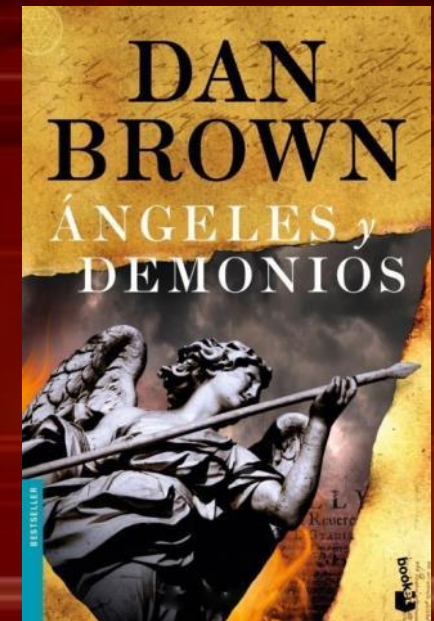
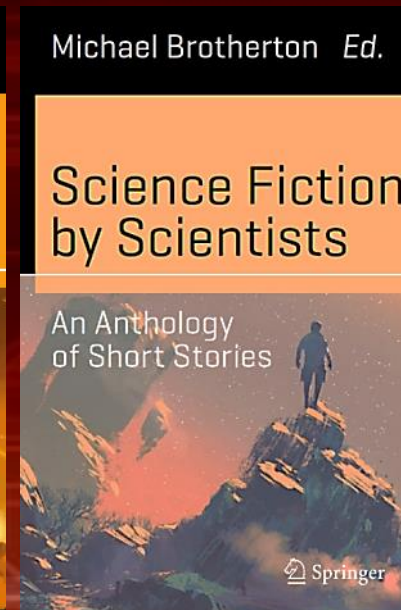
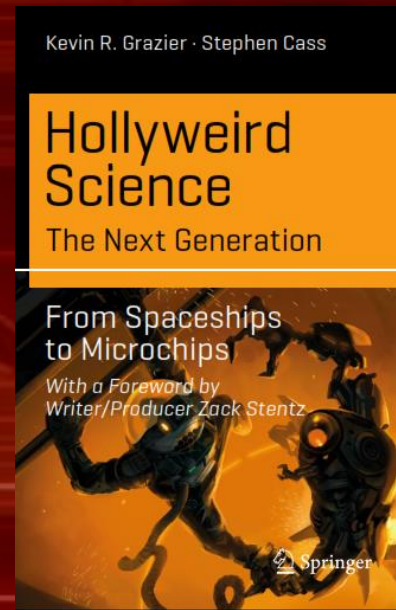
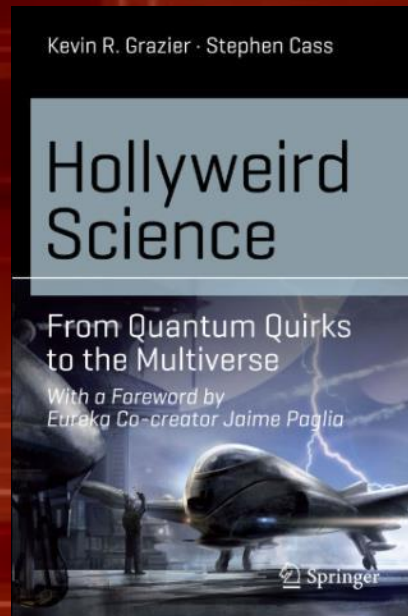
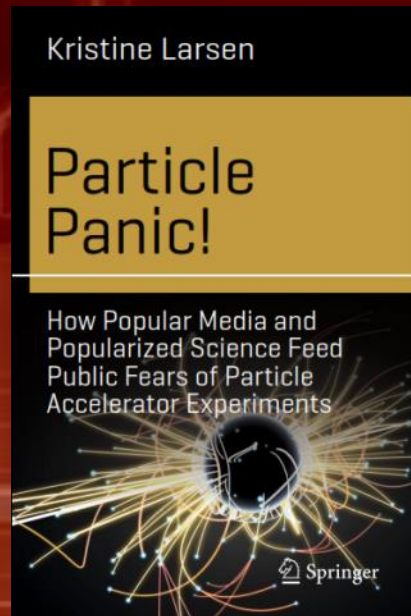


Curiosity. Angels or Demons?

Stereotypes of Scientists

Víctor M. Loyola Vargas

vmloyola@cicy.mx; vmloyola@gmail.com



Science is not only a discipline of reason, but also one of romance and passion.

Stephen Hawking

Science is a way of thinking much more than it is a body of knowledge.

Carl Sagan

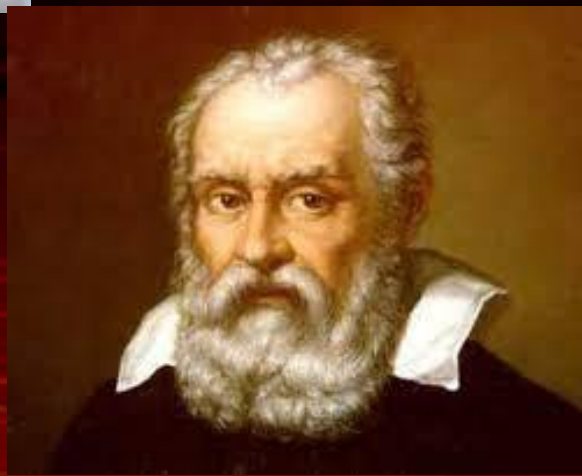
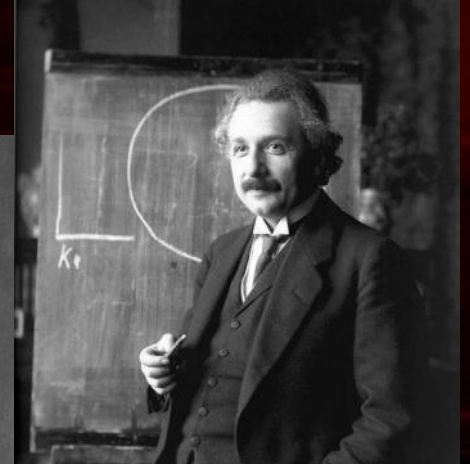
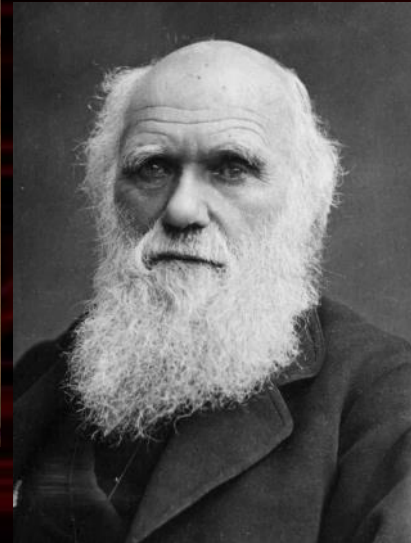
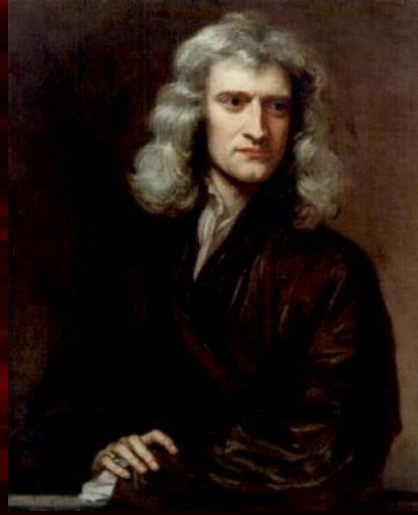
The most exciting phrase to hear in science, the one that heralds new discoveries, is not “Eureka” but “That’s funny...”

Isaac Asimov

You scare me, doctor. You risk your patients’ lives and justify it in the name of research. Genuine research takes time... sometimes a lifetime of painstaking, detailed work in order to get any results.

Beverly Crusher, Star Trek: The Next Generation, “Ethics” (1992)

What is the driving force behind scientific development?



Curiosity

Andrea Ghez



Donna Strickland

Public perception of science



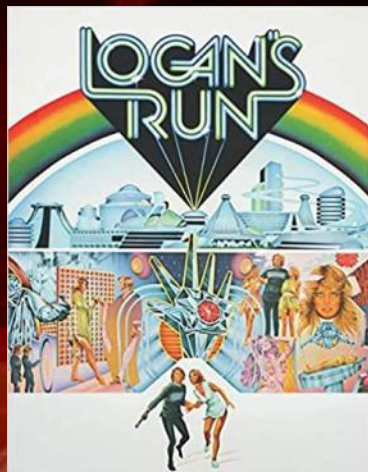
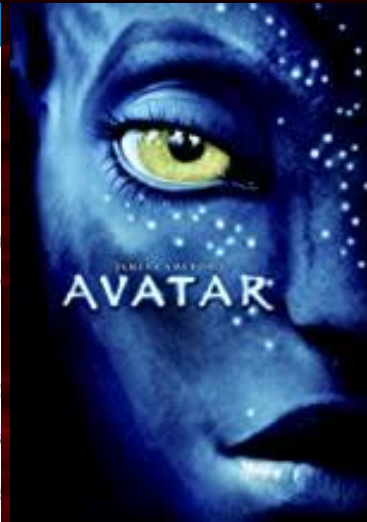
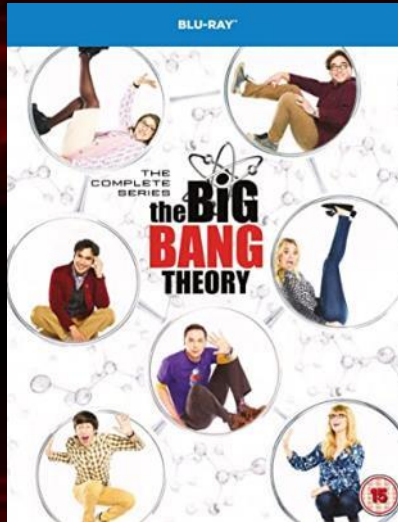
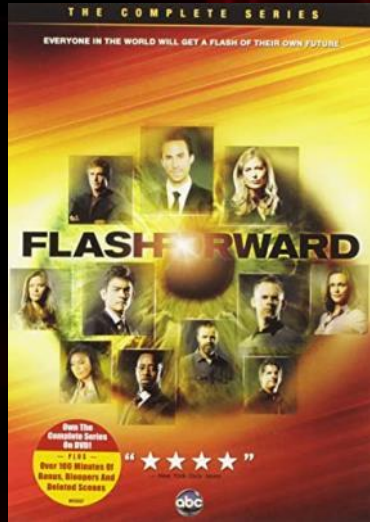
Scientific literacy

- In 1993, Dr. Jon Durant, director of the MIT museum and founding editor of the journal *Public Understanding of Science*, stated that basic science literacy is “**what the general public ought to know about science.**” Still, how much physics, chemistry, biology and astronomy does the average person really need to know? Durant outlined three levels of scientific knowledge.
 - Knowing Some Science.
 - Knowing How Science Works.
 - Knowing How Science *Really* Works.

