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

physical models of the nature of climate have taken over.

William D. Sellers's admirable little book, **Physical Climatology** (University of Chicago Press, Chicago, 1965. 280 pp., $7.50), reflects this last approach. Sellers attempts to look at the manifestations of climate as energy transformations, primarily at the boundary between the atmosphere and the earth's surface. Our debt to R. Geiger and M. I. Budyko for pioneering this path is properly acknowledged.

The elements of the radiation balance and their measurement (78 pp.) and the water balance with due emphasis on evaporative phenomena (43 pp.) occupy almost half of the substantive text. That the role of microprocesses through wind, turbulence, and diffusion (30 pp.) is properly stressed is a welcome departure from the treatment accorded this topic in most English language books.

Perhaps a bit too much emphasis has been placed on zonal averages of climatic elements. They give a very fictitious picture, and lead one to underestimate the extraordinary influence of the distribution of land, water, and mountains in climatogenesis. Recent numerical simulation of climates from models of the general circulation of the atmosphere is not mentioned. Strangely, this term has been essentially banished to the last page.

A long chapter (32 pp.) on paleoclimates and theories of climatic change attempts to sift the many ideas that have been advanced in this thoroughly confused field. Here the author had to abandon the quantitative approach, which otherwise prevails in the book, but he gives a very good account of the—mostly unsolved—problems.

The book, which covers only selected areas of the field, will make a very fine text for senior and incipient graduate students for a one semester course. It will also serve as a good modern reference for workers in the various fields of ecology who have an interest in climate.

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## Studies in Anthropological Method

Henry A. Murray has held that the life history is one of the building blocks of a science of man. Eleven years ago Murray made a statement that is still pertinent: "The truth is that until very recently the study of lives—the only possible way of obtaining the granite blocks of data on which to build a science of human nature—has generally been depreciated in academic circles as an undertaking to which no true scientist would commit himself." For those who share Murray's view and for those who are interested in the contributions of the life history as a method of investigation, this small book, **The Life History in Anthropological Science** (Holt, Rinehart, and Winston, New York, 1965. 94 pp., $1.50), by L. L. Langness, is a valuable contribution.

Langness defines the life history as ". . . an extensive record of a person's life as it is reported either by the person himself or by others or both, and whether it is written or in interviews or both" (pp. 4 and 5). In systematically examining this method, the author reviews the history of the use of the life history in three periods: up to 1925; from 1925 to 1944; and from 1945 to the present. The bibliography of biographical materials for these periods is most impressive and an invaluable resource.

The remainder of the book deals with the utility, acquisition, and meaning of the biographical method.

The contributions of the life history to the following important problems are systematically covered: an understanding of culture and the idiosyncratic; an individual's perspective on deviance; cultural structure as viewed by the people themselves; culture change and the role of the leader; personality studies in the culture and personality tradition; role analysis; factors of chance and accident in life experience; value studies; and the socialization process. The author also carefully examines the problems of collecting field data. The problems of rapport, language, interviewing, reliability, sampling, taking and recording notes, and interpretation are briefly but adequately discussed.

For the sake of improvements in the biographical method, Langness emphasizes the need for greater sophistication in interpretation and analysis, and the need for greater accuracy.

This is a most useful book. I want to add one thought about the life history method: when the life history is used systematically as a part of a larger set of investigative tools—for example, surveys and controlled experiments—for understanding a given problem, then the hypothesis elaborating function of the life history is vastly multiplied. In my view, it is this relative lack of making the life history an integral part of a larger set of investigative models that has seriously hindered the maximum use of this important but neglected method.

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## Culicidology

On a worldwide basis, the family Culicidae (the mosquitoes) is probably the most thoroughly studied suprageneric taxon among the insects. The role of mosquitoes as pests and as vectors of diseases of man and other animals has stimulated extensive research activities not only in control techniques, but also in systematics, zoogeography, and all phases of biology. N. V. Dobrotworsky has culminated 13 years of research with a comprehensive treatment of the mosquito fauna of Victoria, a state in the southeast corner of Australia. His book, **The Mosquitoes of Victoria (Diptera, Culicidae)** [Melbourne University Press, Carlton, Australia; Cambridge University Press, New York, 1965. 243 pp., $18], is the first publication to consider all 69 mosquito species in the state. Only four species of the genus *Anopheles* are found in Victoria, and only one of these can be regarded as a potential vector of malaria. The fauna is dominated by members of the genus *Aedes*, which encompasses more than half the known species; this genus is followed in importance by the genera *Culex, Culiseta, Mansonia, Tripteroides*, and *Aedeomyia*. Seven bird-pox viruses have been recovered from mosquitoes collected in Victoria, and Murray Valley encephalitis, a disease suspected of being transmitted by mosquitoes, has been recorded on several occasions from the northwestern part of the state. Myxomatosis, a virus disease introduced to control rabbits, is mechanically transmitted by a number of mosquito species in Victoria.