

# BOOK REVIEW - William Herschel Discoverer of the Deep Sky

Review by Mark Bratton

This long-awaited study of the observing career of William and Caroline Herschel was finally released last year as a print-on-demand book. The recent decision by Cambridge University Press to concentrate exclusively on academic publishing and the suspension of operations of Willmann-Bell in the United States (since revived by the American Astronomical Society) has meant that there are few, if any, remaining publishers willing to take a chance on printing an astronomy-related book that cannot guarantee reliable sales. In response, author Wolfgang Steinicke chose to go the self-publication route and the result is a very handsome book indeed.

Print-on-demand books, generally speaking, have a poor reputation among the reading public and usually feature cheap paper, poor binding, and poorly reproduced illustrations. There is no hard and fast reason for this however, and Steinicke has chosen to go in the opposite direction with his book. Considering the fact that the author has been researching this work for decades, his intention seems to have been that the resulting publication would be "built to last" and what we have is an imposing volume, weighing in at about 3.75 kg. This is a well-bound, attractive publication that uses a heavy, glossy paper stock, guaranteeing the best reproduction possible. The sans serif typeface used for the text is clear and easy on the eye and the book has been expertly laid-out by the author and is fun to just browse through, which I did for the first couple of weeks after it arrived at my door.

There are several hundred illustrations reproduced in the book, many of them images of deep sky objects and, when available, sketches of the same objects that Herschel made. There are reproductions of observing note books, field and finder sketches detailing both William and Caroline's observing activity, images of telescopes and telescope parts, historical figures, etc., etc. It's just not possible to describe all that is presented in detail. There are a plethora of tables and charts that provide a clean, cut and dried interpretation of the data presented.

The result is that, for the reader, the book is delightfully slow going. The narrative is already rich and complex; turning the page and being confronted by a handful of fascinating illustrations or detailed table of data means that one doesn't read the book so much as absorb it. I would usually read about 10 pages a day; I really couldn't process any more. The book took two months to read.

The book is a thorough re-examination of the observing career of the Herschels, starting at the very beginning in 1774 and continuing to the end of William Herschel's life. The author has done a deep dive into the historical record, studying all published and unpublished accounts archived at the Royal Society, the Royal Astronomical Society and elsewhere. The amount of effort it must have taken to study, organise and collate this massive body of work is little short of astounding. The result is a pleasure to read.

Steinicke quite rightly sticks to a chronological organisation of Herschel's career and the book is divided into six sections. The first concerns Herschel's early observational activity covering the years 1774 to 1783 and we can see straight away how William Herschel's approach to the nighttime sky differed from that of both contemporary astronomers and those who had come before. During this period, Herschel engaged in three star reviews and two double star surveys, each lasting many months and covering wide swaths of the sky. He examined hundreds of targets, resulting in the discovery of large numbers of double and multiple stars, "garnet" stars, deep sky objects and the planet Uranus.

The superiority of Herschel's broad and deep surveys can be seen in the example of the astronomer Christian Mayer, who published a catalogue of 72 double stars discovered up to the year 1779. William and Caroline, by contrast, published two double star catalogues presented to the Royal Society in 1782 and 1784 that numbered over 700 objects, the overwhelming majority new discoveries.

For deep sky enthusiasts, the meat of the book is covered in sections two and three, which deal with the Herschel's monumental sweep campaign in search of undiscovered nebulae. This part of the book goes into great detail describing how records were kept and the absolutely crucial role that Caroline played in the success of the almost twenty year campaign.

The key development for the project was the construction of the large twenty-foot reflector that allowed a deep survey of the sky to be attempted. Steinicke describes the telescope in detail in this section, demonstrating how an unwieldy telescope was slowly improved over time, with the aid of Herschel's brother Alexander, who built the devices that brought greater refinement and accuracy to the telescope.

For the most part, the actual observations drive

the narrative and Steinicke describes the discovery circumstances for about 40% of the nebulae appearing in Herschel's three catalogues. Interesting or important objects are, of course, described, but many of the highlighted objects are ones which have had identity problems over the years and Steinicke meticulously describes how he has managed to clear up errors in the record over time. Pairs and groups of galaxies also come in for examination and the combination of Herschel's original descriptions combined with other sources and Steinicke's own narrative means that highlighted objects are described in great detail.

