famous old names of industry disappeared in great upheavals of money, marketing and technology, among them DuMont and Philco, powerhouses from the early days of radio. Mighty RCA, the giant of television innovation and sales, sold out to General Electric.

Two decades later there seemed to be a replay of corporate birth and growth in the life sciences, as investors responded to reports of an onrush in biotechnology that would even dwarf the spectacular triumph of electronics. "Biomania" was the term for this marketplace phenomenon, highlighted in 1980 by the initial public offering of shares in Genentech, a company with great promise but virtually no income. Genentech came on the market at $35 a share and 20 minutes later had ascended to $89. A decade later, Genentech, no longer the darling of Wall Street, entered into a corporate relationship with Hoffmann-La Roche to finance the difficult quest for profitability from biotechnology. Other companies in the biotechnology sector also soared in share price at the start, and subsequently went out of business or sold out to the established powers of the pharmaceutical industry.

The dynamics of these successes and failures is the subject of *Profits of Science*, an ambitious study that confronts the elusive relationship of finance and science and technology in the new postwar industries. Robert Teitelman, a senior editor at *Institutional Investor* magazine, is a knowledgeable guide through the finances and technologies of the centrepieces of this account: electronics, pharmaceuticals and biotechnology. Along the way, he also reaches for an understanding of the contributing roles of scientific progress, entrepreneurship, government policies and Wall Street's herd behaviour. Relying heavily on published sources, both scholarly and journalistic, this is a lucidly written work of interpretation, though in the end the author confesses his own puzzlement about many aspects of the dynamics of the high-tech economy.

The stage in Teitelman's techno-industrial dramas is dominated by finance — its availability, cost and accompanying conditions. The role of money is repeatedly emphasized as the most influential variable in product development, manufacturing and marketing. "It is a mistake to view technologies as if they were isolated phenomena, rising as if by spontaneous combustion", he states. "Rather, they are built on a scientific base, shaped by the financial environment." And he goes on to argue that "Cheap, available capital can shrink the gap between science and technology, accelerate change, undermine the hegemony of the large corporations, and occasionally hold off the shadow of maturity. Large reserves of inexpensive financing can allow smaller, newer companies to exploit scientific possibilities earlier." If the science yields technology, as it so abundantly did in electronics, the small fry can prosper, Teitelman points out. But not so if the science remains recalcitrant, as has been the case so far in biotechnology — a scientific triumph yet to find great marketplace success.

As a case in point, Teitelman chronicles the postwar triumph of the transistor over the venerable vacuum tube, a victory produced by science-based technology, abundant venture capital and nimble management. Although "the vacuum tube industry was confident of its staying power" and even developed and marketed some transistor products, he says, "the smaller companies proved to be more aggressive marketers — they had no vacuum tube business to defend — and they were more effective in sniffing out and providing what the market needed and wanted".

In the postwar period, he observes, the unprecedented abundance of government research funds enriched the scientific and technological atmosphere, loosened a gusher of venture capital and spawned the creation of innumerable start-up companies that "surfaced in great waves, many with a technological mission and a zeal for competition. The ready availability of capital brought these new players more time to commercialize new technologies, to develop new products and skills (marketing, manufacturing, management) that had traditionally allowed larger corporations to preserve their position in a dangerous, unstable world."

Interacting with the availability of capital, he writes, is the state of the science that underlies the technology, and these factors, in turn, shape the corporate structure and managerial style of commercialization attempts. "Generally speaking, the ease with which a technology is commercialized varies with the maturity of its underlying science . . .. The bureaucratic structure of most major drug companies and of drug regulation was formed, in part, as a response to the stubborn uncertainties of drug discovery and biology . . .. The scarcity of venture capital in the early 1950s meant that television makers came predominantly from the ranks of prewar radio companies; the flood of equity capital in the 1980s floated many new computer and semiconductor firms, despite the daunting costs."

Teitelman is particularly incisive about the transition in research politics wrought by the postwar infusion of government money into academic science. From the late nineteenth century to the early 1950s, he points out, "the technological economy was dominated by a handful of giant companies: AT&T, General Electric, RCA, Westinghouse, Du Pont". Buttressed by economies of scale and ample corporate treasuries, these companies "deployed their financial muscle to build patent fortresses, heavily influenced the government's R&D [research and development] and regulatory agendas, and, again through the power of the purse strings, held the greatest sway over academia". By the late 1950s, however, federal funds provided an alternative to industrial financing of university research, while small companies proved to be particularly fruitful settings for developing and commercializing electronic products.

As should be evident by now, Teitelman crams a great deal of fact, argument and interpretation into a modestly sized book. He is strong on insights, asking, for example, who on bedazzled Wall Street "really knew what was happening inside Texas Instruments not to mention at newer, smaller, more obscure firms?" The answer is that once share prices took off, few cared. But whether the grand themes of technology, finance and industry that he presents hold up under scrutiny is another matter.

Oddly enough, he concludes on a note of doubt, asserting: "The system that has developed in the United States is one of great complexity, constant change, and feedback. Quantification is difficult (though by now, great effort has been put into quantifying technological inputs and outputs), and one is left with description and portraiture."

True. Still, this is a commendable book, particularly worth reading in the current context of deliberate government efforts, in the United States and elsewhere, to cultivate high-tech riches. □

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