eral times, however, Drlica lapses into detailed scientific histories (for example, of Max Delbrück) that may seem confusing and tangential to his "consumer" audience.

No single guidebook is sufficient to lead us through the uncharted territory of genetics; indeed, there are no three guidebooks that will accomplish that. But the territory is vast and we are approaching it more rapidly than we know, so such books are valuable as we as a society decide where we will go and how we will deal with what we find when we get there.

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Industrial Geophysics

Science on the Run. Information Management and Industrial Geophysics at Schlumberger, 1920–1940. GEOFFREY C. BOWKER. MIT Press, Cambridge, MA, 1994. viii, 191 pp., illus. $27.50 or £23.50. ISBN 0-262-02367-9. Inside Technology.

At a time of growing interest in the development of so-called industrial science, this book examines the strategies by which one firm—specializing in the assessment of potential oil fields—developed proprietary techniques that were vital to its industry and rose to international prominence.

The Schlumberger firm was founded after World War I, at a time when theories of petroleum formation were not effectively predictive. Prospectors employed a range of surface and drilling techniques to discover and map oil fields, but scientific understanding lagged greatly behind technological exploitation and, embarrassingly, wildcat discoveries. Schlumberger used electrical logging to map oil fields by measuring subsurface resistivity. But, as Bowker notes, there is no simple measurement. Each oil field had its own peculiarities. Practicing what Bowker calls "science on the run," the firm, by imposing laboratory conditions in the field and maintaining close contact between field engineers and the calculators at its Paris headquarters, managed to weave generalizable knowledge from local data. Bowker focuses on the tightly controlled interpretation, manipulation, and dissemination of the information generated as key reasons for Schlumberger's success.

Schlumberger began with the major advantages of being a family-owned business with special access to the geophysically challenging Alsatian oil field of Pechelbronn. This rear base enabled brothers Conrad and Marcel Schlumberger to experiment with their techniques, train staff in relative secrecy, and watch competitors. Unstated but implied is that revenue from Pechelbronn supplied the deep pockets that kept the firm alive after some initial failures in the United States, the world's largest oil market, in the 1920s.

"Wherever the drill goes, Schlumberger goes." [From *Science on the Run*; Proselec]

Contingency—or luck—played a major role in Schlumberger's fortunes. Its unsuccessful North American ventures were in salt domes, where at the time seismic measurements were more predictive than electrical logging. Oil fields in the Caucasus and Venezuela, however, had the geophysical conditions necessary for electrical logging to succeed. A friendly Soviet government and the isolation of Venezuelan drilling sites further contributed to a more receptive business environment. While Schlumberger developed its logging techniques and expanded in those regions in the 1920s and '30s, potential competitors were removed as similar exploring firms were swallowed by vertically integrating oil firms in the United States.

When the company returned to the United States in the mid-1930s, it arrived with an international reputation, an array of well-developed techniques, and a tight organization for managing information. Not only was electrical logging now effective in a wide range of geological formations, it soon proved invaluable in the legal regulation of oil production in California and Texas. Following some adroit maneuvering in two crucial patent battles, Schlumberger established the leading international position it has maintained for over half a century.

Bowker looks at the firm's business strategy between 1920 and 1940; shows how it represented its work to different audiences to justify its activities, appear "scientific," and defeat competitors; and explores the internal infrastructure by which it established and maintained its position as an independent creator and broker of knowledge. The firm kept the specifics of its techniques secret while its engineers worked to generalize and adapt locally acquired information. For their money its clients received logs of electrical resistivity of their wells whose usefulness required interpretation by the Schlumberger engineers.

Key to Bowker's analysis is the assumption that Schlumberger's success depended on changing the way oil companies perceived the ground they drilled and how they drilled it. Local knowledge and control of the wells were insufficient; Schlumberger also had to negotiate and alter its corporate and political environments. Anyone working in biotechnology today will appreciate this situation and the skills it required.

Bowker's conclusion that innovations in work and organization—"locally controlling social and natural time and space"—preceded theory and the development of an industrial science fits well into the larger portrait being drawn by other studies in the field. His study demonstrates the importance of measurement and information management in the history of technology. Schlumberger succeeded in large part because of its ability to coopt both the natural and the social environments in which it operated.

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17th-Century Issues

The Scientific Revolution. STEVEN SHAPIN. University of Chicago Press, Chicago, 1996. xiv, 218 pp., illus. $19.95 or £15.95. ISBN 0-226-75020-5.

General accounts of the scientific revolution of the 17th century have been few and far between. Until the appearance of this