does not reduce the usefulness of the distinction.

Similarly, in talking about method should not some care be taken to distinguish what is properly epistemological from what is more authentically procedural or stylistic? It cannot be entirely sound to suppose that the "format" of Newton's *Opticks* (or the "mode of presentation" to the Royal Society of the theory of colors in 1672 as a "compelling tale of discovery") by itself allows inferences about underlying epistemological convictions. In another instance, Sabra takes great care to show that Huygens is not a Baconian despite the appearance of a plan for the Physical Assembly of the *Académie Royale* written by Huygens almost entirely out of Bacon's *Novum Organum*. In all this, the very real possibility that Huygens's tract has not an epistemological but a "political" core is never considered. Surely one part of scientific method has to do with establishing the literary and social acceptability of scientific practice. Some scientists and scientific institutions in the 17th century may have had good reasons to appear Baconian without ever giving real substance to that appearance. Indeed, one may very well ask to what extent 17th-century scientists were able to separate the procedural, stylistic, and social aspects of the Baconian ideology from the epistemological commitment to inductivism. Even if our current philosophical verities were only beginning to emerge in this period, it does not reduce their usefulness as tools of inquiry. Finally, one is left wondering whether Sabra would have come to the same conclusions about the methodology of Descartes, Fermat, Huygens, or Newton if he had considered in addition to their meta-optical speculations the ways in which they argued their support for, say, Descartes's first law of motion, the principle of inertia.

In the controversial closing section on Newtonian optics and its critics, Sabra masterfully sustains the argument that Newton's commitment to atomism permeates his optical theorizing even down to the level of the "deductions from phenomena." At that lowest level, however, atomism appears in the benign form of a principle of simplicity. Sabra's argument—borrowed from M. Gouy and supposedly hinted at by Hooke—that white light may be regarded as homogeneous if the prism is regarded as a Fourier machine seems to me too weak to support the charge of Newtonian "dogmatism." Much more could be made of the awesome unity that atomism gave Newton's natural philosophy and of the considerable experimental support it enjoyed. More attentive than any other optical theorist to the physico-chemical investigations of Boyle and Hooke, Newton maintained the essential identity of light and matter as atomic as a way of coping with the complex interactions that are the essence of physical optics. Much the same methodological motivation stands behind the proposal of Kelvin and J. J. Thomson, in the very different climate of 19th-century physics, that if light is an aether-wave then matter must also be a "mode of motion" of the aether, the smoke-ring vortex of Helmholtz. The triumph of Newton's derivation of the sine law is the defense of the hypothesis that the particles of light and matter act on each other at a distance. To support that proposal is also the essential point of the "Queries" to the *Opticks*; atomism responded well to what Newton recognized as physical, chemical, and optical specificity.

As the century closed, Newton's methodological "dogmatism" was more than matched by Huygens's metaphysical stubbornness and by Hooke's inability to turn his ideas into theories. Newton's bizarre theory of "fits of easy transmission and reflection" with which Sabra closes his excellent book is testimony enough of the crisis into which optics had fallen.

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Molecular Interaction

Organic Charge-Transfer Complexes. R. FOSTER. Academic Press, New York, 1969. xii, 472 pp., illus. $22.50. Organic Chemistry, vol. 15.

In 1952 Mulliken explained the special character of light absorption by many "molecular complexes" as being charge transfer, thereby stimulating a surge of research in this area. For a few years it seemed as if everything from the color of liver to the infectivity of viruses would be explained in terms of charge transfer, but early enthusiasm has given way to more sober and careful examination of one of the really significant aspects of intermolecular interaction. As the recent Gordon conference on electron donor-acceptor interactions demonstrated, thorough experiments on the thermodynamics, the structure, and the chemical behavior of "charge-transfer complexes" are now the rule.

Foster has written a thoughtful and comprehensive account of these complexes. Proceeding from a general and historical introduction, he describes very clearly the theory of the complexes and then their electronic, infrared, and nuclear magnetic resonance spectra. After a thorough discussion of the equilibrium constants for complex formation (methods and results), the crystal structures and electrical and magnetic properties are covered. A few pages are devoted to complexes that are of special interest. Reactions that may involve charge-transfer complexes are treated in a clear way, and a judicious and astute review of the biochemical significance of charge-transfer complexes is then presented. The book ends with a few applications of complexes in organic chemistry.

No errors were noted and no important omissions came to mind. Foster has made an effort to make the book easy to read and easy to use, and it deserves a place in every chemical and biochemical library.

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Books Received

America Adopts the Automobile. 1895–1910. James J. Flink. M.I.T. Press, Cambridge, Mass., 1970. xiv, 344 pp., illus. $12.50.

The Biological Importance of Selenium. V. V. Koval'skii and V. V. Ermakov. Translated from the Russian (1968) by S. J. Wilson. Raymond C. T. Powell, Ed. National Lending Library for Science and Technology, Yorkshire, England, 1970. iv, 144 pp., illus. 7s 6d.

Biosphere. A Study of Life. N. M. Jessop. Prentice-Hall, Englewood Cliffs, N.J., 1970. xiv, 954 pp., illus. + plates. $11.50.

Birds. C. J. O. Harrison and G. S. Cowles. Trustees of the British Museum (Natural History), London, 1970. 48 pp., illus. Paper, 4s. Instructions for Collectors, No. 2A. Publication No. 561.

Carl Friedrich Gauss. A Biography. Tord Hall. Translated from the Swedish by Albert Froderberg. M.I.T. Press, Cambridge, Mass., 1970. xii, 176 pp., illus. $7.95.

Catalogue of the Type Specimens of Microlepidoptera in the British Museum (Natural History) Described by Edward Meyrick. Vol. 8, Tineidae, Adelidae, Incurvariidae, Olethreutidae, Elachistidae, Hyponomeutidae, and an index to all vol-

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