

We were unable to purchase permission for online use of the image that was originally in this space. If you would like a print copy of this article, including this image, send your snail mail address to DartMed@Dartmouth.edu. Be sure to note the article title and issue date.

This 1635 painting by John Souch depicts an all-too-common occurrence in centuries past—death in childbirth. Titled *Sir Thomas Aston at the Deathbed of His Wife*, it was commissioned by Aston, a wealthy merchant in Chester, England, after his wife died giving birth to their fourth child.

“The most unspeakable terror”

By Emily Baumrin, William Corbett, Amita Kulkarni, and Lee A. Witters, M.D.

On November 30, 1843, tragedy struck at the brick home of Harvey Benton, a carriage painter of “unusual skill.” Benton and his 31-year-old wife, Orilla Greely Benton, lived at 6 South College Street in Hanover, N.H., the current site of Dartmouth’s Hood Museum gift shop. Orilla Benton had given birth a few days earlier to their first child but died of postpartum complications on the 30th. Their infant daughter, named Orilla G., died on December 5.

These facts were duly recorded in a list of deaths “in the vicinity of Dartmouth College from 1777-1861” kept by William Worthington Dewey, a tavern keeper and chronicler of Hanover history. Dewey recorded the cause of death as “childbed erysipelas,” but then crossed out the latter term and replaced it with “puerperal fever”—a disease called by Dr. Charles Meigs, a leading 19th-century obstetrician, “the most unspeakable terror.”

As it happens, three days earlier—on November 27—Dewey had also recorded, and then amended, the deaths of Mary Baker and her infant as due to “childbed erysipelas puerperal fever.” A later entry

by Dewey noted that out of 23 deaths in Hanover during 1843, “Mrs. Baker and Benton both died of puerperal fever.”

Dewey appears to have been struck by this coincidence; indeed, they were the only deaths due to the condition that he recorded over the course of 84 years. Could the deaths have been related, and if so how? And what was the relationship seemingly identified by Dewey between puerperal (pronounced PWER-per-ul) fever and erysipelas (air-uh-SIP-uh-liss), a skin disease? Had he learned something by living across North Main Street from the institution now known as Dartmouth Medical School but then called New Hampshire Medical College? What was being taught about the two diseases to 19th-century medical students?

Answers to many of these questions can be found in medical reports and textbooks of that day; classroom notes and theses by Dartmouth medical students; local and national census data; and information gleaned from visits to local cemeteries, museums, and town clerks’ offices.

The DMS student theses are especially revealing

In the 1800s, childbirth was often fraught with fear and death rather than joy. But growing knowledge about the cause of puerperal fever—also known as childbed fever—eventually brought the epidemic of maternal and infant mortality under control. How that knowledge was gained can be tracked in 19th-century documents.

Nov 27th Mrs. Mary A. Baker childbed erysipelas puerperal fever 21
The Infant of Mrs. M. A. Baker puerperal fever
30 Mrs. Harvey Benton - childbed erysipelas puerperal fever 31
Dec 5th The Infant of Mrs. H. Benton

Mrs. Baker & Benton both died of Puerperal Fever
Number of Deaths this year 23

These entries from 1843, in a record kept by a tavern keeper of all deaths in the vicinity of Hanover, show the suspicion even then that there was a relationship between childbed fever and the skin disease erysipelas.

PAGE 36: MANCHESTER (ENGLAND)/CITY GALLERIES, PAGE 37: DARTMOUTH COLLEGE ARCHIVES

For several [WEB EXTRAS](http://dartmed.dartmouth.edu/w09/we01) with further background on this subject, see dartmed.dartmouth.edu/w09/we01.

about the emerging understanding of a tragedy that touched many families of the period. Between 1815 and 1881, it was a graduation requirement that every DMS student write a scholarly thesis, which had to be defended to the faculty and, in some instances, to the president of Dartmouth College. (For a database listing all 1,202 of these theses, see dartmed.dartmouth.edu/w09/we01.)

Few of the theses represent the kind of original research done by today's graduate students. Indeed, as John Wingate Bucknam wrote in his 1857 thesis on erysipelas: "We search our minds for some subject that we are best acquainted with, but find ourselves alike deficient upon all subjects. We know nothing about medicine practically: it is all theory. Therefore we are not enabled to prove any system of practice by our own observations but are obliged almost wholly to refer to the lectures and to the numerous medical works that have been handed down to us year after year by the learned of the profession."

