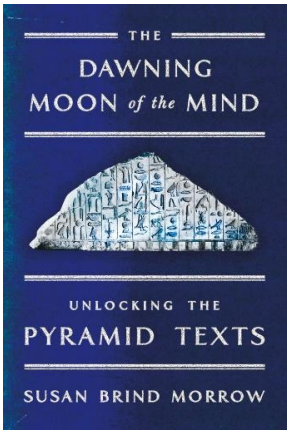
BOOK REVIEWS

***The Dawning Moon of the Mind* by Susan Brind Morrow (New York, Farrar, Straus and Giroux, 2015), pp. 289. ISBN 978-0-374-20010-7, 160 × 235 mm, US$28.**

With this landmark book archaeologist and linguist Susan Brind Morrow has unlocked the hieroglyphs of ancient Egypt. Specifically, she has examined the Pyramid Texts in the pyramid of Unis, the oldest version of the work found to date. Unis was the last ruler of the Fifth Dynasty, and dates to the mid-24th century BCE.

Morrow gives us a completely different translation of the texts, upending more than a century of scholarly analysis. Until now, Egyptologists have said the beginning of the texts deal with the private parts of a baboon. Morrow reveals it is actually a description of the constellation Orion!! Maybe the fact the ceilings of the pyramid are covered in stars should have given earlier researchers a clue as to what the texts are about. The Pyramid Texts are in fact the oldest astronomical text in existence. Here is an excerpt from her description of the north wall of the antechamber in the pyramid:



> The north wall of this room presents a sequence of riddles encoding the visible features of the north side of the night sky. The first verse introduces the primary constellation of the north, the Big Dipper. The riddle lies in the mystery of what the Big Dipper is and what it does. The Dipper is the mechanism that turns the sky like the hand of a clock. Hence it is a paradox: it is the arm of the night, real and active, yet as a pattern of stars it is diffuse and nonmaterial. The night is not a goddess. It is the night.

Morrow goes on to explain the second verse on the north wall deals with the stars Sirius, the falcon and Canopus, the dog. The third verse "… presents this glittering stream of the marvelous sky as a ladder of souls, a word (*mkt*, ladder) that is a pun on the hieroglyphic name of the Milky Way (*mskt*)."

In this description we see the three primary elements that Morrow employs to great effect, elements no other reader of the hieroglyphs has ever done. Recognising the text contains paradoxes, riddles and puns, she reveals what has remained hidden for more than 4,000 years (she actually lists six linguistic devices the Egyptians used). Morrow places what we can now read here in dramatic terms:

> The verse is a return to the catalogue of celestial phenomena that began on the west wall of the entrance-way. It is as though one were in a planetarium, a miniature re-creation of the night sky. But the actual, accurate re-creation of the map of the night sky is effected not with a detailed visual imitation of it, as in Grand Central Station. It is done with iconographic riddles that contain not only the physical description of primary stars and specific constellations, but layers of deeper meaning that reveal their significance in the life of the universe.

Morrow gives us a full translation of the Pyramid Texts, wall by wall and room by room. Her discussion both before and after this translation is illustrated by specific hieroglyphs, which she explains, showing how they have been misinterpreted by previous scholars.

The name of the Dipper, for example, grows out of the word *ms*, "to give birth." Until now the hieroglyph was thought to represent three fox skins tied together by a tail. Morrow reveals it is a botanical illustration! The correct text reads "Great Night uncovers her arms …" but what does that mean? She explains:

> This is a coded line that means night reveals its secret. The secret is that the night sky is a clock. The arms are the Dippers, which swing around the North Star like the arms of a clock. This is at once an astute astronomical observation, a poetic conceit, and a practical measuring device. The monument is a metaphor for time: conception, gestation, and birth.

One feels almost giddy finally knowing what the Egyptians really meant. I read the canonical translation of the Pyramid Texts 30 years ago, but it did not make a whole lot of sense to me. Now I know why: it was wrong. "Hieroglyphs are not recondite or indecipherable …" writes Morrow.

There is clearly much work for archeo-astronomers too, as Morrow links the texts to the pre-dynastic culture of Egypt. She specifically mentions a site on the Nabta Playa, a hundred miles west of Aswan, "… where stones are set up as an astronomical observatory."

