BOOKS

A CAUTIONARY TALE ABOUT SCIENCE RAISES UNCOMFORTABLE QUESTIONS ABOUT FICTION

Benjamín Labatut's Sebaldian "When We Cease to Understand the World" grapples with science's moral quandaries, but what is real and what is imagined?

By Ruth Franklin

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One of the most famous images by the Spanish artist Francisco Goya is an etching that depicts a man slumped over his desk asleep, papers underneath him and his head buried in his arms. From the shadows behind him, strange and sinister creatures emerge: owls and bats with their wings spread wide, a cat with a stony gaze, other beasts impossible to identify. "*El sueño de la razon produce monstruos*," a caption on the side of the desk warns: "The sleep of reason produces monsters."

The picture is often taken as Goya's assertion of faith in Enlightenment values, in the ability of logical thought and empirical observation to sweep away the darkness of superstition. But there is a catch: *sueño*, the Spanish word for "sleep," can also be translated as "dream." What if the monsters are present not because reason isn't awake to fend them off but because reason, in its slumber, actively generates them? If monsters can exist not despite reason but as a consequence of it, then perhaps we're not as safe in the rational world—the land of logic and science—as we thought.

This image, with its duelling interpretations, was constantly on my mind as I

worried over "When We Cease to Understand the World" (New York Review Books), a haunting new book by Benjamín Labatut. Described by its author as "a work of fiction based on real events," it is as compact and potent as a capsule of cyanide, a poison whose origin story takes up much of the opening chapter—the first of many looping forays into the wonders and horrors unleashed by science in the past few centuries. After starting with the glass vials of cyanide that members of the Hitler Youth allegedly handed out to concertgoers at the Berlin Philharmonic's last Nazi-era performance, Labatut works his way back to experiments conducted in Berlin in the first decade of the eighteenth century by the dyer Johann Jacob Diesbach, who was working in a laboratory set up by the alchemist Johann Konrad Dippel. In an effort to emulate a ruby red made from crushed insect carapaces, Diesbach used potash contaminated with animal by-products from some of Dippel's more grotesque experiments and accidentally obtained a blue so beautiful that he thought he had discovered the lost formula for *hsbd-iryt*, a fabled hue of the ancient Egyptians. It's unclear who first thought of calling this creation Prussian blue, the name by which it has become known; Labatut claims that Diesbach came up with the name in homage to the empire that he imagined would surpass the glory of Egypt, and wryly adds, "It would have taken a much more gifted man—one endowed, perhaps, with the curse of foresight—even to conceive of its future fall."

In 1782, another chemist, mixing Prussian blue with sulphuric acid, produced the poison hydrogen cyanide, also called prussic acid, which, in the formulation known as Zyklon B, was eventually to leave its residue on the bricks of Auschwitz, coating them with that same brilliant shade of blue. Musing on the tortuous path that can lead from beauty to deadliness, Labatut wonders if "something in the colour's chemical structure invoked violence: a fault, a shadow, an existential stain passed down from those experiments in which the alchemist dismembered living animals to create it."

Labatut was born in Rotterdam in 1980 and raised in The Hague, Buenos Aires, and Lima. He now lives in Chile, writes in Spanish, and is the author

of two previous works, which have yet to be translated into English: a collection of short stories titled “La Antártica Empieza Aquí” (“Antarctica Starts Here”), and “Después de la Luz” (“After the Light”), described in *Granta* as “a series of scientific, philosophical and historical notes on the void, written after a deep personal crisis.” “When We Cease to Understand the World,” translated by Adrian Nathan West and published in the U.K. last year, found its way onto the shortlist for this year’s International Booker Prize as well as Barack Obama’s summer reading list. It is a meditation in prose that bears a familial relationship to the work of W. G. Sebald or Olga Tokarczuk: a sequence of accounts that skew biographical but also venture into the terrain of imagination. Labatut writes that “the quantity of fiction grows throughout the book,” from a single paragraph in the first chapter to “greater liberties” as the book proceeds. Tantalized, I found myself Googling anecdotes and details, each more preposterous than the last—those cyanide capsules passed out by the Hitler Youth, or a Nazi drive to plant mulberry trees in order to cultivate silkworms—and discovering them to be true.

