tributions to the symposium, so that the volume systematically considers every major aspect of Galileo's work, is an important addition to the literature which will exercise considerable influence over continuing scholarship.

Faced with nearly 40 separate articles, the reviewer has no alternative but to discuss those few which particularly catch his eye as relevant to issues he himself is currently concerned with. I might remark that in every case the enduring influence of Koyré is evident. Whether scholars agree with him or disagree, they are discussing Galileo within the context that he established. Inevitably mechanics bulks large in any set of papers devoted to Galileo. The Notre Dame volume opens with a long essay by the editor, one of the finest discussions of Galileo it has been my pleasure to read, which focuses primarily on the historical development of his mechanics. Partly as a result of Koyré's work, we have been accustomed to think of a two-stage development—the mechanics of *De motu* and the mechanics of the *Dialogue* and the *Discourses*. McMullin urges persuasively that in fact four distinct stages can be isolated, the development after *De motu* proceeding through three stages which can be identified in the *Dialogue* and the different segments from which Galileo composed the *Discourses*. Departing again from Koyré, he also maintains that a concept of rectilinear inertia is implicit in the *Discourses*. Much as McMullin's paper impresses me, I do not think he sustains the latter point. Nor do I now think that it can be sustained. I remain with Koyré—Galileo's natural horizontal motion is comprehensible only as motion on a spherical plane everywhere equidistant from a gravitating center. Whereas McMullin agrees with Koyré that the major progress embodied in Galileo's contribution to mechanics was conceptual, Thomas Settle advances the argument that experimentation with inclined planes led Galileo to abandon the position of *De motu* and to embrace the concept of uniform acceleration. Settle may be regarded as the leading advocate today of what was the orthodox interpretation of Galileo before Koyré wrote. Skillfully though he defends his position, I am unable to judge his effort a success. The expressions he finds himself forced to employ are suggestive of an inherent weakness of the argument—"one may surmise . . . ," "it seems safe to say . . . ," "he may have tried . . . ," "it would seem. . . ." To me "it seems safe to say" that surmise is the refuge of an uncertain argument whereas solid evidence concludes in positive statements. One other article on mechanics deserves mention. Whereas Koyré's influence has stressed the determinative role of Copernicanism in Galileo's mechanics, Émile Namer attempts to reverse the roles and to make dynamics the central factor in Galileo's endorsement of Copernicanism. Although the continuity of *De motu* with the later mechanics can scarcely be denied, I think it is impossible to contend effectively, as Namer tries to do, and as his argument demands, that a celestial dynamics (beyond a couple of very general hints) can be found in Galileo.

Perhaps the core of Koyré's interpretation of Galileo was the role of Platonism in determining his approach to nature. Both volumes of essays make it evident that the question of Galileo and Plato, far from being settled, is the livest topic of discussion concerning him. In addition to its passing appearance in any number of papers, it forms the central theme to which four are devoted. Edward Strong and Thomas McTighe attack the thesis that Platonism molded Galileo's distinctive approach to nature; Ernst Cassirer and Aron Gurwitsch defend it. One thing appears certain—Koyré's statement of the Platonistic interpretation requires some modification. If Galileo was a Platonist, he introduced a new element into Platonism when he brought geometry down from the realm of the eternal into terrestrial physics. On this point everyone seems to agree. Strong and McTighe contend that the new element was so contradictory to the Platonic tradition as to constitute its negation. Both Cassirer and Gurwitsch, however, stress what Strong and McTighe seem to ignore, that "nature" to Galileo was not the world of appearance but an ideal world of which the material one is only an imperfect realization. His "natural" motions, horizontal and vertical, are motions confined to that ideal realm where friction and resisting media do not exist. To the extent that they ignore what is the central feature of the Platonistic interpretation, Strong and McTighe engage in knocking down straw men. McMullin, who also enters the lists, argues that a science of motion, that is, a science of change, would have been a contradiction in terms to Plato. Is this entirely correct? Was there not a science of astronomy, and did not ancient astronomy build on the Platonic injunction that only the perfect figure, the circle, expresses the immutable perfection of the heavens? One central feature of Galileo's thought was the abolition of the distinction between the mundane and celestial worlds, expressed in the repeated assertion that the earth has become a heavenly body in the Copernican system. His insistence on the uniformity of natural motions embodied a concept of unchanging change similar to that which had long been the foundation of astronomy. In the case of horizontal motion, uniform motion became equivalent to rest in his eyes and participated in the eternal perfection of circularity. Such a concept could have provided the bridge which led from a geometrical conception of reality to a science of terrestrial motion. I will not, however, presume to settle a vexed and hotly debated question in this limited space. If I can manage it without giving offense, let me point out to Raymond Seeger that asserting the influence of Platonism on Galileo is not equivalent to calling him a "Platonic dreamer" or denying that he was a physicist. Just because he did more than correlate experimental data he remains an everlasting object of interest and inquiry, as these latest additions to the literature testify.

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Astronomy

Nebulae and Interstellar Matter. BARBARA M. MIDDLEHURST and LAWRENCE H. ALLER, Eds. University of Chicago Press, Chicago, 1968. xxii + 835 pp., illus. $27.50. Stars and Stellar Systems, vol. 7.

