Sir Charles Bell
Life and the Art of Science

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Sir Charles Bell (Fig. 1), a Scottish-born surgeon, had many passions in life, including artistry and neuroscience. These passions culminated in An Essay on the Anatomy of Expression in Painting, which was read by Queen Victoria, and The Anatomy of the Brain, which he read before the Royal Society.

Until his death, Bell compiled numerous accolades including professorships and knighthood. Among his most lasting achievements are his discoveries regarding the nervous system including spinal nerve root arrangements, Bell’s phenomenon, Bell’s nerve, Bell's spasm, and the Bell-Magendie/Bell's Law.
Methods

Details on Bell's scientific and artistic ventures were extensively reviewed. Bell's "The Nervous System of the Human Body" and Gordon-Taylor's biography on Charles Bell were the primary sources, in addition to a number of historical pieces focusing on physicians of the nineteenth century.
Sir Charles Bell followed his elder brother John’s footsteps by pursuing a career in medicine. Charles received his medical degree in 1799.

In 1813, Bell was hired by the Middlesex Hospital and studied gunshot wounds after the battle of Corunna, a battle during the Napoleonic Wars.

In 1815, Bell headed to Brussels without a passport as soon as he knew of the battle of Waterloo to operate from morning to night while also continuing his passions of painting and sketching. His investment in the fields of medicine and art culminated in receiving the Medal of the Royal Society and being knighted into the Guelphic Order in 1833.
Bell’s appreciation and tact for art began in High School. Although Bell was known to be unhappy while attending Edinburgh High School, he did find solace in his friend David Allan, the “Hogarth of Scotland,” who encouraged Charles’ draughtsmanship.

Charles contributed to the first two volumes of his brother John Bell’s *Anatomy and Physiology of the Human Body* (Fig. 2).

While in London, Charles covered his expenses through anatomical and art lectures. Bell published *An Essay on the Anatomy of Expression in Painting* in 1806 (Fig. 3), which was even read by Queen Victoria.

Images courtesy of the U.S. National Library of Medicine’s Digital Collections.
Bell placed an emphasis on the nervous system in *The Anatomy of the Brain* (1802) (Fig. 4) and *The Nervous System Of The Human Body* (1830), among others.

Bell posited: spinal nerves came in pairs with a motor ventral and a sensory posterior root, differing from the current doctrine.

The Bell-Magendie Law differentiated anterior spinal nerves designated for motor functions from those posterior, which were reserved for sensation.

Bell's phenomenon was noted by Bell as “a very remarkable [unconscious] turning up of the cornea in an attempt to close the eyelids (...) the patient is not at all aware”.

FIG. 4. Partly exposed brain with flesh and skull cap removed from Sir Charles Bell’s *Anatomy of the Brain*, Plate 1.

Image courtesy of the U.S. National Library of Medicine’s Digital Collections
Exploring the Central Nervous System

Bell also described the nerve of Bell as the external respiratory or long thoracic nerve supplying the serratus anterior muscle, illustrated in Plate IX The Nervous System Of The Human Body (Fig. 5). He described it as “the external respiratory nerve of the chest. It is like the last nerve of its origin, but it deviates in its course, passes on the outside of the chest to supply the powerful respiratory muscle, the serratus magnus”.

Bell also wrote of Bell's spasm: Involuntary twitching of the facial muscles.

“His face is singularly contracted. There is a violent action of all the muscles on the right side of the face; the eye forcibly shut; the forehead contracted; the mouth drawn [up]”.

FIG 5. (left). Plate IX Figure 1 (left) and Figure 2 (right) in The Nervous System Of The Human Body.

Image courtesy of the U.S. National Library of Medicine’s Digital Collections
Discussion

Sir Charles Bell passed at the age of 67. However, few can say they’ve accomplished as much as he has. He will be remembered as a titan in the fields of anatomy, surgery, and research who never hesitated to question popular beliefs to elucidate the true functions and divisions of the nervous system. His appreciation for anatomy and the brain led to him discovering Bell’s phenomenon, Bell’s Spasm, Bell’s Nerve, and the Bell-Magendie Law, among other findings. Moreover, this appreciation also carried into the field of art as he produced stunning plates detailing the intricate design of the central nervous system and other divisions of the human body. The fields of medicine and neuroscience were forever changed once Sir Charles devoted his career to medicine and scientific inquiry.
Summary Points

Sir Charles Bell debunked popular beliefs of the nervous system by the combination of the scientific method and the beauty of his paintings.

His full understanding of the anatomy of the brain resulted in a new appreciation of the relationship between structure and function.