BOOKSHELF

Book Review: 'Starlight Detectives' by Alan Hirshfeld

One amateur astronomer adjusted his eyes for nighttime observation by staring into a deep well.

By PETER PESIC

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The crispness of Saturn's rings; the strange, vivid colors of nebulae; the imposing spirals of distant galaxies: sights so vivid and familiar that we feel we have actually seen them ourselves, with our own eyes. Yet all these iconic views depend on photography or computer imaging, often pushed to their extremes, far beyond the capability of the human eye. To a surprising extent, what we consider "our" vision of the cosmos is really shaped by technological artifice. Alan Hirshfeld's "Starlight Detectives" tells the story of how photography entered astronomy and transformed it, utterly changing our understanding of the universe.

Starlight Detectives

By Alan Hirshfeld
Bellevue Literary Press, 399 pages, $19.95

A long-exposure image of the Palomar Observatory near San Diego shows the 200-inch telescope inside its rotating dome. © *Bill Ross/CORBIS*

Mr. Hirshfeld, a physicist at the University of Massachusetts Dartmouth, writes clearly and engagingly, at times excitedly. To be sure, anyone who has ever looked through a telescope will recognize what Mr. Hirshfeld describes: "Looking at a star in the eyepiece, one sees, not a languid speckle against the firmament, but a crazed firefly, darting about in random fits." He brings forth a large and mostly unfamiliar cast of remarkably interesting characters. Many of them were amateurs in an age when that was not a derogatory term but denoted "lovers" of astronomy in the most literal, positive and passionate sense. For instance, in the early 1800s, William Bond went from his day job in a Boston clockmaker's shop to nights spent scanning the skies. He prepared for these sessions, Mr. Hirshfeld recounts, by "staring into a well for ten minutes" to adapt his eyes. Bond was the first in America to spot the Great Comet of 1811, and by 1851 he had helped make one of the first daguerreotypes of the moon. What made this difficult was that the insensitive photographic plates of the day required very long exposures, and telescopes didn't yet have the mechanical capability to track their objects steadily.

Bond became the astronomer at the fledgling Harvard observatory, but many of his peers were pure amateurs, some of them wealthy, pouring their fortunes as well as their sleepless hours into home observatories. Mr. Hirshfeld has a keen eye for these personalities and their stories. His enthusiasm is justified by such extraordinary characters as John and Anna Draper, whose Manhattan mansion included a state-of-the-art (for 1870) observatory on the far edges of the city (at the time, around 40th Street). After completing his own grand tour of the Continent, their son Henry took up

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their work—if only Henry James or Edith Wharton had treated these astronomical votaries and their curious quests!

Interestingly, these amateurs were often more advanced in their views than the professional astronomers of the time, who devoted themselves to arduous measurements of celestial position, following the mathematical direction that had long guided astronomical practice. In contrast, amateurs such as Lewis M. Rutherfurd in America and William Huggins in England pioneered the development of astrophysics, the study of stars and galaxies as laboratories for physical processes mostly impossible on earth. For a long time, the professionals judged that their trained eyes could see far more than imperfect photographs recorded. Mr. Hirshfeld gives a good account of how the tables turned so that by about 1900 photography had become the central tool of astronomy, eclipsing the skills of even the best observers.

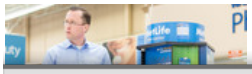
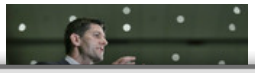
In the process, though, as telescopes became ever more complex and expensive, the inspired participation of amateurs increasingly gave way to the dominance of professionals. Still, non-professionals were at the forefront of introducing the use of the "spectroscope" as an essential adjunct to photography. As early as the 1810s, optical observers had begun to notice that various distinct colored lines appeared when the light of celestial objects was passed through prisms, lines that evidently gave clues to their sources' chemical composition. Only photography could record these faint traces with sufficient precision and clarity.

Mr. Hirshfeld is particularly good at describing the collaboration of Robert Bunsen, a pre-eminent chemist, with the younger physicist Gustav Kirchhoff; they began working together in the late 1850s. Kirchhoff was short and self-conscious, Bunsen tall and fearless, often burning his fingers while handling hot glass tubes, losing consciousness from noxious fumes, even losing sight in one eye from an explosion. Together they brought new clarity to the understanding of the spectral lines of elements that could be recognized in light from stars. Those stellar spectra also revealed the motion of the stars in relation to earth: Light from stars moving away from us looks redder; light from stars moving toward us looks bluer.

Mr. Hirshfeld ends with the grand story of the increasingly large reflecting telescopes built in the early 20th century. By then, it was clear that refracting telescopes, which magnified their objects using ever-thicker lenses, absorbed too much of the faint starlight they were to record. Reflectors, by contrast, could be built to scales that seem (to this day) to have no limit. But these mammoth instruments required funding beyond what individual benefactors provided. The astronomer George Ellery Hale became a new kind of leader, raising from Andrew Carnegie's charitable foundation the large sums needed to build the new generation of telescopes. Hale was involved in the design and construction of the 60-inch reflector built for Yerkes Observatory in Wisconsin, an instrument he later moved to the clearer skies of California. There he also guided the building of the 100-inch telescope on Mount Wilson and the 200-inch reflector on Mount Palomar (only finished in 1948, after his death). Though Hale was in many respects indomitable and indefatigable, his wife and children suffered from the incessant strain; he himself underwent four mental breakdowns.

Eventually, using Hale's instruments, Edwin Hubble and others made the crucial observations that in 1929 established that our galaxy is only one among a vast number of others, which the spectroscope showed were receding. Mr. Hirshfeld tells this climactic discovery of the expanding universe with great verve and sweep, as befits a story whose scope, characters and import leave most fiction far behind.

—Mr. Pesic, tutor emeritus and musician in residence at St. John's College, Santa Fe, N.M., is the author of "Music and the Making of Modern Science."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