the Dred Scott case and, ultimately, the Civil War, gives us a rather different context in which to place Darwin. Rather than seeing him worried by British reactions to early theories of transmutation, we are asked to see him engaged in dialogue with American writers and events. There is an important reminder here about the movement of literary and scientific ideas between Britain and North America in the mid-nineteenth century, yet Darwin’s public reticence ensured that the flow of ideas was mostly one way (his responses were often clear and strong, but almost always private). These chapters worked better as reinterpretations of the relations between science and race than as evidence of Darwin’s views being influenced.

However, Desmond and Moore’s emphasis on the American scientific supporters of slavery leads them to several interesting reinterpretations of key decisions by Darwin. For instance, rather than asking why he delayed writing his ‘big book’ on natural selection until the mid 1850s, they ask instead: Why did he start writing it then? Their answer lies in Darwin’s growing annoyance at Louis Agassiz’s support for plural racial origins, coupled with the specific stimulus of Nott and Gliddon’s *Types of Mankind* (1856). This, they suggest, made Darwin sufficiently angry that he finally began to gather his own materials into a book. Similarly, they link his decision at last to write publicly about human origins, in the book that became *The Descent of Man*, to the outcry over Governor Eyre’s brutal repression of the uprising in Jamaica in 1865. The characteristics of the different races were of such contemporary relevance that Darwin was goaded into explaining his understanding of how mankind had developed and diversified. (Darwin’s late decision to omit mankind from *Origin* was not, however, due to events in America, but to those in India. Right up to 1857, mankind was to be included, but when the uprising in India cut off letters from a key correspondent, Darwin felt he simply did not have sufficiently complete evidence to be as convincing about mankind as he could be about the distribution of seeds, the varieties of pigeons, or the species of barnacles.)

Overall, I was disappointed that the narrative pace did not live up to Desmond and Moore’s 1991 biography of Darwin. For the sake of my students, I very much hope that the authors will integrate their insights and new contextualizations into a revised edition of the biography.

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PRACTICAL ASTRONOMY AT UK UNIVERSITIES


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In a year when government funding for astronomy is being severely squeezed, it is salutary to realize that it was only after World War II that there was any significant

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government funding at all for university astronomy. To understand why that was, it is helpful to look back at how our forebears built up the framework that led eventually to astronomy’s becoming a recognized university subject with sufficient status to attract national support. This was the theme of Roger Hutchins’s DPhil thesis, which he has now turned into this monumental study (533 pages, weighing 1.3 kg) of the observatories at British universities, and how they developed from the founding of the Radcliffe Observatory in Oxford in 1772 to the beginning of World War II; some discussion of later developments is also included.

Although astronomy is one of the oldest sciences, perhaps second only to mathematics, and it figured largely in the syllabuses of mediaeval universities, there was very little financial support for practical astronomy in British universities in the eighteenth and nineteenth centuries, and most of that was for teaching. During most of this period, research in astronomy was almost entirely directed towards positional astronomy, a field that was dominated in the UK by the Royal Observatory at Greenwich. The difficulties faced by university professors in obtaining funding are exemplified by early developments at Glasgow, where in 1753 Robert Dick, Professor of Natural Philosophy since 1751, submitted a request for an observatory, to support teaching. The college did grant him money for a small mural quadrant, and he later benefited from the bequest of other instruments from one Alexander Macfarlane, a merchant in Jamaica. In 1757 the Senate approved funds for the Macfarlane Observatory, which opened in 1760. The problem that then arose was that a chair in practical astronomy was founded, but the incumbent was not allowed to teach any mathematical parts of the subject—these were already being taught by Dick, who gained income from the lecture fees. Very few students were attracted to a purely practical syllabus, so the professor had an inadequate salary and was very constrained in what he could accomplish, either in teaching or in research. Despite that, the first professor, Alexander Wilson, did achieve some research results, including the discovery of the well-known Wilson Effect in the umbrae of sunspots. Similar problems of having too few students, inadequate funding, and constraints on teaching affected other universities.

