

developing his theory of the achromatic lenses and the maker Passemant in constructing the first French achromatic telescope.

Finally, the book is enriched by 12 appendices. Nine of them reproduce letters that could be found in the original paper of Nordenmak and Nordström. Three new appendices (4, 5, and 12) were added by the editor of the volume. The first of them transcribes Peter Dollond's reply to Ramsden's 1789 letter to the Royal Society. The second is a 1761 letter of James Short to the Royal Society explaining the significance of Klingenstierna's research for J. Dollond's work. Both documents have not been previously published. The final new appendix reproduces a 1762 speech of Carl Lehnberg to the Royal Swedish Academy of Sciences concerning his work on achromatic telescopes, a paper not earlier published in English. The final 20 pages of the volume are dedicated to notes and many bibliographical references.

In the last decades, many articles and books have been devoted to the saga of achromatic lens (see, for example, the recent and excellent study of the late Brian Gee: *Francis Watkins and the Dollond Telescope Patent Controversy*, ed. by A. Macconnel and A. D. Morrison-Low, Ashgate, 2014). However, the 1930s work of Nordenmark and Nordström remains a fundamental contribution in one of the most intricate and controversial chapters of the history of optics. Thanks to the Antique Telescope Society, it is now available to the English-speaking world and will be an invaluable reference for historians of instruments, of optics and of astronomy.

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Astronomers as Oracular Technicians in the Pre-Columbian Andes

Constructions of Time and History in the Pre-Columbian Andes. Edward Swenson and Andrew P. Roddick (University Press of Colorado, Boulder, CO, 2018). Pp. xiv + 288. \$72. ISBN 9781607326410.

Do not imagine that any other culture's conception or representation of space-time might resemble your own. This is the cardinal rule of cultural astronomy, and this volume, a collection of essays by Andean archaeologists intended primarily for pre-colonial studies in that area, though not without considerable value for historians, bears out that rule. Nine papers, including an introduction and final assessment, explore the analytical divide between history and temporality by demonstrating how indigenous versions of these concepts merge in a variety of Pre-Columbian Andean societies.

To the Inka, for example, the idea that the past is dead and gone would have made no sense. Unlike the Romans or Egyptians, they made no publicly displayed iconic images depicting seminal historical events as a substitution for their contemporary absence. Rather, the Inka conceived of a past alive in the present in the form of *wak'a*, natural and

man-made lithic bodies related via kinship to every ethnic segment of the population. Andean time and space were inextricably bound in the Quechua language concept of *pacha*, meaning earth, time, and place. Rather than celebrating memorials of things past, their rituals continually reconstructed *pacha*.

This collection explores ways indigenous memory was conceived and how it affects ways contemporary archaeologists think and write about history. Standard archaeological models, generally taken for granted, are critiqued, for example, chronological charts, ceramic sequences, and stratigraphic profiles, on the grounds that they tend to force-fit representations of the indigenous past to traditional western historical interpretation. Indigenous Andean history might better be characterized as synechdochal, with time being set in motion by materially manipulating and renovating *wak'a*. Thus, at the northern coastal Peruvian site of Huaca de la Luna, ceremonial sacrifices keyed to seasonal cycles were performed in a series of nested interior chambers, each involving the complete enclosure of earlier monuments by the later ones. This repeated termination and rededication of a pre-existing monument is reminiscent of what one finds in the seven-phase, built-over Aztec Templo Mayor: living history entombed. Likewise, nested plazas interweaving different building periods once charted the courses of pilgrimages through coastal Pachacamac, where visiting the great oracle could take months of experienced temporality. Aware of the "silencing" of the past by the overuse of western approaches to history, the collection challenges the horizon model, whereby a distinctive type of artefact found across a large area over a limited time, has long been employed to order cultures historically. The contributors find that recognizable phases in a ceramic sequence often turn out not to be indicative of changes in the political landscape.

