

While slower rotation can be produced by a rifled launcher, the spin-stabilized rocket requires in general a series of canted jet nozzles. The second half of the book deals with spin-stabilized rockets. After a careful discussion of the force system involved, the analysis of motion during burning and during launching is taken up. Motion during the burning phase is fairly simple since the jet forces are dominant, but the complete analysis of the motion after burning becomes very involved. The authors start by introducing a simplified discussion which gives a physical "feel" of the situation before proceeding to a more rigorous mathematical treatment which includes the more general cases such as precessions with generalized nonlinear aerodynamic moments. There is a lucid discussion of the gyroscopic stability breakdown which occurs if the aerodynamic forces overbalance the gyroscopic forces and cause the spinning body to turn nearly broadside. In fact, the very attractive feature of the book is that in spite of the great complication the discussion is easy to follow, mathematics is kept very simple, and the results are liberally illustrated in the form of graphs.

A few remarks should be reserved for the problem of classification. They form comments on the authors' preface. I think it is a pity that data on various aerodynamic coefficients from NACA reports and from the recent open literature were not included. I don't really believe that "this would raise classification difficulties". Then again: "... it is most regrettable that footnote references to (other people's) work are often excluded by security regulations." After 15 years? But these are small points when we consider the authors' ordeal of completing the book under three successive sponsorships (1946-53) which finally resulted in an obscure classified report to be followed by a 3-year declassification procedure. They have performed a real service in making the material widely available. I could really have used this book a couple of years ago when we were concerned with the design of simple unguided high-altitude sounding rockets.

Advances in Geophysics, Vol. 4. Edited by H. E. Landsberg and J. Van Mieghem. 456 pp. Academic Press Inc., New York, 1958. \$12.00. *Reviewed by S. A. Korff, New York University.*

As is usual today, in subjects which are in a very rapid process of development, it is difficult to write textbooks which are even approximately up to date. Hence there is much need for a review-type book, which treats in detail various special topics, which will enable the student, or indeed the expert, in one field to become aware of the advances in the adjacent fields which may impinge upon his own. Such a series is *Advances in Geophysics*, of which Volume 4 is the subject of this review.

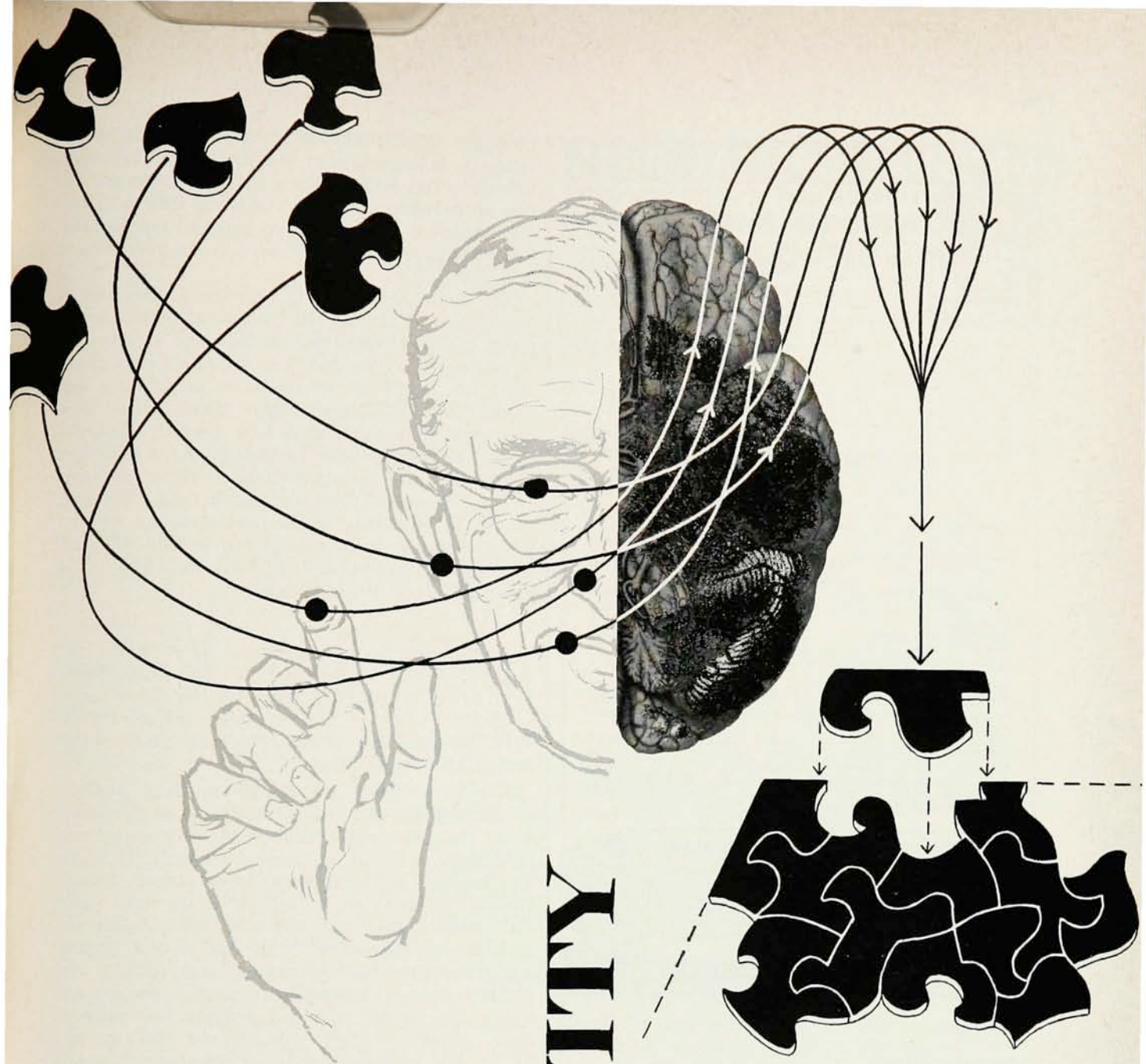
This book deals with five topics: Atmospheric Chemistry by Christian E. Junge, Theories of the Aurora by Joseph W. Chamberlin, The Effect of Meteorites upon the Earth (including its inhabitants, atmosphere, and

