



Session 5



Famous Women in Medicine and Science

Louise Bourgeois Boursier
Marie Sklodowska Curie
Françoise Barré-Sinoussi
Jane Cooke Wright
Jennifer Anne Doudna
Gertrude Belle Elion
Rosalind Elsie Franklin
Florence Nightingale



LOUISE BOURGEOIS BOURSIER (1563-1636)



Louise Bourgeois Boursier ⁽¹⁾

- During the War of Religions, fled her home to go inside Paris walls and escape from the army of Henry of Navarre.
- Her barber-surgeon husband was at war, so she started learning midwifery.
- Began practicing in the Latin Quarter of Paris, delivering babies of rich and poor.



Louise Bourgeois Boursier (2)

- Took the government exam for midwives and passed it, gaining an official license to practice “as a sworn midwife” in 1598.
- Soon, began to be the midwife of poor and well-to-do women, and became midwife to the queen, living like a maidservant.
- Her pay was much higher:
 - 10 times a maid’s annual salary for delivering a prince.
 - 6 times a maid’s annual salary for delivering a princess.



Louise Bourgeois Boursier (1563-1636)

Midwife to the wife of King
Henry IV of France, Marie de
Medici, to whom she delivered
6 children:

1st child
became King
Louis XIII of
France

2nd child
became
Elizabeth
Queen of Spain

3rd child
became
Duke of
Anjou and
later Orleans

4th child
became
Duchess of
Savoy

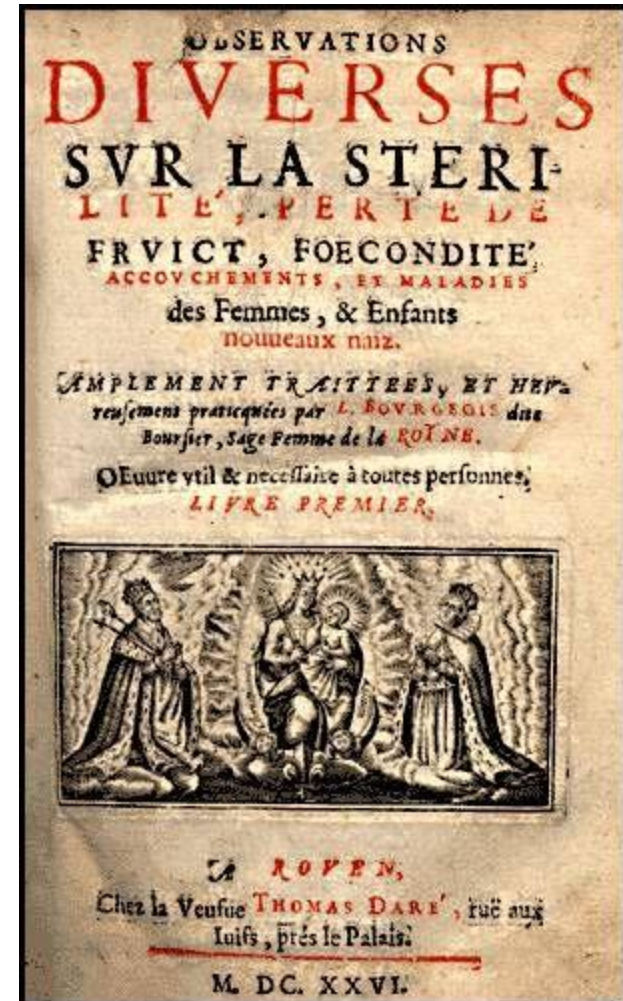
5th child
became
Queen of
England, of
Scots and
of Ireland

6th child,
breach died in
infancy



Louise Bourgeois Boursier (4)

- In 1609, wrote *Diverse Observations on Sterility, Loss of the Ovum, Fertility, Childbirth, Women's Ailments and Newborns*.
- Published expanded editions with additional material in 1617, 1626, 1634, 1642 and 1652.
- Was translated into other European languages and became the essential reference for midwives for the next 50 years.





Louise Bourgeois Boursier (5)

- Was the 1st woman to write a midwifery book in the vernacular, not in Latin.
- She had 2 sources for her book:
 - Her understanding of the humoral basis of medicine as practiced by the leading physicians.
 - Her own practical experience on maternal bleeds, delivering twins, rotating babies in uterus, and delivery of baby from a dying mother.
- She had delivered over 2,500 babies by the time she retired; died at 73 in 1636.



