BOOK REVIEWS

***Astronomy, Weather, and Calendars in the Ancient World.* Parapegmata *and Related Texts in Classical and Near-Eastern Societies*, by Daryn Lehoux (Cambridge, Cambridge University Press, 2007), pp. xiv + 566, ISBN 978-0-521-85181-7 (hardback), US$131, 247 x 174 mm.**

Professor Lehoux laudably serves scholars and all others with an interest in ancient astronomy and calendrics in the first large-scale study of parapegmata to appear in over half a century (see Figure 1). But first things first: I read the Ph.D. dissertation on which the book is based (University of Toronto, 2000, under the supervision of Alexander Jones) and then waited months for my pre-ordered copy of the book to arrive. When it did, I was heartened to receive much more than a reupholstered doctoral thesis.

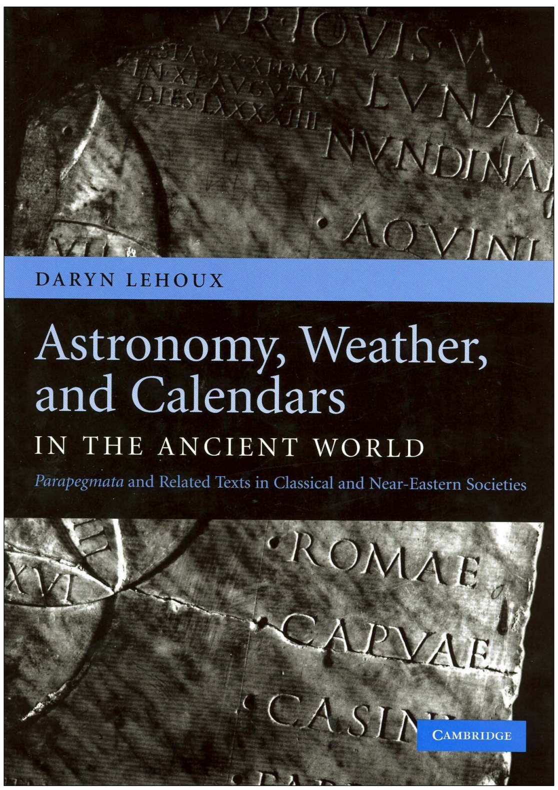

Figure 1: The front cover of Daryn Lehoux's book.

From the Greek "… to put a peg beside something …" (*parapegnumi*), a *parapegma* is an instrument or inscription that tracks the passage of time with movable pegs, or a literary text with a similar aim. It resembles a calendar or (as Lehoux notes) a farmer's almanac:

> But the fact that parapegmata sometimes incorporate calendars does not mean they *are* calendars. They may contain calendrical information, but they are not conventions for the dating of events. They are rather tools for keeping track of phenomena (astronomical, meteorological) and cycles (astrometeorological, hebdomadal, nundinal, lunar), and, specifically, our current position in those cycles. (Page 91).

Lehoux's study is divided into two parts. Part I consists of a collection of fairly individualized essays written in a fluid and (usually refreshingly) colloquial style—much of one was published as a stand-alone article in 2004. Here, there is something for everyone—from the serious historian of calendrics to your run-of-the-mill Egyptologist. The first chapter is titled "The rain in Attica falls mainly under Sagitta" and presents *inter alia* an introductory discussion of parapegmatic texts and instruments as well as the relevant naked-eye astronomy (e.g., stellar phases). In Chapter Two, "Spelt and Spica", Lehoux situates Greek and Roman parapegmata within the context of ancient agricultural practice, with particular emphasis on Rome. In the next chapter, *De signis* (literally "On the signs"), Lehoux illuminatingly fleshes out the role of observation in the construction and use of classical parapegmata. Chapter Four, "When are thirty days not a month?", consists of a largely technical discussion of calendar systems and luni-solar cycles in Greece and Rome, and of what parapegmata can (and cannot) add to debates on the origins of ancient calendars. The next two chapters deal with texts that look like (but which Lehoux does not call) parapegmata from Mesopotamia ("Calendars, weather, and stars in Babylon") and Egypt ("Egyptian astrometeorology"), such as hemerologies, menologies, and lists of lucky and unlucky days. In light of these two chapters, I think a few more words on ancient brontologia and seismologia as well as a description of the meteorological tablets in the Enuma Anu Enlil, though not necessary, would probably not have been out of place—they are all clearly 'related texts'.

