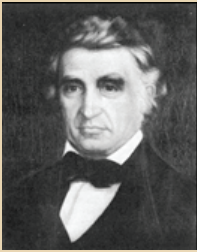
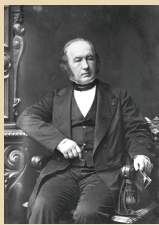


Milestones in Physiology (1822-2013)



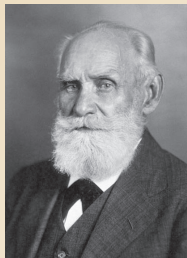
1822 William Beaumont is the first American to employ the practical application of physiology when a patient's gunshot wound healed with a window-like opening. This allows Beaumont, an Army physician, to look directly into the stomach and study gastric function. Read more at: <http://bit.ly/16UCSme>



1865 Claude Bernard publishes his landmark text, "An Introduction to the Study of Experimental Medicine." His book provides the first clear explanation of the theory and practice surrounding physiological and medical experiments.



1876 A Bausch and Lomb Optical Company microscope, in use by Warren P. Lombard, later APS President 1919-1920, to aid in his research.

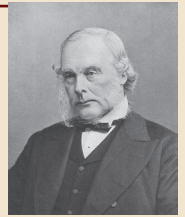


1891 Ivan Pavlov begins extensive research on "conditional reflexes" involving dogs' saliva production as it relates to certain sounds and visual stimuli. He is awarded the 1904 Nobel Prize for his discoveries on the neural regulation of salivary, gastric, and pancreatic secretion.

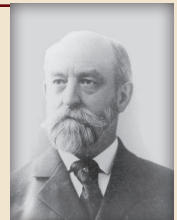


1898 William Townsend Porter, Harvard Medical School, starts the *American Journal of Physiology*. Read how things changed over the next 100 years at: <http://bit.ly/155AqcZ>

1898 Robert Tigerstedt and Per Bergman discovered renin, the active substance in kidney extracts that produced hypertension, demonstrating for the first time that the kidney is an endocrine organ. Read more about the endocrine system at: <http://bit.ly/140YfHQ>



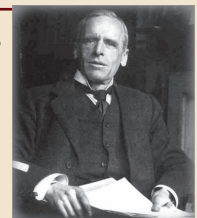
1858 Joseph Lister studies the cause of blood coagulation and inflammation that result after injuries and surgical wounds. He later discovers antiseptics and, through their use, cuts the rate of death from surgery from 50 to 15 percent.



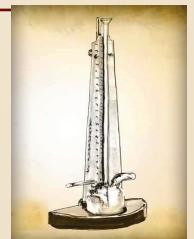
1870s Harvard University initiates a medical physiology program. Henry Bowditch serves as the first physiologist and first full-time program faculty member.



1887 Twenty-eight charter members, representing the handful of the nation's physiology labs, form the American Physiological Society (APS) in New York City.



1896 Ernest Henry Starling develops a hypothesis in physiology known as Starling's hypothesis of fluid exchange.



1896 Scipione Riva Rocci invents the sphygmomanometer, an inflatable cuff for placement around the arm. The following year, Harvey Cushing introduces the device into American medical practice as a way to measure blood pressure noninvasively.

1901 The Nobel Prize in Physiology or Medicine is awarded to Emil von Behring "for his work on serum therapy, especially its application against diphtheria, by which he has opened a new road in the domain of medical science and thereby placed in the hands of the physician a victorious weapon against illness and deaths."

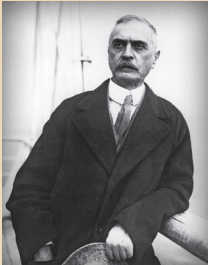


Milestones in Physiology (1822-2013)



Early 1900s Beam balance in use to weigh small amounts of chemicals to as little as 0.1 mg.

1904 Alexis Carrel performs the first mammalian heart transplant. He wins the 1912 Nobel Prize for developing techniques to suture blood vessels, transfuse blood, and transplant organs.



1909 Karl Landsteiner classifies the basic human blood groups: A, B, AB, and O. He wins the Nobel Prize in 1930 for these discoveries. Ten years later, he discovered the Rh (+ or -) factor in blood, completing the current blood typing system used today.



1913 Florence Rena Sabin studies the functional development of the lymphatics.



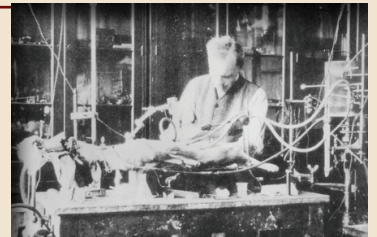
1916 Anton Carlson studies the stomach and the relationship between hunger and digestion. In one of his experiments, Carlson goes on a 15-day fast, using an inflated balloon in his stomach to measure the stomach contractions.