The stories here circle obsessively around the question of whether some of the twentieth century’s greatest minds drove themselves to the brink of insanity—and, in Labatut’s accounts, well beyond it—in their search for a key to the secrets of the universe. Among the main figures is Fritz Haber, a German Jewish chemist who developed a process to obtain ammonia from nitrogen in the air, for use as fertilizer—an innovation that won him the Nobel Prize and, by staving off famine, has probably saved the lives of hundreds of millions of people—but who also pioneered the military use of chlorine gas, a chemical weapon responsible for some of the worst horrors of the First World War, as well as a hydrogen-cyanide pesticide that was a direct forerunner of Zyklon B. Then there is Karl Schwarzschild, a physicist who came up with the first exact solutions to Einstein’s equations of general relativity, and in the process proved the existence of black holes, a concept that shook the foundations of physics. Later, we encounter Alexander Grothendieck and Shinichi Mochizuki, two of the most brilliant

mathematicians of the past hundred years; both pursued a quest for greater and greater abstraction, "a strange entity located at the crux of the mathematical universe." The most familiar of the stories, perhaps, is that of Werner Heisenberg and his formulation of quantum uncertainty, a theory that seems to defy reason. "Einstein sensed that if one followed that line of thinking to its ultimate consequences, darkness would infect the soul of physics," Labatut writes. "A fundamental aspect of the laws that governed the physical world would remain forever obscure," opaque to human understanding.

Like Sebald, Labatut sees history's patterns as cyclical rather than linear, crossing similar terrain again and again as they wend their way toward disaster. But he is focussed equally on the question of what happens once we become aware of the enormity of the destruction that humankind is capable of inflicting on the world—and whether our brains are wired to cope with that fatal understanding. After such knowledge, what forgiveness?

For Schwarzschild, the key to the universe lay in astronomy. Born in Germany in the late nineteenth century, he built his own telescope as a child and published his first astronomy paper at sixteen. By twenty-eight, he was the director of the observatory at the University of Göttingen. Like many German Jews, he was deeply patriotic: as Labatut tells it, he believed that Germany could someday rise to the height of ancient Greece in its ability to civilize the world, but first its scholarship in science must equal its achievements in philosophy and art. "Only a vision of the whole, like that of a saint, a madman or a mystic, will permit us to decipher the true organizing principles of the universe," Labatut quotes him as writing.

When, late in 1915, Einstein published his theory of general relativity, Schwarzschild was serving in the German Army. Within a month, he had solved Einstein's field equations, and what he found profoundly destabilized his own conception of the organization of space. According to

Schwarzschild's calculations, when a star is in the throes of collapse, it compresses, its density increasing until the force of gravity distorts space and time around it. The result, in Labatut's words, is "an inescapable abyss permanently cut off from the rest of the universe," at the center of which lies the "singularity," where "the notions of space and time themselves became meaningless."

By now, the concept of the black hole is familiar. But at the time it seemed a harbinger of chaos and destruction. "Inside the void his metrics predicted, the fundamental parameters of the universe switched properties: space flowed like time, time stretched out like space," Labatut writes. "If a hypothetical traveler were capable of surviving a journey through this rarefied zone, he would receive light and information from the future, which would allow him to see events that had not yet occurred." A person who stood within the singularity—impossible, since gravity would tear him to bits—could see both "the entire future evolution of the universe at an inconceivable pace" and "the past frozen in a single instant." The singularity itself is surrounded by a barrier marking a point of no return, beyond which nothing can cross without getting sucked in; the dimension of this boundary is now known as the Schwarzschild radius.

Up to here, this chronicle of Schwarzschild's life is largely verifiable. Now Labatut takes matters a step further. Not only was Schwarzschild terrified by his discovery, in Labatut's telling, but he became obsessed with it. He supposedly confessed to a colleague who visited him in the military hospital—he was suffering from pemphigus, a painful and disfiguring autoimmune disease primarily affecting the skin—that the "true horror" of the singularity was that it was a "blind spot" in the universe, "fundamentally unknowable." If the physical world was capable of generating such a monstrosity, what about the human psyche? "Could a sufficient concentration of human will—millions of people exploited for a single end with their minds compressed into the same psychic space—unleash something comparable to the singularity?" In Schwarzschild's mind, such a

thing was taking place at that very moment in Germany. He had visions of a "black sun dawning over the horizon, capable of engulfing the entire world." By the time people became aware of it, it would be too late:

> The singularity sent forth no warnings. The point of no return—the limit past which one fell prey to its unforgiving pull—had no sign or demarcation. . . . If such was the nature of that threshold, Schwarzschild asked, his eyes shot through with blood, how would we know if we had already crossed it?

The gravitational pull of fiction in this book works in a similar fashion. The dividing line between reality and imagination is not marked; it is only after several paragraphs or pages that we realize we have crossed it. We know, for instance, that Heisenberg did indeed travel to Helgoland in 1925, seeking relief from his allergy to pollen ("the microscopic particles that were torturing him"), and there reached his understanding of the behavior of elementary particles, discovering a way to describe the location of an electron and its interaction with other particles. But did the frenzy of his intellectual energy combine with fever to generate nightmares in which the Sufi mystic Hafez appeared in his bedroom, offered him a wineglass filled with blood, and masturbated in front of him before receiving oral sex from Goethe? We assume not, but the boundary is obscured by the gothic fervor of Labatut's narration, in which even mundane details are relayed with heavy melodrama: Heisenberg's allergies transform him into a "monster," his lips swollen "like a rotten peach with the skin ready to come off."

