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Lewis Swift: Celebrated Comet Hunter and the People's Astronomer, by Gary W. Kronk. (Cham (Switzerland), Springer International Publishing, 2017). Pp. xvi + 428. ISBN 978-3-319-63720-4 (hardcover), 160 × 235 mm, US\$44.36.

Lewis Swift was a great comet discoverer and well-known astronomer of the nineteenth century, but such is fame, his name is hardly known today. This is, unfortunately, the case for many once well-known astronomers whose legacies have been absorbed into the light of common day.

I became aware of that personally when twenty years ago I wrote a biography of one of the astronomers Swift mentored, Edward Emerson Barnard, whose own achievements eventually went far beyond what Swift himself achieved. Barnard's name has been attached not only to the comets he discovered but also to the dark nebulae he first recognized on his wide-angle photographs of the Milky Way and the star in Ophiuchus (Barnard's Star) with the fastest proper motion of any known. Despite the familiarity of his name, I found, whenever I lectured about Barnard's discoveries even to very bright graduate students, that they had no knowledge of the man or what he did, while when I sought to have my (very expensive) biography issued in an abridged edition, to make it more accessible to the very people who would most appreciate it (amateur astronomers), I was told by the then editor at the University Press that had published the hardback edition that there was no interest—Barnard was too obscure a figure. I remember thinking at the time that if that was true of E.E. Barnard, what hope was there for the rest of us!

Like Barnard, Lewis Swift was an important figure in the rise of American astronomy during the nineteenth century, a century that saw it begin to achieve parity with British and European science as it did in industrialization, trade and economic development. There were, of course, significant advances at major observatories such as the Cincinnati Observatory, the U.S. Naval Observatory and the Harvard College Observatory.

But an almost uniquely American development during this period was a rather de Toquevilleian democratic impulse, which saw major contributions not only by professional astronomers but also by amateurs. In his important book on *The Victorian Amateur Astronomer* Allan Chapman (1998) has shown the importance of the 'Grand Amateurs'—those like William Lassell, Lord Rosse, James Nasmyth, Warren de la Rue and William Huggins, whose wealth, in many cases due to success in business and industry achieved during the Industrial Revolution (in Lord Rosse's case due to an advantageous marriage) gave them the means to follow their own interests, and to afford the expensive equipment required. There were working class amateurs who contributed to popularizing the sky to others of their class, but for the most part—at least until

the founding of organizations like the British Astronomical Association—they did not contribute much to research.

Gary Kronk, with the passion for research in primary documents and the attention to detail that has characterized his prolific and invaluable work on comets and meteor showers (including his monumental six-volume *Cometography*, a greatly expanded version of his still useful *Comets: A Descriptive Catalog* that I found indispensable when writing about Barnard), has done a great service by rescuing Swift from undeserved oblivion.

Swift was known as the ‘People’s Astronomer’. Although he boasted an ancestry that went back to the *Mayflower*, he had a hard-scrabble existence as was characteristic in that time, and never lost the common touch. Indeed, he shared features of his life with those of other eminent Americans, most notably Abraham Lincoln, who grew up without advantages and achieved success through sheer intelligence, hard work and determination.

Born in 1820, Swift grew up on a farm in upstate New York, and might have carried on as a farmer were it not for a fortunate misfortune that he suffered when he was thirteen. He fractured his hip, and owing to unskillful surgery, the bones never set, and he was lamed for the rest of this life (though eventually he recovered enough to be able to manage for most everyday purposes). “Being unable to do farm work,” he afterwards recalled (p. 4), “I was sent to school, walking nearly three miles on crutches. I received a better education than any of my brothers.”