MARIE SKŁODOWSKA CURIE

(1867-1934)



Marie Sklodowska Curie (1)

- Born in 1867 in Russian-occupied Poland; children were forced to learn Russian language and culture.
- When Marie was 4, mother contracted TB and spent lots of time & money in health resorts.
- She traveled with Marie's older brother Zosia, but he died of typhus in 1874.
- In 1875, mother died of tuberculosis.



Marie Sklodowska Curie (2)

- In 1891, at age 24, she went to Paris and enrolled at the Sorbonne.
- In 1894, she met Pierre Curie, and they were married in 1895.
- They started to work together on uranium rays and exploring radioactivity of substances.





Marie Sklodowska Curie ⁽³⁾

- Found radioactive fractions in pitchblende:
 - Polonium, which co-precipitated with bismuth.
 - Radium, which accompanied barium.
- Submitted her work to the French Academy which awarded her a prize of 3,800 francs.
- But they did not inform her, they sent a letter to her husband.



Marie Sklodowska Curie (4)

- Marie worked on purifying the new element (radium) and verifying its atomic weight and place in the periodic table.
- Scavenged for residues of radium wherever she could get them.
- In her diary, she wrote that they enjoyed going to the workroom at night and seeing the faint glow of the bottles containing their ores, looking like “faint fairy lights”.



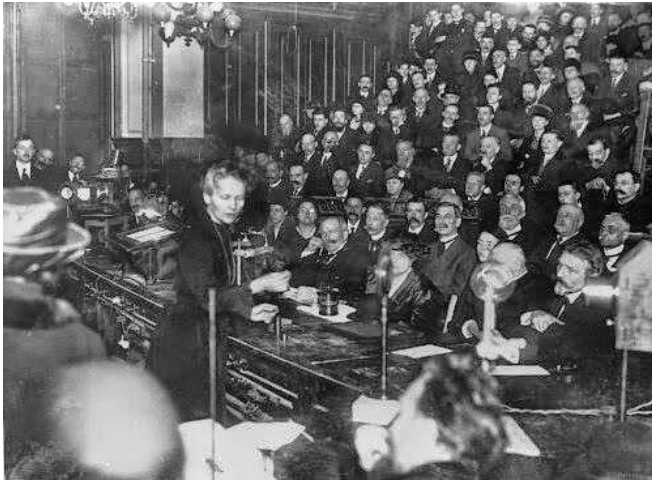
Marie Sklodowska Curie (5)

- In 1902, she was able to obtain 1/10 gram of pure radium from 1 ton of pitchblende
- In 1903, she obtained her doctorate in Physics with a thesis based on her work with radium.
- That year they were notified that they would get the Nobel along with Henri Becquerel.
- They were often ill and could not go to Stockholm until 1905.





Marie Sklodowska Curie (6)



- In 1906, Pierre was run over by a horse-drawn carriage, and killed instantly.
- The Sorbonne asked her to take over Pierre's physics course. (1st woman professor!)
- She accepted if her female students could attend.
- In 1908 she had a short affair with a married physicist.





Marie Sklodowska Curie (7)

- In 1911, she was proposed for the French Academy of Sciences, but the press leaked her affair and her candidacy was defeated.
- 2 days later, she was notified of her 2nd Nobel prize, this one in Chemistry.
- Despite attacks on her morality, she defended herself by stating that there was no connection between her personal life and her work.
- She went to Sweden and got her Nobel from King Gustaf.



Marie Sklodowska Curie (8)

- She had frequent episodes of pyelonephritis and traveled to health resorts, like her mother.
- During WWI, she designed mobile X-ray vans to perform radiologic examinations in the battlefields.
- She trained operators and nurses in the use of X-rays.
- During the 1920's, evidence mounted of the harms of radiation exposure.



Marie Sklodowska Curie ⁽⁹⁾

- In 1934, she was seeking another rest cure in the French Alps but died there.
- She probably had leukemia or aplastic anemia.
- She was buried next to Pierre.
- Later, both were laid to rest in the Pantheon of French Heroes.



