in philosophy is, of course, explicit in his acceptance of a professorship of natural philosophy at Washington University in 1954 (an appointment which he reported to me with evident satisfaction). In fact the view proposed, according to which quantal uncertainty is requisite for, but does not fully encompass, human freedom, that freedom is chance plus choice and quantum theory provides only the chance, is an insight that has been borne out by developments in other fields with increasing power of conviction. A short paper entitled "Science and the supernatural" is less persuasive, probably because it has an outward purpose, for in it Compton tries to counteract certain irreligious claims made by the physiologist A. J. Carlson. Religious sensitivity marks this writing, as it does the author's character; only his attempt to justify the doctrine of the Trinity seems a little artificial. However, in this context I cannot forego mentioning my amazement at Compton's knowledge of oriental lore and oriental religions, which is evident throughout this book.

Many readers will enjoy the biographical reflections. There are recollections of Michelson, Millikan, Richardson, Rutherford, Stearns (a student and collaborator of the author's), Einstein, Davisson, and Lawrence, all personal friends of Compton's. And there is a patriotic speech on Jefferson as a scientist.

Doubtless of greatest interest are the extensive comments on the momentous affairs of the atomic age. The author, together with Fermi, Lawrence, and Oppenheimer, formed a panel which was asked by President Truman to prepare a report stating whether it could devise any kind of demonstration that would seem likely to bring the war with Japan to an end without using the bomb on a live target. The conclusion, submitted on 16 June 1945, was negative. Many people have wondered how a man of Compton's moral and religious convictions arrived at the formidable decision to drop the bomb on a city. The reasons are given in article 28, entitled "On the use of weapons," and they will impress posterity.

The book needs no praise from any reviewer. It is monumental and will stand among the great personal documents of all time.

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## Pictures from the Scott Expeditions

**Edward Wilson's Birds of the Antarctic.** BRIAN ROBERTS, Ed. Humanities Press, New York, 1967. 191 pp., illus. $17.50.

Ornithological work in polar regions has presented two quite different challenges. One is to study birds in an individual-rich but species-poor avifauna. The other is to meet a climate of a severity unsurpassed on the globe. Remarkable, talented men have accepted these challenges, and Edward Wilson is an outstanding example. His personal influence and practical contributions to Scott's two antarctic expeditions (*Discovery*, 1901–04, and *Terra Nova*, 1910–12), on which he served as surgeon and zoologist and, on the second, chief scientist, have obscured his ability as an artist and, still more, as an ornithologist.

Wilson's trip with two companions to Cape Crozier to study emperor penguins nesting in the dark, cold (−40° to −70°F), and blizzards of an antarctic winter has been called "the hardest journey ever made" and "one of the most gallant stories in polar history." Wilson has been called the most gifted ornithologist ever to serve in south polar explorations. It has also been said that if he had lived (he died with Scott on their return journey from the pole in 1912) he would have been one of the foremost bird artists of his day.

In expeditions of an earlier period, sketches and paintings often filled the function that specimens and photographs have now largely taken over. Wilson collected many specimens, and some pioneering photography was done on the Scott expeditions, but his sketching and painting, done under extremely difficult conditions, formed an important part of the scientific results of the expedition.

Included in this volume are a summary of Wilson's life, extracts from his diaries, including his account of "the worst journey in the world," a bibliography of his writings and one of writings about him, and a list of manuscripts and pictures, most of them from the Scott Polar Research Institute at Cambridge, consulted by the editor. But this text is merely a frame in which to present a selection of Wilson's pictures. Besides those used to embellish the text, there are more than 300, in 60 pages of color and 42 of monochrome. They range from pencil sketches of petrels in flight and penguins active and at rest to color details of heads and feet of albatrosses, from pencil studies of icy scenery to watercolors of emperor penguins on their breeding grounds. There is intimate detail and scenic splendor; Wilson has caught the very feel of ice, snow, and sea, and his birds live.

This volume provides a footnote to history. It is also an important part of the permanent record. Not least, it is a handsome book of beautiful pictures.

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## A Record of Accomplishments

**Nobel Lectures.** Physiology or Medicine, 1901–1921. Published for the Nobel Foundation by Elsevier, New York, 1967. xii + 563 pp., illus. $85 for the 3-volume set Physiology or Medicine.

Each year since 1901 the Nobel Foundation has published *Les Prix Nobel*, which contains all Nobel Lectures of that year, in the languages in which they were given. Short biographies of the laureates are also included. The Elsevier Publishing Company has now published, in English, the Nobel Lectures for 1901–1962, organized by subject categories, Physics, Chemistry, Physiology or Medicine, Literature, and Peace. The appearance of the present volume marks the completion of the three scientific series, consisting of three volumes each.

The publication of these volumes is justified by the publisher on the grounds that the articles will be more readily accessible to those who wish to follow the development of only one, or a few, of the categories. The presentation addresses and biographies accompany the articles.

