testable predictions. But when, for example (in one of his few brief references to any actual culture), Swanson describes Protestantism as "an allele of Christianity", all he appears to be doing is re-phrasing common knowledge in genetic language. This seems to typify his approach. Little justification is offered for seeking the cultural analogues of genetic processes, from replication and recombination to drift and selection, or for supposing that the identification of such analogues in itself enhances understanding.

Both books, then, attempt much and achieve disappointingly little. Neither is without some redeeming qualities, and no doubt each will have an interested audience. But I could not recommend either of them to biologists or general readers in search of an incisive, informative view of human biology and culture: nor could I assure cultural anthropologists that either would offer them convincing grounds for taking evolutionist views of culture more seriously. □

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Scattered thoughts

Z. Kam

Absorption and Scattering of Light by Small Particles.

By Craig F. Bohren and Donald R. Huffman.

Wiley: 1983. Pp.520. £42.70, \$59.80.

BLUE skies and red sunsets intrigued Leonardo de Vinci and stimulated some of the best scientific compositions of Tyndall and Lord Rayleigh. While no longer an enigma to a generation which was exposed to essays on sky colour in the classics of children's scientific literature and which witnessed colour television images of lunar sunrise, the interaction of radiation with inhomogeneous media is nevertheless a subject of research where applications are so varied that it is difficult to integrate, into

End of Bewley & Black

SPRINGER-Verlag have recently published both the long-awaited second volume of J. Derek Bewley and Michael Black's *Physiology and Biochemistry of Seeds in Relation to Germination*, and a corrected reprint of Vol. 1. The first volume, which appeared in 1978, deals largely with the germinating seed, while Vol. 2 is devoted to aspects of dormancy. Prices are Vol.1 DM 97, \$41, and Vol.2 DM 128, \$55.

Paper phenotype

RICHARD Dawkins's *The Extended Phenotype* has now appeared in paperback (for review see *Nature* 296, 506; 1982). Price is £5.95, \$7.95; the publisher is Oxford University Press.

one essay, the theories and methodologies used in different fields.

One therefore inevitably assumes a somewhat subjective point of view in approaching Bohren and Huffman's *Absorption and Scattering of Light by Small Particles*. In fact, the book is quite well written and contains the basic theory. The relation of scattering and absorption phenomena to the bulk properties of the scatterers is logically developed through rigorous derivations; examples are easy to follow and adequately illustrate the theory. The chapters contain more than enough cross references to create a balanced, well integrated presentation.

The basic theory of scattering and absorption by particles is preceded by a concise summary of electromagnetic wave phenomena in the first chapter. The next chapter presents the classical approximations for particles smaller than the wavelength of the radiation, the Rayleigh-Gans approximations, Mie scattering and a few other exact solutions. The optical properties of bulk matter are then related to absorption and scattering of suspensions of particles. The chapter about applications is limited chiefly to examples from atmospheric and space sciences.

Although the authors restrict themselves to small-particle light scattering in this volume, I think that some additional reference to scattering and absorption of ultraviolet and X-ray radiation, as well as of neutrons and electrons, would have been appropriate and stimulating, in view of the extensive development of such modern techniques as synchrotron radiation spectroscopy and electron microscopy. The same can be said for limiting cases of scattering from dense suspensions of particles and plasmas.

It is unfortunate — at a time when students' imaginations are more likely to be stirred by problem-oriented approaches to basic scattering theory than by a formal exposition, however well-presented — that the authors give modern, practical applications considerably less attention than seems warranted. While the basic theory is developed on occasion to a level of computer algorithms, the presentation of other applications, in short descriptive passages, often lacks depth. It is consequently easy to relate basic theories to practical problems in meteorology, biophysics or fibre optics. Without providing motivation for developing appropriate models for the understanding of complex phenomena, the task of applying the theory presented in the book to new problems may well be left to the very few physicists who will choose this area as their field of research. In this sense, the book lacks the potential to become a classic reference but is, nonetheless, an important and well-written update to the established references such as those of Kerker and van de Hulst. □

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The rhythm of Barro Colorado

Malcolm Coe

The Ecology of a Tropical Forest: Seasonal Rhythms and Long Term Changes.

Edited by E.G. Leigh, A.S. Rand and D.M. Windsor.

Oxford University Press/Smithsonian Institution Press: 1983. Pp.468. Pbk £19, \$15.

IN 1980, T.C. Whitmore wrote: "The second half of the twentieth century will stand in history as the brief period during which Man reduced the area of the richest and most complex ecosystems in the world by one third". The ecosystems he referred to, of course, are the world's tropical rain forests where evolution seems to have gone mad, producing a vast and, in the large part, unstudied flora and fauna. These forests straddle the Equator in West Africa, South East Asia and South America, and together comprise just over 50% of the Earth's forests. The largest of these forests are in South America, where in 1976 A. Sommer calculated that no more than 63% of the forest area still survived.

It is against a background of ruthless exploitation and destruction that we must view this collection of papers which was first published by the Smithsonian Institution in 1982. The work presented was entirely carried out on Barro Colorado Island by staff, students and visitors to the Smithsonian Tropical Research Institute in Panama. This island is a basaltic hill, which was previously submerged when the Gatun Lake, in which it lies, was formed in 1914, and now covers an area of 1500 ha.

Ecological and behavioural studies are often carried out in a specific area because a particularly interesting species happens to be present, which in consequence results in a poor knowledge of local physical conditions and their accompanying animal and plant communities. Indeed, there are probably no more than a few dozen areas in the world that have been submitted to detailed inventory studies accompanied by long-term monitoring programmes of the local biota. The detailed background to many of the papers in this volume derives from such an environmental monitoring programme, established on Barro Colorado Island as long ago as 1916. Although the small size of the island may have led to artificially high densities of some animals, the seasonal nature of this isolated, tropical deciduous forest provides a valuable contrast with studies carried out in similar environments on other continents, and even with the richer humid tropical forests.

The value of this volume to tropical ecologists is that it draws together information on the physical factors which