Most famous scientists picked a thing.

But a few polymaths, like Aristotle and Ibn Sina, picked everything. Francis Galton, one of the most important thinkers in the generation after Darwin, fell into column B.

Hardcore. Galton was a co-founder of a range of scientific disciplines, including meteorology, psychology, forensics, and above all statistics. He was an active member of the influential British Association for the Advancement of Science.

He made the first weather map. Mostly, though, he is remembered for something that we don't even count as science today: Galton was the father of eugenics, the idea that the gene pool of the human species could somehow be improved, if certain people with different abilities didn't have kids. Where did Galton come up with such a terrible idea?

Partly, from the work of his half-cousin. Charles Darwin. [INTRO MUSIC PLAYS] When Darwin and Wallace proposed their theory of evolution by natural selection, it was based on observing differences produced by thousands of years of gradual changes. But we, as short-lived humans, can't observe thousands of years of evolutionary change first-hand.

So it was hard to know what to do with natural selection. In the late 1800s, no one really understood how heredity worked. But many biologists, most notably Herbert Spencer, argued that "survival of the fittest" applied to humans, just like other species.

So they figured there must be a technical way to use that knowledge… Spencer, for example, argued against all laws that limited class conflict, which he saw as tests of fitness—including basic child labor laws. Spencer's idea, called social Darwinism, influenced a lot of people in the late 1800s. And one of them was Darwin's younger cousin, Francis Galton.

Born in 1822 to a prominent Quaker family, Galton was a child prodigy. Like Darwin, Galton was largely self-taught—a "gentleman of science." Also, like Darwin, he never did well in school, suffered from nervous breakdowns, and traveled widely. Unlike Darwin, Galton was not a shy scholar.

He was obsessed with the idea of genius—whether it was a product of good hereditary luck or learning. For Galton, as for most Victorians, nature held all of the cards. He got this idea from his cousin's hit book.

On the Origin of Species blew Galton's mind. After 1859, Galton focused on the social implications of Darwin's work. He argued that an organism's most important characteristics must be biological, rather than shaped by the environment or experience.

And, like Darwin, he sought evidence for his theory. The first step was to pick some trait to track over time. He selected "eminence," which today you might think of as basically awesomeness.

Galton thought that, if human traits can be inherited, then tracking the descendants of obviously eminent men—and of course they were men—should show a decreasing level of eminence over time, as intermarriage with non-eminent people diluted this trait. So he gathered all of the historical evidence he could on eminent British men and their descendants, and indeed found that eminence seemed to decrease over time. The resulting book, Hereditary Genius, published in 1869, contains the first use of the phrase "nature versus nurture." The book also, by the way, includes a chapter on eminent "Wrestlers of the North Country." !!!

Hereditary Genius popularized the practice of historiometry, or studying human traits by tracking ancestry information. But Galton knew that he was barely scratching the surface of heredity. He needed more evidence.

So he did what his cousin would have done: he turned to a model from nature. This time, twins and peas instead of pigeons and barnacles. In 1875, in the paper, "The history of twins," he proposed studying twins, which he saw as a natural experiment.

By the mid 1900s, twin studies became the foundation of behavioral genetics, or how heredity affects behavior. Galton realized that twins presented a "natural experiment": if nature is more powerful than nurture, then twins should be more similar than not, even if they're raised apart. But if nurture is more powerful, then twins should behave differently when raised apart.

Galton didn't conduct his own twin studies, but he outlined what future research should look like. Galton also developed statistical methods to research inheritance, and in doing so, he created the quantitative science of human behavior. Thought Bubble, show us how: Galton also started breeding sweet peas, comparing the sizes of the offspring of different seeds.

Galton's work with peas led him to conclude that traits tend toward a statistical average. Galton couldn't figure out why, but he could use statistics to model the general pattern of how traits were distributed over time—in this case, in a "normal" distribution, a bell curve. In 1884, Galton took his pea model to the International Health Exhibition in London.

Visitors to his "Anthropometric Lab" paid to have Galton measure their bodies, minds, and senses in various ways. He produced many new instruments in order to measure, for example, eyesight. Visitors received the results, and Galton also kept a copy to add to his library of research on variation in humans.

This practice, known as anthropometry—or literally, measuring humans—became common across many disciplines. Galton also pioneered the use of fingerprinting in forensics. He classified the features that we still look for: loops, whorls, and arches.

Thanks Thought Bubble. So Galton built on Darwin's work to invent a statistical science of life. But now it gets weird.

And, frankly, difficult. Because Galton decided that, based on his investigations of inheritance, good traits such as genius and morality were diluted down to some norm over time. In 1883, one year after Cousin Chuck passed away, Galton published Inquiries into Human Faculty and Its Development, in which he coined the term "eugenics"—the discipline of "good breeding," or literally making "good families," in humans.

