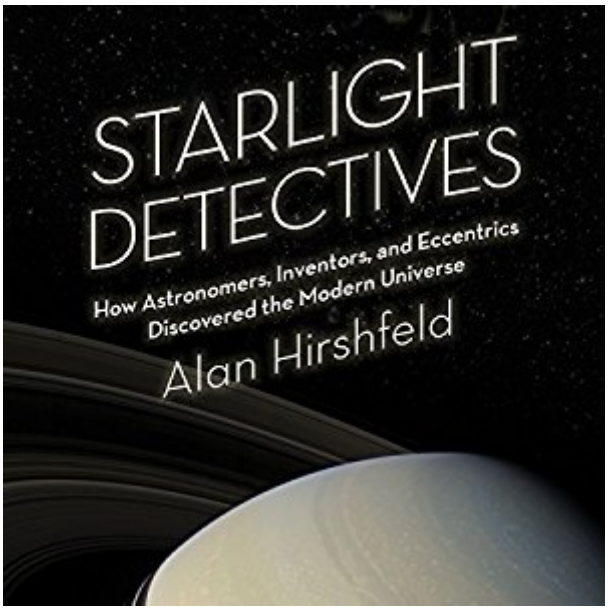
Starlight Detectives: How Astronomers, Inventors, And Eccentrics Discovered The Modern Universe



Synopsis

In 1929, Edwin Hubble announced the greatest discovery in the history of astronomy since Galileo first turned a telescope to the heavens. The galaxies, previously believed to float serenely in the void, are in fact hurtling apart at an incredible speed: the universe is expanding. This stunning discovery was the culmination of a decades-long arc of scientific and technical advancement. In its shadow lies an untold, yet equally fascinating, backstory whose cast of characters illuminates the gritty, hard-won nature of scientific progress. The path to a broader mode of cosmic observation was blazed by a cadre of 19th-century amateur astronomers and inventors, galvanized by the advent of photography, spectral analysis, and innovative technology to create the entirely new field of astrophysics. From William Bond, who turned his home into a functional observatory, to John and Henry Draper, a father and son team who were trailblazers of astrophotography and spectroscopy, to geniuses of invention such as Lon Foucault and George Hale, who founded the Mount Wilson Observatory, Hirshfeld reveals the incredible stories and the ambitious dreamers behind the birth of modern astronomy.

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Customer Reviews

Review of Hirshfeld’s "Starlight detectives" by Paul F. Ross As a student in the process of metamorphosing into a scientist, I noticed that science could advance when instrumentation advanced and very often instrumentation advanced when science motivated the effort. Improved instrumentation and improved knowledge, including theory, seemed interlaced. I’ve seen no survey of the history of all the sciences that tests this hypothesis, but Hirshfeld’s Starlight detectives (2014)

certainly supports the notion ... repeatedly. Picking up astronomy in the early 1800s, he follows astronomy through the late 1920s. His stories strongly fit the hypothesis of interlaced progress. Refractor and reflector telescope lenses improved. Positioning of telescopes with respect to Earth's_____
_____Hirshfeld, Alan Starlight detectives: How astronomers, inventors, and eccentrics discovered the modern universe 2014, Bellevue Literary Press, New York NY, 400 pages_____
_____atmosphere - putting telescopes under better weather or higher on mountains - improved. Means for observing and capturing data from the observations improved from astronomers eyeing what they saw and recording it in drawings to astronomers becoming photographers and photographing what the telescope saw - including improving the technology for tracking a moving stellar object through hours, even repeated days, of viewing. Teasing light into its components improved through the use of ever-better spectroscopes and diffraction grids. With these advances in the technologies for capturing data, astronomy's understanding of the "universe" expanded from "the Milky Way is the universe" to Hubble's "there are many island universes (galaxies) and most are moving away from us." Amateur astronomers - they had to be wealthy to buy equipment and have the freedom to allocate time to astronomy - contributed uniquely, some might even say "led," innovation in the 1880 - 1900 time span. In this time period, the very purpose of astronomy changed from mapping the skies to understanding the evolving history of the universe. Even professional astronomy was upended. Hirshfeld tells the story. Alan Hirshfeld is professor of physics at the University of Massachusetts Dartmouth and an Associate of the Harvard College Observatory. His several other book titles and the multiple journals for which he has written are listed. I bought Hirshfeld's book having read Pesic's review (2014) in the Wall Street Journal. Hirshfeld's story thread necessarily transitions from place to place, time to time. As lenses improved, the "best and biggest" producing the most new information was now "here," then "there." I found it interesting to see the contributions made by various private and university observatories (Harvard, De La Rue, Draper, Common, Roberts, Lick, Huggins, Fleming, Cannon, Barnard, Kenwood, Yerkes, Flagstaff, Mount Wilson), some of the contributions being made "in the back room" by "computers" - women employed to make measurements and do calculations using photographs as their data source. The book's index allows one to trace the story of "an observatory" through what, sometimes, are its several phases of creativity and contribution. The mechanisms for moving the telescope (or its lens, or its film plate) as the celestial body being observed moves across the sky are at least noted, if not described in detail, as they improved in their function. As

