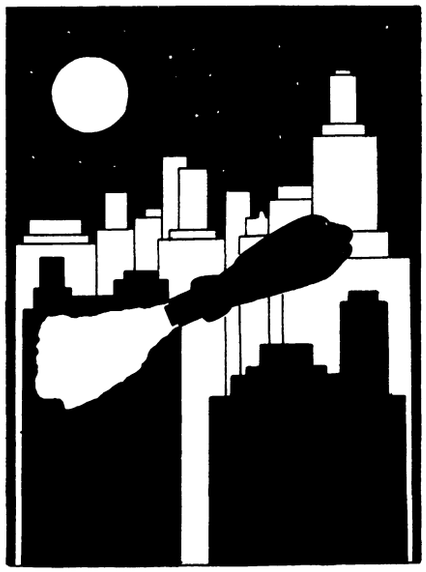

"Futuristic spaceship designed by Cleator was winning design in contest for first cover [January 1934] of *Journal of the British Interplanetary Society*." [From *Prelude to the Space Age*; Smithsonian Institution Negative No. 77-14787]

international phenomenon, and that they established a certain public acceptance of and infectious enthusiasm for space travel where there had been none before. He thus agrees with an earlier study by the sociologist William Bainbridge, *The Spaceflight Revolution* (1976), that these early space travel societies created an intellectual revolution. At the same time he rejects Bainbridge's contention that von Braun manipulated the German war machine into paying for the development of space vehicles. Winter makes it amply clear not only that the army was interested in liquid fuel rockets before it approached von Braun but that von Braun, as did Korolev, subordinated his interest in space flight to the development of rocket hardware for the military.

Though this book will certainly be an essential reference document on the rocket societies of the interwar era, it does have some problems. The artificiality of Winter's distinction between the military and civilian societies results in the rather arbitrary omission of some military developments. The civil-military dichotomy is reasonable for the Western countries, where the army was not linked to the societies. It is somewhat artificial for Germany, where the army had gained control of the remains of the societies by the early 1930's, and totally so for the Soviet Union, where the army was indirectly involved in the societies from their beginnings.

Occasional lapses of style and spelling detract from the work, though they are not serious in the great majority of cases. At two crucial points in the conclusion, however, incorrect word usage gives the author's remarks exactly the opposite meaning to that he had intended. "The perfection of the rocket became subordinated to the spaceflight idea" (p. 114) clearly reverses the author's intended meaning, and the statement "Very early the spaceflight idea was subordinated or given lip service in lieu of weaponry or other military applications" (p. 115) must mean that "Very early the spaceflight idea was subordinated to weaponry or other military applications."

Finally, Winter's use of the term "lobby" to describe a generation prepared to accept space flight is vague and problematic. If "generation" refers to the societies' members, the term "lobby" is in order. Otherwise, the book does not adduce sufficient evidence to show the effect of the societies' efforts on the wider public's interest. In fact, it gives the impression that the wider public usually showed limited interest in spaceflight and less in rocket experiments.

Despite such problems, the book presents a thorough and interesting discussion of the rocket societies. Winter's research is solidly based on the journals of the societies, the correspondence and personal papers of the participants, and interviews with them. It further contains valuable appendixes and excellent illustrations of the rocketeers, their inventions, and of the literature of the era. It is a most informative addition to the material on the origins of the space age.

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"By 1930 . . . Germans had their *Raketenflugplatz* (Rocket Flying Place) in Berlin where the VfR [German Rocket Society, Verein für Raumschiffahrt] planned, built and flew most of their early rockets." [From *Prelude to the Space Age*; Smithsonian Institution Negative No. 77-4214]

Biological Theorists

The Philosophical Naturalists. Themes in Early Nineteenth-Century British Biology. PHILIP F. REHBOCK. University of Wisconsin Press, Madison, 1983. xvi, 281 pp., illus. $30. Wisconsin Publications in the History of Sciences and Medicine, no. 3.

Early-19th-century naturalists did more than accumulate descriptive information about plants and animals; they also developed a body of theory. In Britain, where empirical traditions were especially strong, the theoretically minded sought to distinguish their special activity by calling themselves "philosophical naturalists." Philip Rehbock has written a history of the two principal groups among them: comparative anatomists, who promoted idealist concepts, and biogeographers, who began to adopt historical theories.

Although Britain produced a highly original biological idealist in William Sharp Macleay, most British idealists owed a great deal to Continental thinkers. Rehbock has devoted special attention to Robert Knox, the Edinburgh anatomist who introduced Continental

idealist thinking into Britain; and he emphasizes the Continental influence on other British idealists like Peter Mark Roget, Martin Barry, John Goodsir, Edward Forbes, and, above all, Richard Owen. In considering biogeography Rehbock notes that Alexander von Humboldt, A. P. de Candolle, and other Europeans set the stage for British biogeographical thinking, much as Continental idealists had prepared the way for British transcendental anatomists. Rehbock describes the biogeographic thinking of Charles Lyell, John Fleming, H. C. Watson, and others, but this section of the book is dominated—perhaps excessively—by Edward Forbes. Rehbock credits Forbes with adapting botanical methods of biogeography to the study of invertebrates, extending the range of investigation by offshore dredging, and introducing historical theories of migration to account for modern distribution.

Rehbock provides a useful account of British idealist theorizing. Readers interested in biogeography will prefer the more comprehensive account provided by Janet Browne in *The Secular Ark* (Yale University Press). However, Rehbock has established some important general features of British natural history in this period. Despite the significant devotion to empiricism in Britain, a number of thinkers attempted to illuminate their discipline theoretically, and, in doing so, they showed considerable receptiveness to the thought of continental Europe. Yet, as Rehbock makes clear, these early-19th-century naturalists looked at the world with divided minds, applying formal explanations to one class of phenomena and historical explanations to the other.

In some ways Rehbock might have been more vigorous in developing these insights. In discussing Forbes, Rehbock relates his routine empirical work to his historical theorizing, but many other figures do not fare as well. Similarly, there are hints in the book—for example, J. D. Hooker's quoted remark about "dirty species mongers"—that philosophical naturalists looked down on purely empirical workers, but one finds no systematic investigation of the social status of the two groups in British science. Greater attention to the relationship between practice and theory might have paid dividends. It would doubtless have enriched Rehbock's basic observation that different scientific specialties adopted different modes of reasoning about nature. In order to succeed fully, comparative studies require the systematic marshaling of evidence on related issues. Pointing to intellectual influence, as Rehbock has done with Continental and British naturalists, is one good way to interpret historical events, but it needs to be supplemented by other explanatory strategies.

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