ANNALS OF SCIENCE

THE BIRTH OF AN IDEA

What do great leaders have in common? What about revolutionaries? After a quarter century of research, Frank Sulloway has discovered a very simple factor that may explain history.

BY ROBERT S. BOYNTON

It was the fall of 1967 when Frank Sulloway realized that the key to understanding Charles Darwin's genius lay in the fact that Darwin hadn't been one. Sulloway, a Harvard sophomore at the time, was hardly the first to be struck by how improbable it was that the theory of evolution had been discovered by so undistinguished a scholar, someone who once described himself as possessing "rather below the common standard in intellect." The historian Gertrude Himmelfarb, for example, once asked, "Why was it given to Darwin, less ambitious, less imaginative, and less learned than many of his colleagues, to discover the theory sought after by others so assiduously?" The answer that most biographies gave was simply that Darwin was a genius. To Sulloway, this sounded like a cop-out.

"The one thing I knew as soon as I read 'The Voyage of the Beagle' and his 'Autobiography' was that Darwin was an ordinary person," Sulloway recalls. "Sure, he was smart, but he didn't start out as a genius—he was nothing like Isaac Newton, who could probably solve differential equations in his head. No, Darwin wasn't capable of anything I couldn't understand myself, and that was part of his appeal. I identified very strongly with him, because he proved that we all have a chance. I thought Darwin would make a fascinating case study of how a modest, hardworking guy with terrible spelling but lots of heart became one of the most famous scientists in five hundred years. I thought, Gee, *that* would be an interesting nut to crack."

So, over the next thirty years, as his peers traded the cerebral passions of their youth for careers in finance and law, Sulloway pursued his interests with a tenacity that would have pleased Darwin, a man whose favorite expression was "It's dogged as does it." Having rejected the academy for the life of a freelance intellectual sleuth, Sulloway retraced the Beagle's Galápagos voyage, mastered Darwin's œuvre, won a series of illustrious awards (a MacArthur "genius" grant among them), and wrote a much praised study of Freud and a series of brilliant monographs that changed the face of Darwin studies—all the while pondering the question of what had made his mentor tick.

Today, Sulloway believes he has finally solved the puzzle of Darwin's genius and, in the process, discovered why the great figures of history have been inspired to reject the conventional wisdom of their day. The single best predictor of revolutionary creativity, he argues, is birth order. Firstborns tend to become conservatives, and "laterborns," like Darwin, are more likely to become freethinking iconoclasts. Some people are simply "born to rebel"—a proposal that Sulloway defends in a provocative and quirky book of that title, to be published this month by Pantheon.

In short, Sulloway wants us to completely rethink standard theories of personality development and history—to cast aside modernity's Freudian and Marxist scaffolding, renounce such notions as the Oedipus complex and the class struggle, and replace them with a thoroughly Darwinian view of human behavior. The engine of history, he argues, is sibling rivalry, the Darwinian ur-conflict between firstborns and laterborns. Lest this sound like the kind of facile pop psychology one finds in supermarket self-help books, Sulloway has actually tested his claims and presented a massive trove of statistical evidence to illustrate the role of birth order in history.

"Born to Rebel" is supported by a sophisticated multivariate analysis of three thousand eight hundred and ninety scientists who took part in twenty-eight scientific revolutions; the eight hundred and ninety-three members of the National Convention that ruled France during the French Revolution; seven hundred men and women who were involved in the Protestant Reformation; and participants in sixty-one American reform movements. The result is more than a million biographical data points, culled from five hundred years of history. In the twenty-six years Sulloway worked on the book, he read more than twenty thousand biographies. He had over a hundred professional historians evaluate his historical findings; the chairman of Harvard's statistics department and a colleague drew on their work for the United States census to create software for the enormously diverse data. Entering the data in a computer took two years, and designing the book's graphs took another year.

For all its technical complexity, however, Sulloway's birth-order theory shares the parsimonious elegance of the Darwinian principles that were its inspiration. Personality, he argues, is the repertoire of strategies that siblings use to compete with one another, secure their place in the family, and survive the ordeal of childhood. By recasting Darwin's theory of natural selection in terms of family dynamics, Sulloway highlights the adaptive tactics that siblings deploy to differentiate themselves from one another in the eyes of their all-powerful parents. "Depending on differences in birth order, gender, physical traits, and aspects of temperament, siblings create differing roles for themselves within the family system," he writes. "These differing roles in turn lead to disparate ways of currying parental favor." Parental favor increases parental investment, which, in turn, improves a child's chances of survival. "During the brief period of childhood," Sulloway says, "children use their brains to accomplish the differentiation and adaptation that species like Darwin's finches took millions of years to achieve." As Jonathan Weiner observes, "The mind is our beak."

The most basic niche is that of the firstborn. In the family, firstborns identify more strongly with power and authority than their siblings do: they employ their superior size and strength to defend their special status and frequently "minimize the costs of having siblings by dominat-