Galton was not the first to suggest that smart people should have kids with each other, or that cousins should avoid marrying. What Galton did was argue—based on what he saw as scientific evidence—for the public to do something about these ideas. He wanted "families of merit" to grow, and he thought the government should incentivize this growth.

This was called "positive eugenics." Galton pointed out that many well-born Victorians married late and had few kids, compared to the lower classes. If this fear of the weakening of supposedly "good stock" by new, poor, or different people sounds familiar, that's partly because Galton's so-called "science" of eugenics quickly gained traction. The First International Congress of Eugenics was held in 1912, the year after Galton died.

And it was around this time that nations began passing "eugenical" laws. Particularly the United States. Driven by a fear that births of

supposedly inferior people would lead to weak or criminally "degenerate" adults, some states introduced forcible sterilization laws starting in 1907.

These were mostly used to justify the sterilization of already incarcerated groups and those with different abilities. This was "negative eugenics," which was not something Galton had explicitly argued for. The metaphor used by eugenicists was drawn from Darwin, but modified: a family or nation was a tree, and its branches sometimes needed "pruning." A famous example of this thinking in the United States was psychologist Henry Goddard's 1912 book about a family from New Jersey called the "Kallikaks." This was a made-up name for a real family whose genealogy Goddard studied to understand what he called "feeble-mindedness," or intellectual disability.

In the book, Goddard compared the branch of the Kallikak family that was descended from its founding father's legitimate marriage, and the branch descended from that founder's affair with a "nameless feeble-minded girl." Goddard concluded that feeble-mindedness was strongly heritable and a danger to democracy. Although he later admitted this was a flawed study, it was a hit, and his terms for different levels of intelligence became common: "moron," "imbecile," "idiot." Goddard's attempts to quantify intelligence weren't at the fringes of science. His ideas are creepily still with us in the form of intelligence quotient or IQ tests.

Goddard, who was a big-time fan of Galtonian eugenics, translated the work of three major French psychologists in 1910. This translation was picked up by Lewis Terman at Stanford University, who adapted the work of the French to create the Stanford-Binet Intelligence Scales in 1916. Goddard and Terman then worked with Robert Yerkes to develop an IQ test for the US Army in 1917.

The US Army introduced aptitude tests to place soldiers in different roles. But the tests were highly discriminatory, privileging white candidates from educated backgrounds. The trial of the test showed very low results for non-Northern European whites and non-whites.

Goddard spent much of the rest of his life publicizing these results—even though they were contested in his own day as shoddy science. There were sooo many other serious, Galton-inspired scientists who did creepy research on human difference and argued for terrible policies, we could do a whole creepy spin-off show. Instead, let's just talk about some of the worst.

A lawyer and zoologist named Madison Grant wrote a book called The Passing of the Great Race in 1916, citing Galton. Grant subdivided Caucasians into three types, claiming that the great "Nordics" were being rapidly outbred in the United States by inferior types of whites. Meanwhile, Charles Davenport, a very influential zoologist, founded the Eugenics Record Office at Cold Spring Harbor Laboratory in 1910.

He collected data to help people check whether a potential marriage was suitable. And, maybe unsurprisingly, Davenport was a fan of the Nazis. But probably the eugenicist most well known to us today was the nurse who coined the term "birth control" and opened the first US birth control clinic in 1916: Margaret Sanger.

Sanger founded the American Birth Control League to educate people about safe abortion procedures and contraceptives. She gave lectures on birth control to many groups, including the KKK in 1926. In the 1920s and '30s, Sanger thought that eugenics would give her movement legitimacy.

Eugenics became a dominant theme at her birth control conferences, and she spoke publicly of the need to put an end to breeding by the unfit. By the late 1920s, eugenics had been recognized as bad science by most practicing biologists. But as a source of policy for many lawmakers in the United States, Germany, and elsewhere, eugenics was still very much alive.

In the 1800s, science had become much more important for states. They wanted to understand their populations… and, now, shape them. Compulsory sterilization was challenged in the US Supreme Court in 1927 in the famous Buck v.

Bell case. But the decision, written by Justice Oliver Wendell Holmes, Jr., sided with the eugenicists and has never technically been overturned. In fact, forced sterilization was still happening in California prisons until it was banned in 2014.

Did Galton think that studying human difference would lead to bad science and even worse laws? Not necessarily. But in some ways, his legacy -- a legacy of comparing humans quantitatively -- is still with us.

Next time—we'll see what's going on in a less creepy area of the life sciences: it's time for Pasteur, Koch, and the birth of microbiology! Crash Course History of Science is filmed in the Dr. Cheryl C. Kinney studio in Missoula, Montana and it's made with the help of all this nice people and our animation team is Thought Cafe. Crash Course is a Complexly production. If you wanna keep imagining the world complexly with us, you can check out some of our other channels like Nature League, Sexplanations, and Scishow.

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