a bit of editorial zeal could have shortened an expensive book by 200 pages. Despite much good material, the overall quality is well below that of previous proceedings, including the useful volume edited by Larwood six years ago. Series have a way of unchecked self-perpetuation. This one badly needs outside review.

J. B. C. JACKSON
Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, Maryland 21218

Galactic Research

The Large-Scale Characteristics of the Galaxy. Papers from a symposium, College Park, Md., June 1978. W. B. BURTON, Ed. Reidel, Boston, 1979. xviii, 612 pp., illus. Cloth, $73.50; paper, $38.65. International Astronomical Union Symposium No. 84.

Twenty-five years ago, with the aim of coordinating galactic research, the International Astronomical Union held its first symposium. The present symposium, with 180 participants, demonstrates that the field is still vital and that it has matured. As evidence of maturity, the discussions emphasize the Milky Way as a galaxy, as stellar astronomers now speak of the sun as a star. One observer admits poignantly that the comparison is painful because he is forced to disregard most of the detailed observations of the nucleus of our galaxy.

Our galaxy emerges as a normal spiral (type Sbc), similar to the spiral galaxies of the same type in the Virgo cluster (some 15 to 20 megaparsecs distant). The sun is now thought to be about 8.5 kiloparsecs from the center, rotating with a velocity of 225 kilometers per second.

The major components of our galaxy are the disk, with a mass of about 8×10^{10} solar masses and a density that decreases exponentially with distance from the center; a spheroidal (bulge) component, with a mass comparable to or smaller than that of the disk and a density that decreases as the cube of the distance from the center; and an invisible halo (or dark corona), with a mass of more than ten times that of the disk and a density that decreases as the square of the distance out to a cutoff radius estimated to be in the range 50 to 335 kiloparsecs. In external galaxies, the dark halo is tracked by calculating the gravitational attraction that is required to balance the centrifugal force measured from the rotational velocity of neutral hydrogen. For geometric reasons, this is not possible for our own galaxy, and a careful study of high-latitude objects (globular clusters or RR Lyrae stars) and galactic satellites will be necessary to pin down the extent of the halo.

Our nucleus seems relatively quiet and does not contain a dead quasar (that is, a 10^8-solar-mass black hole). Interior to 1.5 kiloparsecs, there is a gas disk or bar tilted by 22° to the plane of the galaxy (a puzzle). In addition to stars, the disk contains hot gas (10^6 K), warm gas (10^3 to 10^4 K), and cold clouds (10^1 to 10^2 K). The energy balance of these various components is still not understood. There are giant molecular clouds with masses as high as 3×10^6 solar masses which, in total, contribute 3×10^9 solar masses. Their collapse time is short (only 3×10^6 years), and if they all collapsed and made stars they would yield 1000 solar masses of new stars a year. In fact, only 3 solar masses of new stars are made a year, so we have another puzzle.

Beyond 15 kiloparsecs, the disk is warped (like the brim of a Stetson). It is attractive to suppose that it was distorted in a tidal encounter with a nearby companion, but quantitatively it has been difficult to establish that scenario, and so "why the warp" remains another puzzle.

At high latitudes, hydrogen clouds are falling onto our galaxy with velocities approaching 500 kilometers a second. Where they come from is unknown.

Our galaxy is a member of the "local group," which is dominated by it and Andromeda, although the group has at least 28 members. By comparing our galaxy with external galaxies in rich clusters (which have thousands of members), we hope to learn how the environment influences the development of a galaxy.

Should you read the book? Yes, if you are professionally interested in galaxies. (This is not a book for the layperson.) Should you buy the book? You will be buying a lot of relatively short-lived material. A third of the 104 contributions are two pages or less (essentially abstracts), and more than half are less than five pages (with discussions). If only the invited reviews had been included (with perhaps abstracts of the contributed papers published separately), the book would have been smaller and cheaper, and then would have been rated a "best buy."

MYRON LECAR
Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachusetts 02138

Books Received

Alternative Development Strategies and Appropriate Technology. Science Policy for an Equitable World Order. Romesh K. Diwan and Dennis Livingston. Pergamon, New York, 1979. xiv, 258 pp. $19.50. Pergamon Policy Studies on the New International Economic Order, 30.

Ammonia. Committee on Medical and Biologic Effects of Environmental Pollutants, National Research Council, University Park Press, Baltimore, 1979. xvi, 384 pp., illus. Paper, $22.50.

The Analysis of Social Interactions. Methods, Issues, and Illustrations. Robert B. Cairns, Ed. Erlbaum, Hillsdale, N.J., 1979 (distributor, Halsted [Wiley], New York), xii, 244 pp. $16.50.

Analytical Methods for Glycerol. M. R. F. Ashworth with a chapter by A. A. Newman. A. A. Newman, Ed. Academic Press, New York, 1979. xii, 258 pp., illus. $48.50.

Analytic Medicine. Vol. 1, Conventions. Graham Rabey. University Park Press, Baltimore, 1979. vii, 76 pp. illus. $14.95.

Analytical Profiles of Drug Substances. Vol. 8. Klaus Florey and seven others, Eds. Academic Press, New York, 1979. x, 558 pp., illus. $28.

Animal Marking. Recognition Marking of Animals in Research. Papers from a conference, London, July 1977. Bernard Stonehouse, Ed. Macmillan, London, 1978 (U.S. distributor, University Park Press, Baltimore), viii, 258 pp. illus. $37.50.

Annual Reports in Medicinal Chemistry. Vol. 14. Hans-Jürgen Hess, Ed. Academic Press, New York, 1979. x, 358 pp. illus. Paper, $19.50.

Annual Reports in Organic Synthesis—1978. L. G. Wade, Jr., and Martin J. O'Donnell, Eds. Academic Press, New York, 1979. xii, 354 pp., illus. $15.

Annual Review of Astronomy and Astrophysics. Vol. 17. Geoffrey Burbidge, David Layzer, and John G. Phillips, Eds. Annual Reviews, Palo Alto, Calif., 1979. x, 586 pp., illus. $17.

Annual Review of Microbiology. Vol. 33. Mortimer P. Starr, John L. Ingraham, and Sidney Raffel, Eds. Annual Reviews, Palo Alto, Calif., 1979. xii, 702 pp. $17.

Applied Biology. Vol. 4. T. H. Coaker, Ed. Academic Press, New York, 1979. x, 286 pp., illus. $34.

Applied Optics and Optical Engineering. Vol. 7. Robert R. Shannon and James C. Wyant, Eds. Academic Press, New York, 1979. xviii, 344 pp., illus. $36.

Arthritis. The New Treatments. Julian Freeman. Contemporary Books, Chicago, 1979. xvi, 158 pp. $8.95.

Biogeochemistry of Estuarine Sediments. Proceedings of a workshop, Melreux, Belgium, Nov. 1976. Unesco, Paris, 1978 (U.S. distributor, Unipub, New York). 294 pp., illus. Paper, $15.50.

Biology of the Kinetoplastida. Vol. 2. W. H. R. Lumsden and D. A. Evans, Eds. Academic Press, New York, 1979. xxii, 738 pp., illus. $94.50.

Biomedical Engineering and Data Processing in Pneumonology. Papers from a conference, Titisee, Germany, Oct. 1978. H. Matthys and five others, Eds. Karger, Basel, 1979. xii, 322 pp., illus. $75.75. Progress in Respiration Research, vol. 11.

Carbohydrate Metabolism in Pregnancy and