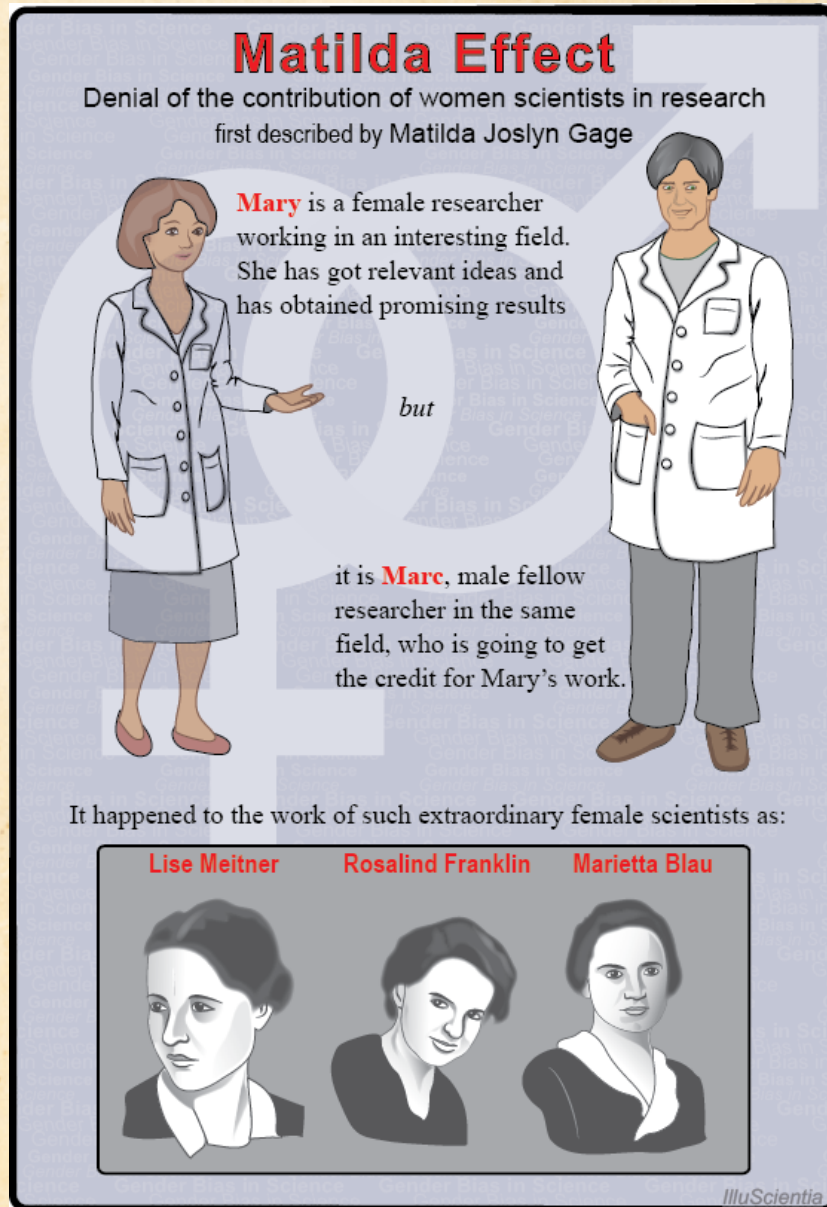


The Matilda Effect

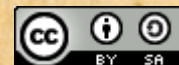


Dr Louise Olsen-Kettle

Mathematics Department
Swinburne University of Technology

lolsenkettle@swin.edu.au

twitter  @DrOlsenKettle



"File:Matilda Effect.png" by IlluScientia is licensed under [CC BY 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

Acknowledgement of Country



We respectfully acknowledge the Wurundjeri People of the Kulin Nation, who are the Traditional Owners of the land on which Swinburne's Australian campuses are located in Melbourne's east and outer-east, and pay our respect to their Elders past, present and emerging.

We are honoured to recognise our connection to Wurundjeri Country, history, culture, and spirituality through these locations, and strive to ensure that we operate in a manner that respects and honours the Elders and Ancestors of these lands.

We also respectfully acknowledge Swinburne's Aboriginal and Torres Strait Islander staff, students, alumni, partners and visitors.

We also acknowledge and respect the Traditional Owners of lands across Australia, their Elders, Ancestors, cultures, and heritage, and recognise the continuing sovereignties of all Aboriginal and Torres Strait Islander Nations.

Margaret Rossiter and the Matilda effect

John
Chester
Buttre,
Public
domain



- Named after suffragist Matilda Gage (1826-1898)
- First known American woman to publish a study of American women in science—*“Woman as an Inventor,”* (1870)

- Margaret Rossiter first coined *“The Matthew Matilda Effect in Science”* in 1993
- Author: *Women Scientists in America* series
- *“The Matilda Effect in Science Communication”* (2013) reported that both men and women judged research papers by men to be stronger than those by women, and showed preference for the male authors as possible future collaborators.

“tendency of men to prohibit women from reaping the fruits of their own toil.”

Percentage of Female Laureates

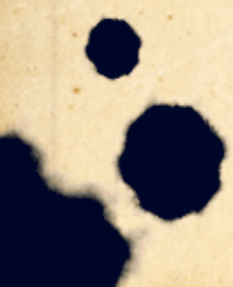


The percentage of Nobel prizes awarded to women:

- 18 women have won the Nobel Peace Prize (16.5% of 109 awarded)
 - 16 have won the Nobel Prize in Literature (13.6% of 118 awarded)
 - 12 have won the Nobel Prize in **Physiology or Medicine** (5.4% of 224 awarded)
 - 7 have won the Nobel Prize in **Chemistry** (3.7% of 188 awarded)
 - 4 have won the Nobel Prize in **Physics** (1.8% of 219 awarded)
 - 2 have won the Nobel Memorial Prize in Economic Sciences (2.2% of 89 awarded)
-
- 2 have won the Fields medal for **Mathematics** (3.1% of 64 awarded)
- 

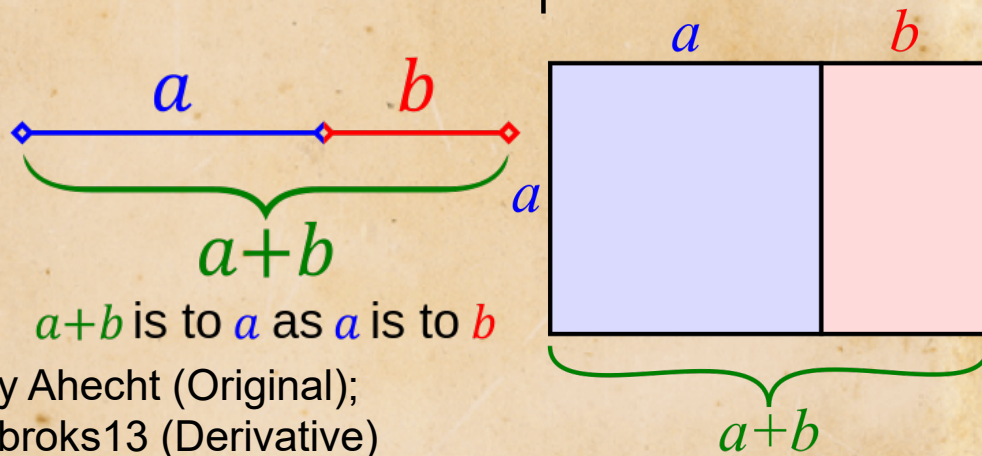


The Matildas



Theano – first known woman mathematician (6th c. BCE)

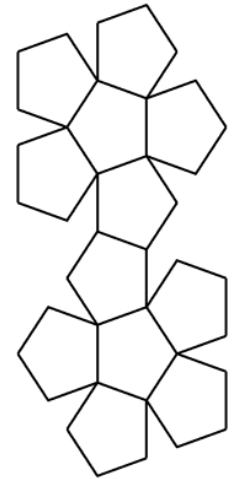
- Golden Ratio φ



By Ahecht (Original);
Pbroks13 (Derivative)

$$V = \frac{5\varphi^3}{6 - 2\varphi}$$

Rectas,
CC0

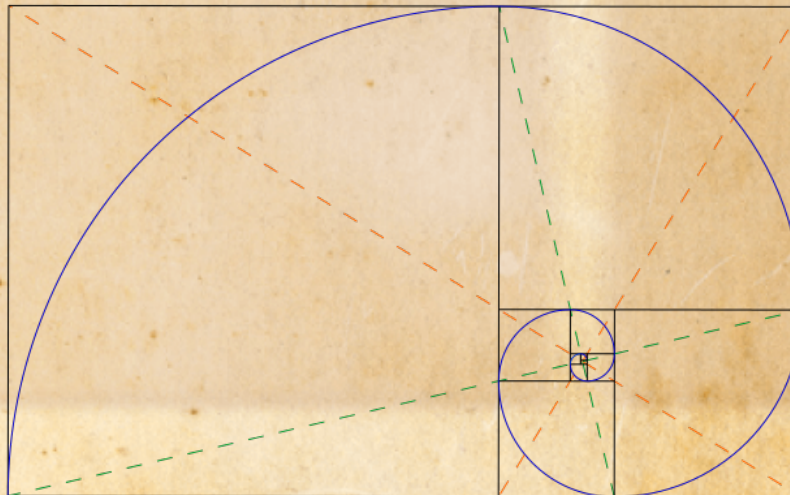


- Very likely her work was attributed to Pythagoras

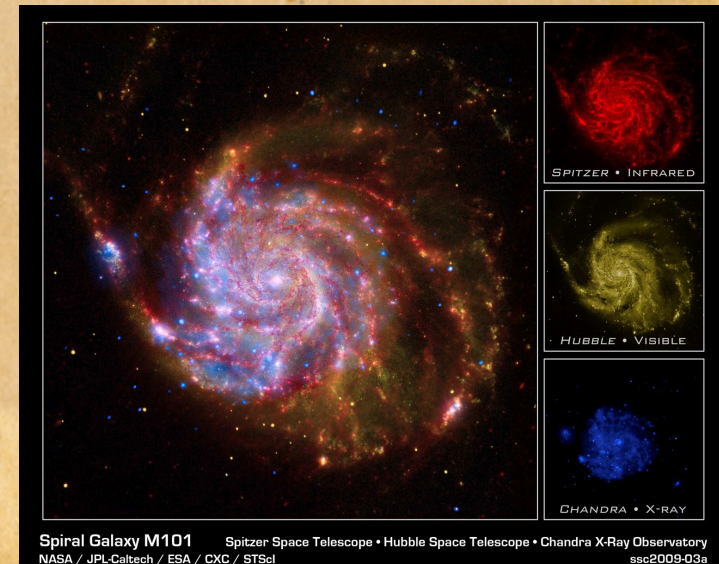


Suyothami,
CC BY-SA 4.0

Personline
, Public
domain



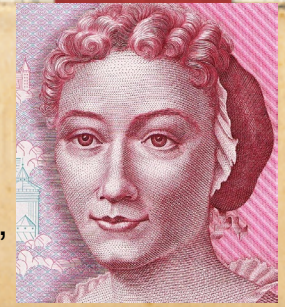
NASA, ESA, CXC, JPL, Caltech and STScI, Public domain



Maria Merian (1647-1717)

-mother of entomology

Deutsche
Bundesbank,
Frankfurt am
Main, Germany,
Public domain



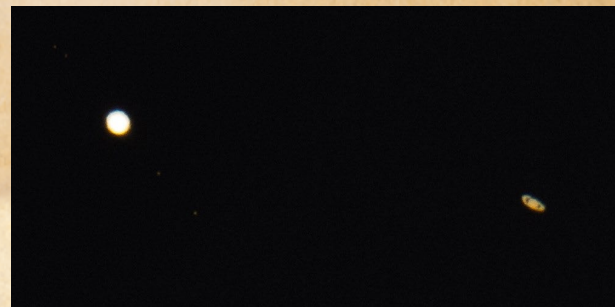
- Her study of insects disputed theory of “spontaneous generation” that insects grew from mud.
- Her observations on the interaction of organisms that are now regarded as a major contribution to the modern science of ecology.
- Because of her lack of formal education and her gender, her successors were hesitant to cite her and her work fell into obscurity for decades.