Durant J., What is scientific literacy? *European Review* 2(01), 83–89, (1994).

Grazier K. y S. Cass, *Hollyweird Science. The next generation*, Springer, Cham, Switzerland, pp 1-420, (2017).

Stereotypes of Scientists in the media



The Mad Versus the Noble Scientist

- The images drawn of science and scientific work are deeply embedded in the culture^[1].
 - Arguably the most common of these images is the cartoonish mad scientist, hell bent on either proving a pet hypothesis correct or world domination (or both), no matter the cost.

SAGE PUBLICATIONS (www.sagepublications.com)

PUBLIC UNDERSTANDING OF SCIENCE

Public Understand. Sci. 12 (2003) 307–318

Between brains and breasts—women scientists in fiction film: on the marginalization and sexualization of scientific competence

Eva Flicker

[1] Flicker E., Between brains and breasts-Women scientists in fiction film: On the marginalization and sexualization of scientific competence, Public Understanding of Science, 12(3): [307-318](#), (2003).

The Mad Versus the Noble Scientist

- This image haunts our “world—down to the white-coated loonies of Saturday morning children’s TV and the plethora of Faustian bargains in popular culture, from the eponymous **Dr. Faustus** himself to **Dr. Frankenstein**, **Dr. Strangelove**, and **Jurassic Park**”^[2].

Faust is the protagonist of a classic German legend, a highly successful scholar, but also dissatisfied with his life, so he deals with the devil, exchanging his soul for unlimited knowledge and worldly pleasures.

1564-1593



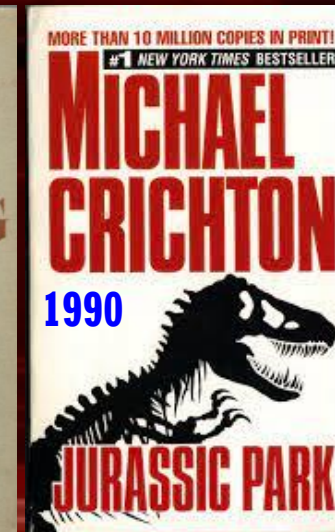
1749-1832



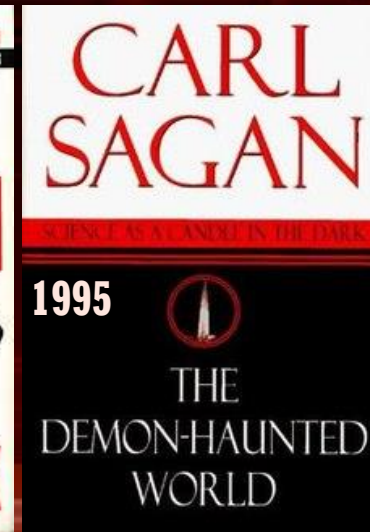
1875-1955



1942-2008



1934-1996



[2] Sagan C., The demon-haunted world, Random House, New York, pp 1-457, (1996). P 11.

The Mad Versus the Noble Scientist

- The iconic mad scientist looms large in a range of stereotypes of scientists Roslynn Haynes found in an analysis of Western literature.
 1. The “evil alchemist” who works in secret labs on illegal experiments.
 2. The “noble scientist”, the hero or savior of society.
 3. The “foolish scientist”, aka the absent-minded genius.
 4. The “inhuman researcher” who has sacrificed relationships, emotions, and all vestiges of humanity in the name of science.



SAGE PUBLICATIONS (www.sagepublications.com)

PUBLIC UNDERSTANDING OF SCIENCE

Public Understand. Sci. 12 (2003) 243–253

Roslynn Haynes

From alchemy to artificial intelligence: stereotypes of the scientist in Western literature



The Mad Versus the Noble Scientist

- The iconic mad scientist looms large in a range of stereotypes of scientists Roslynn Haynes found in an analysis of Western literature.
 1. The “scientist as adventurer”, such as the Doctor of **Doctor Who** or **Indiana Jones**;
 2. The “mad, bad, dangerous scientist”; and
 3. The “helpless scientist” who has no malicious intent, but whose experiment simply gets out of control and threatens the world.

SAGE PUBLICATIONS (www.sagepublications.com)

PUBLIC UNDERSTANDING OF SCIENCE

Public Understand. Sci. 12 (2003) 243–253

Roslynn Haynes

From alchemy to artificial intelligence: stereotypes of the scientist in Western literature

The Mad Versus the Noble Scientist

- In his commentary track to the film treatment of his novel *The Krone Experiment*, physicist J. Craig Wheeler pulls no punches when describing the titular character he portrays as a “**brain dead evil scientist**” who intentionally creates black holes that he cannot control^[3].

1943



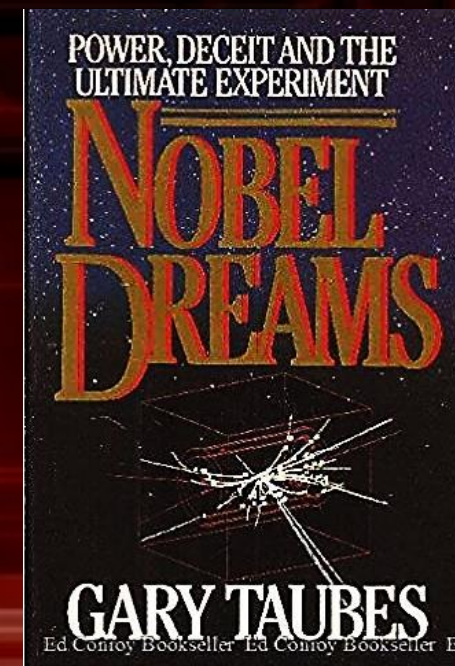
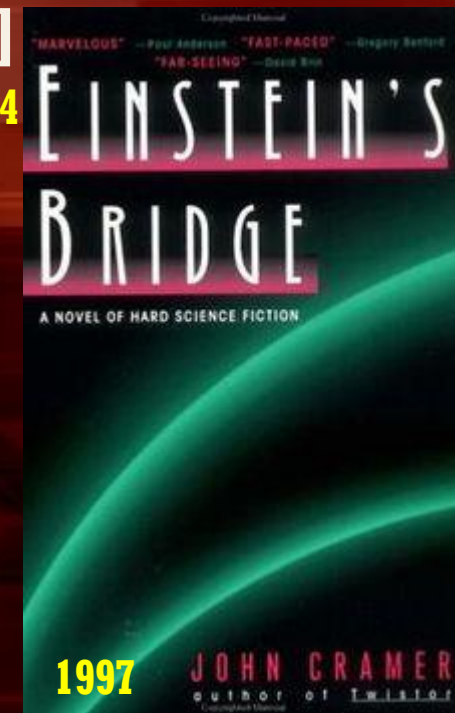
2012



[3]

The Mad Versus the Noble Scientist

- The difficult but brilliant Jake Wang, whose accelerator detectors have “produced excellent physics, and all of them have left a trail of broken minds and bodies in their wake”^[4] in John Cramer’s novel Einstein’s Bridge sounds suspiciously similar to the picture painted of Nobel Laureate Carlo Rubbia in Gary Taubes’ 1986 exposé Nobel Dreams: Power, Deceit, and the Ultimate Experiment^[4b].
 - In reviewing the novel, SF Site said “Cramer weaves a compelling tale.”^[2] Kirkus Reviews noted “Cramer splendidly demonstrates just how fascinating and mind-boggling real science can be, and shows exactly how vulnerable basic research is to political whim.”[Retrieved 22 Jan 2016.]



[4b] Taubes G., Nobel Dreams. Power, Deceit and the Ultimate Experiment, tempus, Washington, pp 1-261, (1986).

Reality

- Carlo Rubbia won a Nobel Prize for his work in experimental particle physics. The book recounts the tale of how the Prize was won.
 - From Taubes's description we come to see this scientist as a thoroughly unpleasant person, obsessed by the need to be best. He terrorizes his subordinates and co-workers and lies to his peers. Most disheartening is that he is interested only in publishing first and exhibits little patience for the kind of meticulous attention to detail that guarantees the accuracy of his results.
 - If Taubes's account is true, then the quest for the Nobel Prize may be doing more harm than good to the cause of scientific progress.

