BOOK REVIEWS

***Caroline Herschel's Autobiographies*, edited by Michael Hoskin (Cambridge, Science History Publications, 2003). Pp. 147, ISBN 0 905193 06 7, £25.**

Caroline Herschel is without doubt the most renowned and admired woman in the history of astronomy. She was for fifty years the indefatigable collaborator of her brother, the great William Herschel, and achieved fame in her own right as the most successful woman discoverer of comets of all time. Caroline's memoirs, written in her old age, are a valuable, indeed indispensable, first-hand witness to the rise of William Herschel's brilliant astronomical career, as well as being a fascinating record of her own extraordinary life. They are copiously quoted in *Memoirs and Correspondence of Caroline Herschel* (1876) and in *The Herschel Chronicle* (1933), key sources of information on the senior Herschels' lives. The original texts, however, were never published until Michael Hoskin, the leading Herschel scholar of today, collected and edited them in the present volume.

The memoirs consist in fact of two separate versions of her autobiography, the first written when Caroline was in her seventies and the second when she was in her nineties. The first autobiography, the longer of the two, stretches from her earliest childhood in Hanover to the day of William's marriage, sixteen years after she had come to England. That event had come as a deep shock to her at the time, and her autobiography, at least as committed to paper, went no further. Caroline had by then discovered her first comet, and was already known and admired in her brother's elevated scientific circle.

Caroline's original manuscripts are preserved in different collections and Dr Hoskin has meticulously assembled them and has published them in full for the first time. Here we read Caroline's words exactly as she wrote them, complete with erratic spelling and somewhat stilted language, which vividly evoke her personality in a way that is lost in second-hand accounts. She had an extraordinary memory, and her story, which also involves the lives of her four brothers and her own relationships with people outside the family, is of absorbing human interest, quite apart from its value in the history of astronomy. Caroline herself emerges as a woman of rigid principles, doggedly hardworking, who never spared herself in the interests of her beloved brother. Her recollections of childhood are unrelentingly grim, and the resentment she felt at her lack of education for which she blamed her hard-pressed uneducated mother, never left her.

The second autobiography, written twenty years after the first, with the encouragement of her nephew John and his wife, revisits the earlier periods. Her memory is as sharp as ever, and her old grievances are again recalled. However, the portrait of her mother, who surely suffered her own share of hardship, seems—at least to this reader—to be more understanding and more just than in the first version which was written at a low point in Caroline's life.

Dr Hoskin (2003) has already provided the definitive account of Caroline Herschel's career as an astronomer and collaborator of her brother William. With this complete edition of the autobiographies, he now gives us a rich source of enlightenment, previously only partially explored, on Caroline's mind and character. He has performed his task with immense thoroughness. There are copious explanatory footnotes and elucidations of Caroline's occasional German expressions. Caroline's original pagination is retained in the body of the texts, and cross-references in the margins allow the versions to be compared. The Introduction is particularly helpful to the reader by explaining the confusing background of war which profoundly affected the entire Herschel household in the early part of Caroline's story. There is a genealogy going back three generations and a detailed chronology of family events during the relevant years that guide the reader through the frequent comings and goings of its members. The book is elegantly designed and produced, with illustrations of Caroline's telescopes and samples of her handwriting from her observing book, including the drawing of her first comet.

This is a book which will be indispensable to future students of Caroline Herschel's life and work and will also be of value to historians of women in science. It is also warmly recommended to all lovers of astronomy as the remarkable and highly-readable story, told in her own words, of one of the great icons of science.

Reference:

Hoskin, M., 2003. *The Herschel Partnership. As Viewed by Caroline*. Cambridge, Science History Publications.

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***Two Paths to Heaven's Gate*, by Nan Dieter Conklin (Greenbank, National Radio Astronomy Observatory, 2006), pp. x + 195, ISBN 0-9700411-1-X (paperback), $13.00 (USA), $24.00 (Canada/Mexico), $30.00 (elsewhere), 152 x 227 mm.**

Nan Dieter Conklin is a pioneering radio astronomer, and was the first American woman to complete a Ph.D. in this field, back in 1958, with a thesis on "Neutral Hydrogen in M33".

