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## Back to Basics: An acclaimed journalist offers up a witty primer on the sciences.

By Amanda Schaffer

Carl Sagan once complained, "We live in a society exquisitely dependent on science and technology, in which hardly anyone knows anything about science and technology." So it is today. A host of national debates -- from stem cell research to climate change -- require a baseline of scientific literacy. And yet even Harvard students surveyed at their commencement couldn't correctly explain why the year is divided into seasons, with hotter weather in summer than in winter. (Hint: It's the earth's tilt, not its orbit.)

As an antidote to the bad news, New York Times science writer and Pulitzer Prize-winner Natalie Angiere offers up her own witty, idiosyncratic primer on the sciences - an exuberant Cliffs Notes for grown-ups that highlights core principles of physics, chemistry, evolutionary and molecular biology, geology and astronomy.

"I'm not a pragmatist, and I can't make practical arguments of the broccoli and flossing kind," she confesses early on. Instead, she argues that delving into the viscera of science is worthwhile because it's enjoyable. "It's fun the way rich ideas are fun, the way seeing beneath the skin of something is fun."

Angier begins with a lively discussion of what it means to think like a scientist, harvesting fresh commentary from a veritable Who's Who of American science. "Science is not a body of facts. Science is a state of mind," she writes, noting that researchers typically recognize the provisional nature of discoveries, revel in skepticism and are spurred by uncertainty (even as they project authority and credibility to the general public). "Working scientists don't think of science as 'the truth,'" Darcy Kelley, a neuroscientist at Columbia, tells her. "They think of it as a way of approximating the truth." Nobel Laureate David Baltimore adds, "As our concepts become more precise, more sophisticated, the absolutes become less absolute."

From the start, Angier makes a friendly anthropologist and good ambassador to planet science. Her tete-?-tetes, which build on years of high-level access and conversation, yield particular gems when she turns to the fundamentals of the natural world. In a discussion on the structure of the atom, with its positively charged protons and negatively charged electrons, for instance, Angier probes what, exactly, charge is. Here's physicist Ramamurti Shankar's delightful response: "A charge is an attitude; it is not in itself anything. It's like saying a person has charisma." And when Angier asks Cynthia Wolberger of Johns Hopkins University "what the cell would look like if it were blown up to the dimension of a desktop

accessory," "Without a moment's hesitation, [Wolberger] replied gaily, 'It would look like snot.'

" 'Snot?'

" 'Yes, cells are very gooey and viscous.' "

Angier clearly revels in the tactile. And her fingers-in-the-pie enthusiasm erupts in page after page of metaphor and visceral appreciation. In her telling, the cell is a "hive in hyperdrive." Cells are also "gossips, scolds, eavesdroppers, and sheep," in that they often take strong cues from neighbors. A virus, on the other hand, is "a wannabeing, a parasitic paralife as told on Post-it notes"; DNA is a "long-winded masterpiece" and the cell's "operating manual and ticket to tomorrow."

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[T]he book is worth reading not only as a science lesson, but also as a rhapsodic personal essay from one of the great science writers of our time -- an eminence whose love of snotty cells and crazy creatures may be second only to her love of language.