Edmonds particularly examines the role of Time. Different cosmologies had their own ideas of the *archê*: what came first? The last head of the Platonic Academy, Damascius, is our source for many of the Orphic myths. In the standard account of the Orphic Rhapsodies (dating from second or third centuries CE) that he relates, Time is the *archê*. "Night becomes an agent of Time, alternating with Day to mark the temporal motion of the cosmos." (page 61). However, the earliest texts relating Orphic cosmology attributes Night as the *archê*, while others give Chaos as the *archê*. The study of this is not just confined to those interested in ancient cosmology. The great play by Aristophanes, the *Birds*, assumes the audience is well familiar with the forces of Chaos and Night, which brings forth the cosmic egg that produces the race of birds. Thus, even literary scholars must become cosmologists to properly analyse the ancient Greek theatre.

Albert Joosse writes on philosophical qualities of night according to Plato, who notes the succession of day is necessary for human understanding and appreciation of cosmic order:

> This is because night and day are at the origin of our notion of number. And the notion of number allows us to acquire knowledge of mathematics and ultimately even of philosophy. (page 95).

Joosse looks at both *Timaeus* and the *Laws* as sources to discern Plato's attitude towards the night. He concludes that while "Things can become clearer at night than they would ever be in daylight …" Plato also warns that one must be philosophically advanced "… to be immune to the night's dangers." (page 110). Kim Beerden (Leiden University) briefly looks at these dangers as she quotes Cicero on nocturnal divinatory signs: "Then indeed during the night various terrible forms were seen and warned of war and sedition." (page 260). It forms part of a passage Beerden considers, where Cicero describes a lunar eclipse and what may be a description of the aurora borealis.

The book contains 2 typos: Enlightenment is spelled wrong on page 8; "in connected" should be "is connected" on page 146. Each chapter concludes with its own bibliography. In addition to an index of names and subjects, there is a very welcome 'index locorum' that allows one to find the pages on which passages are quoted from the ancient sources.

As the first book to apply modern scholarship to bear on the subject of the Night in Classical antiquity, this is an invaluable resource and a fine corrective to previously misguided research.

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"*Pour la gloire de M.de la Lande*". *Une Histoire Matérielle, Scientifique, Institutionnelle et Humaine de la* Connaissance des Temps*, de 1679 à 1920*, by Guy Boistel. (Paris, Institut de Mécanique Céleste et de Calcul des Éphémérides (IMCCE), Paris Observatory, 2022). Pp. 692 pages. ISBN 978-2-910015-87-9. E-book, free PDF version: https://www.imcce.fr/content/medias/publications/ouvrages-pour-tous/Boistel_LaLande_eBook.pdf. The printed version, with coloured figures, costs 72 €, and can be ordered here: https://www.bod.fr/librairie/pour-la-gloire-de-m-de-la-lande-guy-boistel-9782910015879

Connaissance des Temps (hereafter *CdT*) is the oldest astronomical/nautical ephemeris published without interruption up to the present day. It preceded by a century the English *Nautical Almanac* (from 1766) and the Spanish *Almanaque Nautico* (from 1791). It descended directly from Kepler's astronomical ephemerides assembled from 1629, based on his *Tabulæ Rudolphinæ* of 1627, and the intermediary tables by Kepler's pupil, Johann Hecker (1625–1675), published in Gdansk. These tables, in Uraniborg mean time, were translated into French from 1666. After an aborted project by Huygens in 1666, the *CdT* was created in 1679 by Joachim Dalencé (ca. 1630–1707) with the help of Jean Picard (1620–1682). Jean Le Fèvre (ca. 1650–1706) succeeded Dalencé, and in 1701 the journal became an official publication of the *Académie Royale des Sciences*. Aside from ephemerides, it contained more and more material as *Additions*, which became official after 1703. These *Additions* are very interesting as they give an overview of the state of astronomy in France and in Europe.

