

Experiments and Observations

How William Beaumont and Alexis St. Martin Seized the Moment of Scientific Progress

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NESTLED ALONG THE CLEAR BLUE STRAITS BETWEEN the great lakes called Michigan and Huron is an oblong and verdant island. Centuries ago, the Chippewa and Ottawa tribes named it Michilimackinac, or “the great turtle.” Referred to today as Mackinac but pronounced “Mackinaw,” this tiny land mass attracts tourists by the millions seeking its calming waters, grand hotels, attractive vistas, bicycle paths, and tons of a sticky, sweet confection made of butter, milk, sugar, cocoa, and a touch of vanilla, called Mackinac fudge.

In 1670, the French Jesuit missionary Father Jacques Marquette and his intrepid interpreter Louis Joliet fled St. Ignace, Michigan, to settle on the “Great Turtle” in the name of their homeland.¹ Less than a century later, in 1759, the British took control of the island from the French and, in 1783, after signing the Treaty of Paris, Great Britain relinquished it to the fledgling United States, which had to defend and regain it during the War of 1812. The French pursued fur trapping there with vigor and cunning. But it was John Jacob Astor, the first US multimillionaire, who put Mackinac Island on the map in 1817, when Michigan was admitted to the Union and Astor chose the island as the main trading post of his fabled American Fur Company, a pelt empire that spanned from the Great Lakes to the Mississippi River.²

Every June, the American Fur Company hosted a convention on Mackinac for thousands of trappers eager to sell or barter the bounty they had hunted the previous winter. The rest of the year, the island’s population hovered at a mere 500. Situated on the southeast cliff a few hundred feet above the shoreline was a limestone fortress built by the British in 1761 and subsequently occupied by the US Army to protect the island’s commerce and trade.³

In 1820, one of the military officers stationed there was a young physician named William Beaumont. In 1810, he began a 2-year apprenticeship to a well-established Vermont physician named Benjamin Chandler and in 1812 passed his state’s qualification examination. That same year, Beaumont enlisted with the US Army in search of adventure and clinical experience and served as a surgeon’s mate in the War of 1812. After the end of that conflict in 1815, he resigned his post to set up a private practice in Platts-

burgh, New York. Five years later, he turned his practice over to a cousin and re-enlisted in the Army, which assigned him to Fort Michilimackinac.⁴

At this distant frontier outpost, Beaumont began the work that culminated in a remarkable, if not outright revolutionary, book—*Experiments and Observations on the Gastric Juice and the Physiology of Digestion*.⁵ But he hardly accomplished this gargantuan task alone. Indeed, Beaumont had the help and the body of a French Canadian fur trapper named Alexis St. Martin.

The story of Beaumont and St. Martin has been recounted so often it has acquired the finely burnished patina of hagiography. Yet even when stripped of its most sensational layers, their collaboration remains an inspiring and cautionary tale about the boundaries between physician and patient and medical investigator and human participant.

On the morning of June 6, 1822, as the annual pelt swapping jamboree was under way, a 20-year-old St. Martin waited in line at the American Fur Company’s store to make some trades. What began as a rudimentary exercise in capitalism erupted into a medical emergency when a shotgun accidentally discharged. As one eyewitness described, “the muzzle was not over three feet from [St. Martin]—I think not more than two. The wadding entered, as well as pieces of his clothing; his shirt took fire; he fell, as we supposed, dead.”⁶

The gun’s contents entered just under St. Martin’s left breast, fractured several ribs, lacerated his diaphragm, and left a gaping hole through which portions of the lung and stomach protruded. Beaumont quickly arrived and administered first aid amid the stunning sights and smells of St. Martin’s breakfast leaking from the wound. Thanks to Beaumont’s quick-witted and precise ministrations, St. Martin did survive the event, albeit with a fistula leading directly into his stomach that remained patent until his last day of life. It was a medical intervention that would soon change medicine.⁷

For much of the next few years, Beaumont provided daily care and attention to his fascinating patient. Although the wound partially healed, St. Martin remained weak and miserable and refused any attempts by Beaumont to somehow suture the hole shut. As a result of his critical injuries and lengthy rehabilitation, St. Martin was also penniless.

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Medical historians and ethicists have long argued over Beaumont's motives in caring for St. Martin. Alas, the historical record obscures more than clarifies the physician's thinking and intent, as does the striking passage of time, custom, and class, not to mention vast changes in the social understandings of the rights of patients and the obligations of physicians. Assessing the motives and ethical impulses of those long dead is a difficult task for even the most adept historians. Clearly, Beaumont and St. Martin's was a complex relationship consisting of more than sympathy and science. It also included ambition and careerism on Beaumont's part; dependence and need from the ailing St. Martin; and a huge reserve of negative and positive human actions, emotions, and feelings that occupied both men in the years to come.