photography matured and film improved, the photographic record became the principal source of data for astronomy. Fraunhofer, analyzing sunlight after it was divided into light of various wavelengths by passing through a prism, reported dark lines (soon named Fraunhofer lines) in the late 1810s. Bunsen and Kirchoff, working together in about 1850, pursued analysis of the wavelengths of light coming from chemical elements being incinerated in the heat from a Bunsen burner. They learned the patterns of wavelengths emitted by various elements and examined sunlight for the elements present in the Sun. Their work led to Swedish astronomer Angstrom's extension of the mapping of spectral lines in sunlight in the late 1860s which, in turn, led to use of prisms and diffraction grids and film to analyze the spectral lines from stars. Spectral lines from hydrogen in sunlight could be recognized for their pattern, but were recognized as having been shifted in wavelength (the "red shift") as the ideas of Doppler with respect to sound, discovered and named the Doppler shift in the early 1840s, were applied to light emitted by stars moving away from Earth (producing the "red shift") as observed by Vogel at the Potsdam Astrophysical Observatory in the early 1870s. Interlaced developments from many contributors? Yes indeed! Daguerre invented light-sensitive film and began photography in France, showing his work publicly by the late 1830s. Whipple and Bond photographed the Moon in 1851 using the daguerreotype process and created a sensation that effectively introduced photography as necessary instrumentation for an astronomical observatory. Eventually Hubble, using the then "biggest and best" (100 inch) reflector lens at Mount Wilson in Pasadena CA, discovered a Cepheid variable in the M31 "nebula." Hubble understood that this Cepheid's dimness - all variable Cepheids were thought to be of the same brightness at their brightest and therefore capable of serving as a "standard candle," observed brightness indicating distance to the Cepheid - indicated that it was much further from earth than the outer limits of the Milky Way based on the then-estimates of the size of the Milky Way. The variable Cepheid in M31 meant that M31 was outside the Milky Way, was a cluster of stars, and was not a glowing body of gas somewhere within the Milky Way. The data about the Cepheid variables in M31 and its meaning about a universe of many galaxies began emerging in 1923. To identify all the threads in his story, Hirshfeld begins in the early 1800s and concludes his story with Hubble's and Humason's contribution of new ways to measure the distance to galaxies in the 1920s. Having tasted Hirshfeld's slice of the history of astronomy, 1800 to 1930, I immediately wondered if there's a history that covers the whole of human interaction with the stars ... thousands of years. If there is a pointer to such a history in Hirshfeld, I missed seeing it. Reading Hirshfeld's history, one has the impression that all the astronomical research by amateurs and professionals during this period occurred in America and England. There are moments when Hirshfeld does see astronomy being

done in other parts of Europe, but they are few, and the reader is left wondering if Hirshfeld's is a "world view" of the development of astronomy in this time period or whether it is very much "American-centric" with a nod to England. The current issue of the journal Science arrived in my US mailbox as I finished reading Hirshfeld. It had a news story about a supernova (exploding star), first seen in January 2014, being reported in several peer-reviewed journals (Clery, 2014) as well as a news story (Girardi, 2014) and a research report (Melis et al, 2014) about "controversies" with respect to the distance to the Pleiades (a star constellation) being "resolved" using new measurements available from Very Long Baseline Radio Interferometry, thus correcting measurements made using the European-launched Hipparcos astrometric satellite. There was also a report in the journal about planet formation (Meng et all, 2014). I was reminded of the advances in astronomical knowledge and instrumentation that have occurred in the last century (1920 to now) about which I had learned nothing by reading Hirshfeld ... wanting the delight of having and reading Hirshfeld's history to continue to "right now." The reader may want to look at Waller and Hodge (2003), published a decade ago. It does not bring the reader to "right now," but it does extend Hirshfeld's story about eighty years.In the final chapter I came upon the statement in Hirshfeld that "... for each million-parsec increment in distance ... a galaxy's speed ratcheted up a staggering five hundred kilometers per second (eight hundred miles per second)" (p 329). I did a double take. I got my calculator. Five hundred kilometers is roughly 308 miles, not 800 miles. Hirshfeld had made a mistake and his checks, the reviewers' checks, the publisher's checks had failed to catch the mistake. Was this work as carefully put together as I hoped it had been? Hirshfeld's history has a fine bibliography, index, set of notes citing references, even a glossary of names and a very handy timeline. Historians of astronomy will appreciate Hirshfeld's work. Readers will enjoy the read and, like me, be ready for more information from other sources.Bellevue, Washington9 September 2014ReferencesClery, Daniel "Supernova breaks the mold: A massive explosion in a nearby galaxy both confirms and confounds astronomers' expectations" 2014, Science, 345, 993Girardi, Leo "One good cosmic measure: Radio-wave interferometry provides an accurate measurement of cosmic distances" 2014, Science, 345, 1001-1002Hirshfeld, Alan Starlight detectives: How astronomers, inventors, and eccentrics discovered the modern universe 2014, Bellevue Literary Press, New York NYMelis, Carl, Reid, Mark J., Mioduszewski, Amy J., Stauffer, John R., and Bower, Geoffrey C. "A VLBI resolution of the Pleiades distance controversy" 2014, Science, 345, 1029-1032Meng, Huan Y. A., Su, Kate Y. L., Rieke, George H., Stevenson, David J., Plavchan, Peter, Rujopakarn, Wiphu, Lisse, Carey M., Poshyachinda, Saran, and Reichart, Daniel E. "Large impacts around a solar-analog star in the era

