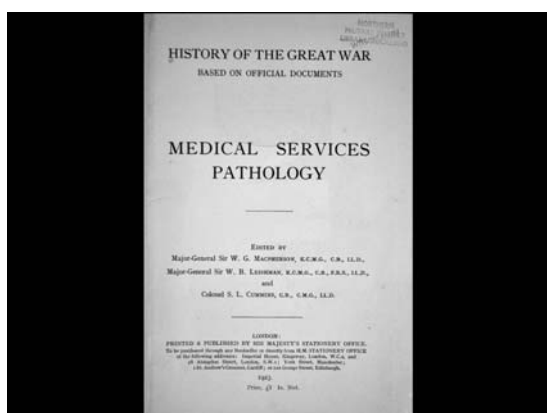
As well as the post mortem service in WWI there was an active clinical pathology service. This was run by William Boog Leishman [of the Leishman blood film stain, Leishmaniasis (Kala Azar), Leishman Donovan bodies in granuloma inguinale (now called Donovanosis)] who became the Director of the Medical Laboratory Services for the British Army. He was interested in Tropical Medicine and had worked, and done his research in the Indian Army Medical Corps before becoming attached to the Royal Army Medical College, London.



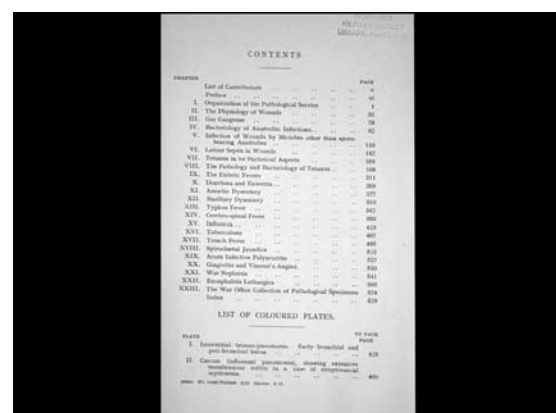
William Boog Leishman (1865-1926)

In 1923 he published a record of the data that had been collected by the Medical staff during WW1 in accordance with the intention to publish the data acquired for 'research and training after the war is over.'

'History of the Great War Based on official documents WWI Medical Services Pathology' WG Macpherson, WB Leishman (William Boog), SL Cummins; 1923, London, Published by His Majesty's Stationery Office
Catalogue Number UH257 M172 P



History of the Great War Medical Services Pathology by Leishman



History of the Great War Medical Services Table of contents

I found this report to be a very interesting account of the Pathology Services. However, it has not been widely read. I had to cut the pages for the copy that I was able to obtain for an interlibrary loan. I was probably the first reader in the 90 years since it was published.

Organisation of the British Army Medical Services Pathology

After the South African war 1899-1902, the Army recognised the usefulness of having a pathology service, particularly a bacteriological service. They started training Army personnel at the Royal Army Medical College at Netley, near Southampton in laboratory work, especially bacteriology.

When WW I came many of those who had been trained had moved into Administrative roles and were not available to the Pathology Service. So they had to rely on Civilian pathologists. As a result, the majority of pathologists in the UK went to work in the Army Pathology Units in France, Egypt and other places in the Middle East and also in East Africa. A skeleton staff was left to run the pathology departments in the hospitals in the UK. As the number of soldiers being repatriated for treatment in Britain increased, the work load of the remaining pathologists became extreme.

In France the pathology laboratories were divided into

(1) Mobile bacteriological units that operated from trucks. These serviced the front line clearing stations and could move quickly when the battle fronts moved. (Such units were sent to Gallipoli but the service was very difficult and near impossible in the chaotic environment there. To add to the difficulties much of the equipment was lost when landing barges were sunk.)

They provided bacteriological diagnoses of the many infectious diseases encountered amongst the soldiers - the diarrhoeas, wound infections, acute respiratory infections, meningitis, typhus (Trench fever) etc. They were also responsible for sending autopsy and other surgical pathology specimens to the Anatomical Pathology facility in Etaples in Northern France where Thomas HG Shore and some other pathologists did autopsies and prepared the specimens to be sent to the Royal College of Surgeons in London.

(2) Laboratories in Fixed Hospitals further from the Front

(3) Research Units

(4) Laboratories in the Base hospitals in Britain.