PIERRE LE-TAN

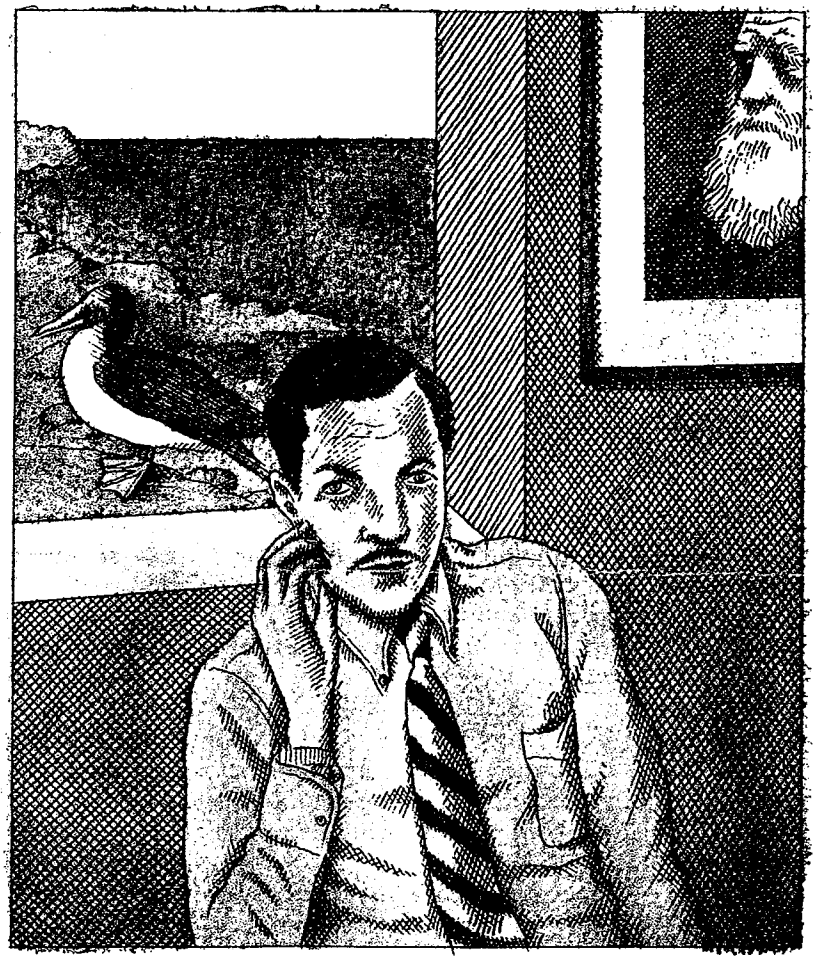
ing them." In their relations with siblings, firstborns are more assertive, jealous, and defensive than laterborns. They also tend to be more self-confident, and are overrepresented among Nobel Prize winners and political leaders, including American Presidents and British prime ministers. Churchill, Washington, Ayn Rand, and Rush Limbaugh might be taken as illustrative.

As the underdogs of the family, laterborns are more inclined to identify with the downtrodden and to question the status quo—sometimes to the point of becoming revolutionaries. They are more open to experience, because this openness aids them, as latecomers to the family, in finding an unoccupied niche. Their openness tends to make them more imaginative, creative, independent, altruistic, and liberal. From their ranks have come the bold explorers, the iconoclasts, and the heretics of history. Joan of Arc, Marx, Lenin, Jefferson, Rousseau, Virginia Woolf, Mary Wollstonecraft, and Bill Gates typify the behavior of laterborn siblings.

The volume of biographical information that Sulloway has amassed on the nearly seven thousand historical figures he assays is astonishing. In addition to birth order, he has gathered details on gender, family size, social class, temperament, relationship with parents, connection to siblings, and two hundred and fifty other variables, which together give "Born to Rebel" an interpretative nuance rarely found in quantitative studies. Of course, anyone is capable of becoming a revolutionary under certain conditions, and the bulk of Sulloway's book is dedicated to deciphering the complex combination of conditions whose final product is personality. His method is extremely sensitive to context and was designed to account for the fact that particular variables interact in different ways, depending upon the individual in question. An "interactionist perspective," Sulloway writes, "lies at the heart of this book."

A tendency toward shyness, for example, can either promote or inhibit the revolutionary personality, depending upon one's birth order: shy firstborns tend to be more reflective and therefore more open to experience than most firstborns, while shy laterborns are likely to become more cautious and less rebellious than most laterborns. Extroversion, on the other hand, increases the chances that firstborns will be outspokenly conservative, while extroverted laterborns are likely to be more self-confident in their revolutionary opinions. Conflicts between parents and children also interact with birth order and increase the likelihood that a child will reject authority. This is especially true in the case of firstborns who have bad relationships with their parents—a group of potential rebels whom Sulloway designates as "honorary laterborns."

Using Sulloway's model, one can calculate the probability of someone's demonstrating revolutionary behavior. Darwin, for example, was replete with the kinds of attributes that promote radical tendencies. The fifth of six children, he was four years younger than his next eldest sibling, and he suffered the loss of his mother at age eight. Sulloway's estimate of the probability that someone with Darwin's background will support a radical revolution is ninety-four per cent. The firstborn Isaac Newton, on the other hand, was left in the care of his elderly grandparents at age three, when his mother remarried, and not until his stepfather died, seven years later, was he allowed to live with his mother and three half siblings. Apparently as a result of this poor treatment, Newton rebelled against his mother; Sulloway calculates the probability that someone in these circumstances will support radical innovation at seventy-three per cent.



Unlike Darwin, Sulloway applies evolutionary theory to the human personality. "History," he states, "is biography writ large."

But birth order doesn't just interact with other traits and circumstances; it also encapsulates some of them. Sulloway writes, "It is a proxy for differences in age, size, power, and privilege within the family system"—and thus serves as a Rosetta stone for decoding the principles of family niches. "Like other predictors of radicalism, birth order is a *fallible* indicator," he continues. "Its principal virtue lies in its being *less* fallible than any other predictor I have been able to identify." He contends that birth order plays a consistent role across the twenty countries and five centuries he has examined, and that it is as predictive of behavior in religious upheavals as in scientific and political revolutions. "History," he states, "is biography writ large."

