Book Reviews

The Picaresque in Science

Count Rumford, Physicist Extraordinary. Sanborn C. Brown. Doubleday, Garden City, N.Y., 1962. xv + 178 pp. Illus. Paper, 95¢.

The career of Benjamin Thompson (1753–1814), Count Rumford (from 1792), is outstanding as an example of the picaresque in science. It took him from his birthplace, a farm in Woburn, Massachusetts, principally to Concord, New Hampshire, to London, to Munich, to London again, and finally to Paris. His chief distinction is the battle he fought, from 1778 to the end of his life, single-handedly, unremittingly, and unsuccessfully, against the prevailing caloric theory of heat, and in favor of the kinetic theory. In this connection he is best remembered for his experiment on the heat of cannon-boring, which was carried out in the 1790's at the arsenal in Munich. He deserves to be known also as the discoverer of convection. He was, further, a successful early practitioner of the application of science to technology, and the application to economic and social problems of methods that may strike present-day observers as totalitarian. In London he founded the Royal Institution and launched Humphry Davy. In Munich he created the English Garden and saved the city from becoming a battleground between the French and Austrian armies. In both cities he rose to positions of power, only to become, in the end, *persona non grata* through his arrogance, obsessiveness, and perfidy. He was variously a spy for England against the Colonies, for England against the Empire, and probably for France against England. He had two brief and unsuccessful marriages, of which the second, in his fifties, was to the brilliant Madame Lavoisier. He ended his days in a fever of experimentation and an aura of eccentricity, in Auteuil. These are only the highlights.

To give this flamboyant story the popularization for which it so clearly calls, without falling into an induced flamboyance, is a difficult feat. This Sanborn Brown has accomplished, I believe for the first time, and beautifully. Since his book is an essay rather than a comprehensive biography, it has involved the problem of selection. Brown's solution shows that he possesses a superb command of the facts. In particular, the balance between the scientific and the other aspects of Rumford's career seems excellent. The book is intended for high school students (it is a volume in the PSSC Science Study Series), and the author has evidently been at pains to make his account correspondingly simple. This has not been a drawback, but on the contrary, supplemented by the author's tact, humor, and refreshing lack of pretentiousness, it has produced a result that I find very beguiling. The book should give pleasure and profit to all, young or old, scientist or nonscientist.

In two respects I think the book could have been improved. The first, and lesser, is that it might have been instructive to mention Rumford's erroneous conclusion that in fluids thermal conductivity is zero and convection is the *only* mode of heat transport. The second has to do with Rumford's relation to the theory of heat, and I will elucidate under three headings: (i) The author mentions that Rumford learned of the kinetic theory of heat from Boerhaave's "Treatise on Fire," but he does not tell us that this theory was the *generally prevailing* one in the century or so preceding Rumford's birth. Once this is realized, one sees that Rumford was scientifically a reactionary as well as a radical; he was, to borrow Nietzsche's phrase, "of day before yesterday and day after tomorrow, only not of today." (ii) I think the epilog, and especially the statement that "the result of Rumford's antisocial attitudes was to cut him off from the very fame he sought," is misleadingly moralistic. Suppose Rumford had been successful in putting over the kinetic theory of heat. He would of course have become and stayed famous had he been twice the rogue he was. A case in point is Rumford's younger contemporary, Dalton, who, though no rogue, was notoriously antisocial and obsessive, but whose ideas were accepted. Why wasn't Rumford successful? The reason is that he was fighting, as Dalton was not, the caloric theory, which was, on the whole, doing very well, and which was to do even better before it died in the 1840's. [See T. S. Kuhn, "The caloric theory of adiabatic compression," *Isis* **49**, 132 (1958) and "Energy conservation as an example of simultaneous discovery," in: *Critical Problems in the History of Science*, M. Clagett, Ed. (Univ. of Wisconsin Press, 1959).] (iii) This leaves us with some interesting psychological questions. Why, although he could not convince his contemporaries, did Rumford keep fighting the battle for decades? Is this perhaps a further expression of his general need to dominate by proving people wrong? And in turn, could this need be his equivalent of the colonial farm boy's struggle for independence: the return—in Freudian terms—of the repressed idea in the repressing one?

I hope Brown will entertain such questions in the comprehensive biography of Rumford promised in the preface of this excellent study.

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Demonstration Models

Teaching Chemistry with Models. R. T. Sanderson. Van Nostrand, Princeton, N.J., 1962. ix + 175 pp. Illus. $5.75.

Those who have followed Sanderson's many articles on chemical bonding or who have made use of his lecture-demonstration films will welcome this presentation, in permanent and expanded form, of the subject to which he has devoted much of his career. This short, informal volume, which follows closely upon the author's *Chemical Periodicity*, is obviously a labor of love. It demonstrates admirably and in simple language the versatility and scope of the model approach to teaching chemistry, an approach applicable not only to freshman courses but to high school and advanced inorganic and organic