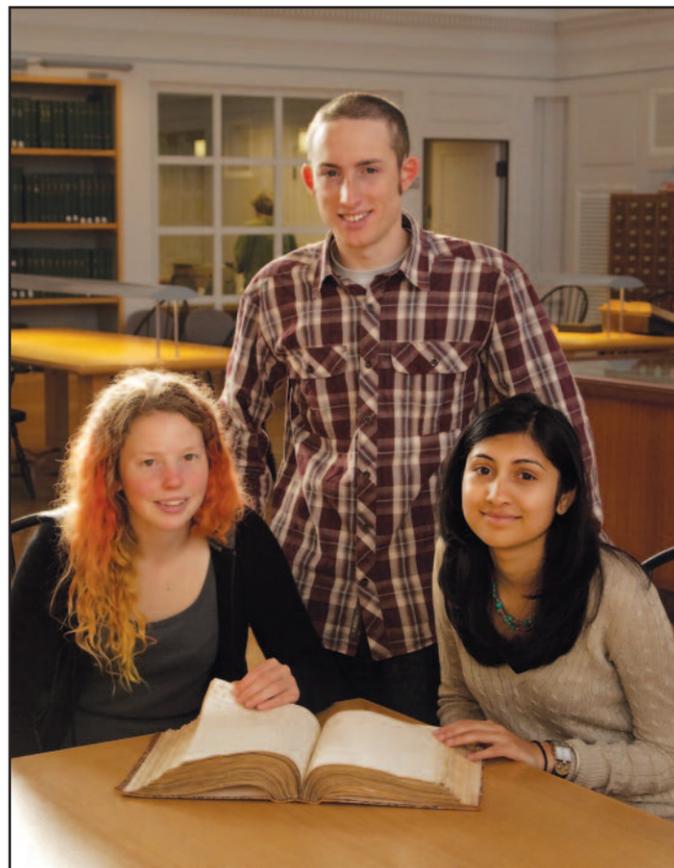
Yet despite Bucknam's disclaimer, the theses illustrate the growing understanding—by both the students and the faculty of DMS—about the tragedy that struck South College Street in 1843.

The illnesses that the mid-19th-century medical student learned about were quite different from those of the present, as indicated by both census records and documents in the Dartmouth archives. Nationally as well as in New Hampshire, the 1850 census (which was the first one to include health data) recorded the leading causes of death as tuberculosis, dysentery/diarrhea/enteritis, typhoid fever, pneumonia, and "old age" (which was defined then as being over 50!). Heart disease and cancer, now the leading causes of mortality in the U.S., accounted in the 19th century for only about 2% of deaths. Average life expectancy was about 45 years. Overwhelmingly, the burden of illness was due to infectious diseases, although the link between human disease and microorganisms was not recognized until the 1860s and 1870s by the insights of Louis Pasteur and Robert Koch.

The topics of the DMS student theses between 1815 and 1881 parallel precisely the disease burden revealed by this census data, with the most common topics being pneumonia, tuberculosis, typhoid fever, scarlet fever/scarlatina, diphtheria, and dysentery. (On occasion, however, DMS students did select other topics—including animal magnetism; tight lacing; suspended animation; the use of skunk secretions to treat disease; mysophobia, or the fear of contamination; and even the evils of masturbation.)

Of the 1,202 DMS theses written over this 66-year period, seven were on the subject of puerperal fever and 21 were on erysipelas. Both subjects also appear frequently in the notes taken by students during lectures. Evident in all these documents is a growing understanding of the connection noted by Dewey between the two diseases—an understanding that illustrates the ascendance of critical analysis in med-

Emily Baumrin, William Corbett, and Amita Kulkarni are Dartmouth undergraduates in the Class of 2010; all have an interest in both medicine and history. Lee Witters is the Eugene W. Leonard 1921 Professor of Medicine and Biochemistry at Dartmouth Medical School and a professor of biological sciences at Dartmouth College; he is also the faculty advisor of the Nathan Smith Society, Dartmouth's undergraduate health-careers organization. The authors are indebted to Barbara Krieger and other members of the staff of Dartmouth's Rauner Library, as well as to several town clerks and museum curators in New Hampshire and Vermont, for their valuable assistance with the research for this article. They also extend thanks to Dan Allosso in the history department at the University of Massachusetts for information about Charles Knowlton, to Dartmouth's Joseph Mehling for photography, and to Omar Armendariz for editorial assistance.



This article's undergraduate coauthors—from the left, Emily Baumrin, Billy Corbett, and Amita Kulkarni—are pictured in Dartmouth's Rauner Library, home of the archives where they did much of their research.

icine. Through the 1800s, increasing attention was paid at Dartmouth Medical School to disease pathogenesis as opposed to just symptomatology; to the link between human disease and microorganisms; and, perhaps most importantly, to the impact of public health measures such as sanitation and hygiene on human health—the latter a battle still being fought in the 21st century in the developing world.

Details of the diseases

Puerperal fever, often referred to as childbed fever, is a highly infectious disease that can follow childbirth. Before the advent of antiseptic practices—and, later, antibiotics to treat sepsis when it occurred—puerperal fever was almost always fatal. In the 18th and 19th centuries, there were between six and nine cases for every 1,000 deliveries, resulting in a death toll during that span of as much as half a million in England alone. Puerperal fever was far and away the most common cause of maternal mortality and was second only to tuberculosis among all causes of death for women of childbearing age.

