John Hunter (1728–1793) [1]

By: Wagoner, Nevada

John Hunter [2] studied human reproductive anatomy, and in eighteenth century England, performed one of the earliest described cases of artificial insemination [3]. Hunter dissected thousands of animals and human cadavers to study the structures and functions of organ systems. Much of his anatomical studies focused on the circulatory, digestive, and reproductive systems. He helped to describe the exchange of blood between pregnant women and their fetuses. Hunter also housed various natural collections, as well as thousands of preserved specimens from greater than thirty years of anatomy work. Hunter's work developed practices in reproductive and reparative surgery and furthered the study of human anatomy and physiology.

Hunter was born the youngest of ten children on 14 February 1728 outside of Glasgow, Scotland, to Agnes Hunter and John Hunter [2]. Hunter attended primary school before quitting at age thirteen. He then worked alongside his father on the family farm. Hunter later described himself as inquisitive about nature from a young age, and he recalled much time spent exploring outdoors and observing natural phenomena. With his father's encouragement, Hunter contacted his brother, William Hunter, to inquire about work in England. The elder brother's position at an anatomy school presented Hunter an opportunity to work and to pursue an education in science. Hunter was many years younger than his brother and the two were not well acquainted, but at the age of twenty, Hunter moved to London, England, to join his brother.

In 1748, Hunter began work at Convent Garden, an anatomy school in London, where his brother taught. Lacking any formal anatomical training or schooling, Hunter was tasked with procuring human corpses for dissection and anatomical studies. Since the sixteenth century, the bodies of persons hung for murder had been made available for medical dissection. However, during Hunter's time at the anatomy school, the number of available human bodies collected from executions fell below the number of dissections in schools. That discrepancy has led some historians of science to investigate how corpses were obtained. One well-documented phenomenon was bodysnatching from fresh graves and subsequent sales of those bodies to anatomy schools. Regardless of the speculated origin of the corpses at Convent Garden, the anatomy school had a steady supply of corpses for students and instructors, largely due to Hunter. Hunter eventually became involved in dissections of the bodies he procured, and under his brother's instruction, he transitioned from pupil to teacher. He taught anatomy for students, and he was present for or involved in greater than 2,000 dissections of human corpses.

Between 1748 and 1760, Hunter studied anatomy at Convent Garden both independent of and alongside his brother. In 1750, Hunter and his brother completed an experiment to better explain how fetuses received their blood. Before dissecting the uterus [4] of a pregnant cadaver, Hunter injected different colored waxes into the arteries and veins of the uterus [4]. Based on the results, Hunter and his brother inferred that maternal blood entered the vessels of the placenta [5], but did not flow directly to the fetus [6]. They speculated that the fetus [6] received blood from a different system of vessels in the placenta [5], and they suggested a separation between maternal and fetal blood during pregnancy [7]. The elder Hunter brother, being more established within the scientific community, presented the results of their work.

Over the course of several years, the brothers hired artists to produce drawings of their dissections of pregnant cadavers. Years later, Hunter's brother published a collection of their commissioned drawings called *The Anatomy of the Human Gravid Uterus* (1774). While his elder brother often sanctioned the type of anatomical studies being completed, Hunter and students completed the majority of the dissections. The work completed during that time led to a series of disagreements between the brothers, as Hunter claimed that his older brother received a disproportionate amount of credit within the scientific community for their joint work. The brothers' relationship remained strained for the rest of their lives.

Hunter focused much of his individual work on analyzing some of the structural properties of human tissues, organs, and vascular systems. Hunter injected fluids and other substances of varying viscosity into vascular systems to detail the network of the circulatory system and other bodily pathways. Through these techniques, he and his students observed and studied the ways in which body fluids, particularly blood, move through the body. One of the techniques expanded the capillaries and other small vessels using wax, and allowed Hunter to observe those vessels not otherwise visible to the naked eye. Some of Hunter's other work included observing embryos during various stages of development, tracing the path of nerves leaving the human brain, and recording how tissue in the intestine absorbs substances. While exploring techniques to better observe those physiological systems, Hunter also developed methods to preserve anatomical specimens and tissue samples from much of the work he completed through the course of his life.

