

HARVARD'S FIRST HIGH-ALTITUDE STATION

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Abstract

A review is given of the science and politics of some events that took place a century ago when Edward Pickering, the fourth director of Harvard College Observatory, set out to put telescopes on mountain tops in both the northern and southern hemispheres.

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The idea of a mountain station for Harvard was not new with Edward Pickering. The development of larger telescopes and the application of photography to astronomical observations made nineteenth-century astronomers increasingly aware of "seeing" problems. In 1860, when George Bond, the second director of Harvard College Observatory, wrote to J. Ingersoll Bowditch about augmenting the observatory's endowment, he also proposed supporting an expedition to take celestial photographs from a crest in California. Bowditch, a liberal-minded friend and loyal patron, was the son of Nathaniel Bowditch, who had distinguished himself internationally in astronomy. Both Bowditches were keenly interested in the development of American science, especially in astronomy at Harvard (Bailey 1931).

Having outlined his need for funds to print observations, heat the library, maintain the buildings and grounds, and buy a new meridian instrument, Bond went on in his letter to Bowditch to voice his dream for obtaining better observations: "It would be certain to repay the outlay if an astronomer of experience, furnished with a good telescope and photographic apparatus, should visit different parts of the world (high table-lands and mountains), and experiment on the advantages of a pure and tranquil atmosphere. It is understood that photography succeeds better in California than here, and better here than in Europe. Now a few essays in California, at an expense of a few thousand dollars, might prove of inestimable advantage to the science...If our observatory had possessed the means, we should have sent off an expedition of this kind years ago...We might now, with equal means, get our expedition to the interior of California, secure the best of the results and get back before the Russians have started." Previously in the letter Bond noted that in Russia the government had allotted astronomers nearly \$40,000 for a similar expedition to Persia (Holden 1897).

As meager as the observatory funds were when Bond wrote this letter in March 1860, they grew even leaner in the war years that followed. In 1865 George Bond died impoverished, his dream for high-altitude observations unfulfilled. Nor was his desire realized by his successor, Joseph Winlock, who had to pick up the pieces that both William and George Bond had left. Even so, Winlock carried forward the administration and science of the observatory and laid the foundation for the astronomical empire that Pickering would build in Cambridge and beyond (Jones and Boyd 1971).

In 1876, the year in which he was appointed director of the Harvard College Observatory, Edward Pickering founded the Appalachian Mountain Club. During the 1880's both he and his brother William explored, surveyed, and published papers about the White Mountains.

Not only did they enjoy the healthful benefits of mountain climbing in New Hampshire, but they made thousands of scientific observations with a portable micrometer level that Edward had perfected to determine altitude and position (Bailey 1931).

Meanwhile, in 1879 Uriah Boyden, a wealthy inventor and businessman who was interested in astronomy, left a fortune of almost a quarter of a million dollars to the trustees of his hometown, Foxborough, MA. His will stipulated that the sum be used to establish an observatory on a mountain peak so as "to be free...from the impediments to accurate observations...owing to atmospheric influences." (Pickering 1908; Bailey 1927) Seeing a potential source of funding for Harvard College Observatory, Pickering wrote to the trustees in 1882 offering his knowledge of astronomy and mountain exploration to help them fulfil the terms of the bequest (Jones and Boyd 1971). In reply, the trustees requested Pickering to furnish them with a list of other astronomers to consult and letters of introduction.

The Boyden Fund almost slipped through Pickering's fingers: many astronomers across the country supported a proposal for the National Academy of Sciences to administer the endowment. To turn the tide Pickering had to write very persuasively to the trustees in 1885 about how the experts at Harvard could better invest the money and choose the research projects than the officers of the Academy. While awaiting their decision, he confided to Bowditch in 1886: "I want to establish a station in Peru high up in the Andes where we could reach the southern stars. We could thus include all parts of the sky and this Observatory would be the first to make each portion of its work extend from one pole to the other." Finally, in 1887 the trustees of the Boyden Fund transferred it to the President and Fellows of Harvard College and Edward Pickering appointed his brother William to head the Boyden Department at HCO (Jones and Boyd 1971).

Meanwhile, the construction of an observatory atop a mountain had already begun in northern California. In the 1870's George Davidson, President of the California Academy of Sciences, had dissuaded James Lick from commemorating himself in the center of San Francisco with a great pyramid, larger than that in Egypt (Miller 1970; Osterbrock et al. 1988). Instead, he influenced the eccentric millionaire to set aside the sum of \$700,000 for "a powerful telescope, superior to and more powerful than any telescope ever yet made...and also a suitable observatory connected therewith." (Bell 1984) Subsequently, in the 1880's several small telescopes were installed on Mt. Hamilton while Edward Holden and the trustees awaited completion of the largest lens in the world at that time: the 36-inch refractor by Alvan Clark & Sons. At last, fourteen years after Lick had originally set up his bequest, the Great Refractor yielded its first celestial observations in January 1888. Later that year, the trustees transferred the title for the observatory to the Regents of the University of California in San Francisco (Warner 1968).

The competitive edge that the enterprise gave to Lick Observatory was lost on neither Edward Pickering, flush with the Boyden Fund, nor the leading citizens of Los Angeles, prosperous from a land boom there. The latter wanted not only to keep pace with their northern neighbors but to outdo them (Jones and Boyd 1971). Apparently unaware of the difficulties involved with constructing and mounting the Great Refractor at Lick (Osterbrock et al. 1988), they wanted a telescope with a lens even larger than the 36-inch glass. To that end, Edward Spence, President of both the First National Bank and the Board of Trustees of the University of Southern California, primed the pump for a telescope fund with property worth about \$50,000 (Miller 1970).