Marie Sklodowska Curie (10)



Google Doodle on November 7, 2011, commemorating the 144th anniversary of her birth.



FRANÇOISE BARRÉ-SINOUSSE (1947)



Françoise Barré-Sinoussi ⁽¹⁾

- French virologist, did some of the basic work to identify the human immunodeficiency virus (HIV) as the cause of AIDS.
- Director of the division of Retroviral Infections and Professor at the Pasteur Institute in Paris.
- With Luc Montagnier, was awarded the Nobel Prize in Physiology or Medicine in 2008.
- Mandatorily retired from active research on August, 2015 (age 68) and fully retired in 2017.



Françoise Barré-Sinoussi (2)



- Started at the Pasteur Institute in 1971, joining a group of researchers supervised by Jean-Claude Chermann, who became her mentor.
- Earned her PhD in virology in 1974 and then did a year of research at the NIH in Bethesda, MD.
- Returned to the Pasteur Institute in 1976 to work in Luc Montagnier's virology research unit.
- Married a technician at Radio France in 1978.



Françoise Barré-Sinoussi (3)

- “In 1974, at the end of my PhD, I met with the Ass. Director of the Pasteur Institute and asked him whether I could apply for a position there.”
- The guy looked at me and said: “You think that you are going to make a career as a researcher?”
- I said: “Yes, I really would love to do that at Pasteur since I earned my PhD at Pasteur.”
- He said: “No way! Women have never done anything in science. You better revise your career plan immediately!”



Françoise Barré-Sinoussi (3)

- “So I left I left and I did a postdoc in the US at the National Institutes of Health.
- My driving force was to demonstrate to men what women are capable to do in science.”
- “The 1st one was my father because although he encouraged me to study at university, he was really thinking that I better marry a guy and take care of the children than to be a scientist.”





Françoise Barré-Sinoussi (4)

- Several years later, after I had obtained the Nobel Prize, the Pasteur guy called me.
- “He said: “I would like to congratulate you not only for what you did with the discovery of the AIDS virus but also because you have a lot of courage!”

- “While we all can agree that equity is a good thing, women shouldn’t be selected just because they are women.”



JANE COOKE WRIGHT

(1919-2013)



Jane Cooke Wright ⁽¹⁾

- Also known as "Jane Jones" or "Mrs. Jane Jones".
- Born in NYC in 1919, she was the 1st of 2 daughters of Louis Tompkins Wright.
- Her father was 1 of the 1st African American graduates of Harvard Medical School.



Jane Cooke Wright ⁽²⁾

- Graduated with honors from New York Medical College in 1945.
- Interned at Bellevue Hospital 1945-1946, serving nine months as an assistant resident in internal medicine.
- During her residency at Harlem Hospital, she took a 6-month leave for the birth of her 1st child, then returned to complete her training as chief resident.



Jane Cooke Wright ⁽³⁾



- Dr. Louis Wright established the Cancer Research Center at Harlem Hospital.
- He worked in the lab and Dr. Jane Wright performed the patient trials.
- In 1949, they began testing a new chemical on human leukemias and lymphatic cancers.
- They developed the technique of using human tissue culture rather than laboratory mice to test the effects of potential drugs on cancer cells.



Jane Cooke Wright (5)

- Analyzed many anti-cancer agents, explored the correlation between patient and tissue culture response.
- Developed methotrexate and nitrogen mustard agents to fight cancer cells
- Pioneered combinatorial chemotherapeutics, focused on giving multiple drugs with sequence and dosage variations to increase effectiveness and minimize side effects.
- Developed a catheter system to deliver potent drugs to tumors located deep within the body such as the liver and spleen.



Jane Cooke Wright (4)

- In 1955, became Associate Professor of surgical research and director of cancer chemotherapy research at NYU Medical Center and its affiliated hospitals.
- In 1964, President Johnson appointed her to the President's Commission on Heart Disease, Cancer, and Stroke, and she helped create a national network of treatment centers for these diseases.
- In 1967, was named Professor of surgery, Head of the Cancer Chemotherapy Department, and Associate Dean at NY Medical College, her alma mater.