Dr Conklin was born as Nannielou Reier in 1926, and even in high school decided that science was to be her *forte*. She refined this upon entering Groucher College (Baltimore) and "After two weeks in that first astronomy course I knew I had found what I wanted." (page 18). Her inspiration was the well-known solar astronomer, Dr Helen Dodson. From Groucher, she secured a position with the U.S. Coast and Geodetic Survey, and in 1951 moved to the Naval Research Laboratory where (as Nan Hepburn) she became involved in solar radio astronomy and published her first research paper. Soon she was also doing H-line work, and this was to remain one of her research emphases throughout her career as an astronomer.

In 1955 she began studying for a Ph.D. at Harvard, and after graduating joined the Air Force Cambridge Research Laboratory as an astronomer. In 1965 she moved across the continent to the Radio Astronomy Laboratory at the University of California, Berkeley, and quickly expanded her research 'portfolio' to include OH and formaldehyde lines. She would remain there until she took early retirement in 1977, and her autobiography brings out the excitement she felt in actually 'doing' science—and making discoveries.

Although designed primarily for a non-astronomical audience, this book immerses its readers in some astronomy (particularly radio astronomy), but it does more than this; it also discusses the state of astronomy in the Soviet Union and in France, in 1973-1975, a time when few American astronomers, at any rate, could speak from first-hand experience about their experiences behind 'the Iron Curtain'. Nan and her third husband, Garrett Conklin, spent April-June 1973 there, visiting Moscow, the Crimean Astrophysical Observatory (although the radio astronomers she specifically went to see were mysteriously absent!), the remarkable RATAN-600 Radio Telescope and the 6m telescope in the Northern Caucasus Mountains (which, at that time, was the largest optical telescope in the world). A highlight of their visit to Moscow was the presentation of the 1972 Bruce Medal to I.S. Shklovsky at a ceremony held at the Sternberg Astronomical Institute.

What I also found particularly captivating was the way in which Nan Conklin managed to successfully weave non-astronomical threads into her autobiography, thereby providing us with a view of how a remarkable woman managed to combine an astronomical career with being mother to two daughters, whilst experiencing (and at times greatly enjoying) three marriages, and coping with multiple sclerosis from the age of just 33. In the course of the narrative we also find interesting perspectives on well-known friends:

> Perhaps the greatest benefit of having the astronomy department near us was the presence of graduate students—a talented, dedicated bunch. On my first day I met the young man who was to be my favorite of them all—Miller Goss. He was the sort of student teachers dream of; one only needed to stand back and watch him grow. (Page 62).

Then, reflecting upon her 30-odd years in astronomy, she writes:

> I had chosen [to work in] astronomy for a complex set of reasons, among them my feeling that science held a sort of security for me ... I thought I could depend on my intellect, but that I could not depend on other people … Like many young people I wanted to do something that mattered, something that would last. It soon became clear that my high-flown ambition would require not only very hard work but also a measure of luck. I also found that it would make my connecting with other people still more difficult—especially with women … For reasons that I still cannot fathom anyone who chooses science is thought to be somehow smarter, and all my protests to the contrary don't seem to make any difference. (Page 148).
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> That is not to say that astronomy provides an easy life. Acquiring the background in physics and mathematics is hard … [and] Actually working in observational astronomy presents other problems … On the other hand, I have found in astronomy a career always satisfying and occasionally thrilling. One persists through times of routine, demanding hours with the possibility of an extraordinary reward. Make no mistake; the approval of colleagues, especially those not familiar with your work, is wonderful, but it does not hold a candle to the joy in realizing that you are seeing something for the first time. In my experience there are two ways in which real discoveries are made: stumbling on something totally unexpected while looking at something else, and searching for something because you think it might be there. In my own work I found one of each. (Pages 148-149).

