behind the collapse of the Gloucester and New England fisheries. Until we reveal these dual roles and the ensuing pathologies, there will be no rebuilding, no renewal of the fisheries.

I suspect that this book, ironically, will find popularity among the tourists who flock to a gentrified Gloucester. Under Kurlansky's disapproving gaze, they will gradually displace the fishermen, as in most fishing towns around the north Atlantic. Visitors to Gloucester will love the book and the town's many charming features described in its pages. They will think of the fish and shake their heads at such a loss, still failing to understand. ■

Daniel Pauly is professor of fisheries and director of the Fisheries Centre at the University of British Columbia, 2202 Main Mall, Vancouver, British Columbia V6T 1Z4, Canada.

Making genetic history

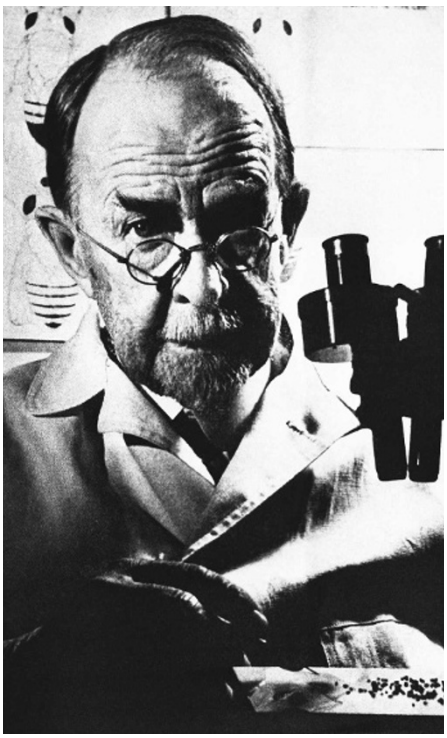
In Pursuit of the Gene: From Darwin to DNA
by James Schwartz
Harvard University Press: 2008. 384 pp.
$29.95, £19.95, €22.50

When I was a student, 'doing genetics' meant crossing two different strains or species. Now it means sequencing DNA, preferably human. Between these two poles lies the history of genetics, a pathway fraught with sharp turns, steep gradients and dead ends — and engagingly recounted in James Schwartz's new book.

Despite its subtitle, *In Pursuit of the Gene* is not a comprehensive history of genetics, but focuses solely on classical genetics. Schwartz, a science writer, begins with Charles Darwin's ill-fated 'pangenesis' theory of the inheritance of acquired characteristics, and runs through the rediscovery of Gregor Mendel's work on inherited traits. The story continues with the consolidation of Mendelism and chromosomal inheritance by Thomas Hunt Morgan and his students in the 'Fly Room' lab at New York's Columbia University, where modern genetics began, and concludes in 1946 with Hermann Joseph Muller's Nobel Prize in Medicine for inducing mutations with X-rays. Later history, from the discovery by Oswald Avery and colleagues that DNA was the 'transforming principle', to the Human Genome Project, is squeezed into a 12-page epilogue. Those seeking a history of molecular genetics should read Horace Freeland Judson's magisterial *The Eighth Day of Creation* (Simon & Schuster, 1979).

Many histories of genetics cover the same ground. What distinguishes Schwartz's account is his impeccable scholarship, based on many primary sources, and his ability to keep the narrative moving, interweaving discoveries with the strong and eccentric personalities who made them. He does not slight the science, describing experiments in detail so dense that the reader is advised to keep a pencil and paper handy. The effort required to understand the book may, sadly, remove it from the ambit of popular science.

The book's apogee is its tale of the "Mendel Wars" around the beginning of the twentieth century, the struggle to bring together Mendel's ideas on heredity and Darwin's theory of evolution. On one side were the Mendelians, including Francis Galton, William Bateson and Charles Hurst, who accepted Mendelism but considered natural selection as ineffective, seeing evolution as occurring by 'macromutations', or single genetic changes of very large effect. On the other side stood the biometricians, most notably Karl Pearson and Raphael Weldon, who accepted the ubiquity of Darwinian selection but rejected Mendelian genetics. Given the strong egos involved and the fundamental nature of the science at stake, the battles Schwartz recounts were fierce. Friendships were destroyed, careers threatened. After a particularly contentious meeting about the genetics of horse coat colour at the Royal Society in London, Pearson hissed at Hurst, "You shall never be Fellow here as long as I live".



