

But Bateson paid him no mind. He simply crossed De Vries off the ever-shrinking list of the people who were one of "us." If not for Bateson, Mendel's pea experiments might never have become the unifying starting point of genetics. By the same token, if not for Mendel, we might know — or care — very little indeed about the opinionated zoologist from Cambridge.

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The Monk's Bulldog

Gardeners are the ones who, ruin after ruin, get on with the high defiance of nature herself, creating, in the very face of her chaos and tornado, the bower of roses and the pride of irises.

— *The Essential Earthman*,
Henry Mitchell, 1923–1993

THE LECTURE WAS NOT SCHEDULED to begin for another hour, yet the room was packed. Every seat in the hall had long been filled; now people were beginning to perch on windowsills or lean into out-of-the-way niches along the walls. Rumors of an impending fight had been rumbling all morning, bringing out both the intellectually engaged and the morbidly curious. No doubt the fight would appear tweedy and civilized, in the fussy, carefully clipped manner of British academics. But who wouldn't want to see a good healthy row, even one you had to infer between the lines?

William Bateson was first to stride onto the stage, his long legs catapulting his six-foot-plus frame as though they were attached to someone else's body. If Friday, August 19, 1904, was a day like any other, Bateson was wearing a wool gabardine suit, a high-buttoned vest, and a white shirt with a tall, tight collar. If it was a day like any other, he had a copy of Voltaire's *Candide* tucked into a pocket — his wife and frequent collaborator, Beatrice Bateson, used to say that her husband almost never went anywhere without it. If it was

a day like any other, his huge mustache was drooping over his full lips, his eyebrows were bristling, and he was primed for a fight.

And if it was a day like any other, this imposing, energetic bear of a man was suffering from stage fright. This always afflicted him, whether he was about to speak to a class of Cambridge undergraduates, a group of ladies from the local horticultural club, or, as on this day, a group of partisan listeners crammed into a hot lecture hall to await the scholarly equivalent of a Sunday afternoon bullfight.

Nervous as he was, Bateson was on home ground. This meeting of Section D, the section on zoology, of the British Association for the Advancement of Science was being held in Cambridge, the university town in which Bateson had been born, raised, married, and where, at the age of forty-five, he still taught and conducted research. More to the point, he had just been installed as the new president of Section D.

These were his people. Unless, that is, he had completely alienated them the morning before. On Thursday, August 18, Bateson had delivered a presidential address to the section that probably caused more uncomfortable shufflings than had any other address in the association's seventy-three-year history. In a diatribe uncharacteristic for staid British academia — but perfectly in keeping with Bateson's own pugnaciousness, and with the rancor of the debate in which he was embroiled — Bateson had used his presidential prerogative to demean the ideas and methods of his arch-rivals, the biometricians. He had done this time and again for four years, ever since assuming the role of chief apostle for Mendel's theories and taking on the mission of bringing the monk's work to the attention of the English-speaking world. He derided the biometricians' most impressive statistical feat, the correlation table, as a rigid structure in which "the biometrical Procrustes fits his arrays of unanalyzed data." The table, a complex gradient of inherited traits and their correlation with those traits in earlier genera-

Nature of group dealt with	Correlation of parent plant and offspring capsule	Regression of offspring on parent plant
(a) Early capsules (apical flowers) of principal plants	.2323	.4003
(b) Capsules on plants — not starvelings, i.e. with at least three capsules	.2430	.4050
(c) All capsules on principal plants	.2295	.4295
(d) All capsules on all plants	.1960	.4064

A correlation table of the biometricians.

tions, might have looked "imposing," Bateson intoned, but it was "no substitute for the common sieve of a trained judgment."

The fight was the one between "continuity" — the biometricians' view of evolutionary change — and "discontinuity" — Bateson's view. Bateson had spent the previous four years rallying his camp around the nineteenth-century genius whose paper he had discovered on that train ride to London (or shortly thereafter): Gregor Mendel.

In his presidential address, Bateson found fault not just with the biometricians but with the entire scientific branch of zoology. Zoologists had become mere cataloguers, he said, having wandered far from their proper task, which was to find "the fundamental nature of living things." But with the job of describing all the animals on earth "happily approaching completion," Bateson said it was time for zoologists to embrace the future by shifting their attention back to the central questions of the twentieth century, those of heredity and evolution.