The Nobel Prize in Physics 1984

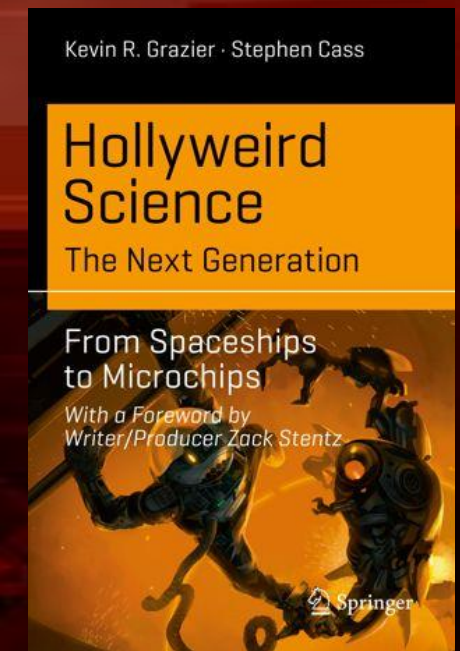
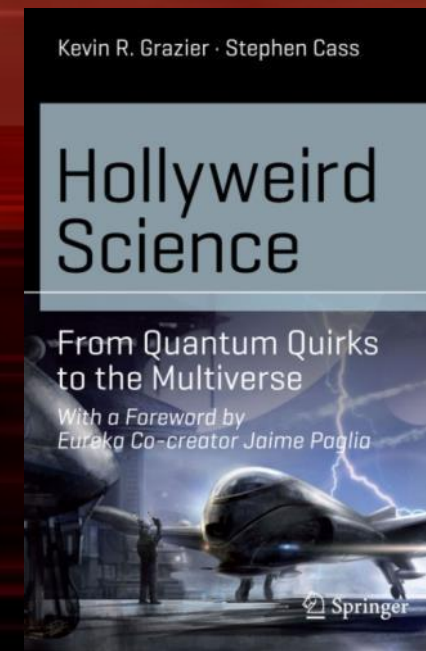
Harold D. Shane, Mathematics Dept., Baruch Coll., CUNY Copyright
1987 Reed Business Information, Inc.



<https://www.nobelprize.org/prizes/physics/1984/rubbia/biographical/>

The Mad Versus the Noble Scientist

- Classification of scientists in film and television:
 - Mad scientist.
 - Socially awkward nerd.
 - Sidekick.
 - Helpless victim.
 - Hero.
 - “Conflicted Protagonist ... a mash-up of protagonist and antagonist”^[8].
- There is a dichotomy in both classification schemes, with scientists leaning towards being either weak and ineffective or having strong, egotistical personalities.



The Mad Versus the Noble Scientist

**SCIENCE ON
TELEVISION:
How It Affects
Public Conceptions**

George Gerbner

- Is there evidence that the prevalence of these negative stereotypes translates into mistrust of real world scientists?
 - An analysis led by George Gerbner of primetime television dramas aired between 1973 and 1983 found that these shows represent the medium through which Americans “encounter science and technology most often”^[9].
 - This study found that, while most individual portrayals of scientists were positive, the percentage of evil scientists was far higher than evil physicians (with 1 in 6 scientists depicted as evil, as opposed to 1 in 20 doctors).
 - Scientists were also more likely to be described as older, odd, unsocial loners, an image summarized by Gerbner as being “somewhat foreboding, touched with a sense of evil, trouble, and peril”^[9].

[9] Gerbner G., Science on television: How it affects public conceptions, *Issues in Science and Technology*, 3(3):109-115, (1987)

The Mad Versus the Noble Scientist

- These results agree with more recent data cited by the National Science Board showing that between 2001 and 2016 the percentage of Americans who felt scientists are “apt to be odd and peculiar” rose from 24% to 52%^[10].

[10] National Science Board, *Science & Engineering Indicators 2018* (National Science Foundation, Alexandria), pp. [7–66](#), (2018).

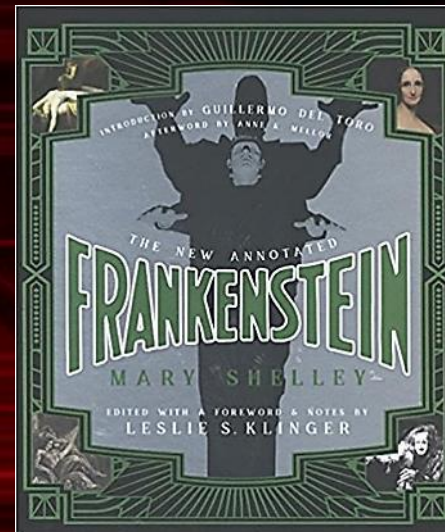
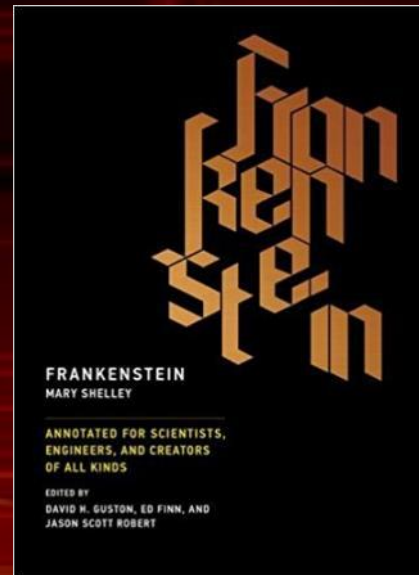
Dr. Alexander Thorkel of *Dr. Cyclops* (1940) illustrates the stereotype of the mad scientist (Paramount Pictures, public domain, via Wikimedia Commons)



The Mad Versus the Noble Scientist



- Reviewing specific examples of fictional scientists demonstrates the staying power of these negative stereotypes (and hence their potential influence on public opinions of both scientists and the science they do).
 - Arguably the most (in)famous fictional scientist is **Victor Frankenstein**. A victim of his own hubris, Frankenstein's secret experiments not only ultimately lead to his own death, but also the deaths of those he loves.



Facts

- The book has 4 letters and 24 chapters.
- Mary does not appeared as the author in the first edition.
- There is not a precise date for the facts related in the novel.
- Percy Shelley edited the original manuscript.
- VF is not named doctor.
- VF never name his creation.
- **VF did not have an assistant.**

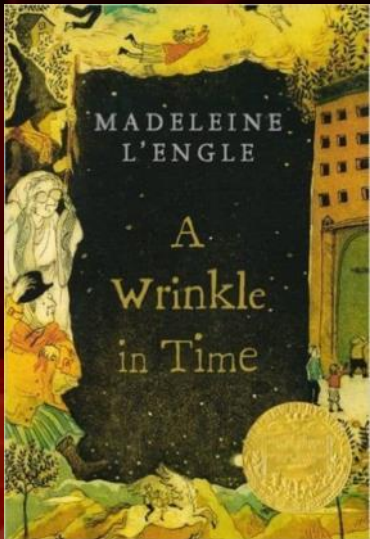


Igor (2015)
Daniel Radcliffe

The Mad Versus the Noble Scientist

- Another helpless scientist in a more recent tale is Mr. Murry, the father in Madeleine L'Engle's 1962 novel *A Wrinkle in Time*.
- After the government physics experiment in “tessering” (traveling through a fifth dimension) unexpectedly brings him to the alien and hostile world of Camazotz, Murry is held hostage until he is rescued by his children. He calls himself a “wiser and humbler man” and is eager to warn his physicist colleagues that “we know nothing... We're children playing with dynamite. In our mad rush we've plunged into this” [11].

[11]

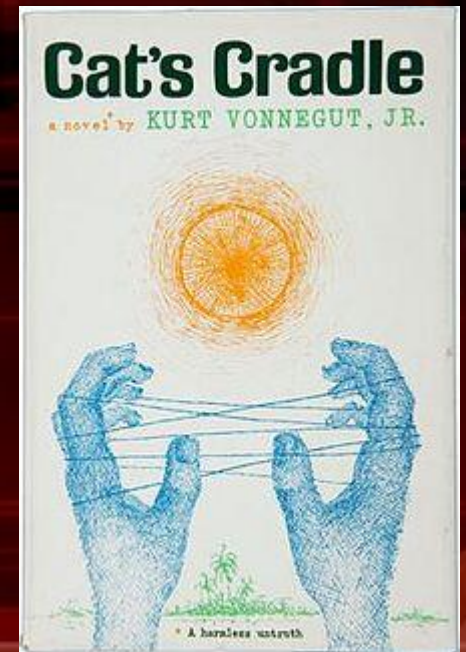


<http://www.avalontheatregj.com/events/dinner-shopping-movie-wrinkle-time>



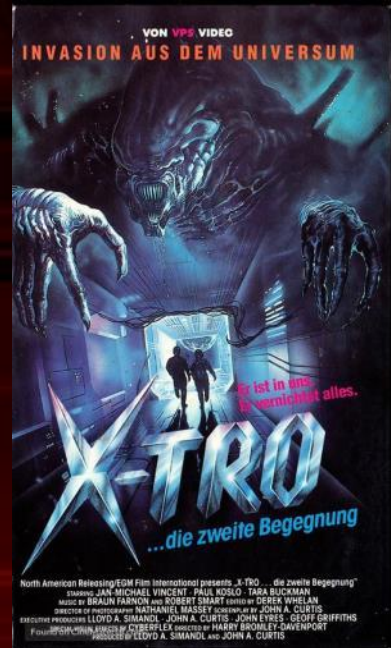
The Mad Versus the Noble Scientist

- Both a foolish and inhuman scientist, Dr. Felix Hoenikker of Kurt Vonnegut's classic 1963 novel *Cat's Cradle* is emotionally stunted and unable to relate to his beautiful wife. Called odd by all who knew him (including his youngest son), he felt no compunction for his part in creating the first atomic weapons. When asked by the military to create a solution to the logistical problem of carrying out military maneuvers under muddy conditions, he created ice-nine, ignoring the catastrophic implications of a material that instantly solidifies water into ice at room temperature.



The Mad Versus the Noble Scientist

- The noble scientist is often set in direct opposition with his mad counterpart.
 - For example, director Harry Bromley-Davenport's *Xtro II: The Second Encounter* (1990) features a struggle between mad scientist Dr. Alex Summerfield, director of the Nexus Program, and noble Dr. Ron Shepherd.
 - A previous particle accelerator experiment had created a doorway to a hostile parallel dimension, and as the sole survivor to return from exploring that hell, Shepherd had destroyed the facility to prevent its further use. When only one member of an exploration team sent by the new accelerator returns from the parallel world, Shepherd not only advises against a rescue party, but tries to murder the survivor before she infects the rest of them with the parasitic alien she carries (in homage to the classic film *Alien*).