The dramatic course of the disease is apparent in a case description penned in 1844 by Dr. Charles Knowlton, an 1824 graduate of Dartmouth Medical School (for more about his career, see dartmed.dartmouth.edu/w09/we01). In February of that year, less than three months after the deaths of Orilla Benton and Mary Baker, Knowlton rode through the night to call upon a woman in distress. The 10-mile journey across

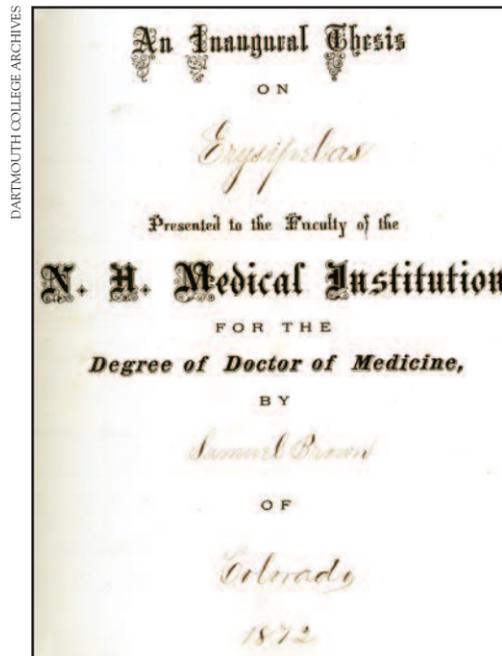
the treacherous terrain of western Massachusetts was long and exhausting. But as soon as Knowlton arrived, he rushed directly into the sickroom of a patient he referred to only as Mrs. L. She was a previously healthy 39-year-old woman, the mother of several children. She had been three months pregnant when she suffered severe uterine pains followed by profuse hemorrhaging.

After an examination "per vaginam," wrote Knowlton, he confirmed the cause of her distress as a spontaneous abortion, or miscarriage. He then manually cleared the uterus of its remaining contents (without washing his hands!). Mrs. L recovered nicely and was led to believe the worst was over; little did she know it was yet to come. Three days later, she was overcome by weakness and fever. On the fourth day, she was afflicted by severe diarrhea, followed by continuous vomiting. When Knowlton returned to the house five days after his original visit, Mrs. L was in an alarming state. Her abdomen was so distended that the slightest pressure on it drew deadly screams. Knowlton observed inflammation of her face and lips and a blackening of her tongue. Mrs. L soon died, leaving her children motherless and her doctor bewildered as to the cause of the unexpected fatality.

Knowlton reported this case and others in a paper in the March 1844 issue of the *Boston Medical and Surgical Journal* (now the *New England Journal of Medicine*). Mrs. L, like Mrs. Benton and Mrs. Baker, was a victim of puerperal fever. Though seemingly ignorant of prior insights by other U.S. and European physicians—relying only on his experiences as a "country practitioner"—Knowlton drew a firm connection between puerperal fever and erysipelas. In the paper, he wondered "if I communicated any poison" from a 15-year-old boy suffering from erysipelas whom he'd cared for just before calling on Mrs. L. He even noted that he had not washed his hands between patients.

Erysipelas is a skin infection and inflammation that is also known as St. Anthony's fire. It was quite common in the mid-19th century, accounting for nearly 2,800 deaths in the 1860 U.S. census.

We now know the link between these two diseases to be a streptococcus bacterium. But knowledge of the link has roots in the distant past. Childbed fever is mentioned as far back as the Ayurvedic texts of India; written about 1500 B.C.E., they urge midwives to clean and cut their fingernails before examining women. And the Hippocratic texts of ancient Greece, written about 400 B.C.E., note that "if erysipelas of the womb seize a woman with child, it will probably prove fatal." The term puerperal fever, however, was not coined until 1716, when English medical writer Edward



Samuel Brown, an 1873 graduate of DMS (then called the "New Hampshire Medical Institution"), chose erysipelas as the subject of his required thesis.

Strother deemed it a subclass of fevers particular to the puerperum, as the period after childbirth is known. Another 50 years would pass before puerperal fever emerged as a distinct disease associated with specific symptoms and treatments.

Why did it take so long for the delineation of puerperal fever to take hold? Such a delay seems unfathomable today. It was due to the much slower diffusion of information in the past, but also to childbirth's place in society. Prior to the 1760s, women delivered babies in the privacy of their home with the help of a midwife. Doctors rarely aided in deliveries and thus were not privy to the occasional occurrences of puerperal fever.