Likewise, we know that the physicist Erwin Schrödinger spent time in a sanatorium recovering from tuberculosis, but Labatut seems to have invented a fantasy romance for him there, involving the teen-age daughter of the

doctor who runs the institution. Herself a TB patient, she distracts herself from her illness by experimenting with a type of aphid that gestates while still in utero, resulting in three generations "nestled one inside the other." She separates them and exposes them to a pesticide that—sure enough—"stained the glass such a striking shade of blue that it seemed as though she were looking at the primordial colour of the sky." Like those aphids, the stories in this book nest inside one another, their points of contact with reality almost impossible to fully determine. As the layers of patterns and affinities accumulated, I realized that I was no longer compulsively Googling, instead allowing the stories to flow.

There is liberation in the vision of fiction's capabilities that emerges here—the sheer cunning with which Labatut embellishes and augments reality, as well as the profound pathos he finds in the stories of these men. But there is also something questionable, even nightmarish, about it. If fiction and fact are indistinguishable in any meaningful way, how are we to find language for those things we know to be true? In the era of fake news, more and more people feel entitled to "make our own reality," as Karl Rove put it. In the current American political climate, even scientific fact—the very material with which Labatut spins his web—is subject to grossly counter-rational denial. Is it responsible for a fiction writer, or a writer of history, to pay so little attention to the line between the two?

Labatut seems to gesture toward a justification for his mode of narrative in his long section on Heisenberg and Schrödinger, which gives the book its English title. (In Spanish, it is called "Un Verdor Terrible," which might be translated as something like "A Terrible Greenness," a reference to another nightmarish vision, this one supposedly experienced by Haber, of plants taking over the world.) Heisenberg argued that quantum objects have no intrinsic properties; an electron does not occupy a fixed location until it is measured. In Labatut's telling, Heisenberg, following this idea to its limits, reflects:

What was beyond our grasp was neither the future nor the past, but the present itself. Not even the state of one miserable particle could be perfectly apprehended. However much we scrutinized the fundamentals, there would always be something vague, undetermined, uncertain. . . . If we cannot know, at the same time, such basic things as where an electron is and how it moves, we also cannot predict the exact path it will follow between two points, only its multiple possible paths.

Why stop at electrons? If we cannot grasp the past or the present (not to mention the future) with any degree of clarity, then fiction becomes as plausible as history as a method for describing the actions and events of people's lives. Who is to say that Heisenberg did not in reality have a nightmare vision, as he does here, of the victims of Hiroshima and Nagasaki —"countless men and women with slanted eyes, their bodies sculpted of soot and ash"—their fate the unintended consequence of his own discoveries in quantum mechanics? Or that Schwarzschild, fighting in the trenches of the First World War, did not glimpse the horror of the singularity "in the eyes of dead horses buried in the muck, in the bullet wounds of his fellow soldiers, in the shadowy lenses of their hideous gas masks," or have the dreadful sense that the world was "slipping off a precipice"? Schrödinger, in the sanatorium, pictures his own future "as though it were composed of parallel simultaneous scenes opening like a fan and leading off in all possible directions": he runs off with the young girl he loves; he dies in the clinic; his wife leaves him. Fiction, as much as physics, is the domain of the multiverse.

Like the doctor in "Frankenstein," whose ghost hovers over these stories of science pushed beyond its limits, the men in them are transformed by their obsessions. Schwarzschild is reckless with himself and with others; he damages one of his eyes while watching a solar eclipse and endangers his companions during a climbing expedition in the Alps, when he loosens the ropes so that he and his colleagues can better use their pickaxes to scratch into the permafrost the equations they are working on. Alexander Grothendieck decides that mathematics is too dangerous to pursue and moves off the grid, living without electricity or drinking water, wearing rags,

and subsisting on soup made from dandelions. Shinichi Mochizuki reads all of Grothendieck's work as a freshman in college and is discovered babbling deliriously, having gone for days without food or sleep, "his pupils as wide as an owl's." Many of these men forswear human connection; the only people with whom they are able to communicate are other scientists or mathematicians who understand their predicament.

As vividly as the narrator presents the stories of others, he remains absent. We see him only in the book's brief final section, where someone who might be the author appears, speaking in the first person. He reports on his interactions with the natural world and with a man he identifies only as the "night gardener," another former mathematician who has withdrawn from society after realizing that modern science has failed us, and that the human mind is unable to "come to grips with its paradoxes and contradictions." Turning to Google—yet again—reveals little personal information about Labatut, especially in English. He gives few interviews and has not said much about the process of writing this book, aside from providing an incomplete list of sources. But the way he depicts himself here, along with the "deep personal crisis" referred to in *Granta*, made me wonder if an obsession with obsession may entail risks of its own. If so, Labatut's cautionary tale of great minds unhinged by staring into the abyss may, like Goya's etching, have a second interpretation that mirrors the more obvious one. Can it be that contemplating such questions is as dangerous as not contemplating them? ♦