tivity seems to me not notably different from many elementary expositions now in print. Occasionally, though, he says misleading things. Thus, owing apparently to his insistence on treating special relativity as a mere theory of measurement, Goldberg writes that rotational motions "fall outside the realm of discourse of the special theory of relativity" (p. 71). But special relativity, exactly like Newtonian mechanics, can deal perfectly well with rotations; either theory would be cripplingly impoverished if it could not. (It is true that if one chooses, in either theory, to use rotating, and hence non-inertial, reference frames one has to introduce so-called fictitious forces.)

More original and more interesting than his exposition of special relativity is Goldberg's history of the reception of special relativity in Germany, France, Great Britain, and the United States in the years 1905 to 1911. Briefly, what Goldberg contends is that each response was a function of "social custom and fashion" within the respective national physics communities. Thus, leading German physicists debated the paradoxes that seemed to inhere in special relativity (such as the difficulty of defining a rigid body and the possibility of velocities exceeding that of light in vacuo); French physicists, following the lead of Poincaré, ignored Einstein's theory altogether; British physicists reworked Einstein's main results so as to make them compatible with the traditional concept of an ether; and American physicists—or at least the few who paid any attention to the theory—either attacked it as metaphysical speculation or interpreted it as based on empirical generalizations, "consistent with the pragmatic experimental emphasis prevalent within the American scientific community" (p. 256). This last theme is pursued in a long chapter entitled "Relativity in America, 1912–1980."

Goldberg's evidence for American interpretations of special relativity from 1912 to 1980 is drawn primarily from physics textbooks—graduate, advanced undergraduate, and introductory—widely used in the United States during the period in question. He favors such evidence because "textbooks prove to be one of the few places where physicists are willing to discuss, if only implicitly, the meaning of theories and their concepts of how evidence supports theories" (p. 276). He concludes, "The American interpretation of the meaning of the theory of relativity is based on the belief that the theory is correct because both the postulates and the predictions of the theory are in agreement with measurement and observation. Such an interpretation is more easily integrated into traditional American views about the relationship between evidence and theory than is Einstein's view that theories are the free creation of the human spirit" (p. 318). To me there is nothing inconsistent about holding both views referred to in the latter of the sentences quoted; I believe, furthermore, that Einstein himself held both views. A theory may be freely created, but once formulated it can be subjected to observational and experimental tests. (A point of logic: Goldberg appears to hold that the "conclusions" of a theory but not the "premises" must be "tested and demonstrated" [p. 293]; but if the conclusions, or predictions, of a theory are testable, then its premises, or postulates, are also, at least indirectly, testable—which seriously reduces the force of Goldberg's intended distinction between conclusions and premises.)

One test of whether there is anything peculiarly "American" about the interpretations of special relativity found in the textbooks studied by Goldberg would be to compare those interpretations with ones found in European textbooks of the same period. Without such a test Goldberg's historical thesis remains a suggestive, but hardly cogent, finding.

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Climate

Theory of Climate. BARRY SALTZMAN, Ed. Academic Press, New York, 1983. xiv, 505 pp., illus. $64. Advances in Geophysics, vol. 25. From a symposium, Lisbon, Oct. 1981.

The theme of this volume is that in the last decade scientists in the disciplines concerned with the climate system have increasingly come to appreciate the connections between the various components of the climate system and the hazards of overly narrow viewpoints.

The eight chapters in the volume are illustrative of the "bringing together" of areas of expertise in the search for a fuller understanding of the theory of climate. I particularly appreciate the tutorial nature of almost all the chapters. Particularly notable in this respect is Golitsyn's chapter, "Almost empirical approaches to the problem of climate, its variations and fluctuations," in which basic physical concepts and order-of-magnitude estimates are used to demonstrate the power of climatic processes. Also notable is the final chapter, by Oort and Peixóto, who present a global picture of the general circulation of the atmosphere and of its thermal structure from observational data. Their meticulous analysis of data from 10 years of observation illustrates that such data are very much harder to come by and considerably more difficult to interpret than the ever-flowing streams of output from global climatic models. It does not seem too strong to claim that validation and, hence, fully successful parameterization in climate models will not be achieved until as much money, computer time, and scientific effort are devoted to the improvement, careful checking, and analysis of observational data as are currently devoted to climate modeling. In this respect a chapter by Ohring and Gruber devoted to the analysis of the scanning radiometer data from the National Oceanic and Atmospheric Administration's polar orbiting satellites and the application of these data to climatology is a valuable contribution to the literature.

