Archangel

fiction by

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as the inside of the sweltering factory, his father turned on him. No one, his father said, could blame him for having a few drinks in a cool bar; and who was Constantine to look at him that way? What happened afterward was bad enough that, even his first summer at Uncle Harry’s, he guessed why his mother had sent him away. But when the heat broke his father’s rages abated, and then his mother needed him around. To help with the girls, he’d assumed. But also, Taggart had said, “It changes things, when you’re there.”

If he went home, his uncle had said, for just a while longer, until he finished high school and his sisters were older, he could come back to Hammondsport then and live at the farm and work wherever he wanted. Or maybe his mother and sisters would come as well. Either way would be wonderful. Faintly—he had years ahead of him, years and years in which to explore everything here—he heard Miss Atkins calling his name.

The Ether of Space

(1920)

There was a lot of chitchat, to start. Some the usual—Owen’s health, the weather in London, a tactful acknowledgment of the tenth anniversary of Michael’s death—but some not: Owen’s sister was heading to Russia with a group of Quaker relief workers, his nephew was working for her old teacher at Cornell, his paper on variable stars would be published in the spring. But where was the crucial news?

Across the ocean, at her desk in her bedroom in her parents’ house in Philadelphia, Phoebe Wells Cornelius scanned the pages of her friend’s letter impatiently. Last March, after the fighting had stopped, some British astronomers had quickly organized an expedition to view the eclipse. At two different stations along the path of totality, despite clouds in the Gulf of Guinea and a distorted mirror in Brazil, they’d photographed stars in the neighborhood of the sun. The results had been
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presented in November, at a meeting in London that Phoebe had been in no position to attend, and since then—nearly two months; it was already January, not just a new year but a whole new decade—she'd been waiting for Owen to supplement the sketchy, sensational newspaper articles with some firsthand observations.

We were all squeezed into the meeting room at Burlington House: the pews were packed and there were people standing behind the last row and in the ante-room. The usual eminences from the Royal Society and the Astronomical Society—J. J. Thomson, Fowler, Lodge, Silberstein, Jeans, etc.—but also the philosopher Whitehead, several reporters, and many I didn't recognize. About 350 of us, so many the room was steaming despite the wintry day. Dyson spoke first, summarizing the work of the expeditions and then describing the photographs in the most enthusiastic terms, despite the lack of data. He claimed there was no doubt that they had confirmed Einstein's prediction: the sun's gravitational field had been shown to bend the rays of starlight in accordance with his law of gravitation.

But Dyson's words don't really explain it—it was more the tone, the feeling in the room. I wish you'd been there. Half of us sighed as the other half gasped, some thrilled and some appalled and some split between the two; the older members were really upset. I could feel—well, I'm not sure what that was. Something that shook me. I took notes as fast as I could, trying to get not only the Astronomer Royal's tabulated values but Dr. Cremmelin's description of conditions in Brazil during the eclipse and Professor Eddington's comments on the difficult weather. I noticed that Eddington had discarded many observations, but we'll see what's really there when the full report is published a few months from now. I do believe that Einstein's theory is correct, but I'm not sure these results support it as definitively as they're claiming.

The report on the meeting in the next day's Times was typically muddled regarding the mathematics and said nothing, after these years of denouncing all things German, about the oddity of celebrating the work of a German scientist. In fact an article on the same page announced the King's call for two minutes of silence during the anniversary of the signing of the Armistice. I went with my sister to the cenotaph that day, and when eleven struck and the guns went off, the crowd fell silent. The traffic stopped too, and the trains, and the Tube, people stood still in the shops, stood up at their desks—I wept like everyone else and thought: I've never seen anything like this. Although later, I realized that, at Burlington House, I'd had a similar sense of being present at a—what do you call these? A discontinuity, a rift? In one case torn by grief and in the other by wonder.

For some, the meeting itself was a kind of grief. In the midst of the questions, Sir Oliver Lodge stood up abruptly and rushed out without a word. Later, he told a reporter he'd left to catch a train, but some of the younger men have been a bit cruel, the old man running from the new theory and so forth. Not easy at that age. I imagine, to find that the world has just become a different place.

I have forgotten to thank you for your report on the Washington meeting, and to say that I read your chapter on "The Evolution of the Stars" with real interest. I hope the book is coming along wonderfully, and that you and Sam are both well.
An actual report, finally, from an actual witness: how pleasing, to glimpse a scrap of reality! The articles in the *New York Times*, based on cables sent from London, had been as muddled as those Owen described. *Men of science more or less agog*—oh, indeed. *Lights all askew in the heavens.* The articles trumpeted the impossibility of understanding the theory while at the same time suggesting that it had changed the world.

Phoebe rose from her desk, went downstairs, and stepped outside to look at the sky. Nine o'clock and freezing cold, the moon two days past new, the stars giving no sign that they were not as they'd once seemed. The sound of her father's viola waved down from the top of the house, bits of Bach easing through the old glass in the attic windows, spreading from her mother's garden, where in June the peonies flourished as if fertilized by the sound, through the tiny backyard to the neighbors on all sides. Always her father played at night, retreating from what to him was a world in which everything—business, politics, music, art—grew steadily worse. Yet the house hadn't crumbled around them; the house, in which first he and then Phoebe had grown up, and in which she was now raising her son, Sam, looked the same. So too—she checked again—did the stars above. Where you lived and what you knew determined what you expected to see. Once the moon was a smooth glowing orb, and then it had mountains and seas. Once Jupiter wandered alone, and then he had moons; once orbits were round, and the stars stayed still in space. In earlier books, she'd traced those changing perceptions. Now she was trying to write about the universe beyond the solar system. Who first thought those glowing specks were other suns, like ours? Or that some were island universes, far beyond the Milky Way?

Back in the dining room, her mother sat at one end of the table, doing something with a heap of cloth, while Sam, at the other end, frowned over his homework. Phoebe stopped in the doorway, next to the long crack that might have appeared to a stranger as part of the molding's design, but in fact had been made when Sam, in a fit of temper after they'd first moved here, had hurled his suitcase at the wood. "I had a letter today from London," she told her mother.

"Michael's old student, Owen—"

"Do these look the same length to you?" her mother asked, holding up two white strips.

"She's been cutting out sleeves, for shirts to send overseas," Sam explained without raising his head. He turned the pages of a small notebook and with his pencil added a tiny number to a column.

"Homework?" Phoebe asked her son. Look up, she thought. Talk to me.

"Sort of," he said.