The Mad Versus the Noble Scientist

- Summerfield, the first to be infected, wants to capture the newborn creature alive, even as it murders most of their ranks. Shepherd banishes his mad colleague to the parallel dimension before he can spread the infection further, thus proving that the mad scientist rarely meets with a good end.
- The noble character often “fails to communicate the danger effectively—often because he is so socially removed” or is reduced to a “passive pawn ... **controlled or co-opted by the military or big business**”^[12].

The image of scientists in
***The Big Bang
Theory***

Margaret A. Weitekamp

[12] Weitekamp M. A., The image of scientists in The Big Bang Theory, Physics Today, 70(1):~~40-48~~, (2017).

The Big Bang Theory



The Mad Versus the Noble Scientist

- Therefore, even when a fictional male scientist tries to act heroically, for example in the role as the lone voice of reason, he is frequently not taken seriously by those around him (often to the detriment of society). While one can argue that this is necessary for the sake of dramatic tension, this emasculation of male scientists propagates a negative stereotype. As Haynes reflects, the bottom line is that “good scientists are clearly in the minority”^[7].

Scientists as Active Villains

Gee, Brain, what do you want to do tonight?

The same thing we do every night, Pinky, try to take over the world!

Pinky and The Brain, *Pinky and The Brain*

Yes, I am a nerd.

Gale Boetticher, *Breaking Bad*, "Sunset"

"One of the things we tried to do with this film [*Aliens of the Deep*] was to show what scientists are really like, which is they're people. And sometimes they're really cool people, and they really care about what they're doing. They're not driven by a materialistic value system. They're seeking something else, something more important. That message speaks to me."

James Cameron

Screenwriters

INT. WATSON'S OFFICE, CAVENDISH LABORATORY - DAY

Watson and Crick stare across the desk from one another. Watson is pissed, and slams the desk with his fist.

WATSON

It's only a matter of time until Pauling realizes his model has one too many helixes. I need that diffraction data!

CRICK

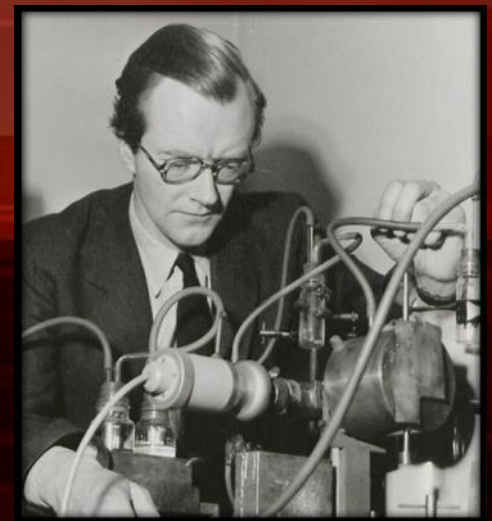
Dammit, Jim, I'm a physicist, not... Watson just stares knowingly.

CRICK

I'll get right on that. Crick turns on his heel and heads for the door. Watson calls after him.

WATSON

What about Franklin's data? Use that, just don't tell her.



The dark side of Science



Albert Einstein
Old Grove Rd.
Massau Point
Peconic, Long Island

August 2nd, 1939

F.D. Roosevelt,
President of the United States,
White House
Washington, D.C.

Yours very truly,
A. Einstein
(Albert Einstein)

-2-

The United States has only very poor ores of uranium in moderate quantities. There is some good ore in Canada and the former Czechoslovakia, the most important source of uranium is Belgian Congo.

In view of this situation you may think it desirable to have some constant contact maintained between the Administration and the group of physicists working on chain reactions in America. One possible way of achieving this might be for you to entrust with this task a person who has your confidence and who could perhaps serve in an unofficial capacity. His task might comprise the following:

- a) to approach Government Departments, keep them informed of the latest developments, and put forward recommendations for Government action, paying particular attention to the problem of securing a supply of uranium for the United States;
- b) to speed up the experimental work which is at present being carried on within the limits of the budgets of University laboratories, by raising funds, if such funds be required, through his contacts with private persons who are willing to make contributions for this cause, perhaps also by obtaining the co-operation of industrial laboratories which have the necessary equipment.

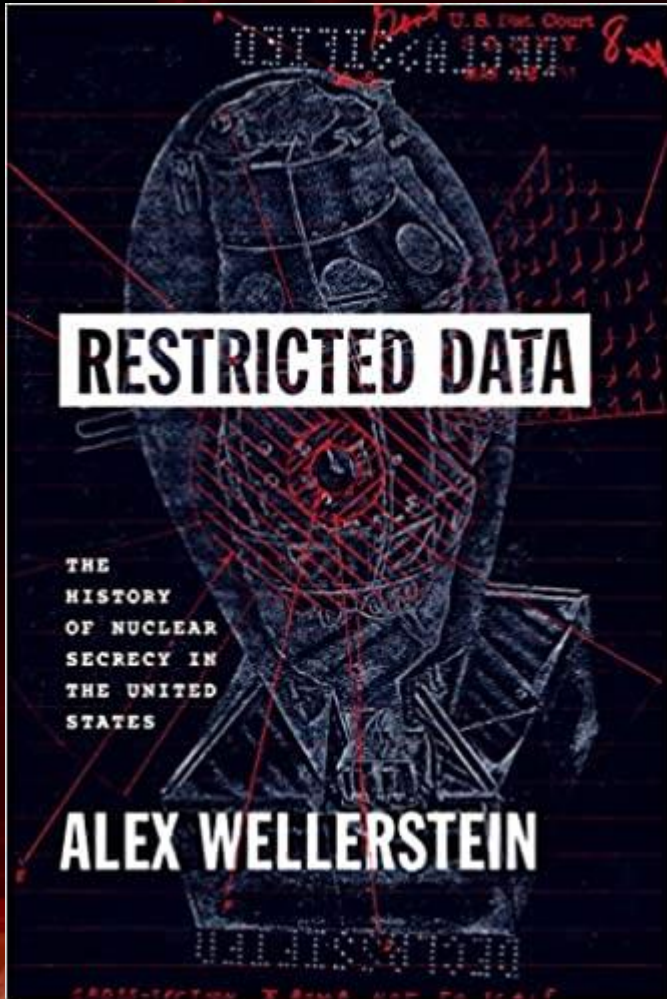
I understand that Germany has actually stopped the sale of uranium from the Czechoslovakian mines which she has taken over. That she should have taken such early action might perhaps be understood on the ground that the son of the German Under-Secretary of State, von Weizsäcker, is attached to the Kaiser-Wilhelm-Institut in Berlin where some of the American work on uranium is now being repeated.

Yours very truly,
A. Einstein
(Albert Einstein)



This new phenomenon would also lead to the construction of bombs, and it is conceivable - though much less certain - that extremely powerful bombs of a new type may thus be constructed. A single bomb of this type, carried by boat and exploded in a port, might very well destroy the whole port together with some of the surrounding territory. However, such bombs might very well prove to be too heavy for transportation by air.

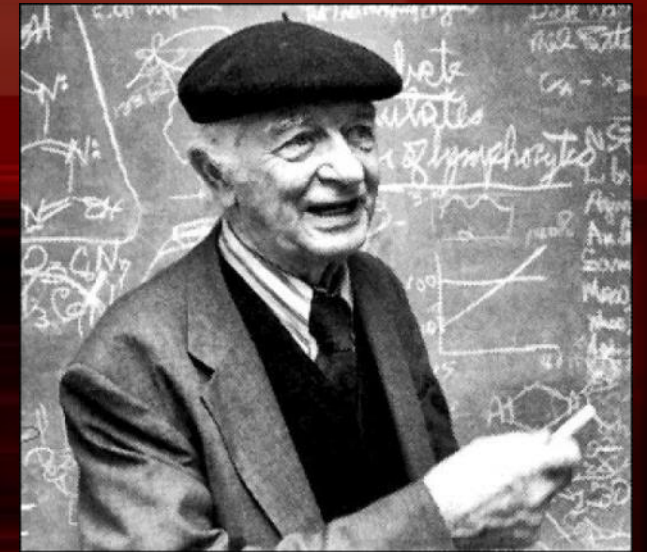
The Manhattan project



"By using this type of weapon for the first time, we align ourselves with the barbarians of the early ages."



Robert Oppenheimer



Linus Pauling. PNP 1962

The only sensible policy for the world is to eliminate war.

Acceptance Speech (December 11, 1963)

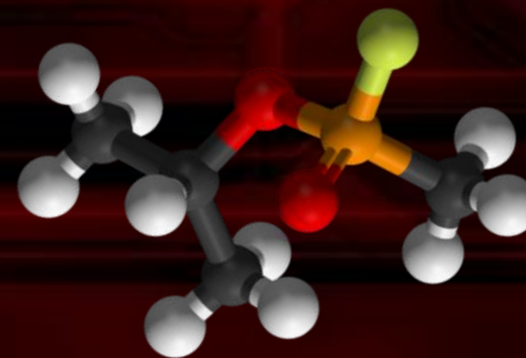
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The Yoda's path to the dark side



1918. Fritz Haber: for his method of synthesizing ammonia from its elements, nitrogen and hydrogen.

1931. Carl Bosch. In recognition of their contributions to the invention and development of chemical high pressure methods.



Chlorine, chloropicrin, phosgene, bis(2-chloroethyl) sulfide

**Propan-2-yl methylphosphonofluoridate
(Sarin)**

Asilomar conference held in February 1975

Recombinant DNA technology entails the joining of DNA from different species and the subsequent insertion of the hybrid DNA into a host cell.