Sixteen lectures are included in this volume. Two each were presented in 1906 and 1908; two laureates, Finsen (1903) and Bordet (1919), did not deliver lectures, and prizes were not awarded in 1915–1918 and 1921. The list of names is sufficiently impressive to justify the publisher's statement that

"in the world of science, the history of research and progress during the present century is largely a history of the accomplishments of the winners of the Nobel Prize": von Behring, Pavlov, Koch, Golgi and Cajal, Metchnikoff and Ehrlich, Kossel, and Krogh, to name some of them.

The articles make good reading; some are fascinating—Ronald Ross's "Researches on malaria," for example. The book deserves a large circle of readers. However, since the aim of the series was to supplement *Les Prix Nobel* and to spread the knowledge of these landmarks to a wider audience, it is regrettable that they could not have been published in a less expensive format.

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## Geomorphology Down Under

**Landform Studies from Australia and New Guinea.** J. N. JENNINGS and J. A. MABBUTT, Eds. Cambridge University Press, New York, 1967. xxiv + 434 pp., illus. $19.50.

This volume aims to provide a geographical and topical sampling of recent landform investigations in the greater Australian area. It is not an "all about" book and makes no claim to complete coverage. In the light of what it attempts to accomplish it must be judged a success. As with so many things from down under, there is an air of robustness and vitality in this work.

Australia has enjoyed a tradition of great interest and high performance in things having to do with the natural landscape. This tradition has been characterized more by the application of old ideas to new areas and problems than by the production of new concepts. This arises in part from the abundant richness and variety of landforms clamoring for attention and in part from importation of scholars trained abroad who, like missionaries, bring a gospel to be imposed in this unspoiled region. Hints of departure from this tradition are evident in this volume as the flavor of Australian geomorphology becomes more distinctive.

The use of soils in understanding the formation and evolution of landscapes, long fruitfully practiced by Australians, runs as a unifying theme through many of the articles. The factor of climatic differences, both spatial and temporal, and its role in the production of landscape features is becoming an Australian trademark. Good use is made of the superb natural laboratory available for such investigations. Attention to processes shaping the landscape is increasing, and this is all to the good; but one must commend and envy the continuing interest in the landforms, their history and evolution, for their own sake. The rush in other countries to quantify geomorphology has sometimes obscured the ultimate aim of understanding the landscape and the processes which formed it.

The 17 articles by 17 authors cover areas from Tasmania to New Guinea and topics from corals to karsts. Modifications of slopes by slides, slopewash, periglacial processes, and more ordinary forms of erosion are considered. Features of coastal and interior areas are described. Besides learning what goes on, the reader gains more than a bird's-eye view of Australian landscapes.

For non-Australian readers, a simple geographic map of the greater Australian area early in the book would have been welcome. The best possible review of this volume is the excellent preface prepared by the editors, J. N. Jennings and J. A. Mabbutt.

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## Geochemical Advances

**Researches in Geochemistry.** Vol. 2. PHILIP H. ABELSON, Ed. Wiley, New York, 1967. xiv + 663 pp., illus. $22.50.

The well-received first volume with this title, containing up-to-the-minute summaries of current progress in various branches of geochemistry, appeared eight years ago. Constantly expanding activity and startling improvements in technique have now provided the occasion for a second volume, again devoted to the increasingly difficult task of giving readers a broad and balanced view of what is going on at the frontiers of geochemical research. As before, the editor has called on workers active in the various fields of research to write critical summaries of recent papers, to describe their own current activity, and to prepare selected bibliographies.

So kaleidoscopic a volume defies a reviewer's efforts to summarize briefly. Particularly impressive are Wetherill and Tilton's thoughtful presentation of current progress and difficulties in geochronology; Epstein and Taylor's critical review of the possible uses of oxygen isotope ratios in attacking geologic problems; Abelson's and Hoering's papers on the astonishing recent breakthrough in organic geochemistry made possible by new techniques of separation and analysis; a paper by Burns and Fyfe showing the power of crystal-field theory to explain much of the geologic behavior of the transition metals; Helgeson's demonstration by an ingenious use of thermodynamics that the composition of the heavy-metal-bearing Salton Sea brines can be explained by alteration of sea water accompanying metamorphism of clastic sediments; Eugster and Skippen's description of laboratory techniques and theory involved in the use of solid-phase buffers to study gas equilibria in igneous and metamorphic reactions; and Boyd's selective review of recent work on dry silicate equilibria at high pressures. But this rapid sampling covers a bare third of the 23 papers in the volume.

Inevitably the contributions differ somewhat in their approach and in their adequacy as critical summaries. A few are little more than collections of brief paragraphs about work in different laboratories, with scant effort devoted to synthesis or evaluation. A few others are in large part original research papers—excellent papers, all of them, but perhaps better suited for a scientific journal than a review volume. By and large, however, the editor has managed to achieve a uniformity of style and treatment that is rare in volumes to which so many writers have contributed. He has also accomplished the remarkable feat of getting all his 30 authors to complete their papers at the same time; practically every chapter has references as recent as 1966, and most of the papers have the stimulating effect of work fresh out of the laboratory.

The book should be of immediate interest not only to geochemists but to all geologists who try to keep up with the highlights of this rapidly expanding part of earth science.

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