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September 2006

**New Documents Published in Special Issue of *Journal of the Antique Telescope Society*
Reveal Unknown Aspects of Early Career of Major American Telescope-Maker Alvan Clark**

More than two dozen documents previously unknown to historians shed new light on the early struggles of the nineteenth-century American telescope-maker Alvan Clark to establish his reputation for his astronomical expertise and optical skill. The documents, ranging from manuscript letters and notes to letters to newspaper editors—have been made public for the first time in the Summer/Fall 2006 issue of the *Journal of the Antique Telescope Society*, published this month as a single-topic double-length issue devoted to Clark's early telescope-making efforts.

“This special Alvan Clark issue of the *Journal of the Antique Telescope Society* is the most significant publication of new material about Alvan Clark since 1995,” declared the Antique Telescope Society's president, Dr. Michael Reynolds, F.R.A.S., associate dean of mathematics and natural sciences and professor of astronomy at Florida Community College in Jacksonville, and executive director emeritus of the Chabot Space and Science Center in Oakland, California. (In 1995, Deborah Jean Warner and Robert B. Arian published their now-classic biography and catalogue *Alvan Clark & Sons: Artists in Optics* [second edition, Richmond, Va.: Willmann-Bell, in association with the National Museum of American History, Smithsonian Institution].)

Alvan Clark (1804-1887) was the United States's premier nineteenth-century craftsman of astronomical telescopes. Five times after 1860—the year Clark established his factory in Cambridgeport, Massachusetts with his two sons George Bassett and Alvan Graham—the firm Alvan Clark & Sons attained international fame for grinding, polishing, and figuring the lenses for the world's largest refracting telescopes.¹ They also fashioned hundreds of medium-sized and smaller lenses for observatories and individuals in the United States in the nineteenth century, plus dozens more for purchasers in other nations. The optical quality of the Clarks' lenses was superb, still equaling or outperforming telescope lenses of equivalent aperture manufactured today for visual observation of the heavens.

For all of Clark's eventual worldwide fame, surprisingly little is known about him (or his sons) personally because of the absence of any personal diary or any detailed reminiscences by his sons and business partners. In particular, much has remained shadowy about the senior Clark's early career between the time of his first experimentation with speculum-metal reflecting telescopes around 1844 and the founding of his factory in 1860. The documents—many printed verbatim at full length—reveal fascinating details about those earliest years.

¹ Clark's five world's largest lenses were mounted at the Dearborn Observatory in Chicago (18.5 inches in diameter) in 1866; the U.S. Naval Observatory in Washington, D.C. (26 inches) in 1873; the Imperial Russian Observatory at Pulkowa (30 inches) in 1883; the Lick Observatory on Mount Hamilton, California (36 inches) in 1888; and the Yerkes Observatory in Green Bay, Wisconsin (40 inches) in 1897. Yerkes still holds the record for being the largest refractor ever mounted and used.

DETAILED BACKGROUND

What the Special Issue Reveals

The first three journal articles focus on Clark's struggles to establish his reputation.

It was a rough road. When Clark began making telescopes around 1846, he was 42 and had no university training in astronomy or optics—his background had been as a printer's engraver and as a portrait painter. That left him on the outs with a small American astronomical community that was in the process of professionalizing itself and placing greater emphasis on advanced degrees and formal schooling. (American astronomers felt a keen inferiority complex compared to their European "masters.") It was also a long road. Some of the documents from the 1850s have an edgy note of desperation—reflecting the anxiety of a man in his early 50s who has worked for a decade for what he fears may well be no payoff, despite his own conviction about the excellence of his skills.

The new documents reveal that Clark tried several methods of winning notice from both prominent astronomers and the general public:

- First, he wrote personal letters to highly respected astronomers, notably Elias Loomis at Yale (one article in the journal publishes eight letters by Clark to Loomis, giving essential details about his earliest telescopes) and William Mitchell on Nantucket. Many of the letters recounted double stars he had observed with telescopes he had made—an effective technique for drawing the greats' attention to their optical superiority.
- Second, Clark brought his instruments to the annual meetings of the newly formed American Association for the Advancement of Science, where eminent scientists could inspect and try them personally.
- Third, he wrote letters to the editors of Boston newspapers, variously recounting his observations of double stars, analyzing other makers' telescopes (such as the 15-inch Merz refractor at Harvard, then one of the twin largest in the world), and detailing specific optical tests for judging the optical quality of telescopes.
- Fourth, on at least one occasion he allowed the general public to look through one of his telescopes in front of Boston city hall. All these actions were intended to show off his astronomical and optical prowess and perhaps win commissions.
- Fifth, he issued a dramatic dare—wagering the equivalent of a month's income that any telescope he could build would exceed the quality of any competitor, and offering to open his shop to anyone who wanted to observe his techniques.

Other documents reveal that Clark's earliest telescopes garnered praise. A glowing testimonial appeared in the *Boston Medical and Surgical Journal* (the predecessor of the *New England Journal of Medicine*) and was reprinted in newspapers and the early *Scientific American*. Clark also published an excerpt from a letter that he received from the English astronomer William Rutter Dawes, who noted that Clark's ability to identify a particular double star "incontestably proves the extraordinary perfection of your refractor." Dawes himself purchased five Clark refractors in the 1850s.

