erty unsettling. A young Lancaster County, Pennsylvania, farmer considers a new life but wonders, "If it isn't any better out there, why would I leave?"

Between 80 and 90 percent of Amish teenagers choose not to leave the order. The deck is stacked—their schooling ends after age 14, they are pressured to avoid socializing with their mainstream peers, and, as Shachtman notes, "the experiences they have on the outside are usually shallow, most of them involving minor excursions into sex, drugs, and rapid transport." Few gain the imaginative tools needed for radical self-reinvention; for most, the choice is between being an Amish day laborer or a partying factory worker.

Base pleasures, fleetingly encountered, are no match for the safety of familiar community, the support of parents, and the promise of salvation. Says one young man, "It's in the back of my mind every day: If I don't change my ways I might not get to Heaven." In the end, for most who grow up Amish, the God they know is better than the devil they don't.

—Aaron Mesh

SCIENCE & TECHNOLOGY

The Body Sketchers

HUMAN ANATOMY: From the Renaissance to the Digital Age.

By Benjamin A. Rifkin, Michael J. Ackerman, and Judith Folkenberg. Abrams. 343 pp. $29.95

ATLAS OF HUMAN ANATOMY AND SURGERY: The Complete Coloured Plates of 1831–1854.

By Jean Baptiste M. Bourgery and Nicolas Henri Jacob. Taschen. 714 pp. $200

With the notable exception of the work of Leonardo da Vinci, anatomical illustration has generally been a collaborative effort. There is the anatomist who dissects the bodies and at least one artist who, working with the anatomist, his notes, and sometimes his sketches, illustrates the findings. Since illustration is by definition an editorial process—things are left out, subdued, or emphasized for clarity or impact—it is an ideal tool for the anatomist who wishes not only to record what has been observed but also to teach it. Over the past 500 years, these partnerships between artists and anatomists have produced many works both useful and occasionally even magnificent, and *Human Anatomy: From the Renaissance to the Digital Age* offers an enjoyable look at them.

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Art historian Benjamin Rifkin's insightful overview of anatomical works, from Andreas Vesalius and Jan Stefan van Kalkar's *The Fabric of the Human Body* (1543) to *Anatomy, Descriptive and Surgical* (1858) by Henry Gray and Henry Vandyke Carter, is largely given over to brief biographies of the anatomists and portfolios of their plates. In the closing chapter, biomedical engineer Michael Ackerman considers the present and future of anatomical illustration. With the latest scanning technology, it is no longer necessary to create the illusion of three-dimensionality or to suffer inaccuracies of placement or relative dimension. And yet one cannot help but mourn the loss of images created by informed human observation rather than digital data sets. The book's only disappointment, aside from its wee format, is the inclusion at the end of "illustrations" from the *New Atlas of Human Anatomy* (2000). They may be accurate. They may be the way of the future. But they also suggest, by their lack of subtlety and garish colors, that we are made of plastic.

Still, all is not lost. That eclectic publishing house, Taschen, has released a truly extraordinary volume, *Atlas of Human Anatomy and Surgery*. Where the Abrams book serves as a handy guide to possible journeys through the art of anatomy, the Taschen publication is the Grand Tour itself. Its 714 pages contain all the plates from the eight volumes produced by French anatomist Jean Baptiste Marc Bourgery (1797–1849) and his primary artistic accomplice, Nicolas Henri Jacob (1782–1871).

The original plates were printed using lithography, a technique that allows both remarkable detail and a lifelike softness when practiced by artists of Jacob's caliber. His illustrations are so successful in capturing both the procedures and the sense of human life that the surgical plates—showing, for example, how to remove a leg step by step, so to speak—are not for the squeamish. On the other hand, the illustrations of specimens observed through the microscope are worth the journey all by themselves, and the book's double foldouts take your breath away.

The care with which this book has been produced, not to mention the fact that it was produced at all, is a fitting tribute to Bourgery, whose work never received the recognition he felt it deserved. The original work was without doubt a tour de force, and so, appropriately, is this new edition.

—David Macaulay

Gray Matters

SECOND NATURE: Brain Science and Human Knowledge.

By Gerald M. Edelman. Yale Univ. Press. 203 pp. $24

In *Second Nature,* Nobel Prize–winning neuroscientist Gerald Edelman proposes what he calls "brain-based epistemology," which aims at solving the mystery of how we acquire knowledge by grounding it in an understanding of how the brain works.

Edelman's title is, in part, meant "to call attention to the fact that our thoughts often float free of our realistic descriptions of nature," even as he sets out to explore how the mind and the body interact. He favors the idea that the brain and mind are unified, but has little patience with the claim that the brain is a computer. Fortunately for the general reader, his explanations of brain function are accessible, buttressed by concrete examples and metaphors.

Edelman suggests that thanks to the recent development of instruments capable of measuring brain structure within millimeters and brain activity within milliseconds, perceptions, thoughts, memories, willed acts, and other mind matters traditionally considered private and impenetrable to scientific scrutiny now can be correlated with brain activity. Our consciousness (a "first-person affair" displaying intentionality, reflecting beliefs and desires, etc.), our creativity, even our value systems, have a basis in brain function.

The author describes three unifying insights that correlate mind matters with brain activity. First, even distant neurons will establish meaningful connections (circuits) if their firing patterns are synchronized: "Neurons that fire together wire together." Second, experience can either strengthen or weaken synapses (neuronal connections). Edelman uses the analogy of a police officer stationed at a synapse who either facilitates or reduces the traf-