BOOKS & ARTS

A measure of importance

Astronomer François Arago of the Paris Observatory defied war, disease and death to survey the meridian running through his city — and helped define the metric system we use today, explains **Andrew Robinson**.

Full Meridian of Glory: Perilous Adventures in the Competition to Measure the Earth

by Paul Murdin

Springer: 2009. 187 pp. £15.99

Astronomer Paul Murdin began his career in 1963 at the United Kingdom's Royal Greenwich Observatory. Proud of his employer's history, going back to the observatory's foundation by King Charles II in 1675, Murdin became curious about the prime meridian running through Greenwich that, in 1884, came to define Greenwich Mean Time. He learned, however, that its roots lay not in Britain but in seventeenth- and eighteenth-century France, intertwined with the French Revolution. The accurate scientific measurement of the Paris meridian also formed the basis of the nineteenth-century metric system and its modern form, the *Système International* (SI). Murdin's book *Full Meridian of Glory*, its title taken from Shakespeare's *Henry VIII*, is the outcome of his long fascination with the Paris Observatory, founded by Louis XIV in the late 1660s. Murdin's interest is reinforced by his regular professional visits to the Paris headquarters of the European Space Agency.

Others have trodden this path before, notably Ken Alder in his prizewinning *The Measure of All Things* (Little, Brown; 2002), a historian of science mentioned only once by Murdin. Although a better narrative writer than Murdin, Alder focuses on the 1790s, whereas Murdin ably covers four centuries. Alder also lacks the enthusiasm and knowledge of a working scientist.

Murdin knows what it is like to make night-time observations in sub-zero conditions. He would empathize with the French savants who, in 1734–44, laboriously surveyed and compared the length of a degree of latitude in polar Lapland with that in the equatorial Andes, to prove whether Earth was flattened or elongated at the poles. "I can speak of the pain from personal experience, having left a ring of skin from around my right eye frozen to an eyepiece when I withdrew my head from a telescope in an upstate New York observatory," Murdin writes. He recounts how French astronomer Pierre Charles Le Monnier "had a similar experience in Lapland when his tongue froze to a silver cup from which he was

drinking brandy". And when Murdin includes a full-page photograph of NASA's notorious Mars Climate Orbiter — lost in space in 1999 as a result of a muddle between the imperial units used in its design and the metric units used in its operation — the past and present are seamlessly integrated.

The same cannot be said for the main text. Murdin draws on an extensive and distinguished cast of scientists, including the four key figures of the Cassini dynasty and their nemesis Isaac Newton, whose theory on gravity

François Arago was influential in both science and politics.

was opposed by the elder Cassinis. The Cassini family reigned at the Paris Observatory for more than a century, and mapped France through their combined efforts. Also mentioned are the scientists who surveyed the Paris meridian at the turn of the nineteenth century — in particular, Jean-Baptiste-Joseph Delambre, Pierre Méchain and François Arago. Instead of weaving them into the main text, Murdin mostly discusses their lives in numerous thumbnail sketches set apart in paragraphs of small type. This typographical separation of the biographical from the scientific makes for an indigestible and sometimes confusing read, even though the sketches are informative and often enjoyable.

Fortunately, Arago, clearly a hero to Murdin, gets a lively chapter of his own. Arago became director of the Paris Observatory in 1843. In 1848, he was briefly the minister of war and of the navy, and even the head of state for 46 days during that Revolutionary year. He is known for applying the wave theory of light — proposed by his friend Thomas Young — to stellar aberration, and for suggesting the crucial test between wave and particle theory by comparing the speed of light in water and air. But Arago's journey to survey the mountains of Spain during the war with France in 1806–09, following the death of Méchain from malaria, was both significant science and colourful adventure. Running the gauntlet of isolation, bad weather, equipment failure, brigands, homicidal Spanish mobs and a British blockade of French ports, Arago completed his measurement of the meridian at Majorca in the Balearic Islands. At one point, he had the strange experience of reading in a newspaper about his own execution by hanging, in which he had apparently met death heroically.

In an unusual final chapter, Arago returns as Murdin gives a guided walk through Paris following the trail of more than 100 bronze discs set into the pavement, which carry merely the inscription 'ARAGO' and the compass direction letters N and S. They mark the line of the Paris meridian. The discs were created by a Dutch conceptual artist, Jan Dibbets, winner of an open competition to honour Arago on the bicentenary of his birth in 1986. "The idea was that the people of Paris would accidentally come across the medallions, wonder about them and thus discover Arago," Murdin explains.

At the Louvre, three Arago medallions traverse the Denon Wing, and five others run across the Cour Carrée behind the glass pyramid. In Dan Brown's *The Da Vinci Code*, Murdin informs us, the novel's hero is drawn to the pyramid by the discs. Yet as this quirky book demonstrates, the discs are not mysterious markers but a celebration of French science at its most rational, symbolized by Arago. ■

Andrew Robinson is a visiting fellow at Wolfson College, Cambridge CB3 9BB, UK. He is the author of *The Story of Measurement* and *The Last Man Who Knew Everything*, a biography of Thomas Young.

e-mail: ar471@cam.ac.uk

C. STEUBEN/OBSERVATOIRE DE PARIS