Then in the late 18th century, Europe established "lying-in hospitals," where physicians were trained to deliver babies. This change not only gave doctors firsthand exposure to puerperal fever, but it also led to a sharp increase in its incidence due to the communicability of the disease in a hospital's close quarters. As a result, puerperal fever became a well-established cause of maternal mortality and a major concern for European physicians.

But although physicians were aware of the disease by the end of the 1700s, there was great confusion over its cause. Most doctors shied away from confronting this uncertainty, focusing instead on recognizing the symptoms and determining the proper treatment. Occasionally doctors proposed

Relying only on his experiences as a "country practitioner," Knowlton drew a firm connection between puerperal fever and erysipelas. In his paper, he wondered "if I communicated any poison" from a 15-year-old boy suffering from erysipelas whom he'd cared for just before calling on Mrs. L. He even noted that he had not washed his hands between patients.

theories, such as “milk-metastasis,” which held that puerperal fever was caused by the retention of putrid lacteal milk—which was actually the white pus of infection!

Dr. Charles White, a surgeon in Manchester, England, was one of the first physicians to take a step back from merely cataloging the disease’s physical signs and think critically about its origins. In 1773, he published *A Treatise on the Management of Pregnant and Lying-in Women*. In an early call for hygienic practices, White warned against the heavy blankets and crowded quarters then common in lying-in hospitals. Instead, he wrote, “the lying-in chamber should in every respect be . . . sweet [and] clean” and “the patient should often be supplied with clean linen. . . . If separate apartments cannot be allowed to every patient,” he went on, “at least as soon as the fever has seized one she ought immediately to be moved into another room, not only for her immediate safety, but for that of the other patients.” These comments, made nearly 100 years before the discovery of microorganisms, are prescient musings on the theory on transmissibility.

The concept of transmission was even more firmly associated with erysipelas and puerperal fever by Dr. Alexander Gordon. In Aberdeen, Scotland, a terrible epidemic of puerperal fever broke out in 1789, in conjunction with numerous cases of erysipelas. Gordon observed the epidemic’s path and noted in a treatise published in 1795 that “I could venture to foretell what women would be affected with the disease, upon hearing by what midwife they were to be delivered.” And, he wrote, “I had evident proofs of its infectious nature. . . . It is a disagreeable declaration for me to mention that I myself was the means of carrying the infection to a great number of women.”

Others picked up on Gordon’s observations, and in the 1830s Dr. Robert Collins, the master of Dublin’s Rotunda Hospital, reported that after the institution of hygienic practices (such as filling wards with chlorine gas and washing the woodwork with chloride of lime), the number of deaths from puerperal fever plummeted.

It is of note that all these observations arose in Europe and were not quick to cross the Atlantic Ocean. As Irvine Loudon points out in his superb book, *The Tragedy of Childbed Fever*, “we assume that practitioners . . . possessed a clear and agreed system of beliefs. . . . One has only to spell out such an assumption to see that it leaves no room for plain, ordinary muddle and confusion, which, I strongly suspect, was, in many instances, the prevailing state of mind.”

That sentiment is evident in an 1826 thesis by DMS student George Bellows, who wrote that “it is often difficult to decide, when discovering so much discrepancy of opinions among those who are styl’d eminent.” Bellows made some astute observations about the occurrence of childbed fever but was less incisive about its origins. For example, he stated that “having very recently witnessed eleven cases of Puerperal Fever, that prov’d fatal in the short time of four weeks, has strengthened my former views.” In other words, seeing so many cases allowed him to recognize the epidemic nature of the disease. In examining its cause, however, he fell short. He noted the plethora of convoluted theories that existed at the time and concluded, “I shall forbear to make mention of the predisposing or exciting causes, fearing the accusation of prolixity.”

But Bellows’s ignorance was not the fault of an inattentive student. It stemmed from much higher up the academic ladder—his teachers. For example, the lectures on obstetrics by DMS faculty mem-



The final resting place of Orilla Benton and her baby is in a cemetery that is just a stone’s throw from the center of the Dartmouth campus.

ber Dr. Reuben Mussey, as recorded in notes taken by both Amory Gale (in 1822) and Jesse Little (in 1827), made no mention of hygienic precautions in performing vaginal exams and deliveries. Even 40 years after White urged doctors to use “clean linen” for childbirths, Mussey was recommending that students bring oil-soaked towels and pig lard with them to deliveries.

Through the 1820s and 1830s, the study of puerperal fever at DMS was limited to its diagnosis and treatment. In a typical 1830s thesis, Thomas Hazen devoted four pages to symptoms and diagnosis, eight pages to treatment, and a mere two sentences to causation. “The causes of this disease may be an improper regimen during pregnancy or improper aliments [food] after delivery,” he feebly suggested.

