EXPLORATIONS

Blinded by Science

A story of one professor's fate and focus.
Surrounded by wooden laboratory benches, glass beakers and serious students in the basement of a University of Michigan building, Edward Campbell was actually on top of the world. He was completing his second year as a professor at his alma mater, teaching and researching in the infant field of metallurgy. Six years earlier, in 1886, he had graduated with a bachelor of science degree in chemistry — a first at U-M. Now he was back in Ann Arbor, a town he loved, with a burning interest in how chemistry could be used in industry, particularly in the strengthening of steel and iron used in construction and transportation.

His research unfolded daily in a sprawling building known as the chemical laboratory, the first of its kind built on any American college campus. As U-M’s science courses grew, so did the chemical laboratory; every six or eight years, campus planners erected an addition to the building. The University itself referred to the lab as a “conglomerate pile.”

For Ed Campbell, it was glorious. It was science and intellect and desire. It was everything he had missed since graduating, when he left for work in steel mills; more than any American industry, the mills hired chemists, as they knew best the properties of coke, ore and phosphorous. But he hated it and the tiny burgs he called home: Dayton, Tenn.; Zanesville, Ohio; Sharon, Penn. (“Fortunately almost all the quarrels are among the same class of men, gamblers and general toughs …” he wrote of unruly neighbors in Dayton.)

It was his pursuit of science that, in the years to come, would define Campbell as a beloved professor, respected scholar and the father of chemical engineering at Michigan.

Today, in early April 1892, he would work in the lab with students and, together, they would continue their chemical analysis of steel. The process involved dissolving steel with sulfuric acid and capturing the gasses that were released; everyone involved knew it was complex and volatile. A graduate student had already started the experiment when Ed Campbell walked into the room, stood at the lab bench, and stooped to look directly into the gassy, heated glass apparatus.

CHAPTER 2
Acid, Morphine and Cocaine

Exactly one year earlier, a young man from Michigan’s Upper Peninsula presented himself to ophthalmologists at University Hospital. Twenty-year-old Charles Sendling said he could not see out of one eye, the result of being hit in the face months earlier with a slab of wood. Doctors determined the eye was a loss and removed it in procedure known as enucleation. They then extracted a 1.5-inch splinter lodged in the bone of the hollow socket.

The outcome was similar for 13-year-old Bertie Oberlin, whose right eye was injured by a toy gun on New Year’s Eve. And farmer Frank Greavia, who felt something fly into his eye while binding oats on his Tuscola County farm. And Mandie Hovis, a 9-year-old schoolgirl whose right eye went dark when pierced by a corset stay.

Doctors removed these damaged eyes, washed out the cavities with boracic acid, prescribed a mixture of cocaine and morphine for the pain, and sent patients home from the hospital within a week.

Accidents and injuries were the leading causes of blindness at the end of the 19th century. Of more than 35,000 totally blind people nationwide, all of 60 were teachers and professors, and only 13 had lost their sight as adults. One of them was now Edward Campbell.
Those who were there when the glass exploded said the young professor screamed and staggered, grabbing his face with hands soon covered in blood. “Oh my god, I’m blind.”

His students — one can only imagine their shock — took him by the arms and led him out of the lab and into the care of Dr. Flemming Carrow, the head of ophthalmic surgery at University Hospital. The examination did not take long: lacerated and punctured beyond repair by slivers of glass, both eyes were a loss. Carrow removed them.

Campbell was 28, with a pregnant wife and two young children. He was in his second year of teaching. News accounts reported him begging Carrow to kill him.

“I cannot bear to think of it — it seems such a dreadful thing for a man, young and strong, and with all his life before him, to meet with such a blow,” his older brother Douglas, himself a professor at Stanford University, wrote after learning about the accident. “I hope he will not be so entirely broken down and discouraged as to give up in despair - as he might very well be excused for doing.”

As white bandages were wrapped around Campbell’s face and head, a pall fell across Ann Arbor. The Michigan Daily called it “the saddest and most distressing accident in the history of the University.”

“How it gripped us all and how we suffered together when Professor Campbell lost his eyesight in the laboratory,” wrote student Lilian Wychoff Johnson, underlining the word “together” as she recalled the accident more than 30 years later.