(5) Special laboratory units such as the Malaria units in Egypt and elsewhere in the Middle East that were run by Philip Manson-Bahr, son in law of Patrick Manson the father of Tropical Medicine in the UK.

(It was here that Neil Hamilton Fairley and some of the other Australians who in WWII took part in the important Malaria Research Unit in Cairns and Atherton did their first training. Hamilton Fairley worked as a specialist in Tropical Medicine in Harley St., London post war and became the Director of the Australian Army Medical Service for WW2.)

The different levels of laboratory were responsible for dispensing the vaccines and antitoxins that were used. Typhoid, Cholera, Tetanus, Diphtheria, Clostridial for gas gangrene, Influenza.

These vaccines were made in the Vaccine Department of the Royal Army Medical College.

Later in the war there was a shortage of laboratory animals - rabbits that were used for diagnosing diphtheria and guinea pigs that were used for diagnosing tuberculosis.

The laboratories all made their own culture media. It was only after the War that they started to arrange to have media made centrally for distribution to smaller labs.

The bacteriologists visited the patients to liaise with them and the doctors and to take the specimens themselves to make sure they got proper specimens.

(The pathologist who led the first Mobile Bacteriological laboratory {which used a caravan} died in 1917 from Cerebro spinal Fever, a manifestation of meningitis that occurred in epidemic form and was caused by the meningococcus.)

What did the Medical Services Pathology contribute?

The following are my comments based on reading this book and a retrospective (perhaps superficial) view of what happened since then.

First and foremost it provided an opportunity for the revolutionary discoveries that allowed Louis Pasteur and Robert Koch to introduce the era of the diseases caused by living organisms. The War brought together thousands of men in both armies to be exposed to similar organismal causes of disease. As well they brought hundreds of clinical doctors and laboratory workers to look after the sick and wounded soldiers.

This resulted in the transfer of laboratory knowledge into clinical practice on an unprecedented scale. The discipline of Infectious Diseases could be regarded as being born as a result of this.

The European campaign dealt with bacterial, viral and rickettsial causes of disease. Immunological disease in the form of acute glomerulonephritis was also investigated. They came to the conclusion that they did not know the real cause of glomerulonephritis and they would need to wait for further research to determine its aetiology.

The Middle East campaign added a dimension of tropical medicine into this mix. In those areas a large number of people who had not been exposed to malaria before were introduced into areas where malaria was endemic. This could be crudely considered as being a controlled experiment in the study of the epidemiology, treatment, and drug and mosquito control measures.

Clinical, epidemiological and pathological aspects of acute nephritis were clearly defined and formed a basis for the development of greater knowledge of the causes and effects of renal disease.

The collection and preservation of pathology specimens from surgery and post mortem examinations allowed these to be further investigated after the War. Perhaps the most outstanding result of this was the ultimate discovery in 1997 of the genome of the Flu virus that caused the Spanish flu epidemic.

The organisation of the laboratory services provided a blue print for subsequent wars. Diagnostic testing was available to help in the treatment of soldiers at the front line, in the staging hospitals and in the super specialist hospitals in more peaceful areas. Provision was made for research to be done as well.

The acute treatment of impact wounds was improved, and the laboratory services assisted at all levels of that treatment.

Psychiatric and venereal diseases (sexually transmitted infections) were not well managed, but the laboratory testing was necessary in the latter diseases, and the failures stimulated more research to try to improve these aspects of the medical support for soldiers.

WW1 specimens in other Institutions in the UK

Injured soldiers were sent to hospitals in England as well as to those in France and Belgium for treatment. Pathology specimens from these soldiers were dealt with in those hospitals. They did not necessarily forward these to the RCS. The major military hospitals were those at Netley near Southampton and Aldershot SW of London. Both of these hospitals were closed many years ago. I have not been able to find any pathology records from either of them.

Quite by accident while I was attending the IAP Congress in Cologne in September 2016 I met Prof. Phil Quirke from Leeds. He said that he had some WW1 specimens. One of his predecessors in the Chair of Pathology, Matthew Stewart had collected a few pathology specimens from WW1 soldiers. They had microphotos of one who died as a result of gas inhalation. There is a small section of trachea that shows complete loss of the lining epithelium and a small piece of lung that shows pneumonia.

