THE MATILDA EFFECT

Quick: Name five famous woman scientists. Let's see—there's Marie Curie, Jane Goodall, Rachel Carson, and…uhh…There's a reason it's tough to think of more names, and it's called the "Matilda effect."

BACKGROUND

The Matilda effect comes from the world of science, but it applies to the arts, business, and politics as well. It refers to a systemic bias against women, whose contributions are often credited to men. A recent *National Geographic* article described it like this: "Over the centuries, female researchers have had to work as 'volunteer' faculty members, seen credit for significant discoveries they've made assigned to male colleagues, and been written out of textbooks."

The term was coined in 1993 by science historian Margaret W. Rossiter, who was inspired by Matilda Joslyn Gage—a suffragist and political activist who worked alongside Susan B. Anthony to gain the right to vote for women. But she also strongly advocated for women to receive proper credit for their advances in science. Here's an excerpt from Gage's 1883 essay "Woman as Inventor":

> No assertion in reference to woman is more common than that she possesses no inventive or mechanical genius...But, while such statements are carelessly or ignorantly made, tradition, history, and experience alike prove her possession of these faculties in the highest degree. Although woman's scientific education has been grossly neglected, yet some of the most important inventions of the world are due to her.

On the next few pages you'll find the stories of just a few of the countless pioneering women who were met head-on by the Matilda effect.

TROTA of SALERNO (mid-1100s)

Accomplishments: The "Renaissance of the 12th Century" was a period of enlightenment in southern Italy. Women were actually allowed to be educated and have careers. One such woman was Trota di Ruggiero, a doctor and teacher at medieval Europe's first true medical school. Far ahead of her time, she was responsible for several crucial advances, including:

- First doctor known to call for a separate field of medicine dedicated to women's reproductive health, and the first to suggest that women would be better at treating women.

Mistletoe gets its name from the Old English *mistil tan,* "dung twig," because people thought it grew in places where bird droppings landed in trees.

- Among the first doctors to recommend a balanced diet and regular exercise for better health.
- Argued that pain during childbirth should be limited—a notion that went directly against the contemporary Christian belief that women should suffer during childbirth. And she administered opiates during childbirth to dull the pain.
- Among the first doctors to turn a fetus into the proper position while still in utero.
- Developed revolutionary Cesarean surgical techniques that led to lower postpartum death rates from infection.

Trota's legacy lives on thanks to her three seminal books: *Book on the Conditions of Women, On Treatments for Women,* and *On Women's Cosmetics* (which offered "treatments for frizzy hair, freckle removal, bad breath, and chapped lips"). Collectively, the books became known as a single work called *The Trotula,* which remained the definitive text on women's health for the next 400 years.

Matilda Effect: In the years following Trota's death, Italy's first renaissance came to an end, and women were once again denied educations. As such, later scholars falsely assumed that Trota had been a man—or even several men—all writing under the same pseudonym. (Some of the men given authorship weren't even doctors.) Eventually, it became scandalous to even suggest that *The Trotula,* a book dedicated to women's health, could have been written by anyone other than a man. It would take until the 16th century for that notion to finally be proven wrong. Today, Trota of Salerno is recognized as the world's first modern gynecologist.

CECILIA PAYNE (1900–79)

Accomplishment: Today, it's common knowledge that the Sun is made mostly of hydrogen and helium. But as recently as the 1920s, it was a widely accepted "fact" that the Sun was made of the same materials as Earth, and to suggest otherwise was scientific heresy. Cecilia Payne suggested otherwise. The British-born astronomer made the groundbreaking discovery about the true composition of stars in 1925 while working on her Ph.D. at Radcliffe College (now part of Harvard). When she presented her thesis to her professor, Henry Norris Russell, he told her it was the best thesis he'd ever read. (And it holds up today: Neil deGrasse Tyson called Payne's "Stellar Atmospheres" the "most brilliant Ph.D. thesis ever written in astronomy.")

Matilda Effect: Even so, Russell urged Payne not to publish her "clearly impossible" conclusion because it went against scientific consensus. So Payne reluctantly shelved her work. Four years later, Russell reached the same conclusion in his own research and published the results himself. Although he did acknowledge Payne's contributions

Air conditioners were first installed in Disneyland in 1963, eight years after the park opened. Reason: The animatronic figures were overheating.

within the paper, he put his own name on the cover, and she had to stand idly by as a man was given sole credit for her discovery. Payne finally set the record straight in her book *The Stars of High Luminosity*. In 1956 she became Harvard's first female astronomy professor and the first woman to become department chair.