Maria
Sibylla
Merian,
Public
domain



Verbesserter		Januarius.		Jenner.	
Sonnab.	1. Neujahr.	57	67	79	Nachlaß
1. Sonntag	Ehr. Flucht in Egypten.	Matth. 2.			
Montag	2. nach N. J.	der Kälte.			
Dienstag	3. Enoch	windigt und nicht abheftige Kälte.			
Mittwoch	4. Orth	8 wird küh			
Donnerst.	5. Simeon	schbar.			
Freitag	6. H. König.	ho			
Sonnab.	7. Adorus	ho			
	8. Erhardus	ho			
2.	Jesus 12. Ja	hr a			
1. Sonntag	9. Epiph.	lt. Luc. 2.			
Montag	10. Pauli Einf.	G r. j. o. s. Frost und Schnee.			
Dienstag	11. Hyginus	Frost und Schnee / oder nur Regen.			
Mittwoch	12. Reinhold	Regen oder Schnee.			
Donnerst.	13. Hilarius				
Freitag	14. Felix				
Sonnab.	15. Maurus				
3.	Hochzeit zu C ana.	Joh. 2.			
Tages-Länge		O Aufgang	O Untergang.		
5	7 h. 36 m.	8 U. 12 m.	3 U. 48 m.		
10	7 44	8 8	3 52		
15	7 58	8 1	3 59		

- Gottfried
Kirch, 1700



2020 Great Conjunction between Saturn and Jupiter

Sophie Germain (1736-1831)

- Germain primes



Mu, CC BY-SA 3.0

Assumed a man's identity
(Monsieur Le Blanc)

Matemateca
(IME USP)

Fermat's last theorem:

Germain primes p where $2p+1$ is also a Prime showed for Germain primes n there are no solutions for: $x^n + y^n = z^n$

where x, y, z are not multiples of n . The Germain primes are used in cryptography.

Memoir on the Vibrations of Elastic Plates laid the foundations for Theory of Elasticity.

Her name is excluded from Eiffel tower.



Benh LIEU
SONG, CC
BY-SA 3.0

Mary Anning (1799-1847)

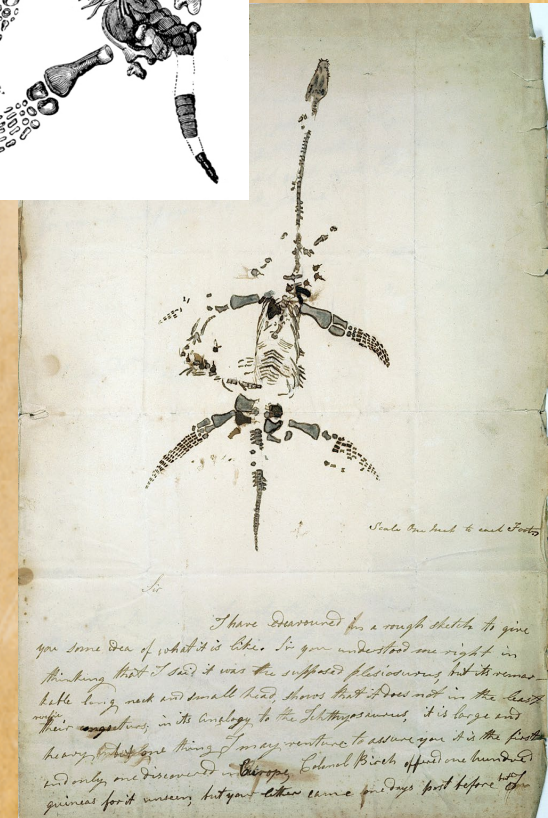
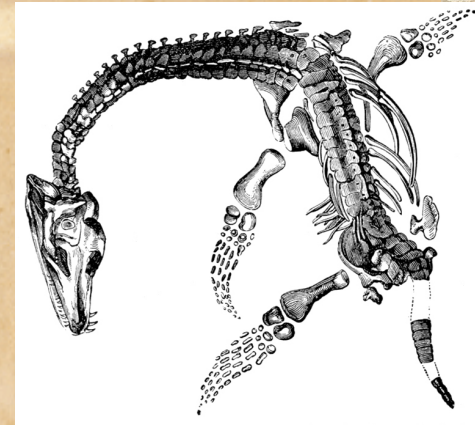
-fossil collector and palaeontologist

- Anning discovered 2 ichthyosaurs, 9 and 11 foot plesiosaurs, a pterosaur, a new flying dinosaur and a new species of plesiosaur over 22 feet.
- Discovered the first plesiosaur.
- Her work was claimed by men like William Buckland and William Conybeare, who gave talks and wrote about her discoveries.
- In 1832, she discovered the head of a large ichthyosaur but could not get to the rest. Thomas Hawkins paid to dig up the full fossil.

The Geological Society of London raised money when she was diagnosed with cancer and made her an honorary member in 1846.



Carbonmoon,
CC BY-SA 4.0



Mary Anning & William
Buckland Public domain

Nettie Stevens (1861-1912)

- discoverer of sex chromosomes

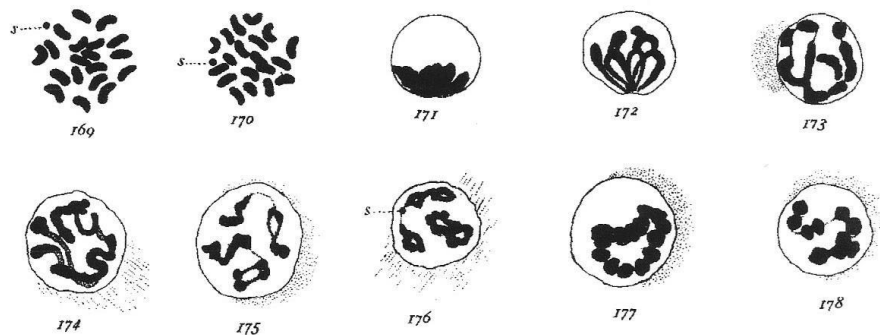


The Incubator,
Institution of
Washington,
Public domain

- While studying mealworms found males made reproductive cells with both X and Y chromosomes, and females made only those with X
- Concluded that sex is inherited as a chromosomal factor and that males determine sex
- Edmund Wilson made a similar discovery at about the same time and was given the credit for this discovery.
- Stevens' conclusions were more accurate than her male counterpart's.

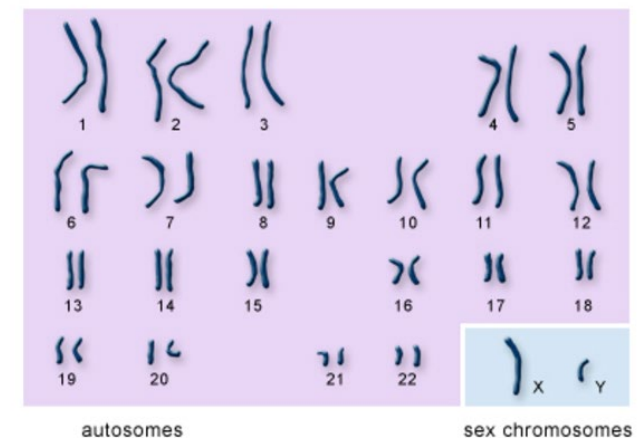
STEVENS.

PLATE VI.



Credit: U.S.
National Library of
Medicine

Nettie Maria
Stevens,
Public
domain



U.S. National Library of Medicine

Alice Ball (1892-1916)

- the Ball method for treating leprosy



Public domain

- developed an injectable form of chaulmoogra oil, which was used for 20 years to treat leprosy.
- After her death, Arthur Dean continued her work, and soon the chaulmoogra injections were in demand and sent all over the world to treat leprosy. (*“Dean method”*)
- Dean never credited Ball for the initial discovery.
- Hollman refers to *“Ball Method”* in *Arch Derm Syphilol*. 1922;5:94-101. doi:10.1001/archderm.1922.02350260097010
- First woman and first African American to receive a master’s degree and become chemistry professor at the University of Hawaii.

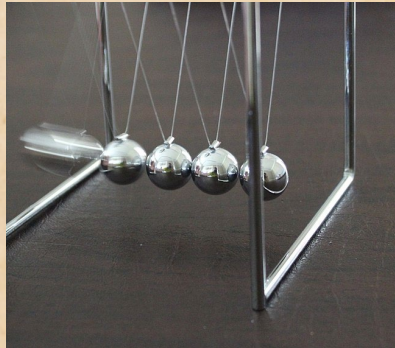


Hoapili,
original
creator,
Public
domain

Emmy Noether (1882-1935) - most important female mathematician

Lived almost her whole life without a salary or little pay.

Noether conservation theorems: foundations of general relativity and quantum mechanics



The Dean of
Physics, CC BY-
SA 4.0



NASA Goddard
Space Flight
Center



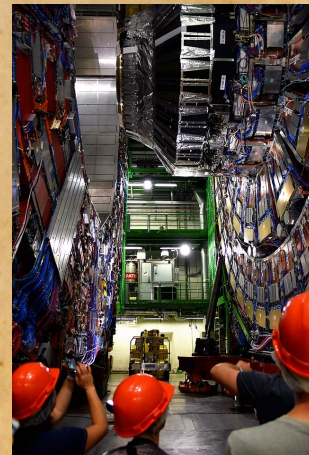
Martin Rulsch, CC
BY-SA 4.0

Created modern commutative algebra as a basis for algebraic topology, geometry and number theory

Homomorphism and Isomorphism theorems replacing equations by maps between structures



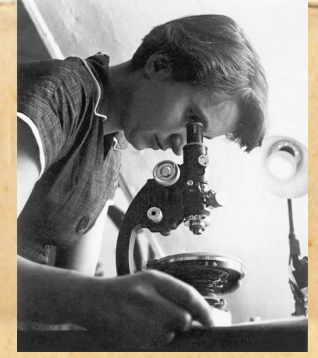
Konrad Jacobs,
Erlangen,
CC BY-SA 2.0



SimonWaldherr,
CC BY-SA 4.0

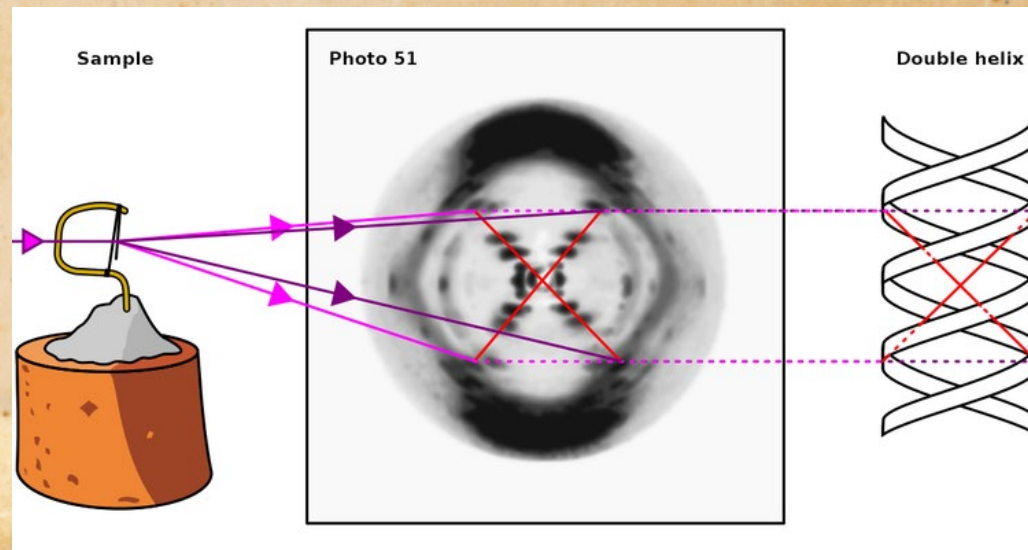
Rosalind Franklin (1920-1958)