Of course, not all rebellions are alike: attacking the status quo in Hitler's Germany has a different political complexion from challenging creationism in nineteenth-century England. Sulloway argues that theories with socially radical implications tend to be championed by laterborns, while conservative revolutions are most often backed by firstborns. Firstborns, for example, favored

eugenics in the early decades of the twentieth century, presumably because it rationalized socioeconomic disparities in terms of genetics. Laterborns, on the other hand, were nine times as likely as firstborns to champion phrenology, which was a movement that "sought to make talent, not privilege, the main criterion for social advancement."

Sulloway's dynamic developmental model undercuts the tumultuous "nature versus nurture" debate that has plagued evolutionary psychology since the publication of Edward O. Wilson's "Sociobiology," in 1975. Sulloway likens the nature/nurture relationship to that between an artist and his tools. "Genetics supplies the equivalent of canvas and paints," he writes. "The environment, which guides the process of individual development, provides the equivalent of the artist's brush strokes."

If some of Sulloway's variables sound inherently vague, the results are impressively concrete. In Western history, the likelihood that a laterborn will champion a radical political revolution is eighteen times that of a firstborn. During the Reformation, a laterborn was forty-six times as likely as a firstborn to suffer martyrdom for the Protestant faith. During the French Revolution, laterborn members of the French National Convention, being more liberal, were twice as likely as firstborns to vote in favor of sparing the King's life. Republican Presidents have consistently nominated firstborns to the Supreme Court, while Democrats have favored laterborn justices, who, once appointed, have been significantly more likely to vote in a liberal fashion. During the first decades of the Copernican revolution, laterborns were five times as likely as firstborns to accept the theory that the earth rotates around the sun. Upon the publication of "On the Origin of Species," laterborns were 4.4 times as likely as firstborns to support Darwin's ideas. "Laterborns are consistently overrepresented among the champions of conceptual change," Sulloway writes. "The likelihood of this difference arising by chance is substantially less than one in a billion."

Early readers of "Born to Rebel" have been impressed by its depth and its scope. "It definitively settles the question of birth order's importance in the development of personality," Edward O. Wilson says. "I'd be surprised if there are serious scholars who can mount significant arguments against it." Steven Pinker, a cognitive scientist at M.I.T., calls Sulloway's work "completely original and unlike anything I have ever seen," while the eminent anthropologist Sarah Blaffer Hrdy seems hyperbolic in her praise. "I am almost embarrassed by the strength of my conviction," she says, "but I think that with this book Frank will join the pantheon of thinkers, like Freud and Darwin, whose work has radically and forever changed the way we look at ourselves and the world."

"Born to Rebel" is also an extended homage to Darwin and the culmination of Sulloway's lifelong fixation. His relentless empiricism and reliance on hypothesis testing mimic Darwin's own intellectual style. But, unlike Darwin, who dared apply evolution directly to "man" only once in the entire text of the "Origin," Sulloway has no misgivings about extending evolutionary principles to human affairs. "In the distant future I see open fields for far more important researches," Darwin wrote in the final pages of the "Origin." "Psychology will be based on a new foundation. . . . Light will be thrown on the origin of man and his history." Little did he suspect that the foundation would be an electronic maze of correlation coefficients and regression analyses. "My book," Sulloway says proudly, "aspires to be the kind of history that Mr. Spock on 'Star Trek' might have liked."

On a hot summer morning in Washington, D.C., the vast strip of lawn stretching from the Washington Monument to the Capitol is teeming with brightly clad tourists who have descended on the capital to visit its monuments and museums. Off to one side, a somewhat more sober-looking crowd wends its way into the Smithsonian Institution, down two flights of stairs, where they are attending a two-day conference on evolutionary psychology, the hybrid discipline that examines human behavior through the lens of Darwinian theory. Sulloway arrives early, and finds that his lecture has been sandwiched between a presentation entitled "Politics as Sex" and one on the psychology of homicide. "How can I compete with *that*?" he remarks dryly. "I'll have to throw in a little sex and violence."

Sulloway stands six feet tall and has a slight paunch; his pencil-thin mustache and thinning, slicked-back hair give him the look of a nerdy Clark Gable. He has a fondness for silly puns and exhibits the good-humored goofiness of someone who has spent a great deal of time alone. (One evening over dinner, he asked a puzzled-looking waiter whether the baby roast pig was a firstborn.) Wearing white sneakers with black socks, rumpled khakis, and a blue tennis shirt whose pocket bulges with pencils, pens, and a calculator, he seems an unlikely candidate to join the august company of those who claim to have solved the riddle of history.

Sulloway slumps onto a folding chair at the back of the lecture hall and talks of his fears about the way "Born to Rebel" may be received. "I get a chilly shiver up my spine when I realize my work shows that one version of pop psychology has turned out to be true," he says. "I worry that people won't take it seriously, because they'll think I'm saying something like 'Well, there actually *is* something to phrenology' or 'You've *missed* something about mesmerism.'"

As it happens, the study of birth order isn't in particularly good standing among social scientists these days. In the nineteen-twenties, the psychiatrist Alfred Adler suggested that firstborns became "power-hungry conservatives" as they struggled against siblings to restore their lost eminence within the family. Since then, psychologists have churned out mountains of birth-order research, exploring possible links to everything from homosexuality to I.Q. In 1983, the Swiss psychiatrists Cécile Ernst and Jules Angst reviewed over a thousand of these studies in a book-length critique and concluded that "birth-order influences on personality and I.Q. have been widely overrated." The problem with previous birth-order studies is that most of them were poorly designed and lacked good data and proper statistical methods. "But once you control for factors like family size and social class," Sulloway counters, "it is easy to distinguish between differences due to social background and those caused by birth order."

