gard to basin subsidence, W. J. Morgan contributes a general discussion of vertical movements of crust in response to the generation of hot lithosphere and its subsequent cooling, A. G. Fischer examines both the isostatic consequences of changes in crustal thickness and some of the ways in which dynamic plate interactions can counteract or override tendencies for static balance from crustal isostasy alone, and D. J. J. Kinsman makes a provocative analysis of the joint effects of thermal tumescence and decay combined with effects of crustal thinning and rupture during the evolution of rifted continental margins along so-called trailing edges. The variable relationships of oil formation to different tectonic settings with different characteristic geothermal environments are explored tentatively in separate papers by J. G. Erdman and H. D. Klemme.

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Theoretical General Relativity

Homogeneous Relativistic Cosmologies. MICHAEL P. RYAN, JR., and LAWRENCE C. SHEPLEY. Princeton University Press, Princeton, N.J., 1975. xvi, 322 pp., illus. Cloth, $15; paper, $7.50. Princeton Series in Physics.

During the last five years it has become increasingly evident to theoretical workers in the field of "homogeneous relativistic cosmologies" that the time is ripe for the appearance of a monograph to review and consolidate the enormous recent progress in this area and to pave the way for future research. With this in mind, and knowing the authors, I approached this book with optimism. I came away disappointed. This book is not the monograph we need.

Nevertheless, since someone must make the first attempt, the authors are to be congratulated for their valiant, if not wholly successful, efforts. The author of the still-awaited monograph may well benefit from this book by emulating its good points and avoiding its pitfalls. In the meantime, moreover, this work of Ryan and Shepley is the only one we have, and it may, with reservation, be recommended to graduate students of theoretical general relativity.

Where did the authors go wrong? Since the book is a potpourri of good and bad items, let us begin by advertising its more desirable aspects.

In keeping with the other books in the Princeton Series in Physics, this book is reasonably well produced for the price. Graduate students can profit from the clear—almost intuitive—mathematical discussions of gravitational singularities and the singularity theorems in chapters 4, 5, and 8 through 10; and it is useful to have a straightforward treatment of differential forms and isometry groups (especially chapters 2 and 6) in the same book. Finally, there is a bibliography of nearly 500 important references (covering the years 1892 through 1973) on mathematical cosmology.

The debit side of the ledger is more extensive. Nowhere in the book are we really told what it intends to do, its purpose, or its reason for existence. We *are* informed in the preface that the first half of the book has something to do with "the singularity theorems of 1965–68" and that the second half addresses itself to "specific cosmological problems" and "the application of Hamiltonian techniques." In essence, the book consists of 15 rather arbitrary "chapters" tenuously held together by a single gossamer thread, the (disparate) research interests of the two authors. The result is a confusing juxtaposition of previous works and papers, and not a coherent book.

The flow charts that outline the chapters are a symptom of this malaise. In a good book they would be redundant; here they are far too necessary.

Many times while reading the book I found myself asking, "Why is this part here?" The introductory chapter is weak. Differential geometry and forms (chapter 2) were better handled in Shepley's thesis (1965), and this material, together with that of chapters 3 and 4, has been quite adequately covered in the textbook by Misner, Thorne, and Wheeler (*Gravitation*, Freeman, 1973). The discussion of the singularity theorems in chapters 5, 7, 8, and 10 suffers tremendously by comparison with the lucid and elegant presentation of Hawking and Ellis (*The Large Scale Structure of Space-Time*, Cambridge University Press, 1973). To understand the physical aspects of cosmology, treated in chapters 1, 4, 14, and 15, one is strongly advised to read Peebles's excellent book (*Physical Cosmology*, Princeton University Press, 1971) instead. And the essence of what this book has to say about spatially homogeneous cosmologies and the Hamiltonian method has already appeared in a delightful earlier monograph by Ryan (*Hamiltonian Cosmology*, Springer-Verlag, 1972).

Finally, it would be good to air a number of minor irritations here. There is an excessive "cuteness" to the large number of literary quotations in the book; at the least they should have been accompanied by English translations so that their wit would be more apparent to the reader who does not know Greek, Russian, Latin, and French. The possibility that our universe is "open"—as indicated by much recent observational evidence—is virtually ignored in the book. Another error, which is essentially perpetuated on p. 219, is to continue to believe that "classical matter" has any bearing upon quantum cosmology when we know that matter must be treated quantum mechanically in that regime. The most blatant error of fact appears on p. 265, where a matter density of "about one gram/cm^3" when the universe is at the decoupling epoch ($T \sim 3000$°K) is quoted; the actual value is closer to 10^{-20}. Another irritant (p. 42) is the use of the "Russian school" notation, $w = \rho(1+\epsilon)$ and p, in discussing perfect-fluid matter, when the more widespread convention is to use ρ (in place of w) and p.

The Problems section of the book is a random agglomeration in which some of the exercises are trivial and others are virtually impossible. I see no point to the two short paragraphs on "relativistic astrology and religion" (p. 268), and the final section of the book, which attempts to delineate the observational and theoretical studies that will be most useful in the near future, is vague, ill-considered, and trite.

I trust the consumer is properly warned.

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Books Received

The Adolescent as Individual. Issues and Insight. Carol J. Guardo, Ed. Harper and Row, New York, 1975. xiv, 322 pp. Paper, $6.95.

Aging Gametes. Their Biology and Pathology. Proceedings of a symposium, Seattle, June 1973. R. J. Blandau, Ed. Karger, Basel, 1975. xii, 416 pp., illus. $54.75.

The Alaska Pipeline. The Politics of Oil and Native Land Claims. Mary Clay Berry. Indiana University Press, Bloomington, 1975. x, 302 pp. + plates. $10.95.

American Self-Dosage Medicines. An Historical Perspective. James Harvey Young. Coronado Press, Lawrence, Kans., 1974. xvi, 76 pp. $5. Logan Clendening Lectures on the History and Philosophy of Medicine (New Series), No. 1.

Les Algues. Morphologie, Cytologie, Reproduction, Ecologie. P. Gayral. Doin, Paris, 1975. 166 pp., illus. Paper, 120 F.

Annual Review of Pharmacology. Vol. 15. Henry W. Elliott, Robert George, and Ronald Okun, Eds. Annual Reviews, Palo Alto, Calif., 1975. x, 518 pp., illus. $15.

Attention and Performance V. Papers from a symposium. P. M. A. Rabbitt and S. Dornic, Eds. Academic Press, New York, 1975. xviii, 744 pp., illus. $42.25.

A Beachcomber's Botany. Loren C. Petry. Illustrated by Marcia G. Norman. Chatham, Old Greenwich, Conn., 1975. 158 pp. $6.95. Reprint of the 1968 edition.

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