Now, on Friday afternoon, the second half of his planned one-two punch against the biometricians was about to begin. Bateson had choreographed this preemptive strike since early June. Every morning throughout the summer, he had taken a lawn chair and table out to the grove of shrubbery behind the chicken coops at his home in Grantchester, a village just beyond the Cambridge city limits. Each day's work began with his assistant Reginald Crundall

Punnett, a fellow zoologist at Cambridge University, bringing the *Morning Post*, the only local newspaper Bateson read, and then only for news about art auctions and sales. After a quick glance at the paper, Bateson set to work writing, rewriting, rethinking, and revising his presidential address and the following day's presentations. As the older man worked, leaving strict orders not to be disturbed, Punnett set about attending to the sweet peas with which he was replicating and enlarging upon Mendel's experiments. While Punnett recorded and labeled peas, Bateson would occasionally emerge from his little work station in the glen to casually ask Punnett's opinion of one point or another. But he already knew what he wanted to say; indeed, he already knew how he wanted to say it. He brought things up with Punnett in part just to hear himself speak.

Throughout the summer Bateson relished the upcoming fight with the biometricians much as he relished a good tussle on the croquet field. (Inexplicably, Bateson always wore a fez when he played croquet.) Years later the novelist Nicholas Mosley described a character closely modeled on Bateson, whose most salient feature — besides his brilliance and his determination to be Mendel's mouthpiece — was his single-minded aggressiveness on the playing field. For the fictional Bateson, the game of choice was tennis rather than croquet. He "used a tennis court as some sort of battleground on which to engage with the people (and these seemed to be most people) against whom he felt aggression. He . . . put great energy into his game; he would serve and rush to the net; he would leap to and fro volleying; he would prance backwards towards the baseline slashing at high balls as if they were seagulls."

In real life Bateson could indeed be a ferocious opponent — as he demonstrated on that hot Friday in August 1904. He stacked the morning's program with presentations by his allies. Miss Edith Saunders, his long-time research assistant, spoke about their experiments on *Datura stramonium* (jimsonweed), *Silene alba*

(catchfly), *Mathiola incana* (gillyflower), and other plant species. Colonel C. C. Hurst talked about his work with rabbits, such as his crosses between Belgian hares and inbred Angoras. And A. D. Darbishire, who until just months before had been on the side of the biometricians, focused on animal experimentation, specifically on his work crossing albino mice with Japanese waltzing mice.

Having Darbishire on his side was a major coup for Bateson, which he had accomplished by scaring the wits out of the younger man. Darbishire had been a promising protégé of Walter Frank Raphael (known to his friends as Raphael) Weldon, the leading advocate of the biometricians. In the previous year and a half, Darbishire had published four anti-Mendelian papers in *Biometrika*, a journal cofounded by Weldon. Darbishire's crosses between albino mice — with the recessive traits of white fur and pink eyes — and waltzing mice — with a recessive trait that made them spin in circles when other mice stood still — showed no support for the Mendelian ratios, the young man concluded. Instead the hybrids confirmed Galton's theory of ancestral heredity, which said that no inherited contribution from an ancestor, however distant, is ever lost.

Bateson, suspicious of Darbishire's results, wrote to him seeking his original data. In May 1904 he realized that Darbishire's data were inaccurate, incomplete — and possibly falsified. He revealed this in a letter to Darbishire on May 22, to which Darbishire replied immediately with a desperate plea for discretion — something Bateson had in only limited supply.

"I hope you will do your best to get me out of the position I am in as soon as possible and I pray you not to mention this letter to anyone," Darbishire wrote. "What do you suggest?"

What Bateson suggested was total — and public — capitulation. Less than three months later, when Darbishire spoke at the British Association meeting, he rejected all prior interpretations of his findings and said that they proved, rather than disproved, Mendel's

laws. The biometricians denounced Darbishire, who devoted some effort to attempting a reconciliation between the two camps — and then, failing that, became a devoted and lifelong Mendelian.

At last, at about the time the sun was surely baking the roof of the new Sedgwick Museum of Geology, and the people crammed into the museum's lecture hall were doubtless fairly roasting in the stifling air, Bateson brought to the podium Raphael Weldon, his most vociferous opponent. In their youth, Weldon had been Bateson's best friend. Now, in middle age, he was his bitterest and most impassioned enemy.

Weldon was a volcanic speaker. He gestured so violently when he was excited, as he was that Friday morning, that the sweat glistening on his bald dome danced off his head with every flourish and dripped from his brow and cheekbones onto his prepared comments. Weldon used his standard arguments against Bateson and the Mendelians: the occasional appearance of remote ancestors' traits, known as atavism; the intermediate nature of some hybrid crosses; the possibility that the Mendelians' results could be explained with other hypotheses. He called their methods careless and their theories about underlying mechanisms "cumbrous and undemonstrable."

A slight, pale man with a severe mustache and a fringe of dark hair, Weldon often lost his composure when he felt strongly about a cause — to the detriment of his own arguments. But his Cambridge audience on this August morning was moved by both his volubility and his intellect. "Clever beggar, that," one young Oxford student said to his friend with admiration; "he hasn't got to stop and think."