If she moved his way, she knew, he'd smile and close the notebook, say good night, and a minute later disappear into his room. Door closed behind him, books closed on his shelves, body—he'd suddenly sprouted six inches, and his hair had darkened to Michael's shade—concealed beneath long sleeves and long pants. Instead of reaching for her secretive boy she hung back and watched her mother shuffle paper patterns, pins and chalk, and a formidable pair of scissors.

"Russia?" she asked. "Owen said his sister is headed there with another relief committee."
"Arkangelsk," her mother said. "Way north, near Finland. There's been a lot of fighting there. Odette's doing the collars and Leila's working on the cuffs. We'll start piecing them together next week. What else did he have to say?"

Briefly Phoebe explained the meeting in London and the results Owen had described. Sam's pencil ticked down the numbers while her mother's scissors yawned and then snapped through the middle of a sentence. "That sounds important," her mother said.

"It is," Phoebe said. "I need to understand it better, for a chapter in the new book. In fact—"

"Of course," her mother said, snipping away. "Don't let us interrupt you."

BACK AT HER desk, back in her room, centered in the house like a plum in a dumpling. Her father above and her mother and Sam below—Sam, who for a couple of years after Michael's death had clung so closely that sometimes, if she stopped or turned quickly, she'd trip over him. He liked to balance on a footstool, one hand on her thigh and the other on the frame of the large painting hanging in their tiny rented house in Washington.

"Tell me," he'd demand, until she pointed out the figures that her great-uncle, Copernicus Wells, had painted on Pike's Peak during the eclipse of 1878. Then she'd name the instruments—telescope, spectroscope; your father had fancier versions of those—and finally note the flaring corona and the coincidence of her being born, far away, on that exact day. Copernicus had given her father the painting, which her father had given to her—"Just after you were born," she'd add, pushing away the memory of Michael gazing at his new son, eyes wide beneath his reddish gold brows. "When you're grown up, I'll give it to you."

Adrift in Washington then, with no idea how to continue her life, she'd imagined that she and Sam would always be close and that when he was older she'd tell him how that painting, along with her love for mathematics, had helped steer her toward astronomy. How her father had bought her a telescope when she was twelve, while her mother, who came from a Quaker family with a long tradition of learned women, had encouraged her studies. Surely Sam would want to know what she'd done before he was born. She'd imagined telling him about her time at Cornell, where she'd been drawn not to the patient collection of data, nor to speculations about the nature of the universe, but instead to the long, complicated, orderly calculations of celestial mechanics. An observant professor had helped her find a job as a computer at the nautical almanac office in Washington, where she'd briefly imagined that she might be promoted. Instead, she'd met Michael Cornelius, an astronomer with the Smithsonian.

"We fell in love," she'd told Sam beneath the painting. A phrase that usefully hid everything, from the feel of Michael's leg against her own to the smell of his hair warmed by the bedside candle. "We got married, and—your father always appreciated the work I did—I kept my job until you were born. I helped him with his papers."
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Sam, not quite four when Michael died, claimed to remember only his father's instruments and the scarred wooden desk where he'd bent over maps of the sky. What different images they'd kept from those few years! The bed she and Michael had shared, their passionate absorption in astronomy, and their companionable hours of work were invisible to Sam, who remembered only what he saw and heard, and what had to do with him. In the dimly lit room where they worked after supper, Sam would sit on Phoebe's chair, his back snuggled against her side, tightly held by her left arm—but it was Michael, concentrating fiercely, whom he faced and whose smile lit Sam's eyes. So too had he faced the student visiting from England, a young man with an odd gait who delighted in clowning and liked chanting nursery rhymes to Sam. Tweedledum and Tweedledee: that was Owen, acting out bits from Through the Looking-Glass while she calculated results from the data he and Michael had gathered.

Owen was at Cambridge now, a rising young astrophysicist with everything before him. Whereas she... at least he was polite about her work. Books and articles for the interested ignorant—Astronomy for the Young, Eclipses for Everyone—mingling what she hoped were sufficient facts with artful descriptions and homely analogies designed to take the place of the mathematics she loved but knew her readers couldn't understand. The Milky Way is shaped like a biscuit. A nebula is like a cloud on the verge of condensing into rain. Donkey work, requiring a certain gift but not, despite what Owen was polite enough to pretend, a valuable one. She pushed herself to try something new each time. For her latest, The Universe Around Us, she'd promised her publisher a clear and interesting version of the complicated material often mauled in popular accounts. Until recently, when she'd begun this difficult chapter on gravitation and the ether of space, she'd thought it was going well.

She turned back to Owen's letter, struck again by that image of Sir Oliver Lodge bolting from the meeting. Only a few days earlier she'd seen an article about him in the newspaper. He was on a ship from London to New York, about to begin a big lecture tour. Some of the talks were already sold out, which wasn't surprising—unusually, for such an eminent scientist, Lodge liked to write for those who had no scientific training, and she'd sometimes turned to his books for help. Remembering that a list of lecture dates had appeared in the article, Phoebe rummaged through the stack by the fireplace until she found the right paper.

ON THE EVENING of Lodge's scheduled talk, a crowd snaked out between the tall arches of the Academy of Music, and she learned that every seat was sold. Reluctantly, she bought a standing-room ticket and stepped into the moving mass, carried up the stairs and then up again to one of the galleries on the second tier, where she came to rest behind two women pressed against a fluted column.

"You can fit in here," the first woman said, moving her purse to make room.

"It's Phoebe, isn't it?" said the second. Her nostrils faced more out than down, giving her a slightly pig-like air. "Odette," she continued, tapping her chunky throat. "Jenkins—your mother's friend?"
"Of course," Phoebe murmured. One of the scores of well-meaning women who served with her mother on committees to educate the children of China or feed the starving people caught in Russia's civil war. Too many to keep straight. They'd cheered her decision to go to college, been delighted when she got her job in Washington, tried to conceal their disappointment when she married young and promptly had Sam.

"There he is!" the first woman said.

Phoebe craned her head but could see the famous old physicist only in snippets. One long leg, one big hand; he was enormously tall. A sliver of his forehead gleamed in the light of the chandelier before a woman's hat eclipsed it. He would speak, he said—he had a fine voice—on "The Reality of the Unseen."

