

# William C. Miller

## (1910-1981)

Few of us realize to what an extent we are indebted to William C. Miller for the photographic techniques we use, and for the compatibility of our photographic emulsions with our astronomical needs. For many years, Bill was the only person employed by an American observatory to spend most of his time on research on photographic techniques and materials. The techniques that he developed were quickly explained by word of mouth, rather than by publication, to all observatories active in photography. And he acted as the representative of the astronomers in their requests to Eastman Kodak Company for special needs as they arose.

Bill was trained in physics and worked during World War II for Mount Wilson Observatory and Beckmann Instruments, designing infrared spectrographs and other optical systems. But his avocation was astronomy. Even as a student he spent several summers working as one of the observers on the site survey for the future Palomar Observatory. He was located at Winona, just east of Flagstaff, with a small telescope to record seeing and weather. Those summers had a strong influence upon him and helped develop his love for the desert, Navaho, and high-altitude country. Later he voluntarily took plates on Mt. Wilson for Paul Merrill and others.

With the near completion of the giant Palomar telescopes, Dr. Bowen and others saw the need for an expert in photography who would develop improved methods. At that time most of the observing was photographic—and all of it still is with the Schmidt—so if any of the photographic characteristics could be improved, it would be an important gain.

Of course, there was no one trained specifically in astronomical photography, but Dr. Bowen realized that Bill had the background in optics and physics, and the interest in astronomy, to learn photographic theory and fill their needs. And that expectation was indeed satisfied. Bill was employed by the Mount Wilson and Palomar observatories in 1948, about at the time of the 200-inch dedication. Bill soon became *the* expert in the field, upon whom all of us relied for help and advice. By 1951 he started teaching photography courses at Caltech, and they changed with time as our understanding and the language of photographic theory evolved.

Bill either originated or perfected many of our photographic techniques. For instance, Ira Bowen suggested that baking plates could make them more sensitive for the relatively long exposure times that astronomers use; and Bill, in a long series of tests, determined the optimum baking conditions for various emulsions and exposure times. Later he experimented with other hypersensitizing techniques, such as immersion in forming gas, and improved the methods. He started routine testing of incoming emulsions, so that the astronomers had on hand data on different batches to tell which emulsions were best for clean background, low or high contrast, speed, etc. I have never seen at any other observatory such good data available for helping to decide which plates to use. And of course Bill was continuously



involved in intensity calibration problems. He helped to monitor the quality of the Palomar Sky Survey plates. In connection with his taking of deep photographs with the new 200-inch Hale and 48-inch Schmidt telescopes, he realized the dependence of color balance upon exposure time, and he produced the first realistic color-corrected astronomical photographs. At the same time, he was unselfish in working with the Observatory astronomers in the reproduction of their photographs to show the sometimes-subtle features that they wished to illustrate.

Bill had the foresight to see that substantial improvements could still be made in photographic techniques, and that plates would continue to be used for many decades to come, despite the advent of photoelectric and solid-state detectors for some of our needs. As American astronomy expanded and interest in photographic research spread to more than just the West Coast observatories, he helped to start the Working Group on Photographic Materials in 1966 and was its second chairman, succeeding Art Hoag. He also started the *AAS Photo-Bulletin* as a journal in which photographic research can be published. The health of both organizations confirms his good judgment.

During one of his summers at Winona, Bill was sitting on a pile of rocks for some time, appreciating the scenery and the ever-changing weather, when he realized that he was sitting on an Indian ruin! His interest in archeology gradually developed, partly as a way of visiting beautiful country while fulfilling a scientific need. Despite the fact that every square metre in this country has undoubtedly been seen by at least one person, there are thousands of ruins and archeological sites that have not been reported to museums, marked on maps, or surveyed. By 1953 Bill had made arrangements with the Museum of Northern Arizona in Flagstaff to do voluntary surface surveys of unreported promising areas.

The first of those trips, on which I was his companion, was to White Mesa, northeast of Tuba City in the Navaho Reservation (see *Natural History* for March, 1955). In three weeks of driving by jeep, walking, and climbing, we covered the 12 x 18-km mesa with moderate thoroughness and found three-dozen ruins. Some of the cliff dwellings were so obscure that they were not visible from the mesa top or

from the canyon bottoms, but only from the intermediate slopes. Later trips successfully explored other areas. Then those summer surveys were funded by the government, which wished to know about and excavate ruins that would be flooded by the future Lake Powell behind the Glen Canyon Dam that was under construction. Bill developed survey techniques that are now used by others.

One unexpected result of the White Mesa survey was the first discovery of a petroglyph that may represent the supernova of 1054 A.D., which became the Crab Nebula. Bill reasoned that petroglyphs rarely show astronomical events (except for the moon), and determined that the area had a peak in population in the eleventh century. With help from Walter Baade, he calculated the phase of the moon (which was shown correctly) and that the moon was within two degrees of the supernova on the first night of its visibility.

Later we found a second similar petroglyph in Navaho Canyon (see A.S.P. Leaflet No. 314, July 1955) and searches by others found more.

Bill had many interests (exploring, archeology, photography, constructing and playing an electric organ). And many people can attest to his hospitality and willingness to help others in a variety of ways. It is therefore especially regrettable that he did not have many years of retirement to pursue his interests. Just after his retirement (see *AAS Photo-Bulletin* No. 9, 1975 No. 2) he had heart bypass surgery and later a series of strokes that left him increasingly unaware of his surroundings until his death on 8 August 1981. He really deserved many more years to enjoy our gratitude for his help to us.

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