Although Hazen’s description of the disease’s symptoms is still accurate today, the therapies he cataloged reveal doctors’ total ignorance regarding its pathology. Most treatments then were attempts to rid the body of so-called “bad humors.” They included early and copious bleeding, blistering of the inflamed area, administration of cathartic of calomel (to induce defecation), and application of turpentine on a hot towel to induce sweating. Anesthetics such as opium and ice chips were suggested to ease the disease’s pain and swelling. But none of these treatments attacked the bacterial cause of the infection.

As late as 1858, DMS student George Gove conceded that despite

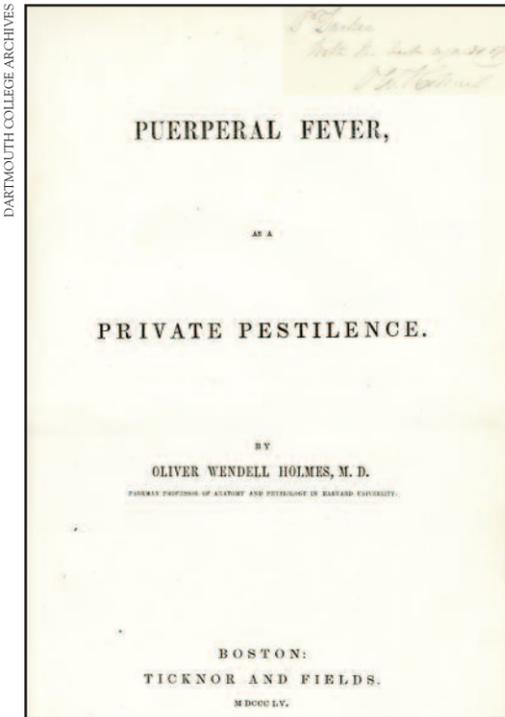
treatment, “often patient dies in 12 hours after these symptoms make their appearance.”

But the attitude toward the study of puerperal fever changed dramatically when cases began to appear in New England. Orilla Benton and Mary Baker did not stand alone as victims to this terrible disease. Epidemics swept the Northeast, taking hold in both small towns and major cities. An outbreak in one Vermont county killed 29 women in 1842, while Bath, N.H., suffered the loss of 20 women in 1843. The increasing proximity of the disease to Hanover is reflected in a simultaneous increase in notes and theses on the subject during the 1840s. And this provided an impetus for practitioners to start thinking critically about the disease and to formulate theories regarding its cause.

Two physicians associated with DMS emerged as key figures in spreading knowledge in the U.S. about puerperal fever. Dr. Oliver Wendell Holmes, known today more for his poetry than for his medical achievements, held an appointment in Dartmouth’s Department of Anatomy and Physiology from 1838 to 1840. His knowledge of puerperal fever appears to date from his studies in France in 1833 and 1834, when he fell under the influence of Dr. Gabriel Andral, who pointed out that doctors of the time frequently worked in ignorance and that students should be skeptical of authority and should examine all theories critically. In one of his lectures, Andral introduced the topic of puerperal fever, vaguely suggesting it might be contagious.

Holmes, upon returning to Boston in 1834, joined the Boston Society for Medical Improvement (BSMI), a small group of physicians who met twice a month to discuss cases and hear papers; he maintained his membership in the group throughout his time at DMS. There is no evidence that puerperal fever captured Holmes’s interest during his tenure in Hanover. But just a couple of years later, in June of 1842, Holmes attended a BSMI meeting where Dr. Walter Channing, a professor of midwifery and medical jurisprudence at Harvard, presented his notes on 13 fatal cases of puerperal fever. During the discussion that followed, mention was made of an outbreak of erysipelas associated with some of these cases. Further presentations and discussions on the subject continued into the fall of 1842 and the following winter.

Intrigued, Holmes began to critically survey the literature. In February of 1843, he presented to the BSMI his now-classic paper, “The Contagiousness of Puerperal Fever.” A well-reasoned analysis, it concluded that puerperal fever was a contagious disease conveyed to lying-in women (perhaps often from patients with erysipelas) by the unhygienic practices of a physician, midwife, or nurse. Holmes



This seminal monograph by Oliver Wendell Holmes was published 15 years after his time at DMS.

evidenced little tolerance for the misconduct this conclusion implied on the part of health practitioners. “The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime,” he boldly stated.

Unfortunately, although Holmes’s paper was published in the *New England Quarterly Journal of Medicine and Surgery* in April 1843, it was not widely read because the journal ceased publication within a year. It was not until 1855 that his insights were republished and widely circulated in a monograph titled *Puerperal Fever as a Private Pestilence*.

Dr. Charles Knowlton, the DMS graduate who wrote perspicaciously about the unfortunate death of Mrs. L, was also key in helping spread enlightenment in the U.S. about puerperal fever. Though just a country practitioner with no apparent connection to the Boston academic establishment, he added to Holmes’s theory of transmissibility in 1844—just a year after Holmes first published his conclusions. Knowlton did not mention Holmes (or any other physician) in his paper and thus seems to have come independently to his idea, linking puerperal fever to erysipelas even more firmly than Holmes had.