Philosophers of the history of science and astronomy will also have much to consider here. The pyramid as a metaphor for time, coming from such a distant time in human history, must be integrated into the very bedrock of how and why man relates to the cosmos.

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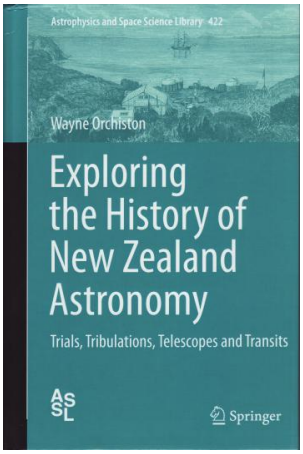
Exploring the History of New Zealand Astronomy: Trials, Tribulations, Telescopes and Transits **by Wayne Orchiston (Cham, Springer International Publishing, 2016), pp. [xlv] + 688. ISBN 978-3-319-22565-4 (hardback), 161 x 241 mm, CHF146.50. Also ISBN 978-3-319-22566-1 (eBook), PDF and ePUB, CHF 117.00.**

This journal's founding editor, Professor Wayne Orchiston, has devoted a goodly part of his research life to the history of astronomy in the islands comprising the country now known as Aotearoa/New Zealand. As is inevitable in the history of science, Wayne has reported his work in a wide range of publications, some of which may be difficult to access, such as numerous conference proceedings, the now-defunct *Australian Journal of Astronomy*, and especially *Southern Stars*, the journal of the Royal Astronomical Society of New Zealand.

Exploring the History of New Zealand Astronomy thus performs a great service in summarizing some of this work in a single publication. The book is no mere rehash, however. Since many of Wayne's original papers were written new information has come to light, and the National Library of New Zealand's *Papers Past* project has appeared, digitizing and making text searchable many of the country's historic newspapers and periodicals. Wayne has incorporated numerous additional details which provide texture and deepen our knowledge of what happened.



The book is divided into an introduction followed by seven parts comprising in total 24 chapters. The introduction starts with a touching feature. Wayne recounts his life as an astronomer, which is highly appropriate since he is himself part of Kiwi astronomy, being Auckland-born and having served in the 1990s as Executive Director of the Carter Observatory in Wellington. His interest in astronomy was sparked in boyhood when his family moved to the "... simply stunning ..." dark skies of the small, South-Island town of Lincoln, and continued 'across the ditch' in Sydney, where, *inter alia*, he worked with radio astronomer Bruce Slee (b. 1924). Acquaintance with archives left by the Australian amateur John Tebbutt (1834–1916), who featured on the old Australian $100 note, redirected his research towards astronomical history. "... New Zealand astronomical history remains my sentimental favourite," writes Wayne, "hence this book." The paths to astronomy are many and surely provide grist to the mill for future astro-sociological research. Let me encourage all members of the *JAHH* Editorial Board to follow Wayne's example and put their own journeys as astronomers into print, perhaps in *JAHH*; and you too, dear reader.

The introduction goes on to stake out the book's boundaries—astronomy done in New Zealand, whether by navigators, amateurs or professionals, up to about the 1960s. So, for example, there is no discussion of the US Naval Observatory, Carter Observatory and JANZOS outstations on Black Birch, nor of the University of Canterbury's Mount John University Observatory, near Tekapo, nor of the flights of the Kuiper Airborne Observatory and its SOFIA successor. But space and time limitations have led to other exclusions too, such as the history of astronomical societies, the pioneering radar meteor astronomy undertaken by Cliff Ellyett (1915–2006) and Colin Keay (1930–2015), or discussion of astronomers who have already been the subject of biographies or autobiographies. Here I think of the charismatic Alexander Bickerton (1842–1929), author of the 'partial impact' theory of the formation of almost everything, and Frank Bateson (1909–2007), who for 77 years was director of the Variable Star Section of the Royal Astronomical Society of New Zealand, and was heavily involved in the early days of Mt John. Both fell foul of authorities at the University of Canterbury and receive only the briefest mention in *Exploring the History ...*, though I am sure there is no causal connection!