After Weldon's talk, Section D broke for lunch. This was no doubt part of Bateson's strategy. He was, after all, a chess player, having taken up the game when he learned that Mendel had been an avid player himself. (For the same reason he had taught himself

to smoke cigars, and subscribed for a while to *Die Fliegende Blätter*, Mendel's favorite humor publication.) Bateson probably thought it best to allow time for his audience's brains and body temperatures to cool down before taking his own turn. He might also have hoped that interest in the afternoon session would grow during the lunch break, as men murmuring in corridors and nearby cafés informed other British Association members about the great fight brewing in the zoology hall.

The afternoon session started off much as the morning session had — with reports of experiments from some of Bateson's minions. Punnett described his and Bateson's work on fowl, and Minot talked about his experiments on guinea pigs. Then it was time to hear from the president. The event had been so carefully orchestrated that the lecture hall into which William Bateson strode was exactly as he had pictured it: crowded, hot, and as expectant as a child on Christmas morning.

Bateson was an arrogant man who fiercely defended his supporters and just as fiercely trounced his enemies. And Weldon had tumbled far in Bateson's hierarchy of allegiance.

In the early 1880s, while they were both at St. John's, College at Cambridge, the two had been the best of friends. Bateson at the time cut an awkward and gangly figure; his very movements were "unconventional," a classmate later recalled, his whole aspect "a living protest against the 'average.'" He was large, untidy, and out of control. Weldon, in contrast, always looked well-trimmed and carefully turned out, his slim bearing and pale, fine skin a testament to the frail health that would ultimately lead to his unexpected death. How strange they must have looked together, traversing the crisscrossing paths of the courtyards of St. John's, their student robes flapping in a breeze freshened by the River Cam.

Although Bateson dominated in physical bearing, Weldon was the spiritual leader of the twosome. It was he who suggested that

his friend embark on what would be a turning point in Bateson's scientific career: a trip to America during his first two summers after graduation. He thought Bateson would benefit from working with William K. Brooks, a morphologist at Johns Hopkins University interested in the path of evolution from invertebrates to the more complex vertebrates. Brooks was studying an animal that would become Bateson's first research model, a worm known as *Balanoglossus*, which lived in the warm waters of Maryland's Chesapeake Bay.

Weldon was only a year Bateson's senior, but he was, as an undergraduate and for the rest of his life, more entrenched in the old-guard academic elite. He achieved a professorship at University College, London, by the age of thirty, which thoroughly rankled Bateson, who was not made a professor (at Cambridge) until he was forty-seven. Weldon was such an overshadowing presence that Bateson had been heard to complain that when the two first knew each other, even though they were friends, he was often made to feel "like Weldon's bottle-washer" — the job in any laboratory given to the lowliest person. Maybe Bateson was always aware of being, as the British put it, "one generation from trade." His father rose to become the master of St. John's College, making him a highly respected man in Cambridge, but both grandfathers had been Liverpool merchants. Weldon, too, was the grandson of a middle-class manufacturer, but his father, who started out as a journalist, became rich by inventing a new chemical process for making chlorine. His financial comfort might have given Weldon the air of an aristocrat.

The first years of Bateson's research adventures overlapped the final years of Gregor Mendel. In the summer of 1883, when Bateson went to Maryland to work with Brooks, Mendel was still fighting the monastery tax, still taking his weather readings, still playing Sunday afternoon chess with his nephews. By Bateson's

second American summer, in 1884, Gregor Mendel had been dead for nearly six months.

At first Bateson, like Brooks, was concerned with morphology — the study of the forms of animals. He performed his work with *Balanoglossus* so well that he discovered new evidence that the worm was an intermediate between invertebrates and vertebrates. In the next two years he published three major papers on the evolutionary significance of *Balanoglossus* in the *Quarterly Journal of Microbial Science* — a remarkable feat for a man so young. Then he set off on an extended and difficult trip to Russia, hoping to find more evidence of large-scale variations among different plant species growing under different conditions in the salt lakes scattered across the steppes. He spent eighteen months away, miserable and alone, wintering in the village of Kazalinsk in Turkestan and summering out near the lakes. During that time Bateson decided morphology was an outdated field.

He saw an analogy with the steam engine, just then transforming the transportation industry. "Presently steam will be introduced into Biology," he wrote to his mother in 1886, "and wooden ships of this class won't sell." The biological steam engine, of course, was understanding how organisms change, not merely describing how they were at present, which the "wooden ship" of morphology was chiefly concerned with. In short, the future of biology would be filling in the details of evolution.