Sulloway opens his presentation with a question. "Why is it that siblings from the same family are so different from each other?" he asks. "Recent research has discovered that, contrary to conventional wisdom, siblings raised in the same family are almost as different in their personalities as people plucked randomly from the population at large. What's more, the longer they live together, the *more* different they become." He cites a 1987 paper by Robert Plomin and Denise Daniels in the journal *Behavioral and Brain Sciences.*

"Yet another bipartisan commission!"

"Upper middle-class brothers who attend the same school and whose parents take them to the same plays, sporting events, music lessons, and therapists," they wrote, "are little more similar in personality measures than they are to working-class or farm boys." What psychologists once thought was a shared family environment turns out not to be shared at all; although the family seems to be a homogeneous entity, from a child's perspective it is a "panoply of microenvironments," as Sulloway puts it—a collection of niches, consisting of distinct vantage points from which siblings experience the same events in very different ways. "The family doesn't provide a monolithic experience that automatically immerses its offspring in a single environmental bath," he says.

Siblings are so different from one another because they act in accordance with Darwin's "principle of divergence," he explains. In the family, as in nature, diversification is a strategy that helps individuals minimize direct competition for scarce resources. In Darwinian terms, childhood is the search for a family niche.

The reason Sulloway concentrates on sibling rivalry can best be understood in the context of recent research in behavioral genetics. One of the greatest puzzles for Darwinians had always been the question of why organisms coöperate despite the fact that natural selection acts for the good of the individual only. Why, in other words, do we help others when all we are programmed to care about is getting our *own* "selfish genes" into the next generation? In 1963, the biologist W. D. Hamilton came up with an answer that he called the theory of kin selection. Since copies of an individual's genes are present in close kin, he reasoned, it makes good Darwinian sense for individuals to coöperate with one another to the degree that they are related. Hamilton even quantified the nature of this relationship, calculating that one is likely to be more altruistic to a full brother than to a half brother, and so forth.

In 1974, this cost-benefit explanation was further refined by the biologist Robert Trivers in his theory of "parent-offspring conflict." Trivers argued that, given the fact that each parent and his or her offspring share only half their genes, parents will disagree with each child in the family about the optimum level of investment that is due to that child. Each child wants to monopolize more of his parents' resources (in order to increase *his* chances of survival) than they are willing to give, for the parents' genetic interests are better served by spreading their resources among *several* offspring.

Sulloway's contribution to this line of thought is at once subtle and dramatic. He noticed that beneath Trivers' parent-offspring theory lay an even more fundamental Darwinian conflict; namely, sibling rivalry. After all, when a sibling strives for parental attention it is primarily his other siblings that he is competing against; conflict with the parent is actually a by-product of this primal competition. Sibling altruism is sharply delineated by sibling rivalry. As anyone who has ever watched two siblings fight over the size of a piece of cake knows, they tend to disagree about the allocation of shared resources. As a rule, an offspring's idea of "fairness" is to give a sibling a *third* of any shared item, not half. "Children may not know if they are loved less than the children of other parents, but they are painfully aware when they are loved less than a sibling," Sulloway explains. They are extremely sensitive to inequality, whether real or perceived—an insight confirmed by studies that have found that children become increasingly agitated and demanding the instant they perceive a sibling getting something they are not getting. Though incremental differences in things like food and shelter might seem insignificant given the abundant resources of the present day, in the hunter-gatherer societies of early man, even the smallest advantages could make the difference between life and death; throughout history, half of all children have failed to reach adulthood. "Even the Bible concurs with evolutionary theory regarding the primacy of sibling strife," he writes. "The first biblical murder—that of Abel by his elder brother, Cain—was fratricidal."

Sulloway now tells his audience, "We all come into this world with roughly the same bag of tricks. No one is genetically destined to be a first- or lastborn; we merely find ourselves in that position and have to make the best of it. Then, depending on the specifics of our family, we select strategies that help us compete with our siblings and find an available niche. Over time, the strategies perfected by firstborns will spawn counterstrategies by laterborns, and so on—the result being something like an evolutionary arms race played out in the family."

When Sulloway concludes, he is deluged with questions from members of the

"He's not Mr. Right, he's more like Mr. Now."

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audience. Someone asks about only children: Where is the rivalry in a family with just one child?

"Even an only child is locked in sibling conflict," Sulloway answers with evident enthusiasm, "because he is trying to maximize parental investment in *anticipation* of a sibling. All he wants to know is: 'Is there any more investment to be had from my parents, any more blood to be squeezed from this stone?' Children are hardwired to use sibling strategies to maximize parental investment. They don't even *need* a sibling to do it; they have hundreds of millions of years of biology telling them to do it anyway."

LATER that week, over lunch at a small Cambridge café, I ask Sulloway about his own experience of sibling rivalry. "I have two older brothers and a much younger half brother, so I grew up as the youngest of the first bunch and would classify myself as a functional lastborn," he says. "We are all about two and a half years apart. It was not a particularly friendly sibling group, which probably has something to do with my interest in the topic."