The book's seven parts treat pre-European astronomy, Cook-voyage astronomy, telescopes and observatories, the 1874 and 1882 transits of Venus, "stunning spectacles" (that is, observers of eclipses, comets and meteor showers), a clutch of additional North-Island astronomers, and pioneering New Zealand radio astronomy. Each component chapter is written as a research paper following a set format, beginning with an abstract and introduction, and ending with concluding remarks and references. This may seem strange, but in the shifting sands of academic publishing was a deliberate decision by the publisher so that a reader with a very specific interest can (for CHF 24.95) download an individual, pertinent, stand-alone chapter.

Wayne's doctorate is in environmental prehistory, through an Anthropology Department, which gives special importance to what he writes

concerning the Māori astronomical world view. As he points out, 'Māori astronomy' really means Māori ethnoastronomy, and cannot be divorced from Polynesian ethnoastronomy. The problem with this field is that there had been many decades of widespread contact with European ideas before there was any large-scale investigation of Māori celestial lore by the ethnographer Elsdon Best (1856–1931); and in a culture which showed major regional variations, Best's research was mostly limited to only one part of the North Island. To summarize, Best reports lunar calendars and lore relating to stars, asterisms, planets, the Milky Way and the Magellanic Clouds as well as reflecting awareness of events such as lunar and solar eclipses, 22° solar haloes, comets, fireballs and stellar occultations, most of which were taken to portend terrestrial events. But the conclusion has to be that either the Māori were not overwhelmingly interested in the sky, or that Best's account is superficial. Wayne hopes for the latter, but I find it difficult to believe that the current renaissance of interest in Māori star lore, and particularly in the heliacal rising of *Matariki* (the Pleiades) as a new-year marker, will reveal much about Māori ethnoastronomy prior to European arrival in Aotearoa.

Many authors have written about Cook's three circumnavigations of the globe, but it is useful to have a summary of the New Zealand astronomical material in one place. Although celestial observations were made on the first voyage for navigational and cartographical purposes, notably of a transit of Mercury, it was on the second voyage, in 1773, that New Zealand "... gained its first genuine astronomical observatories …" when tent observatories were erected at Dusky Sound and Queen Charlotte Sound. An interesting chapter concerns the so-called 'Cook' telescope bought by the New Zealand Government in 1952 and now in The Museum of New Zealand/Te Papa Tongarewa in Wellington. This Gregorian telescope was made by the London instrument-makers Heath & Wing. Wayne traces its provenance. Revising an earlier opinion, he now believes that there is indeed a Cook connection, and that it is the telescope used by Daniel Solander (1733–1782), the naturalist on Cook's first voyage, to observe the 1769 transit of Venus from Tahiti.

A century was to pass before professional astronomy returned to New Zealand in the form of Stephen Carkeek (1815–1878), who as Controller of Customs played a key role in setting up a transit telescope and time ball on the Wellington waterfront to provide a time service for shipping and the city. In retirement, Carkeek built a private observatory. Its dilapidated remains are the country's oldest surviving observatory.

In 1869 the Colonial (formerly Provincial) Observatory set up by Carkeek was transferred from the waterfront to Wellington's Botanic Garden. The nominal Director of the Observatory was James Hector (1834–1907) who was perhaps the most influential nineteenth-century scientist in New Zealand, and behind the introduction of standard time throughout the country in 1868. However, most of the observations were the work of the enthusiastic Archdeacon Arthur Stock (1823–1901), who Wayne characterises as "... New Zealand's first professional astronomer (albeit a part-time one) ..." Stock, incidentally, suggested the idea of the solar coronograph eleven years before experiments with a similar idea were performed in London by William Huggins (1824–1910), and seventy years before such an instrument was built by Bernard Lyot (1897–1952) in France. The Colonial Observatory met an abrupt end when it was demolished on the day of the funeral to provide a grave and monument site for the just-deceased Prime Minister, 'King Dick' Seddon (1845–1906). (This is apparently politics trumping science, but I suspect there is more behind this event than meets the eye.) Happily the Botanic Garden proved fertile ground for observatories, and several others bloomed there—the Hector Observatory (whose observer resigned when the Government refused to triple his salary), the Dominion Observatory, the Thomas King Observatory, the Wellington City Observatory (colloquially known as the 'Green Tin Shed'), and finally the Carter Observatory, which for several decades was enshrined by legislation as the country's 'National Observatory', whatever that may mean. Wayne discusses these establishments and their equipment, as well as others set up or made by amateur astronomers in Thames, W(h)anganui, Dunedin, Auckland, and elsewhere, including the production of Joseph Ward (d.1927), a pioneer New Zealand telescope maker. On the subject of more recent optical production (and crossing the 1960s time boundary), it is nice to see photographs of the then-Department of Scientific & Industrial Research's optical designer Norman Rumsey (1922–2007) and optical fabricator Garry Nankivell (1929–2001), who were so important in providing instrumentation for Mt John. With the creation of Mt John in the early 1960s, the focus of professional astronomy moved from Wellington to the University of Canterbury in the South Island.