The proposed site for the new observatory was on Wilson's Peak,

near Pasadena. And in the spring of 1888 the president of the university, the Rev. Doctor M. M. Bovard, consulted with Pickering about telescopes. The scientist recommended a practical research instrument such as a 24-inch photographic doublet. However, because the size of the instrument was more important than its scientific merit, Bovard disregarded Pickering's counsel (Jones and Boyd 1971). Later that year Alvan Graham Clark was on the west coast where he "discussed the possibility of a large refractor for Wilson's Peak with representatives of the University of Southern California; and he received authorization to place an order with Mantois of Paris for the 40-inch crown and flint discs." (Warner 1968)

As eager as Edward Pickering was for a high-altitude station for HCO, he might have taken more than a few months to deliberate its details had there not been a solar eclipse in January 1889. By itself, neither the prospect of site-testing on Wilson's Peak nor that of viewing an eclipse would have lured him into sending an expedition to California so soon. But the timing of the two events together swayed him. Usually conservative, he seemed to throw caution to the wind and agreed to collaborate on setting up a preliminary site on the mountain with the non-scientists of USC whose motives were so different from his own. He understood that he would bring Harvard scientific expertise to the joint venture and share the results and expenses. In exchange he presumed that USC would build roads and buildings for the site (Jones and Boyd 1971).

Thus, in November 1888 William Pickering led a party of Harvard astronomers to the Sacramento Valley in California, where they set up a camp at Willows to observe the eclipse on January 1. Later that month they journeyed down the coast to test the "seeing" on Wilson's Peak. For whatever reasons, Bovard had made no preparations for the Harvard party. So the astronomers had to wait until spring to clear a trail and set up shelters for themselves and the telescopes. In spite of this unfavorable beginning, Edward King and Robert Black had set up the new Boyden 13-inch refractor and were photographing the heavens by May. Although King had written to William Pickering that the site was "an astronomer's paradise," the living conditions were anything but heavenly. Rattlesnakes and flies were the least of it. The observers had to negotiate the treacherous trail for every necessity: to carry wood and water, and to board with a nearby mountaineer.

Having fulfilled more than Harvard's share of the work on Wilson's Peak, Pickering tried in the summer of 1889 to recoup some of the expenses for it from the University of Southern California. Again, Bovard reneged. Rivalry for a piece of astronomical glory had escalated between the towns in southern California. And apparently the trustees of the University and of the Spence Fund mistrusted both their neighbors and Harvard. Because the observing on Wilson's Peak was so fine, Pickering then decided to try to acquire the site himself for Harvard's first high-altitude station. As it turned out, there was no clear title to Wilson's Peak. By the spring of 1890 both the scientific and political situation in California had deteriorated. And Pickering decided not to spend any more of the Boyden Fund there.

Astronomically, the venture had been extremely successful: the "seeing" was so good on Mount Wilson that the Harvard telescopes captured the first photographs of globular clusters with stellar images good enough for variable-star studies. Politically, the enterprise had been unfortunate: the communication between the University of Southern California and Harvard was so poor that the two institutions failed to support each other in the science or the administration of the project. Consequently, Harvard ended up losing some money and, more importantly, losing a mountain-top site in the northern hemisphere.

Fortunately, another party of Harvard astronomers under Solon

Bailey had sailed south to Peru at about the same time and managed to set up a makeshift observing station there near Chosica (Ferne 1976). Eventually, a permanent station near Arequipa was built and named the Boyden Station after the benefactor whose funds had financed Harvard's quest for lofty sites both north and south.

EPILOGUE

The American economy underwent a depression in the 1890's and the land boom in California collapsed. Thus, when Edward Spence and the University of Southern California defaulted on the 40-inch refractor, the Clarks were eager to find a new buyer for the lenses. Pickering was eager to have them (Miller 1970) but did not have time to find a patron before George Ellery Hale had persuaded Charles Yerkes to buy them and to build an observatory as well (Warner 1968). As for Spence, he died in September 1892 before the lenses had even been sold. So he never knew that they were installed at Williams Bay, Wisconsin, in 1897 (Miller 1970; Warner 1968).

A few years after the 40-inch refractor had been mounted, Hale moved to California where he yearned for a 60-inch reflector for spectrographic work. In 1902, as a member of an astronomical advisory committee to the trustees of the Carnegie Institution, he advocated that they establish a solar observatory (Wright 1966). Having visited many mountain tops and consulted with Pickering, Hale chose Wilson's Peak for the site of the Mt. Wilson Solar Observatory. In January 1910 when Pickering went to Mt. Wilson to attend the fourth meeting of the International Union for Cooperation in Solar Research, he visited the site of Harvard's first high-altitude observatory. While there, he placed a plaque on the pier that had held the Boyden 13-inch refractor (Jones and Boyd 1971).

In January of 1989 the Carnegie Institution decided to allow a non-profit research corporation, Mount Wilson Institute, to operate the Observatory for a two-year transition period. The Institute represents the scientific, educational, cultural, and recreational interests of the Observatory. As a member of the Board of Directors of the Institute, and an associate of HCO, Sallie Baliunas works on Mount Wilson to observe solar-type stars and to investigate their magnetic activity. While there, she noticed Pickering's plaque near the parking lot: "Station of Harvard College Observatory, 1889-90." Last year, to celebrate the centennial of Harvard's 13-inch refractor on Mount Wilson, she and her colleagues persuaded the town of Sierra Madre to sponsor, construct, and display a float in the Rose Parade to symbolize the event. Pickering would be pleased that astronomers from the Harvard-Smithsonian Center for Astrophysics not only remember the site of his first high-altitude station, but now also observe there.

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