JENNIFER ANNE DOUDNA (1964)



Jennifer Anne Doudna ⁽¹⁾

- Helped develop CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) and its practical uses.
- Genetic engineering may lead to the eradication of SCD, CF, Huntington's disease and HIV.
- In 2020 she was jointly awarded the Nobel Prize for Chemistry with Emmanuelle Charpentier for their development of gene editing.



Jennifer Anne Doudna (2)

- Born in Washington, DC, grew up in Hilo, Hawaii, went to Pomona College, California to Complete a Bachelor's in Chemistry.
- Went to Harvard to do a PhD in Biochemistry under Jack Szostak who won the 2009 Nobel.
- Researched RNA, then went to Colorado to do a Post-doc fellowship with Thomas Cech who had just won the 1989 Nobel.



Jennifer Anne Doudna (3)



- CRISPR-Cas9 poses many ethical questions.
- Her concern is for it being used in human embryos before it has been proven to be safe.
- In 2015 she supported a temporary worldwide moratorium on using this technique before its consequences have been fully considered.



Jennifer Anne Doudna (4)

- He Jiankui at the Direct Genomics lab in Shenzhen, China, edited the genes of twin newborn girls, to make them genetically resistant to HIV.
- International condemnation ensued, including He's firing from his post.
- Several international meetings have tried to reach a consensus re 2 basic issues:
 - Modification of germ cells or embryos.
 - Modification of cells in a living individual.