satellites) by Lincoln La Paz, The Smoothing and Filtering of Time Series and Space Fields by J. Lieth Holloway, Jr., and Earth Tides by Paul J. Melchior.

The first section deals largely with the "trace gases" in the troposphere, namely such gases as ozone, nitrous and nitric oxides, nitrogen dioxide, ammonia, sulphur dioxide, hydrogen sulphide, methane, and other gases present in small amounts, plus carbon dioxide, which is present in appreciable amounts. The various formation, exchange, and diffusion processes are treated at length. Also he discusses the evidence about nuclei of various kinds in the atmosphere, both solid particles and ionic nuclei which become the centers of condensation for droplets of rain or fog. In the last section, air pollution is treated briefly. All in all, the section is principally a summary of data and chemical processes in the lower atmosphere, and the complex photochemistry of the upper atmosphere is not treated. The discussions are interesting and illuminating. They well illustrate that the atmosphere is much more complex than merely a mixture of oxygen and nitrogen. The physics of small particles, their rates of settling and diffusion are also included. Here both the theory and the actual data are included, so that one can from this account get a pretty good idea of the situation.

The chapter on the aurora starts out with an extensive discussion of the motion of a charge in the field of a monopole; then it goes into the Störmer theory and the various elaborations thereon. Next the more elaborate theories are treated, and the various modifications suggested by Chapman and Ferraro, and by Bennett and Hulburt, and the calculations of Wulf, of Alfven, and of Vestine are discussed. All in all, it is a comprehensive review of the theories. Not much experimental data is presented. About the several theories, this reviewer is left with the distinct feeling that they are excellent intellectual exercise, but only rarely or in small part give a good description of the way nature actually operates. The actual problems are very complex, and the motion of the charged particles generates fields which interact with the fields already present in a manner which cannot be well described by simple theory. Experiments in this field are quite insufficient to date, and one can only hope that the IGY satellite program will yield much more of the type of background information needed before satisfactory theories can be formulated.

The third section, on the effects of meteorites, is largely a review of the known data in this field. Here again, the unsatisfactory situation presently existing in the data is well brought out. From a comparatively small number of meteorites actually recovered, one must estimate numbers, characteristics, and compositions of much larger samples, and extrapolate by several orders of magnitude. The author does a good job in summarizing not only the data, in showing the various disagreements among the various investigators, but in discussing in much detail all the many effects which one might wonder about: does the accretion of such material affect the rate of rotation and dozens of other



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problems. In particular he devotes a good part of the article to a discussion of the problem of hyperbolic velocities. This problem bears upon the origin and history of the meteors in space, and is also difficult to analyze because it is impossible to know all the perturbations which a swarm may have experienced over a long time.

The fourth chapter deals with the mathematics of smoothing and filtering. In geophysical problems generally, much statistical work is done, and various sorts of averages are computed. The ways that such procedures can distort the interpretation of data are well brought out. The importance of these procedures is great, and the chapter should be carefully read, not only by experimental geophysicists in all the disciplines thereof, but also by experimental physicists generally.

The last section deals with earth tides. The quite interesting deflections in the solid earth are well reviewed, both theoretically and experimentally. All in all, the volume is an excellent one which should be on the bookshelf of every geophysicist.

Basic Science Series: *Mechanics* by A. Efron, 112 pp., \$1.50; *Heat* by A. Efron, 105 pp., \$1.50; *Sound* by A. Efron, 72 pp., \$1.25; *Energy* by Sir Oliver Lodge, 54 pp., \$1.25. John F. Rider Publisher, Inc., New York, 1958. Paperbound. Reviewed by Manuel Sandoval Val-larta, University of Mexico.

Mechanics, *Heat*, and *Sound* are three carefully written booklets of a basic science series at high-school level. The treatment is deliberately very elementary, but interest is added by frequent references to up-to-date machines and common household gadgets. Enough standard problems are worked out in the text to give the student a good lead, and numerous questions and problems are then added at the end of each chapter. The text on mechanics is conventionally divided into vectors, torques, kinematics, dynamics, energy, and power; that on heat into basic concepts, heat measurement, transfer, change of state, and heat engines; finally, that on sound into an introduction which fills up almost a third of the whole, hearing, and sound waves.

At the risk of being guilty of pedantry, this reviewer must confess that he was surprised to find on page 65 of the text on mechanics the underscored statement that no external force can change the total momentum of a system. There are some slips in the logical development of the subjects treated. For instance, the Kelvin temperature scale is used in figure 1-1 on page 2 of the heat text, but is not defined until page 13, figure 1-12. And why spell fahrenheit with a small letter? Is not Fahrenheit entitled to a capital as much as his colleagues Kelvin and Rankine? Joseph Louis Gay-Lussac and Jacques Charles seem to be the only physicists mentioned by their full names, but then only to make their scientific association quite unclear. Other similar minutiae could be picked out.

Altogether three valuable textbooks which may help