Phil's assistant Aidan Hindley is looking to see whether there are any other specimens.

In similar circumstances to the above, I met someone who said that a hospital at Harefield was a major medical centre for treatment of Australian soldiers. This hospital has expanded over the succeeding years and it is still operational. The pathologist is looking to see whether she has any WW1 pathology specimens.

Medical conditions amongst the German soldiers

The Head of the German Military Medical Service was Ludwig Aschoff. He was a leading German pathologist and was no less outstanding than Leishman. In 1916 he held a meeting in Berlin with the German military chiefs to establish a War Pathology Service. He established 5 pathology units, one for each of the German Divisions, in which many post mortems were performed on military casualties.

It took me a few years to track down the remaining specimens after the British bombings during WW2.



Ludwig Aschoff (1866-1942) wearing his military officer's cap performing an autopsy on a German casualty.
 Note the effects of the newly invented explosive ammunition on his left leg.
 The machine gunners on both sides of the trench warfare aimed their guns at the legs of the soldiers as they emerged from their trenches for a charge.
 The multiple bullet holes in the right leg would have resulted from this.

Two other leading German pathologists Walter Koch in Berlin and Max Borst in Munich assisted with the autopsies.



Max Borst Professor of Pathology at the Ludwig Maximilians Institute for Pathology, Munich at the time when he was performing post mortems on soldiers during WW1.

The specimens were sent to Berlin, Munich and Vienna, for research and teaching to be done on them 'after the war is over.' Aschoff distributed the specimens around the country in case they were all destroyed by being in one place.

In contrast to Leishman, Aschoff was strictly a morbid anatomist. German bacteriologists were leading the world in bacteriology in 1914 but they did not play much of a role in Aschoff's Medical Corps.

This may have been a result of the bias of Aschoff, but possibly the main problem may have been due to internal forces.

The clinicians were somewhat overwhelmed by the fame of people like Robert Koch and his pupils, and by Aschoff himself.

The laboratory investigations were done by Pharmacists who were given unsatisfactory specimens that arrived in the lab some days after they were taken.

As a predictable result of this, the reports were not reliable. Clinicians who were not convinced by the usefulness of bacteriology and other laboratory tests, saw an opportunity to reassert their place in the firmament. They began trumpeting their opinions that all diseases could be classified on clinical grounds alone, and that they were caused not by living organisms but by miasms etc.

The hunt for the remaining German specimens

In November 2009 I was invited to give one of the regular weekend training sessions organised by the German Division of the IAP on Infectious Diseases. One of the participants at my lectures in Bonn was a military doctor who told me that there was a museum of 'war pathology' in the Military Headquarters in Munich. The name of the Institute is Sanitatsakademie der Bundeswehr, München. She did not know about the exact contents of this museum because she had never visited it.

After this meeting I visited Freiburg where my hostess was Prof. Annette Schmitt-Graeff the successor to the first Professor who was none other than Ludwig Aschoff.

The Pathology Department had recently been moved from the original one of Aschoff to a new building. During the move virtually all the Aschoff records were lost. However Annette had an article by the Medical Historian Cay Rüdiger Prüll.

This proved to be very informative.

She also found a small, well illustrated book on 'Scurvy in German Soldiers in WW1.' by Ludwig Aschoff. These soldiers were mainly Bulgarians.

This visit to Germany gave me the key to knowing that it was Aschoff who was the head of the German Military Medical Service, and the clues that finally led me to the remaining specimens.

In 2013 I did an extensive tour through some of the leading German Pathology Institutes including Berlin and Munich.

Berlin

From Cay Rüdiger Prüll I learned that in 1921 there was a register of as many as 70,000 postmortem reports and over 6,000 dissected specimens in the Kaiser-Wilhelms-Akademie for Research into Military Medicine in Berlin.

This was where the pathologist Walter Koch, one of the leading WW1 pathologists was working.

My Berlin contacts did not know of any records of WW1 pathology having survived the upheavals in Berlin since that time.

Munich

My long time colleague in Munich who was interested in Medical History was Peter Meister.