During his twelve years at Convent Garden, Hunter intermittently pursued a formal education in anatomy and medicine. He studied at the University of Oxford in Oxford, England, and at institutions across London including Royal Hospital Chelsea, St. Bartholomew Hospital, and St. George's Hospital. Hunter's formal medical training focused on surgery, and he treated his first living patient in 1752. His first position in medicine was as a junior surgeon at St. George's Hospital. As a junior surgeon, Hunter prepared patients for operations and cared for them after operations. He also treated patients in the event of a senior surgeon's

absence, conducting surgeries and treating wounds.

In 1760, Hunter enlisted in the British army as a surgeon and deployed to the French island of Belle-Ile during the Seven Years' War. Hunter spent several years treating casualties on the front-lines and performing emergency surgeries in war conditions. Hunter argued against the common practice of immediately removing musket balls from wounded soldiers, and he used his knowledge of the circulatory system to developed methods to significantly limit blood loss and inflammation. Thirty years later, Hunter wrote *A Treatise on the Blood, Inflammation, and Gun-Shot Wounds* (1794), on his experience treating wounds during the war.

After his return from military duty to London in 1763, Hunter tried to find work as a surgeon. However, despite years of experience in the army, he lacked scientific recognition among surgeons. Hunter instead pursued dentistry, and much of his work involved surgical removal of rotten teeth and treatment of inflammation arising from gum disease. His decision to pursue dentistry proved lucrative, both financially and professionally, and he lived comfortably in London as an accomplished dentist. Years later, Hunter published anatomical works about human teeth, including *The Natural History of Human Teeth* (1778).

In 1771, Hunter married Anne Home in London, England. The couple had four children between 1772 and 1776, of which only two survived to adulthood. Hunter continued work as a dentist, but he pursued independent anatomical studies to earn a position in surgery. In 1778, he secured a surgery position at St. George's Hospital in London. While at St. George's Hospital, Hunter also instructed pupils on anatomy, experimental methods, and surgical techniques, including Edward Jenner, who later helped develop a smallpox inoculation.

Hunter often performed novel experiments on animals prior to attempting them on human patients. He advocated for the use of hospitals as medical training facilities and research centers and stressed surgery as a scientific pursuit. In 1772, he began teaching anatomy and lecturing out of his home in London. His lectures often reviewed the principles of surgery that Hunter had developed through years of experimental and professional work.

Over the next twenty years, Hunter continued to lecture and conduct experiments related to human and animal physiology and anatomy. He completed much of his work at home, where he kept well-equipped anatomy rooms and dissection tables for experiments and lectures. He also maintained a large selection of natural collections and specimens from his work. In addition to surgical specimens and teaching collections, he housed numerous natural history specimens such as preserved animals and fossils.

Hunter helped establish a variety of procedures in the surgical community that became commonplace. In 1785, Hunter surgically rerouted blood flow when a life-threatening aneurism, or bulging artery, formed behind a patient's knee. Hunter completed the procedure four more times and provided a framework for the technique for other surgeons. Some of his other work included successful removal of cancerous tumors including full breast removal (mastectomy), surgical techniques for birth complications, amputations, bone grafts, and treatment of injuries such as lacerations and broken bones.

In 1790, Hunter completed artificial insemination [3] in a woman, after previously completing the procedure in moths. Hunter used a syringe to implant semen [8], collected from the woman's husband, in the patient's vaginal canal, and she conceived soon after.

Hunter's work is detailed in *Observations on Certain Parts of the Animal Oeconomy* (1792) and a posthumously published book *Essays and Observations on Natural History, Anatomy, Physiology, Psychology and Geology* (1861). Hunter was elected fellow of the Royal Society in 1767, appointed deputy surgeon general of the English army in 1786, and elected to the Company of Surgeons in 1789. Hunter died in 1793 at St. George's Hospital in London. In the early decades of the twenty-first century, his collections of thousands of wet and dry preserved specimens were available for viewing in the British Royal Museum in London.

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Subject

Hunter, John, 1728-1793 [18] Human reproductive system [19] Artificial insemination [20] cadavers [21] Body snatching [22] Pregnancy [23] Anatomy [24] Human physiology [25] Dissection [26] Uterus, Pregnant [27] vessels [28] Royal Hospital (Chelsea, London, England) [29] Saint Bartholomew's Hospital Site (Bristol, England) [30] University of Oxford (Oxford, England) [31] Anatomy [32]

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