One of the few difficulties with this excellent volume is that chapters are grouped under somewhat contrived headings. For example, a section entitled Radiative, Surficial, and Dynamical Properties of the Earth-Atmosphere System encompasses the papers by Ohring and Gruber and Oort and Peixóto as well as an excellent review by Dickinson of the considerable difficulties faced by the very few of us concerned with incorporating land-surface processes into global-scale climate models. Dickinson's paper covers topics as wide-ranging as stomatal resistance and modeling of regional-scale albedos in the cryosphere. However, it should not have been positioned between the strongly observational chapters of Ohring and Gruber and Oort and Peixóto. Grouping chapters by Shutts and by Saltzman under the heading Statistical-Dynamical Models tends almost to diminish the wide-ranging nature of both.

A paper by Manabe on carbon dioxide and climatic change seems rather familiar. Perhaps this is simply a reflection of a jaded academic's oversaturation with results of increased CO_2 on global climate modeling sensitivities. The tutorial nature that is so strong in other chapters is missing here. My favorite chapter is the opening review, by Smagorinsky, of the beginnings of numerical weather prediction. It is a delightful and highly personal account of the dynamic interactions of some of the most famous persons in meteorology and climatology, as well as of some of the first computers devoted to the problems of atmospheric modeling.

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High-Energy Physics

Quarks, Gluons and Lattices. MICHAEL CREUTZ. Cambridge University Press, New York, 1984. vi, 169 pp., illus. $34.50. Cambridge Monographs on Mathematical Physics.

Quarks, Gluons and Lattices is a brief, clear introduction to lattice gauge theory and its applications to quantum chromodynamics, the field theory of interacting quarks and gluons.

The book begins with a discussion of the connection between statistical mechanics and field theory and goes on to introduce Euclidean scalar, fermion, and gauge fields. It then turns to the construction of lattice degrees of freedom, lattice actions, and various techniques of extracting the mathematical and physical content of such theories. Strong coupling and weak coupling expansions, mean field theory, duality, renormalization group transformations, and computer simulation methods, some of which were pioneered by the author, are considered in turn. These topics are illustrated through examples drawn from the recent literature. The computer simulation and numerical evidence for the crucial features of the theory, such as confinement in the continuum limit, are critically and sensibly discussed.

Since a considerable array of topics is essential to a balanced presentation of lattice gauge theory, a short work such as this is forced into compromises. The reader will find sketches of some arguments rather than full presentations and discussions. The references, however, are quite complete, and in all probability they will have to be consulted from time to time. The book does not discuss some actively developing topics, including the lattice topological charge, the lattice Dirac equation, chiral symmetry, species doubling, and the axial anomaly. These are important topics that are not completely understood at this time.

In summary, this timely monograph could serve as a solid centerpiece in a course on lattice gauge theory. If it were supplemented with additional material covering recent developments, such as the Monte Carlo renormalization group and fermion computer simulations, a very profitable graduate-level course would result. Since lattice gauge theory and its attendant mathematical and numerical methods, such as large-scale computer simulations, are expected to play an important role in high-energy and statistical physics in the coming years, such an enterprise should be well worth the effort devoted to it.

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Books Received

Aerosols. An Industrial and Environmental Science. George M. Hidy. Academic Press, Orlando, Fla., 1984. xx, 774 pp., illus. $89.

Air Pollution and Plant Life. Michael Treshow, Ed. Wiley-Interscience, New York, 1984. xii, 486 pp., illus. $70. Environmental Monographs and Symposia.

Alice Hamilton. A Life in Letters. Barbara Sicherman. Harvard University Press, Cambridge, Mass., 1984. xvi, 460 pp. + plates. $25. A Commonwealth Fund Book.

The Alkaloids. Chemistry and Pharmacology. Arnold Brossi, Ed. Academic Press, Orlando, Fla., 1983. Vol. 21. xx, 368 pp., illus. $49.50. Vol. 22. xviii, 342 pp., illus. $50.

The American Academic Profession. A Synthesis of Social Scientific Inquiry since World War II. Martin J. Finkelstein. Ohio State University Press, Columbus, Ohio, 1984. xii, 289 pp. $17.50.