– the unsung hero of DNA



- Died before her “collaborators” were awarded Nobel Prize
- Her essential contribution was minimized in Watson’s distorted autobiographical account of 'their' discovery
- Franklin presented the helical pattern and outside backbone structure of B DNA, with the phosphate groups on the outside in 1951
- 1962 Nobel Prize for solving the structure of DNA was presented to Wilkins, Crick and Watson

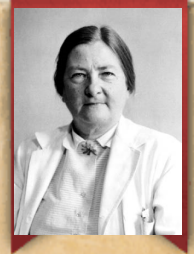
Franklin's X-ray diagram
of the B form of DNA fibres,
J. D. Bernal, Nature, 1958



Top image:
MRC
Laboratory of
Molecular
Biology,
CC BY-SA 4.0

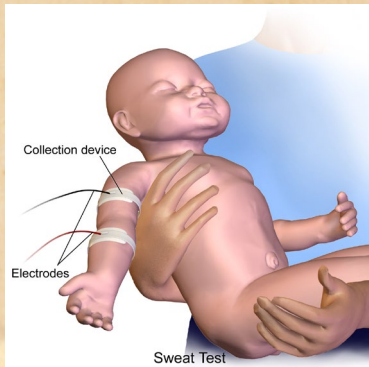
Dorothy Andersen (1901-1963)

—first to diagnose cystic fibrosis

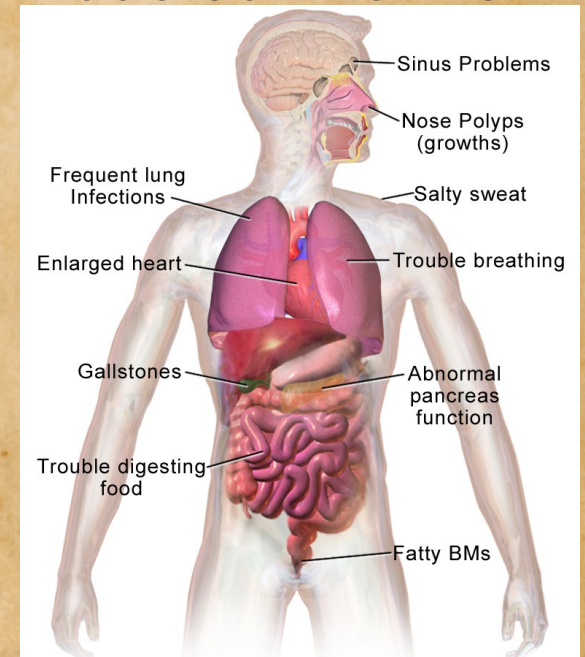


- studied many children who had digestive or breathing problems, conclusion that the lung and pancreas damage came from "cystic fibrosis of the pancreas".
- In 1939, she was awarded the E. Mead Johnson Award for her identification of the disease. In 2002, she was inducted into the National Women's Hall of Fame.
- Sweat test- she and Paul di Sant'Agnes
- recognised that increased salt content in
- sweat could be used to diagnose cystic
- fibrosis.

BruceBlaus,
CC BY-SA 4.0



Her role was
minimized later by
di Sant'Agnese.



Dorothy Andersen, top right, Public domain,
<http://www.nlm.nih.gov/changingthefaceofmedicine/physicians/bio>

Blausen.com staff (2014). "[Medical gallery of Blausen Medical 2014](#)". Â WikiJournal of Medicine Â 1 Â (2). Â [DOI:10.15347/wjm/2014.0](https://doi.org/10.15347/wjm/2014.0)
ISSN Â 2002-4436.

Klára Dán von Neumann (1911-1963)

- early weather forecasting



Alfred Eisenstaedt, Time Life magazine

- Primary developer of coding for the 1940s ENIAC computer and reprogramming ENIAC to make weather predictions.
- Was not listed as an author in the 1950 paper “Numerical Integration of the Barotropic Vorticity Equation” in the scientific journal Tellus by John von Neumann and Charney
- All first 6 programmers of ENIAC were women:
 1. Kay McNulty
 2. Betty Jennings
 3. Betty Snyder
 4. Marlyn Meltzer
 5. Fran Bilas
 6. Ruth Lichterman



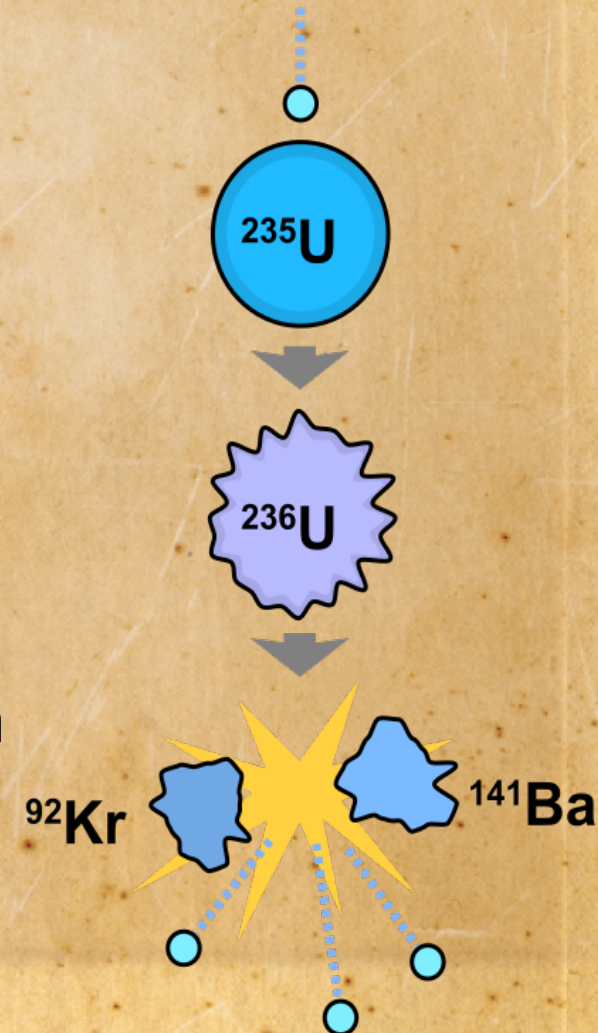
ENIAC computer.
Picture courtesy
of U.S. Army
website archive

Lise Meitner (1878-1968)

-pioneer of nuclear technology



- Meitner led the research that ultimately discovered nuclear fission
- In 1944, Meitner's professional partner for >30 years, Hahn, received the Nobel Prize in Chemistry, as the discoverer of nuclear fission. Meitner directed Hahn's most significant experiments and calculated the energy release resulting from fission
- In 1922 Meitner discovered the Auger Effect (named after Pierre Auger who discovered it in 1923) which occurs when a high energy electron hits an atom and excites an inner shell electron which transfers its energy to an outer shell electron which is expelled.

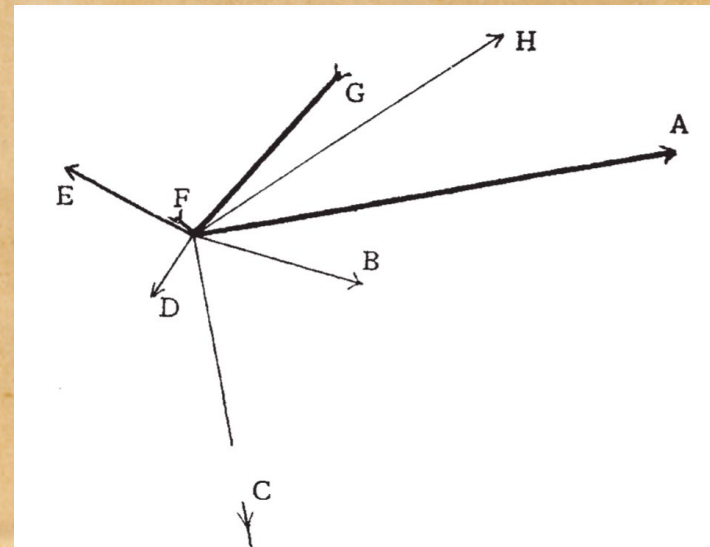
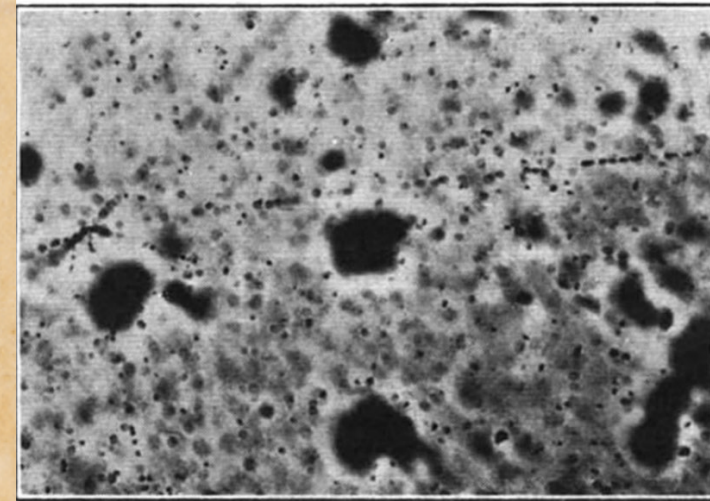


Marietta Blau (1894-1970)

-pioneer of nuclear emulsions



- Blau developed photographic nuclear emulsions, a way to take pictures of high energy interactions of nuclear particles
- With PhD student Wambacher in 1937 discovered cosmic ray “disintegration stars” – micro configurations of particle paths resulting from the split of a nucleus hit by a cosmic ray. Recording these rare high-energy nuclear events forged the field of particle physics
- In 1950, Powell won the Nobel Prize for Physics for applications of the photographic method that Blau developed.
 - Blau & Wambacher were nominated for the 1950 Nobel Prize but did not win

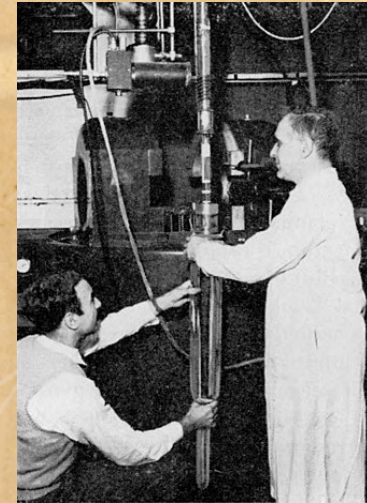


Nature, Blau & Wambacher, 1937

Chien-Shiung Wu (1912-1997)

