tion 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There are 16 chapters by 18 authors, but unfortunately, because of publication delays many of these chapters are a bit out of date.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

Mean measurements of male cranial remains from Peru and Easter Island.

Measure	Peru	Easter Island periods	
		Middle	Late
Minimum frontal breadth (mm)	85.4	93.4	94.9
Endobasion–prosthion length (mm)	100.5	101.8	103.5
Orbital height, left (mm)	36.1	34.8	33.6
Cranial capacity (cm^3)	1356–1445.0*	1411.0	1462.0
Upper facial index	55.6	52.6	51.5
Nasal index	44.2	50.5	52.8
Height index	82.6–87.6*	88.2	88.7

* From "Handbook of South American Indians," vol. 6, *Bur. Amer. Ethnol. Bull.* 143.

an undescribed procedure by C. A. Leone, fall within the Polynesian range rather than that of American Indians, and skeletal pathologies, because of their rarity, appear more oceanic than continental. Teeth were not studied.

Murrill, who was not on the expedition but whose help was sought later, predicts, unlike Heyerdahl, that if Early Period skeletons are ever found they will be Polynesian in physical type (p. 84). While many anthropologists do not believe that Polynesia was significantly settled by American Indians, Murrill's prediction seems more dogmatic than considered: First, the carbon-14–dated Peruvian-like masonry (as well as other features) of the Early Period is unusual, if not unique to the Pacific area. Easter Island is the closest Polynesian island to Peru, which makes the probability of influence higher than if the island were in western Polynesia. Second, had Murrill made a separate comparison of the skeletons from the two later periods with Peruvian ones, instead of lumping the two periods together, he would have found that frequently, but not always, intermediate trait frequencies occur for the Middle Period—exactly the expected condition had admixture occurred on Easter Island between an assumed early Peruvian population and later populations that were demonstrably Polynesian-speakers. The accompanying table, using data from Murrill, gives only a few of the many such possible comparisons. Pre-Spanish South American pottery has been found on four of the Galápagos Islands. Finally, it should not be forgotten that Heyerdahl has dramatically demonstrated that balsa rafts of prehistoric Peruvian design can travel far beyond Easter Island. All the above, and other evidence, casts doubt on Murrill's prediction that the Early Period people will prove to be Polynesian.

This study has appeared previously in practically identical form in T. Heyerdahl and E. N. Ferdon, Eds., *Reports of the Norwegian Archaeological Expedition to Easter Island and the East Pacific (Monographs School Amer. Res. Kon-Tiki Mus.*, No. 24).

Notwithstanding the above criticism, this book is a valuable and easy-to-use reference for all concerned with Pacific anthropology. In sum, Murrill has shown that before contact with Europeans Easter Islanders were physically Polynesian and seemingly possessed Polynesian-like ABO gene frequencies, and that, as always, the best and deciding evidence for migration studies is the actual physical remains of the migrants.

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Uses of a Label

Thymidine Metabolism and Cell Kinetics. J. E. CLEAVER. North-Holland, Amsterdam; Interscience (Wiley), New York, 1967. 259 pp., illus. $13.25. Frontiers of Biology, vol. 6.

This book is the sixth volume of a series of monographs, Frontiers of Biology, a title that is more catchy than exact. The content of the book has to do with the very core of the problems in biology: replication and segregation of DNA in chromosomes, the cell cycle and cell renewal in tissues. The production of a book is not unlike pregnancy with its traumas and its satisfaction, though often the time to parturition seems elephantine in length. The finished book is examined, not unlike the newborn child, which is praised and criticized by the family members, each with his own motivation. This book is a bonny child; may it flourish. As with a child, it can be faulted, but those errors that can be corrected will no doubt disappear before reproduction.

Anyone who still contends with the literature must feel with the Sorcerer's Apprentice. The author in the preface likens his experience in coping with the flood of literature to shoveling water uphill. He has not only shoveled superbly but filtered the water up to 1966.

The main character in this monograph is tritiated thymidine, the hero of high-resolution autoradiography and the trusted servant of the investigator interested in DNA and cell replication. The pathways of incorporation and degradation of the label lead from problems associated with pool size and reutilization to the use of the label in the study of cyclic events at a chromosome and cell level. Then 50 pages deal with the use of this labeled DNA precursor in the investigation of cell population kinetics in tissues. The content will be very useful to the worker with some experience in one or another of the fields covered. It leads the newcomer to where he can find, rather than gives him, the details of the methods he may need. An even more critical evaluation of the suitability of various methods for particular problems would have been valuable. Some of the methods which are suitable for the study of cells leading a somewhat hippie existence in culture—all turned on and clinging to the glass of their petri pad—are not so suitable for the study of an organized community of cells in tissues.

The author chose, and he states quite clearly why, to discuss such aspects as granulopoeisis in relation to the experiments that he knows best by personal contact with the workers involved. He has attempted to balance this by reference to the work of others in the field. This approach has obvious advantages and disadvantages. The advantages are clarity and an air of certainty that is not clouded by contradictions, some of which may be more apparent than real. The disadvantage is that the points on which important differences may exist are not immediately apparent. But then a choice had to be made. There are, after all, only about 250 pages, and on every one of them I found something of interest. The choice has, also, made the book readable and personal, which alone is an achievement. One last point, irrelevant except perhaps to the ambulatory reader, isn't 900 g heavy for a book of this length written in anything but a heavy style?

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