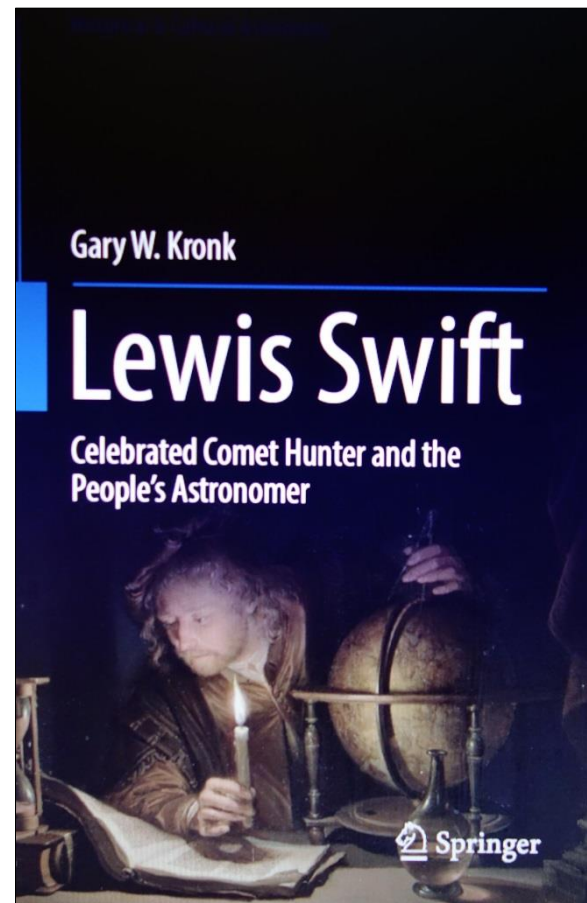
The year of his accident, he witnessed the great Leonid Meteor Storm of 13 November 1833. His father had happened to wake early, and noted that the clock had stopped. He therefore sent an older son to make a fire and get a pail of water. Outside, fetching water from the well, the older son was heard to scream. His father thought he had fallen into the well. However, the scream was prompted by the observation that the sky was full of shooting stars, and young Lewis Swift hobbled out and saw, as he later recalled, the stars falling

... like flakes of snow in a moderate snow storm ... I noticed that they appeared all over the sky, bright and faint, with short and long train, but was too young to observe it scientifically, and failed to notice that the trails if traced backward would meet at a certain place like the spokes of a wheel. (p. 4).

Two years later, Swift witnessed his first comet—Halley’s—and the sight (p. 5) “... awakened a faint desire to study the stars.” (It is, by the way, noteworthy that the sight of a comet, or of an eclipse, awakening awe in the late pre-teens or early teens, has often been associated with a

lifetime commitment to a career in astronomy; a number of astronomers, including the great lunar observer Johann Mädler, had their interest awakened by the Great Comet of 1811, while the total eclipse of 1842, whose track ran across Europe, was also productive of many conversions to astronomy, including that of seven-year-old Giovanni Schiaparelli in Italy—whose astronomical career would, as we shall see, become intertwined in a significant way with that of Lewis Swift.)

Swift, meanwhile, developed an interest in all branches of science, and in his mid-twenties he travelled extensively, giving popular lectures on electricity and magnetism. In 1851, he became



a country storekeeper at Hunt’s Corner, New York, where he purchased from a pedlar a copy of the Works of the Reverend Thomas Dick, whose mixture of astronomical information and theological speculations proved very stimulating to Swift, who like most people of his time, was deeply religious and saw evidence of God’s handiwork spread throughout Creation.

Dick’s writings inspired Swift to acquire a small telescope, and in 1860 he graduated to a better one, a fine 4.5-inch (11.4-cm) Fitz refractor, with which in July 1862 he detected a comet in the constellation Camelopardalis. Not having any better source of astronomical information than that provided in the local newspapers, he at first assumed he had only picked

up the comet reported two weeks earlier by Julius Schmidt at Athens Observatory, but in fact, Swift's comet was nowhere near Schmidt's comet (which was far to the south, in Virgo), and when three nights later Horace P. Tuttle of Harvard—another astronomer of this era who richly deserves a full biography—independently picked up the new comet, Swift published an account of his earlier sighting in order to claim a share of the credit. (The competing claims were mediated in large part by Professor G.E. Hough from Dearborn Observatory.)