She missed his introduction. His words floated up through the horseshoe-shaped tiers, interrupted when the crowd murmured or shifted in their seats, obliterated entirely when Odette whispered to her friend. There were things known to be real, Lodge said, but impossible to see: atoms, for example. Molecules. She strained to hear, hoping he'd describe the invisible but omnipresent ether. Instead she caught something about the vast distances between the stars and the contrast between that and the minuteness of the atomic world: also unseen, but also real. After a lost chunk that must have contained a vital transition, she heard next a sentence about the reality of mental events, such as thoughts and feelings, which were also invisible. She peered through the crack between the two women's necks.

"Likewise," Lodge said just then, "the human personality survives death in a form we cannot see, but which makes communication after death possible."

She pulled her head back and jammed her hands into her coat pockets. What kind of science was this? She knew he was interested in psychical research—he was as famous for this, in circles she avoided completely, as he was for his work on the ether and electromagnetic waves—but she'd assumed his lecture would be about physics. Instead, he was explaining how great discoveries in science have reversed the evidence of the senses: the earth is not flat, but round, and it is not static, but whirls through space at inconceivable speeds. "So too will we come to reverse the evidence of our senses with regard to death," she heard. "Psychic research, the youngest science, deals, like astronomy, with phenomena that cannot be examined in the laboratory. Still, theories can be tested and refined over time. Science will eventually prove the existence, all around us, of former humans; they are not far from us; we are all one family still. To the mothers of boys lost in the war, I would say that they are only separated from us by a veil of sense."

In front of her, both women sighed, and Phoebe remembered that Odette's son had gone overseas to drive an ambulance. Had he returned? All around her, the audience—mostly women, she now realized—listened raptly, while Odette reached back to touch Phoebe's arm, as if they had something in common.

"We should not exalt the senses," Lodge continued. Phoebe drew her arm away. "They have been developed through necessity for the physical survival of the fittest. But if we did not dedicate
ourselves so completely to the daily work of keeping our bodies alive, what organs of spiritual comprehension might we not develop? The space that separates you”—he stretched one hand toward the audience—“from me”—he pressed that hand to his chest—“is not empty. It is the purveyor of light, of electricity, of magnetism, and it may well contain our immortal souls, which persist after matter has disintegrated.”

She stepped back before she understood that she was going to, ignored Odette’s startled face, and pushed her way through the bodies and down the stairs. Wrong, so wrong. She hated when people spoke of communication with the dead, and it was worse when a scientist did so. Rappings and knockings, scribblings on slates, ectoplasm and all of that—ancient history, half a century old, most already proven fraudulent and the rest fit only for parlor games but still strangely persistent. When those superstitions had surfaced again, during the thrilling years when the discoveries of X-rays and radium, radio waves and electrons had made almost anything seem possible, she and Michael had simply ignored them, instead reading eagerly about light as waves, light as photons, energy possessing mass. The space between them, Michael said, was filled with energy, the ground of life itself.

She couldn’t imagine what he’d have made of the ease by which, once the war began to swallow the young, those left behind succumbed to the resuscitated parlor tricks. The turbaned women cracking their joints in code or slipping their feet from specially stiffened shoes to write with their toes on slates—by then, left behind herself, she knew exactly how despicable they were. In 1909, not long after Owen returned to England, Michael had welcomed into the observatory a little boy who turned out to have measles. The boy recovered, but Michael’s fever soared higher and higher until the morning he closed his eyes and sighed and—stopped, just stopped. In that instant she’d known she would never talk with him again.

The lobby stank of face powder; Phoebe pushed through the doors and into the street, where the snow flickered in the electric lights and a cat streaked by with something squirming in its clamped jaws. Michael had wanted to show off the wonders of the universe and now—she was walking so fast that her cheeks were hot and a woman in a short skirt stared at her—now, because a boy had given him measles, because she had a boy of her own to raise (the church bells chimed the hour; he’d be doing his homework), because, despite working all the time, she couldn’t save enough to buy a house of her own, she was, at the age of forty-one, living with her elderly parents, and still, despite having published three books and innumerable magazine articles, orbiting so far from the center of the scientific world that she must turn to others for explanations that would, when included in her book, lend it the air of authority she lacked herself. She must go to a lecture where, instead of learning what she needed, she was forced again to confront the unalterable fact of Michael’s death.

I WAS ASTONISHED, she wrote to Owen a few days later.

Not to mention disappointed. How does a man like him—a man who has spent his entire life thinking and writing about physics—a
man who idolizes Clerk Maxwell and Helmholtz and the rest—end up like this? One thing to bolt from your meeting; Einstein's theories are so abstract that I sometimes wonder if anyone really understands them. But to refuse to accept them on the basis of insufficient proof, while at the same time contending that the survival of human personality has been proved: how does this make sense? The crowd was enormous, though, and seemed to glide right over the holes in his logic.

What, she thought as she took a new sheet of paper, would Owen have made of that talk? He'd been fresh out of university when he came to Washington, a slim boy with a high forehead, a clubfoot, and a calm faith in the triumph of true science. Not once had he acted surprised by her mathematical skills or questioned her ability to help him and Michael. He'd been Michael's protégé, not hers, but she'd come to think of him as a friend and an equal and still considered him her one stalwart colleague, although they hadn't seen each other since before Michael's death, and she could no longer picture his face. Always—almost always—he responded to her letters. Always, courteously, he asked about her son, although she knew he envisioned not this Sam but the eager, open toddler of their days in Washington. Sam's hair had been blond then, wisping pale curls she could never keep parted; no more like the springy auburn mat he now hid behind than her own sandy dullness was like the shiny chestnut waves Michael had loved. But then Owen himself might be halfway bald, no longer thin; perhaps with a stoop, still with a limp: wouldn't he have told her if he'd had his foot repaired? Maybe not. Ideas connected them, mathematical symbols and diagrams, a disembodied thread of thought divorced from their daily lives. When she wrote him, she shaped her letters around pleasant anecdotes.

There'd been no point describing the details of those first harsh years after Michael's death, when she'd tried and failed to regain her old job and then found that she and Sam couldn't survive on the piecework calculations sent over by the Ephemeris staff. Skipping over the daily humiliations and petty miseries, she wrote lightly about the newspaper editor seated next to her at a dinner party—in her letter to Owen, a casual encounter, in fact, her rescuer—who, after learning about her training, had asked her to explain what caused the spring and neap tides. Pleased by her quick demonstration with an apple, an almond, and two bits of bread, he'd suggested she try writing about astronomy for the general public. From the column in his local paper (no examples of which she sent to Owen), she'd moved on to articles for the Electrical Experimenter and McClure's, then to her Scientific American pieces (which she did send), and her first books.