> "The giants—Copernicus, Newton, and Einstein—each in his turn, brought a new view of the universe. Payne's discovery of the cosmic abundance of the elements did no less."
>
> **—The American Physical Society**

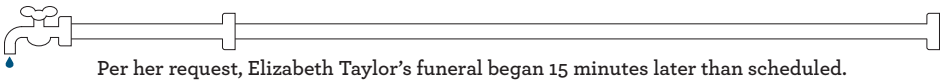
ANNA ARNOLD HEDGEMAN (1899–1990)

Accomplishments: In her six decades as a civil rights activist, Hedgeman served as executive director of the YWCA, executive director of the Fair Employment Practices Commission, and Assistant Dean of Women at Howard University. She also served as director of Harry Truman's 1948 presidential campaign, and became the first African American woman to serve in the cabinet of a New York City mayor. But perhaps her greatest achievement came in 1963 when she helped organize Martin Luther King Jr.'s historic March on Washington for Jobs and Freedom, where he gave his "I Have a Dream" speech. Without Hedgeman's involvement, the march might not have ever happened.

That year, there were two civil rights marches planned on Washington, DC, one to be led by King in July, and the other by labor leader A. Philip Randolph in October. Concerned that the two marches might cancel each other out, it was Hedgeman who came up with the idea of combining the two into one. She arranged for the two civil rights leaders to meet and then helped them hammer out the details. Not only that, Hedgeman singlehandedly recruited more than 40,000 Protestants to attend, arranged transportation for more than 100,000 people, and made sure that everyone there got fed. Thanks in large part to her, the event was a huge success.

Matilda Effect: The core team that organized the March on Washington became known as "the Big Six," consisting of Martin Luther King Jr., James Farmer, John Lewis, A. Philip Randolph, Roy Wilkins, and Whitney Young. Notice someone missing? Anna Hedgeman. She was, as she later described it, "kept out of sight." You read that right: the men who fought for civil rights denied a woman a place at the table.

But what really got Hedgeman angry was the announcement—a week before the march—that no women would be allowed to deliver speeches. "Instead," wrote Hedgeman, "it was proposed that Mr. Randolph, as chairman, would ask several Negro women to stand while he reviewed the historic role of Negro women, and that the women would merely take a bow at the end of his presentation." Hedgeman drafted a passionate letter urging them to reconsider, which she read aloud at a meeting:



Per her request, Elizabeth Taylor's funeral began 15 minutes later than scheduled. (She wanted to be late to her own funeral.)

> In light of the role of the Negro women in the struggle for freedom and especially in light of the extra burden they have carried because of the castration of the Negro man in this culture, it is incredible that no woman should appear as a speaker at the historic March on Washington Meeting at the Lincoln Memorial.

Because of Hedgeman's vigilance, one woman did get to stand at the podium and give "brief remarks"—Daisy Bates, a publisher and civic leader who had helped the "Little Rock Nine" black students attend an all-white school in Arkansas in 1957. The remarks weren't much, but it was another small step forward. Three years later, Hedgeman and 48 other women cofounded the National Organization for Women.

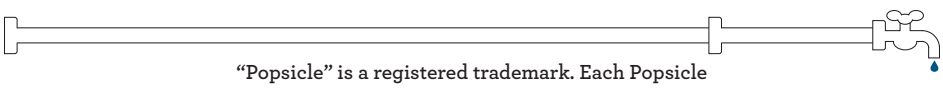
MARGARET KNIGHT (1838–1914)

Accomplishments: We take it for granted that paper grocery bags have flat bottoms. Before that advancement, paper bags were pretty much useless: they didn't stand up, and were so poorly made that they often broke. Margaret Knight changed all that. She'd been a successful inventor since her teens, when she invented an automatic shutoff for malfunctioning factory machines. Because women weren't supposed to apply for patents, Knight didn't, and she never made a dime from the invention, even as her design was being used in factories around the world and would go on to save countless lives.

In 1868 Knight was working at the Columbia Paper Bag Company in Springfield, Massachusetts, when she invented a wooden hand-cranked machine that could cut, fold, and glue a flat-bottomed bag. The result was a stronger and more stable paper bag than any that had come before it. This time, Knight wanted due credit, so she went against social norms and decided to apply for a patent. But first she needed an iron prototype, so she went to a machine shop in Boston to have one built.