This comet—Swift's first discovery—also was one of his most significant: the comet, known as Swift-Tuttle (1862 III) was a splendid object, and was shown by Schiaparelli, the Director of Brera Observatory in Milan, to be moving in the same orbit as the debris encountered by the Earth each August and giving rise to the Perseid meteor shower. Thus, Swift's comet provided the essential link between comets and meteors—one of the outstanding astronomical discoveries of the nineteenth century. This comet, now known to move in an orbit with a period of 134 years, was recovered at its first return since the American Civil War in September 1992 by a Japanese amateur astronomer, Tsuruhikio Kiuchi; it will not return again until 2126.

Meanwhile, circumstances intervened. Swift's first wife Lucretia died in the year of the comet; he was widowed only a year, before he married Caroline Topping of Long Island, New York. Meanwhile, he continued his mercantile career, and in 1872 moved to Rochester, New York, where he opened a hardware store. But he never gave up his astronomical pursuits. At first he set up his Fitz telescope in the back alley behind the store, then on the roof of a nearby cider mill; he left the tube and mount in place, and escorted the objective lens and eyepieces in a basket. From that roof, exposed to the elements, he continued a nightly watch for comets (and winters in Rochester can be brutal; he regarded a sturdy blanket as an indispensable accessory, and later was always seen wearing a woollen cap). Kronk notes (p. vii) that there can have been few others to have "... lost so much sleep on account of science."

Still hobbled with lameness, and bringing the Fitz lens to the rooftop observatory night after night, Swift stumbled, and the flint component of the objective was broken. He had it replaced by a new flint component made by the up-and-coming optician Alvan Clark. With the repaired lens Swift discovered new comets in 1877, 1878, and 1879. This brought him to the attention of Rochester patent-medicine (i.e. snake oil) vendor Hulbert Harrington Warner, whose 'Safe Kidney and Liver Cure' promoted good bowel hygiene, a Victorian-era obsession. In his prime, Warner manufactured 7000 gallons of 'Safe

Cure' a day, and with his millions he not only endowed a lucrative prize for comet discoveries, placing Swift in charge of its administration, but built for him an observatory which was duly equipped with a 16-inch (40.6-cm) Clark refractor—at the time the fourth-largest refractor in the country. It was located in a fine building at the corner of East Avenue and Arnold Park.

The observatory was not ready for Swift until 1882, so Swift continued sweeping for comets, as before, from the roof of the cider mill. In the end, he would be credited with 13 comets, placing him equal to Charles Messier, and behind only the Europeans, Jean-Louis Pons and Wilhelm Tempel, and later two great Americans to whom he passed the torch of comet discovery, Barnard and William Robert Brooks of Geneva, New York. Now, equipped with the 16-inch telescope, Swift's own comet hunting took a back seat to his sleuthing out of new nebulae, of which he discovered hundreds in areas of the sky like Draco, located far from the plane of the Milky Way. As we now know, these were distant galaxies.

Warner's business failed during the Panic of 1893, and he moved to Minneapolis, where he attempted, apparently without much success, to revive his patent-medicine interests. Deprived of financial support—and with his horizons literally obstructed with the construction of the Third Presbyterian Church next to the observatory—Swift began to cast around for alternatives. He was no longer a young man, but he still had energy and stamina. After considering a number of options, he decided to join Civil War balloonist and entrepreneur Thaddeus Sobieski Constantine Lowe in setting up an observatory venture in the Sierra Madre range, at Echo Mountain, California. There, the 'Columbus of the Skies', as he was known, continued to search for uncatalogued nebulae and for new comets. He was duly rewarded. He discovered comets in 1892, 1895, 1896, and his last in 1899—when he was nearly eighty! Even his sixteen year-old son, Edward, discovered a comet, in 1894.