BETTMANN/CORBIS

Fruitful collaborations were formed in Thomas Hunt Morgan's fly genetics lab.

Other high spots in the book include the early and now largely forgotten work on cytological genetics by Walter Sutton and Edmund B. Wilson, involving years of eye-strain from squinting at confusing chromosomal preparations of sea urchins, aphids and grasshoppers. These studies established that different chromosomes carry different hereditary factors, yet occur in pairs that become separated during the formation of gametes in meiosis, giving essential physical support for Mendel's laws.

The book's longest section details the immense contributions of research on the fruitfly *Drosophila melanogaster* to our understanding of heredity. Schwartz explains how, from 1912 to around 1930, Morgan and his 'boys', Alfred Sturtevant and Calvin Bridges, along with Muller, were "responsible for the integration of Mendelism and the chromosome theory that is the basis of genetics". Within a few years, this conjunction of remarkable intellects in a tiny laboratory led to methods for mapping chromosomes both genetically and cytologically, and to the discovery of sex linkage, chromosome inversions, nondisjunction and many other phenomena that now form the dogma of transmission genetics.

Alas, here we find a major flaw. Schwartz notes that he was inspired to write his history by reading Elof Carlson's worshipful biography of Muller, *Genes, Radiation, and Society* (Cornell University Press, 1981). But this only generates further hagiography: the discussion of Muller's work occupies a quarter of *In Pursuit of the Gene*, a disproportionate chunk. Schwartz gives the impression that Muller, or ideas purloined from him by others, was behind nearly every advance in fly genetics. Sturtevant's contributions are given short shrift, Morgan is portrayed as a conniver who acquired his Nobel status on the backs of his students, and Bridges — perhaps the finest pair of eyes ever to peer at a magnified fly — is dismissed as being "famous for stealing other men's wives as well as their ideas". Schwartz does not mention the work of Lewis Stadler, who independently discovered X-ray induction of mutations in barley at the same time as Muller's work on *Drosophila*. Like many plant geneticists, Stadler was marginalized as a glorified crop breeder.

It is easy to sympathize with Muller, who had a tumultuous life and was the perennial underdog: Jewish, short, bald and with a high voice.

Fractious, and possessed of unpopular socialist views, he floated from university to university, winding up in the Soviet Union until he fled to escape Trofim Lysenko's destruction of Russian genetics. Yet during all these peregrinations he maintained an uninterrupted programme of research. It is a scandal that Muller did not secure a tenured academic job until he was 55 — he won the Nobel prize a year later.

Muller was one of the best geneticists of the twentieth century, a visionary who predicted the rise of molecular genetics and the use of association mapping to identify genes for human behaviours. He was also difficult to work with, obsessed with credit and depressive to the point of once attempting suicide. Schwartz repeatedly states that Sturtevant, Bridges and Morgan tried to ruin Muller's reputation by stealing his ideas and slandering him, but the evidence is unconvincing. Working together in the Fly Room, talking science as they worked on flies in what was a continuous lab meeting, it is not surprising that they shared ideas and information. After all, it was Sturtevant who gave Muller the idea of using lethal alleles to measure mutation rates.

The other 'boys' were not slouches. Bridges discovered nondisjunction, thereby proving the chromosomal theory of heredity, and published it as the first paper in the first issue of the journal *Genetics*. He constructed the first map of genes on autosomes, did fundamental work on sex determination and produced maps of *Drosophila* salivary-gland chromosomes that have never been bettered. Sturtevant was the first to establish, while still an undergraduate, that genes are arrayed linearly on chromosomes. He devised the chromosomal fate mapping later used so effectively by the geneticist Seymour Benzer, founded *Drosophila* taxonomy and, by studying the action of eye-colour mutations in the fly, became the father of biochemical genetics. But neither Sturtevant nor Bridges was obsessed with priority: Sturtevant was the most modest of men, whereas Bridges, a great womanizer, had more pressing interests.