The American Frontier. An Archaeological Study of Settlement Pattern and Process. Kenneth E. Lewis. Academic Press, Orlando, Fla., 1984. xxviii, 333 pp., illus. $68.50. Studies in Historical Archaeology.

Analysis of Ordinal Categorical Data. Alan Agresti. Wiley, New York, 1984. xii, 287 pp. $35.95. Wiley Series in Probability and Mathematical Statistics.

Analytical Profiles of Drug Substances. Vol. 12. Klaus Florey, Ed. Academic Press, Orlando, Fla., 1983. x, 735 pp., illus. $47.

Animal Life-Cycle Feeding and Nutrition. Tilden Wayne Perry. Academic Press, Orlando, Fla., 1984. xvi, 319 pp., illus. $24.50. Animal Feeding and Nutrition.

Annual Review of Biochemistry. Vol. 53. Charles C. Richardson, Paul D. Boyer, and Alton Meister, Eds. Annual Reviews, Palo Alto, Calif., 1984. xvi, 990 pp., illus. $29.

Annual Review of Biophysics and Bioengineering. Vol. 13. Donald M. Engelman, Charles R. Cantor, and Thomas D. Pollard, Eds. Annual Reviews, Palo Alto, Calif., 1984. x, 538 pp., illus. $47.

Annual Review of Materials Science. Vol. 14. Robert A. Huggins, Joseph A. Giordmaine, and John B. Wachtman, Jr., Eds. Annual Reviews, Palo Alto, Calif., 1984. x, 416 pp., illus. $64.

Annual Review of Nutrition. Vol. 4. William J. Darby, Harry P. Broquist, and Robert E. Olson, Eds. Annual Reviews, Palo Alto, Calif., 1984. xiv, 610 pp., illus. $27.

Antimicrobial Drug Resistance. L. E. Bryan, Ed. Academic Press, Orlando, Fla., 1984. xviii, 576 pp., illus. $79.

Antiproton Proton Physics and the W Discovery. J. Tran Thanh Van, Ed. Editions Frontières, Gif-sur-Yvette, France, 1983. 665 pp., illus. $65. Moriond Series, 40. From a colloquium, La Plagne, Savoie, France, March 1983.

Antitumor Drug Resistance. B. W. Fox and M. Fox, Eds. Springer-Verlag, New York, 1984. xxvi, 738 pp., illus. $198. Handbook of Experimental Pharmacology, vol. 72.

Antiviral Agents and Viral Diseases of Man. George J. Galasso, Thomas C. Merigan, and Robert A. Buchanan, Eds. Raven, New York, 1984. xiv, 577 pp., illus. $75.

Applied Atomic Collision Physics. Vol. 4, Condensed Matter. Sheldon Datz, Ed. Academic Press, Orlando, Fla., 1983. xiv, 632 pp., illus. $79.

Beyond Whistleblowing. Defining Engineers' Responsibilities. Vivian Weil, Ed. Center for the Study of Ethics in the Professions, Illinois Institute of Technology, Chicago, 1983. vi, 334 pp. Paper. From a conference, Chicago, March 1982.

Biological Foundations and Human Nature. The Katzir-Katchalsky Lecture Series. Miriam Balaban, Ed. Academic Press, Orlando, Fla., and Balaban, Philadelphia, 1983. vi, 243 pp., illus. $39.50.

Biological Oceanographic Processes. Timothy R. Parsons, Masayuki Takahashi, and Barry Hargrave. 3rd ed. Pergamon, New York, 1984. xii, 330 pp., illus. $40; paper, $19.75.

Biological Processes and Soil Fertility. J. Tinsley and J. F. Darbyshire, Eds. Nijhoff/Junk, The Hague, 1984 (U.S. distributor, Kluwer Boston, Hingham, Mass.). xxx, 403 pp., illus. $69. Developments in Plant and Soil Sciences, vol. 11. Reprinted from *Plant and Soil*, vol. 76. From a meeting, Reading, England, July 1983.

Biology of Lichenized Fungi. James D. Lawrey. Praeger, New York, 1984. x, 408 pp., illus. $39.95.

Biology Today and Tomorrow. Jack A. Ward and Howard R. Hetzel. 2nd ed. West, St. Paul, Minn., 1984. xx, 557 pp., illus. Cloth.