The introductory essay summarizes the role of astronomy and calendar related to process and historical agency in Andean thought, which can be understood only in deep context. The astronomers might better be regarded as oracular technicians, who played major roles in rearranging time as a means to ensure social and cosmic equilibrium. In the Inka capital of Cuzco, they set up horizon orientations, for example, to mark the disappearance and reappearance positions of the Pleiades, which timed the ending and re-beginning of the 328-day seasonal year, the star group's 37-day period of absence becoming uncounted time. Each of the 328 *wak'a* of the radial *zeq'e* system, that overlays the capital and was tended to by a specific kin-related segment of the population, became the living materialization of a day in the cycle.

Astronomical observation appears in a few cases among the papers. At the Moche site of Huaca, Colorada, archaeologists excavated an adobe structure made of carefully cut bricks in the form of a pentagon. Three of its points align with major mountain peaks located east and north of the site. Another point accords with summer solstice (21 June) sunrise. In another essay, architectural alignment shifts at the site of Huacas de Moche are posited as evidence of a transformation in historical consciousness. Unfortunately, this presentation is marred by an absence of data and analysis. Moreover, the illustrative site maps show neither a scale nor an arrow indicating spatial direction and labels for alignments offer no indication of what was actually measured. Owing to these deficiencies, the work cannot be evaluated.

Both a challenge and a corrective to long-held methodology in archaeological practice, *Constructions of Time and History* is a challenging read for the non-expert, but it is worth an encounter, if only to reveal how the western-educated Spanish chroniclers, who wrote their “true” New World histories, missed the mark.

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Early Astrophysics in Canada

Northern Star: J.S. Plaskett. R. Peter Broughton, with a foreword by James E Hesser (University of Toronto Press, Toronto, ON, Canada, 2018). Pp. xx + 539. CAD 67.50. ISBN 9781442630178.

J.S. Plaskett was the driving force behind the creation of the Dominion Astrophysical Observatory in British Columbia, Canada, which for a short period in 1918 and 1919 boasted the biggest operational telescope in the world. Plaskett’s research also reaped a range of honours, including the Bruce Medal and the Gold Medal of the Royal Astronomical Society. Although part of the late Richard Jarrell’s pioneering study of the history of Canadian astronomy, *The Cold Light of Dawn*, was devoted to Plaskett, the book under review paints a much fuller picture.

The young Plaskett attended school only in the winter months so he could work at other times on the family farm in Ontario. He became an apprentice at a foundry for 3 years before joining the Edison Electric Company in the United States for a short period. The critical moment for Plaskett’s later career arrived in 1890 when he was hired at the University of Toronto to assist with lecture demonstrations and experiments. He began his university studies in 1895, and although his employment duties usually prevented him from attending lectures, Plaskett graduated with first-class honours in 1899. He became a government employee in 1903 when he joined the Boundary Survey Division of the Dominion Observatory in Ottawa. He soon turned to astrophysics and quickly demonstrated his mastery of instruments, particularly spectrographs.

After visiting Mount Wilson and seeing its 60-inch reflector, Plaskett began to campaign for a large, state-of-the-art reflector for the Dominion Observatory. Plaskett emphasized the value of statistical studies of the constitution, stellar motions within, and size of, the Galaxy. The telescope he was proposing, Plaskett contended, would, among other things, contribute to these studies through measurements of stellar radial velocities. As he explained in 1911, such a telescope and its associated observatory “would undoubtedly give Canada a very high standing in the scientific world” (p. 113).

Canada’s Minister of the Interior approved the project 2 years later on the understanding that the telescope’s primary mirror be at least 60 inches in diameter. What turned out to be a 72-inch reflector saw first light in 1918, so there was a strikingly short period between conception and completion, especially as Canada had been at war since 1914. The new Dominion Astrophysical Observatory housed the giant telescope. Although the Observatory employed only a few astronomers before Plaskett retired as director in 1935, it was a