After surviving a devastating wild fire that swept over the Lowe Observatory in 1900, and after helping astronomical entrepreneur George Ellery Hale develop another mountain observatory at Mount Wilson, 3000 feet higher than Echo Mountain, Swift—with failing eyesight—retired to Marathon, New York, to live out his days in the care of his daughter. He continued to read the Bible diligently with the aid of a hand magnifying glass. Finally, in January 1913, just shy of age 93, he passed away. He attributed his longevity to never drinking or smoking—and not once uttering a swear word.

What a brilliant and colorful career! Kronk has chosen a captivating subject for his bio-

graphy. His own passion is comets, and so he affectionately details each and every aspect of Swift's career as a comet discoverer. But he also provides fascinating insights into Swift's other interests, including his work as a discoverer of the then profoundly mysterious nebulae, searcher for the intra-mercurial planet Vulcan, mentor and father-figure to younger astronomers such as Barnard, and—perhaps the least known but not the least important aspect of his career—as a popularizer and promoter of science to the general public.

At xvi + 428 pages, *Lewis Swift* is not for the timid. However, it is an important addition to the serious amateur's library. It is handsomely produced, and is more affordable than I had expected (something which Lewis Swift himself, the 'people's astronomer', would have appreciated). The work is based almost exclusively on primary sources and contemporary documents, which must have cost the author great pains to track down and research; this is its strength, though I found it curious that the author seems oblivious to—or intentionally chose to ignore—more recent research, such as the biography of Barnard mentioned above (Sheehan, 1995), or the standard work on the history of the Vulcan episode (Baum and Sheehan, 1997), in which Swift figures prominently. But these are minor quibbles. *Lewis Swift* is a monumental achievement. Its author deserves our sincere thanks in producing a work that will stand as the authoritative work on its subject probably forever.

I only hope that the talented Mr Kronk, who has now given us Swift, will tackle other equally deserving nineteenth century American astronomers who wait in the wings. Barnard has had his due, but Ormsby McKnight Mitchel, perhaps America's first celebrity astronomer, Horace P. Tuttle, a comet-discoverer whose career was even more colorful than Swift's, and Sherburne Wesley Burnham, the great discoverer of double stars, still await. And there are others ... These rugged and highly motivated individuals remind us of a simpler day, when the frontier of the skies—and the gold rush after the riches buried within its vast expanse—awaited a step out the open door. These were frontiersmen of astronomy, astronomical Daniel Boones, Lewises and Clarks, and John Fremonts. Their stories remind us of what can be accomplished through sheer determination and willpower, and can be read with edification—and pleasure—even today.

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John Tebbutt: Rebuilding and Strengthening the Foundations of Australian Astronomy, by Wayne Orchiston (Cham (Switzerland), Springer International Publishing, 2017). Pp. xlviii + 555. ISBN 978-3-319-44520-5 (hard-cover), 158 × 242 mm, €149.99.

To say this book is a labour of love would be a considerable understatement. The author's fascination with the life and times of John Tebbutt has spanned almost sixty years. In 1959, then a teenager, Orchiston recalls a hot Saturday when he took a train to Windsor, a small town 50 km west of Sydney, hoping to find the remains of Tebbutt's famous observatory. He was delighted to find most of the original Windsor Observatory buildings largely intact, even though Tebbutt had died over forty years earlier. Later, Orchiston was one of those who lobbied for the conversion of the Observatory buildings into a Museum of Astronomy.

Tebbutt was born in 1834 and when he was nine his parents bought a large and prosperous farm near the Hawkesbury River, which he would later inherit. The farm provided the means to pursue full-time his great passion for astronomy (though he did find time to marry and raise six children). In 1984, in recognition of his contributions to astronomy, a sketch of Tebbutt and the Windsor Observatory were featured on a new Australian \$100 note.

Although a relatively brief Tebbutt biography has been published by Bhathal (1993) and Tebbutt's astronomical activities have been described in historical works by Moyal (1976, pp. 163–68) and Haynes et al. (1996, pp. 115–121), it is