After a short conclusion to Part I, there follows in Part II 346 pages of "all extant" parapegmata which Lehoux has catalogued, translated, and in many cases reproduced in the original. These originals-cum-translations include Ptolemy's *Phaseis*, Clodius Tuscus' *Ephemeris* (pp. 343-375) and over sixty others. The classification scheme Lehoux devises for cataloguing these sources is based principally on usage: the 'astrometeorological' texts and inscriptions relate astronomical events to meteorological events; 'astrological' ones track astrological phenomena—e.g., zodiacal signs—and similarly for 'astronomical' parapegmata which mark for example the phases of fixed stars. Even though Lehoux has not re-edited the texts, his commentaries, divergent readings and textual criticisms, and translations—especially for the Greek and Latin astrometeorological parapegmata—are of tremendous value. This is reason alone for those who even peripherally come into contact with these texts to have this book at their disposal. The remaining classes are 'other' (e.g., fragmentary), 'reports of' (parapegmata), 'related texts' and 'dubia'. The study ends with two short appendices of authorities cited and a table of correspondences; a bibliography (pp. 499-518), updated since 2000; an 'astrometeorological' index (pp. 519-547); and a general index (pp. 548-566).

Although I managed to stumble across a few minor errors (e.g., "a brontologia" (p. 392) should be "a brontologion", while Marino (2000) (p. 12) and Boll (1910b) (p. 404) are not in the bibliography), I highly recommend this useful work. It will make a valuable addition to any university's research library.

Jefferson Sauter
Centre for Astronomy, James Cook University, Australia

***The Astrolabe*, by James E. Morrison (Rehoboth Beach (USA), Janus, 2007), pp. xiv + 438, ISBN 978-0-939320-30-1 (softcover), US$60, 276 x 213 mm.**

The title of this book is *The Astrolabe* (Figure 2) without any subtitle. Yes, this fact agrees with my conclusion as well as the author's intention. This book is a comprehensive and lucid treatise on the astrolabe itself.

Beginning with the history and principle of the 'planispheric astrolabe' (ordinary astrolabe), this book explains several related astronomical instruments. The planispheric astrolabe is an astronomical instrument which is based on the stereographic projection of the celestial sphere on the equatorial plane, and was invented in the Hellenistic world (around the fourth century AD), and largely developed in the Islamic world. It was also used in medieval Europe, India, etc.

Regarding the astronomical and mathematical principles of the planispheric astrolabe, this work is almost self-contained, and readers will be able to construct their own astrolabes after reading this book. The principle of the stereographic projection is lucidly explained, and each component of the planispheric astrolabe is minutely explained with several figures and formulae. This book is not a description of particular existing astrolabes, but a comprehensive and balanced description of several variations of astrolabes. So, readers who want to analyze specific astrolabes will easily be able to get useful information regarding the theory of the instrument from this book.

The author then proceeds to explain the 'universal astrolabe'. The ordinary planispheric astrolabe is projected from the celestial South Pole (or North Pole in the case of the astrolabe for southern latitudes), and its plate can only be used at a particular terrestrial latitude. So, travellers had to possess several plates for different latitudes. The 'universal astrolabe' is projected from the point of the equinox by stereographic projection (or projected by orthographic projection etc.), and can be used at any terrestrial latitude.

Next the author explains 'quadrants'. A quadrant is one-fourth of a circle, and there are several versions of this instrument. The reverse sides of astrolabes were sometimes divided into four parts, and some of them were used as quadrants. There are also several independent quadrants. The simplest quadrant was used to measure the altitude of heavenly bodies. More complicated quadrants were used for graphical calculation of astronomical problems. Some of them are quite ingenious and interesting.

The author explains other stereographic and related instruments. He then discusses basic spherical astronomy and how to design personal astrolabes using computers.

It must be stressed that this book is a treatise on the principle of the astrolabe, and not a compendium of specific specimens. For the latest information regarding historical specimens see King (2005).

The author conducted a useful survey of the literature on Islamic and European astrolabes, but I would like to provide some additional information. Several Indian astrolabes are described by Kaye (1918) and Sarma (2003; 2008), while Ôhashi (1997) discusses literature (particularly Sanskrit literature) about the astrolabe in India. Readers may also be interested in these Eastern astrolabes.

Although the astrolabe is an historical instrument of the past, it is a very useful educational tool nowadays. As it can be designed with a ruler and compasses (or, of course, with a personal computer), paper models can easily be made in the classroom, and the rotation of the celestial sphere is represented clearly. Educators should recognize the importance of the astrolabe and other historical astronomical instruments.