Herbert W. Boyer (UC/SF) and Stanley N. Cohen (Stanford University)



Paul Berg

1980 Nobel Prize in Chemistry with
Walter Gilbert and Frederick Sanger

At the Asilomar Conference on Recombinant DNA, these concerns were discussed and a voluntary moratorium on recombinant DNA research.

Paul Berg and Maxine Singer in 1995, said that the conference marked the beginning of an exceptional era for both science and the public discussion of science policy.

https://en.wikipedia.org/wiki/Herbert_Boyer

https://en.wikipedia.org/wiki/Stanley_Norman_Cohen

Women

(1985)

Carl
Sagan

CONTACTO

2011



Jane Foster, astrophysics

Natalie Portman
Neta-Lee Hershlag



Ellie Arroway, astrophysics

A Simple Method To Demonstrate the Enzymatic Production of Hydrogen from Sugar

Natalie Hershlag

Syosset High School, Syosset, NY 11791

Journal of Chemical Education • Vol. 75 No. 10 October 1998

Ian Hurley

Department of Obstetrics and Gynecology, North Shore University Hospital, Manhasset, NY 11030

Jonathan Woodward*

Chemical Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831-6194

High school paper

Frontal Lobe Activation during Object Permanence: Data from Near-Infrared Spectroscopy

Abigail A. Baird,* Jerome Kagan,* Thomas Gaudette,† Kathryn A. Walz,*
Natalie Hershlag,* and David A. Boas†

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Received November 13, 2001

NeuroImage 16, 1120–1126 (2002)
doi:10.1006/nimg.2002.1170



Stereotypes of Female Scientists

- Eva Flicker found six specific stereotypes of women scientists:
 1. The old maid who is married to her work (until she abandons her science and reclaims her femininity through her love for a man).
 2. The male woman (a middling, asexual scientist who relies on her assertiveness to survive in an all-male environment).
 3. The naïve expert (ethical, good-looking, but ineffective).
 4. The evil plotter (an attractive, self-absorbed vixen with questionable morals who wields her sexuality as a weapon).
 5. The daughter/assistant (whose character is defined only through her relationship with a male scientist).
 6. The lonely heroine (a strong, competent, ethical scientist and who can simultaneously be feminine but who still requires a male mentor to be successful).

Stereotypes of Female Scientists

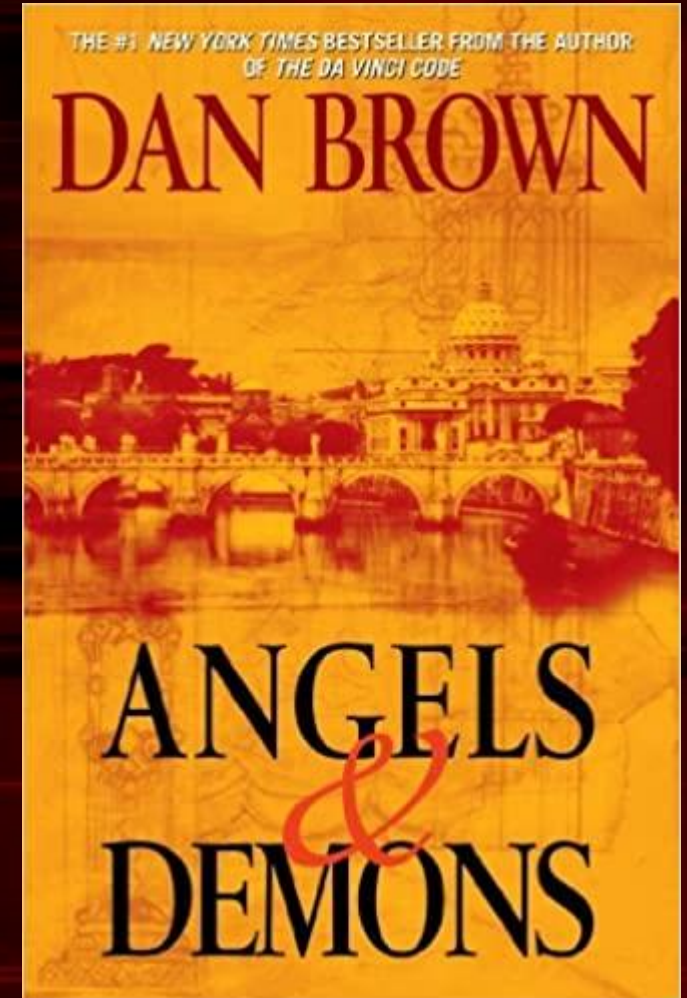
- Interestingly Flickr did not encounter female examples of the classic mad scientist working alone in a secret laboratory on dangerous projects. While this may be strictly true for her sample, depictions of fictional female scientists working on particle accelerator related projects are often hardly positive.

Physical chemist Barbara Askins, the first individual woman to receive the National Inventor of the Year Award, is unfortunately depicted as the stereotype of the “male woman” scientist in this photograph (NASA, Public domain, via Wikimedia Commons)



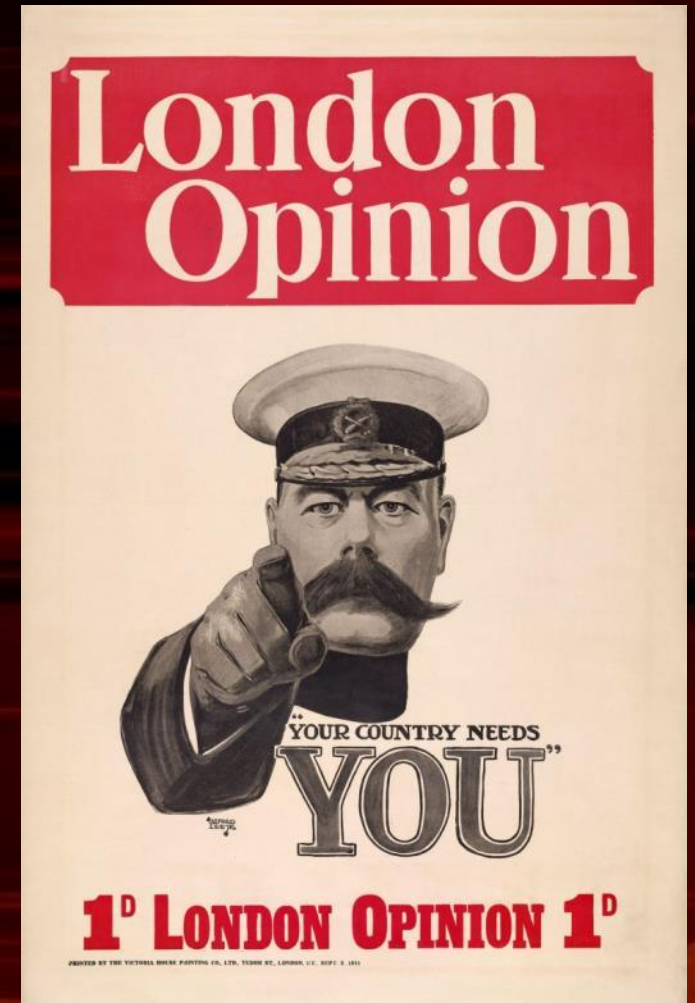
Stereotypes of Female Scientists

- In Ron Howard's 2009 film **Angels & Demons** CERN scientists **Vittoria Vestro** and Father Silvano Bentivoglio have the electricity temporarily cut to their experiment because colleagues are concerned by their attempt to generate and contain a significant amount of antimatter at the **Large Hadron Collider**. Vittoria rejects a plea to wait (it is implied until safety issues can be checked), and threatens to call the Director to complain. After her colleague pleads, "Don't blow us all to heaven", an intentional pun on the religion aspects of the film, their experiment is a success. Silvano is visibly uneasy with their result while Vittoria is exuberant.



Stereotypes of Female Scientists

- The 2013 German-Austrian made for television project **Heroes-When Your Country Needs You**, directed by Hansjörg Thurn, features a very different depiction of a female particle physicist. Creates a black hole that changes the planet's electromagnetic and gravitational fields. The world is in chaos as satellites and airplanes fall from the sky, the communication grid collapses, and mountains suddenly appear, thrusting upward from the crust.