Although White, Gordon, Holmes, and Knowlton all recognized the contagious nature of puer-

Holmes concluded that puerperal fever was a contagious disease conveyed by the unhygienic practices of a physician, midwife, or nurse. He evidenced little tolerance for the misconduct this conclusion implied on the part of health practitioners. “The time has come when the existence of a private pestilence in the sphere of a single physician should be looked upon not as a misfortune but a crime,” he stated.

peral fever, and Collins had suggested a preventive measure through hygiene, it is Dr. Ignaz Semmelweis, a Hungarian physician, who usually receives credit for the monumental discovery. This can be attributed to the experimental nature of Semmelweis's work, for he based his findings on an epidemiologic analysis.

Semmelweis was appointed to the staff of the lying-in unit at Vienna General Hospital in 1846. He soon began to notice a drastic difference in the rates of puerperal fever mortality between the two clinics of the unit. One clinic was restricted to midwives, while the other one was used to teach physicians-in-training. The physicians and medical students who presided over the latter clinic would perform autopsies in the hospital's morgue and then go directly upstairs to conduct deliveries and vaginal exams. Consequently, the second clinic had a far higher death rate due to puerperal fever.

With this evidence, Semmelweis implemented a regimen in which the physicians and trainees were required to wash their hands with chloride of lime before entering the maternity unit. The data supported his hypothesis, with the rate of puerperal fever deaths in the physicians' clinic declining by 90% after the intervention. His findings, however, were not widely circulated and were not even published until his 1860 treatise, *Etiology, Concept, and Prophylaxis of Childbed Fever*, so it's unlikely that they influenced medical education and practice in the 1840s and 1850s, especially in the United States.

Lessons from the 19th century

Although there was much debate through the 19th century about contagion, infection, and viruses, the understanding then of those terms bore only a vague resemblance to today's knowledge. For example, one of the prevalent theories of contagion involved so-called "miasmas." They were thought to be poisonous vapors "generated by putrid, decomposing materials that polluted the atmosphere," according to *A History of Infectious Diseases and the Microbial World*. But it was not until the latter part of the century that the existence of airborne microorganisms was proven.

Yet long before that time, the debate surrounding contagion influenced the medical community's response to diseases like erysipelas and puerperal fever. It was commonly acknowledged that a disease like smallpox could be transmitted by direct contact from an affected individual to an unaffected individual. But the idea that a person unaffected by a disease might be a vector for its transmission was not supported by the knowledge of the time.

Some practitioners of the day considered themselves "anticontagonists," and others considered themselves "contagionists." Loudon explains that the anticontagonists were thought of as optimists, for "they believed that something could be done by looking for the causes, prevention, and cure of epidemics in social and political terms, thereby laying the groundwork for 19th-century public health." And the contagionists were considered pessimists, as they were sure diseases were transmissible but were unsure how to prevent their transmission; they therefore advocated quarantines and governmental controls when epidemics arose.

Even those who were staunch anticontagonists still believed that some diseases were communicable. Loudon notes that "although miasmatic theory and contagion are usually presented as opposite poles, the 'contagionist and anticontagonist miasmatic explanations were neither mutually exclusive nor essentially in opposition.'"



Charles Hunt, an 1857 DMS graduate, signaled in notes he made as a student the growing understanding of puerperal fever's transmissibility.

This confusion is evident in the 21 DMS theses on erysipelas. They, and death records of the time, make it clear that the disease swept through the Upper Valley during the mid-1800s—even more so than puerperal fever. Yet the theses were filled with misconceptions about what caused the disease and even whether it was contagious.

For example, though Samuel Brown referred to erysipelas in his 1872 thesis as a "virus," the term then meant a poison or infectious agent, not the class of microorganisms now bearing that name.

Isaac French also acknowledged erysipelas's contagious nature in his 1854 thesis but was unsure exactly how it spread. "Perhaps it may be as well, to say . . . a few words about the contagious form of the disease," he wrote. "Do not the Typhoid symptoms show that there is something more existing than in ordinary inflammation? And if there is we must consider it a poison or something analogous. But as to what this poison is I do not wish to theorize, for we already have theory upon theory, without arriving at any conclusion. But we know that bad ventilation and filthy location will change almost any inflammation to the erysipelatous kind—and from this have we not good reason to suppose that inflammation by being treated to bad air and filth . . . generates a poison, which may be transmitted to another and another, especially if they are surrounded by the same influences, and so become contagious as we need no proof that it is so in many cases."