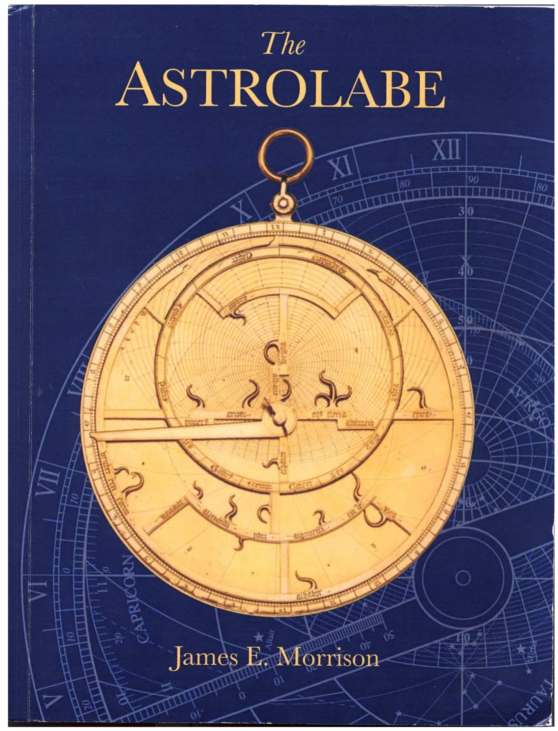

Figure 2: The front cover of *The Astrolabe*.

In future bibliographies relating to the astrolabe, I think that Morrison's book should be listed in the section on primary sources (rather than secondary sources). This is a very impressive book, which shows that the astrolabe is still living!

References

Kaye, G.R., 1918. *The Astronomical Observatories of Jai Singh*. Calcutta, Archaeological Survey of India, (Reprinted: New Delhi, Archaeological Survey of India, 1982).

King, David A., 2005. *In Synchrony with the Heavens. Volume Two, Instruments of Mass Calculation*. Leiden, Brill.

Ôhashi, Yukio, 1997. Early history of the astrolabe in India. *Indian Journal of History of Science*, 32, 199-295.

Sarma, Sreeramula Rajeswara, 2003. *Astronomical Instruments in the Rampur Raza Library*. Rampur, Rampur Raza Library.

Sarma, Sreeramula Rajeswara, 2008. *The Archaic and The Exotic*. New Delhi, Manohar.

Yukio Ôhashi
Tokyo, Japan

***Shrouds of the Night. Masks of the Milky Way and Our Awesome New View of Galaxies*, by David L. Block and Kenneth Freeman (New York, Springer, 2008), pp. 441, ISBN: 978-0-387-7894-3 (hardcover), US$39:95, 240 x 310 mm.**

This is a beautiful large-format book (Figure 3), written by two astronomers who have each spent a lifetime studying 'dark matter'. The Preface is by the renowned Vera Rubin, Senior Fellow at the Carnegie Institute of Washington, who briefly tells the reader about what they are going to read and enjoy.

Early civilizations explained their curiosity about the Universe with stories, myths and legends about its origin, how the Milky Way was formed, the rising and setting of the Sun and the Moon, etc. These stories were handed down through the generations. As tools and understanding progressed, some of the questions were answered, but new discoveries and new questions arose to take their place. Before 1946, the discoveries were largely restricted to observations made in visible light, with or without telescopes or cameras. From this date, however, we have seen the remarkable growth of radio astronomy and more recently ultra-violet, infrared, X-ray and gamma-ray astronomy.

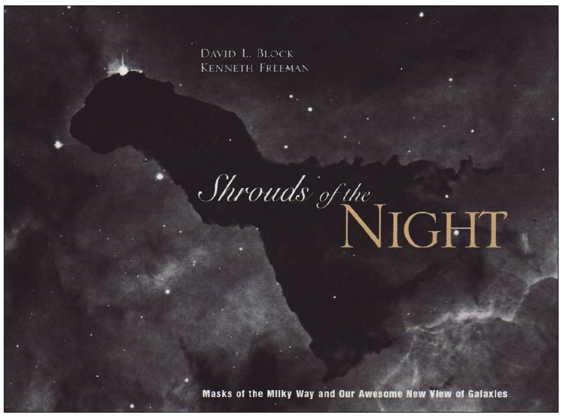

Figure 3: The front cover of *Shrouds of the Night …*

The first five chapters in *Shrouds of the Night …* cover the period from Galileo in 1609 to Sir John Herschel in 1847. During this interval observations of the heavens were recorded in written descriptions and hand drawings. Both authors expressed their tremendous joy at personally being able to hold and examine many of the Herschels' drawings of nebulae housed in the archives of the Royal Astronomical Society in London. William and John Herschel discovered an astonishing 4,630 objects.