The foregoing examples—and various others that I could have given—indicate that *Two Paths to Heaven's Gate* is, at times, captivating reading. Apart from Nan Conklin's own narrative, we are treated to Forewards by Moreton S. Roberts and Claire Hooker (the latter on "The Woman in the Woman Scientist"), and I found the 'Timeline' on pages 13-14 and the Endnotes and full list of her publications (pp. 181-191) invaluable. An extra bonus are the photographs and paintings by Nan Conklin scattered throughout the book, although it has to be said that some of these could have been a little sharper. However, this in no way detracts from a fascinating book by a remarkable scientist, and it belongs in the library of every astronomer with an interest in the history of radio astronomy or the roles that women have played in the overall development of science.

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***The Man Who Changed Everything: The Life of James Clerk Maxwell*, by Basil Mahon (Chichester, John Wiley & Sons, 2004), pp. xx + 226, ISBN 13-978-0470-86171-4 (paperback), £8.99, 129 x 197 mm.**

Number 14 India Street is part of an elegant Georgian terrace in Edinburgh's New Town. It is now the home of the James Clerk Maxwell Foundation. The Foundation acquired it in 1993 because it is the birthplace of James Clerk Maxwell (1831–1879). As well as a working centre for mathematicians and scientists which regularly hosts meetings and symposia there is also a small museum of Maxwell memorabilia which is well worth visiting if you are in Edinburgh. Maxwell, of course, is famous for being the physicist who is not famous. Amongst physicists his contributions are held to be broadly as fundamental as those of Newton or Einstein, but he is largely unknown to the wider public. The aim of Mahon's biography is to rectify this deficiency and introduce Maxwell to a larger audience.

The outline of Maxwell's life is simply told. Though born in 14 India Street, he spent his early years at the family estates at Glenlair, in Galloway, South West Scotland. He attended the Edinburgh Academy and later Edinburgh and Cambridge Universities. He held posts at Aberdeen (where he was made redundant when that city's two universities merged), King's College London and Cambridge. Throughout he divided his time between his university posts and Glenlair. He died at the tragically early at the age of forty-eight.

Maxwell is best known for two pre-eminent pieces of work. The equations of electromagnetism that now bear his name underpin all electrical and magnetic phenomena and describe one of the fundamental forces of nature. They also predicted electromagnetic radiation. Maxwell and Ludwig Boltzmann, working independently, formulated the kinetic theory of gases which explained the behaviour of gases in terms of molecules moving with a range of velocities, and in the process introduced statistical methods into physics.

However, Maxwell did much other important work. He made significant advances to the study of colour vision and took the first colour photograph, a feat which was not replicated for many years. He developed the modern understanding of Saturn's rings by showing that they must be composed of countless separate particles, each pursuing its own orbit. He did important early work on the standardisation of electrical and magnetic units and in the process developed the practice of decomposing all units into their basic constituent quantities, the familiar 'mass, length and time' which is now second-nature to all physicists. He was the first Director of the Cavendish, superintending its construction and early years of operation, and consequently one of the architects of Cambridge's rise to its current eminence in the physical sciences.

All told, Maxwell's achievements are rather impressive for a man whose nickname at his first school was 'Daftie' because he was thought to be slow on the uptake. He seems to have been an admirable man to boot: kind, modest, generous, helpful and with a weakness for jokes and humorous poems (some of which are reproduced in the book). As a child, Maxwell continuously pestered his parents and relatives to know "what's the go o' that", a curiosity to understand the working of things that stayed with him throughout his life and underpinned all this scientific work.

