coupled with a personal charm. During his teaching career at Swarthmore, about half the students studied under him and several pursued distinguished careers in astronomy. Earlier, at the turn of the century, at Indiana University, he persuaded a student named V. M. Slipher to go into astronomy. During succeeding years when Slipher was at Lowell Observatory, Miller was Slipher's advisor and confidant. In May of 1913, Slipher informed him of the astonishingly high radial velocities he had found for several spiral nebulae. Miller replied, "It looks to me as though you have found a gold mine, and that by working carefully you can make a contribution that is as significant as the one that Kepler made, but in an entirely different way." Miller liked to tell about the AAS meeting held in Evanston in August of 1914 when Slipher presented his results for 15 spiral nebulae. He would mention the modesty and clarity which characterized this presentation and go on to say "Something happened at that meeting which I have not seen before or since at any scientific meeting—when he finished speaking, everyone stood up and cheered." Some 30 years later I repeated these comments in the presence of V. M. Slipher. He did not question their accuracy.

13.02 Early Spectrographic Observations of the Crab Nebula, W. G. Hoyt, Lowell Observatory - V. M. Slipher was the first astronomer to photograph the spectrum of the Crab Nebula (NGC 1952) and to recognize its extraordinary characteristics. From 1913 to 1919 he obtained six spectograms which showed an "enormous" splitting and distortion of the "chief nebular lines" between $\lambda$5007 and $\lambda$4321. In his initial attempts to explain the spectrum, he rejected "velocity effects" in favor of a cause "within the atom," and even in 1916 he suggested that the phenomenon might represent the recently discovered Stark effect involving the motion of electrons in a strong electric field. Archival data reveal that he was anxious to test this suggestion by making polarization measurements, but was unable to do so for mundane reasons. Nor did others to whom he communicated his results follow up his work, although W. W. Campbell and J. H. Moore of the Lick Observatory reported in 1918 that polarization tests on other split-line nebulae, NGC 7662, were inconclusive. Had such tests been made on the Crab, astronomical interest in this unique object might well have developed earlier, and along somewhat different lines. Slipher's work, however, represented a considerable observational feat for the time, and in fact confirmed the bright-line status of the Crab which previously had rested uneasily on vague visual observations dating back to those of J. Winlock and C. Peirce at Harvard College Observatory in 1869.


Much of the literature written on Holden has portrayed him as being egotistical and unreasonable dogmatic or selfishly dictatorial in his administration of the Lick Observatory. This paper is directed towards counteracting this viewpoint. The view presented herein is that Holden was an important organizer of modern astronomy, developing the research programs of the Washburn and Lick Observatories which were continued long after he left these institutions. While agreeing that Holden was not the easiest man to work for, it is suggested that many of the conflicts which Holden had with other astronomers at the Lick Observatory, particularly those conflicts he had with Burbury and Barnard, reflect more upon differences about the nature of astronomical research than about the personalities of the participants of those conflicts. In looking at Holden's role as adviser to the Lick Trust in building the Lick Observatory and as director of the Washburn and Washburn Observatories, this paper portrays Holden as an able organizer with a vision for astronomy which influenced the direction American astronomy took in the early twentieth century in several important ways.


At a recent meeting of west coast historians of science, Karl Hufbauer urged his colleagues to pay closer attention to interdisciplinary science as a fruitful approach apt to lead to interesting insights. He illustrated his thesis by pointing to the many instances and areas where discoveries in physics influenced developments in astronomy in the period 1919-1939.

The career of P. J. C. Janssen provides an almost classic example of interdisciplinary science at an earlier time. From rather unlikely beginnings—he was a bank clerk at the age of sixteen—Janssen became a pioneer in spectrum