“Nothing has ever stopped Ann Arbor to such a depth as this accident,” wrote Henry Campbell, Ed’s oldest brother and a prominent Detroit attorney. “Everybody has been affected by it, and hundreds of people are only too anxious to do everything possible for him and his family.”

Deliveries of flowers overwhelmed University Hospital, where Campbell was given a secluded room and where his wife, Jennie, carried bouquets into neighboring wards so other patients could enjoy them.

“The windows were full of flowers, and while we were there two boxes of lily-of-the-valley came from his students,” wrote an aunt. “In one window was a gorgeous Easter lily, in another a very large hydrangea with heads of white flowers, and hyacinths, Heliotrope, narcissus and other cut flowers around. He has had the most magnificent roses from his students, from Mrs. Angell and others, and he has taken pleasure in them though unable to see them.”

Mrs. Angell’s husband, James — the president of the University — had himself visited Campbell. It was only three years earlier that he had reached out to the young chemist and offered him a teaching appointment. The Michigan faculty, particularly in the sciences, was growing and he wanted Campbell to be part of it. Now Angell had another message for the young researcher: Your best days are ahead of you.
When Ed Campbell was a boy, the smallest details and the finest features of animals fascinated him. He roamed the woods and fields of Detroit and nearby Grosse Île, an island in the Detroit River, identifying and hunting birds and then studying and dissecting their delicate bodies. He enrolled at Michigan, where his father James was a law professor and all four of his brothers had studied. Intending to pursue zoology, he veered into chemistry and then the narrower field of metallurgy. He took meticulous notes in his chemistry courses.

His attention to detail never waned, whether inside the laboratory or elsewhere. Consider a letter he wrote a year before being blinded, as he described a new home being built for his young family:

“The house is to be severely plain colonial style. The woodwork is to be dark stained ... The plaster is to be a sand finish that is a light grey color, a little rough. The finish is especially adapted to tinting, and in a year or two, after the house has settled thoroughly and all cracks have shown up, I hope to have the walls tinted. The house is to be painted light yellow, with white trimmings and very dark green blinds. The doorknobs, hinges, etc., are to be plain polished bronze, the knobs downstairs to be egg-shaped.”

His keen eye was equally attentive when it came to animate objects.

“Yesterday was the day for weighing Cornelia at four months. She weighs just sixteen pounds,” he recorded of his firstborn, also noting she had a small rash on her cheek. “If it were not for the little trouble with her face, she would be about as perfect a specimen of small humanity as could ever be asked.”

By age 2, little Cornelia seemed to have inherited her father’s awe of nature. “The windows in the kitchen are about eighteen inches from the floor and she enjoys standing with her hands on the sill and watching some fox squirrels and blue jays that live in the yard,” he wrote.

Curiosity can carry risk. One day young Cornelia pitched forward from a rocking chair into a window, which cracked and cut the toddler’s lips, nose and face. The glass shards poisoned her blood, the cuts were slow to heal, and a tiny scar marked her upper lip.

Her eyes, however, went untouched.
No other member of the Michigan faculty was blind when Edward Campbell lost his sight. Only a tiny minority of blind adults in the nation was self-supporting. Those with jobs were often music teachers, piano tuners, maids and servants, and makers of brooms and brushes.

To be blind at the turn of the 20th century often meant being an object of curiosity, pity or both. When Helen Keller — arguably the world’s most famous blind (and deaf) person — spoke at the 1904 World’s Fair in St. Louis, she praised and encouraged national efforts to educate and employ the blind. “All that is gathered here symbolizes the will of the American people that a way shall be paved to the education of all, no matter how humble or limited their capacity,” she told the huge crowd. At the same fair, blind children were on display among “defectives,” doing crafts, making brooms, playing violins and reading books in Braille.

The most potent antidote given to the newly blind Campbell was the encouragement of his family, friends and students. It was a given — in their minds — that the pursuit of science would continue to be his calling.

“There is a universal demand that he go on with his work and a firm conviction that there will be no obstacle to it,” wrote Charles Campbell, one of Ed’s four older brothers. “The University authorities say they cannot spare him. All this is wonderfully encouraging to him and he already is planning his work.”

He added: “I do not feel about Ed the same anxiety and despair that I should in the case of a more dependent or less adaptable person. He is so quick to learn and so extraordinarily self-reliant that he will find himself very quickly as busy as ever.”