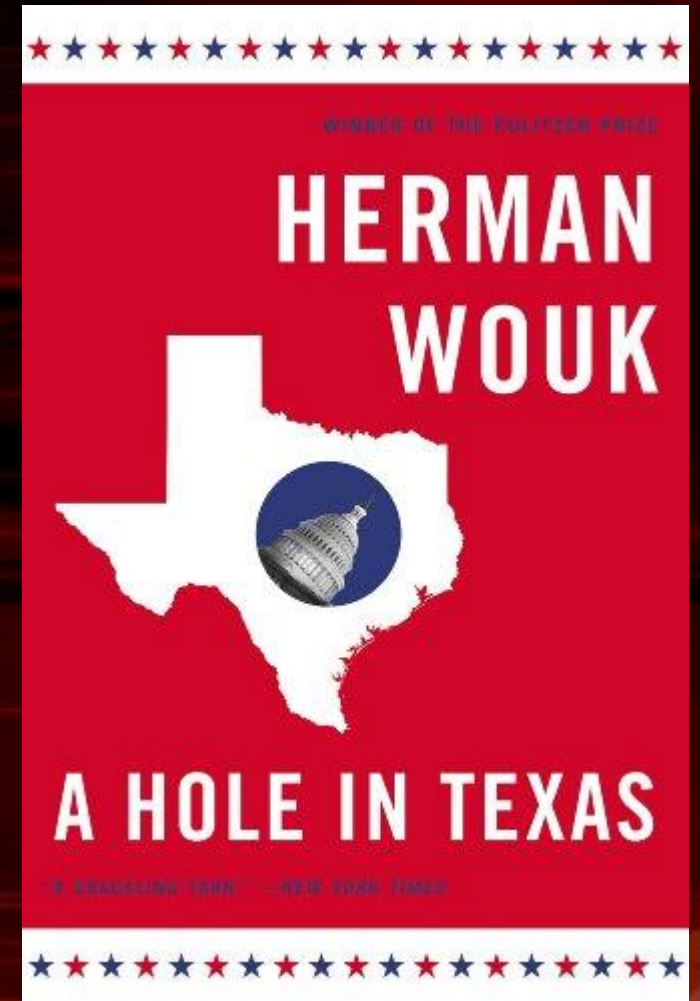


Stereotypes of Female Scientists

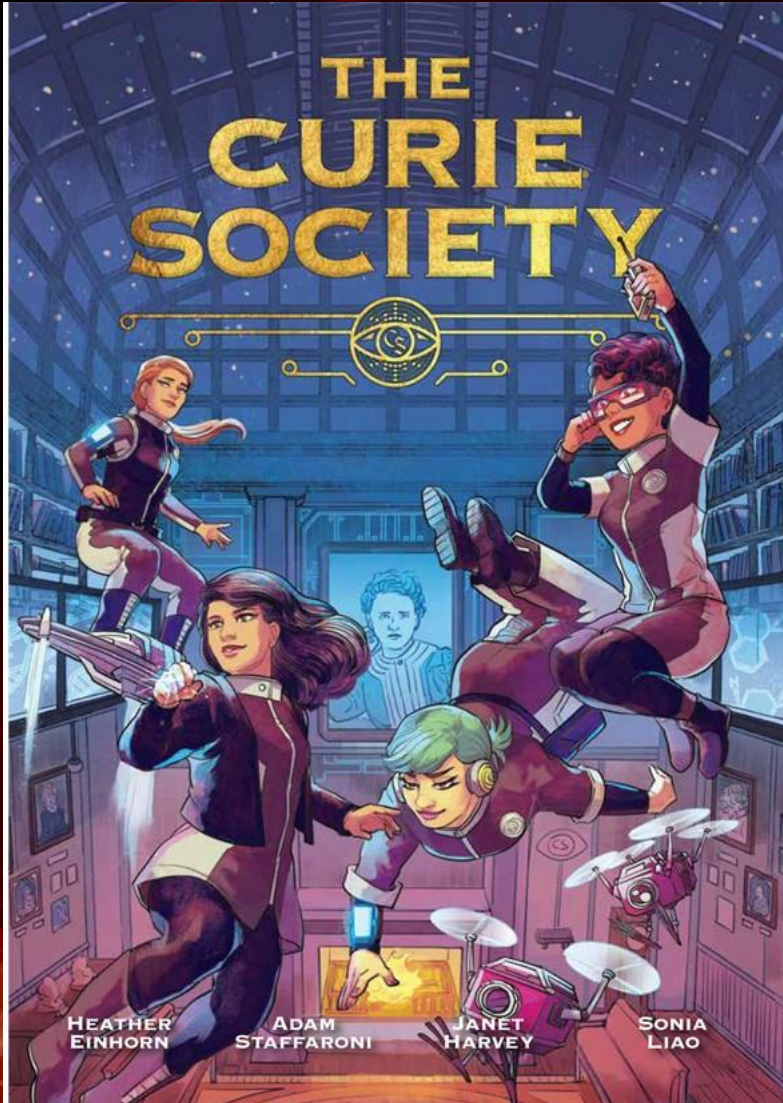
- The hero(ine) of the film, the young scientist **Sophie Ritter**, has the dubious satisfaction of knowing that she had been right about the dangers she had predicted as part of her thesis, warnings that had been rejected by the scientific establishment.

Stereotypes of Female Scientists

- **Dr. Wen “Wendy” Mei Li**, Herman Wouk’s fictional female physicist in *A Hole in Texas*, exhibits stereotypically male confidence as she testifies before a Congressional committee about her country’s apparently successful Higgs program. Although she strongly ridicules any notion of a “Boson Bomb” and chastises the U.S. for having lost the opportunity to discover the Higgs particle following the cancellation of the SSC, more attention is paid to her previous love affair with fellow particle physicist Guy Carpenter than her current science.



Stereotypes of Female Scientists



The Curie Society

Heather Einhorn et al. MIT Press (2021)

“Now is the time to understand more, so that we may fear less.” Marie Curie’s words preface this action-adventure graphic novel fostered by a group of female scientists from varied disciplines who aim to inspire young women. Created by Heather Einhorn and Adam Staffaroni with writer Janet Harvey and artist Sonia Liao, it shows the three diverse heroines of the secret Curie Society using brains, resourcefulness and cutting-edge technology to outwit nefarious rogue scientists who threaten the world. Right on!

Another kind of demon

- Women.
- Racism.
- Couples.

8 BIOMEDICAL COMPUTATION REVIEW SPRING 2006

THE *Female* Factor:

BY KRISTIN COBB PhD

Is the
gender gap
in computer
science
carrying
over to
biomedical
computing?

Women must not be obscured in science's history

The literature has often failed to acknowledge female researchers. But a new generation is changing the narrative.

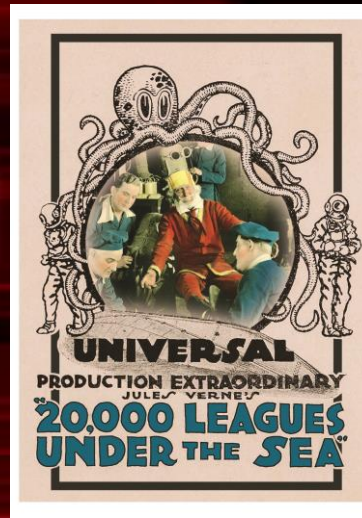
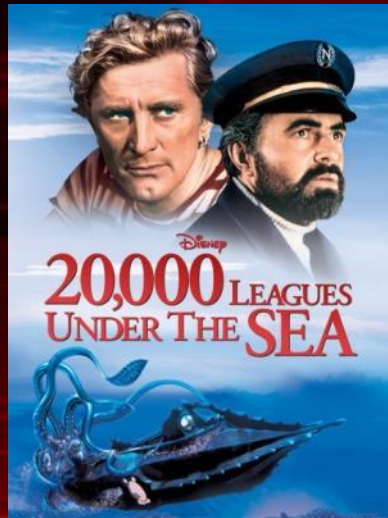
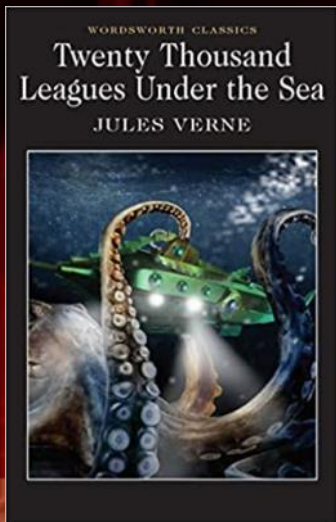
Nature | Vol 591 | 25 March 2021 | **501**

Scientists and Gender/Racial Demographics in Art

- US in 2001, 82% white, 2.5% black, 13% Asian, 3% Hispanic or Indian.
 - 72% men; 28% women.
- US in 2011, 81% white, 2.75% black, 12.5% Asian, 4% Hispanic, Indian/Alaskan Native, or other.
 - 68% men; 32% were women.
- Does Art simply imitate life?

Art

- Captain Nemo from Jules Verne's novel **20,000 Leagues Under the Sea**, first published in 1870. Although it is arguable whether Nemo is a scientist, or just very science-literate, the character is often cast as **Caucasian**, while in the novel, Nemo was the **Indian Prince Dakkar**, son of the Raja of the Kingdom of Bundelkund—a region in central India.



Public Understand. Sci. 12 (2003) 307–318

Between brains and breasts—women scientists in fiction film: on the marginalization and sexualization of scientific competence

Eva Flicker

The popular media, film, cinema and television, contribute to the public's general understanding of science. This article focuses on the portrayal of female scientists and the reception of such depictions within the general understanding. The article questions: the images depicted; their relation to scientific reality; how such depictions have changed over time (1929–1997); and their significance within the broader social context.

Stereotypes of Female Scientists

- Throughout much of the history of Western Culture, science has been viewed as primarily the domain of men, with this stereotype being especially true in the physical sciences. While women scientists are thankfully no longer seen as odd exceptions, the statistics remind us that women in the physical sciences are far from reaching parity with men.
 - For example, in 1975 only 5% of the Ph.D.s in physics awarded in America were earned by women; this percentage was 18% in 2016 (down from a high of 23% in 2000 and 2003).
 - A meta-analysis by three researchers at the University of Melbourne of 36 million authors published in over 6,000 STEM (Science, Technology, Engineering, and Mathematics) and medical journals over the past 15 years showed that, at the rate things are improving for women in terms of publications, it will be over 250 years before the percentage of female to male senior authors in physics reaches about 45%^[14].