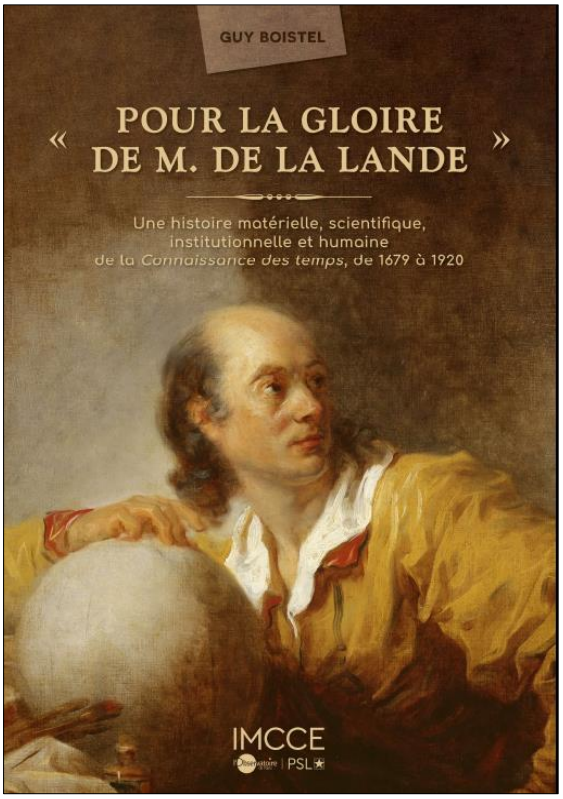
In 1759, the young Lalande (1732–1807) took over the editing of the *CdT*, which he renovated deeply, introducing tables for the sailors, in particular those to calculate lunar distances produced after the issue for 1761, using the theory of Tobias Mayer rather than that of Clairaut. He was helped by various calculators under the supervision of Nicole-Reine Lepaute (1723–1788). Thanks to his good relations with the editor of *Nautical Almanac*, the Astronomer Royal Nevil Maskelyne (1732–1811) who could benefit from seven or eight calculators,

Lalande borrowed some of his tables, while the English publication was influenced by Lalande's very numerous *Additions*. The first official calculator for the *CdT* was only appointed in 1785. Starting in 1791, low-cost extracts were published for navigators. The end of the eighteenth century saw the important contribution in celestial mechanics of Pierre-'Simon' Laplace (1749–1827), Jean-Baptiste Joseph Delambre (1749–1822), Johann-Carl Burckhart (1773–1825), Alexis Bouvard (1767–1843) and Johannes Bürg (1766–1834): tables were revised according to their theories.

The volumes of the *CdT* for 1790 to 1794 were written and calculated by Pierre Méchain (1744–1804) and Louis-Robert Cornelier-Lémery (1728–1802), the first professional calculator of the journal. But in 1792 Méchain and Delambre were called to measure the Paris meridian and a period of instability followed. Jean-Dominique Cassini (Cassini IV, 1748–1845) took over the volumes for 1795 and 1796 amongst various difficulties (he was put in jail for 6 months in 1793). However, the publication never stopped, as it was considered politically important given competition from the *Nautical Almanac*. Thanks essentially to Lalande, a clever politician, astronomers crossed without too many problems the troubled times of the Revolution, with the exception of Jean-Sylvain Bailly who was guillotined in 1793. The creation in 1795 of the *Bureau des Longitudes* (hereafter the *BdL*) was to change the organization of French astronomy and in particular of the *CdT*. The latter change was only progressive, as several volumes were already prepared under Lalande, with the contribution of Lémery, Bouvard and calculators from the *Bureau du Cadastre* (Land Survey Office) headed by Gaspard Prony (1755–1839). They contained, as before, *Additions* and an annual *History of Astronomy*, all by Lalande. The adoption of the revolutionary calendar brought some complications, until the return to the Gregorian Calendar in 1806.

In 1801, Méchain, who was director of Paris Observatory and Chairman of the *BdL*, complained about the dictatorial behavior of Lalande, and managed to reorganize to some extent the *CdT* on the model of the *Nautical Almanac*, with permanent calculators paid by the Bureau. The influence of Laplace and Delambre was growing, and in 1806 the *CdT*, now calculated entirely in the Gregorian Calendar, entered a new era under the supervision of Delambre and Bouvard. The *CdT* was now an official publication of the *BdL*, together with the *Annuaire du Bureau des Longitudes* where many monographs were published, principally due to François Arago (1786–1853), replacing in part the *Additions* of Lalande in a more scientific vein. The CdT had a circulation of 2000 copies sold by booksellers, plus 200 free copies, against 10000 for the *Nautical Almanac*, compulsory aboard English ships contrary to what occurred in France. The price and the number of copies was to change during the following years, but the *CdT* always remained rather expensive.

Bouvard was to run the *CdT* from 1806 to 1829, while Delambre was in charge until his death of what remained of the *Additions*. These *Additions* were read at the meetings of the *Bureau des Longitudes* and considered as official publications of the *BdL*. Bouvard was



succeeded by Charles-Louis Largeteau (1791–1857) until 1852. The latter introduced important improvements, in particular to make the publication better adapted to the needs of navigators (lunar distances to planets and longitudes of harbors). The ephemerides were now published in Paris mean solar time rather than true solar time. Largeteau managed to regularly publish the *CdT* well in advance, at the same time as the *Nautical Almanac*, thanks to a stable team of calculators. Rather than competition, there was collaboration between the two publications, and the *CdT* was well distributed in foreign countries. The *Additions*, which initially concerned only astronomy, progressively covered geodesy, at least for some time, and geography.