Biosafety in Microbiological and Biomedical Laboratories. Public Health Service, Bethesda, Md., 1984 (available from the Superintendent of Documents, Washington, D.C.). x, 100 pp. Paper, $4. HHS Publication No. (CDC) 84-8395.

The Birth of Neurosis. Myth, Malady, and the Victorians. George Frederick Drinka. Simon and Schuster, New York, 1984. 431 pp., illus. $21.95.

Caffeine. Perspectives from Recent Research. P. B. Dews, Ed. Springer-Verlag, New York, 1984. xx, 260 pp., illus. $29.

^{14}C and Archaeology. W. G. Mook and H. T. Waterbolk, Eds. Council of Europe, Strasbourg, 1983 (distributor, T. Hackens, 28a av. Léopold, B-1330 Rixensart, Belgium). 525 pp., illus. Paper, $70. PACT, 8. From a symposium, Groningen, Aug. 1981.

The Caribbean–South American Plate Boundary and Regional Tectonics. William E. Bonini, Robert B. Hargraves, and Reginald Shagam, Eds. Geological Society of America, Boulder, Colo., 1984. x, 421 pp., illus., + maps. $47.50. The Geological Society of America Memoir 162.

The Cauchy Method of Residues. Theory and Applications. Dragoslav S. Mitrinović and Jovan D. Kečkić. Reidel, Boston, 1984 (distributor, Kluwer Boston, Hingham, Mass.). xiv, 361 pp., illus. $67. Mathematics and Its Applications. Translated from the Serbian edition (Belgrade, 1978).

A Century of Ulcer Surgery. Medical and Surgical Therapy Today. Hermann Bünte and Peter Langhans, Eds. Urban & Schwarzenberg, Baltimore, 1984. xii, 304 pp., illus. Paper, $44.50. Translated from the German by Glenn E. Whitted. From a symposium, Münster, Oct. 1981.

Developments in Statistics. Vol. 4. Paruchuri R. Krishnaiah, Ed. Academic Press, Orlando, Fla., 1983. xiv, 287 pp. $62.

Diagnosis and Management of the Hospitalized Child. Howard B. Levy, Stephen H. Sheldon, and Rabi F. Sulayman. Raven, New York, 1984. xiv, 681 pp., illus. Paper, $19.75.

The Dictyostelids. Kenneth B. Raper, with Ann Worley Rahn. Princeton University Press, Princeton, N.J., 1984. xii, 453 pp., illus. $75.

Diet, Diabetes, and Atherosclerosis. Guido Pozza *et al.*, Eds. Raven, New York, 1984. xviii, 278 pp., illus. $47.50. From a meeting, Milan.

Dietwalk™. The Doctor's Fast and Easy 3-Day Superdiet. Fred A. Stutman. Medical Manor Books, Philadelphia, 1984. xiv, 185 pp., illus. Paper, $8.95.

Diffusion. Mass Transfer in Fluid Systems. E. L. Cussler. Cambridge University Press, New York, 1984. xii, 525 pp., illus. $49.50.

Directory of Environment Statistics. United Nations New York, 1983. vi, 305 pp. Paper, $30. Department of International Economic and Social Affairs Statistical Papers, Series M, No. 75.

Dominance and Affection. The Making of Pets. Yi-Fu Tuan. Yale University Press, New Haven, Conn., 1984. xii, 193 pp., illus. $19.95.

The Dragon Hunters. Frank Graham, Jr. Illustrations by Robert Shetterly. Dutton, New York, 1984. xiv, 334 pp. $22.95. A Truman Talley Book.

The Dynamic World of Physics. Robert T. Dixon, Merrill (Bell and Howell), Columbus, Ohio, 1984. xvi, 560 pp., illus. Cloth.

The Earth's Magnetic Field. Its History, Origin and Planetary Perspective. Ronald T. Merrill and Michael W. McElhinny. Academic Press, Orlando, Fla., 1983. xii, 404 pp., illus. $67.50; paper, $30. International Geophysics Series, vol. 32.

Ecological Effects of Fire in South African Ecosystems. P. de V. Booysen and N. M. Tainton, Eds. Springer-Verlag, New York, 1984. xvi, 426 pp., illus. $33.50. Ecological Studies, vol. 48.

Ecology of Tropical Plants. Margaret L. Vickery.

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