While Bateson was going through this crisis of the mind, his friend Weldon was back in England going through some crises of the heart. Weldon's emotional blows began several years earlier, while he was still an undergraduate at Cambridge. In June 1881 his younger brother, Walter Alfred Dante Weldon, who had joined Raphael at Cambridge, had dropped dead of apoplexy at the end of his first semester. He was nineteen years old. Within weeks Weldon's grieving mother was dead, and the following summer

Raphael's beloved mentor, the esteemed biologist Francis Maitland Balfour, died while mountain climbing. Loss, then another loss, and another. And in 1885, four years after the death of his brother, and two years after his marriage to Florence Tebb, Weldon lost his father, who died unexpectedly at the age of fifty-three.

Weldon kept these tragedies to himself but was forever haunted by them. As his close friend Karl Pearson, a brilliant mathematician and statistician at University College, London, put it, Weldon's outgoing manner belied an underlying "tinge of melancholy, a doubt whether he too would live to finish his work, and a tendency to take the joy and fullness of life while it was there." Weldon's lows were very low, but his highs were very high. Like Bateson, he brought an "almost boyish delight" to his work and seemed blessed by boundless energy. But he was more approachable than his stormier, more opinionated friend. Weldon debated with colleagues far into the night, gave vigorous classes and public lectures, and bicycled as much as one hundred miles in a day. "To see Weldon keen over a piece of work was to believe him robust and ready for any fray," said Pearson; "but looking back on the past one can see what each piece of work cost him."

After Bateson came home from Russia, he spent the next seven years working on his first book. "My brain boils with Evolution," he wrote to his sister Anna. During this time he and Weldon were drifting apart, finding themselves on opposite sides of the debate over evolution's pacing. Bateson was becoming a diehard discontinuitarian; Weldon, with his new friend Pearson and their mentor, Francis Galton, came down on the side of continuity. On this question Galton was something of an anomaly; his statistical proofs were used as support for both the continuous and discontinuous camps, and each side claimed him as a spiritual leader — competing claims that Galton did nothing to oppose.

The split between the two groups turned ugly in the spring of

1894, when Bateson's long-incubating book was published and Weldon publicly embarrassed him by writing a critical review. The book, *Materials for the Study of Variation: Treated with Especial Regard to Discontinuity in the Origin of Species*, described in vivid detail nearly nine hundred examples of discontinuous variation. Weldon's review, for the journal *Nature*, was one of history's most dramatic confirmations of the old publishing adage: friends should not review each other's books.

Weldon began by praising the "descriptive" first half of *Materials*, which he said "must be carefully read by every serious student; and there can be no question of its great and permanent value, as a contribution to our knowledge of a particular class of variations, and as a stimulus to further work in a department of knowledge which is too much neglected." But Bateson — like most authors — focused only on Weldon's criticism. The second half of the book contained "several inaccuracies," Weldon wrote, "due partly to want of acquaintance with the history of the subject." Bateson's central point was that discontinuous variation was essential for creating new species. Weldon's central point was that it was not.

When the critique appeared in *Nature* on May 10, Bateson reacted venomously. As he confessed later in one of his lengthy missives, in handwriting so insistent that at times it could scarcely be read: "If ever a man set himself to destroy another man's work, that did he do to me."

Maybe Bateson took such personal affront in part because his heart was already sore from lovesickness. The woman he adored, Caroline Beatrice Durham, had been kept from marrying him four years earlier — not because she didn't love him (she did, madly) but because her mother felt Bateson had drunk too much wine at the couple's engagement party. Mrs. Durham was especially sensitive to this because Caroline's father was a secret alcoholic. Bateson

had nursed his broken spirit by immersing himself in his work — and now the work, too, was being rejected, by a man he felt closer to than almost anyone else he knew.

Nine months later Bateson's hurt feelings led him into a spirited public controversy, not with Weldon but with a surrogate. At a meeting of the Royal Society on February 28, 1895, a biologist named W. T. Thiselton-Dyer gave a talk about the origin of new hybrids of cineraria, a hairy-leafed perennial, properly called *Senecio cruentus*, the flower of which has a profusion of tiny bristles that give the genus its name, the Latin for "old man." Thiselton-Dyer reported that the wild type of *S. cruentus*, found on the Canary Islands off the coast of Spain, differed dramatically, in flower shape and color, from a recently cultivated form at the Royal Gardens at Kew. These differences within the same species, he said, were proof that natural selection worked through small, continuous changes. To Thiselton-Dyer, the hand of the breeder at Kew, creating artificial selection, was analogous to nature's hand in natural selection. In both instances, small differences were sufficient to lead to big changes — resulting in new varieties and, given enough time, entirely new species.