In Pursuit of the Gene should be required reading for all biologists unfamiliar with the history of genetics. Schwartz shows how quickly science can advance when a group of first-class minds encounters a fertile but unploughed field. Progress in genetics, as in all modern science, was truly a collaborative affair. There was no Darwin of genetics — not even Muller. There was, and is, plenty of credit to go around. ■

Jerry A. Coyne is a professor in the Department of Ecology and Evolution at the University of Chicago, Illinois 60637, USA.

Swayonomics

Sway: The Irresistible Pull of Irrational Behavior
by Ori Brafman and Rom Brafman
Currency/Doubleday: 2008. 224 pp. $21.95

In the Biblical parable in Matthew 25:14–29, a servant who was given five talents of money invested them and returned ten talents, whereas a servant given one talent buried it in the ground without profit. The master gave the risk-averse servant's one talent to his successful rival. The effect was elevated into a principle: "For to everyone who has, more shall be given, and he will have an abundance; but from the one who does not have, even what he does have shall be taken away."

Sometimes named the 'Matthew Effect', marketers call this response 'cumulative advantage'. I think of it as the 'bestseller effect'. Every author and publisher knows that once a book gets a head-start in sales it signals to consumers that other people want that book, causing them to desire it and purchase more, so the richest authors get even richer.

In *Sway*, the brother authors Ori Brafman, an entrepreneur, and Rom Brafman, a psychologist, describe the social and psychological effects that shape our beliefs and behaviours. They hope to trigger their own Matthew Effect with this highly readable book. But predicting the next bestseller is as reliable a business as astrology. That problem affects all books, including, ironically, those about marketing and behaviour: the psychological principles may explain what happened in hindsight, but cannot be used to predict the future.

Sway is a fun read, and the brothers Brafman are compelling storytellers, pulling in the reader immediately and narrating at a breezy pace. But the book is thin on science and thick on anecdotes. The authors have a propensity for 'just-so' stories, favouring this or that behavioural principle when other explanations exist.

The book opens, for example, with the tragic 1977 crash of KLM flight 4805 during take-off from the tiny Tenerife airport in the Canary Islands. While motoring down the runway, the Boeing 747 slammed into Pan Am flight 1736, also a 747. The crash was the worst disaster in aviation history. What was the cause? The authors argue that it was psychological. The KLM captain Jacob Veldhuyzen van Zanten was a top pilot, featured in airline advertisements, who took pride in getting his passengers to their destination on time. That day he was behind schedule, having been rerouted to Tenerife after a bomb threat at his destination airport, and delayed on the island by fog. Captain van Zanten worried about his reputation for punctuality. "An unseen psychological force was at work," claim the authors, "steering van Zanten off the path of reason." This force was "loss aversion". Behavioural economists have shown that when we make a decision, potential losses hurt twice as much as potential gains feel good. "This principle is key to understanding van Zanten's actions," the Brafmans explain. He dreaded "the cost of putting up the passengers, the chain reaction of delayed flights and the blot on his reputation for being on time".

"People find evidence for what they already believe and ignore anything contrary."

Baloney. Van Zanten's plane was one of several large aircraft diverted to Tenerife. They manoeuvred tightly around the runway, the taxiway that ran parallel to it and four small connector taxiways between the two. Several spilled over onto the taxiway, so some planes had to taxi up the runway, turn around, and then take off down that same runway. Van Zanten did this, but after turning around in preparation for take-off, the fog reduced visibility to 300 metres. Unknown and invisible to van Zanten, at the same time Pan Am 1736 had been instructed to taxi down the same runway and take the third exit on its left in order to avoid the KLM flight's take-off. After clarifying which exit to take — "The third one, sir; one, two, three, third, third one" the controller emphasized — the Pan Am jet counted them off against an airport diagram. The cockpit voice recorder revealed that the Pan Am crew identified the first two connecting taxiways, but missed the third; the collision happened near the fourth exit.

Meanwhile, in the KLM plane, van Zanten's co-pilot radioed the tower for clearance. The tower did not clear them for take-off immediately. At this moment, a call from the Pan Am jet to the tower caused interference on the radio. The Pan Am crew signalled that they were still on the runway, but because of the radio interference the KLM crew did not hear the message, and began their fateful take-off sequence. The