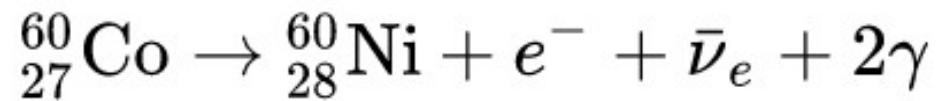
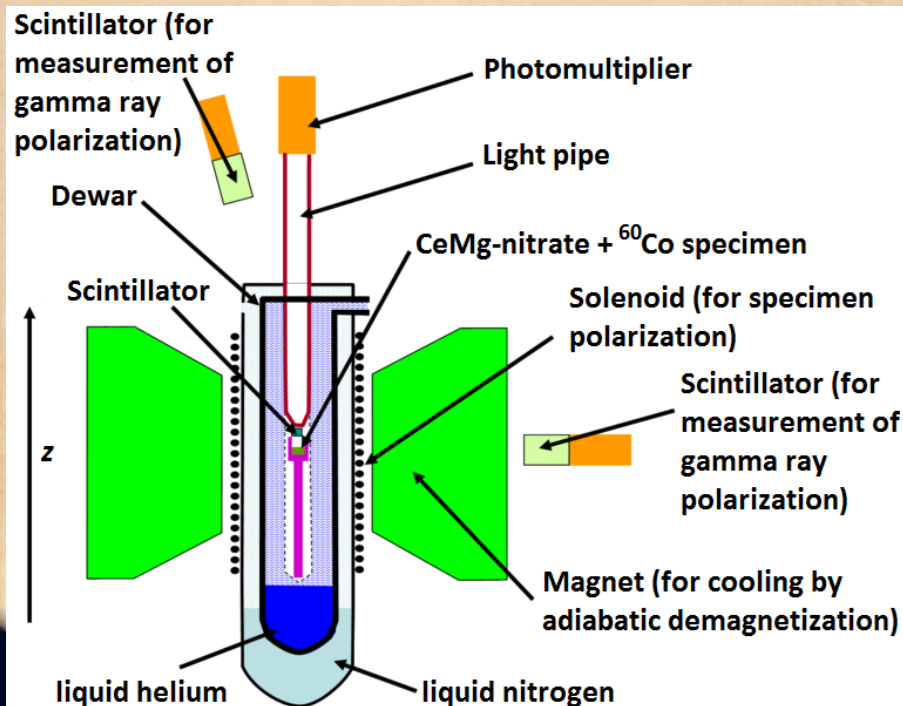
-Queen of nuclear research

- Her experimental work on the law of parity in physics proved that parity was not conserved
- Wu's experimental discovery in 1957 confirmed a theory by Yang and Lee, who were then awarded the Nobel Prize in physics later that year
- Gamma rays had a preferential direction

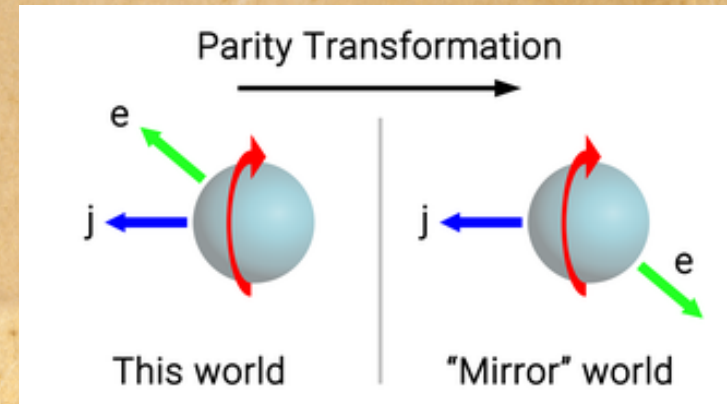


A. V. Astin, Director,
The Wu Experiment,
Bureau of Standards

Image Top Right Smithsonian Institution



A schematic of the [Wu experiment](#), wherein a cobalt atom with spin vector j emits an electron e .



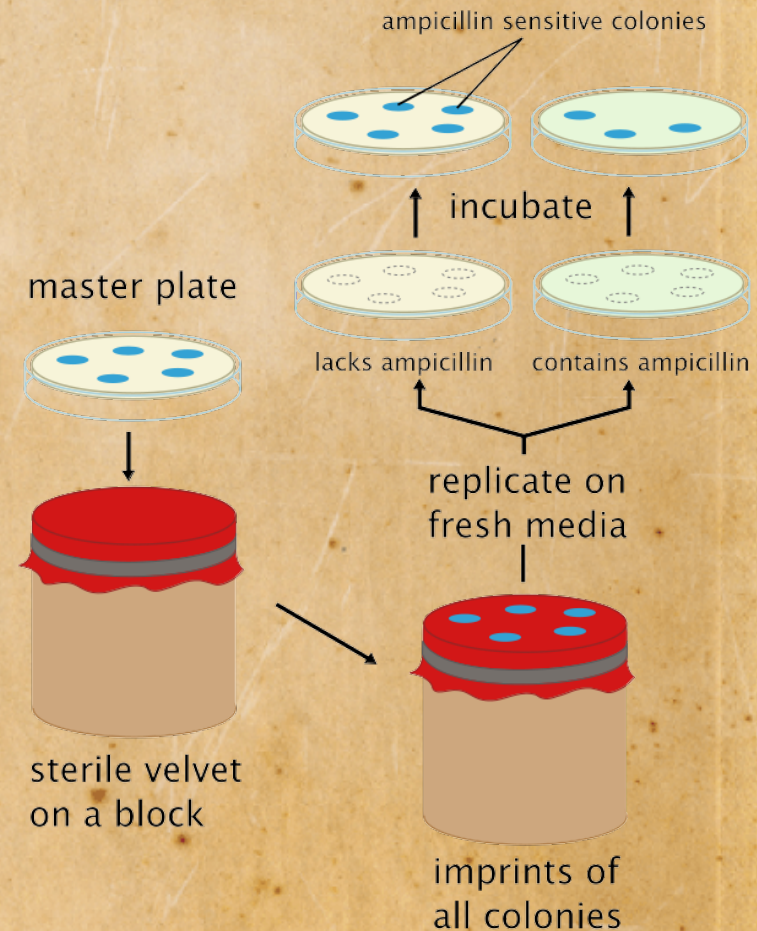
Esther Lederberg (1922-2006)

-pioneer of bacterial genetics



Esther M. Zimmer Lederberg

- Lederberg discovered the bacterial virus λ and the bacterial fertility factor F
- She devised the first implementation of replica plating for which her first husband and his research team won the 1958 Nobel prize for Medicine.
- Studied the transfer of genes between bacteria by specialized transduction.
- Textbooks often ignore her work and attribute her accomplishments to her first husband, Joshua Lederberg.
- Never held a tenured position despite her foundational discoveries in the field of microbiology.



Histidine, CC
BY-SA 3.0

Vera Cooper Rubin (1928-2016)

-brought dark matter to light



NASA, Public domain

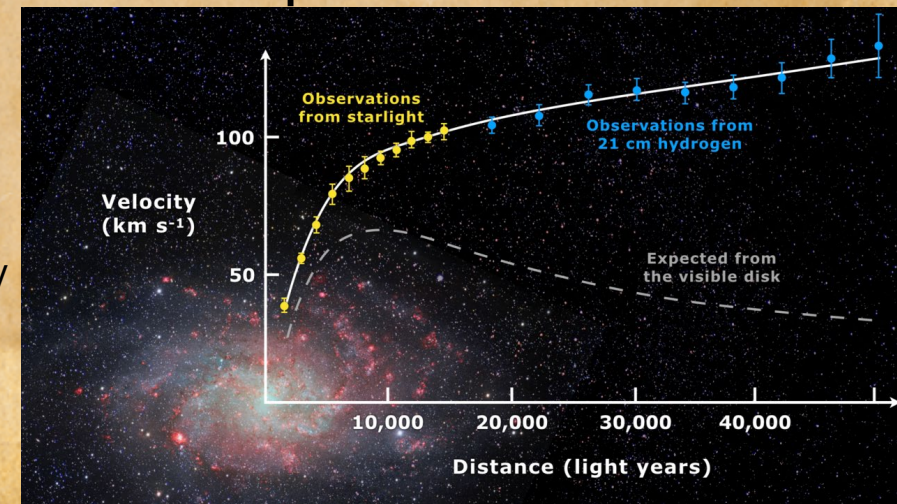
- Rubin's measurements of the speeds at which stars orbit around galactic centres, established evidence for the existence of dark matter and its gravitational pull
- Newtonian mechanics predicts that rotation would slow down with distance from a galaxy's centre
- Rotational speed measured remained more or less constant as far from the centre.
- Rubin postulated dark matter settles like haloes around galaxies, providing the gravitational pull to keep them stable
- Not nominated for Nobel Prize

Vera C. Rubin
Observatory

NSF/AURA,



Mario De Leo
(own work)
Rotation curve
of spiral galaxy
Messier 33.

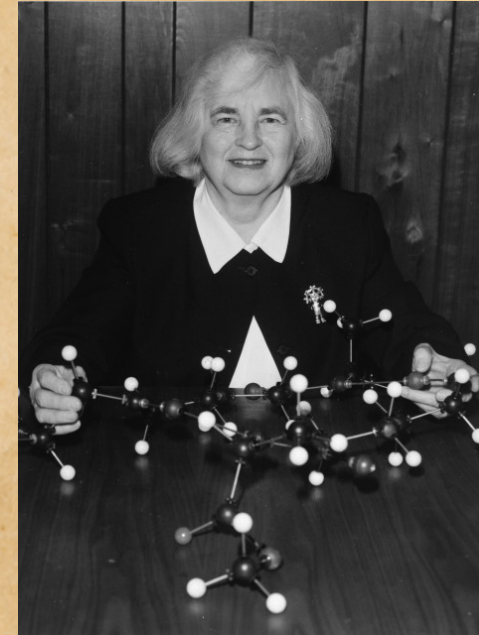


Isabella Karle (1921–2017) -pioneer of crystallography

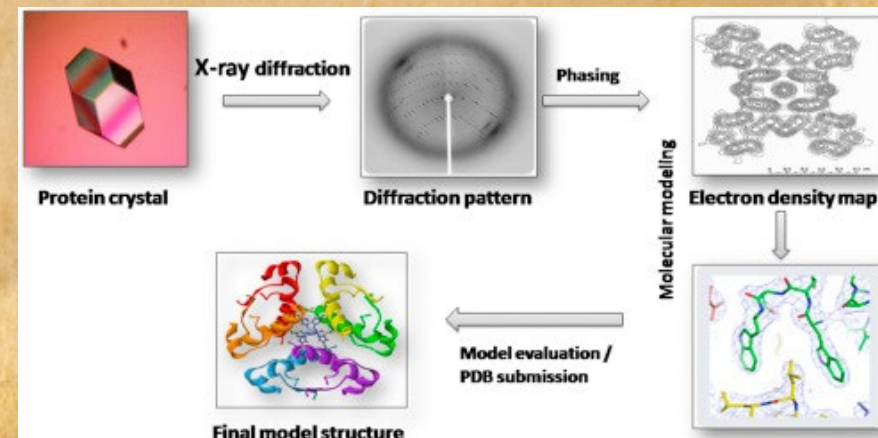


U.S. Naval Research
Laboratory, Public domain

- In 1963, Karle published her "Symbolic Addition Procedure," which used x-ray analysis to determine essentially equal-atom crystal and molecular structures.
- Remains the basis of all advanced x-ray crystallography programs today.
- Determined the structure of complex biological molecules, including proteins, revolutionising drug development by showing how drugs interact with proteins in the body.
- In 1985 Jerome Karle and Hauptman were awarded the Nobel Prize in Chemistry for developing direct methods for analysing x-ray diffraction data.