The 1769 transit of Venus was a seminal event in the European colonization of New Zealand, which was in full swing by the time of the next transits a century later. German, French, American and British teams came to make observations of the 1874 transit with high hopes that photography would provide observations of unprecedented quality. The British coordinated

local observers. Only the Americans and Germans got much in the way of results, and photography was a deception. In 1882 just the Americans and British returned; they made visual observations only. Nevertheless, the transits of Venus represent a high point in nineteenth-century professional astronomical interest in New Zealand.

The 1880s was a time of high spectacle in the sky. Besides the transit of Venus, there were major comets in 1880, 1881 and 1882, and a widely-observed total solar eclipse in 1885 (a special train was laid on so that citizens of Napier could travel to within the path of totality). In the early 1880s British astronomy popularizer Richard Proctor (1837–1888) made a lecture tour of New Zealand. Wayne misses a link here—Proctor turned to writing and lecturing after he lost all his money in the collapse of a New Zealand bank.

Wayne breaks the 1960s time limit to consider all Kiwi comet discoveries, from one found by Stock in 1881, through those detected by John Grigg (1838–1920) from Thames in the first decade of the twentieth century and the cometary astro-photographer C.J. Westland (1875–1950), to the most recent comet discovery, Comet Gilmore in 2007. Photographs of the discoverers are a welcome feature. Westland is an example of what Wayne has dubbed an 'ATP'—an amateur turned professional—because after amateur astronomy on his farm he was employed by the Hector Observatory. Later, the process was reversed when he returned to farming and amateur astronomy—a 'PTA'.

Several chapters describe other Kiwi astronomers, including the Wellington-resident Robert Sheppard (1810–1896), William Mein Smith (1799–1869), and instrument-maker James Henry Marriott (1799 or 1800–1886), who advertised as a "Telescope manufacturer", but whose production may have been small, since only one example is known to survive. Also deserving mention are talented science-lecturer Henry Severn (1833–1883), whose attempt to observe the 1874 transit of Venus was thwarted by rain, and meteor tracker Ronald McIntosh (1904–1977). In 1959 McIntosh was appointed "Lecturer-Demonstrator" at the newly-opened Auckland Planetarium. Upon his retirement thirteen years later, he claimed to have given 310,000 lectures on astronomy over his life. Most must have been very short! McIntosh was also a key player in the founding of the Auckland Observatory, opened in 1967.

The final part of Wayne's book is devoted to the baby days of radio astronomy. Wayne highlights unjustly-forgotten war work by Dr Elizabeth Alexander (1908–1958), who as Director of the Radio Development Laboratory in Wellington identified non-thermal emission from the Sun in dawn and dusk recordings from radar stations in the South Pacific Command, and notably from Norfolk Island. (A biography of this arguably first woman radio astronomer by her daughter Mary Harris should be published imminently.) Alexander was followed by better-remembered work by John Bolton (1922–1993) and New Zealander Gordon Stanley (1921–2001), who were sent from Australia to make 'cliff interferometer' observations of the 'radio stars' Cygnus-A, Centaurus-A, Virgo-A and Taurus-A, while Wayne's mentor, Bruce Slee, carried out concurrent observations in Sydney. By setting their antenna on sea cliffs at Pakiri Hill and later Piha in Northland, they were able to make interferometric observations of the sources and their mirror images in the sea at both rising and setting, which led to accurate positions and optical identification of all but Cyg-A, and the realization that 'radio star' was a misnomer.

