A Note from History:  
Samuel D. Gross of Philadelphia: Pathologist, Surgeon, and Medical Historian

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Samuel David Gross (1805–1884) (Fig. 1), a native of Easton, Pennsylvania, and a graduate of Jefferson Medical College in Philadelphia, wrote his first book [1] in 1828, just two years after he received his M.D. degree. The book, which was the first American treatise on orthopedic pathology and surgery, was an instant success, but Gross’s attempt to establish a surgical practice was a failure.

Gross had ample time to study and, since he was fluent in French and German, he read the pathology texts of Baillie (1761–1823), Bichat (1771–1802), Cruveilhier (179–1874), Horner (1793–1853), and Andral (1797–1876), published in 1793, 1801, 1829, 1829, and 1832 respectively. Based on his diligent study of these treatises and his experience in dissection of human and animal bodies, Gross soon became qualified for a pathology position. In 1833 he was appointed demonstrator in pathology at the Cincinnati College of Medicine and in 1835 he was promoted to professor of pathologic anatomy. He continued to autopsy human and animal bodies and he performed the first experimental pathology studies in the United States [2]. He also organized the nation’s first didactic course in pathology for medical students and aspirant pathologists.

In 1839, at age 34, Gross summarized in book form his experience in pathology and all that he had deduced from publications of European pathologists [3]. His book, in two volumes, filled a void in the American medical literature. It went through several editions and remained the only comprehensive text of pathology published in the United States until 1908 [4]. Gross’s book contained descriptions and illustrations of clinical, surgical, gross pathologic, and microscopic aspects of hundreds of pathologic conditions from inflammation to tumors. He wrote that during infection the blood becomes profoundly altered in its properties according to the intensity of the disease. He observed that colorless globules (white blood cells) have a tendency to extravasate into membranous tissues, accompanied by fluid accumulation (effusion). He named cupped blood as “buffy coat.” Gross was aware of revascularization by formation of new vessels at sites of infection, trauma, and tumors. He recognized the formation...
of granulation tissue and keloid. Benign tumors were defined by Gross as an enlargement of a part, structure, or organ produced by abnormal deposit (hyperplasia) of new formations (cells) or by mere enlargement (hypertrophy) of preexisting components (cells). He characterized malignant tumors as those capable of destroying not only the tissues and organs in which they arise, but also the life of the patient. He commented that certain malignant tumors involve nearby lymphatic nodules, either by direct extension or by sympathetic irritation (lymphatic drainage).

Many of Gross’s pathological observations [3] were original and were published just one year after Schwann (1810–1882) announced in Berlin that the human body was composed of cells [5]; and soon after Müller (1801–1858) first described and illustrated the microscopic appearance of cancer cells [6]. The most eminent pathologists in Europe (ie, Rokitansky (1804–1878), Lebert (1813–1878), and Virchow (1821–1902)) followed Gross, instead of preceding him, with publication of their major treatises in 1842, 1857, and 1858, respectively.

In 1840 Gross accepted the chairmanship of surgery at the University of Louisville, Kentucky. His publications during his years in Louisville attest to his continued interest in pathology. He wrote the first treatise on experimental surgery in the United States [7] and the first book in English on urologic pathology and surgery [8]. Returning to an earlier interest in forensic pathology [2], he published a monograph on aspiration pneumonia and death by asphyxiation [9].

In 1856, Gross returned to Philadelphia as professor of surgery at Jefferson Medical College, his alma mater. The following 26 years in Philadelphia were his most productive years in surgery. In 1859 he published his monumental treatise on surgery, pathology, and therapeutics [10]. He stated that he incorporated in these two volumes his entire experience in pathology and surgery and all pertinent thoughts that were advanced by others. The discussions contain astute comments regarding gross pathologic features, operative appearances, and microscopic findings. In the more than 2000 pages, there were approximately 1900 woodcut illustrations, including hundreds of microscopic drawings. Gross’s System of Surgery [10] is remembered as the foremost surgical treatise published in the 19th century. It was also the first textbook of surgical pathology.

From the many firsts in Gross’s System of Surgery [10], it is noteworthy to single out his description of malignant tumors. He wrote that “malignant tumors are always formed out of new material (cells) which is either entirely distinct from the natural structures (cells), or which bears merely a very faint resemblance to them in its physical, chemical and microscopic composition.” He also listed in a table the differences between two groups of malignant tumors, carcinomas and sarcomas. He accomplished this at a time when others, including Rudolph Virchow, were uncertain about the origin and composition of malignant tumors, and when most sarcomas were regarded as benign tumors.

Gross’s busy schedule did not keep him from assisting in the care of soldiers during the Civil War. To advance proper care on the battlefield, he wrote a manual for military field surgeons [11].

When Gross grew older he wrote historical notes and biographies. His monograph on the history of American medical literature [12], his paper on 100 years of American Surgery [13], and the book he co-authored on the same topic [14] are his most valued contributions to medical history.

Summing it up, Samuel D. Gross is well-recognized as a dominant figure in the development of American surgery [15]. It is less well known even in pathology circles that Gross was an accomplished pathologist and remained so throughout his life. His dictum was that a surgeon cannot be successful without knowing pathology. Undoubtedly, because of his multifaceted contributions to pathology, he surpassed some of the internationally renowned pathologists of his time. Above all, Gross should be remembered as the first surgical pathologist in the history of medicine.

References
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