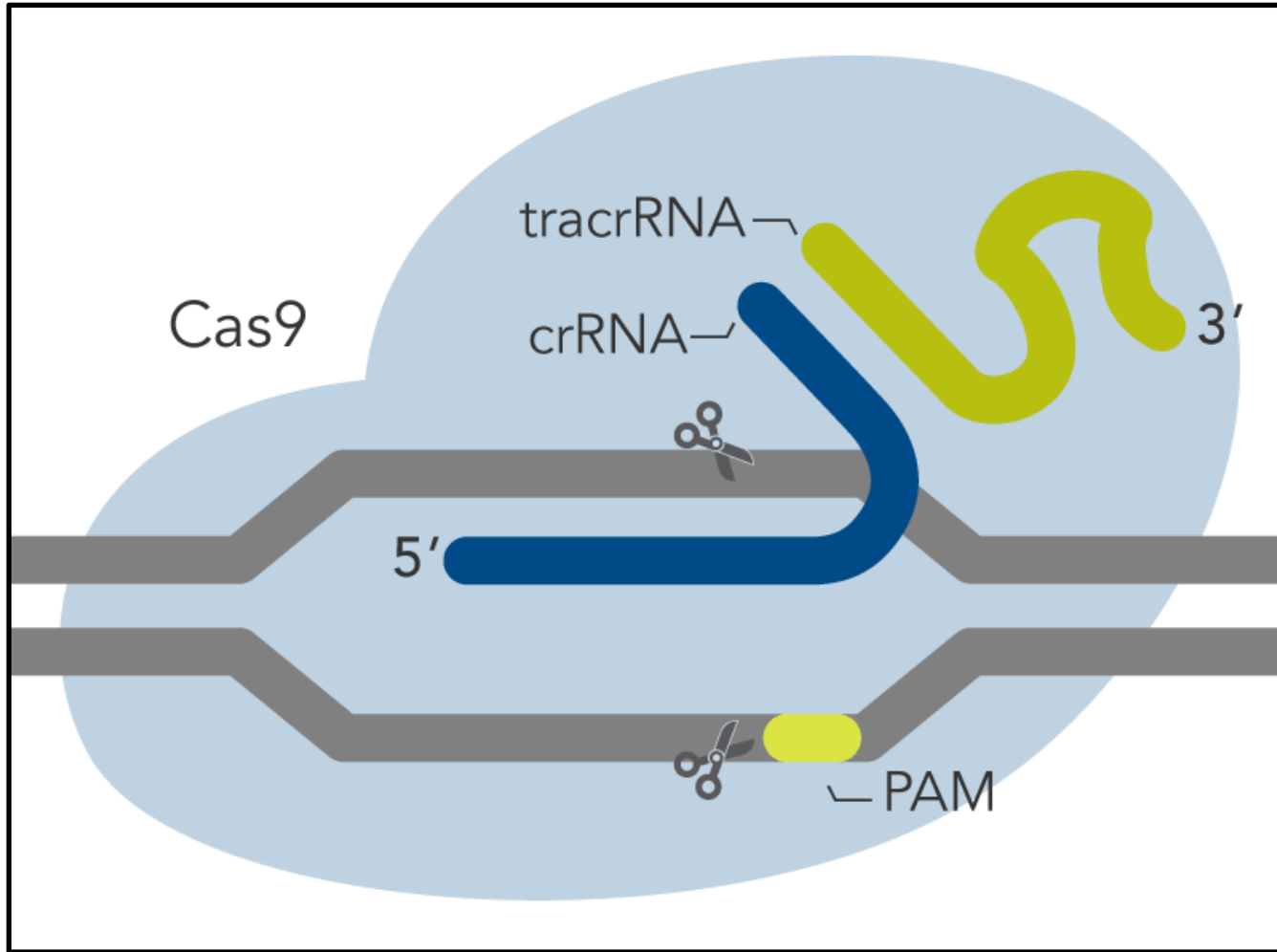


The CRISPR System (1)

- CRISPR is part of the bacterial immune system.
- RNA from invading viruses incorporates into the bacterial DNA between short repeating blocks of the bacteria's DNA sequences.
- The next time the virus invades the bacterial cell, the stored DNA is converted to RNA by the Cas9 enzyme.
- The newly coded RNA seeks out matching strands of viral DNA and cuts it, preventing the virus's replication and infection of the bacteria.



The CRISPR System (2)





GERTRUDE BELLE ELION

(1918-1999)



Gertrude Belle Elion ⁽¹⁾

- Born in NYC, as a teenager, saw her MGF die of cancer and decided to devote her life to fighting the disease.
- She studied chemistry at Hunter College and NYU, but, as a woman, had difficulty finding work as a chemist.
- During WWII a lack of male chemists allowed her to find work at Burroughs Wellcome's research laboratory (now GlaxoSmithKline), where she remained until her death.



Gertrude Belle Elion (2)

- She worked during the day, studied at night and did part-time work on her doctorate.
- She was told she had to choose: full-time job or a doctorate; she chose to continue with her work.
- Shared the 1988 Nobel Prize in Physiology or Medicine with George Hitchings & Sir James Black for “Important new principles of drug treatment”.
- Years later, she received 3 honorary doctorates from George Washington U., Brown U. and the U. of Michigan.



Black, Elion, Hitchings



Gertrude Belle Elion (3)

Helped create:

- *Azidothymidine* (AZT) or Zidovudine (ZDV) for AIDS.
- *Azathioprine* (Immunan) 1st immunosuppressive drug.
- *Acyclovir* (Zovirax) 1st antiviral drug, for herpes.
- *Pyrimethamine* (Datraprim) for malaria.
- *Allopurinol* (Zyloprim) for gout.
- *Trimethoprim* (Proloprim, Monoprim) for bacterial infections.



Gertrude Belle Elion (4)

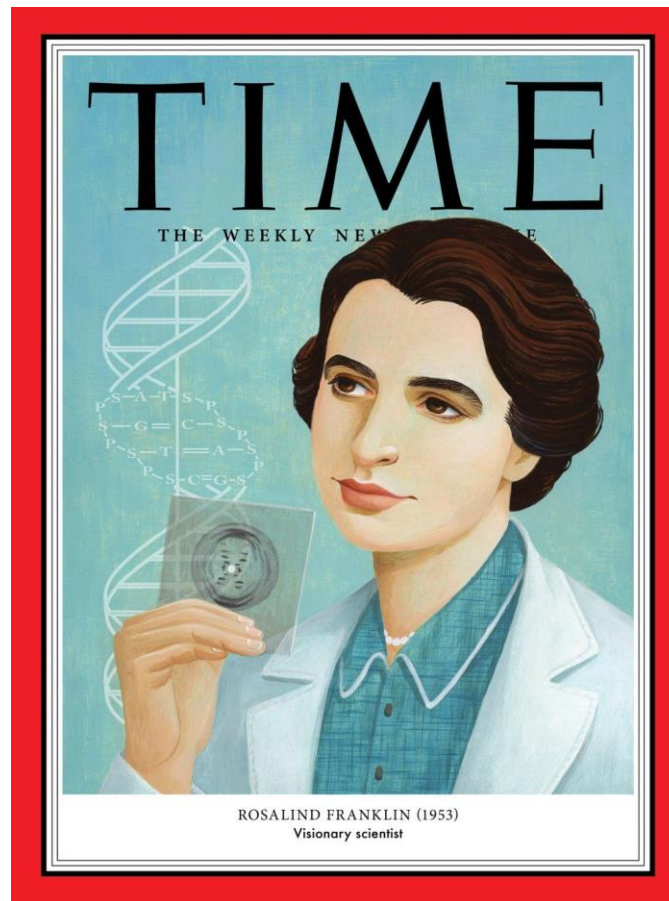
- She and George Hitchings changed the development of new pharmaceuticals.
- They created a system for producing drugs based on knowledge of biochemistry and diseases rather than relying on natural sources.
- One of their first drugs was *mercaptopurine* (Purinethol) for leukemia, which helped many children survive.
- They also created other drugs to fight malaria, infections, gout, lupus, and organ transplant rejections.