Exploring the History of New Zealand Astronomy is accurately titled. It is an exploration, because although the book brims with information, almost every topic invites further investigation; and there are myriad undiscussed subjects, some of which will be treated in an announced companion volume. Wayne has scoured New Zealand to find photographs, many of them previously unpublished, and the book is abundantly illustrated. It abounds with references too; and given the number of people whom Wayne thanks that have died, comes none too soon. I do have some minor gripes—a number of the illustrations, particularly the maps, should have been printed at higher resolution; and the index is not comprehensive, which is regrettable since material on some topics and astronomers is spread over several chapters, but only partially indexed, or not at all.

Does the history of New Zealand astronomy matter, some may ask? Well, it certainly does for people in Aotearoa as part of their national story, and for them and the country's libraries, this is a must-have volume. But New Zealanders (and others) often under-rate the importance of the Kiwi experience for the world's stage. Science at the periphery is an important thread in current history-of-science debate, and Wayne's work provides a solid base from which to attack wider questions such as why the history of professional astronomy has been so different in Australia compared to other lands of former British influence, like Canada and New Zealand. In a review of the history of Australian astronomy written by Haynes et al. (1996) I made the suggestion that visionary scientists who know how to influence the workings of government are of cardinal importance (Tobin, 1996). And what about amateur astronomers? An NZ-Oz

comparison could be extended to include the UK, thanks to Allan Chapman's work on British amateurs (1998), and also South Africa, through an expansion of a paper that Wayne has already published in *Monthly Notices of the Astronomical Society of Southern Africa* (Orchiston, 2006). Scientists and historians of science, professionals and amateurs, we must all heartily congratulate the author for this impressive and weighty volume.

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***Galileo's Telescope: A European Story*, by Massimo Bucciantini, Michele Camerota and Franco Giudice, translated by Catherine Bolton (Cambridge, Harvard University Press, 2015), pp. [x] + 340. ISBN 978-0-674-73691-7, 160x240 mm, US$35.**

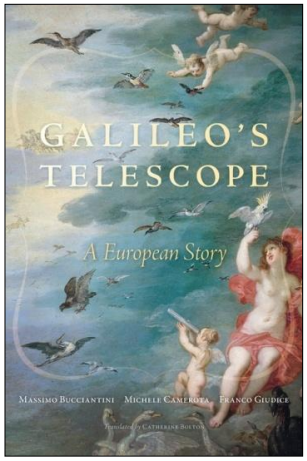
***Galileo's Idol: Gianfrancesco Sagredo & the Politics of Knowledge*, by Nick Wilding (Chicago, University of Chicago Press, 2014), pp. 200. ISBN 978-0-226-16697, 160x235 mm, US$35.**

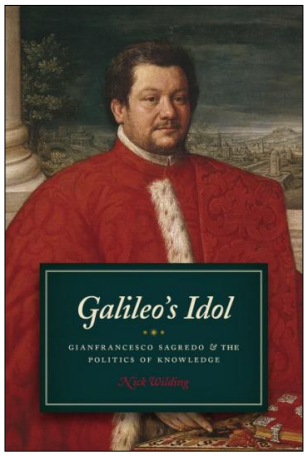
These two excellent books on various aspects of the life and work of Galileo are complementary. Each has its unique strengths, and together they provide an insightful and remarkably detailed look at the astronomical world of the early 1600s.

Until now historians of astronomy have concentrated on the contents of Galileo's 1610 book *Sidereus Nuncius* which contains the first astronomical observations made with a telescope. However, a close look at the title page reveals a hidden secret. Dominating the page is an image known as a printer's mark with a Latin inscription that reads "From Here True Religion". Printed below that is: Apud Thomam Baglionum.

The Bucciantini book states on page 77, "His *Sidereus nuncius* finally came off the press of Tommaso Baglioni on the night of Saturday, March 13." As Nick Wilding at Georgia State University conclusively proves in his book—in a masterful case of bibliographic detection work—this is not true.