[Advances in Biological Science Research](#)
A Practical Approach, 2019, Pages 69-84



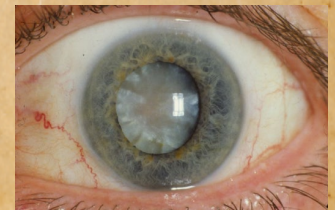
Patricia Bath (1942–2019) -invented Laserphaco Probe



National Library of Medicine, Public domain

- pioneering ophthalmologist who invented the Laserphaco probe that revolutionized cataract surgery in 1986.
- the first woman to lead an ophthalmology residency program.
- nominated an incredible 11 times to be inducted into the National Inventors Hall of Fame, and if admitted, would be the only African-American woman out of 603 inventors.
- Bath held 5 patents and was the first African-American woman doctor to receive a patent for a medical purpose.
- Founded the non-profit American Institute for the Prevention of Blindness

U.S. Navy photo by Mass
Communication Specialist 2nd Class
Eddie Harrison, Public domain



NIH Image Gallery Public domain

"Hater-ation, segregation, racism, that's the noise you have to ignore that and keep your eyes focused on the prize, it's just like Dr. Martin Luther King said, so that's what I did."

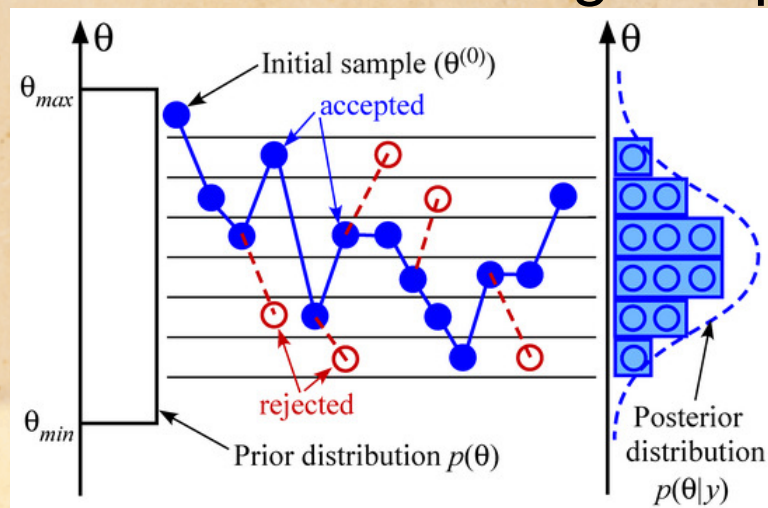
Arianna Rosenbluth (1927-2020)

-pioneer of data science



Mrosenbluth, CC BY-SA 4.0

- Contributed to (but un-named in) the Metropolis algorithm - basis of the Markov chain Monte Carlo method (MCMC)
- Wrote the first full implementation of the MCMC
- MCMC is a technique for generating random samplings from high dimensional probability distributions used widely eg. analysing election or covid 19 results, machine learning
- MCMC methods draw samples where the next sample is dependent on the existing sample, called a Markov Chain.



Appl. Sci. 2020, 10, 272



By Auckland Museum, CC BY 4.0

Katherine Johnson (1918-2020), Mary Jackson (1921-2005), & Dorothy Vaughan (1910-2008)

– Hidden figures



Twentieth
Century Fox

- Employed initially as human computers by NASA
- 1960s: Mercury astronauts Shepard, Grissom & Glenn
- were first men in space.
- Supported by hundreds of unheralded NASA workers, including "human computers" who calculated their orbital trajectories
- Johnson did trajectory analysis for Shepard's Freedom 7 mission in 1961, and (at Glenn's request) did analysis for his orbital mission in 1962
- Jackson was NASA's 1st African American female engineer
- 2015: Johnson received the Presidential Medal of Freedom, the highest civilian honor in US

Freedom 7
Mercury
spacecraft
May 5, 1961



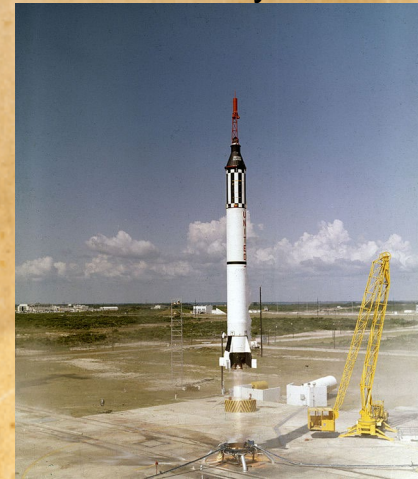
Katherine
Johnson
NASA;
restored by
Adam
Cuerden,
Public
domain



Dorothy Vaughan
(left)

Mary Jackson
(right)

NASA, Public domain

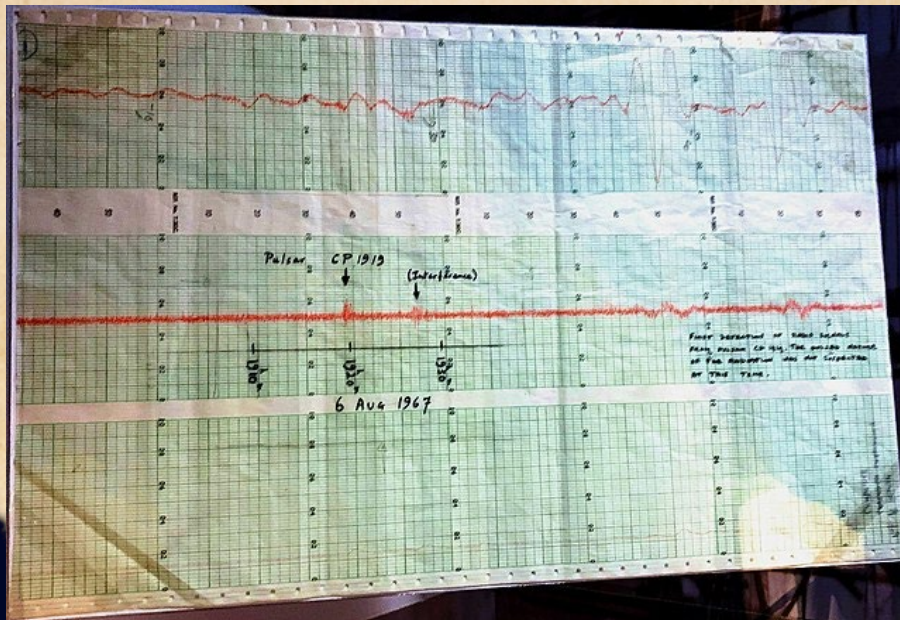


Jocelyn Bell (1943-) -discovered pulsars

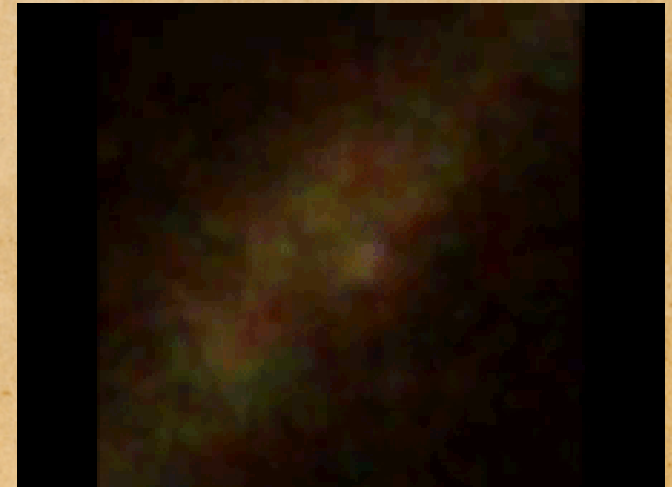


Roger W Haworth, CC BY-SA 2.0

- 1967 discovered pulsars of astronomical sources - a rotating neutron star that emits a regular ticking signal of radio waves
- This observation is considered one of the greatest astronomical discoveries of the 20th century.
- 1974, Hewish, Bell's supervisor, and Ryle, were awarded the first Nobel Prize in observational astronomy - for Jocelyn Bell's pulsar discovery



The chart examined by [Jocelyn Burnell](#) in showing the trace of the first identified pulsar, subsequently designated [PSR B1919+21](#)

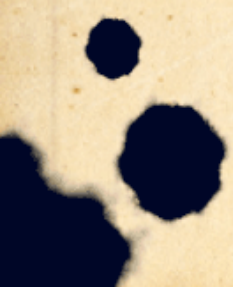


Billthom,
CC BY-SA 4.0

Vela pulsar, Roger Romani (Stanford University),
Lucas Guillemot (CENBG), Francis Reddy (SPSYS), Public domain,



The Success Stories



Hypatia (ca.360-415 CE) greatest mathematician during early 5th c.



Jules Maurice Gaspard,
Public domain

- Earliest documented female mathematician
- Theon (her father) invented the astrolabe for ship navigation and likely she assisted him.
- Worked on algebraic equations and conic sections
- “I am twice as old as my son, who is six times the age of his daughter. Next year she will start school at age 6.”

- $I=2*S$

- $S=6*D$

- $D+1=6$

with integer solutions $D=5$, $S=30$ and $I=60$

- While she didn't suffer from the Matilda effect she was murdered in 415 CE by a Christian mob

Ada Lovelace (1815-1852)

- first programmer



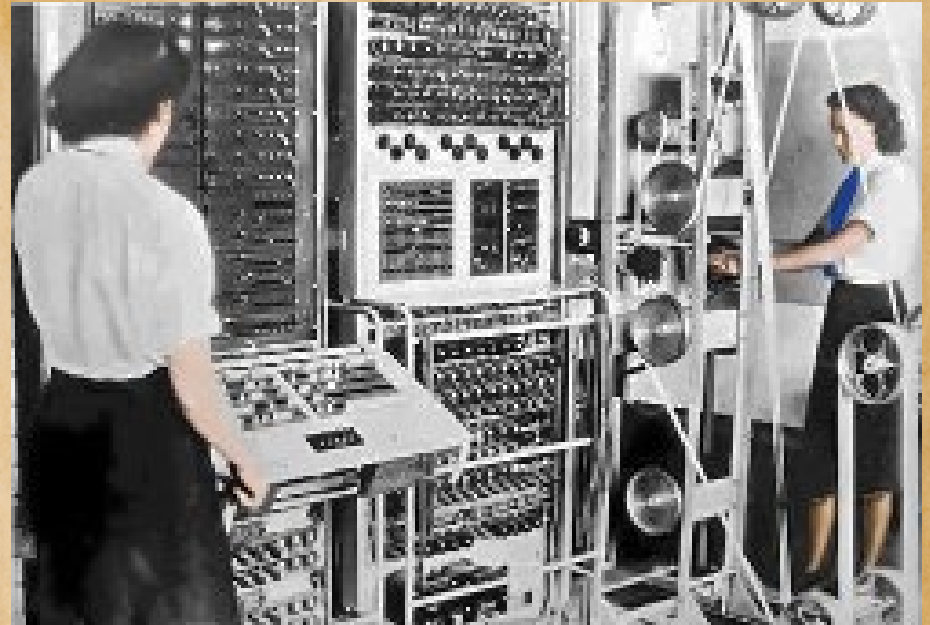
Alfred Edward Chalon,
Public domain

Recognised as the world's first programmer

Wrote first computer program demonstrating how an Analytical Engine (*Babbage*) could be used to generate Bernoulli numbers

Influenced Turing's concept of The Universal Turing Machine, the machine concept that began the modern age of computing