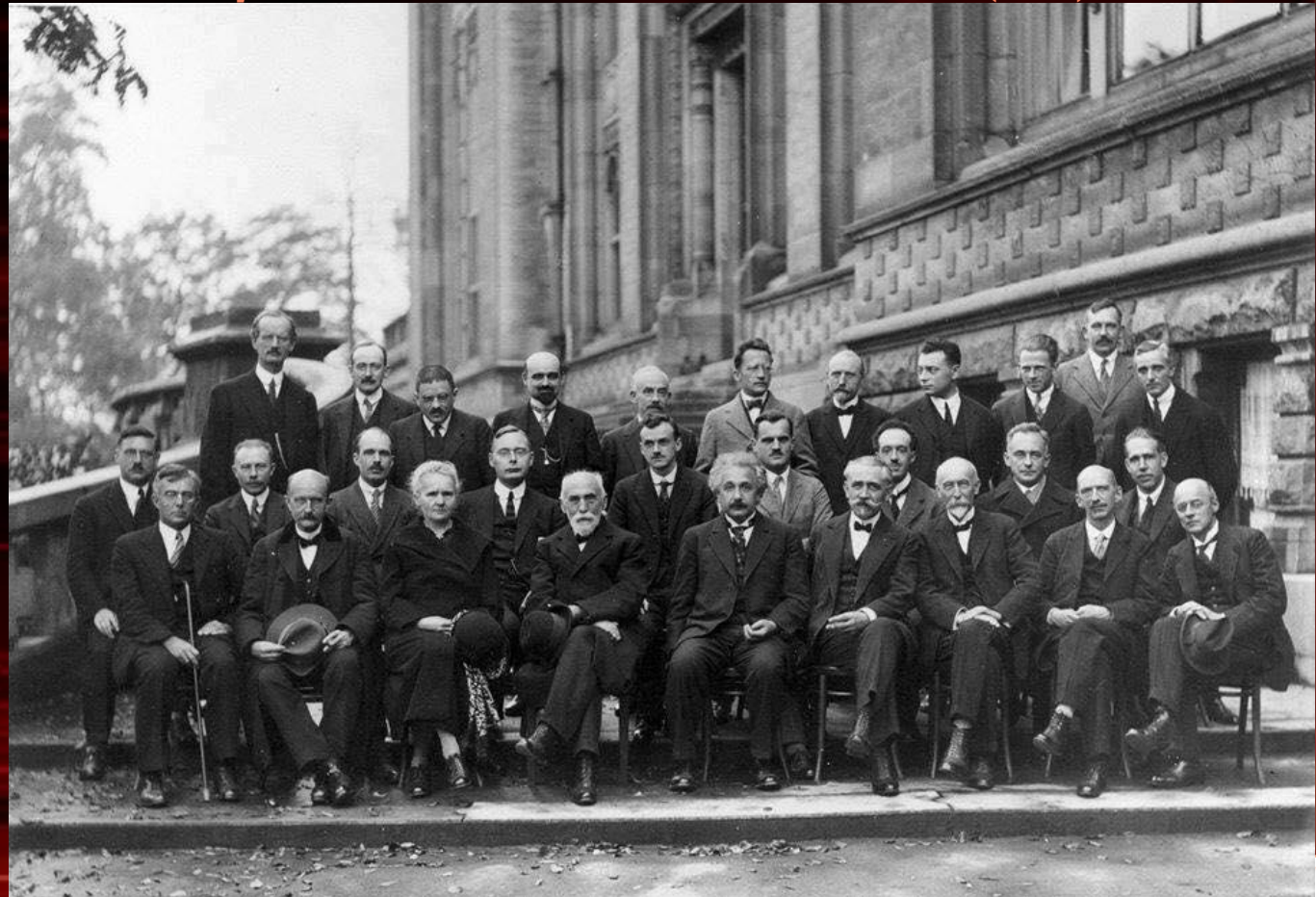


[14] Holman L. et al., The gender gap in science: How long until women are equally represented?, *Plos Biol.*, 16(4):[e2004956](#), (2018).

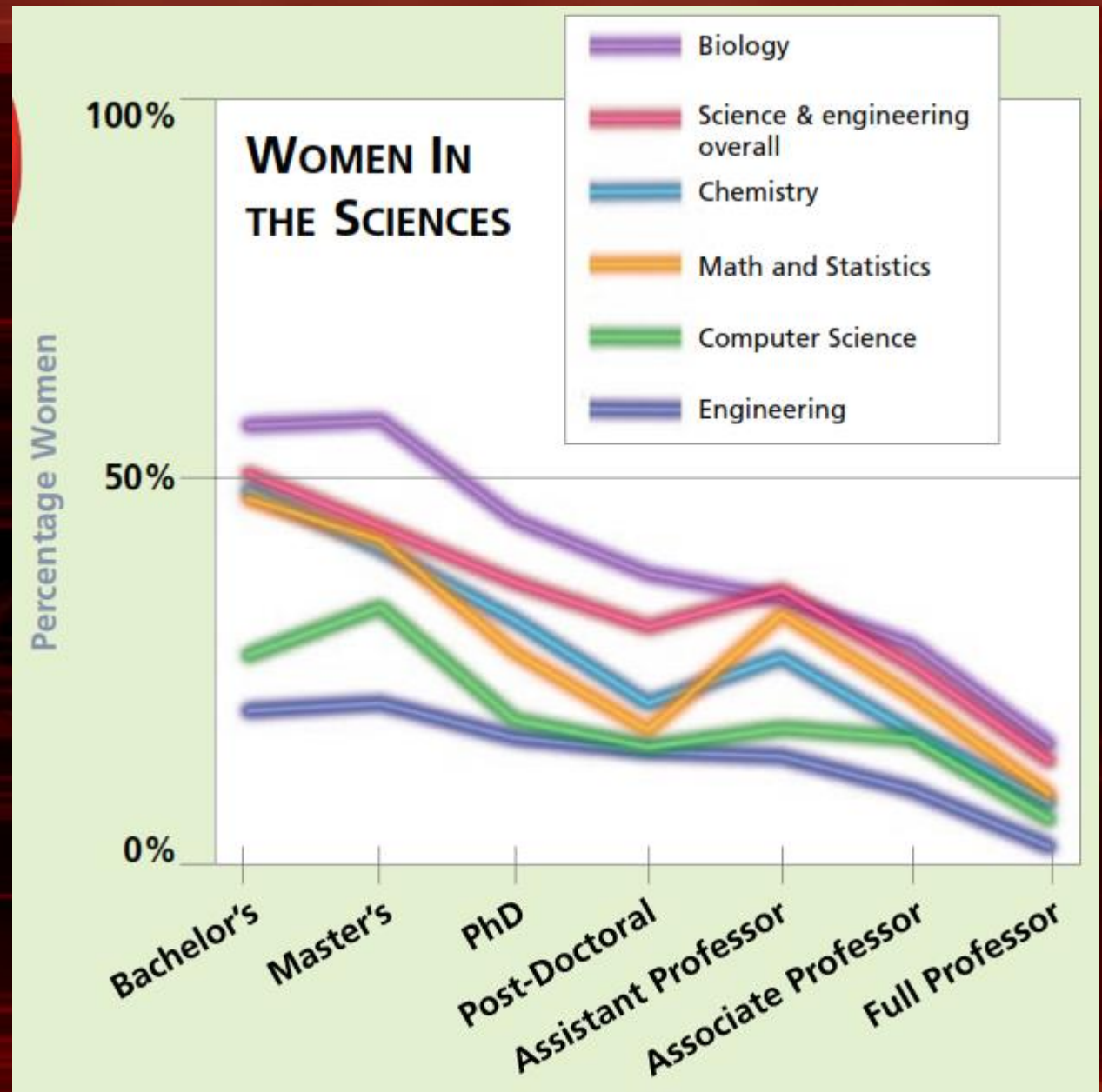
What is wrong with these pictures?



Solvay Conference on Electrons and Photons (1927)



NP women



The other demon

KATHERINE JOHNSON

1918-

DOROTHY VAUGHAN

1910-2008

MARY JACKSON

1921-2005

KATHERINE JOHNSON, DOROTHY VAUGHAN AND MARY JACKSON WERE BLACK FEMALE MATHEMATICIANS WHO WORKED AT NASA DURING THE SPACE RACE. THE VISIONARY TRIO CROSSED ALL GENDER AND RACIAL LINE AND INSPIRED GENERATIONS.

THEY
CHANGED
STEM

WONDERFULWORLD.OF.ELECTRONICS.COM

LO FORTINO BULLAS 2018

CC BY



Nobel prizes

	Prizes	Laureates	Women
Physics	114	216	4
Chemistry	112	186	7
Medicine	111	222	12
Literature	113	117	16
Peace	101	135	17
Economic	52	86	2
	603	962	58



Women in science

In 2018 Donna Strickland became only the third woman in history (and the first in 55 years) to win a Nobel Prize in Physics,

NP Physics 1962



Maria Goeppert Mayer
became a full professor at
just 54 years old.

NP Physics 2018



Donna Strickland

NP Physics 2020



Andrea M. Ghez

Stereotypes of Female Scientists

- In 2016 Fabiola Gianotti became the first woman Director-General of CERN.



The current Director-General of CERN, Fabiola Gianotti, alongside the ATLAS experiment (CERN, CC BY-SA 4.0, via Wikimedia Commons)