She liked the work; she was good at it and pleased when Owen praised her: but it was too painful to explain to him that, even writing all the time and as fast as she could, she could barely pay the rent, and she was sometimes short with Sam. Nor had she wanted to mention that Sam repaid her with temper tantrums, shrieking with anger when she tried to work on weekends, until finally her parents, after several worried visits, had convinced her to move back to Philadelphia—which move she'd presented to Owen as a pleasant choice. No mention after that, of course, of the way Sam at first ignored his teachers and balked at his
grandfather's attempts to discipline him; nor about the molding
he cracked around the dining room door or the scene he caused,
a few months later, that ended with a broken vase and a cut on
his scalp. And so, thus, no need to express her huge relief when,
after a while, something happened—a teacher was kind, his body
changed when he turned eight, who knew?—and he settled down.
And no need to admit, except in the most positive and praising
terms—Sam has grown very studious and stays late at school almost every day,
working on special projects with his teachers; you'd recognize him instantly as
Michael's son—that now, instead of hanging around her, scowling
and demanding her attention, he was completely courteous but
as distant as Jupiter.

A SERIES OF short magazine articles on the night sky in win-
ter kept her from tackling the chapter she should have been
writing, and she felt herself falling farther and farther behind.
Behind what? her mother asked, reasonably enough, when she
found Phoebe fretting at the window. The same unambitious and
pleasant publisher had handled each of her books, approving her
rough outlines and then leaving her alone until she returned with
a tidy pile of pages, which he exchanged for a check. It was hard to
explain that the self-imposed schedule she'd laid out so carefully
was as real to her as the demands of her mother's garden.

Weary of her own excuses, she was also embarrassed by the
way she'd left Lodge's lecture, bolting from a disagreeable idea in
the same way that Lodge himself, confronted with the evidence
that his beloved ether might be in jeopardy, had fled the meeting

in London. At the library, where she went to catch up with the
 astronomical journals, she instead took out a pile of his books.
She read swiftly, voraciously, taking notes. What was she hoping
to find? She could not have answered, she was glad no one asked.
Nor could she have explained why she expanded those notes into
pages describing material that she and Michael, years ago now,
had once discussed. She wrote:

The whirling machine, the massive metal structure bolted into the
bedrock beneath the lab: it's difficult for a modern reader to imagine
without inspecting the illustrations from Lodge's 1893 paper; "A
Discussion Concerning the Motion of the Ether near the Earth."
Here you may see the steel discs, a yard in diameter, perched on the
central pillar like an oversize hat on a woman's head. In a separate
drawing is the optical frame, complete with mirrors, telescope, and
collimator; a third illustration shows the whole assembly in action,
a man standing beside the pillar, frighteningly close to the discs and
caged by heavy timbers supporting the optical apparatus. It looks
like a sketch for Mr. Wells's Time Machine, an utterly improbable
device on which Sir Oliver Lodge made the experiments he has called
the most important of his life.

During the 1890s, he performed a series meant to supplement
the Michelson-Morley experiments, which he felt could not be right.
Electromagnetic waves, including light, moved through the luminif-
crous ether; a wave must have something to wave in, and the ether,
whatever its mechanical structure, was the needed medium. That
medium must be detectable, flowing past the rapidly orbiting earth as
a kind of wind, but the two scientists in Cleveland had failed to find
Sir Oliver Lodge, long a preeminent physicist, is only slightly less well known than Marconi. At an early age he decided that his main business was with what were then called "the imponderables" — the things that worked secretly and have to be apprehended mentally. So it was that electricity and magnetism became the branch of physics that most fascinated him. Once, in London, at the height of his fame as a lecturer on popular science, policemen had to rearrange the traffic patterns outside the Royal Institution so that the cabs delivering his eager audience could fit in the street. Another time, giving a lecture and demonstration on "The Discharge of a Leyden Jar," he was as astonished as the audience to see the coating on the walls flashing and sparking in sympathy with the waves being emitted by the oscillations on the lecture table. From the basement came a man, shaken and pale, to report that the gas and water pipes were similarly sparking.

She stopped when her mother, walking the house restlessly long after she should have been in bed, leaned over her shoulder and read the last lines.

"I like the sparks," she said, resting her fingers on Phoebe's forehead.

As if the sparks explained how a man could move from the drudgery of his family's clay and chemical business to the heights of science, and then to an ardent belief in the possibility of communing with the dead. Or how a leading researcher into electromagnetism and the nature of light could end up being the most famous opponent of a radical new theory. If Einstein was right — but he was only possibly right, which meant Lodge was possibly
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not wrong, or at least not wrong about the ether, although utterly wrong about the spirits in the ether... Phoebe squirmed beneath her mother's hand.

"That's—for your book?" her mother asked.

"Not exactly," Phoebe said. "Maybe. I don't know. I went to hear him...."

"I know," her mother said. "Odette mentioned." She traced the outline of Phoebe's forehead with two fingers, as if the friction might extract a clearer sentence. "Let me make you some tea."

Phoebe, pulling away, pushed her mother's hand toward the newspaper, open to yet another of the frequent pieces about Lodge. "Here," she said. "I'm not the only one who's curious about him."

The article, which her mother scanned quickly, offered an impression of Lodge as he'd appeared soon after his arrival in New York. A typical Victorian, the reporter had noted, "of the tradition of Darwin and Huxley, who still reads his Wordsworth and Tennyson, who still appreciates the poet's wonderment in those days at the marvels of science."

Three more columns followed, all meant, Phoebe thought while her mother finished, to drum up interest in Lodge's forthcoming lectures. His next scheduled talk was actually to be on "The Ether of Space"—his special area of expertise, and the material she most needed to review. Owen had gone to the meeting in London, to hear the results of the Einstein experiment. Maybe she should go to this in the same spirit and listen to Lodge expound what he really knew, taking from it what she needed. Wasn't science based on weighing evidence for oneself?

Surprising herself, she said, "I should try to hear this next lecture. I think I'll ask Sam to come with me." She imagined his quiet, sturdy presence at her side, his quick intelligence; he'd see things she didn't, and he wouldn't be easily distracted or upset. "He might find it interesting. And I could use the company."

"Since when," her mother asked, moving away, so rich herself in friends and colleagues that she might not have meant her question to pierce Phoebe, "do you want company?"