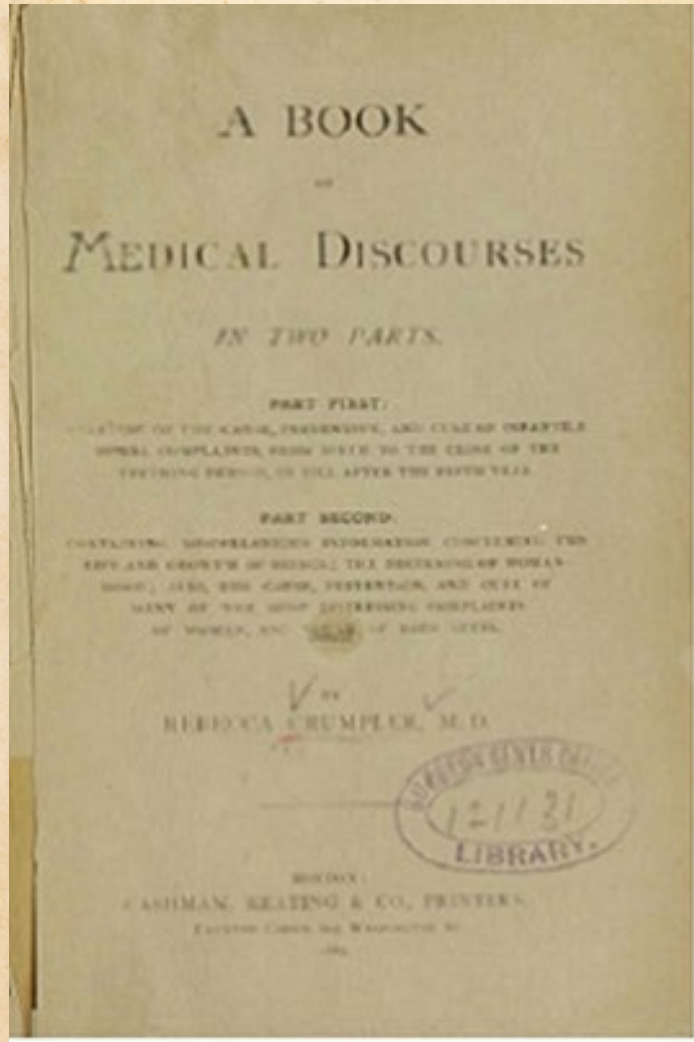
The Pentagon and US military's programmers named their computing language Ada



Colossus Mark 2 codebreaking computer being operated by Dorothy Du Boisson (left) and Elsie Booker (right), 1943, WWII, Public Domain

Rebecca Crumpler (1831-1895)

-first female African American doctor



- Crumpler battled deep-seated prejudice against women and African Americans in medicine.
- She cared for formerly enslaved people in VA.
- In 1883, Dr. Crumpler published her *Book of Medical Discourses* providing guidance on maternal and child health.

Front page of Dr. Crumpler's "A Book of Medical Discourses."

Top image: <https://www.pbs.org/newshour/health/celebrating-rebecca-lee-crumpler-first-african-american-physician>

Florence Nightingale (1820-1910)

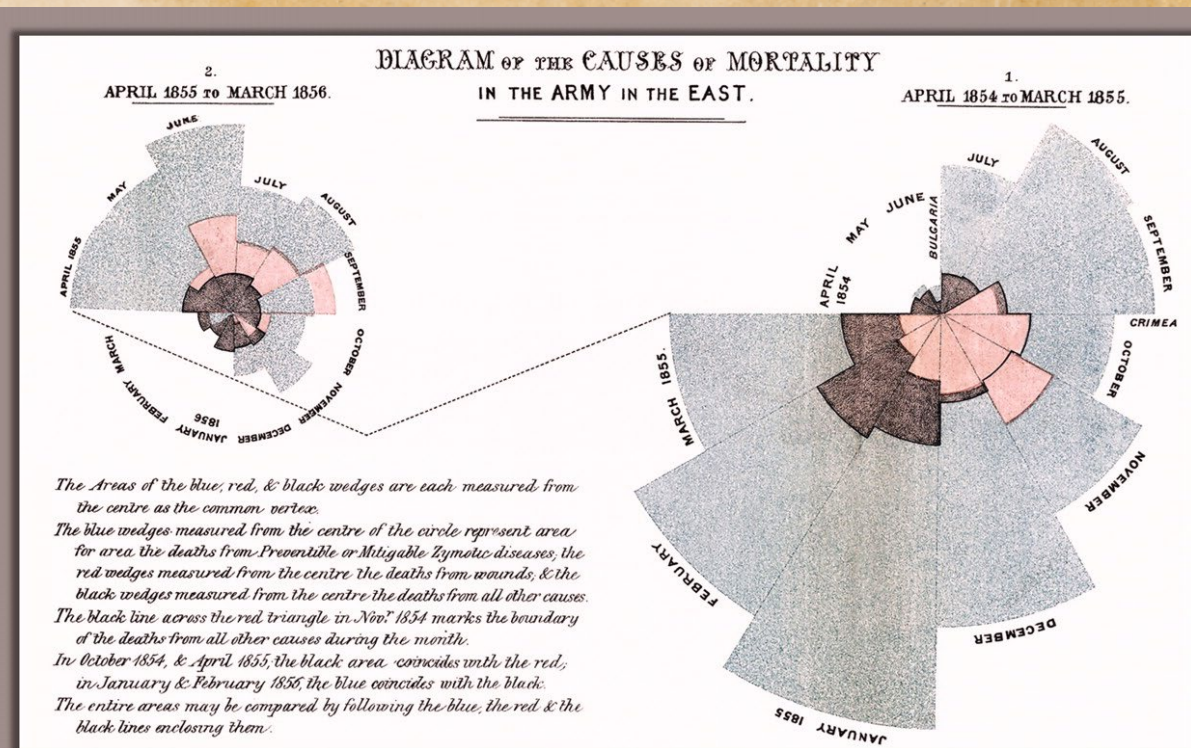
-one of the earliest data scientists



Henry Hering, Public domain

- Crimean war: recorded medical statistics in the British Army and contributed hugely in government policy and public understanding of statistics and data management
- Created first infographics
- Operational research: her data visualisation and analysis helped government and armed forces make better decisions.

Science (2011) 333, 1393-1400
Deaths from sickness (blue), deaths from wounds (red), and deaths from other causes (black). Each sector corresponds to a month, and the area of a sector is proportional to the number of deaths per 1000 soldiers during that month. The drop in deaths from sickness followed the introduction of sanitary measures in early 1855.



Marie Curie (1867-1934)

-discovered radioactivity

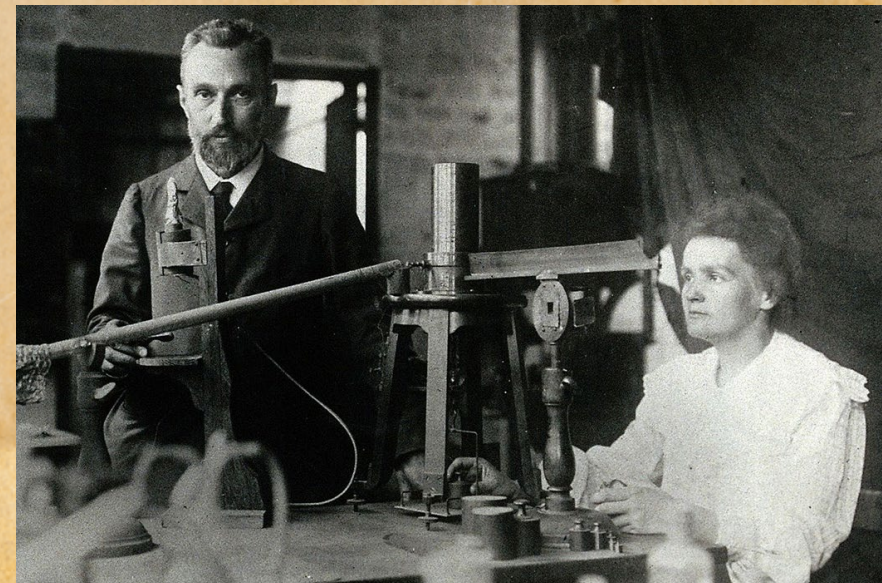


Bärbel Miemietz,
CC BY-SA 4.0

- 1903 Marie and Pierre Curie & Becquerel were awarded the Nobel Prize for their work on radiation
- 1911 Marie Curie awarded the Nobel Prize in chemistry for her discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable elementy
- First person to receive a second Nobel prize to this date

The objective of the Curie method is to measure the number of electric charges produced, which is proportional to the radioactive emissions of the sample. The apparatus used by the Curies for their experiments included an ionization chamber, a quadrant electrometer, and a piezoelectric quartz.

Musée Curie (coll. ACJC) 1898



Ynes Mexia (1870-1938)

-Mexican-American botanist

Ynes Mexia:
Botanist And
Adventurer,
Durlynn Anema



- One of most successful botanists and female plant collectors of her time.
- Began her career at 55.
- This specimen of *Saurauia mexiae* was collected by Mexia and named in her honor.



<https://www.nps.gov/people/ynes-mexia.htm>

Ruby Payne-Scott (1912-1981)

-first female radio astronomer



Peter Gavin Hall, CC BY-SA 3.0

- Payne-Scott was an Australian pioneer in radio physics and radio astronomy.
- She is believed to have been the first female radio astronomer.
- CSIRO initiated Payne-Scott Awards to support researchers who have taken extended leave to care for a newborn child following birth. The grant provides support to researchers to re-establish and re-connect with the research underway in their field.



Jessica
Chapman,
CC BY 3.0

Grace Murray Hopper (1906-1992)

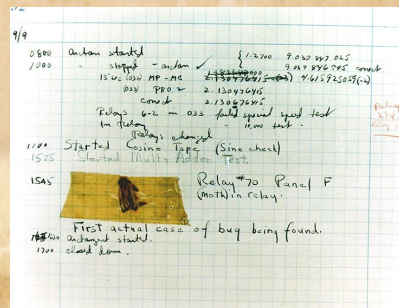
-computer science pioneer



James S. Davis, Public domain

- First woman to earn a Ph.D. in mathematics from Yale University in 1934
- In 1952 created the first computer language compiler, which translated mathematical code into machine-readable code—an important step toward creating modern programming languages
- She is credited with coining the terms “bug” and “de-bug”
- Hopper was involved in the creation of UNIVAC, the first all-electronic digital computer.
- The Cray XE6 “Hopper” supercomputer was named after her.