He did not know about any WW1 pathology specimens in Munich, but he made enquiries about how we could get into the Army Headquarters to find out. This was controlled by heavy security, but not nearly as heavy as it was during WW2 when it was the headquarters of the Gestapo that was responsible for the supervision of Dachau. Peter found that the just retired Commandant of the Museum (Karlheinz Wurster) was one of his former trainees. Karlheinz arranged permits for us to visit the museum.

Here we found a veritable treasure trove. There was quite a big collection of WW1 specimens as well as a big collection of ordinary pathology specimens that had been given to the Museum by Prof. Fischer, one of Peter's predecessors at the Ludwig Maximillians University Pathology Department in Munich.



Army Medical Museum, Munich
Sanitatsakademie der Bundeswehr



WW1 pathology specimens, (right)
Sanitatsakademie der Bundeswehr



Army Medical Museum, Munich,
Fischer collection



WW1 pathology specimens, Munich

WW1 Specimens in Vienna, Austria

Only a small number of items from WW1 were present in the Narrenturm Museum. There was a cabinet of items from WW1, mainly bones damaged by bullets and wax models of two trench feet (already illustrated.)



Theodor Billroth a surgeon who played a key role in the Medical School of Vienna in the late 1850s. The Narrenturm Museum is just behind the ward building at the end of the

treelined walkway in the old Vienna General Hospital.



The Narrenturm Museum, Vienna

They also had lung and skin specimens from 3 people who had died after an accident in a factory in Hamburg that was making mustard gas. The lungs and skin showed acute changes following this mustard gas exposure.

It is not clear from the records as to whether this was a factory that was manufacturing gas for the gas attacks during WW1.

WW1 specimens in Australia

William Keith Inglis (1888-1960) was an Australian pathologist who helped in the collection of pathology specimens during the War and when the war was over he assisted in the curating of the specimens that were sent to the Hunterian Museum. After a lot of heated negotiations with the British administrators he obtained from the War Collection 700 specimens from Australian soldiers and he brought them with him when he returned to Sydney in 1919.

Keith became the Professor of Pathology at Sydney Uni. He divided the specimens between the then existing Medical Schools, Sydney, Melbourne and Adelaide. There is no trace of those sent to Adelaide. Some years after the Australian National University (ANU) was established in Canberra in 1946, most of the Sydney and Melbourne specimens were sent to Canberra.

WW1 Specimens in Canada

From the Canadian Medical Association Journal 1919 vol. 9 no. 10 p 949-950

Report on the material received for the Canadian National War Museum from the Royal College of Surgeons, London.

A report has been presented to the Director-General of Medical Services, Ottawa, by Captain Morton E Hall on the Museum material being received and mounted for the Canadian National War Museum in the Preparation Department of the Medical Museum of McGill University, Montreal, which has been made the depot for the reception and preparation of this material pending further arrangements. The report embodies the following facts:

Arrival of Material from England

Sixty three boxes of museum material have been shipped from the Royal College of Surgeons, England to Canada, consisting of wet pathological specimens, macerated bones and several cases of captured German medical war accessories as splints, drugs, bandage, etc. These cases contained all the material available in England for Canadian Medical Museum purposes.

Thirty Canadian specimens, included in the National collection at the Royal College of Surgeons were retained by the Imperial authorities and an equal number substituted from the National collection.

Classification of Canadian Medical Museum Material

The material may be divided roughly into three classes, viz:

1st Macerated bones (about 200) illustrating all varieties of gunshot injuries and more particularly the associated processes of repair and infection.

2nd Wet specimens illustrating gunshot wounds and action of poisonous gases on the tissues. (about 300 specimens)

3rd Wet specimens illustrating ordinary clinical diseases that the Army Medical Officers were called upon to treat.

Conclusion

The collection when finally assembled in Ottawa will form an excellent nucleus for the future Canadian National Medical Museum. It should be very valuable for the teaching of Medical Science.

In March 1918 the first consignment of specimens sent to Canada was received in the museum at McGill University, Montreal. Curator Maude Abbott and her assistant Mr EL Judah curated them on behalf of the Canadian Army Museum. They made a display for a meeting of the Canadian Medical Association in Hamilton, Ontario, in May-June 1918 and, after receiving more specimens, staged another at the American Congress of Surgeons meeting in Montreal in October 1922.

The above paragraph is from Maude Abbott

International Association of Medical Museums Bulletin, vol. 7 (special war number of the American and Canadian Sections of the IAMM), May 1918.