Chapter 6 on "The Dawning of the Photographic Era", describes the transformation from hand drawings to Fritz Zwicky's well known research in the 1940's and the rise of photography as a handmaiden of astronomy. The first recognizable image formed by a *camera obscura* was obtained by Joseph N. Niepce in 1826. In 1833 W.H.F. Talbot made sketches of the scenery at Lake Como (Italy) using a *camera obscura*, and in 1835 he exposed the earliest-known surviving photographic negative on sensitized paper, which had been washed in salt and silver solutions. The photograph was fixed by a liquid solution devised by Sir John Herschel. Thus it is to Herschel that we owe the word *photography*, from the Greek *photos* (light) and *graphos* (to write). In this book, the early development of astronomical photography is discussed in detail.

Enter Edward Emerson Barnard, one of the most admired astrophotographers of all time, who was inspired by the Reverend Thomas Dick's description of the heavens. To support his widowed mother, Barnard took a job at nine years of age, directing a solar camera used to develop photographic enlargements. To pay his way through Vanderbilt University, Barnard successfully searched for comets, receiving a prize of $200 for each new one he discovered. For me personally, Barnard is best remembered for *A Photographic Atlas of Selected Regions of the Milky Way* which was published in 1927, four years after his death. It contained the best seven hundred photographs from a lifetime total of 35,700 that Barnard took.

Chapter 7 opens the discussion on the classification of spiral galaxies with the contribution made by Edwin Hubble. Mention is also made of Herber D. Curtis and John Reynolds. Reynolds became a wealthy industrialist making cut nails for the American market. Taking an interest in astronomy, he purchased a 30-inch mirror from Andrew A. Common and helped design a reflector telescope which eventually was installed in Egypt and became operational in 1907. Reynolds then decided to build his own observatory and made his own 28 inch mirror. After an upgrade in Egypt, the 30 inch mirror was returned to Reynolds, who installed it in his own telescope. He then donated the telescope to the Commonwealth Solar Observatory (later Mount Stromlo and Siding Spring Observatories) in Canberra, Australia, where for many years it was a stalwart of the astrophysical research program. Amongst those who used this telescope was Ken Freeman, one of the authors of this book. Block and Freeman end Chapter 7 by reproducing extracts from previously-unpublished letters between Reynolds and some of the leading astronomers of the day. In 1899, at just 25 years of age, Reynolds was elected a Fellow of the Royal Astronomical Society, and he served as President of the Society from 1935 to 1937.

Chapter 8, "The Dust Penetrated Universe: Hidden Symmetries", opens with an analogy of our view of the Universe to a ship entering a strange harbour at night in a fog. The captain's view of the harbour is misleading, because of the light beaming from the lighthouse and the fog enveloping the actual lighthouse. Compare this view to the full Moon masking the presence of fainter stars. This chapter shows how our view of the Universe changed markedly with the advent of new technology.

The final chapters highlight the philosophy of astronomy and religion, starting with music played by a string trio in the famed Carnegie Hall. The authors view spiral galaxies as "… great stringed instruments, instruments being plucked or bowed, in which the strings of gas and dust typically measure some 100,000 light years across." They talk about "Penetrating the Mask of Time" and move forward to the "Eyes of the Future". There is also a short chapter on "Planets Orbiting other Stars".

Meanwhile, the religious aspect opens with a discussion on the insignificance of man. In this regard, Bernard de Fontenelle (1657–1757) said: "Behold a Universe so immense that I am lost in it. I no longer know where I am. I am just nothing at all. Our world is terrifying in its insignificance." Block and Freeman then ask the audacious question, "Does God exist?", and is the language of the Universe one of eternal silence? To answer this question Block prepared a questionnaire and sent it to many of his colleagues. Readers of this book will be very surprised by the answers he received.

This is a 'must-have' book for those interested in the history of astronomy, and an ideal gift for any young aspiring astronomer.

Colin Montgomery
Centre for Astronomy, James Cook University, Australia

***The Greatest Comets in History. Broom Stars and Celestial Scimitars*, by David Seargent (New York, Springer, 2009), pp. xx + 260, ISBN: 978-0-387-09512-7 (paperback), €24:95, 235 x 155 mm.**

As an authority on comets, a successful searcher for new comets, and the author of other books about comets, Dr Seargent is ideally placed to pen a book on the 'greatest comets' (see Figure 4). Whilst many comets can be designated 'great comets' and have made their mark in history, what Seargent is concerned with in this particular book are "… the greatest of the great, the cream of the comet world. We are looking for nothing less than cometary royalty." (page vii).