The book's author, Basil Mahon, is an engineering graduate with a long-standing interest in Maxwell which originated when he was a student. Now retired, he has been an officer in the Royal Mechanical and Electrical Engineers and a civil servant. His biography of Maxwell tells the story of his life and work. It is well-written and easy to follow, with a largely chronological treatment. Maxwell's physical ideas are simply and effectively explained in non-technical language and with virtually no mathematics. The text is not unduly burdened with references but there are extensive notes and a bibliography for further study. The book has an index, a *dramatis personae* detailing Maxwell's (sometimes confusing) relatives and colleagues and a chronology of important dates. I did not notice any typographic errors. There is an inset of black and white illustrations, well-reproduced on glossy paper. During 2006 I attended a lecture that Mahon gave about Maxwell and he spoke as well as he writes.

The Man Who Changed Everything can be strongly recommended as a general biography of Maxwell. Readers seeking a detailed, mathematical analysis of his work should look elsewhere (Mahon relates that scholars of Maxwell still argue about whether a minus sign omitted from one of the equations in Maxwell's paper "On Physical Lines of Force", published in 1861, and apparently corrected for by changing the meaning of a symbol in another equation, is a mistake or a deliberate part of the treatment). However, as a general account aimed at introducing Maxwell to a wider audience this book deserves to succeed.

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***Harrison in the Abbey*, edited by Arnold Wolfendale (Durham, Roundtuit Press, 2006). Pp. [vi] + 78. ISBN 1-904499-06-6 (paperback), £10.00 + postage, 148 x 211 cm.**

John Harrison (1693–1776) is a famous figure in maritime studies and horology; he is the man who invented an accurate portable chronometer which revolutionized the determination of longitude at sea. Some years ago, the former Astronomer Royal, Sir Arnold Wolfendale, noted that Harrison's name was not commemorated at Westminster Abbey, and with commendable energy—and invaluable support from The Worshipful Company of Clockmakers—set about rectifying this. As a result, on 24 March 2006 a memorial was unveiled at the Abbey, precisely 313 years after Harrison's birth.

The appearance of this little book (Figure 1) was linked to the unveiling at Westminster Abbey, and in it we are presented with thumbnail sketches of Harrison and his chronometers. After a Foreword by His Royal Highness, Prince Philip, and two short introductory chapters by Sir Arnold, we are introduced to Harrison's early wooden clocks by John Taylor, and this is

followed by a biographical sketch on Harrison by Dava Sobel, "Harrison's Contributions in Perspective" by William Andrewes, chapters on The Worshipful Company of Clockmakers and on Harrison's association with this group and the Clockmakers' Museum (by Dianna Uff and George White, respectively), and finally, two further biographical perspectives on Harrison, one by Andrew King and the other by Jonathan Betts.

For those who have already enjoyed Sobel's *Longitude* and want to learn more about Harrison without wading into Quill's (1966) long biography, Wolfendale's little book is an ideal option. It is beautifully-produced on fine-quality paper, well-endowed with coloured images, reasonably-priced and is very readable. I recommend that you add it to your bookcase (copies can be purchased from The Clerk, The Worshipful Company of Clockmakers, Salters' Hall, Fore Street, London EC2Y 5DE).

Reference:

Quill, H., 1966. *John Harrison. The Man Who Found Longitude*. London, John Baker.

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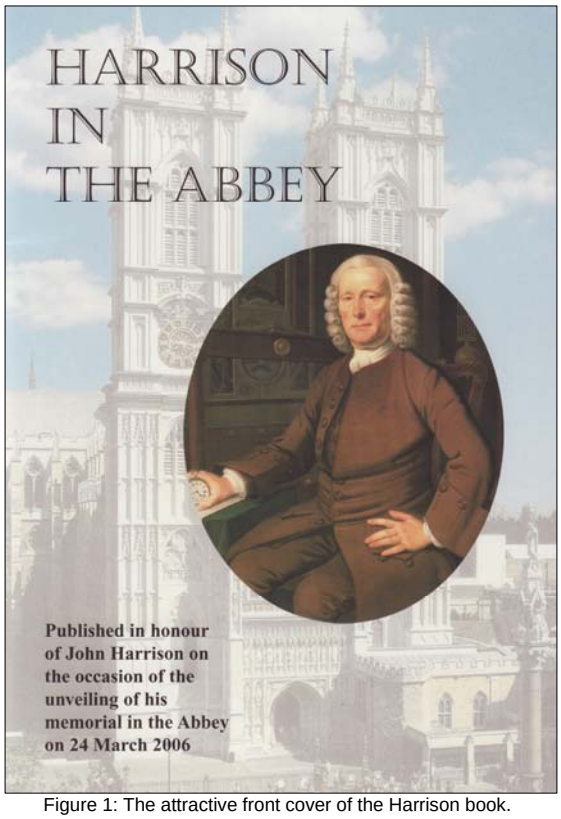