Yet a few students who wrote about erysipelas made startling con-

Erysipelas is not well known in all its forms. Some are known and others are

and vice versa—The Physician should use caution after leaving the P[atient] especially if he is called to an Obst[etrical] case his clothes should be changed and before he makes an examination his hands should be covered all over with tallow or otherwise he may give the lady Puerperal Fever

Hunt's 1852 lecture notes describe the symptoms of a skin inflammation called erysipelas, then suggest a link between that disease and puerperal fever. Today, we know both are caused by a streptococcal bacterium.

nections between disease causation and the spread of infection—an idea that wasn't widely accepted until years later. As early as 1826, for example, George Bellows discussed a series of puerperal fever cases in which inflammation of the face was often evident.

Other theses attest to the fact that these connections had been incorporated into the DMS curriculum by the 1850s, well in advance of wide knowledge of the work of Semmelweis. For example, Ezra Paine wrote in 1851, "We ought to practically consider that there is a risk of conveying infection, if we were to attend the erysipelatous and the puerperal at the same time." He mentioned children born with advanced erysipelas due, he suggested, to "bad management of the umbilical cord, in addition to causes in the adult." Paine also discussed an erysipelas epidemic in northern New Hampshire in 1842 and 1843; he supported his observations about the disease's contagious nature by noting that it was more common to find erysipelas in families where cases of the disease had previously occurred.

And Charles Hunt—an 1857 graduate of DMS who later achieved wide recognition for his service during the Civil War (for more about his career, see dartmed.dartmouth.edu/w09/we01)—included in his 1852 classroom notes a three-page summary of erysipelas. This account concludes with a mention of the disease's connection to puerperal fever. Hunt, like Holmes and Knowlton before him, also discussed the possibility of the doctor's role in transmitting the erysipelas contagion to female patients, in whom it manifested itself as puerperal fever. "The Physician should use caution after leaving the

P[atient]," he wrote, "especially if he is called to an Obst[etrical] case—his clothes should be changed and before he makes an examination his hands should be covered all over with tallow or otherwise he may give the lady Puerperal Fever."

In 1856, Hunt wrote a lengthy thesis on erysipelas in which he further discussed its connection to puerperal fever. There he wrote, "It has been noticed that Erysipelas exists in hospitals at the same time that puerperal fever prevails; under these circumstances it has been sustained that the disease is contagious. That it at times prevails as an epidemic cannot be disputed. It sometimes acts on a more extensive plan than at others, not only affecting small localities, but spreading over large territories of country. But whether the real causes are yet known, or whether it is contagious or noncontagious my limited knowledge of the disease will not allow me to decide."

A specific infectious agent was never discussed in these theses, however, or even in the writings of Holmes and Knowlton. Holmes stated in his paper that he had no desire to dispute the particular mode of transmission, whether it was the environment or "the direct application of the virus to the absorbing surfaces with which his hand comes in contact." Knowlton mused that "contagion is something which we do not know much about." Nor did either test their hypotheses by controlled experimentation, to see whether improved hygiene would prevent the transmission of the disease. That was left to Semmelweis and ultimately to Pasteur, who in 1879 isolated and characterized streptococcus as

continued on page 56

Charles Hunt included in his 1852 classroom notes a three-page summary of erysipelas. This account concludes with a mention of the disease's connection to puerperal fever and of the doctor's possible role in transmitting the contagion to female patients. "The Physician should use caution after leaving the [P]atient," he wrote, "especially if he is called to an Obst[etrical] case," or "he may give the lady Puerperal Fever."

Dr's. Thomas G. Schell & Patrick Noble
Family & Esthetic Dental Care

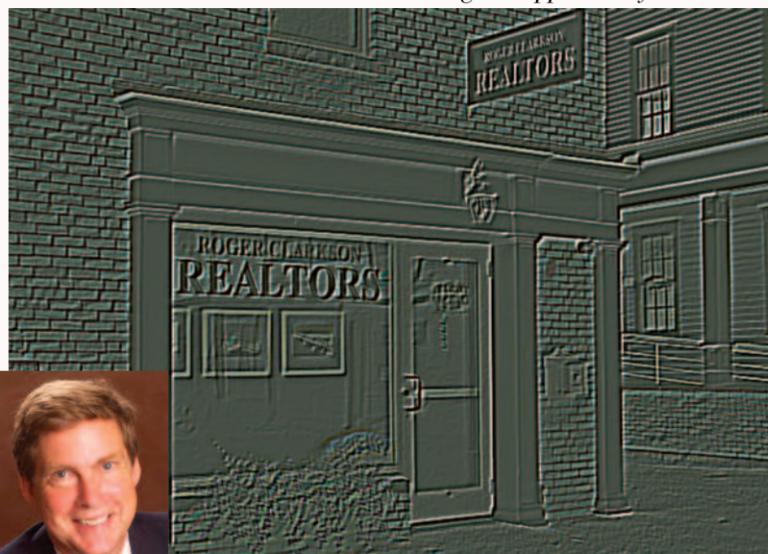
Gentle family dental care &
 custom appliances for the treatment
 of obstructive sleep apnea



31 Old Etna Road, Suite N1
 Lebanon, New Hampshire (603) 448-3800

ROGER CLARKSON REALTORS

Serving the Upper Valley since 1975



Sales and Rentals in New Hampshire & Vermont
 38 S. Main Street, Hanover, NH. (Behind Ledyard Bank)
 Parking Available. (603)643-6004 • www.rogerclarkson.com

“The most unspeakable terror”

continued from page 43

the cause of puerperal fever and erysipelas.