Gertrude Belle Elion (5)



- 1st woman to be inducted into the National Inventors Hall of Fame in 1991.
- Inducted into the National Women's Hall of Fame in 1991.
- Elected to the Engineering and Science Hall of Fame in 1992.
- Elected a Foreign Member of the Royal Society (ForMemRS) in 1995.



ROSALIND ELSIE FRANKLIN

(1920-1958)



Rosalind Elsie Franklin (1)

- Born in London in a rich British Jewish family.
- Went to school in Hammersmith where physics and chemistry were taught.
- Went to Cambridge and studied Chemistry.
- Worked under Ronald G. Norrish, who later won the Nobel Prize in Chemistry.



Rosalind Elsie Franklin (2)

- Learned X-ray crystallography in Paris.
- Went to work at King's College in London.
- Devised techniques to produce better images and purportedly wrote about DNA having a double helical structure.
- Took the famous photo 51.



Rosalind Elsie Franklin (3)



- In 1950 New Zealand physicist Maurice Wilkins made pictures of ram DNA and thought structure was a double helix.
- Chemist Rosalind Franklin came in 1951 as a researcher in crystallography.
- Wilkins thought she was hired as his assistant!
- She continued to work and took a picture called ***Photo 51***.



Rosalind Elsie Franklin ⁽⁴⁾

- Watson and Crick in Cambridge were working on the structure of DNA.
- Franklin told them that their 1952 model was inside-out!
- In early 1953, Maurice Wilkins showed Watson & Crick a copy of **photo 51** without Franklin's permission.
- In March 1953 Crick & Watson produced the now-famous model for the DNA double-helix.
- All 4 agreed that W & C would take credit for the model, with Wilkins and Franklin credited with the background research.



Rosalind Elsie Franklin ⁽⁵⁾

- In 1962, F. Crick, J. Watson and M. Wilkins were awarded the Nobel Prize for their first accurate description of the DNA double-helix.
- Rosalind Franklin had died of cancer in 1958.
- The Nobel is not awarded to more than 3 researchers, and is never given posthumously !



Rosalind Elsie Franklin (6)

- Rosalind Franklin University of Medicine and Science (RFU) is a private graduate school in North Chicago, Illinois with more than 2,000 students in five schools.
- The School of Graduate and Postdoctoral Studies (SGPS) offers interdisciplinary graduate programs in biomedical sciences as well as combined degree programs leading to MD/PhD and DPM/PhD degrees.





Rosalind Elsie Franklin (7)



- Google doodle on 93rd birthday 25 July, 2013



FLORENCE NIGHTINGALE

(1820-1910)





Florence Nightingale (1)

- Born in Florence, Italy from a wealthy British family, and was named after her birth city.
- Showed an interest in science and in collecting and analyzing data graphically.
- **Wanted to enter nursing, which was opposed by parents and by her restrictive social status.**
- Early on, yearned to devote her life to the service of others.



Florence Nightingale (2)

- After a 9-year courtship with politician and poet Richard M. Milnes she rejected him, convinced that marriage would interfere with her ability to follow her calling to nursing.
- In 1850, visited the Lutheran community at *Kaiserswerth-am-Rhein* in Germany, and had 4 months of medical training at their institute.
- In 1853, became superintendent at the Institute for the Care of Sick Gentlewomen in Upper Harley Street, London.
- Her father gave her an annual income of £500 (~US\$65K today), which allowed her to pursue her career.