Thiselton-Dyer published these thoughts in a letter to the editor of *Nature*. Bateson wrote a letter in response, thrashing his opponent for his "misleading" statement, which he said "neglects two chief factors in the evolution of the Cineraria, namely, hybridization and subsequent 'sporting.'" Sporting was the term first used by Darwin's critic Fleeming Jenkin to mean the occasional eruption of sudden changes in a species' makeup that lead to dramatic, unexpected differences.

Over the next two months, ten letters about cineraria appeared in *Nature* — from Bateson, from Thiselton-Dyer, from Bateson again, and at last from Weldon. Bateson took special offense at Weldon's letter of May 13, 1895. "All I wish to show is that the

documents relied upon by Mr. Bateson do not demonstrate the correctness of his views," Weldon wrote, "and that his emphatic statements are simply of want of care in consulting and quoting the authorities referred to." The accusation of carelessness, made by one conscientious scientist about another, was particularly wounding.

Hoping for a rapprochement, Bateson and Weldon met in person on Tuesday, May 21. The meeting did not go well. Weldon excused Thiselton-Dyer's arguments as just so much "bluffing." If this was the case, Bateson parried, then Weldon must have been "the accomplice who creates a diversion to help a charlatan." Faced with such accusations, Weldon gave up. On Friday he fired off a disgusted letter that began "Dear Bateson, I can do no more." The chance for civility had long passed, he told his former friend: "If you insist upon regarding any opposition to your opinions concerning such matters as a personal attack upon yourself, I may regret your attitude, but I can do nothing to change it."

The letters to *Nature* continued. Thiselton-Dyer accused Bateson of "facile theorizing" and "barren dialectic." Bateson said Thiselton-Dyer was theorizing, too, and without any facts to back him up. Finally, the journal editors had had enough. In June 1895 they refused to publish another sentence on the subject.

But the damage had been done. Bateson and Weldon never again spoke a civil word to each other.

While his affection for his erstwhile friend and colleague was disintegrating, Bateson's other affair of the heart was taking a dramatic turn for the better. In September 1895 — soon after the cineraria controversy had played itself out in *Nature* — another controversy was being resolved in the pages of a very different journal: the *English Illustrated Magazine*, a popular woman's monthly. In a short story under the byline of Beatrice Durham —

the young woman to whom William Bateson had been engaged six years before — a mousy middle-aged woman named Sophy accompanies her beautiful young niece to a ball and stuns the niece by capturing the eye of the evening's guest of honor, Sir William Collins. On the carriage ride home, the niece discovers that Aunt Sophy and Sir William loved each other in their youth, and that their plans to marry were thwarted by Sophy's mother. In the intervening years Will has turned his life around. He has gone on "expeditions," been knighted for his service to the Crown, and finally has shown up again before her, resplendent in top hat and tails. Aunt Sophy, now in her forties, having never recovered from the heartache of losing her first beau, falls in love all over again. He does, too.

"Will you marry me?" Sir William asks Sophy. "No, no, William," she replies heatedly, "it's too late, dear — too late now." Well, then, Sir William asks "huskily," may I call on you, so that we can try to get to know each other once again? "Oh, William," she exclaims, "if you will!"

This story was meant to be a message to Bateson from his Beatrice, the middle name she used then and forever after. I regret having lost you, the message was meant to say; all obstacles have been removed now that my parents have died; I long to see you again. In 1895 a maiden would never be so direct as to send a letter bearing such a message or to utter these words aloud. Indeed, it was forward of Beatrice to announce herself even in this oblique fictional way. But the effort would have been in vain had not the wife of the famous Cambridge philosophy professor Alfred North Whitehead, who was a close friend of Bateson's, taken the initiative to send him the September issue of the *English Illustrated Magazine* the following April. Bateson, of course, had never seen it — he was not in the habit of reading women's magazines — and he instantly dispatched a letter to Miss Durham.

"I have been led to think it possible that you may be willing to

see me again," he wrote in his earnest scrawl. "If it is not so, you tell me and that will be all; but if it is so, will you some day meet me? . . . [I]t has been for a long time my earnest desire to meet you again, if only as one who was once my dear friend, without regard to the future at all." But the future quickly announced itself anyway. In a matter of weeks the two were engaged, and on June 16, 1896, they married at last.

Bateson began to build the family he had always wanted. In 1898 Beatrice gave birth to a son, John, and the following year another son, Martin. The four of them were bursting out of Norwich House, their shallow three-story stone house on the corner of Norwich and Patton streets, with tall bay windows and a wrought iron gate enclosing its tiny thumbprint of greenery.