of terrestrial planet formation" 2014, Science, 345, 1032-1035Pesic, Peter "Flickers in the firmament" 2014, Wall Street Journal, 26-27 July, p C9.Waller, William H., and Hodge, Paul W. Galaxies and the cosmic frontier 2003, Harvard University Press, Cambridge MA

Wow, what a great book on the history of astronomers and their understanding of the stars. I am an avid astro-imager myself and especially enjoyed reading about the early development of astrophotography. I smiled to myself many times while reading about the amateur astronomers of 100 to 150 years ago and their constant want/need to buy or build newer and larger scopes and equipment. Some things never change! We still suffer from those same needs. I must say that I was very surprised at how popular it was amongst the people with inquisitive minds and how many built observatories to house their instruments. I also find it interesting that the scientists of those days, both professional and amateur, were held in very high esteem by the public, much as our athletes and entertainment celebrities are today. It also certainly made me more appreciative of the instant communication we have today versus the slow long distance communication of those days to share ideas. Many of the names are very familiar to most anyone with some background in astronomy but there were also many unsung heroes who were totally new to me. This is one of the best non-technical books I have read on astronomy and highly recommend it to anyone with even a passing interest as well as my fellow astronomy buffs.

This is a history of mankinds search for the stars here on earth. The book starts in the mid 19th century and continues through the 1930s. It focuses on key individuals, both amateurs and professionals (and the line was unclear on the separation) who moved the astronomy forward to the modern era.The best part of the book, in my opinion, covers Hubble and his observations that solved the conflict on whether there was one galaxy or many. This happened in 1923 and his presentations afterwards resolved the issue once and for all. Of course, the result led the recognition today that there billions of galaxies in the universe.In the development of this history, the book covers the importance of photography, spectographs, and, of course, telescopes. The book reviews the development of the huge telescopes of the late 19th century. Some were refractor telescopes and some were reflector.My only issue with the book is that it doesn’t do a very good of covering the difference between these two types of telescopes: reflector and refactor. I had to look it up to get some clarity.Other than that issue, I consider this book a good read and worthwhile for anyone interested in astronomy.

I bought this books as a gift for my husband, who has been involved with an astronomy project at the museum where he works. He has found the book to be very interesting, and learned a lot that he had not run across elsewhere. Although he is not an astronomer, he has done a lot of reading about the history of the telescope and the major "players" in the astronomy world, and he said this book filled in a lot of information that he hadn't found elsewhere. He also said it was very readable, and though it contains a lot of technical and historical information it was also a pleasurable read.

A great read for history of science buffs. I had never thought about how the primitive state of photography in the 19C had impacted astronomy nor anything about the rivalries between the amateur and professional astronomers affected the field of astronomy.

Fascinating read with simple to understand technical advancements over the centuries. I imagined how wonderful it must have been to look out to the Heavens a 150 years ago to see what the heck was there, and try to develop a better telescope to see more...to this day with the Hubble!

More fun than a person ought to have on a weekday. Absolutely delightful science history.

If you have an interest in astronomy, read this book. Then go out and look with wonder at the stars.

Storm: The Conquest of the Great North Faces of the Alps (Modern Library Exploration) Days of Blood & Starlight (Daughter of Smoke and Bone Book 2) Days of Blood & Starlight (Daughter of Smoke and Bone) Stella by Starlight Sierra Starlight: The Astrophotography of Tony Rowell Stallion by Starlight (Magic Tree House (R) Merlin Mission) Runaway (Starlight Animal Rescue Book 1)