In fact, Professor Campbell was back in the classroom less than two weeks after the accident, his face still bandaged.

“I simply realized that whether I had my sight or not, I must continue my life in much the same way as before,” he said years later. “I might have spent more time in trying to improve my other sense; that might possibly have made life hold out a little more of pleasure for me. But that would have been purely selfish.”

He added: “I went back to my classes and my laboratory work. Time taken in training the senses would have taken from my work.”

Initially he was an oddity. Decades after the accident, alumna Thyrza McClure could not shake Campbell’s appearance that spring at a campus performance of the Boston Symphony, recalling “the profound hush that came over the audience in the old auditorium when Professor Campbell first appeared after the loss of his eyesight.”

And then, it seemed, people stopped seeing him as a blind man.

He learned to read Braille and to type using what was then called a point writer; he was among the first recipients of the machine. It allowed him to record his lecture notes and then use them to improve upon his teaching. “It gave one an eerie feeling,” a colleague said, “to hear the sound of his typewriter coming from a pitch-dark room.”

He also continued to use a traditional typewriter — and his memory of the keys — to correspond with family and friends. (“There were surprisingly few mistakes in it,” his sister Nellie wrote. “What a wonder the boy is! How many men would learn to help themselves as he has done, and in so short a time?”)

Within a year of the accident, Campbell hosted President Angell and members of the Scientific Club at his home, and delivered a lecture on inventions that allowed the blind to read, write and calculate. He himself had started to design his own instruments for the laboratory.

He remained a devoted husband and doting father, while conceding the help his wife and children always offered. “She appreciates that I cannot show her pictures any longer,” he wrote when daughter Cornelia was 4, “so she always gets her books and tells me all that she can about the pictures that she finds.”

His students did the same, although with weightier materials, meeting at his house in the mornings and reading aloud that day’s New York Times. “I would read the headlines and he would say whether to read the article. We always read all the editorials and other important articles,” said student Walter E. Jominy.

Then, together, they would walk to campus for the day’s experiments, lessons and readings of technical papers. The Board of Regents always allotted funds for Campbell to have an assistant.

Campbell also made time — always — for exercise, working out daily at the Barbour Gymnasium and on a walking track he built at home. “He was fine looking and erect in his carriage,” a colleague wrote.
One of Campbell’s student assistants was Edwin Bret Hart, who would go on to a distinguished research career as a biochemist at the University of Wisconsin and election into the National Academy of Sciences. As an undergraduate in the mid-1890s, Hart said he learned the importance of precision in research from Campbell. The two scientists spent time together both in and out of the lab; at the end of each day, they would mount a tandem bicycle and ride throughout town. Most of the power, Hart conceded, came from Campbell.

He never lost his love of the outdoors, and was a charter member, and then president, of the Pleasant Lakes Club; a hunting and fishing outfit of faculty colleagues and their families, it was located 30 miles north of Ann Arbor and “freely used by its members as a place of retreat from academic worries.”

He embraced hard work, both physical and intellectual. “There is more satisfaction in hard work than in almost anything else and I feel that now more than ever before,” Campbell told his sister. “I wish you had learned that keen pleasure that is derived from working for the sake of work; it is the best of all pleasures.”
His was a dark world lit by intellectual sparks.

“Being blind is dull business,” he told a journalist. “It is strange how much relation there is between the sense of sight and the living of the average happy, interesting life. Think how much the average mortal spends just in looking at things. He goes to plays; he reads; he goes walking and traveling just to have a change of scenery. At times he just sits and looks at nothing in particular — and enjoys it.

“I can do none of those things. An hour spent on the porch of my home is as interesting to me as an hour spent looking at the Alps. A play, to me, is nothing more than dialogue. As much enjoyment can be had listening to a member of my family read to me.

“But there are certain advantages. It gives one endless opportunity to think. When I am alone there is little else for me to do. I cannot idly pick up a book and glance through it. Nor can I sit and look out the window. I must spend my time in reflection.”

What he thought about was what had blinded him: Chemistry.

Chemistry had been taught at Michigan since the earliest days, when the number of students and faculty totaled fewer than 20. By the 1850s, President Henry Tappan called for a chemical laboratory, and for 50 years that one building would accommodate the teaching of chemistry at all levels and in all disciplines.