In 1899 Bateson moved his young family to Grantchester. The walk to the tiny village from Cambridge winds along the stone-lined River Granta, an easy two miles punctuated by footbridges and meadows. The village itself is not nearly as charming as the walk — just a few streets and high hedged walls that hide the more impressive houses from the curious eye. Behind one of these hedges, on a winding lane called Broadway, just down the road from the Rose and Crown pub, is Merton House, where the Batesons lived for eleven years. The property included orchards, a garden, several outbuildings, and an enclosed paddock.

"Would I were/ In Grantchester, in Grantchester!" wrote the village's most famous native son, the poet Rupert Brooke. Sitting in the Café des Westens in Berlin on the eve of World War I, Brooke was filled with nostalgia for a place where he could,

*flower-lulled in sleepy grass,
Hear the cool lapse of hours pass,
Until the centuries blend and blur
In Grantchester, in Grantchester . . .
Say, do the elm-clumps greatly stand
Still guardian of that holy land? . . .*

*Stands the Church clock at ten to three?
And is there honey still for tea?*

Brooke would never see Grantchester again. He died of blood poisoning while his navy ship was stationed in the Mediterranean. In his honor the Rose and Crown was renamed the Rupert Brooke Pub. And when the church clock was repaired in 1985, the hands were left frozen for all time just the way Brooke remembered them — poised at ten minutes to three.

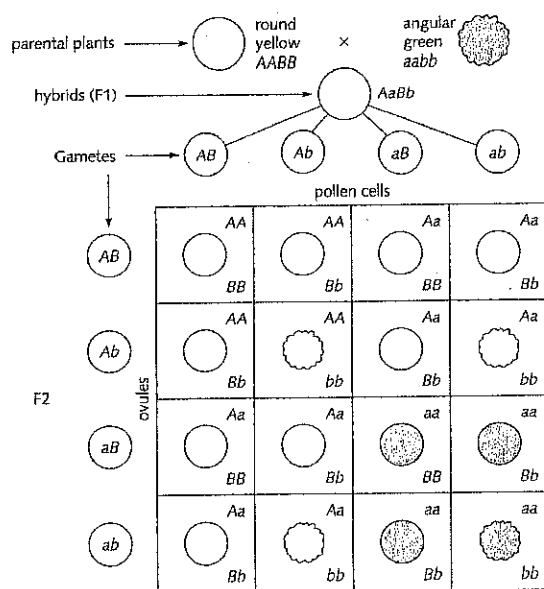
Merton House offered rather primitive conditions for Bateson's numerous experiments. The problem was the scarcity of money rather than the cramped quarters — though cramped they still were, especially after the birth of Gregory, named after Gregor Mendel, in 1904. Through an artful exchange of what he called "begging letters," Bateson managed in the last days of 1903 to secure £150 a year for two years from his friend Christiana J. Herringham. Mrs. Herringham acknowledged that the money "isn't as much as you want," but said it might pay for a research collaborator and might help Bateson not "hanker after America." He was, indeed, flirting with the idea of moving to America, where he had been gloriously received on a lecture tour the year before, and from which he had already received one job offer, from Dr. A. G. Mayer of the Brooklyn Institute. After receiving Mrs. Herringham's support, Bateson promptly wrote to Leonard Doncaster, a biologist from Cambridge, asking him to join him as a full scientific collaborator. Doncaster declined, saying he preferred to work on his own — though for many years he counted himself among Bateson's acolytes, conducting experiments that Bateson would use to support his case for discontinuous variation. Bateson then tried his second choice. On Christmas Day of 1903 he wrote to R. C. Punnett, a zoology demonstrator at Cambridge, asking him to enter "into partnership in my breeding experiments. . . . We could do far more in combination than separately."

Punnett, a well-liked young man, was at the time more famous for his athletic brilliance (in cricket, golf, tennis, and a British game called fives) than for his scientific acumen. He accepted the job with enthusiasm but declined the £80-a-year salary Bateson offered. He had an independent income from the wealthy Punnett family of Lincolnshire fruit growers — a business so famous that its very name entered the British vocabulary, "punnett" being the word for a large wicker basket used for gathering strawberries.

The Punnett name is also familiar today, especially in the United States, for quite another reason, one directly related to R.C. himself. It was he who invented the easiest way to visualize the crosses Mendel described in his paper of 1866. Mendel had used a few charts showing the possible combinations for each of the four gametes involved in a monohybrid cross, and his successors had tried to refine those charts to make the combinations more clear. But Punnett's matrix was the clearest. He called it a checkerboard, setting it up so that the female contribution was shown in the horizontal boxes and the male contribution in the vertical boxes. In each box, then, two gametes intersected — one from the top, one from the side — and it was an easy matter to write in the box which two gametes had paired to form each particular offspring.