The Sulloways descend from an old New England family, whose earliest American ancestor, a Scotch-Irish indentured servant, arrived in Newburyport, Massachusetts, in 1652. Sulloway was born on February 2, 1947; soon afterward, his mother suffered a nervous breakdown, and she was in treatment for much of the first three years of his life, his care being left to a housekeeper. It is an absence to which he attributes his intellectual independence. "When my mother came back home she was horrified to find that I would walk around town knocking on the doors of strangers and introducing myself," he says. "I was a totally intrepid, kind of weird three-year-old. She couldn't control me, so she just taught me to look both ways before crossing the street and left it up to the Fates." According to family lore, she read "The Voyage of the Beagle" to Frank when he was five, although he has no memory of it.

In his small prep school, Sulloway was put in the awkward position of having his father as an English teacher. "I was a good student and once got the highest score on a test," he recalls. "But my father didn't want to appear to favor me, so he went over it again and again until he found a reason to mark it down."

The Sulloways were an athletic family; Frank's father and grandfather were national father-son tennis champions in 1938, and his second-oldest brother went on to become a professional tennis player and coach. To avoid competition, Frank took up track. The strategy he developed for the sport was one that he would use throughout his life. "When the coach told us to run four quarter-mile intervals, I would run twenty of them—five miles of sprinting!" he recalls. "Nobody had ever *heard* of workouts like that. As a freshman at Harvard, I'd run an extra workout before practice. I found that if I was willing to be insanely persistent I could always outcompete other people—not necessarily through natural talent but just by doing something so absurdly more labor-intensive. Still, it wasn't until the last meet of my junior year, against Yale, that I finally got enough points for my letter in cross country." In a close race, he managed to edge past a Yale runner to the finish line. His opponent was Frank Shorter. "I had to beat a future Olympic gold medallist to get a lousy college letter," Sulloway says.

Between running and studying, he didn't have time for campus politics. Although the basement of his off-campus coöperative housed the S.D.S. printing press, his room upstairs was home to far less subversive activities. As he became familiar with the capabilities of the newly developed computers, he learned how to analyze market trends and identify undervalued stocks, and he then sold the information to several Boston investment firms.

At Harvard, Sulloway signed up for a hybrid history-of-science major, which required a senior thesis. One day, after a class on evolutionary theory, he asked Edward O. Wilson, his professor, what he should do. "Go to Galápagos!" Wilson shouted. "You'll find all of evolution

there in a microcosm." After doing a little research, Sulloway found, to his disappointment, that the Galápagos Islands had been practically overrun since Darwin's visit, in the eighteen-thirties—that every naturalist, ornithologist, and evolutionary biologist worth his salt had made the pilgrimage. Nobody, however, had ever retraced the Beagle's entire voyage through South America. Sulloway did so, after raising enough money to make a documentary film of the trip.

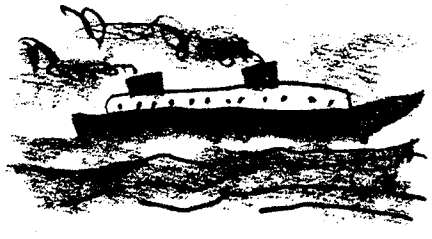
Sulloway graduated summa cum laude and won a Harvard travel grant, which he used to study finches in the Galápagos and then to pore over the original Darwin manuscripts, in England. "I had been bitten by the Darwin bug," he says. He began a history-of-science graduate program at Harvard in 1970, intending to write a biography of Darwin. While doing preliminary research on scientific creativity, his interest was piqued by a comment made by a professor of his, the psychologist Jerome Kagan, to the effect that one of Darwin's friends had opposed the theory of evolution because he was a first-born. Sulloway delved into the birth-order literature and began collecting data of his own.

Still puzzled by the nature of Darwin's genius, Sulloway began reading Freud in the hope that psychoanalysis might shed some light on it. He polished off Ernest Jones's massive Freud biography and started "The Origins of Psycho-Analysis," a collection of letters from Freud to his friend Wilhelm Fliess. Almost immediately, he sensed that something was amiss. On December 6, 1896, Freud had written to Fliess about what seemed to be infantile sexuality—something that Sulloway found odd, since, according to Jones, Freud didn't discover infantile sexuality until after he began his self-analysis, in the fall of 1897. "How could he mention something he didn't know about until nine months later?" Sulloway recalls wondering. "I realized something was out of whack about the whole story."

Darwin and birth order went on the shelf, and for the next seven years Sulloway immersed himself in Freud. His familiarity with nineteenth-century science helped him to see the deep connections between the discoverer of evolution and the man whom Jones called "the Darwin of the mind." In 1979, Sulloway's unearthing of the covert evolutionary and biological roots of Freud's "pure psychology" resulted in "Freud, Biologist of the Mind," a book that established Sulloway's reputation as an intellectual iconoclast. "Bad biology ultimately spawned bad psychology," Sulloway later wrote. "Freud erected his psychoanalytic edifice on a kind of intellectual quicksand, a circumstance that consequently doomed many of his most important theoretical conclusions from the outset." According to Sulloway, Freud's problem was not that he had drawn from evolutionary theory but that he had drawn from the *incorrect version* of evolutionary theory—a variant proposed by the French biologist Jean-Baptiste Lamarck, who believed in the inheritance of acquired characteristics. Under the influence of Lamarck and Ernst Haeckel, Freud argued that children "inherited" an encapsulated form of the oral and anal stages of pregenital sexuality through which mankind had evolved over the course of history. Freud's conception of human nature, Sulloway wrote in *The New York Review of Books*, is "largely a collection of nineteenth-century psychobiological fantasies masquerading as real science."