The last two journal articles recount early visits to Clark's telescope-making factory.

One reprints extended excerpts from a chapter titled "Astronomy in America" from an obscure 1862 book *God's Glory in the Heavens*, by William Leitch, D.D. (1814–1864), a principal of Queen's University in Kingston, Ontario, Canada. When Leitch visited in 1861, Clark was working on his first 'world's largest', the 18.5-inch lens now at the Dearborn Observatory of Northwestern University in Evanston, Illinois—making Leitch's description possibly the earliest published account of the layout of Clark's factory and observatory.

The other article publishes for the first time a transcript of hand-written notes by eminent Vassar College professor of astronomy Maria Mitchell, describing her visit to Clark's factory in 1872, when Clark was working on his second 'world's largest,' the 26-inch lens for the U.S. Naval Observatory in Washington, D.C. Mitchell described techniques that the Clarks were using before they installed machines, with snippets of rare detail—such as a wonderful account of four men hand-grinding the 110-pound lens atop the stump of a still-living pine tree around which Clark had built an addition to his workshop for just that purpose.

The special issue also features a 4-page annotated and footnoted “Table of Alvan Clark’s Known Pre-Factory Refracting Telescopes,” which chronologically lists 22 instruments Clark completed between 1846 and 1860 with lenses between 4.5 and 12.25 inches in diameter—including at least one instrument discovered during research for this special issue of the *Journal of the Antique Telescope Society*—along with their distinguishing characteristics and a pedigree of their known owners.

How much did Clark know?

“Among the special issue’s surprising revelations is that Alvan Clark may have had more optical and mathematical background from his pre-telescope-making careers as a printer’s engraver and as a portrait painter than standard references suggest,” said ATS vice president Kenneth J. Launie, an optical engineer at ZINK Imaging, who in 1998 led a team that disassembled and cleaned the 150-year-old lens of Harvard’s 15-inch Great Refractor.

Near-legend has grown up around Clark that he was mathematically ignorant—a tradition perpetuated by Leitch in 1862, who characterized Clark as being “totally unacquainted with mathematics” with only the “signs of *plus* and *minus* [being] about the sum of his algebraical knowledge.” That perception hindered Clark’s early career; according to Mitchell, her astronomical colleagues perceived that “Mr. Clark’s lack of mathematical learning, or learning of any kind, kept him out of the confidence of the scholarly persons around Boston. His work was too much like empiricism; his claims seemed to be unreliable.”

But the documents published in this special issue of the *Journal of the Antique Telescope Society* disclose a completely different tradition: that of Clark having a local reputation as a mathematician even while he was still a portraitist. According to that tradition, he helped a neighboring eyeglasses optician solve “a problem in figures”; it was then that Clark discovered that opticians themselves, even the best of them, knew comparatively little about lenses, ultimately leading Clark to his optical experiments. Tantalizing circumstantial evidence even hints that Clark could have gained experience with optical principles as early as in his 20s when still a printer’s engraver. To help capture accurate portrait likenesses, Clark was known to have used a camera lucida—an optical instrument invented in 1804 that used a prism to project an image onto paper—which was a tool used by engravers needing to alter the sizes of illustrations for publication. The journal issue thus raises key research questions about Clark’s early pre-telescope-making mathematical and optical expertise.

New images published

The journal’s special issue features a portrait of William Harvey Wells, who while principal of the Putnam Free School in Newburyport, Massachusetts, bought one of Clark’s earliest refractors—and reveals that Wells later helped arrange the Chicago Astronomical Society’s purchase of Clark’s first “world’s largest” refractor. Also published for the first time is Clark’s own exquisite pencil and charcoal drawing of Saturn in 1853, several early photographs of Clark’s factory, and unpublished photographs of the 7-1/8-inch pre-factory Clark refractor at Williams College, Williamstown, Massachusetts, that Clark fashioned in 1852—the oldest known surviving signed and dated Clark telescope in the United States.

“It is hoped that all these ‘new’ primary documents may inspire others to delve more into local newspapers and personal correspondence for more insights about Clark and other pioneering telescope makers,” said Trudy E. Bell, the journal’s managing editor (a former editor for *Scientific American* and *IEEE Spectrum* magazines with a master’s degree in the history of science from New York University).

The Antique Telescope Society, Inc., founded in 1991, is recognized as a tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code.

The Society is an international organization. Its purpose is to unite colleagues interested in antique astronomical telescopes, binoculars, books, and related items, and to promote the membership’s interests in astronomical history and discovery, the history of optics, and the preservation and use of these instruments through stewardship and education. The principal activities of the Society are publishing a journal, organizing meetings, providing assistance with the restoration of instruments, hosting shows and displays, preserving historical data, and guiding collectors.

The ATS’s 2006 annual convention will be held at McDonald Observatory, Fort Davis, Texas, September 29–October 1.

REVIEW INFORMATION

Because of the significance of the special double issue on Alvan Clark, editors are encouraged to review the issue as they would a book. For a review copy, please contact the managing editor, Trudy E. Bell (t.e.bell@ieee.org), 216-221-5008:

Journal of the Antique Telescope Society

Issue 27-28

Summer/Fall 2006

44 pages

\$20.00

Order information: Check only, payable to the *Antique Telescope Society*; mail to:

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