For those with an historical interest in comets, this is a compelling book in that it succinctly presents an overview of almost fifty truly amazing comets, all in the span of about 230 pages. But first, Seargent assigns 30 pages to Chapter 1, where he discusses "The Nature of Comets" and provides a useful anatomical exploration of these broom stars and celestial scimitars. Then follow chapters on "Halley's Comet Through the Ages"; "The Greatest Comets of Ancient Times" (from 372 BC to AD 905); "The Greatest Comets from A.D. 1000 to 1800"; "The Greatest Comets from 1800 to Present Times", the final candidate being C/2006 P1 (McNaught); "Kamikaze Comets: The Kreutz Sungrazers"; and "Daylight Comets". The final 20 pages of the book contain a glossary, a very short list of "Further Reading", a table summarizing information on comets discussed in the book, and name and subject indexes.

Each chapter is easy reading, and embellished throughout with a brilliant selection of drawings and photographs. Seargent draws freely on archival material, and also incorporates data supplied by astronomical and lay informants. When dealing with comets of the last three to four decades, the fact that he often knew the astronomers responsible for their discoveries and actually observed many of these objects brings a refreshingly personal touch to the accounts. Meanwhile, those wanting further details on individual comets can always resort to Kronk's excellent *Cometography* series (the fourth volume of which has just been published).

The one challenge when writing a book like this is to decide which comets to include and which to omit, and as Seargent says in the Preface, "… it is quite possible that I have missed some comets that should have been included, and I may have included one or two that should not be here." (page x). Clearly this involves a personal choice and I suspect that each author would come up with a slightly different list. Certainly, if I had written this book I would have included C/1881 K1 (Tebbutt), which is also known as the Great Comet of 1881. This comet fulfils all of Seargent's selection criteria (it had a bright nucleus, an impressive tail, and was a conspicuous naked eye object that attracted the attention of non-astronomers), but it also arrived at a critical time in the emergence of astrophysics. As such, it was the first comet to be successfully photographed and the first comet that was subjected to detailed spectroscopic investigation (see Orchiston, 1999). In this regard, I believe that it really deserves to be a member of cometary's 'royal family'.

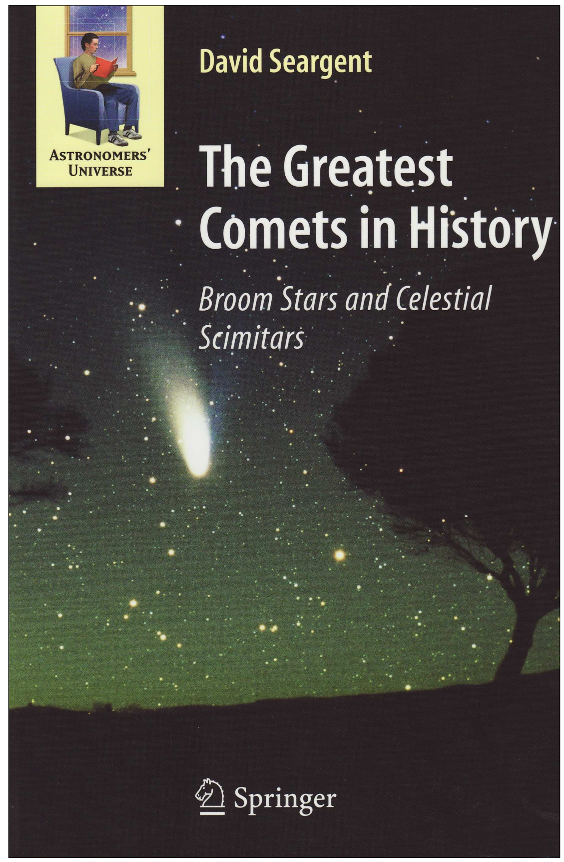

Figure 4: The front cover of David Seargent's book.

Notwithstanding this personal aside, *The Greatest Comets in History* … is an excellent book. It is totally affordable, and belongs in the library of all those with a passion for comets and cometary history.

Reference

Orchiston, W., 1999. C/1881 K1: a forgotten "Great Comet" of the nineteenth century. *Irish Astronomical Journal*, 26, 33-44.

Wayne Orchiston
Centre for Astronomy, James Cook University, Australia