Florence Nightingale (3)

- Florence and Sidney Herbert, Secretary at War became lifelong close friends.
- Herbert and his wife were instrumental in facilitating Nightingale's nursing work in the Crimean War.
- In October 1854, Herbert sent 38 volunteer nurses trained by Nightingale (including her aunt Mai Smith) and 15 Catholic nurses to the Ottoman Empire.



Florence Nightingale (4)

- The nurses arrived at Selimiye Barracks in Scutari in November, 1854.
- They found that wounded soldiers were receiving very poor care by overworked medical staff.
- Medicines were in short supply, hygiene was neglected, mass infections were common and there was no food-handling equipment.

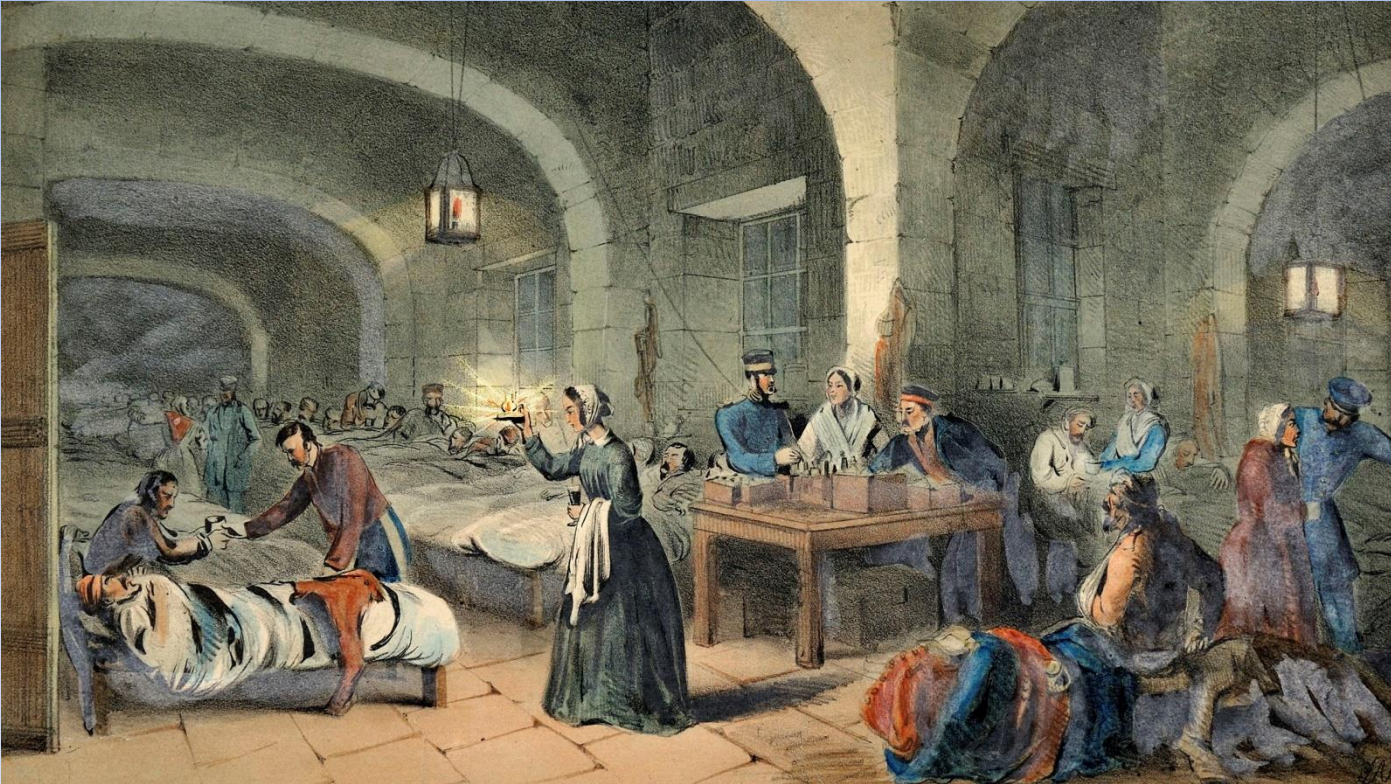


Florence Nightingale (5)

- Nightingale implemented handwashing and other hygiene practices in the war hospital.
- 10X more soldiers died from typhus, typhoid, cholera, and dysentery than from battle wounds.
- In 1855, the British Sanitary Commission flushed out sewers, improved ventilation and decreased overcrowding.
- Death rate went from 42% to 2%, by her improvements in hygiene with help from the Sanitary Commission.