It was believed for centuries that Thomas Baglioni was the publisher of Galileo's book, but Wilding shows that Baglioni did not have a press at that time; he actually used the press of Niccolò Polo. "His appearance on a title page was legally irregular, and it indicates some kind of impropriety …" writes Wilding on page 95. Even though the Bucciantini book has a publication date a year after the Wilding book, it does not include this new research. The reason is that the 2015 book is an English translation of a 2012 Italian book entitled *Il Telescopio di Galileo: Una Storia Europea*.





In my own study for a *Mercury* magazine history of astronomy column (see Cunningham, 2016), I looked at a book by Marco Antonio de Dominis, who is not mentioned in either of these Galileo books. The title page of his book bears the same printer's mark that appeared on Galileo's book the following year.

Giovanni Bartoli is named on the title page of Dominis' book as the editor, and his name does appear in both Galileo books under review here. He is merely mentioned by Wilding in passing as "… the Tuscan resident in Venice." But as the Bucciantini book reveals, he is a key source for our knowledge of the origins of the telescope in Venice. Here we learn he was "… secretary to Asdrubale Barbolani, the resident of the Grand Duke of Tuscany in Venice …", thus correcting Wilding's assertion he was the resident.

On 22 August 1609, Bartoli informed his masters in Tuscany of a remarkable event in Venice:

> … a person came here who wanted to give his lordship the secret to a spyglass or a cannon ... with which one can see even twenty-five

> and thirty miles away so clearly that they say it seems to be nearby ... in France and elsewhere this secret is known to all, and that it can be purchased cheaply. (pages 36–37).

On 27 March 1610, Bartoli wrote to a friend that Galileo's book *Sidereus nuncius* was being "… read by everyone …" in Venice, and

> With his spyglass, Galileo has found four other planets and seen another world on the Moon, and similar things that provide pleasant food for thought to the professors of those sciences. (page 86).

The Bucciantini book is superb in its richness of manuscript records, many of which have never before been published. The authors weave the story of the origins of the telescope throughout Europe (and even India and China), with some well-placed maps that show the dissemination of knowledge about this amazing invention. They describe this historiographical approach as "… our experiment in cartography and the cross-referencing of texts in an attempt to offer an overall vision of the circulation of the telescope." (page 169). Their experiment has succeeded admirably.

Likewise the Wilding book, with its focus on the little-known figure of Gianfrancesco Sagredo, opens up a new aspect of Galileo studies. Until now readers of Galileo's 1632 book *Dialogue upon the Two Main Systems of the World* regarded Sagredo as nothing more than, in Wilding's words, "… a Socratic midwife ... In the *Dialogue* Galileo narrates Sagredo's experiences and makes them stand in for experiments." As Wilding notes, "Sagredo left no published work, invented nothing, gave his name to no theory or law." Nonetheless he was a real person and a close confidant of Galileo, and this book brings him to life at long last. Letters he wrote still exist, and years of archival research have enabled Wilding to give us a convincing portrait of his life. Indeed, he was even able to identify previously-unknown portraits of Sagredo, one of which (at the University of Oxford) graces the cover.

The addition of these two books advances our understanding of Galileo and his world far beyond anything previous generations of scholars have attained. While Galileo's trial and scientific experiments are amply covered by other great scholarly books, these two books fill a critical gap in Galileo studies.

Reference

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EDITORIAL NOTE

The March/April issue of *JAHH* included the following paper:

> Cuntz, M., Gurdemir, L., and George, M., 2016. Seasonal dating of Sappho's 'Midnight Poem' revisited. *JAHH*, 19(1), 18–24.

It has been brought to our attention that some of the biographical material about Sappho in this paper draws freely on text included in the Poetry Foundation and other web sites without giving due recognition or acknowledgement. We very much regret this, and have taken steps to ensure that henceforth the proper attribution of sources will be rigorously adhered to.

Meanwhile, we would like to stress that the authors of this paper never claimed (nor desired) to make an original contribution to the biography of Sappho herself, whereas their analysis of the astronomical content of the 'Midnight Poem' is an original contribution to scholarship.

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