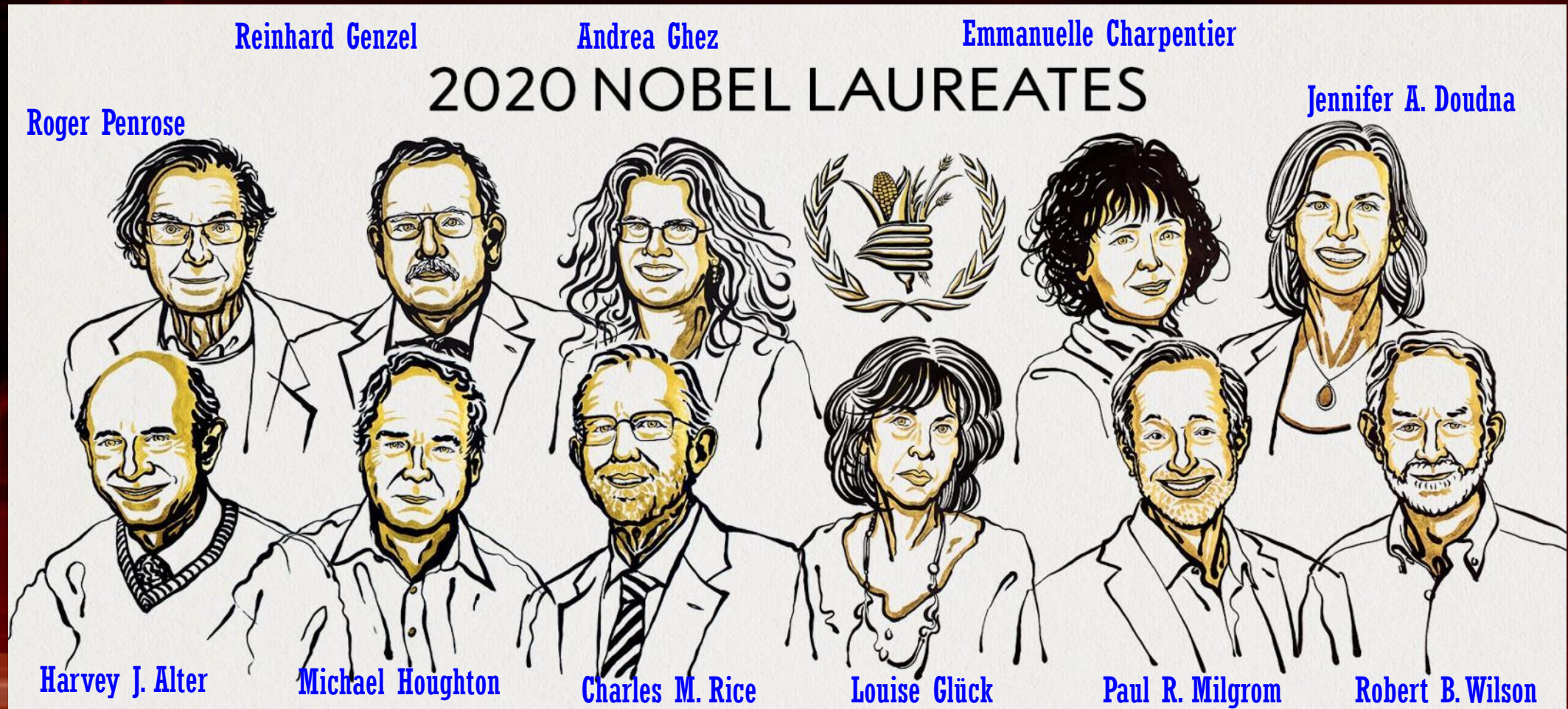
Stereotypes of Female Scientists

- It should also be noted that in 2019 Esther Duflo became only the second woman in history to win a Nobel Prize in Economics.



- Emmanuelle Charpentier & Jennifer Doudna became the firsts women in history to win a Nobel Prize in Chemistry (2020) without a man among the winners.

Slowly, there is a change



Katalin Karikó



Suppression of RNA Recognition by Toll-like Receptors: The Impact of Nucleoside Modification and the Evolutionary Origin of RNA

Katalin Karikó,^{1,*} Michael Buckstein,² Houping Ni,² and Drew Weissman²

¹Department of Neurosurgery

²Department of Medicine

University of Pennsylvania School of Medicine
Philadelphia, Pennsylvania 19104

Incorporation of Pseudouridine Into mRNA Yields Superior Nonimmunogenic Vector With Increased Translational Capacity and Biological Stability

Katalin Karikó¹, Hiromi Muramatsu¹, Frank A Welsh¹, János Ludwig², Hiroki Kato³, Shizuo Akira³ and Drew Weissman⁴

Molecular Therapy vol. 16 no. 11, 1833–1840 nov. 2008

In 2013, after almost 40 years of practically anonymous work, Karikó was called by BioNTech, of which she is now vice president.

Sarah Catherine Gilbert

Professor of Vaccinology at the University of Oxford

Lancet 2020; 396: 467–78



Safety and immunogenicity of the ChAdOx1 nCoV-19 vaccine against SARS-CoV-2: a preliminary report of a phase 1/2, single-blind, randomised controlled trial

Pedro M Folegatti, Katie J Ewer*, Parvinder K Aley, Brian Angus, Stephan Becker, Sandra Belij-Rammerstorfer, Duncan Bellamy, Sagida Bibi, Mustapha Bittaye, Elizabeth A Clutterbuck, Christina Dold, Saul N Faust, Adam Finn, Amy L Flaxman, Bassam Hallis, Paul Heath, Daniel Jenkin, Rajeka Lazarus, Rebecca Makinson, Angela M Minassian, Katrina M Pollock, Maheshi Ramasamy, Hannah Robinson, Matthew Snape, Richard Tarrant, Merryn Voysey, Catherine Green*, Alexander D Douglas*, Adrian V S Hill*, Teresa Lambe*, Sarah C Gilbert*, Andrew J Pollard*, on behalf of the Oxford COVID Vaccine Trial Group†*

Enhanced immunogenicity for CD8+ T cell induction and complete protective efficacy of malaria DNA vaccination by boosting with modified vaccinia virus Ankara

NATURE MEDICINE • VOLUME 4 • NUMBER 4 • APRIL 1998

JÖRG SCHNEIDER¹, SARAH C. GILBERT², TOM J. BLANCHARD³, TOMAS HANKE¹,
KATHRYN J. ROBSON⁴, CAROLYN M. HANNAN¹, MARION BECKER³, ROBERT SINDEN⁵,
GEOFFREY L. SMITH³ & ADRIAN V.S. HILL^{1,2}

Stereotypes of Female Scientists



Ruth Buscombe
Senior strategy engineer

McLaren has 66 people who routinely travel in the core team, five are women, and only one woman occupies a senior management role.

Alfa Romeo said, like all teams, that the size of the core team varies, but on average there are 51 people who regularly travel to races, of these five are women (9.8%). Looking at the F1 side of the company, 13 women work in senior roles.



Mercedes Wind Tunnel Technique, Dr. Kathryn Richards



W Series champion Jamie Chadwick is an F1 development driver for Williams.


Stereotypes of Female Scientists

- Stereotypical images of scientists become ingrained at a young age, as demonstrated in studies of children's drawings. While illustrations of female scientists have become more common in recent decades, children seem to retreat to assuming most scientists are male as they get older^[17].

Child Development, November/December 2018, Volume 89, Number 6, Pages 1943–1955

The title for this Special Section is **Meta-analysis and Individual Participant Data Synthesis in Child Development**, edited by Glenn I. Roisman and Marinus H. van IJzendoorn

The Development of Children's Gender-Science Stereotypes: A Meta-analysis of 5 Decades of U.S. Draw-A-Scientist Studies

David I. Miller , Kyle M. Nolla, Alice H. Eagly, and David H. Uttal
Northwestern University

[17] Miller D. I. et al., The Development of Children's Gender-Science Stereotypes: A Meta-analysis of 5 Decades of U.S. Draw-A-Scientist Studies, *Child Dev.*, 89(6):[1943-1955](#), (2018).

Stereotypes of Female Scientists

- Jocelyn Steinke argues that negative stereotypes of scientists (as being socially awkward, unpopular, or unethical, for example) lead girls to be less inclined to consider careers in STEM fields^[18].

Cultural Representations of Gender and Science

Portrayals of Female Scientists and Engineers in Popular Films

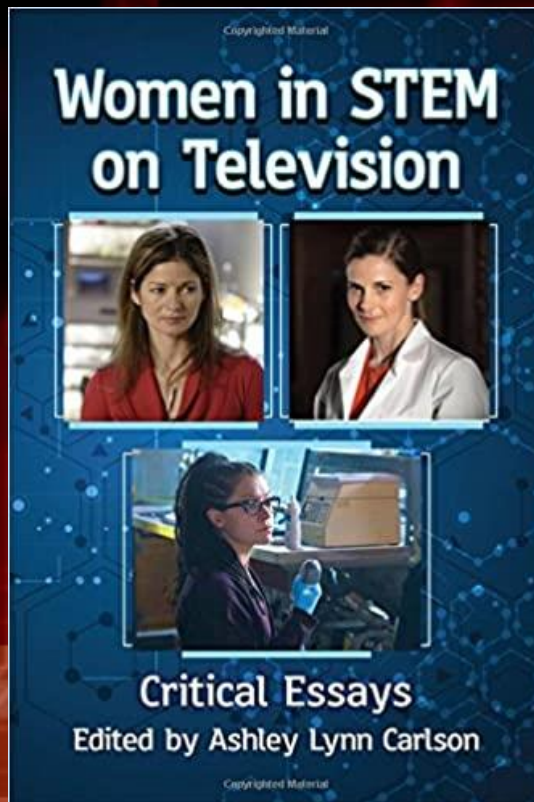
JOCELYN STEINKE

Western Michigan University

Steinke J., Cultural representations of gender and science: Portrayals of female scientists and engineers in popular films, *Sci. Commun.*, 27(1):[27-63](#), (2005).

Stereotypes of Female Scientists

- Representations of female scientists in popular culture therefore have the potential to send powerful messages about the role of women in science and influence the next generation of scientists, for good or evil^[19].



A.L. Carlson (ed.), *Women in STEM on Television: Critical Essays* (McFarland & Company, Jefferson, NC, 2018), pp. 4–5

Couples

Annette Lykknes
Donald L. Opitz
Brigitte Van Tiggele
Editors

For Better
or For Worse?



Pierre & Marie Curie
(1903 F)



Irène y Frédéric Joliot-Curie
(1935 Q)



Carl Ferdinand Cori and Gerty
Theresa Cori (1947 M)



Alva Myrdal (1982 P)
Gunnar Myrdal (1974 E)



May-Britt y Edvard Moser (2014 M)



Esther Duflo & Abhijit Banerjee (2019 E)



Birkhäuser

Other demon



The Victoria Building at the University of Liverpool, UK.

ROW ERUPTS OVER USE OF RESEARCH METRICS IN JOB-CUT DECISIONS

Critics say a university put jobs at risk using unreliable measures related to funding and citations.

Nature | Vol 592 | 1 April 2021 | 19

Conclusions

- The image created by literature, cinema, TV, and the media have a strong influence on the perception of the role of scientists in society.
- This influence is even more significant in boys, and particularly in girls, in their decision to pursue a scientific career.
- Scientists should participate more in science dissemination programs.
- Programs like AMC's "Science at School" should be strengthened and not canceled.

Before I came here, I was confused about this subject. Having listened to your lecture, I am still confused, but on a higher level.

Enrico Fermi

YUMBOOTIK