The most devastating section of the book, however, was devoted to the founder of psychoanalysis himself. Sulloway's sleuthing explored a number of inconsistencies in the Freud legend, including the fact that Freud was well acquainted with a number of books and ideas of which he claimed complete ignorance. Sulloway argued that Freud's destruction of his early manuscripts, diaries, and correspondence was only the most dramatic of his many attempts to enhance the myth of his heroic isolation and to conceal the scientific and cultural context in which psychoanalysis had actually developed. The story of psychoanalysis's pristine birth, via Freud's self-analysis, was crucial for substantiating the notion of his absolute originality and sustaining the insular cult for generations to come.

"Psychoanalysis is the only theory in the history of science which demands that its history be consistent with its theory," Sulloway says. "Can you imagine Darwin claiming that his discovery of natural selection had been the result of a *natural selection* of ideas in his head, or imagine Newton saying that his thoughts had *gravitated toward* the theory of universal gravitation? Only psychoanalysis demands that its founder's life—his childhood, and even the self-analysis that led to his discoveries—follow his theory."



"Freud, Biologist of the Mind" sparked intense debate. Anna Freud tried to block a German edition; Sulloway was verbally attacked at psychoanalytic conferences. Despite the book's hostile reception within analytic circles, however, it was well regarded elsewhere. It received the Pfizer Award for the best book on the history of science. Peter Brooks praised it in the *Times* as "a work of prodigious scholarship." And the Harvard historian Donald Fleming stated, "The whole of the existing literature on Freud has been rendered obsolete."

HARVARD'S Agassiz Museum of comparative zoology is an imposing sandstone building with long Palladian porticoes punctuating a stately neoclassical façade. It is home to the university's collection of three hundred and twenty thousand bird specimens, and is named after the nineteenth-century naturalist who was the museum's founder and first curator and also one of Darwin's most determined foes.

A light morning rain is falling as I wait for Sulloway, who has agreed to give me a tour of the collection. After half an hour, he bounds up the museum's steps bathed in sweat. He apologizes, telling me that he has run all the way from Harvard University Press, where he has been testing the cover of "Born to Rebel" on the editors there. This is not an unusual practice for him; indeed, every aspect of the book has been subjected to the same rigorous hypothesis-testing that generated its data. Sulloway calculated what he believed to be optimal terms for his contract and negotiated a five-hundred-thousand-dollar advance from Pantheon without a literary agent. To evaluate chapter and book titles, he created a rating system in which the syllables of a potential title were calculated along with its sibilance, "punch value," and "euphony index"—all of which were reduced to an over-all ratio, rank-ordered, and then randomly tested on unsuspecting subjects walking the streets of Cambridge.

Sulloway is unhappy with the cover and is pressing for a new one. Pulling a thick folder from his knapsack, he shows me dozens of alternatives he has designed himself, among them a series of edgy computerized motifs, a montage of color

SHOWCASE BY HELMUT NEWTON

HUSTLED

LIKE George Wallace, Larry Flynt, who was crippled by a would-be assassin's bullet in 1978, is a backcountry recalcitrant undergoing absolution. A deep-fried hillbilly and high-school dropout, Flynt built a string of vending machines and strip clubs into a media empire, whose flagship title is *Hustler*. Unlike Hugh Hefner or Bob Guccione, his rivals in the wank trade, Flynt has never given himself airs as an epicurean surrounded by objets d'art. He has remained an unrepentant redneck, and *Hustler* promotes pornography without pretension. Its most infamous cover—a woman being fed into a meat grinder—remains Exhibit No. 1 on the anti-porn activists' evidence sheet. When Flynt ran a witless ad parody suggesting that Jerry Falwell had had sex with his mother, and it resulted in a 1988 Supreme Court decision in his favor, even civil libertarians wished they'd had a better First Amendment horse to back. Recently, however, renowned writers (Barry Hannah in *George* among them) have been sprinkling sympathy on Flynt's behalf as part of the press buildup to Milos Forman's film "The People vs. Larry Flynt," which stars Woody Harrelson as Flynt and Courtney Love (said to give a riveting car wreck of a performance) as Flynt's junkie wife. Flynt's life might seem to be B-movie material, but Forman is an A-list director, and the movie closes the New York Film Festival.

In December, Flynt's reputation rehab will continue with the publication of his autobiography, "An Unseemly Man," in which he reflects on becoming what Tom Arnold once called America's worst nightmare—white trash with money. Living large in L.A., he confesses to having had sex with a chicken and to lots of bar fights, yet the book does not reek of Tobacco Road; it sidles into psychobabble ("It was a transitional time for me emotionally"). There's no denying that Flynt's account of his years of pain after being shot is harrowing. But it seems odd that a man who prides himself on being so coarse should be doted upon as if he were a wheelchair saint. There's too much anger at the root of Flynt's portrayal of women and others in *Hustler* to afford him such easy redemption.—JAMES WOLCOTT

Larry Flynt in Los Angeles, 1986

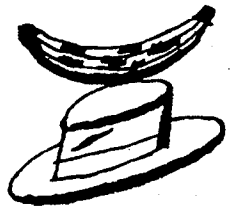
Xeroxes, and even an oil painting he commissioned. "I've probably spent three thousand dollars of my own on the cover," he admits as he leads me to the ornithological collection.

When we open the door to the specimen room, our eyes and nostrils are assaulted by the fumes of chemical preservatives. After passing aisle after aisle of fifteen-foot-tall wooden cabinets, we arrive at the Galápagos finches. Sulloway swings open an enormous door and slides out a shelf holding thirteen neat rows of tiny tagged birds. Identifying each bird, he gives me a brief synopsis of its history. Sulloway knows the birds well; a 1982 study of his was the first to identify definitively the islands from which Darwin's original specimens came.