The way in which the understanding of these two diseases was acquired and spread offers a fascinating case study regarding the advancement of medical knowledge. The time between Dartmouth Medical School's founding in 1797 and the mid-1850s was a period marked by expanding diffusion of knowledge—between the city and the country, between practitioners and patients, and between continents.

This diffusion was supported by an increasing number of medical publications and meetings, by new textbooks, and by a substantial increase in the U.S. in the number of medical schools. A logical and critical analysis of diseases, coupled with close observation of individual patients as the starting point of hypothesis-based problem-solving, emerged as the centerpiece of American medical education. A review of the medical literature, perhaps undertaken for the first time by Holmes, soon became an important tool to ferret out the essence of diseases and of best practices in treating them.

The past's unquestioning reliance on authority and on ancient teachings about human disease fell before the skepticism of curious clinicians and students. Some even had the audacity to suggest that practitioners themselves might be spreading illness. The circle of disease pathogenesis was closed by the experiment of Semmelweis who, while not the first to suggest the transmissibility of puerperal fever, directly tested his hypothesis in an epidemiologically defined group of patients.

Today, puerperal fever is far from eradicated—especially in developing countries, where sanitation is still a challenge. The incidence of poverty is almost perfectly congruent with the incidence of maternal bacterial sepsis following childbirth. Puerperal fever is significantly more prevalent in the developing nations of Africa, Asia, Latin America, and the Caribbean than in industrialized nations. In 2005, the World Health Organization estimated that the maternal mortality rate in sub-Saharan Africa was 100 times the rate in industrialized countries.

So the lessons learned during the 18th and 19th centuries from the examination of

puerperal fever in Europe and the United States are being reapplied during the 21st century. There is still a need for diffusion of medical knowledge, for understanding of disease pathogenesis and epidemiology, and for education regarding the prevention of disease through sanitary practices.

Mysteries for the ages

Today we know much more about “the unspeakable terror” that took the lives of Orilla Benton and Mary Baker, but mysteries remain about their specific cases. Time has erased many of the details of their lives, although the gravestone marking the final resting place of Orilla Benton and her infant daughter can be seen in the Dartmouth cemetery not far from the campus Green. Mary Baker, however, is not listed in any cemetery records or in census data for Hanover or any surrounding towns. A map of the neighborhood near the Bentons' house on South College Street does not reveal any house occupied by a family named Baker.

And questions about about the relationship between the two women. Did they and their infants die at home after visits from the same physician or midwife? Or did they perhaps die in the hospital that was established in Hanover sometime during the 1840s by Dr. Dixi Crosby? “Dr. Dixi's Hospital,” as it was known, was located on North College Street (in a building that is now Dartmouth's Hispanic and Latino affinity house), right next to the home of town scribe William Dewey. Could he have learned of the women's demise from Crosby? Could it have been Crosby, a professor of surgery and obstetrics at DMS, who cared for both women and inadvertently transmitted the disease between them? Or did they both acquire erysipelas during the Upper Valley epidemic, and is that what complicated their deliveries? Was Crosby even aware of the association between the two diseases and of the growing evidence of their transmissibility?

And—perhaps of most enduring interest—did the cases of these two women contribute to the growing understanding at Dartmouth Medical School about the terror that befell them? We can only hope that they did, for it was a terror which, in the words of Charles Knowlton, caused its victims “to sink right down and go off so like the wind . . . [with] a malignancy about them which I am not at all used to.” ■

WillowBrook Prosthetics & Orthotics



Robert Diebold, C.O., Orthotist • David Loney, C.P., Prosthetist

190 Hanover Street • Lebanon, NH • 603/448-0070



Plans Settled.
 Passions renewed.

For residents Gen Williamson and Doris Bogen, gardening has been a passion since childhood. Kendal offers them the opportunity to enjoy the outdoors, while sharing in the cooperative nature of the community garden.

At Kendal at Hanover you'll enjoy a naturally tranquil setting with full access to outstanding services and amenities. Carefree living, on-site wellness programs, flexible dining options, enriching cultural events, lifelong learning at nearby Dartmouth College, complete healthcare services... all giving you less responsibility, and more opportunity in transforming your experience of aging.

KENDAL® at Hanover



a Continuing Care Retirement Community
 Quaker-Related • Not-for-Profit

call 603-643-8900
 www.kah.kendal.org