Courtesy of the
Naval Surface
Warfare
Center,
Dahlgren, VA

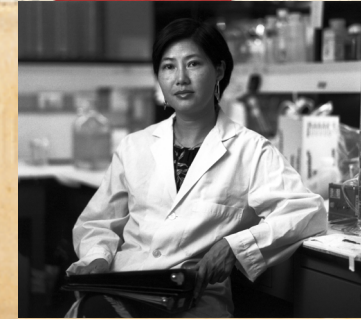


Unknown
(Smithsonian
Institution),
CC BY 2.0



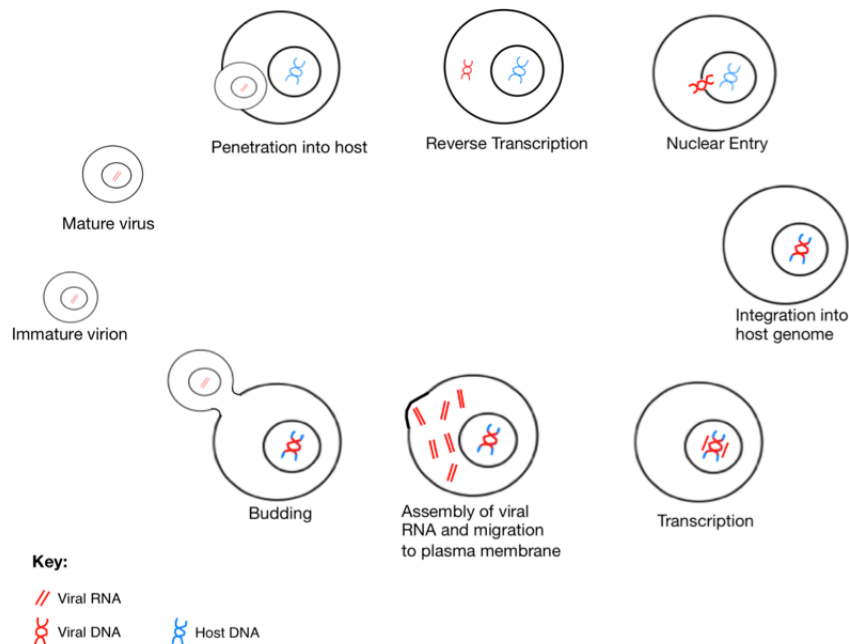
Flossie Wong-Staal 1946-2020

Trailblazing HIV researcher



Bill Branson, Public domain

Integration of viral DNA into host genome



Replication cycle of a retrovirus
Adrian.maglaqui, CC BY-SA 4.0

- Wong-Staal played a key role in showing that HIV causes AIDS.
- First scientist to clone HIV which showed how HIV evades immune system and led to development of blood tests.
- Showed how virus mutates which helped develop effective antiviral therapies to manage aids.
- Pioneer in human retrovirology.

Discover magazine named her one of the 50 most important women in science in 2002, #32 of the Top 100 Living Geniuses by Daily Telegraph in 2007, and named the top female scientist of the 80s by Institute for Scientific Information

Isabel Joy Bear 1927-2021

- Mineral chemist



<https://csiropedia.csiro.au/bear-isabel-joy/>

- With Richard Thomas were first scientists to scientifically describe the smell of rain – ‘petrichor’.
- The smell itself comes about when increased humidity fills the pores of stones (rocks, soil, etc) with tiny amounts of water. This flushes the oil from the stone and releases petrichor into the air.
- 1988 - Bear became the first woman to be awarded the Royal Australian Chemical Institute Leighton Memorial Medal.



John Robert
McPherson,
CC BY-SA 4.0

Gladys West (1930-) -her satellite geodesy models are basis of GPS



US Air Force, Public domain



U.S. Navy, Public domain

- West's mathematical modelling of shape of the earth and development of satellite geodesy models formed basis of global positioning system (GPS)
- Inducted into US Air force hall of fame in 2018
- Awarded the 2021 Webby Lifetime Achievement Award

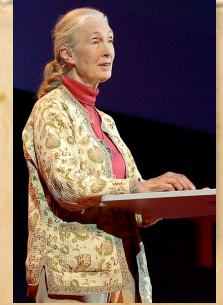


National Oceanic and Atmospheric Administration, Public domain

The GPS receiver receives signal from 3 satellites and calculates how far it is from these satellites, it can pinpoint its exact location on Earth through a process called trilateration.

Jane Goodall (1934-)

-revolutionised our knowledge of chimpanzee behaviour



Erik (HASH) Hersman CC BY 2.0



Daderot, CC0, via
Wikimedia Commons



National Geographic
Creative, Hugo van Lawick

- Goodall showed that chimpanzees are omnivorous, can make and use tools and have highly developed social behaviours.
- Awarded a PhD in ethology from the University of Cambridge (1965)

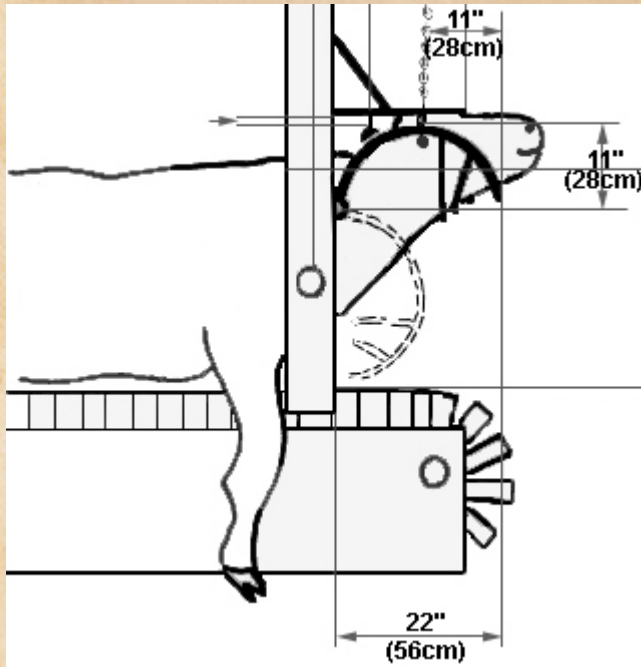
Many awards including Dame Commander of the British Empire, 2003 and 2021 Templeton prize.

Temple Grandin (1947-)

-hero to America's cattle industry



Steve Jurvetson CC BY 2.0



Sketches by Temple Grandin

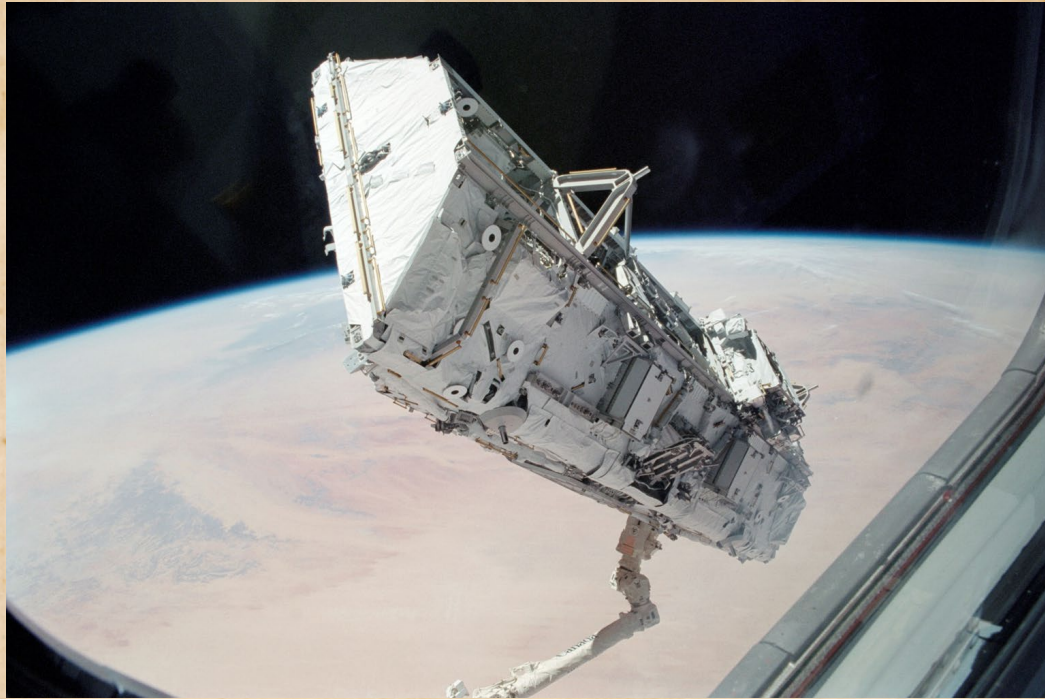
- Grandin's designed meat processing plant holding pens and walkways.
- Resulted in a more tranquil and efficient process – better for animals and plant workers.
- Designs now used globally as well

One of TIME Magazine's 100 Most Influential People in the World in 2010. Proponent of humane treatment of livestock for slaughter.

Ellen Ochoa (1958-) -astronaut and engineer



NASA, Public domain



S0 Truss lifted by Ochoa and Bursch
from Shuttles cargo bay (NASA)

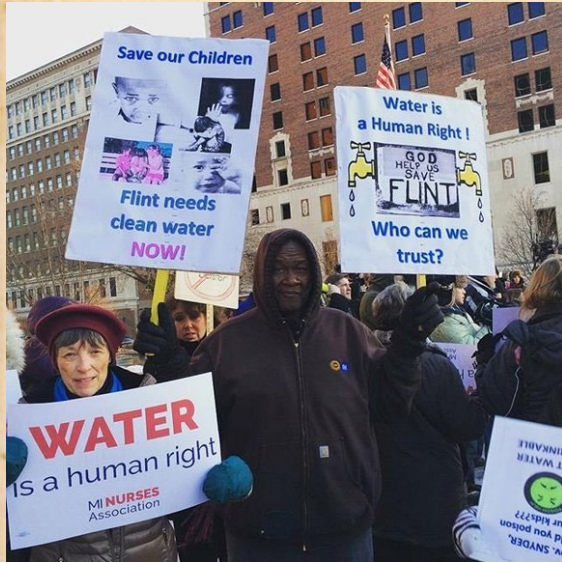
- First Hispanic woman to go to space in 1993.
- She is a co-inventor on three patents an optical inspection system, an optical object recognition method, and a method for noise removal in images.
- Former director of the Johnson Space Center.

Her inventions significantly increased the ability to capture and analyze finely-detailed imagery, including applications in space and on the Earth.

Mona Hanha-Attisha (1976-) -paediatrician, public health advocate



CC BY-SA 4.0



Shannon Nobles,
CC BY-SA 4.0



US Environmental
Protection Agency

- Her research exposed the Flint water crisis.
- Showed children were exposed to dangerous levels of lead in Flint.
- Testified twice about the water issues before U.S. Congress

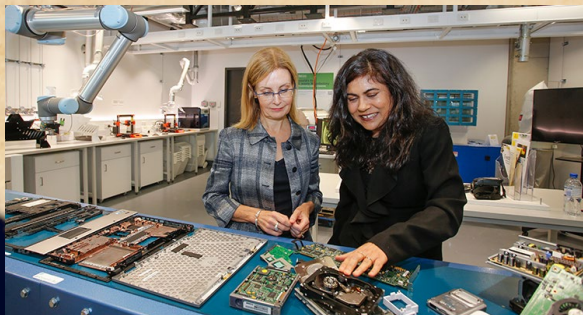
Named one of Time magazine's 100 most influential people in the world, received the PEN America Freedom of Expression and Courage Award

Veena Sahajwalla – one of Australia's best known engineers



Eva Rinaldi, CC BY-SA 2.0

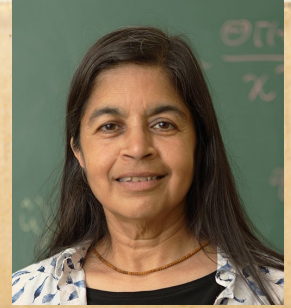
- Inventor of green steel by demonstrating that carbon and hydrogen can be extracted from waste rubber instead of coking coal in steel production
- Revolutionised recycling in Australia by introducing small specialized recycling factories
- Recipient of numerous awards, and named one of Australia's 100 most influential engineers and most innovative engineers (Engineers Australia 2015/16)



Images
from
UNSW

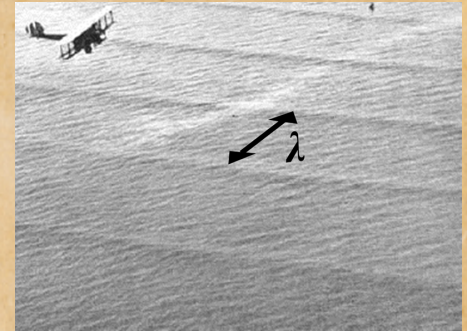


Nalini Joshi – one of Australia's top mathematicians

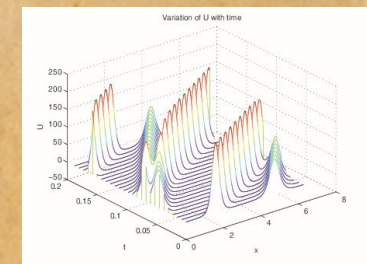
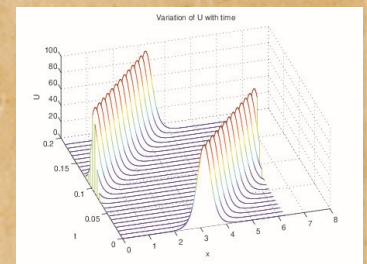


Ted Sealey, CC BY-SA 4.0

- First female Professor of mathematics at University of Sydney
- Co-founded the Science in Australia Gender Equity program, which works to increase retention of women in STEM fields
- appointed an Officer of the Order of Australia for service to maths and tertiary education, and for being a role model and mentor of young mathematicians
- Research in non-linear differential and difference equations and nonlinear integrable systems. E.g. solitons



Brews ohare,
CC BY-SA 3.0



"But when I attend functions at the academy, wearing a black suit, with a name badge, I am often mistaken for one of the serving staff. And, I am not alone."