Figure 1: The attractive front cover of the Harrison book.

***Observatoires et Patrimoine Astronomique Français*, edited by Guy Boistel, 2005 (Lyons, ENS Éditions, Cahiers d'Histoire et de Philosophie de Sciences No. 54), pp. 220, ISBN 2-84788-015-1, €35, 150 x 210 mm.**

This volume contains the Proceedings of the Centre François Viète in University of Nantes colloquium, "Observatoires et Patrimoine Astronomique Français", which was held in Nantes on 8-9 June 2001. Professor Emeritus Jacques Gapaillard pointed out the three circumstances which triggered these two days dedicated to history of astronomy and observatories in France: first, a growing academic interest within France in its astronomical heritage, then the formation in Nantes, in the Centre François Viette, of a research team dedicated to historical studies in both astronomy and observatories; at last, the recent discovery in Nantes of the old observatory; this observatory, which was run by the Marine (Navy) and the City, closed in August 1887. In a sort of 'Tour de France' of observatories, this book contains a detailed and comprehensive presentation on eleven different observatories, although in a somewhat heterogeneous manner due to differing levels of available archives. For each of them, the connections between the local academic societies, hydrographic schools (when present) and town and/or public authorities are analysed since in most cases one or more of these institutions would support and fund the observatory, either in turn or simultaneously. The authors, who are astronomers and/or historians, report about the different observatories, and their successes and failures.

Laetitia Maison explores the *raison d'être* of the Bordeaux Observatory (which was created in 1878 and succeeded an earlier observatory established in 1772 by the Academy of sciences), and its activities during the early years (1879-1906). She analyses how the three objectives of the Observatory (astrophysical research using spectroscopy, the measurement of double stars, and the determination of stellar parallaxes), the economic utility of the Observatory, meteorological measures and predictions, the establishment and diffusion of a time service, the verification of Naval clocks and teaching activities (both in the University and in the City) were defined and how these objectives were fulfilled. All this occurred in spite of the interest of Georges Rayet—one of the two discoverers of the Wolf-Rayet stars—and fundamental research activity was limited to mathematical applications to celestial mechanics and astrometric observations. In fact, most time and energy was devoted to the Carte du Ciel project as Bordeaux Observatory was one of the participating observatories.

Guy Boistel examines Marseilles' Jesuit Observatory during Father Pézenas' era. Boistel first provides a detailed description of the different source materials used in his study. The many instruments available in the Jesuit Observatory (1750-1763), namely the clocks, mural quadrants and parabolic telescopes, are analysed, as are the scientific objectives and the relations between Father Pézenas and contemporary scientific communities. The presence of foreign Jesuits in Marseilles Observatory is emphasized by the author. James Caplan reviews the development of astronomy in Marseilles from 'prehistory' through to the founding of the Marseilles Observatory: Pythéas' time, the Middle Ages with Raymond de Marseilles, Guillaume l'Anglais (or de Marseilles?), the Thibbon family, then the foundation of the Observatory in 1685 when Chazelles came to Marseilles to educate sailors in hydrographic matters. The institutional history of the Observatory up till the present day is reported in an appendix, where some significant events and leading personalities are commented on.