On May 30, 1823, for example, Beaumont first recorded his inkling that major scientific observations in this case were possible after introducing a cathartic via a glass funnel into St. Martin's fistula and stomach. "I gave a cathartic, administered, it is presumed, as never medicine was administered to man since the creation of the world." The next day, however, Beaumont described taking a destitute and sickly St. Martin into his own home "from mere motives of charity, and a disposition to save his life or at least to make him more comfortable."⁸

Others, however, have pointed out that a local woman named Mary LaFleur first boarded St. Martin through the spring of 1823, and it was not until after Beaumont discovered the ease with which food and medications could be inserted into St. Martin's stomach for further study that he eagerly welcomed the trapper into his home.⁷

On August 1, 1825, St. Martin finally felt well enough to allow Beaumont to formally begin the studies that served as the basis of his soon-to-be famous book. As Beaumont gleefully recorded, at "12 o'clock [noon], I introduced through the perforation, into the stomach, the following articles of diet, suspended by a silk string, and fastened at proper distances, so as to pass in without pain-viz. A piece of high seasoned *a la mode beef*; a piece of *raw, salted, fat pork*; a piece of *raw, salted, lean beef*; a piece of *boiled, salted beef*; a piece of *stale bread*; and a bunch of *raw, sliced cabbage* [italics Beaumont's]."^{5(p125)} During this and subsequent experiments, Beaumont also withdrew copious amounts of gastric fluids and chyme for analysis and elaboration.

Beaumont employed St. Martin as an aide and servant in his subsequent military medical posts and continued to care for him at his own expense. By the summer of 1825, however, St. Martin grew tired of being a human guinea pig and abruptly fled to Canada. It was not until 1829 that physician and patient were reunited after St. Martin made a heroic canoe trip extending from northern Canada to Fort Crawford in Prairie du Chien, Wisconsin, where Beaumont was stationed. A second series of experiments briefly transpired until a homesick and tired St. Martin returned to Canada. Many pleas and years later, the two met again

in Plattsburgh and Washington between 1832 and 1833 for a final round of studies.

When Beaumont published his treatise in 1833, there was great debate among the medical community about the precise mechanisms of digestion. Similarly, the lay public on both sides of the Atlantic were obsessed with every episode of dyspepsia, flatulence, and heartburn they experienced, resulting in a huge demand for panaceas from their physicians. Many medical experts advocated their own theory of how humans digested their meals, but until Beaumont encountered the ailing St. Martin, no one had firsthand access to a living, secreting stomach.⁹

Although sales were slow initially, *Experiments and Observations* eventually generated great excitement in Europe. By 1850, Beaumont enjoyed the status of being the first US-born medical scientist to achieve international renown. No less an authority than Claude Bernard, the Parisian physiologist whose work led to the concept of homeostasis, credited Beaumont with initiating "a new era in the study of this important organ and those associated with it."¹⁰ Across Europe and beyond, physiologists looked for individuals with similar fistulas or created them, experimentally, in animals as they labored to elucidate the digestive process. Ironically, like so many prophets in their own land, in the United States Beaumont's theories were initially met with indifference by a medical profession less enthralled with scientific method than their peers in Britain, France, and Germany. By the mid-19th century, however, even his countrymen reconsidered and initiated a cult of hero worship that remains intact to the present day.^{4,7,10-12}

After the publication of *Experiments and Observations*, Beaumont hoped to conduct another round of experiments, but St. Martin refused all such requests. The constant poking and insertion of food, drinks, medications, tubes, and thermometers into his fistula was hardly enjoyable, let alone comfortable. Moreover, he missed his family and life in Canada and had experienced the ravages of alcoholism.

St. Martin's refusal to cooperate must have frustrated Beaumont; undoubtedly, Beaumont's relentless coercion and pleading irritated St. Martin. At various points in their collaboration, St. Martin demanded a formal contract. In return for allowing experiments to be conducted exclusively by Beaumont, St. Martin received financial compensation, medical care, and a modicum of respect and attention to his wishes and comfort.^{7,13} Yet even after refusing additional experiments with Beaumont in 1833, St. Martin steadfastly rebuffed the requests of other scientists eager to employ him in search of some additional data. In 1856, 3 years after Beaumont's death, the financially strapped St. Martin finally did consent to participate in a short-lived traveling exhibition show with a quack physician named G. T. Bunting.¹⁴

After St. Martin died on June 20, 1880, his family kept the body from being buried or embalmed for 4 days. The corpse decomposed so badly that the odiferous coffin could

not even be brought into the church. He was interred on June 24, in a grave 8 feet deep and covered with 2 feet of stones and another 6 feet of dirt to prevent medically inspired grave robbers from exhuming his body for further inquiry.³

Apparently, St. Martin meant what he said when he told his faithful and persistent healer William Beaumont that enough was enough. Unlike the soil placed over his grave, however, neither refusal nor death could cover the stunning contributions he had already made to the medical literature and, more broadly, medical history. Both St. Martin's wound and his willingness to work with Beaumont literally opened the path for a field of study that continues to benefit humankind to the present day.

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Writing is the action of thinking, just as drawing is the action of seeing and composing music is the action of hearing.

—Brenda Ueland (1891-1985)