gymnosperm pollen and bryophyte spores. It is well illustrated, with excellent photographs of spores and pollen grains as well as electron micrographs of sections of wall and electron micrographs of the surface texture to show fine details at magnifications between 5000 and 15,000 times. These photographs and the palynograms provided in volume 2 are a good combination in that they supplement each other and give the palynologist a better concept of the structure of the grains so illustrated. There are descriptions of a few genera which were not illustrated. The text for the Pteridophyta illustrations, which has been omitted from this volume, will be the subject of a subsequent volume. The specific descriptions are very brief. An examination of the genus *Pinus* reveals a selection of some 25 species from various countries but not a complete inventory of all pine species. American palynologists will be disappointed to learn that descriptions and measurements of *Pinus strobus, P. resinosa, P. echinata, P. monticola,* and *P. ponderosa* were not included. The rare *Abies fraseri* is included whereas the common *A. balsamea* is omitted. Some of these are so important in the investigations of the peat profiles in North America that their absence is noteworthy. Erdtman is noted for coining new terminology to describe various features of pollen and spore structure. This text contains many terms that were not used in the preceding volumes, and there is no glossary to explain their precise meaning, although they have been included in *Grana Palynologica* and other publications.

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Astronomy and the Smithsonian Institution

The Smithsonian Astrophysical Observatory (SAO), now symbiotically located with the Harvard College Observatory in Cambridge, Massachusetts, recently celebrated its 75th anniversary. **Lighthouse of the Skies: The Smithsonian Astrophysical Observatory, 1846–1955** (Smithsonian Institution, Washington, D.C., 1965. 355 pp., $5), by Bessie Zaban Jones, is the story of its first 65 years, when SAO was located in Washington, D.C., a period in utter contrast to its last decade during which SAO catapulted into the ranks of the major institutions of astronomical research.

The history of its first 65 years cannot be separated from that of the Smithsonian Institution (SI) itself, as the author fully recognizes. As a result, the book is much more than a history of a modest, almost obscure, government observatory. Its importance lies in the fine illumination and trenchant insight that it gives to the growth of scientific institutions in the past century and in its skillful delineation of the quiet but powerful role that SI played in almost every major field of science. It constitutes a major contribution to the history of American science.

As American observatories go, SAO is not old, but its conception antedates that of SI. Its spiritual founder was John Quincy Adams, who not only valiantly guarded the Smithson bequest from Washington predators, but also urged that the funds be used entirely for an observatory. Two decades before the founding of the Smithsonian Institution (1846) he had, in his first presidential message, recommended a national observatory, and two years before that he had offered Harvard the then-large sum of $1000 toward an observatory. Neither gestures bore any immediate fruit. It was Adams who called observatories "lighthouses of the sky," a phrase that was politically costly to him. He dedicated his first "lighthouse" in Cincinnati in 1843. The Smithsonian "lighthouse of the sky" had to wait nearly a half century before it came into feeble existence.

When, after much political bickering, the Smithsonian Institution was finally established under its first, and outstanding, secretary, Joseph Henry, the idea of SAO was further formulated, but it was not until the administration of its third secretary, Samuel Pierpont Langley, that the observatory became a humble reality (1890). It was dedicated to the "new" astronomy, the physical study of stars, as the present SAO is dedicated to the study of the "newest" astronomy, space-vehicle astronomy. The Smithsonian Astrophysical Observatory concentrated on one star, the sun, and is most noted for the determination of the solar constant and for early investigation of the solar infrared spectrum.

That SAO was soon outdistanced by other American observatories lies not so much in the lack of vision or ability of its successive directors, as in the utter niggardliness of the Congress in supporting it. Readers will find that story hard to believe; it is a monument to the purblindness of past Congresses to the potential of science, a monument matched only by the foresight of the Ordnance Department which, as late as 1930, saw "no immediate or near future use" for the Goddard rocket, which was developed under staunch support from Smithsonian.

One must wonder at the dedication of the early leaders of the Smithsonian in accomplishing so much with so little, but one may also wonder if they would not have done better by American science had they spent less time in lengthy, detailed, scholarly, and even literary reports and letters, and more on human and public relations, on learning more about their fellow men—particularly those who happened to be politically influential! Certainly the directors of most American observatories have learned that lesson today.

Lighthouse of the Skies is deftly told in a felicitous style. It is an event when a writer of merit undertakes what might otherwise be a drab task—that of writing the early history of a government observatory. The result is an entertaining work in which scholarship is not sacrificed, a rare combination. The author uses a lively change of pace in her writing, bringing to life incidents that might otherwise have all the glamor of pedantic footnotes.

The book should be required reading for all members of the Smithsonian Institution, not only of its observatory. And when they are inclined to complain, observers at the far flung SAO satellite tracking stations should pay particular attention to the ordeals that early SAO observers at the solar stations underwent. The accounts should cheer them up.

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Physical Models of the Climate

Climatology has undergone a remarkable metamorphosis. Two decades ago it began to emerge from a primarily descriptive stage. In the next decade, statistical analysis led to much progress. During the past 10 years