Sarah Gilbert (1962-)

-designer of Astrazeneca vaccine



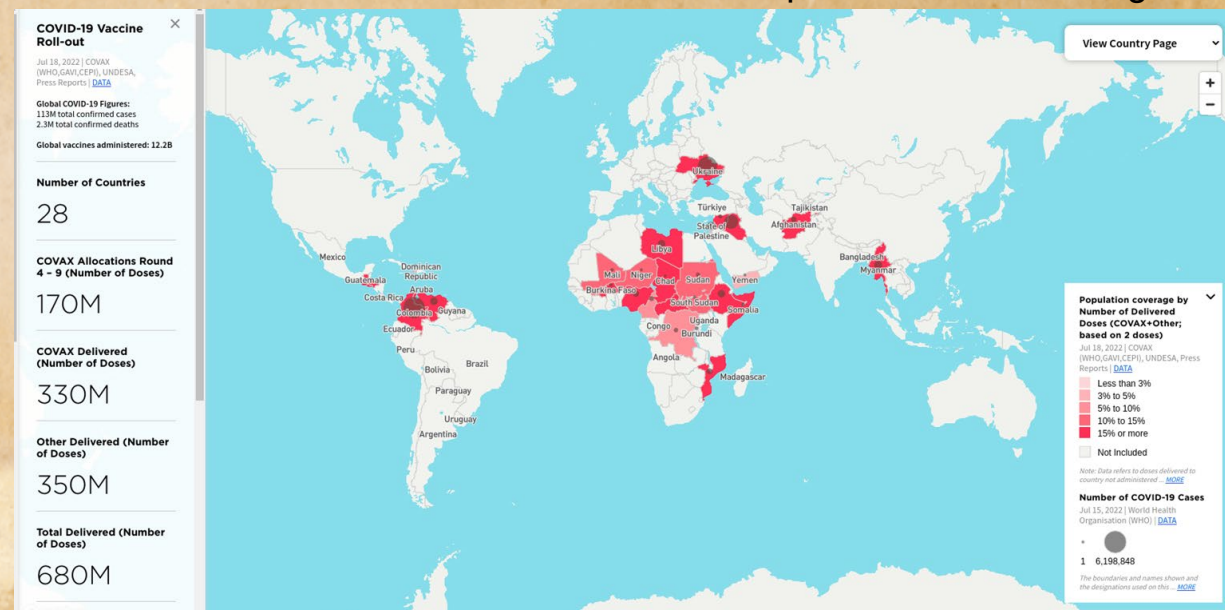
Escv2021, Public domain

- The moment Chinese scientists published genetic details of the new coronavirus, Gilbert's team set to work to create a Covid-19 vaccine.
- Trial results show 70% protection, but the researchers say the figure may reach as high as 90%.
- Gilbert has been developing vaccines against emerging diseases since 2014.

<https://data.humdata.org/>



Agência Brasília, CC BY 2.0



Lauren Gardner

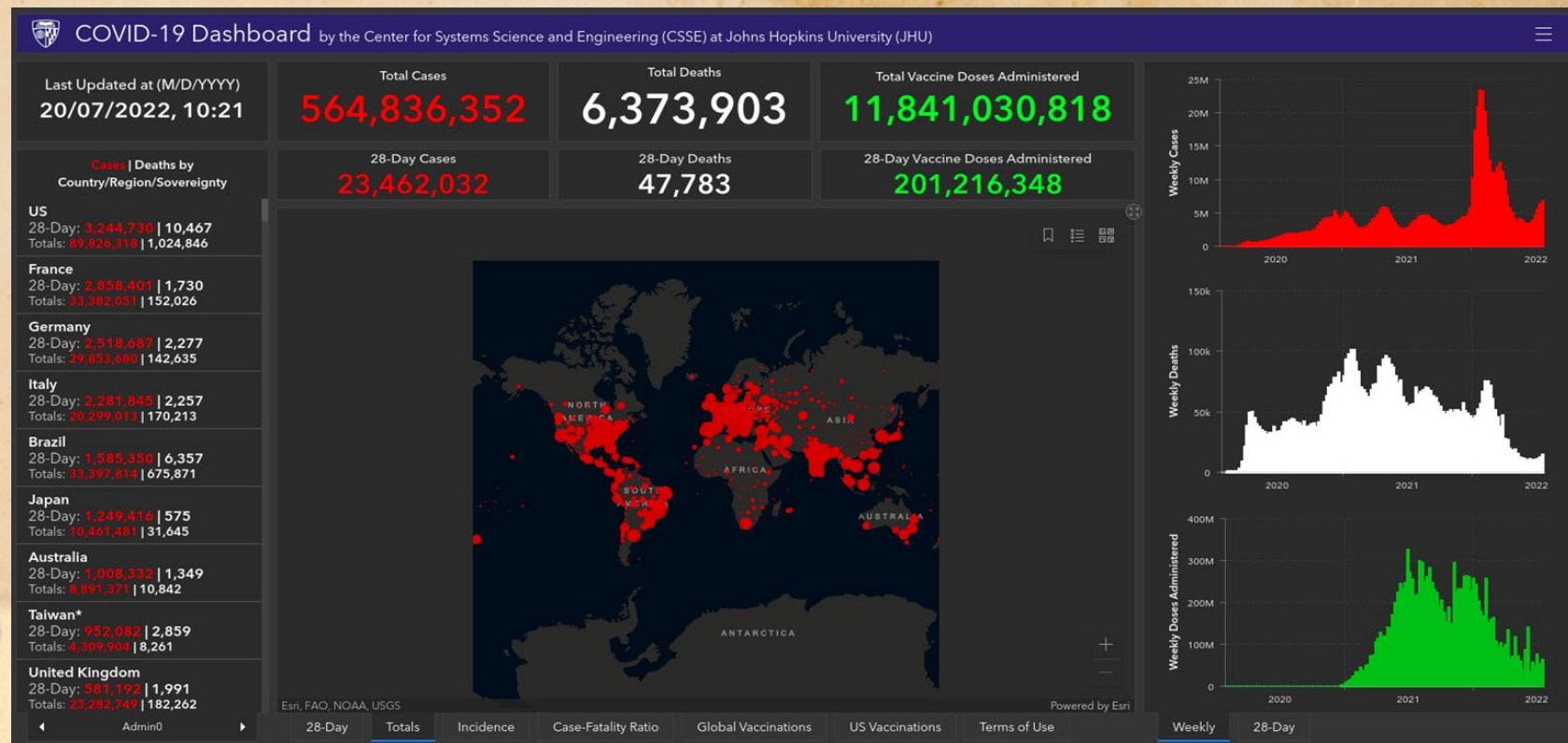
-Covid19 pandemic tracker



https://systems.jhu.edu/lauren_gardner/

- Gardner led the team that built the Covid-19 pandemic tracker that has become the authoritative source of Covid-19 case data. It is used by governments, infectious-disease researchers and media globally

<https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6>



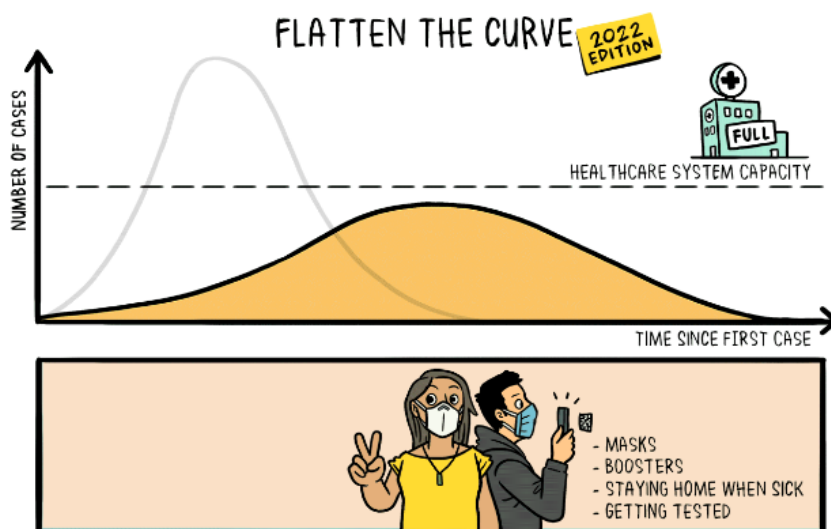
Siouxsie Wiles

-Public health communicator



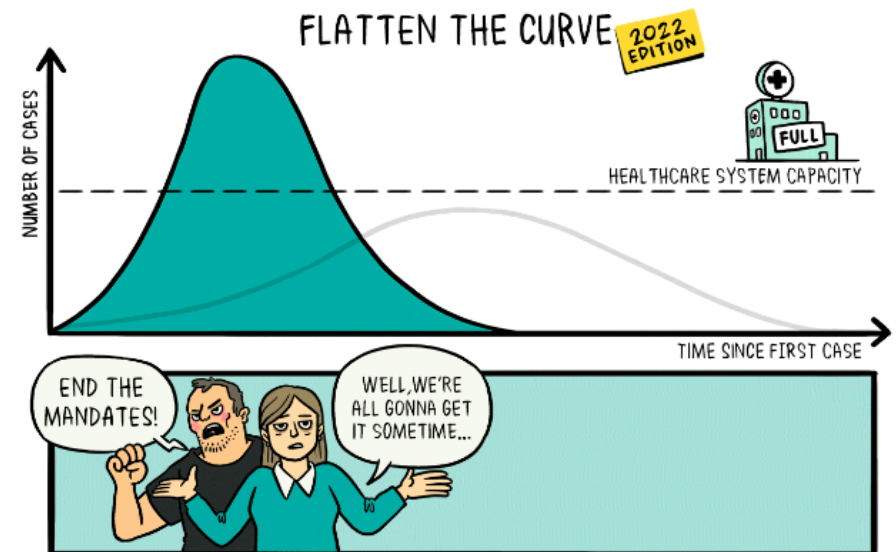
Nicgaston,
CC BY-SA 4.0

- Wiles and cartoonist Toby Morris joined forces to communicate the science of the pandemic. Their award-winning graphics have been translated into multiple languages and adapted by governments and organisations around the world.
- Named as one of the BBC's 100 influential women of 2020, Kiwibank New Zealander of the Year for 2021.



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