IT WAS TRUE that she and Sam seldom did things together anymore—he kept to himself, as she did, and he was busy, as she was herself—but to Phoebe's secret delight he said the trip sounded fun; she'd only brought him twice before to New York. Together they took the train and shared the sandwiches Phoebe's mother packed for them; together they rode the subway to the towering Woolworth Building and there took the elevator up and up, braving the last little climb on the spiral stairs for the sake of the view from the observatory. The entire island lay before them, the East River and the ships moving out into the harbor, Brooklyn stretching away to one side and New Jersey on the other. Pigeons wheeled and sank and rose again, seagulls floated on curved wings, radio waves poured invisibly from the windows. Marconi himself, Phoebe told her son, had sent a wireless message from his office across the ocean, announcing the opening of this building.

Sam leaned against the railing and pointed north, saying, "Look at the park! Look at the river! You can see the museum!" When he laughed and tugged his coat from her hands, she realized she'd been clutching it as if he were a toddler about to pitch over the side.
He teased her about that for the rest of the afternoon, as they ducked in and out of bookshops and took the subway back uptown. After a quick bowl of soup they headed to the theater, where they found seats high in the balcony, and Sam inspected the crowd streaming into the orchestra seats and up the stairs. Around them, coats migrated into seats and hats moved onto laps. Until a curtain opened on Lodge's tall, white-haired figure, bowing into the wave of applause and then, as Phoebe studiously readied her steno pad and mechanical pencil, beginning to speak.

Sam brushed her arm with his—an accident? Turning to him, watching him, she missed Lodge's opening lines. Usually, when she reached to straighten Sam's collar or fix his hair, he stood so still it was as if he was willing himself not to flinch. But he bumped her elbow with his again, gently, almost playfully, as he had when he was small. "Thank you for bringing me," he whispered. "This is interesting."

Sam was glad he was here. Sam was interested; she focused her attention on the talk. What had she already missed? The ether. Lodge was saying, far from being beyond all comprehension, was in fact the most substantial thing in the universe. Why then had we taken so long to discern it? Just because it is so universal. If we were fish living at the bottom of the ocean, surrounded by water, so far from the surface that we had no sense of anything but water, if we were moving in water, breathing water—what is the last thing we would discover? The water itself. So it had been with the ether of space.

Now Phoebe listened intently; she could use this. "Hold your hand near a fire," he said, "put your face in the sunshine, and what is it you feel? You are now as directly conscious as you can be of the ethereal medium. True, you cannot apprehend the ether as you can matter, by touching or tasting or even smelling it; but it is something akin to vibrations in the ether that our skin and our eyes feel. The ether does not in any way affect our sense of touch and it does not resist motion in the slightest degree. Not only can our bodies move through it, but much larger bodies, planets and comets, can rush through it at a prodigious speed without showing the least sign of friction. I have myself designed and carried out delicate experiments to see whether whirling discs of iron could to the smallest extent grip the ether and carry it round, with so much as a thousandth part of their own velocity. The answer is, no. Why, then, if it is so impalpable, should we assert its existence? May it not be a mere fanciful speculation, to be extruded from physics as soon as possible?"

So far, so good; she was glad to see the whirling discs again, but then... her hand was writing, words flowing smoothly and rapidly, but her mind had stopped catching hold. Was it that what he was saying didn't make sense, or that she wasn't concentrating? Action at a distance cannot take place, with the exception of mental action, or telepathy—she looked down at the paper; had he just said that?—and the actions of gravitation, magnetism, and electric force require some intervening medium. The nature of that medium is mysterious, but it might be thought of as a jelly-like substance filling all space.

"A body cannot act where its influence is not," her pencil wrote, but her wayward mind pictured a giant jellyfish, pulsing faintly, stretching in all directions. The pictures were always wrong; only
the mathematics conveyed the truth. "Another and perhaps a
better way of putting it is to say that one body can only act on
another through a medium of communication. When a horse pulls
a cart, it is connected by traces; when the earth pulls the moon, it
is connected by the ether; when a magnet pulls a bit of iron, it is
connected by its magnetic field, which is also in the ether."

Here he reached below the podium, brought up a candy box
striped in yellow and green, and set the box on a table beside him.
"Would it be magic," he said, reaching for his cane, "if, by waving
this, I caused the box to move?"

Sam was staring raptly at the stage—as indeed was the entire
audience. Lodge passed his cane through the air, two feet above
the box. The box slid sideways on the table.

"Hey!" Sam said, leaning so far forward that his chin
would have brushed the hair of the woman sitting in front of him, had
she herself not been leaning over the balcony rail. His own hair
was a beautiful color in this light. Lodge raised the cane above his
head and the box rose from the table.

After the exclamations from the audience subsided, he smiled
modestly and lowered the cane. "When you see action of this
kind," he said—the box settled back down—"always look for the
thread."

What a showman. The thread was invisible at this distance,
but he caught it between the cane and the box and suggested, by
a tugging gesture, how it was connected.

"Always look for the medium of communication," he said. "It
may be an invisible thread, as in this conjuring trick; it may be
the atmosphere, as when you whistle for a dog; or it may be a
projectile, as when you shoot an enemy. Or, again, it may be ether
ripples, as when you look at a star. You cannot act at a distance
without some means of communication; and yet you can certainly
act where you are not, as when by a letter or telegram you bring a
friend home from the Antipodes. A railway signalman can stop
a train or bring about a collision without ever touching a loco-
motive. A conclave of German politicians could, and did"—his
voice rose here, making Phoebe look up from her pad—"operate
on innumerable families in England and slaughter their most
promising members without the direct action of a finger."

She felt a small tremor, as if that finger had moved, miles
away, through the water in which she floated. "No one wants to
be deceived," he continued. "All are eager for trustworthy infor-
mation about both the material and the spiritual worlds, which
together constitute the universe. The ether of space is the con-
necting link. In the material world it is the fundamental sub-
stantial reality. In the spiritual world the realities of existence are
other and far higher—but still the ether is made use of, in ways
which at present we can only surmise."

Her pencil stopped, but he did not. She could feel him gathering
up his thoughts, preparing for some final argument.

"Last May," he continued, "when astronomers measured the
bending of a ray of light around the sun during an eclipse, they
obtained data that when measured made Einstein's theory of
gravitation appear to triumph. But what is the meaning of this
triumph? Is it the death knell of the ether?"

Before Phoebe could frame an answer, Lodge surged on. "Must
we now think in terms of four or even five dimensions to explain
Archangel

this warp or curvature of space? In my opinion, we ought clearly
to discriminate between things themselves and our mode of mea-
suring them. The whole relativity trouble arises from ignoring
absolute motion through the ether, rejecting the ether as our stan-
dard of reference and replacing it by the observer."