At the same time, the study and understanding of chemistry led to diverse and defined academic programs at Michigan: pharmacy, chemical engineering, organic chemistry, metallurgy and more.

Campbell taught U-M’s first classes in chemical engineering in 1898; only one other university in the country — the Massachusetts Institute of Technology — offered anything similar. In 1905, he added to his duties as director of the chemical laboratory.

As programs and enrollment grew, so too did the demand for a bigger, more sophisticated chemistry building. By 1909, the existing building was home to classes for nearly 2,600 students in engineering, medicine, pharmacy, dentistry and the various sciences offered in the College of Literature, Science and the Arts. Essentially one of every two U-M students was using the Chemistry Building.

When the time came for a new building, Edward Campbell’s mind was the strongest tool at hand. For years he had impressed students and colleagues with his memory, his delicate touch, and his recollection of detail in the lab. While plans for a new chemistry building were drawn up by architects, it was Campbell, a blind man, who determined the placement of lab benches, hoods and flues, supply cabinets, water lines and stone sinks.

“He seemed to be able to go to and turn on or off any water tap or find any piece of fixed apparatus on the whole five floors. I had many conferences with him and others while the building was going up and afterward,” recalled longtime administrator Shirley Smith, “and his mind seemed a better blueprint than those the rest of us had before us.”

Indeed, the architectural specifications for the building, now among the holdings of the Bentley Historical Library, are marked in pencil, “Return to Professor Campbell.”
Edward Campbell’s family would grow to six children — four of whom he never saw. All six would earn degrees at Michigan. At all ages, the Campbell children read aloud to their father. His wife Jennie was, by every account, a strong companion, although she worried “he would get tired to death of me” for always being at his side.

When he died in 1925, Ed Campbell had grown increasingly deaf; it meant further isolation, but he continued to work. Only 62 years old, “he was spared the experience of having outgrown his usefulness,” said a brother.

Blinded in 1892, Campbell taught and conducted research as a Michigan faculty member for another 33 years. He published 77 scientific papers, including 74 after losing his sight. “His published papers chiefly interested his colleagues near and far. His achieved character, with its defiance of obstacles and its good cheer, had a still wider and profounder recognition,” read the Faculty Senate memorial.

A year after his death, the American Society for Metals inaugurated the Edward De Mille Campbell Memorial Lecture, an annual award that recognizes exceptional work in materials science and engineering.

Within a decade of Campbell’s death, one in five graduate students in chemical engineering nationwide was studying at Michigan, and the U-M department was ranked in the top three in the country.

His greatest contribution, however, would be the example he set at U-M and beyond.

“Those who become convinced that the search for knowledge is difficult might think of Dr. Campbell who carried on, without sight, in his chosen profession, and who became great in more ways than one,” wrote an editorial writer for California’s Oakland Tribune.

In the entryway of the Chemistry Building that Campbell helped make reality — a building that continues to serve students and faculty of the 21st century — a bronze tablet recognizes his career. “He contributed nobly to life as well to science.”

Adah Sanders Weston, who graduated in 1896, said time as a chemistry student under Campbell was a highlight of her academic career. “Professor Campbell taught me by example how to take a knockdown blow standing up.”

Weeks after Campbell’s death, Professor William H. Hobbs addressed the Research Club as its current president; Campbell had been a charter member of the group.

“Nothing was ever allowed to stand in the way of his attendance upon meetings, and despite the heavy handicaps of total blindness and ever increasing deafness, he kept up his own research work with a courage and patience and with a cheerfulness under adversity which has put most of us to shame,” Hobbs said.

“His was a singularly beautiful life.”

—Kim Clarke

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This article was drawn chiefly from the papers of James V. Campbell and Edward Demille Campbell at the Bentley Historical Library; Department of Ophthalmology and Otology records, U-M Hospital records, Bentley Historical Library; “History of the Chemical Laboratory of the University of Michigan, 1856-1916,” by Edward D. Campbell; “A Century of Chemical Engineering at the University of Michigan,” by James Wilkes; The Blind and the Deaf, 1900, Bureau of the Census; The University of Michigan: An Encyclopedia Survey; and contemporary news accounts.