Note:

A planned catalogue was not published and it seems that the specimens were later transferred to the Canadian War Memorial in Ottawa.

Morton Hall did a lot of work in the RCS especially in curating the bone specimens. This may be the reason why there was such a heavy emphasis on bone specimens in the Canadian collection.

I think that we can presume that the specimens were sent to the Canadian National Medical Museum in Ottawa, but no trace of them since then can be found.

Maude Abbott became famous in the US and Canada as the Curator of the McGill Museum of Pathology. She founded the International Association of Medical Museums in 1906. She had every right to consider herself a world authority on the subject of curating and organising pathology museums. She offered her services to Sir Arthur Keith at the RCS museum to help in the organising of the specimens that were by this time flooding in to the RCS. Naturally, she was particularly interested in the Canadian specimens.

I suspect that the considerable activity of the Canadians in collecting specimens was in part due to her influence and to that of her superior in Montreal, JG Adami who was also involved in the management of the RCS collection after 1917.

I suspect that Keith had very firm ideas about the place of women in medicine and he rebuffed her offers. Adami and Hall knew about Maude Abbott and they had the Canadian specimens sent to her in McGill University.

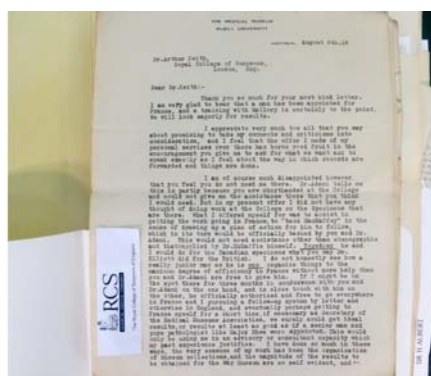
The following photocopies of correspondence relating to this from the records held at the RCS Hunterian Museum, London were kindly provided by Samuel Alberti.



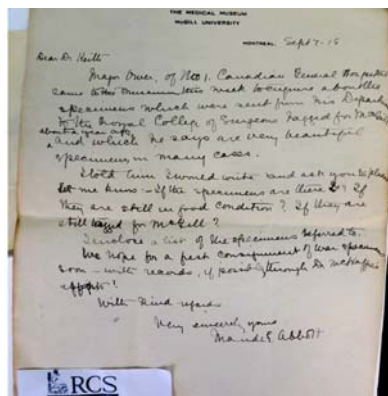
Entrance to McGill University on a dull, wet autumn day.



James McGill the founding benefactor of the University.



Letter from Maude Abbott to Arthur Keith saying how disappointed she is that he does not want her help in his museum.



Letter from Maude Abbott, McGill University, Montreal to Dr. Keith enquiring about the whereabouts of the specimens from No. 2 Canadian General Hospital that had been tagged to be delivered to her at McGill University, Montreal. Sept 7, 1918

List of the specimens to be sent from RCS to Maude Abbott at McGill University. Note they are anonymised. They contain names of the donor doctors and accession numbers.

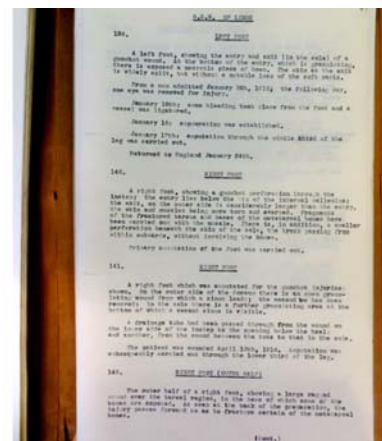
WW1 Specimens in France

Jean-Jaques Ferandis, 'Les Collections Anatomiques réalisées durant La Guerre de 1914-1918 au musée Service de sante des armées.' Histoire des Sciences Medicales, 2004, 38, 233-42;

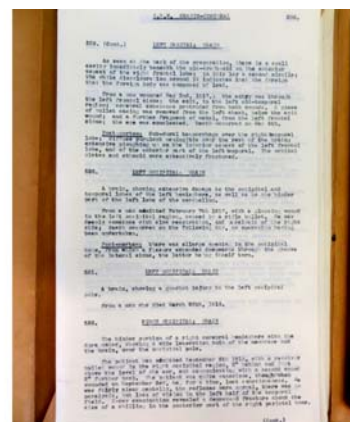
Amy Lyford, 'The aesthetics of dismemberment: Surrealism and the Musée du Val de Grace in 1917' Cultural Critique, 2000, 46, 45-79

In July 1916 there were casts, illustrations, moulages and photographs that complemented 10,000 specimens in the Val de Grace and they had a public showing of these specimens at about that time.