The whole relativity trouble—that simple phrase made Einstein's
theory seem a piece of trickery as foolish as the thread. Caught
in the smooth stream of words, Phoebe could question his logic
only when she split her attention in two and set one part strug-
gling against the flow. Yet even as she was giving up—he was now
discussing the relationship between matter and the ether—he said
something that made her write faster.

"Undoubtedly the ether belongs to the material universe, but it
is not ordinary matter. It may be the substance of which matter is
composed. If you tie a knot in a bit of string, the knot is composed
of string, but the string is not composed of knots. The knot differs
in no respect from the rest of the string, except in its tied-up struc-
ture; it is of the same density as the rest, and yet it is differentiated
from the rest. In order to cease to be a knot, it would have to be
untied—a process which as yet we have not learned how to apply
to an electron."

There—that was why she admired him, why she'd come
tonight. That was the kind of image she searched for in her own
work and found, when she was lucky, with a sense of release that
was almost physical. He was not a charlatan; he was a scientist
who'd made real discoveries—he, as much as Marconi, had dis-
covered the basic principles of the radio—and he'd drawn many
to science through his lectures and his books. He might be old.

The Ether of Space

and distinguished, and British, and a man; capable, as she had not
been for years—had she ever really been?—of doing real science:
but still they had more in common than just bolting from dis-
agreeable ideas. How strange that what he seemed to care most
about now was the possibility of communicating with the dead.

THE LECTURE LIGHTENED something in her, or perhaps
it was Sam's presence beside her; his arm next to hers, his mind
engaged, however briefly, with something that absorbed her. The
distance between them had grown, she would have said a week
earlier, because he'd developed his own interests, which he didn't
talk about much. On the train ride home, though, she considered
how little she'd recently shared with him, so busy that she'd lost
the habit of explaining her work. But as soon as she'd exposed him
to Lodge he responded, which might mean that he'd be interested
in the rest of the project; perhaps she could share other sections
with him; perhaps the book would be wonderful! With a burst of
enthusiasm, she began to draft her chapter on the ether.

First a bit of history: a quick glimpse of Descartes and his
whirling vortices, and then the newer conceptions answering the
need for a subtle medium, universally diffused, that could propa-
gate the undulations of light and electricity while also transmit-
ting the pull of gravity. Waves in the ocean travel through water;
light waves must travel through a similar interstellar ocean,
which we can neither see nor feel nor weigh. This is the ether,
owhere apparent but everywhere implied. The ether, which,
until quite recently, most scientists had assumed must exist: How
then might we conceive of this omnipresent, impalpable, invisible something?

She touched on Maxwell’s ingenious models and the various arrangements by which wheels and rubber bands, gears and pulleys and springs had been set to represent possible mechanisms. Neatly she fit after those pages the sketch she’d made of Lodge’s experiments with the whirling machine. Then on to the more recent and less mechanical conception of the ether as the ground from which both matter and energy arise. From Lodge’s lecture—she pushed aside the tangle of upsetting digressions and disturbing assumptions—she lifted the image of knots on a string, matter as coiled-up ether: matter may be, and likely is, a structure in the ether, but certainly ether is not a structure made of matter.

And there the chapter crashed. She meant her tone to bejudicious, sketching what had been believed when she was young, and what could fairly be believed now. To write something like: Experiments performed during the recent eclipse suggest that Einstein’s theories may be confirmed, in which case we may not need to postulate an ether to explain the transmission of light. However, spirited disagreement continues among scientists as to the meaning of these results, and it seems best, for now, to keep an open mind.

But even as she wrote that, she knew she didn’t believe it herself. No one could find the elusive ether; all the experiments had failed. Lodge and those who disbelieved Einstein wrote as if the ether were real but mysteriously unfindable, the experiments that had failed to detect it somehow defective, and she’d meant to give equal space to that position but—how could she? It wasn’t just the lack of evidence; something was wrong with the logic too. How could the ether be composed of knots or vortices in the ether? Her brain stuttered, her mind balked. Her eyes burned and ached. The sentences crumbled as she wrote them, and when she thought again about Lodge’s lecture, the tangle she’d pushed aside then snared her. The ether was a home for ethereal beings, the medium by which soul spoke to soul; perhaps God lived there; perhaps it was God himself?

She lay down and pressed a wet washcloth to her eyes. The ether was nothing and it was everything, it was whatever anyone wanted it to be. Writing about the ether was like trying to write about phlogiston. Although she’d explained more complicated models, and outlined concepts in which she believed less, never before had she tried to write something that tantalized her with a sense of Michael hovering, just out of sight, in some gaseous form.

Three days of heavy rain trapped her inside. On the fourth day, a front blew through and cleared the air as completely as if a giant hand had sponged it dry. That night, very late, after everyone was asleep, Phoebe went outside and lay down on the flagstones bordering her mother’s garden. Late March, the ground alive despite the cold air. There were the stars, circling above. There were the stars. Brilliant, blazing, bright against blackness, as beautiful as when she’d first stared at them so many years ago. White, blue, yellow, red. Once she’d gotten serious about the work to which the stars had drawn her, she hardly ever looked at them. She studied their motions, not them—when did she look at the sky anymore? Months passed when night meant her yard, her street,
a few blocks of Philadelphia: everywhere people, everywhere lights. Now the lights were out, there was no one around. With her back pressed against the stones, she smelled dirt and leaves and budding trees. Branches fringed her view of the sky, which was speckled everywhere—and wasn't it remarkable, really, that she should see the stars at all? Inconceivably far away, emitting light that traveled and traveled—how? through what?—and fell upon her optic nerves to form a picture in her brain: stars! She felt herself falling up into them, a feeling she remembered from her childhood. The space between her and the stars was infinite or nothing at all, it was empty or it was completely filled, it was, it was, it was.

The next afternoon she went looking for Sam, longing to talk about this. But Sam was gone; he was at a friend's; they were working on a project for school. Disappointed, she sat down and wrote to Owen, describing her struggles and the two lectures she'd attended.

Strangely, it was listening to Lodge that confused me. I'm not sure why, maybe that—how to say this? Lodge's conception of the ether is one of those models, like an orrery or a gigantic watch, sets a nearly infinite number of pieces of something into motion, each affecting the other, until the actions are explained. But I don't think we can explain this mechanistically. Listening to him describe the survival of the personality after death as some element held in or made from the ether made me realize how completely attached he is to the ether as an actual physical thing.