Punnett's matrix first appeared in the third edition of his textbook, *Mendelism*, in 1911. Not until his death in 1967, at the age of ninety-one, was the checkerboard renamed the Punnett square. As a result, Punnett's name is far more familiar to casual genetics students, and to the general public, than is Bateson's.

Bateson plunged into his collaboration with Punnett as ferociously as he approached every other venture, from playing croquet to collecting Japanese lithographs to reading passages of the Bible to his sons every morning. He seemed to be everywhere at once, overseeing projects in every corner of his property — and beyond. "The poultry occupied a small paddock split up into about two dozen



A Punnett square showing a dihybrid cross.

pens," recalled Punnett about the working conditions of 1904, during the time Bateson was composing his presidential address for the British Association. "There were several incubators in a bedroom upstairs though this had soon to be given up since it was requisitioned for the little boys' governess. The chicks were reared in movable brooders along the garden paths. It was not a very satisfactory arrangement for, in a wind, one of them occasionally caught fire [the brooders being warmed by oil lamps], and there was an end to *that* hatch."

Despite his curmudgeonliness, Bateson attracted a constant flow of research assistants, many of whom remained devoted to him for years — even though they were forced to work in whatever

nooks and niches they could find. Many were young women who taught or studied at one of the two women's colleges within Cambridge University — Newnham or Girton. With so many women assistants, it seems inevitable that some were in love with him. That certainly may have been the case with his first assistant, Edith Saunders, a lecturer in botany at Newnham who joined Bateson's circle in 1894 and never left. Why else would she have stuck for so long with a man who treated her coldly, took her scientific partnership for granted, and occasionally made fun of her stiff, mannish bearing and her formidable manner? When "Mr. Bateson" and "Miss Saunders," as they always called each other, together received Hugo De Vries at the Bateson house in 1899, Bateson wrote an amused letter to Beatrice, who was vacationing with the children, about Miss Saunders's uncharacteristically flirtatious behavior with the courtly Dutchman. She "talked and chattered as I never saw her do before," he wrote. Perhaps he would have seen her flirt and chatter more often if he had ever taken note of her.

Miss Saunders bred *Biscutella laevigata* (the Cruciferous Spectacle plant) on land behind the Cambridge University Botanic Garden that the Batesons had rented when they lived in town. Even after the family moved to Grantchester, she continued her experiments in that familiar "allotment garden." In a field behind Newnham College, two other women who worked for Bateson — Miss Solla and Miss Killby — raised guinea pigs and goats. Florence Durham, Beatrice's older sister, was another assistant, consigned to a museum attic to crossbreed mice. Back in Grantchester, Miss Muriel Wheldale grew snapdragons (*Antirrhinum*) and Miss Dorothea Marryat, four o'clocks (*Mirabilis jalapa*). Others, including some men, worked here and there around Oxfordshire; Mr. Staples-Browne bred pigeons, Major C. C. Hurst bred poultry and rabbits, Leonard Doncaster bred *Abraxas* moths, and Miss Nora Darwin grew wood sorrel (*Oxalis*).

Bateson's most loyal assistant was his wife. While raising their

three sons, Beatrice also spent long hours helping with the hard chores involved in maintaining a rotating stock of experimental plants and animals. She was a full partner in both manual and intellectual labor, and she recorded the difficulty of their tandem ventures without any apparent trace of bitterness or regret. "From the merest menial drudgery to high flights of scientific speculation, hand and brain were hard at work," she wrote in a memoir published in 1928, two years after Bateson's death. "There was all the sorting, sowing and gathering of seed to be done personally; the fertilizing and recording; most of the digging, hoeing, weeding, staking and watering; the five incubators, each 100 egg power, and as many rearers (all run with oil lamps); the tiny chicks; and at times hundreds of larvae to be attended to. All writing (not reckoning the ordinary post, which was often heavy) was done at night."

Because of the constant pull of chores, the Batesons took separate vacations, so that one of them was always home to collect the eggs and feed the animals. Between early spring and late autumn, the only time they left the house together was for their annual foray into London to see the flower show of the Royal Horticultural Society in Temple Gardens — the exposition that *The Times* of London called the social event of the season. Then they made a day of it, visiting art galleries or auction houses — Bateson was a fervent collector of old masters' drawings and Japanese prints — or the Tate or some other museum. In his later years, Bateson sat on the board of directors of the British Museum, which gave him more pleasure than all the accolades he had by then accumulated, including the Darwin Medal, the Royal Society Medal, and honorary membership in the Brünner Society for the Study of Natural Sciences.