1922 Frederick Banting and Charles Best isolate insulin, the central hormone involved in diabetes, in dogs. Their innovative use of insulin rapidly converts sufferer prognosis from a certain death sentence to a disease that can be managed while living a normal and active life. Banting is awarded the 1923 Nobel Prize for these developments.

1902 Ida Henrietta Hyde becomes the first woman elected to membership in the American Physiological Society, and the first female to have an article published in its journal.

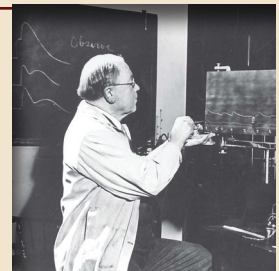


1905 Ernest Henry Starling develops the concept of chemical regulation of body function through "hormones."

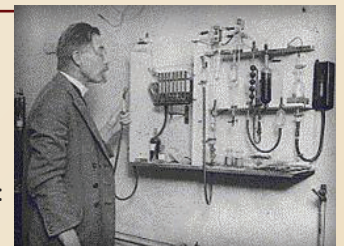


1911 J.S. Haldane leads a group of respiratory physiologists on an expedition to Pike's Peak to study the effects of altitude on human breathing.

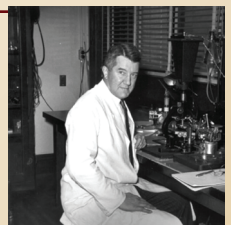
1914 Walter B. Cannon's investigations into the emergency functions of the adrenal gland results in his promotion of a "fight or flight" response that was used to explain the role of the sympathetic nervous system in emergency responses.



1920 The Nobel Prize in Physiology or Medicine is awarded to August Krogh "for his discovery of the capillary motor regulating mechanism." Read about the 2013 lecture at: <http://bit.ly/Zlu4k6>



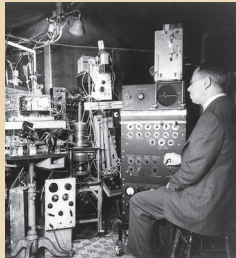
1926 Eugene Landis publishes the first calculations of direct measurements of blood pressure within arteries, capillaries, and veins. Read more about the cardiovascular system at: <http://bit.ly/18EjGfg>



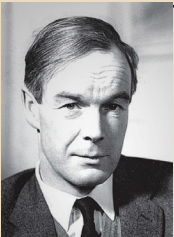
Milestones in Physiology (1822-2013)



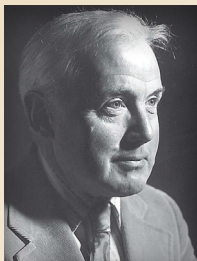
1927 The Harvard Fatigue Laboratory is formed to study exercise and environmental physiology. Laboratory Director, David Dill, conducts extensive research in extreme environmental conditions and often serves as a test subject in his own experiments. Read more at: <http://bit.ly/zGRDLg>



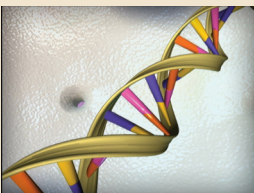
1944 The Nobel Prize in Physiology or Medicine is awarded jointly to Joseph Erlanger (*left*) and Herbert Spencer Gasser “for their discoveries relating to the highly differentiated functions of single nerve fibres.”



1952 Alan Hodgkin (*left*) and Andrew Huxley discover the ionic mechanism by which nerve impulses are transmitted. Read about the nervous system at: <http://bit.ly/180b7iJ>



1954 Two scientific teams, led by Hugh Huxley (*left*) and Andrew Huxley (no relation), discover the sliding filaments in skeletal muscle. Read more about the skeletal system at: <http://bit.ly/16YT9uP>



1962 James Watson and Francis Crick win the Nobel Prize for their description of the double-helix structure of DNA.



1969 Robert Berne and Rafael Rubio (*left*) demonstrate that adenosine is released from heart muscle and mediates changes in blood flow.

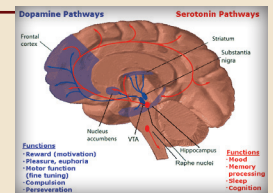
1930s Walter Dandy identifies the cause of water on the brain (hydrocephalus), an often deadly condition affecting infants. A neurosurgeon by trade and a great baseball fan, Dandy goes on to invent the baseball helmet.