No better example of this can be seen than in Steinicke's narrative of Herschel's "monster" sweep 396 that occurred on the night of April 11, 1785. Over the course of a three hour, forty minute period, Herschel observed 79 non-stellar objects, 71 of which were new discoveries. Here, Steinicke provides a minute-by-minute description of proceedings; when the sky darkened, when the moon set, the exact moment when a new nebula came into view, even star gages that Herschel engaged in when he thought there was a lull in the proceedings. The latter part of the sweep found Herschel crossing Abell 1656, the Coma Cluster of galaxies and Herschel discovered 21 of them during the sweep. It is incredible that William and Caroline could accurately record such a bounty of nebulae in the short time available to them. They must have been a well-oiled team.

The period from 1783 to 1789 was extremely busy for William and Caroline, involving as it did the move to Clay Hall and later Slough, William's telescope building business, the construction of the forty-foot telescope, visits by scientists, noblemen and royalty and the preparation for publication of two of the three catalogues of new nebulae. Steinicke handles this by dividing the sweep campaign up into individual years, describing proceedings and providing a summary of activity for the year at the end of each chapter.

Section four concentrates on published papers of the later years and William Herschel's interpretations of the results of his observations.

Section five involves Steinicke's own analysis of the sweep campaign and with charts and diagrams shows where Herschel observed, where he didn't and the locations of the stars and nebulae that were recorded. There were three principal gaps in Herschel's sky coverage. First was a narrow strip of sky to the west of the summer Milky Way that crossed the meridian in June; the sky was too bright then to observe. Next was a patch of northern spring sky at the zenith west of Ursa Major; the high angle of the telescope tube at a cold and icy season meant the telescope was dangerous to use under the circumstances. And the third was about half of the sky within 20° of the north celestial pole; Herschel rarely turned the twenty-foot in this direction of sky, in part because of the slow diurnal motion of the sky in this region. This still left about 90% of the

sky from the north celestial pole to Herschel's southern horizon that was swept.

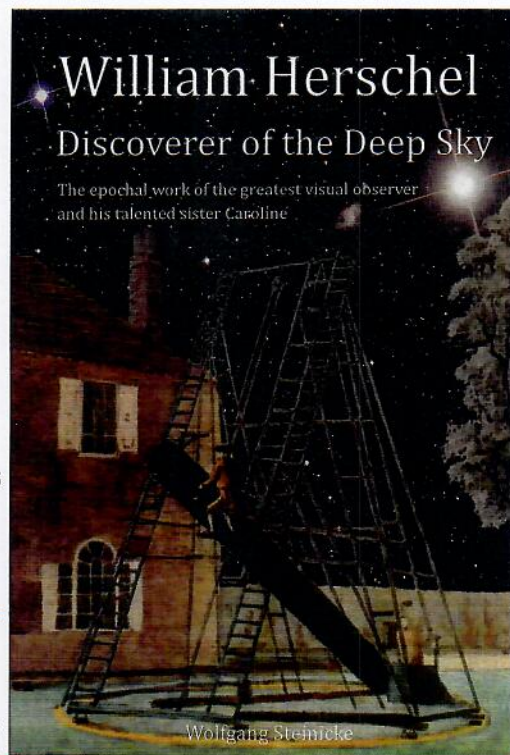
Steinicke also examines Herschel's sweeping pattern, estimating that gaps in the sweeping motion meant that up to 30% of the sky would have been unexamined. Steinicke even comes up with an estimate of the additional number of nebulae that Herschel could have discovered if he had been able to fill in the gaps.

A particularly interesting feature of this section is a table of 76 objects described or suspected by Herschel that did not appear in any of the three published catalogues. Some of them were observed with the 7-foot reflector during the early period of the star reviews, but 59 of them were discovered during the sweeps.

Many of these objects were subsequently found by later observers and made it into the NGC or IC. But sixteen of them have UGC or MCG designations, meaning that in the two hundred plus years since their discovery by Herschel they escaped visual detection. This holds true as well for Trumpler 7, King 17, Collinder 115 and LBN 537; these were also Herschel discoveries. Looking over my own personal observing records, I've observed 48 of the 76. Looks like I have some work to do.

The final section discusses revisions to Herschel's catalogues made through the years. This section is followed by an epilogue, appendix and a well-organised, detailed index to the book.

It is hard to overstate how important this book is. It compares very favourably with Dreyer's "Scientific Papers of Sir William Herschel" and the rich legacy of the late Michael Hoskin, who examined the Herschel oeuvre in many works down through the years. In my opinion, Steinicke's book exceeds them both. Like Steinicke's previous magnum opus, "Observing and Cataloguing Nebulae and Star Clusters", William Herschel: Discoverer of the Deep Sky will be read, re-read and consulted for many years to come. It belongs on the bookshelf of every serious observer of the deep sky.



**William Herschel**

**Discoverer of the Deep Sky**

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