defeat an infection by elevating body temperature to levels not tolerated by the invading microbe. He then turns to consider other possible reasons for fever and explores how we might decide whether different medical interventions for suppressing fever could be deleterious.

But the main issues of the book—virulence evolution in different parasites—are presented largely from a pro-adaptationist perspective, and then presented only from the specific adaptationist perspective that parasites evolve to maximize their rate of spread to new hosts. Alternatives such as virulence being non-adaptive, or virulence being a consequence of short-sighted, within-host evolution of the parasite are ignored. There is a dearth of concrete predictions that might be used to falsify the few models that are offered, and the data reviewed are not presented in a manner that allows a reader to develop an independent conclusion (aside from text, the book includes only one table, one figure with data, and a phylogenetic dendrogram).

The subject of this treatise is or should be of great general interest. The text is, for the most part, very readable and the treatment not at all technical. From one perspective these attributes are a considerable virtue. The book should draw the large audience the subject deserves.

Nonetheless, we don't believe that the simplistic advocacy approach employed in this volume is needed in order to draw wide readership. Rigor need not have required immersing the reader in technical and mathematical details. Indeed, the style of this treatise is likely to have a negative impact. Evolutionary biology is already seen by many outsiders as a soft discipline in which rigorous tests are rarely performed and speculative stories occupy the niche of rigorously developed and empirically tested theories. For anyone possessing that mental stereotype, this book will reinforce their opinion. This effect is especially unfortunate, because Ewald's treatise is the first potentially popular book representing the emerging discipline of evolutionary medicine. For an evolutionary biologist, one of the truly exciting features of infectious diseases is that microbial evolution can be studied experimentally and prospective hypothesis testing can supplant the retrospective, story-telling character of a good deal of earlier evolutionary biology. Ewald's book could have laid the foundation for this future by posing alternative hypotheses and suggesting the evidence needed to reject them. It didn't. Yet the questions raised by Ewald and his premise about the potential utility of evolutionary biology are, we believe, right on. We hope his lead will be followed by others.

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Vignettes: Standards of Discourse

It was common in early modern society to contrast the society of gentlemen with that of scholars according to the different values they respectively placed upon truth and good manners. Polite writers condemned traditional scholars because they would sacrifice the good order of conversation to the imperious demands of truth and accuracy, while the scholar might justify himself through variants of the ancient trope used to identify oneself as "a friend of Aristotle but more a friend of truth." Yet changed conceptions of the nature of scholarly practice in the seventeenth century . . . increasingly reordered and respecified the characters of the scholar and the gentleman. It was now urged that the end of philosophy—the search for truth—might best be acquitted by deploying conversational practices that had traditionally belonged to gentlemanly and not to scholarly society.

—*Steven Shapin*, in *A Social History of Truth: Civility and Science in Seventeenth-Century England* (University of Chicago Press)

When an eminent Victorian such as Justus Liebig could run his own journal, he had no compunction at being offensive to people he disagreed with, even calling them plagiarists or "cocks crowing on a dunghill." . . . The traditional language in British science has continued to be relatively skeptical and direct, with a bite to it. . . . It is interesting to find in an editorial review in the *American Journal of Physiology* [in 1983]: "American science has become vitiated by too much politeness. . . . Conciliatory smoothness is the life blood of diplomacy; it is the death of science."

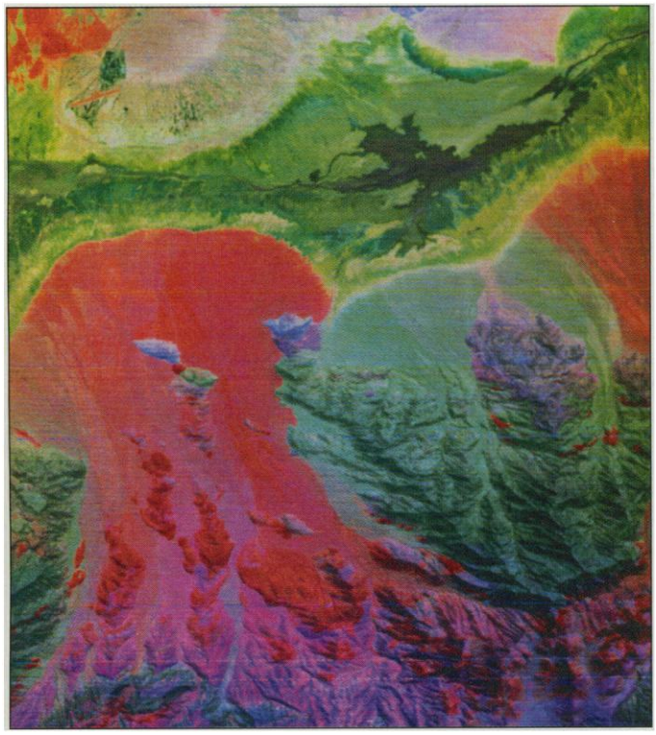
—*Kenneth J. Carpenter*, in *Protein and Energy: A Study of Changing Ideas in Nutrition* (Cambridge University Press)