1951 Rita Levi-Montalcini (*right*) and Viktor Hamburger begin studies of the origin of the nerve growth factor (NGF).



1953 J.H. Welsh discovers the neurotransmitter, serotonin, which is found to take part in many functions of the brain. Reduced levels of serotonin in the brain have been linked since to conditions such as depression and obsessive compulsive disorder. Read more about the brain at: <http://bit.ly/18EkReP>

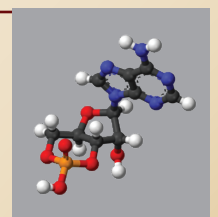


1959 In the early years of the “space race” (1957-1975) two men seek to test a scientifically simple, yet culturally complicated theory: that women might be innately better suited for space travel than men. Read more at: <http://bit.ly/1bJPgxp>



Female Astronaut Candidate
Jerrie Cobb; Image Credit: NASA

1971 Earl Sutherland is awarded a Nobel Prize for identifying cyclic adenosine monophosphate (cyclic AMP), a chemical messenger that mobilizes blood sugar in response to epinephrine. This is the first discovery of a signaling system inside the cell.

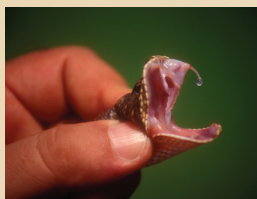


Milestones in Physiology (1822-2013)



1982 Robert J. Mason and colleagues and Edward Crandall and Barbara Goodman (*left*) demonstrate that the alveolar epithelial cells are responsible for keeping the alveolus free of fluid to facilitate gas exchange.

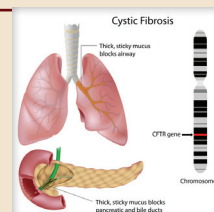
1983 The Nobel Prize in Physiology or Medicine is awarded to Barbara McClintock “for her discovery of mobile genetic elements.”



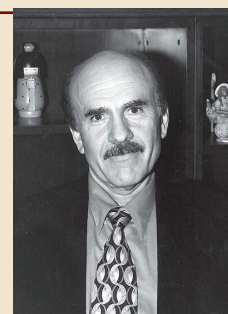
1980s ACE inhibitors are approved by the FDA. In the late 1960s, physiologists notice that snakebite victims experienced fainting spells because of a dramatic and sudden drop in blood pressure.

Scientists later isolate the substance in the venom that blocked the blood pressure-controlling angiotensin converting enzyme (ACE). ACE inhibitors are now the most widely used drug for the treatment of high blood pressure and congestive heart failure.

1989 Lap Chee Tsui, Francis Collins, and Jack Riordan identify the cystic fibrosis gene. Read more about cystic fibrosis at: <http://bit.ly/16IGJEe>



1998 Robert Furchgott, Ferid Murad, and Louis Ignarro (*right*) receive the Nobel Prize for their discovery of the role of nitric oxide as a signaling molecule in various body systems. Their experiments find that this volatile chemical, sometimes introduced into the system by ingesting nitroglycerin, is vital to controlling blood pressure and blood vessels dilation and contraction.



2000 The human genome is deciphered.

2009 Nobel Prize in Physiology or Medicine, is given to Elizabeth Blackburn, Carol Greider and Jack Szostak for their discovery of how chromosomes are protected by telomeres and the enzyme telomerase.

2001 The Nobel Prize in Physiology or Medicine was awarded to Leland H. Hartwell, Tim Hunt and Sir Paul M. Nurse “for their discoveries of key regulators of the cell cycle.”

2012 Nobel Prize in Physiology or Medicine is awarded to Sir John Gurdon and Shinya Yamanaka “for the discovery that mature cells can be reprogrammed to become pluripotent.”

Summary of APS history

The first regular meeting of the APS at which papers and demonstrations were presented was held in Washington, DC, in September 1888 in conjunction with the newly formed Congress of American Physicians and Surgeons.

The first 25 years of the APS's existence were dedicated to the organized effort to advance teaching and research via mutual cooperation. These efforts resulted in a comprehensive textbook of physiology, authored by 10 members of the APS, as well as the first publication of the *American Journal of Physiology* in 1898.

Over the next 25 years, physiology became an established profession. Full-time physiologists were at last considered important members of the faculty of medical schools and biology departments, and both teaching and research became standard and traditional occupations for physiologists.

Throughout the mid-1900s, there was remarkable expansion within the field of physiology, and especially in research. Research topics expanded along with new types of affordable equipment and research results were expected of every teacher and graduate student.

Since the 1960s, there has been increasingly deep specialization in research and teaching. For example, instead of being recognized as a physiologist, an individual was recognized as a neurophysiologist or vascular physiologist.