Sulloway's subsequent monographs on Darwin have the drama of a detective story, in which a Holmes-like investigator arrives at the scene, spots a crucial bit of overlooked evidence, reconstructs the crime, and nabs the culprit. "Frank's papers on the Galápagos finches changed the face of Darwin studies," the Darwin biographer Janet Browne says. Sulloway knew from his 1982 study that, after acquiring the birds in the mid-nineteenth century, the British Museum had replaced their original labels with tags bearing their names and the sites where they were *thought* to have been discovered. No one knew for sure whether Darwin himself had labelled the Galápagos finches by island—information that would provide an important clue to his conversion to evolution. "A creationist would assume that, since God made one set of birds when he created the world, the specimens from different islands would be identical. It wouldn't even occur to him to look for differences by location," Sulloway explains. Only the original tags—none of which had ever been found—could settle the question. "I knew I'd never find an original label for anything that was valuable, because the more valuable a bird was the more likely it was that the curators clipped the original and put on a fancy new one," he goes on. "So I thought, Did Darwin collect anything that *nobody* would care about? And then I realized there was a bobolink! I'll bet that bird was so ordinary they just put it in a drawer and forgot about it." The moment Sulloway saw the bobolink, he recognized the handwriting on the tag as Darwin's; it denoted the bird's name and date but gave no island location—evidence that Darwin

had not yet become an evolutionist when he visited the Galápagos. In another paper, Sulloway analyzed Darwin's spelling habits in order to show that the diary passages in which he mentioned evolution could not have been written while he was in the Galápagos.

So when *did* Darwin become an evolutionist? Sulloway came to suspect that it happened sometime after he returned to England and distributed his specimens among professional zoologists to be properly identified. One of the most distinguished of those scientists was John Gould, the London Zoological Society's ornithologist. Sulloway finally narrowed the date of Darwin's conversion to the second week of March, 1837—eighteen months after he left the Galápagos and days after meeting with Gould. But more revealing than what happened to Darwin during their encounter was what had *not* happened to Gould.



"Darwin's notes show Gould taking him through all the birds he has named, and you can tell from his jottings that this is the first time Darwin has seen that all the finches are variations of a single species," Sulloway says. "Gould keeps flip-flopping back and forth about the number of species; the information is there, but he doesn't know quite what to make of it. The names Gould gives them are beautiful: *Geospiza nebulosa*—nebulous; *Geospiza dubia*—dubious; *Geospiza incerta*—uncertain. What Gould is saying is that the birds are so different that he doesn't *know* whether they are distinct species. Reading these notes was like being alive at the moment evolution was discovered.

"But what is really remarkable about the encounter is the completely different impact it has on the two men. Gould is *teaching* Darwin how to think like a taxonomist, and he isn't fazed one iota by the textbook case of evolution unfolding right in front of him! Gould knew far more about the finches than Darwin did. I mean, Darwin didn't even know that they *were* finches! So why is it that the guy who has more knowledge is stupider than the guy who has less? I knew that, whatever was going on, it didn't have anything to do with the data; it had to be something about psychology or personality. The more I worked on it, the more it ate at me." As it turned out, Gould was not an isolated case; not one of the zoologists examining Darwin's specimens—most of whom were firstborns—became an evolutionist as a result of working on the Beagle collections.

THE winding back lanes of Cambridge, Massachusetts, are filled with quaintly dishevelled two-family houses—with their sagging porches, peeling paint, and the occasional aging Volvo parked in front—inhabited by Harvard graduate students and recently minted professionals. As Sulloway and I walk along the uneven redbrick paths that lead from his apartment to his office, he stops every few blocks to check on morning-glory vines climbing up street signs. "I planted them because I was working so much I wanted something beautiful to look at on my way to and from the office," he says.

Sulloway's office is at M.I.T.'s program in Science, Technology, and Society. In one respect, Sulloway's life has diverged sharply from Darwin's. Once he had returned from the Galápagos and settled at his secluded Downe estate, Darwin never again left it; in contrast, Sulloway has been a veritable nomad. In the past thirty years, he has been at Harvard's Society of Fellows; the Institute for Advanced Study, in Princeton; Berkeley's Miller Institute; and M.I.T.'s Dibner Institute—all these moves supported by multiple grants from the National Endowment for the Humanities, the National Science Foundation, and the Guggenheim and the MacArthur Foundations. "My income has been negative twenty thousand dollars a year for the past five years and I've lived like a graduate student for as long as I can remember," he says. "Every penny has gone to support my research."

Sulloway isn't sure what he is going to do with the money from "Born to Rebel." He has never owned a car or had a mortgage, but he is thinking about settling down. After studying families for so long, he would like to have one. "My single greatest goal now is to get into a relationship and have a family," he says. "It may be too late, though. I'm forty-nine, and the eligible range of partners is limited, since I don't meet many women who are ten or fifteen years younger than I am. And when I do they tend to be the ones who are out of relationships because they are unstable. The mate-selection pool is constantly being drained of the stable ones. I guess I should have invested more in that particular domain."

Flanked by a window on one side and by bookshelves on the other, Sulloway's office is a corner of a large room that he shares with three research fellows. Every shelf is crammed with books on history, science, and evolutionary theory. His computer dominates the desk, its keyboard balanced precariously on a stack of boxes so that he can type while standing. After flicking the machine on, he plugs in a combination of Darwin's biographical variables, and streams of brilliant yellow digits go cascading down the cool azure screen. It is an odd experience to see a man's life broken down into strings of numbers, but this is the essence of history for Sulloway—a maze of probabilities and interconnected decision trees. As he guides me through rows of correlations, I try to look at history through his eyes.