Florence Nightingale (7)



During the Crimean war, she gained the nickname "The Lady with the Lamp".



Florence Nightingale ⁽⁷⁾

- In 1860, she established her nursing school at St Thomas' Hospital in London.
- It was the first secular nursing school in the world.
- This became the foundation for modern professional nursing.



Florence Nightingale (8)

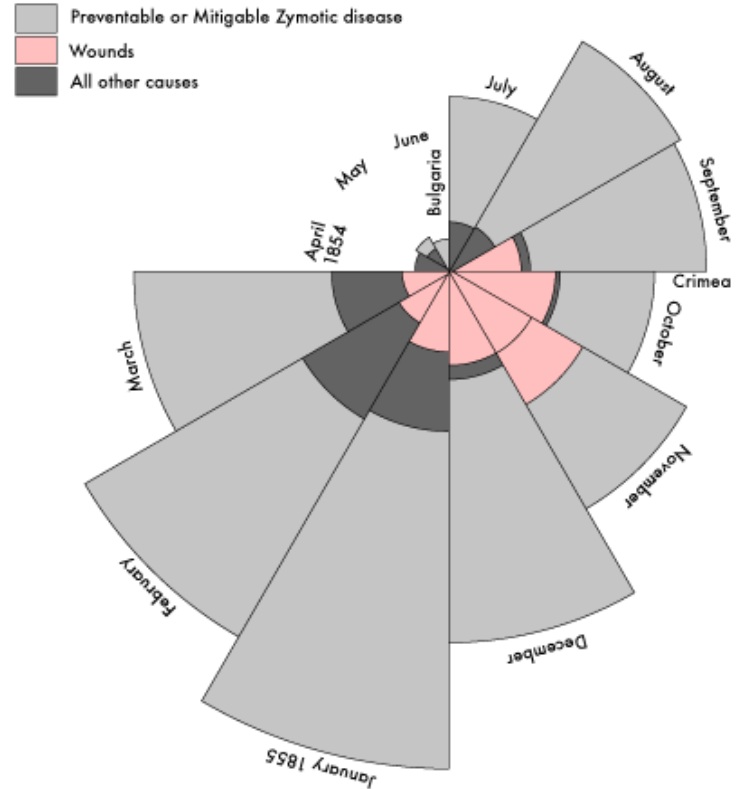
- Florence was stubborn, dominant, unyielding, ambitious, opinionated and forthright.
- Believed that women craved sympathy and were not as capable as men.
- She often referred to herself in the masculine: "a man of action" and "a man of business".



Nightingale's Coxcomb Rose

- Graphic representation of the death tolls during part of the Crimean War.
- Nightingale made many other statistical graphics to clarify points or reinforce ideas.

Diagram of the Causes of Mortality in the Army in the East



The black line across November 1854 marks the boundary of the deaths from all other causes during that month. In October 1854, the black coincides with the red.

Florence Nightingale
1856



Florence Nightingale (9)

- Criticized early women's rights activists who alleged lack of careers for women, while lucrative positions under her supervision went unfilled.
- She preferred the friendship of powerful men, insisting they had done more than women to help her attain her goals.
- Fostered lifelong friendships but also built lifelong animosities, with both men and women.



Florence Nightingale (10)

- Met Elizabeth Blackwell and they became friends.
- Florence did not believe there was a need for female doctors, thought that nursing was a better role for women.
- They then became “frenemies”, each going their separate ways but not obstructing the other’s activities.



Florence Nightingale ⁽¹¹⁾

- From 1857 on she was partially bedridden and blind, with declining mental abilities.
- Suffered from spondylitis, brucellosis and depression.
- Even then, she did great work on hospital planning, which spread worldwide.



Florence Nightingale



On May 12, 2008, Google UK displayed this Doodle to commemorate her 188th birthday.