Information taken from Samuel JMM Alberti, Keeper of the Collections of the Royal College of Surgeons, London, Hunterian Museum.



Catalogue of bullet injuries to bone for the display in 1922.



Catalogue of bullet injuries to brain for the display in 1922.

WW1 Specimens in Turkey

There were no post mortems performed on Turkish soldiers in WW1 for religious reasons.

However, bacteriology was well developed as a discipline in Turkey. This had been achieved by Turkish doctors who had worked in the laboratories of Robert Koch and Louis Pasteur.

The Turkish military doctors did keep records of the bacteriology of diseases acquired by their soldiers, particularly the organisms that caused dysentery.

Prof. Sitki Toslali has studied these records and is willing to present his results at the History meeting in Amsterdam in September 2017.

WW1 Specimens in Italy

None of my contacts in Italy knows of any records being kept of diseases of soldiers in WW1.

WW1 Specimens in the USA

The United States joined the War in July 1917 and carried on till Nov 1918 when the War finished. The Museum at the Armed Forces Institute of Pathology / Walter Reed Hospital in Washington had been receiving War pathology specimens from the time of the Indian wars.

It was natural that they would be interested in collecting specimens from WW1.

The Army issued a memorandum instructing the Medical Officers to preserve pathology specimens and send them to the Museum attached to the Armed Forces Institute of Pathology in Washington. No specimens were being received, so they sent out one of the leading US pathologists, William MacCallum (1874-1944), Professor of Pathology at Johns Hopkins Hospital in Baltimore to investigate.

He found that the Americans had many laboratories that were well equipped but they had no staff because they had been diverted to more clinical duties.

He did quite a few post mortems himself and brought the specimens back to the Museum.

He also managed to streamline the organisation, and then specimens began to flow.

The Museum of the AFIP is now called the National Museum of Health and Medicine and it is situated in the new Army Establishment in Washington that includes the Walter Reed Hospital and Research Institute, and the Joint Pathology Center which used to be the AFIP.

The Museum has quite a few gross specimens of various conditions from WW1 soldiers and the Joint Pathology Center has a number of sections of lungs from fatal cases from the pandemic of Spanish Flu that followed the War.

They are currently preparing a display of WW1 pathology.



National Museum of Health and Medicine, Washington, USA with Walter Reed Research Institute on the right rear of it.



Entrance to National Museum of Health and Medicine, Washington, USA

What Teaching and Research was done using the specimens after the war?

France

A display of specimens in Paris in 1916 is mentioned in the comments on France.

UK

Following the public display of specimens in Paris in 1916, Keogh decided that they should do something as soon as possible. On Oct 11, 1917 Sir Alfred Keogh opened an exhibition that covered 3 rooms of the Hunterian Museum.

The overall intention was to present to the visitor all the possible wounds and conditions of war inflicted on the soldier showing drawings and photographs of the clinical features, and the specimens to illustrate the progress of the condition from diagnosis to healing, treatment and results of treatment. Where possible the weapon that caused the injury would be shown and any attempt to protect from the injury such as helmets.

The display also featured some comparisons between the injuries inflicted during previous wars - Napoleonic, Crimea, South Africa and the injuries inflicted during WW1.

The organisers were very disappointed at the small number of visitors they had to this demonstration. Almost all the visitors were professional medical people. The general public did not attend.

They were not able to make a catalogue or a book of the museum collection but in the five years following the cessation of the war the main people involved in the formation of the Imperial War Collection published specialist articles on their own particular interests. 10 specialised papers were published, 7 of them in the fledgling British Journal of Surgery.

During the war and in the immediate post war period there were a number of articles in the J Path Bact reporting on war pathology.

There were also 2 volumes of the Royal Army Medical Corps Journal 1915 and 1918 that were entirely devoted to 'Injuries and Diseases of War.'