Some 40 years ago a distinguished astronomer deduced from the colors of galaxies that the upper limit for the absorption of light in space was about 0.00015 magnitude per kiloparsec and suggested that astronomers need not disturb themselves further about this question. At about the same time Trumpler, in discussing the diameters of open clusters in the galactic plane, derived a value of the interstellar absorption some 5000 times larger, and astronomers have been increasingly disturbing themselves over this question ever since. The question of interstellar dust, however, and more important, perhaps, its association with bright nebulae, goes back almost two centuries to the time of Sir William Herschel, who would ready himself and his assistant for the appearance of bright nebulae whenever his routine sweep encountered a region nearly devoid of stars. In recent years the study of the interstellar dust, gas, magnetic fields, and cosmic rays has been greatly accelerated not only by new tools such as multiplier phototubes, polarimeters, radio surveys and spectrometers, and x-ray rocket experiments but also by the recognition that new stars and clusters are continually being born out of interstellar dust clouds and that very-high-energy charged particles are produced in the magnetic fields of gas clouds. The detailed and authoritative volume under review is therefore a most welcome and timely addition to the literature.

Two and one-half years have elapsed since the appearance of the sixth volume of this series (volume 5, *Galactic Structure*), and it is greatly to be hoped that the final two volumes, volume 9 (*Galaxies and the Universe*) and volume 4 (*Clusters and Binaries*) will soon go to press and not be left to die aborning. Volume 7 is large and relatively expensive, although the price per page is actually slightly less than for volume 1 (*Telescopes*), which appeared eight years ago. There are 16 chapters by 18 authors, but unfortunately, because of publication delays many of these chapters are a bit out of date. For example, only 11 percent of the 2380 references are more recent than 1964 and only 5 percent are more recent than 1965. The very real problem of how to produce an up-to-date compendium of this type has evidently not been completely solved. Some of the chapters have been circulated in preprint form for a number of years and have already been frequently referred to in the literature.

The keynote first chapter, by Spitzer (written in 1959 and revised in 1962), treats the dynamics of interstellar clouds and the formation of stars. Chapters 2 and 3 are concerned with diffuse and dark nebulae, respectively, and chapter 4 deals with flare stars, which are associated with both types of nebulae. Chapter 5, by Harold Johnson, is more of a research paper than a review paper and is concerned with the value of R, the crucially important ratio of total to selective absorption; his conclusion that $R = 3$ is a minimum value and can be much higher will undoubtedly stimulate many future investigations. Chapter 6 (the lengthiest, 144 pages) deals with interstellar grains and chapter 7 with interstellar absorption lines. The theory of atomic processes is discussed in chapter 8, and chapter 9 is an excellent 92-page monograph on planetary nebulae. Chapter 10 is concerned with radio line-emission and absorption in the interstellar gas, and chapter 11, one of the most interesting, discusses supernovae remnants. Chapter 12 is on the theory of synchrotron radiation, chapter 13 on discrete x-ray sources, and chapter 14 is a useful survey of cosmic rays. Chapter 15 is a short chapter on interstellar magnetic fields, and the final chapter, by Upton, originally scheduled for volume 8, deals with the difficult and little-understood process of just how an amorphous blob of interstellar material contracts into a star.

Those astronomers and embryonic astronomers who have found earlier compendium volumes useful as a source of understanding, reference, and stimulation will find the same to be true of this volume. These books have made a significant contribution to the advancement of the science.

Much of importance has happened since the book was written. A partial list might include the following: the discovery of pulsars and the consequent determination to five significant figures of the number of electrons per square centimeter in the line of sight to these objects; photometric and spectroscopic investigations of x-ray sources, especially by the Tololo observers; the discovery of high-density, compact H I regions; the discovery by the Dutch radio astronomers of high-velocity, high-latitude hydrogen clouds and the intriguing possibility that they are optically invisible satellites of our galaxy; the discovery of the recombination radio emissions from neutral and ionized helium and neutral carbon; the Westerhout high-resolution 21-centimeter survey along the galactic equator; the discovery of gamma rays coming from the galactic center and equator; and finally, transcontinental and transoceanic radio interferometry with baselines up to 100 million wavelengths and giving resolving powers of 0.001 second of arc is beginning to obtain diameters and relative positions of radio sources at least an order of magnitude better than is possible by conventional optical techniques. One might point out in this connection the urgent need for a relatively small steerable dish in both South America and South Africa to work interferometrically with Australian radio observatories on southern radio sources.

For the future: the 28 unidentified diffuse interstellar lines are still an enigma and have been for a third of a century, despite the fact that they absorb about six times as much stellar flux as do the lines identified as atomic or molecular. The abundance and distribution of molecular hydrogen are unknown and could be of crucial importance. Perhaps some day we may even be able to investigate interstellar planet-like bodies, interstellar comets, and neutrinos as well.

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Easter Islanders

Cranial and Postcranial Skeletal Remains from Easter Island. RUPERT IVAN MURRILL. University of Minnesota Press, Minneapolis, 1968. 105 pp., illus. $5.75.

Rupert I. Murrill has studied more than 100 metrical and 75 morphological skull features, numerous postcranial features, and the ABO paleoserology of 33 human skeletons excavated during the 1955–56 Easter Island archeological expedition. Led by Thor Heyerdahl, who was accompanied by several archeologists, including Edwin Ferdon, the team established three periods by carbon-14 dating. Twenty-two skeletons are from the Late Period (A.D. 1680–1868); the remaining eleven belong to the Middle Period (A.D. 1100–1680). Skeletons were not found for the Early Period (A.D. 400–1100), in which occurs Peruvian-like dressed and fitted monumental stone masonry. Although small, the skeletal sample is very informative, particularly so since it is the first absolutely dated series from Easter Island.

When met by Captain Cook, after the initial but brief European contact by Dutchmen in 1722, the Easter Islanders spoke a Polynesian dialect. Their legends suggest that several groups reached the island. Murrill's analysis of the long-headed, rocker-jawed skeletons clearly shows that they are, to use his own phrase, "indubitably Polynesian" (p. 61) and not American Indian. The ABO frequencies, determined through