Interesting that she'd write that, but not a word about Michael. Not what flared through her mind at night: Lodge must be wrong, he has to be wrong. If he's right, then Michael's been within my reach this whole time and I could have been talking to him. I could be talking to him now. Not once had she even tried. She and Michael had held séances and spirit messages in such contempt that even to study the written accounts, never mind visiting a medium, would have felt like a betrayal.

Yet here was Lodge, famous and influential, perhaps even—was it disloyal to think this?—a better scientist than Michael had been, testifying to his beliefs before huge crowds. Either he was a liar, which he didn't seem to be; or she herself was the worst kind of fool. But Einstein's theories had also generated a similar confusion, especially here, as she wrote to Owen:

There's a lot of pressure here—far more, I think, than in England—not to accept Einstein's theory. People are so emotional—a prominent astronomer at Columbia started calling the theory "Bolshevism in science" as soon as the eclipse results were announced, and since then he's written a slew of articles disputing the evidence. Another, in California, repeats him, but more shrilly. They have alternate explanations for the advance of the perihelion of Mercury. They object to the interpretation of the eclipse data (you know these arguments, the discarded observations, the large margins of error, etc.) and in the next breath claim that even if the light from the stars were shown to be bent, the cause may well be refraction by the sun's corona, or a spurious displacement resulting from the chemistry of
film development. They have plenty of supporters, working astronomers who place a premium on precise observations, and think the data from the expedition is nowhere near as solid as claimed.

The daffodils pushed through the dirt; the trees budded and the forsythia bloomed; the tulips came and went as she struggled with her chapter. Over breakfast one morning, she read about a professor who'd been following Lodge from city to city, contradicting everything he said about the dead and demonstrating some of the fakery employed by mediums; apparently she wasn't the only one disturbed by the mingling of physics and spiritualism. She read the article to Sam, who set aside his toast to listen.

"That seems harsher than he deserves," he said, surprising her. "I liked him, the way he seemed determined to think for himself"

But before she could encourage him to say more, her father passed through the room, humming disconsolately, and Sam rose and followed him, leaving Phoebe alone with her failures.

Here her father was, getting older and struggling: she had to earn more money. She went back to work.

Her mother's obdurate peonies pushed through the dirt and unfolded their leathery leaves as Sam finished school for the year. The peonies budded, the buds bulged. Her mother, wrapped in a green apron, her hands sheathed in canvas gloves, disappeared into the garden, and her father retreated to the attic; Bach wafted down from the windows. She picked up her notebook and wrote: Sound is a wave that moves through the air, light is a wave in the ether... Then she crossed that out and wrote to Owen again, enclosing what she had so far. Owen didn't write back, and didn't write back, and then in late July he finally did, complaining about the shortages of food and coal and describing the weekend lectures he'd been giving to gatherings of miners and farmers. Only then did he comment on her draft.

Most of what you have so far seems fine to me, coherent and logical, if too heavily weighted toward the history. Too much context, not enough of the actual theory? That might just be my own perspective. Phoebe, I really am not sure about this—but haven't you fallen into that old trap of trying to make, from the symbols we use to reason about reality, pictures we can view in our minds? You know as well as I do that our ideas about space and time and molecules and matter aren't anything like the "real" universe, although they parallel it in some way, we make models because they help us think, but what we're really talking about here are mathematical statements that describe the relationships of phenomena. It's a mistake to weed out all the mathematics, even when you are trying to explain a theory we already understand to be outmoded. I think you could do this more succinctly. And that you could come down more firmly on the side of what we know now—not what we used to think we knew.

Since when did Owen talk to her like that? As if she were his student; as if she were a colleague's undereducated, amateurish wife. She stared at her draft, unsure how to make it better. Once she'd been able to write, clearly and even powerfully. Once she'd gone to her desk each day with the unthinking expectation that she would pick up her pen and begin, and that from the very
movement of pen across paper a train of thought would develop. Concepts would clarify themselves, sentences would flower into paragraphs; in this one small arena, she could do no wrong. She had lost Michael, she was at a loss with Sam, her parents were a mystery, she had no home of her own—yet on the page she could make an object that was shapely, and orderly, and on occasion helpful to others. She'd counted on this for years, without understanding what it would mean if it disappeared. As she'd counted on the sympathetic ear of a man she apparently no longer knew.

"You're so flushed," her mother said, when the heat drove them outside to sit stickily on the chairs they'd pulled into the garden. "Are you feeling all right?"

"I'm fine," Phoebe told her. "Just tired. It's been hard to sleep."

But what kept her from sleeping was not the heat. She tried to squelch the bitter thought that Owen did not, after all, regard her as his equal intellectually. For all her efforts to keep him from viewing her primarily as a woman—efforts that had cost a great deal in other ways—he still condescended to her.

Quickly, almost mechanically, she wrote over the next few days a magazine article about the implications of the red-shifted spectra Vesto Slipher had observed for a handful of spiral nebulae. Then, with her papers drooping mostly over open books, she returned to her chapter, still unfinished, still not right. She tried this:

If the ether exists as some sort of rigid jelly, then all of space is filled by it. Everything in space is connected to everything else, a ripple here causes effects inconceivably far away—but space, however tied together, is all one thing, and time is something else. In Einstein's vision, etherless, space and time are tied together into one four-dimensional continuum, impossible to visualize but perfectly clearly expressed mathematically. Time is variable in that vision; time expands and contracts depending on the position of the observer, and it seems possible that the past, the present, and the future might all exist at once, so that everything we've ever done and been might be laid out, accessible.

September came and Sam returned to school, still without Phoebe having completed what had once seemed like a manageable task. She gave up writing to Owen. She shut herself in her room, still far too warm, and she wrote and wrote, crossed out and wrote more. Then she fell sick for three weeks—the strain of working so hard, her worried mother said—and when she could rise from her bed she was more behind than ever. She'd lost weight, her hair was dry, and her periods had vanished; was it already time for that? Perhaps it was just from being sick. She made an effort to eat the meals with which her mother tempted her, and she put the chapter on the ether out of her mind. An acquaintance who taught astronomy at Bryn Mawr asked if she'd be willing to tutor three struggling students; she took them all. At the request of an elderly high school teacher in upstate New York,
she also wrote an article detailing useful experiments, requiring little equipment, for youngsters.

She found herself, as the new year came and went, in roughly the same places she'd been when Owen's letter about the eclipse expeditions had arrived. Another year older, her hair more gray, still at her desk in her parents' house—except that now she was past the time when she'd promised to send in her book, and Owen had drifted away, and Einstein was hugely famous everywhere. One by one, essays attempting to explain his theory to the non-mathematically trained reader had been published in *Scientific American*. Across the ocean, *Nature* devoted an entire issue to the explanation and implications of the principle of relativity. In the library, dutifully at first but then with some excitement, Phoebe read through those articles.