The death of Arago in 1853 and his replacement by Urbain Le Verrier (1811–1877) the following year opened a difficult period for the *BdL*. It was separated from the Paris Observatory and, because several members belonged to Arago's 'clan', subjected to the hatred of Le Verrier. He proposed to suppress the *CdT*, and replace it with an ephemerides published by the Observatory. However, he did not succeed, and the *BdL* kept the publication of the *CdT* and the *Annuaire.* But the *BdL* was forbidden from holding its meetings at the Observatory, and the calculators had to work at home or in a rented flat. It was 'war' between Le Verrier and several astronomers: Ernest Laugier (1812–1872), Claude-Louis Mathieu (1783–1875) and Joseph Liouville (1809–1882) —all members of Arago's 'clan'—as well as Charles-Eugène Delaunay (1816–1872), the most active enemy of Le Verrier, Hervé Faye (1814–1902) and Antoine Yvon-Villarceau (1813–1883). This war was to last until Le Verrier's death, with many twists and turns that are detailed in the book. Moreover, the war between France and Prussia in 1870–1871 brought important disturbances and delays. We should not be surprised that the *CdT* was published somewhat irregularly in spite of the efforts of Mathieu until 1868 and of Victor Puiseux (1820–1883) from 1868 to 1872. But it never stopped and the quality was maintained.

A *Bureau des Calculateurs* had been created officially in 1863 for the *CdT*, thanks to Delaunay's efforts. New tables of the Moon were introduced in 1862, based on Hansen's theory corrected by Newcomb, and much later (1915) based on the theory of Delaunay, an enormous work begun in 1867, which necessitated for many years special funds and calculators, and was finished only in 1911. In 1867, the *CdT* began to publish fundamental longitudes for navigators, measured especially for this purpose in a number of harbors worldwide using meridian transits of the Moon. The pages devoted to the *Additions* have decreased considerably.

In spite of all this progress, in 1872 there were requests to suppress the *BdL* and the *CdT*, probably due to Le Verrier's constant attacks, but they failed thanks to Faye's action. With the responsibility of Maurice Lœwy (1833–1907) from 1872 to 1907, then of Rodolphe Radau (1835–1911) until 1911, and finally of Henri Andoyer (1862–1929), the *BdL* and consequently the *CdT* enjoyed an era of relative stability. In 1874, the *BdL* obtained permanent accommodation at the Academy of Science's headquarters, where it continues to meet today. The calculators progressively acquired stable positions, and benefitted from social rights, in particular for retirement, especially after 1870. The number of working hours per year was fixed at 2100 (for comparison, the present legal number in France is about 1610), with the possibility of working 300 paid extra hours. A few women entered the calculation board. These changes are studied in considerable detail by Boistel, as typical of what was occurring in French administration. He also devotes many pages to the material conditions of publication of the *CdT* by the principal scientific publisher of the time, Mallet-Bachelier, succeeded in 1964 by Gauthier-Villars. The relations with the publisher to some extent affected the contents of the *CdT*.

There were also important changes in the contents of the *CdT*. Lunar distances were abandoned, but as late as 1905, and even a few years later by the *Nautical Almanac* and the *American Ephemeris*. Even in the 1860s they were still the most regularly used way of finding longitudes, due to the high cost and low reliability of chronometers. Given competition from private ephemerides, sometimes better-adapted to the needs of navigators, the use of the *CdT* (or rather of an extract) was finally made compulsory in all French commercial and military vessels. It was only in 1916 that the meridian of Greenwich was replaced by that of Paris in the *CdT* and in other French ephemerides.

The end of the nineteenth century saw the internationalization of science, and in particular astronomy. The occasional exchanges between ephemerides were replaced by a more effective cooperation, with a standardization of astronomical constants. This was achieved by international conferences like the Paris *Conférence des Étoiles Fondamentales* in 1896, organized by the *BdL* at the requests of Simon Newcomb (1835–1909) and Arthur Downing (1850–1917), who respectively were responsible for the *American Ephemeris* and the *Nautical Almanac*. The Paris *Conférence des Éphémérides Astronomiques* (1911) decided to share the calculations between Berlin, Greenwich, Paris, San Fernando (Spain), Turin and Washington. However the positions of planets were calculated independently in Paris using the tables of Le Verrier-Gaillot and in Greenwich using those of Newcomb and Hill, and the positions of the Moon derived from the theories of Delaunay-Radau in Paris and Brown in Greenwich "… in order to facilitate the progress of the theory by promoting the use of different tables and theoretical models …", so the corresponding results were slightly different in the various ephemerides.