Early in their marriage the Batesons occasionally managed to squeeze in an evening of theater in the West End. But once they moved to Grantchester, this became impossible. The last train to

their little village, which they could barely catch if they saw a play, left London at midnight. And there were still eggs to be turned and lamps to be adjusted when they got home to Merton House, no matter how late the hour.

One of Beatrice's most distasteful assignments was making entries in the "Dead Book." This attended the opening of unhatched eggs, which was done on a morbid assembly line. With Bateson and Punnett, Beatrice would retire to the outbuilding that housed the incubators. She sat at a table with a notebook, her husband on one side with a large bowl and a blunt-bladed knife before him, Punnett on the other side gripping a pair of scissors. Bateson would pick up an egg and read off the numbers of the pen, the hen, and the date of laying. "Have you got that, Beatrice?" he would ask, then would stab the egg and peel the shell into his bowl, narrating the oddities of the embryo thus revealed. "Light down, no colored ticks visible, rose comb, no extra toes, feathering on leg," he would recite, and his wife would dutifully record "lt., nts., r.c., n.e., fl." Then Punnett took the embryo and slit it open to reveal the sex glands — he would call out "male" or "female," and Beatrice would write it down. The two men often cast good-natured bets about which sex the chick would turn out to be. "Altogether it was a messy job, and 'openings' were not much looked forward to," the unflappable Punnett later recalled. But his good nature about such tasks explains why he and Bateson, who was nothing if not overbearing, got along so well.

With the crowd growing impatient, Bateson was ready to deliver his address to wrap up the day's proceedings at the British Association meeting of August 19, 1904. We do not know exactly what he said — the account in the next month's *Nature* was brief and paraphrased, and Punnett recalled only that his words were "striking" — but we can picture him saying it: tall, bearish, deep-voiced, with a flamboyant style of speech that made his every pronouncement

sound as weighty as the Sermon on the Mount. No doubt he repeated some of the criticisms of the biometricians that he had been making for years, such as their erroneous belief that Mendelism was disproved because there were so many exceptions to its basic laws. "Arguments built on exceptions" only reveal the paucity of one's own evidence, Bateson might have said. By focusing, for instance, on the "fluctuation and diversity in regard to dominance," he might have accused Weldon of "merely indicating the point at which his own misconceptions begin."

"Soon every science that deals with animals and plants will be teeming with discovery, made possible by Mendel's work," Bateson had said in other speeches. "Each conception of life in which heredity bears a part — and which of them is exempt? — must change before the coming rush of facts."

Bateson concluded with a flourish and returned to his seat. He and his associates were sure that it was all over now, that they had delivered the final blows to the biometricians. When Karl Pearson, Weldon's great friend and defender, rose from the audience, the Mendelians felt especially victorious. Pearson proposed a three-year truce. Why would he do so if he had not felt that he and Weldon were about to lose?

Yes, a truce could be a good idea, agreed the meeting's chairman, the mild Reverend T. R. Stebbing, a self-described "man of peace." It was Stebbing's job, according to Punnett's memoir, to wrap up the day's proceedings. Yes, compromise is a good thing, he said. Mediation is useful. High feelings only cause trouble. The crowd fidgeted in irritation. Was this to be the tame and boring end to such a rousing afternoon?

"You have all heard what Professor Pearson has suggested," Stebbing said. Then he paused, looked around, took a breath. The crowd fidgeted some more. "But what I say," he went on, his voice suddenly loud and forceful, "is: let them fight it out!"

And fight it out they did.

17

A Death in Oxford

I was determined to know beans.

— *Walden*, Henry David Thoreau, 1817–1862

RAPHAEL WELDON SEEMED to gain new fervor after the British Association meeting, though he was mortified by his student Darbishire's defection, his enemy Bateson's eloquence, and what he saw as his own overwrought speechifying. Late the following year, in the autumn of 1905, he saw his chance to retaliate.

The opportunity came in the form of a paper submitted to the Royal Society by one of Bateson's most visible supporters, Colonel C. C. Hurst. Weldon, as chairman of the Zoological Committee, was one of the first to see it, and the paper made him inexplicably furious — setting him on a course of action that would prove to be fatal.

Hurst had come up with a theory about the transmission of coat color in horses based on data recorded in Weatherby's twenty-volume *General Stud Book of Race Horses*, the bible of the Ascot set. After analyzing pedigrees from the *Stud Book*, he concluded that bay and brown were passed on as simple Mendelian dominants, and chestnut as a simple Mendelian recessive. He asked Bateson, as a member of the Royal Society, to sponsor his paper on horses for publication in the society's *Proceedings*.

Bateson was always a little uncomfortable with Hurst's ideas; he believed, as Punnett put it, that Hurst was "over-apt to find the