In England, the major university centres for astronomy before about 1900 were Oxford and Cambridge, and Hutchins tells an interesting tale of their contrasting fortunes. At Oxford the first observatory was the Radcliffe, founded in 1772 for the benefit of the university’s Savilian Professor of Astronomy, then Thomas Hornsby. During Hornsby’s time, relations between the Radcliffe Trustees and the university were cordial, and the observatory flourished. Unfortunately, relations soured in 1839, when the university appointed a new professor with no practical experience. The Trustees withdrew the observatory from the university and appointed their own Observer, leaving the new professor with neither observatory nor instruments. An opportunity was missed in 1860 to reunite the observership with the Savilian Chair, and the split was compounded by the opening of the University Observatory in 1873. With bad relations between the two observatories lasting over the next 60 years, there was a blight on astronomy in Oxford that only really lifted when the Radcliffe Observatory was moved to South Africa in 1935, and Plaskett received funding that enabled him to rejuvenate astronomy in the university.

The situation over the same period in Cambridge was very different. First of all, during Airy’s long reign as Astronomer Royal at Greenwich, he built on his Cambridge links (he had been Plumian Professor) and developed a relationship
that David Dewhirst termed ‘the Greenwich–Cambridge Axis’. In the first instance, this caused the Cambridge Observatory (completed in 1824) some problems, because Airy attracted all the best Cambridge observers to Greenwich, where higher salaries were available. However, in the end these links, together with the combination of two fortunate circumstances, led indirectly to a very fruitful development in Cambridge early in the twentieth century. The first event was that Hugh Newall, perhaps the last of the wealthy amateurs that so dominated nineteenth century astronomy (and were largely responsible for founding the Royal Astronomical Society), decided in about 1904 to set up a solar observatory in Cambridge. This was private, but in the grounds of the Cambridge Observatory. Less than a decade later, by a coup that certainly surprised Lockyer, Cambridge persuaded the government to move the Solar Physics Observatory (originally founded and run by Sir Norman Lockyer, but by then largely government funded) from Kensington to Cambridge, where it was merged with Newall’s observatory. Newall’s personality was such that cordial relations between the two neighbours persisted throughout his directorship.

These examples merely scratch the surface of a comprehensive discussion of how university observatories developed, covering all their trials and tribulations, and discussing in careful and objective detail both the controversy over the discovery of Neptune and the neglected story of H. H. Turner’s frustrations as Director at Oxford from 1894 to his death in 1930. Oxford and Cambridge were the major UK university observatories of the period, and Hutchins rightly concentrates on them. But he also gives good coverage to Glasgow, Durham, Armagh and Dunsink (the latter being part of the UK until the formation of Eire), and puts the UK in an international context with discussions of nineteenth-century and twentieth-century developments in Europe and America. It is clear that, with a few exceptions, America adapted faster and more effectively to the rise of astrophysics in the second half of the nineteenth century, with many of the older European observatories caught in the trap of large and time-consuming projects in positional astronomy, such as the *Carte du Ciel*. The key role of the Royal Astronomical Society, particularly in the nineteenth century, is documented, and the twentieth-century development of University College and Mill Hill Observatory is covered.

Inevitably, where I have some personal knowledge I have found one or two small errors, especially in the postwar years that strictly fall outside the author’s remit. For example, the Royal Greenwich Observatory vacation courses mentioned on page 206 pre-dated the foundation of the University of Sussex and were by no means exclusively for Sussex students; also, it is misleading to say that the University of Edinburgh ‘became a university in 1708’ (page 179)—it had a Royal Charter as early as 1582, and 1708 was just the date when non-Arts subjects were first introduced; finally, Smart’s new observatory in Glasgow (page 397) was in University Gardens (a street), not ‘in the University garden’. However, overall this is a thorough and scholarly work, full of fascinating anecdotes. It is quite densely written, so it is not an easy read, but it certainly repays the effort of reading.

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