Matilda Effect: When Knight applied for the patent, she was dismayed to learn that one had recently been granted to a rival inventor named Charles Annan for the exact same machine. Though Knight had seen Annan tinkering around at the machine shop, little did she know that he was spying on her and stealing her work. Despite her insistence that *she* invented the paper bag, no one at the patent office believed her, leaving her no other choice but to sue.

At the trial, Annan's lawyer argued that no uneducated woman could come up with such a contraption. But Knight had the facts on her side—and she had a lot of evidence. She produced all of her notes, explained her invention in detail, and called three witnesses who testified that she was indeed the inventor…and she won the suit. Result: In 1871 Knight became one of the first women ever to be granted a patent. And her flat-bottomed paper bag made an immediate impact on society (much in the



"Popsicle" is a registered trademark. Each Popsicle is made from a patented formula that's kept secret.

way sliced bread would in 1928). England's Queen Victoria even presented Knight with the Decoration of the Royal Legion of Honour. Knight received at least 27 more patents in her life, including a numbering machine and improvements to the rotary engine. But the "Lady Edison," as some called her, had wanted to do much more: "I'm only sorry I couldn't have had as good a chance as a boy."

JOCELYN BELL (1943–)

Accomplishment: In the late 1960s, Bell was a postgraduate student at the University of Cambridge working on her Ph.D. in astrophysics when she detected and identified the first radio pulsars. The discovery proved for the first time that when a massive star went supernova, it didn't just blow up into nothing, but became a much smaller rotating neutron star. That breakthrough gave astronomers a much clearer picture of how the universe works.

Matilda Effect: Bell was working on the research project with two men—her thesis adviser, Antony Hewish, and the astronomer Martin Ryle. Bell's contribution was so important that, on the paper announcing the discovery, her name was listed second, right under Hewish, the professor. In 1974 the research team was awarded the Nobel Prize for Physics—well, not *all* of the team. The prize went to Hewish and Ryle only. Many scientists were upset by the snub. One of them was renowned astronomer Iosif Shklovsky, who told Bell, "You have made the greatest astronomical discovery of the 20th century."

It's not uncommon for the Nobel Prize Committee to favor men; only 16 women scientists have received the prize in the last 100 years. For her part, Bell was diplomatic: "I believe it would demean the Nobel Prizes if they were awarded to research students, except in very exceptional cases, and I do not believe this is one of them." But most disagreed, arguing that it was her discovery, and she should have been a Nobel laureate. Bell didn't let the slight slow her down: she's since served as president of the Royal Astronomical Society, and in 2015 was awarded the Women of the Year Prudential Lifetime Achievement award. But still no Nobel Prize.

NETTIE STEVENS (1861–1912)

Accomplishment: In 1536 King Henry VIII had his wife, Anne Boleyn, executed after she failed to bear him a son. That's a real example, albeit extreme, of the way women throughout history have been punished and scorned for not producing male children. In the early 1900s, geneticist Nettie Stevens discovered the tragic irony: it's the male's contribution—not the female's—that determines the gender of the child.

Stevens was one of many scientists who were trying to solve the gender determination mystery. Her breakthrough came while studying mealworms at Bryn

Olympic swimmers never drown. Even so, there were lifeguards at the 2016 Rio Olympics swimming events. (Brazilian law required it.)

Mawr College in Pennsylvania. She discovered that sperm carries both the X and the Y chromosome, while eggs only carry the Y chromosome. Therefore, she concluded, it's the male sperm that determines the offspring's sex.

Columbia University professor Edmund Beecher Wilson was conducting similar research, and he published his findings first—in 1900. But here's the thing: he came to the wrong conclusion. After studying only male mealworms, he concluded that environment was the major factor in determining gender. Stevens had studied both male *and* female worms, and it was she who correctly concluded—in 1905—that the male XY chromosomes are responsible.

Matilda Effect: Stevens's findings were mostly ignored. Not only was she a woman, but she was a woman stating that men had been wrong to blame women. One man who didn't ignore Stevens's findings was Wilson. After she published, he reassessed his work and came to the same conclusion she had. When he published a correction paper, he thanked Stevens for her contribution. Not that it made any difference. As science historian Stephen Brush writes: "Because of Wilson's more substantial contributions in other areas, he tends to be given most of the credit for this discovery." Sadly, Stevens's life and career were cut short when she died of breast cancer at age 50.