WWI delayed the realization of the decisions of the 1911 conference, in particular due to the loosening of ties between Allied and German astronomers, and caused some disorganization for the *CdT*. More women entered the calculation service: in 1920, there were 7 women from a total of 15 calculators. The creation of the IAU in 1919, with its Commission 4 (Ephemerides), helped to smooth over the political problems and to reorganize the relations between the different ephemerides.

The book stops here, leaving to further researches the evolution of the *CdT* after 1920. The period 1679–1920 has been covered so comprehensively and in such detail by Boistel that the subject is practically exhausted, leaving little room for further studies. His big book, which has involved many years of deep and well-organized research, is well presented, with very few typos and interesting illustrations. It gives a vivid description through a long period not only of the evolution of the *CdT*, but also, as promised by its title, of French astronomy and its relations with the successive governments, the navigators and society in general. The solution adopted by Guy Boistel for publication is excellent for such books with a necessarily limited readership, which would not make much money for the author anyhow; it should be generally adopted in similar cases. A problem however is that the book is written in French. Making a full translation in English would be a large and little-rewarding task, and most interested readers are likely to have at least a superficial knowledge of French. They can use an automatic translator to clear up difficult passages (I recommend DeepL which is considerably better than Google translation for scientific texts). In any case, its reading will be a pleasure for the historian and the astronomer at large. I recommend it warmly and without any reservation.

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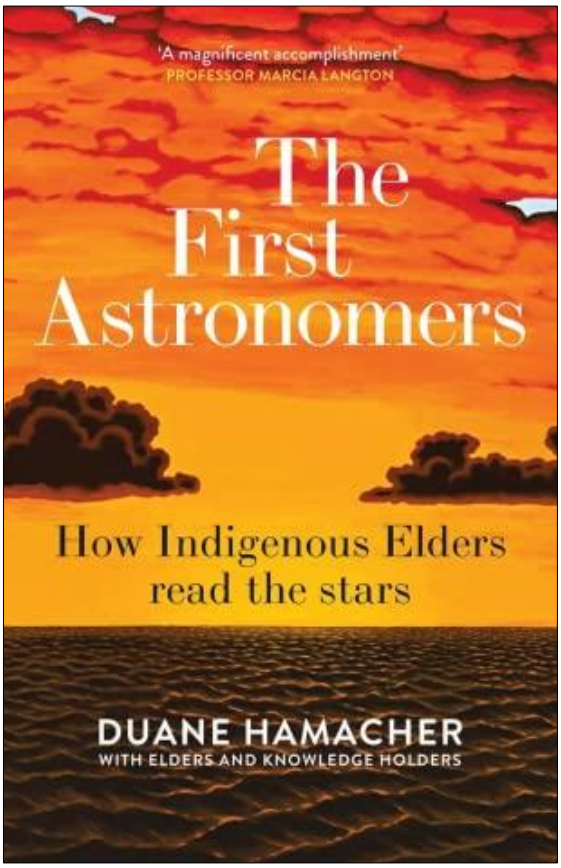
The First Astronomers: How Indigenous Elders Read the Stars, by Duane Hamacher, Ghillar Michael Anderson, John Barsa, David Bosun, Ron Day, Segar Passi and Alo Tapim. (Sydney, Allen & Unwin 2022). Pp. xiv + 290. ISBN 978-1-76087-72-0 (paperback), 155 × 235 mm, AU$32:99.

This is Duane Hamacher's first book, produced in collaboration with Indigenous Elders and Knowledge Holders he has worked with in Australia over the past 15 years after changing his academic direction and completing a PhD in Indigenous Studies instead of Astrophysics.

During this period Duane has been remarkably productive, publishing paper after paper in a variety of journals and books; supervising a succession of Honours and graduate students, first in Sydney and later in Melbourne; Chairing the Ethnoastronomy and Intangible Heritage Working Group of the IAU for three years; serving as one of the Associate Editors of this journal; getting involved in films; and even joining me in running an international Ethnoastronomy Workshop here in Thailand.

But perhaps what has impressed me most about Duane, apart from his dedication, wide-ranging knowledge, infectious enthusiasm for



Indigenous Studies and healthy work ethic, is the way he has published papers on many aspects of Aboriginal Australian astronomy not just in this journal and other astronomical journals, but also in *Australian Archaeology*, the *Australian Journal of Anthropology*, the *Australian Journal of Earth Sciences*, the *Australian Journal of Indigenous Issues* and the *Proceedings of the Royal Society of Victoria*, all in a bid to make scientists, anthropologists and others more aware of the remarkable Indigenous astronomical heritage held in guardianship and trust by the different nations scattered across this unique island continent that we now call Australia.