Once Sulloway had perceived the signal importance of birth order in the development of revolutionary personality, he extended his research and found that laterborns in general were significantly more likely than firstborns to champion Darwinism—a theory that, he notes, celebrates the endless biological achievements that derive from unfettered competition and is thereby the ultimate scientific justification for the abolition of primogeniture.

He began to investigate other historical episodes through his birth-order lens, such as the varied fates of the wives of Henry VIII. He discovered that Henry's three least successful marriages were all to outspoken laterborns, who resisted his authority. Two ended up on the executioner's block. Starting with a lastborn wife, Henry married women who tended to be earlier and earlier in birth rank until he ended up with a firstborn. "Henry seems to have learned a lesson from his various matrimonial experiences," Sulloway writes. "As far as opinionated kings are generally concerned, laterborns might be fun to court, but they tend to make troublesome wives."

The role of birth order in the French Revolution is so enormous that Sulloway dubs it "the story of Cain and Abel writ large." He argues that Marxist historians who interpret the Revolution as a classic bourgeois revolt have failed to explain why the chief victims of the Terror were not aristocrats but, rather, merchants, artisans, and peasants: they constituted eighty-four per cent of those who were executed. "Two centuries of explanations by French historians are largely a footnote to the un-

recognized power of sibling differences," he writes. Seven of the twelve members of Robespierre's Committee of Public Safety were firstborns—the highest proportion in any major political faction during the Revolution. And, as the Revolution became more violent, brothers literally turned on each other. Of the sixteen brothers elected to the National Convention, almost all joined opposing political factions according to birth order. "Liberty and equality proved relatively easy to attain; fraternity was more elusive," Sulloway writes.

As Sulloway refined his multivariate model and accumulated more biographical data, he became adept at formulating statistical explanations for individual personalities. "It is a complicated story, but it has the explanatory power psychoanalysts always *dreamed* of having—that an analyst could get some poor bastard on the couch and after hearing five dreams tell everything about him," he says. "Well, you can't quite do that with any method, but, boy, you can tell an awful lot using this one."

He analyzed Voltaire, an extroverted lastborn who lost his mother when he was seven and experienced significant conflict with his father and elder brother; Sulloway calculated that the probability that someone so situated would support radical causes was eighty-eight per cent. Mao Tse-tung, the eldest of four children, was frequently beaten by his father; Sulloway attributed his militant radicalism to the fact that he identified with his father's ill-treated workers.

As Sulloway takes me through each example, I begin to feel as if I were drowning in a sea of numbers. As happens in any historical narrative, some of his explanations are more convincing than others, and some of them sound too cleverly reasoned to stand up to the messy contingencies of human events. There is something disconcerting about the way Sulloway talks about history—a quality of exaggerated rationality which can sometimes make you wonder whether the whole thing isn't a hoax. Sulloway thinks differently from anyone else I have ever met: he sees the world as a series of statistical probabilities strung together by Darwinian principles. I ask him why the skeptical reader shouldn't lump his explanations with the other ad-hoc "just so" stories that our pop-psychology-crazed culture seems to crave.

"What makes my model non-ad-hoc is that I have spelled out my hypothesis so precisely that anyone can test it for himself," he says. "If anyone ever, *ever* discovers a radical revolution led by firstborns and opposed by laterborns, then I'm out of business. Or if someone discovers the opposite—a conservative revolution led by laterborns and opposed by firstborns—that would also refute my theory. The difference between science and ad-hoc-ism is that in science you very carefully specify what counts as a refutation. What I'm doing seems so strange because historians so rarely do it. I agree that history is full of contingency, but it is a contingency around themes and processes that keep repeating themselves. My eureka moment was realizing that psychologists and historians of science had missed something essential about creativity, which is that the driving force behind most discoveries is something other than the books you read and the knowledge you have. It's character, personality—the kinds of things a biographer can capture for an individual but that nobody had figured out how to translate into a lawlike formula. History is like evolution. There are unique events—like a monkey falls from a tree and is killed, so his genes aren't passed on—and then there are laws, like the one that says monkeys reproduce according to natural selection. But the generalizable rules of history can be understood only at the most complex, multivariate level."

He explains that this is something he didn't understand until just last year. Sulloway, an empiricist by temperament, claims that for the first twenty-five years during which he gathered birth-order data he didn't understand why siblings had such a relentless need to be different. Then, when he was writing a paper for a psychology journal in early 1995, he suddenly realized that siblings differ because they are exemplifying Darwin's "principle of divergence." With that insight, he recast his entire book. Had "Born to Rebel" been published two years ago, it would have been little more than a vast collection of suggestive data, lacking its crucial Darwinian underpinnings—what Sulloway calls "the spiffy stuff."

"I started at exactly the right place and then went down a blind alley with Freud," Sulloway says. "Ninety-nine per cent of what Darwinian theory says about human behavior is so obviously true that we don't give Darwin credit for it. Ironically, psychoanalysis has it over Darwinism precisely because its predictions are so outlandish and its explanations are so counterintuitive that we think, Is that really true? How radical! Freud's ideas are so intriguing that people are willing to *pay* for them, while one of the great disadvantages of Darwinism is that we feel we know it already, because, in a sense, we do. When I think about the folly of my life! After twenty-five years, I see that the best way to understand Darwin is through Darwin." ♦

"Just when I'm beginning to lose faith in the economy, the market hits another all-time high."