CAMILLE CLAUDEL (1864–1943)

Accomplishment: Claudel was one of the most talented sculptors of her day, on a par with her mentor, Auguste Rodin, of *The Thinker* fame. In 1884 the 19-year-old Claudel started her art career as one of the 42-year-old Rodin's assistants. From the beginning, he recognized her immense talent, and she quickly became an artist in her own right—at least to those who knew her.

Matilda Effect: Rodin took credit for a lot of work that was actually produced by Claudel, including *The Slave* and *Laughing Man* (she sculpted the heads). This wasn't necessarily because Rodin was a spotlight hog—it was also because of the times. In those days women weren't accepted as artists, and obtaining funding for expensive bronze sculptures was difficult. It was *especially* difficult for Claudel, whose themes were often overtly sexual. Rodin funded many of her pieces…and then signed his name to them to give them a wider audience. But he was the one who was celebrated for the work, not her.

It got even worse when they had a falling-out in the 1890s. The two had an intimate relationship. When Claudel demanded that Rodin leave his childhood sweetheart and marry her, he refused. Knowing that she could never have Rodin exclusively, or escape his shadow, she left him to make it on her own.

Rodin continued to fund Claudel's work for a few more years…until she created *The Age of Maturity*, a bronze sculpture of a man walking away from a pleading woman.

First U.S. theater that showed only movies: L.A.'s Electric Theater, housed in a circus tent (1902).

When Rodin saw the sculpture, he recognized the depiction of their relationship and was furious. He broke off all contact, and Claudel ended up begging for food in the streets. A few years later, her brother and mother had her committed to a mental institution, where she was diagnosed with schizophrenia. She stopped making art, destroyed most of her sculptures (only 90 remain), and blamed Rodin for stealing all the credit and destroying her life, once saying, "I am in no mood to be deceived any longer by the crafty devil and false character whose greatest pleasure is to take advantage of everyone."

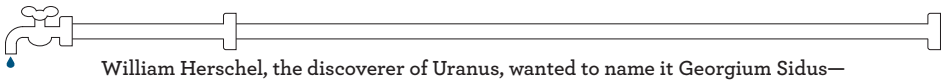
Claudel died in obscurity, at age 78. In 2017, on the 100th anniversary of Rodin's death, the Camille Claudel Museum was opened in France, finally giving the artist the credit she deserved.

MILICENT PATRICK (1915–1998)

Accomplishments: Milicent Patrick was the Hollywood makeup artist who designed Gill-Man, the fishlike creature in 1954's *The Creature from the Black Lagoon*. Prior to that, she'd designed the makeup for Mr. Hyde in *Abbott and Costello Meet Jekyll and Hyde*. She was also a model, an actor who appeared in more than 20 movies, a concert pianist, and the first female animator to work for Walt Disney. To promote the film, Universal executives—no doubt wanting to capitalize on Patrick's good looks—sent her and Gill-Man on a nationwide public relations tour called "The Beauty Who Created the Beast."

Matilda Effect: Bud Westmore, the head of makeup at Universal, was miffed that anyone other than he would get credit for creating Gill-Man—especially a woman. And Westmore had clout. Accounts vary, but most insiders agree that it was Patrick who was primarily responsible for designing Gill-Man's look. Nevertheless, Westmore sent a string of angry memos demanding that her name be removed from the film's credits. He also made the studio change the tour name to "The Beauty Who *Lives with* the Beast." Patrick was afraid she'd lose her job if she stood up for herself, so she made sure to always say that creating Gill-Man was a team effort, and Bud Westmore was the head of that team. The gesture did little to placate Westmore, and he fired Patrick when she got back to Hollywood.

Who knows what other contributions Millicent Patrick would have made to movie monsters had she remained at Universal? After she was fired, her career never really rebounded. She acted in a few more movies, but not much was heard from her after 1970. Today, there's a building at Universal named after Bud Westmore, but not a single monument to the woman responsible for one of Hollywood's most enduring and iconic monsters.



William Herschel, the discoverer of Uranus, wanted to name it Georgium Sidus—"George's Star." It took 69 years for people to finally agree to call it Uranus.