Planetary Surface Studies

Remote Geochemical Analysis. Elemental and Mineralogical Composition. CARLE M. PETERS and PETER A. J. ENGLERT, Eds. Cambridge University Press, New York, 1993. xxiv, 594 pp., illus., + plates. $74.95 or £60. Topics in Remote Sensing, 4.

The study of planetary surfaces involves observations at a vast array of physical scales. At one extreme, Earth-based telescopic observations often involve measurements pertaining to the entire visible surface of a planet. At the other, analyses from landed spacecraft may deal separately with individual rocks only centimeters across. This book deals with remote-sensing observations of planetary surfaces as used to infer the elemental and mineralogical composition of the surface materials. Its stated purpose is to provide a broad introduction at a working level to the techniques of remote sensing and the analysis of data.

The book is a collection of 27 chapters by a total of 62 authors. It is divided up under the broad headings Technical and Scientific Background, Applications and Measurements, and Active Surface Analyses. The Earth is a planet, and a few chapters deal with topics specific to it, but the bulk of the book deals with the other planets and satellites in the solar system. The chapters deal primarily with two different approaches to compositional remote sensing. The first (passive) approach involves understanding reflected and emitted energy at visible, near-infrared, and mid-infrared wavelengths. At these wavelengths, observed spectral features are diagnostic of mineralogical composition and provide information similar to what a geologist would need to interpret field observations pertaining to the geological history of the surface. The second (active) approach utilizes high-energy measurements such as gamma-ray, x-ray, alpha-particle, and neutron spectroscopy. These observations are sensitive to the elemental composition rather than to the mineralogy and provide evidence per-



Thermal infrared multispectral "decorrelation stretch image of Death Valley, California, during the day, with bands 1, 3, and 5 in blue, green, and red. Colors show spectral differences; temperatures are in dark and light. Quartz-rich materials are red; carbonates are green to blue-green; volcanic rocks, shales, etc. are blue to purple." [From *Remote Geochemical Analysis*]

taining to the geochemical evolution of the surface materials. These two approaches are inherently complementary: each provides unique information on different aspects of the surface material, and neither alone will provide sufficient information to completely characterize a surface.

Although field investigation is usually the means of obtaining "ground truth" to verify the results of remote sensing, this has been possible to date only for the case of the Moon. The discussions dealing with the Moon serve as an excellent example of the complementarity of approaches, as we have available each type of remote-sensing data as well as in situ observations and returned samples. I found the lunar chapters especially enlightening, as much of the analysis happened during the Apollo era, before I was old enough to appreciate the scientific value of the data.

A quality of the book is that each chapter stands alone. On the plus side, this means that an individual interested in a single technique can focus on a small number of chapters or can see several different perspectives on a given topic. On the minus side, there is a good deal of redundancy, and information on a given topic may be widely scattered. For example, the properties of surface materials that are responsible for producing spectral features seen in reflection are described in at least four chapters and the composition of Mars as inferred from mid-infrared spectroscopy is discussed in two. Reflectance spectroscopy is dealt with in eight different chapters, and there is no simple division between theory, laboratory work, observations, interpretations, or individual planets.

Despite the inconvenience of having to skip around to find complete treatment of a given subject, the book succeeds remarkably well in its stated purpose. The chapters are authoritative, thorough, and useful at a level appropriate for both the knowledgeable outsider and the active practitioner. In the areas with which I am familiar, the discussions do a good job of summarizing the literature and the state of the field. In the areas with which I am less familiar, the discussions are straightforward and usually clear and contain a large amount of information that I have found useful. I used the book in a course on remote sensing of planetary surfaces this semester and found it to be a most appropriate discussion of compositional remote sensing.

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