Suzanne Débarbat describes more than the founding in 1667 of what is now l'Observatoire de Paris, soon after the creation of the Académie Royale des Sciences. She writes about the motivations, the working programs of the academicians and their astronomical measures. We find a description of the Observatoire from 1784, when Cassini IV received funds to restore Claude Perrault's edifice, to 1795, when the Observatoire was put under the supervision of the Bureau des Longitudes. A second section in Débarbat's presentation provides an insight into the relations and connections between the Bureau des Longitudes and the French observatories, and thanks to the minutes of the Bureau's meetings she is able to report on the various observatories, and the 'musical chairs' that occurred as new instruments replaced ancient ones, and how this affected the astronomers.

Françoise Le Guet Tully provides information about a special case: the creation in the nineteenth century of an observatory in France, *ab nihilo*. Her chapter, "From the reorganisation of the Bureau des Longitudes in 1854 to the creation of the Observatory of Nice in 1879: 25 crucial years to the French astronomy", contains three parts: (1) How the discovery of a new planet can influence the career of an astronomer; (2) Arago and Le Verrier, both astronomers and political key figures, but on opposite sides; and (3) October 1853-January 1854, a critical four-month period when the Observatoire de Paris and the Bureau des Longitudes were reorganized. Le Guet Tully's second part is based on the Report to the Ministère de l'Instruction Publique made by the Committee in charge of the modernization of astronomy in France. On 30 January 1854, the Observatoire de Paris retrieved its self-governing status from the Bureau des Longitudes. Later, after Le Verrier's death, according to Le Guet Tully, the Bureau may have seen the new observatory in Nice as the 'ideal observatory', as defined in the above-mentioned report.

Philippe Véron reports on the 'prehistory' of the Observatoire de Haute-Provence. He first paints a rather bleak picture of French astronomy from the time of the Revolution to the year 1920, with an evident lack of any modern observatory where stellar astronomy or astrophysics might develop. Thanks to internal reports of the Académie des Sciences and correspondence between key figures such as Danjon, Couder and Ferrié, the author details the track leading to the creation of the Observatoire de Haute-Provence. And it was not a quiet one, given the various conflicts between the different actors (Ritchey, Dina, Esclangon, Danjon and Couder) and the different institutions relating to the best site and the best instruments. In the end on 31 October 1936, and under a Front Populaire Government, a Service de Recherche d'Astrophysique was created, with a theoretical section in Paris and an observatory in the village of Saint-Michel (Basses-Alpes) in the south of France. This establishment with two sites depended on a new institutional structure (CNRS). Véron ends this story by questioning the future of the Observatoire de Haute-Provence: astronomers may be fond of large telescopes, but he points out that the first extra-solar planet was discovered in 1995 with the help of observations made with the comparatively-modest instruments at the Observatoire de Haute-Provence!

The tour of French observatories is not over! In his chapter, Jérome Lamy discusses the Observatoire de Toulouse from 1733 to 1908, emphasizing connections between knowledge and power. As in Paris, a Société des Sciences was created, but only in 1729, and an Académie des Sciences, Inscriptions et Belles-lettres, in 1746, and an astronomical observatory was given to the Académie by the City authorities as early as 1733. Garipuy, and then Darquier, were the main astronomers, participating fully in the academic and astronomical life of the eighteenth century. After the Revolution, in spite of support from the Bureau des Longitudes, scientific activity decreased, and a revival of astronomical work only occurred in 1839 when Frédéric Petit became Director. With help from the Bureau des Longitudes, and following the establishment of a new building in Jolimont that was more suitable for astronomical observations, the Observatoire de Toulouse was ready to perform a high-quality research. C. Delaunay, F. Tisserand and B. Baillaud were successive Directors of the Observatory, with each of them leaving some scientific legacy. From 1891, the main concern was the Carte du Ciel project. Lamy emphasizes that throughout its history the Observatory had three funding sources: initially the Académie (of Toulouse) and then the Capitole (City authority) and the République (either in turn or simultaneously).