These all contained illustrations of the specimens and all the other diagnostic tests associated with the conditions. These specialised accounts were probably more informative than just visiting and viewing the original pathology specimens.

Maude Abbott produced a special War issue of the News Bulletin of the IAMM in May 1918. Topics included - trench foot, gassing, industrial poisonings, 'soldiers heart', war oedema, insect vectors, venereal disease, tetanus, gas gangrene, embolism and shock and other war related diseases.

There were also a few publications from German pathologists and some from US pathologists.

Australia

In 1922 Keith Inglis made a display for the annual meeting of the British Medical Association in Sydney.

Canada

There were two public displays in Montreal as described elsewhere.

As far as I can find, these were the only times that the specimens were exhibited. They produced only limited interest and very few people attended. The specimens have been 'gathering dust' since then or they have been lost.

Final comment

In some countries, Australia in particular, there have been numerous commemorations of the centenary of the end of WW1. I have attended and presented papers at a number of these. I have also visited the display at the Australian War Memorial in Canberra and a major presentation in Melbourne. I have already mentioned the big display at the Imperial War Museum in London. Virtually all of these are presented by non medical historians and there is no presentation of the actual medical conditions that affected the soldiers.

We now have much better methods for presenting the 'real' pathology and I am hoping to be able to do this at the meeting of the European Society of Pathology in Amsterdam Sept 23 to 28, 2017.

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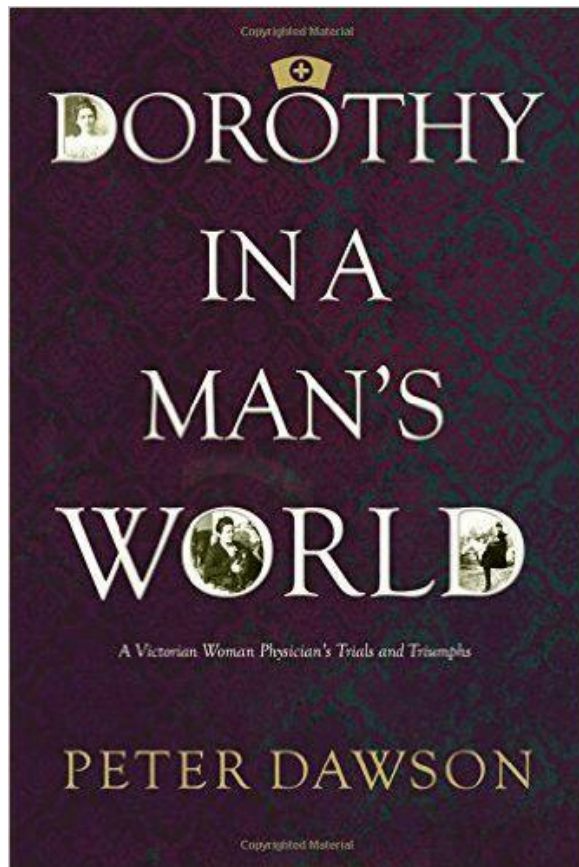
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Lars Eriksen, Senior librarian, Uni of Qld, Medical School, Brisbane, Australia.

NOTICE ABOUT BOOK OF INTEREST TO HISTORY OF PATHOLOGY SOCIETY MEMBERS



Dorothy Reed Mendenhall graduated from the Johns Hopkins School of Medicine in 1900. Two years later, she published a study of the characteristic 'giant' cells in Hodgkin's disease. Even today, these cells are known in pathology as "Reed cells", a game-changer in the diagnosis of Hodgkin's lymphoma. . She later left Hopkins and settled in Madison, Wisconsin, where she had a distinguished career in maternal and child health.

Dr. Peter Dawson has written a superb biography*, which should be read by everyone interested in the history of women in medicine. The book takes a fascinating look at Dr. Mendenhall's fight for equality in a male-dominated medical world and intrigues readers with a mystery: the previously unknown identity of a young doctor at Hopkins with whom Dr. Mendenhall had a passionate romance. She always referred to him as 'AJ' -- initials that do not match any of Dorothy's contemporary doctors at Hopkins. With clever detective work, Dr. Dawson resolves the mystery in the book's epilogue.

**Peter Dawson 2016, available at Amazon.com*