She copied out phrases from the well-known physicists who examined different aspects of Einstein's theory but in the end agreed that it was right: all except for Sir Oliver Lodge, who declared stoutly that while the theory might appeal by its beauty and weird ingenuity to mathematicians lacking a sense of physical reality, it so oversimplified the properties of matter as to risk impoverishing the rich fullness of our universe into a mental abstraction.

Now that he and his psychic beliefs were safely in England, his recalcitrance seemed almost admirable. That steadfast insistence on common sense and the reality of a physical world in a physical ether: what did it cost him to maintain that position, now so unpopular? One afternoon, reading with her mother and Sam in front of the fire, she asked what Sam remembered of Lodge from the lecture last spring.

"He remembers it very well," her mother said. "Don't you?" Sam nodded without looking up from the huge volume open on his lap.

"What are you reading?" Phoebe asked.

"A biology textbook," he said, spreading his fingers over the pages. "My teacher loaned it to me, for an extra project." When her mother said, "Sam?" he added, "I wrote something about Lodge, for an English class."

"Can I see it?"

He paused, looking down at his book, and then closed it on a pencil and rose. "If you'd like." He left the room and returned with a few sheets of paper, covered in his meticulous small script.

The essay, which he'd called "My Father, at a Distance," started not with a memory of Michael but with a description of Sam's evening at the theater in New York. Here were the rapt women, the box with the thread, the flow of Lodge's talk as she too remembered it—but these things, for Sam, had been only a beginning. Like her, he'd gone to the library and investigated Lodge's writings; but unlike her—she hadn't been able to stand more than a few pages—he'd actually read Lodge's book about his son, Raymond, who after being killed in the Great War had supposedly made efforts to communicate with his family.

*I didn't expect to be swayed by it*, Sam wrote. *But I was, although perhaps not in the way Lodge meant*. Sam described the letters Raymond had sent from the front, the photographs of him as a boy, the long transcriptions of Lodge's sittings with mediums after Raymond's death, the chapters of theory and exposition meant to help a reader interpret what Lodge presented as evidence for Raymond's
continued existence in another form. What this was, Sam argued, was evidence of a different sort: evidence of love. When Lodge wrote, People often feel a notable difficulty in believing in the reality of continued existence. Very likely it is difficult to believe or to realize existence in what is sometimes called "the next world"; but then, when we come to think of it, it is difficult to believe in existence in this world too; it is difficult to believe in existence at all, what he meant was: My existence makes no sense without my son.

From Lodge's longing for his son had come, Sam argued, an entire theory of etheric transmission, which, if it wasn't true—he himself believed it was not—was still a marvelous example of how science was influenced by feeling. About the connection between that feeling and the construction and testing of any scientific hypothesis. Lodge had suggested in his lecture that Einstein's theory had been tested but not completely proven by the eclipse experiments. His book suggested that his experiments after Raymon's death offered a similar level of proof for the theory of survival of personality. Phoebe slowed down and read each word.

My father died when I was four; I miss him all the time. For years I was sure he was up in the air somewhere, among the stars he studied. I listened for him every night; I thought that from someplace deep in space he would try to contact me. When we moved from the house where I was born, I was terrified that if he sent a message it wouldn't reach me. Later, I convinced myself that he could find me anywhere, at any distance, and that the fault was mine; if I couldn't hear him, it was because I didn't know how to listen. If I stretched myself, broadened myself, I'd be like a telescope turned onto a patch of sky that before had seemed blank; suddenly stars would be visible, nothingness would turn into knowledge. Across time and space, my father would reach out to me.

Here was Michael at last: she could see his face as clearly as when they'd first kissed on the riverbank, under the starry sky.

Eventually, I had to give up on this idea, but as I listened to Lodge's lecture I fell back into it, and for a few moments, I wanted so badly to believe him that I did. I understood the ether of space to be exactly as Lodge described it, a universal medium that transmits not only electromagnetic forces but also the thoughts and longings of the dead. Only when I looked around at the audience and saw them all believing the same thing did I realize what was happening.

I don't understand the physics behind Einstein's theory, and I don't believe in the existence of a spirit world, but my introduction to Lodge's work changed the way I think. I don't know, and I don't believe there is sufficient evidence yet to prove, whether the ether is real the way the atmosphere is real, or the way the equator is real. Whether Einstein's theory has been proven, or Lodge's theory of survival of the personality after death, or neither or both. I don't know whether my father exists in some ethereal form or only in my heart. What I do know is that the questions we ask about the world and the experiments we design to answer them are connected to our feelings.

Where had Sam learned to write like that? Upstairs, her father's viola sang, dismantling troubles Phoebe knew nothing about. Across from her, Sam and her mother nestled back in their chairs, each reading with such concentration that when
she finished Sam's essay, neither noticed for a moment. Then her mother looked up.

"It's good," she said. "Isn't it?"

"Lovely," Phoebe agreed. Her mother had already read it. Down the stairs, through the empty rooms, triplets rippled in sets of four: the prelude to the sixth Bach cello suite, transcribed for viola, which her father had been playing while she and Sam and her mother read, each of them deep in their own thoughts but sharing a room, the light from the lamps, the sense of piecing together a sequence of thoughts. Then—not a rift, but a discontinuity. How does a person end up like this? For much of her life she'd been listening, sometimes consciously, sometimes not, to her father play those suites. Until just that moment, with the triplets running steadily up and down, she would have told herself that the space between her and family wasn't empty at all but held light and music, feelings and thoughts, and a bond that could be stretched without breaking.

The train trip took the whole day. Oswego to Albany and then the length of Massachusetts, orchards and mountains and rivers and fields, cities appearing then disappearing while the sky darkened steadily until, near Boston and the coast, the rain began. By nine o'clock, when Henrietta Atkins stepped down at New Bedford, it was pouring. Her skirt was spotted with mud before she was halfway down the block; her hair dripped over her shoulders; the two bags packed with notebooks, drawing pencils, boots, clothes, and the tiny stipend meant to cover her expenses for the next seven weeks sagged alarmingly.

This was on a Friday night in July of 1873, the low clouds trapping a smell—weedy, salty, slightly medicinal—that Henrietta, who had never been near the shore, thought might be the sea. She headed away from the station, searching for the hotel that the organizers of the natural history course had recommended.