Jean-Michel Faidit reports on the Observatoire de Montpellier, which started with the creation of the local Royal Society of Science in 1706. The first astronomical observation, of a 1706 solar eclipse, was reported from the Babotte Tower, the astronomical purpose of which was thereby initiated. The golden age of the Babotte Observatory ended around 1770 thanks to neighbouring conflicts, and there was then some rivalry between Toulouse and Montpellier about the formation of a provincial observatory. The revolution and subsequently coordinating activity of the Bureau des Longitudes did not favour Montpellier, and in 1810 the Babotte Observatory was assigned to the new Montpellier Faculty of Sciences. Later, astronomical observations were carried out in the observatory of the Porte du Peyrou created by Benjamin Valz in 1835, then, from 1837, at the top of the Cathedral Saint-Pierre tower. In 1862, Le Verrier succeeded in creating a modern new observatory in Montpellier, the main instrument being a reflector with a 80cm mirror made by Foucault. Faidhit's presentation ends with two appendices relating to the Babotte and Jardin des Plantes Observatories, and for both of them lists of observers and available instruments are listed.

Olivier Sauzereau writes about the different observatories in Nantes, the city at the mouth of the Loire River. Local archives reveal the early existence of astronomical activity and associated buildings in this important commercial town. To provide a good theoretical knowledge of navigation, a hydrographic school was created in 1672, the teaching being in the hands of the Jesuits. The lessons and some of the observations were carried out at the Hotel de Briord. The 1761 transit of Venus was an important event locally. Later, other observational facilities were used: the tower at the cathedral and the tower of the Maison-Graslin (which was at the highest point in the town). After a reorganization of the hydrographic schools was decreed in 1825 by Charles X, the City and the Navy collaborated and created a new Hydrographic School and associated observatory in Nantes. The 1860s proved to be the golden age of this Hydrographic School. The population then became quite interested in astronomy, thanks largely to newspaper articles, public observing nights and the creation in 1884 of the Société Astronomique de Nantes with Camille Flammarion as founding President. But in 1887, the School and the associated observatory were closed.

Two contributions concern the diffusion of astronomy in the public. Colette Le Lay presents a picture of the diffusion of astronomy, and the important contributions of Lalande (1732–1807) and Arago (1786–1853) are emphasized; for instance, Arago introduced soirées at the Observatoire de Paris and public visits. Everything changed drastically with Arago's death, when Le Verrier terminated Arago's initiatives and the popularization of astronomy moved to the hands of writers (except for Camille Flammarion, who worked for a time with Le Verrier). Le Lay examines how the public at large viewed the observatories and their professional astronomers. Danielle Fauque writes a contribution on "Observatoires Astronomiques Français et Diffusion de l'Astronomie à l'Association Française pour l'Avancement des Sciences (1872-1914) (AFAS)." First the AFAS is presented. Leading French scientists created this group after the 1870 defeat in order to promote French science, and it organized annual colloquia (with associated publications) and provided funding for scientific projects (including astronomical ones). Using the proceedings of these colloquia, Fauque analyses the relative importance of the observatories and the communications dedicated to astronomy (or presented by astronomers). On the basis of their outstanding contributions, she identifies two key astronomers, Émile Marchand, who was the first Director of the newly-created Pic du Midi Observatory, and Jules Janssen, who widely contributed on techniques and results related to astrophysics (and not just those relating to solar astronomy—which was his own main research interest).

To conclude: it is often claimed that in France everything derives from Paris, but this book shows that local contributions also have to be considered. The complex connections between institutions and actors are reported and analysed from different points of view; for instance, the actions of the Bureau des Longitudes may be seen quite differently according to the observer's situation. It would be naïve to suppose that the involvement of leading astronomers provided for the overall success of any one project. Thanks to the archives and ways in which they have been used by the different authors, readers are immersed in national and local history that has links to astronomy and to the development of various French observatories. This invaluable book also contains information about many of the astronomical instruments available during this period. Finally, the sources of the various archives, minutes of meetings and reports used in researching the chapters of this book are clearly indicated.

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