

Preface

Milton Humason could have written his own story. His cousin, Tom Humason, an editor at the publisher Harcourt, Brace and Company, wrote him in the fall of 1950 asking Milton if he would write a modern history of the state of astronomical discovery. By then Humason had become a ranking member of the staff at the Carnegie observatories (which combined both Palomar and Mount Wilson observatories) and was considered one of the few people in the world qualified to write such a book. The Big Bang theory was becoming widely accepted as the most plausible explanation for the birth of the known universe, and Humason had driven much of the data behind the theory in an historic twenty-five-year collaboration with his colleague, Edwin Hubble. Together the two men had transformed both public and scientific perception of the visible universe and set the course in astronomy for the next fifty years.

As momentous as the work on the Big Bang concept was, however, it amounted to only a fraction of the work Humason put out during his illustrious and unlikely career. From the publication of his first paper on an obscure comet in 1919 to his last report on the spectra of galaxies in groups and clusters in 1964, Humason published nearly 100 papers with a host of the world's top astronomers and astrophysicists. By 1950, he had worked with almost every member of the sidereal department at Mount Wilson, contributing to the study of star classification, color, magnitude and velocity, stars in clusters and in groups, and novae, supernovae and star populations. His work on galactic structure and universal expansion included his prodigious contribution to the *Hubble Catalogue of Galaxies*, published four years after Hubble's death. In amassing the data for the book, Humason had photographed the spectra of galaxies many times fainter and deeper into space than any before him.

When he wasn't reporting on stellar and galactic evolution, Humason published articles on technological improvements in photography, mirroring, instrumentation and operation. Despite previous notions that he steered clear of the arguments for and against universal expansion, Humason did contribute to the conversation on the topic, which was the center of much public and scientific controversy for decades

during the twentieth century. The list of men with whom Humason collaborated during his career reads like a Who's Who of astronomers and astrophysicists—Nicholson, Merrill, Adams, Hubble, Joy, Seares, Baade and Sandage, to name only a few.

In the heyday of the Mount Wilson and Palomar observatories, Humason was, in a very real way, their spiritual leader. As secretary of the Carnegie observatories, Humason was responsible for scheduling observing time on both mountains as well as reading and responding to the preponderance of letters and telegrams that always seemed to find their way to his desk. From inquiries by scientists in varying fields to questions of the existence of God in the heavens, Humason was entrusted to respond on behalf of the observatories and their parent university, the California Institute of Technology, to whom they had recently been linked. Humason was one of the oldest, most respected and best liked of all the members of the observatories and was known around the world as an authority on stellar spectroscopy, instrumentation and deep space photography. In acknowledgement of his achievements, the University of Lund in Sweden awarded Humason an honorary doctorate, and he was also made a member of the Royal Astronomical Society.

Yet despite these achievements, his knowledge of his craft and his standing within the scientific community, Humason declined his cousin's request to offer an account of the state of astronomical discovery at the time. The reason for his refusal to do so ran to the core of who Milton Humason was, as a man and as an astronomer.

Modern accounts of his life and career have created an unbalanced view of Milton Humason. His chroniclers usually paint him as the high school dropout turned muleskinner that rose to scientific prominence as a stellar photographer during the 1920s and 1930s. Lost in these abbreviated and quixotic tales of his exploits was his overriding sense of inferiority that was anything but trivial. Throughout his adult life, Humason's lack of an education beyond grade school undermined him constantly, delaying his hiring at the institution he would eventually help to elevate and creating in him a tense personal struggle between the deferential assistant that he saw himself as and the respected observer and craftsman he sought to become. Well after his accomplishments had earned him the respect and admiration of his peers, his battle against his own sense of inferiority plagued him.

I have deliberately left Humason's better-known attributes out of this introduction to the book for precisely this reason. An honest account of the man cannot be completed without a thorough discussion of both the positive and the negative effects of the attributes that have so endeared him to his admirers. This is by no means to suggest that the attributes that separate him from others in his field don't exist, nor is it meant to discolor the very colorful and charismatic personality that was Milton Humason. He was by all accounts one of the most colorful of all his contemporaries. In fact, the characteristics that have endeared Humason to his legion of fans were the same ones that attracted me to his story.

My association with Humason began while I was vacationing in the Philippines in 2005. Having always been curious about the nature of the stars, I was reading the

book *Big Bang* by Simon Singh. In his book Singh offers a rich and thorough history of the developments that led to the Big Bang theory. Around the midway point of the book I came across a brief section about Humason who had quit school at the age of fourteen to go to work as a bellboy at the Mount Wilson Hotel. Singh adds that Humason eventually became a muleskinner, helping to haul the supplies and building materials for the observatory buildings and instruments up the steep mountain trail to the peak of Mount Wilson near Pasadena, California. The story goes on to briefly describe Humason's hiring as janitor to the observatory and his subsequent work with Hubble on the expansion problem.

My curiosity piqued, I put down the book and began digging deeper into Humason's background. I soon learned that the details Singh had set out in his book were the only details of Milton Humason's life that anyone seemed to know anything about. Browser searches brought scant traces of his name. A brief biography on Wikipedia offered a few somewhat contradictory details about his life and work. A handful of photographs were scattered among hundreds of photos ranging from astronomers to *The Spirit of St. Louis* to poetry that would have been better left in the drawer. From these few dim clues the trail of Milton Humason vanished into the cold reaches of space-time, leaving me in a quandary as to how to pursue my course. Finally I decided the best way forward was to make my way to Wilson's Peak on the summit of Mount Wilson outside Pasadena, California.

I will never forget my first visit to Mount Wilson in the spring of 2006. As I stood near my rental car in the parking lot of a nearby coffee shop I could see the domes of the 150-foot solar telescope tower and the 60-inch telescope peeking out from the treetops near the summit. Filled with a sense of adventure (that I'm sure many before and after me have felt) I drove to the trailhead and began hiking the old trail up the side of the mountain. I could feel the natural energy of the environment. As I hiked the long and narrow path up the mountain I tried to imagine the excitement of the time when the Mount Wilson Observatory was under construction. The sounds of protesting mules and the young men that drove them up the hill became vivid as I wound my way around the switchbacks and up the steep inclines. I could imagine Milt atop his horse coaxing his charges up the trail, towing thousands of pounds of equipment and supplies behind them.

Once at the observatory, I sat with a small group of people at an abandoned concession stand waiting to take part in a guided tour of the observatory grounds and its instruments. The state of the concession was disheartening. It seemed as though the glory days of the observatory were behind it. Any reservations I had upon reaching the summit, however, were dispelled once I entered the grounds. The observatory is home to a variety of new telescopes and college installations peppered in between the old telescope domes that are still well cared for and maintained.

I had read Helen Wright's book, *Explorer of the Universe*, about the life of George Ellery Hale and could imagine Hale on a visit to the mountain in 1902 (the same year Milton Humason moved to California with his family) clambering up a tall ponderosa pine, dragging behind him a 4" telescope, to observe the seeing conditions above the mountain floor. I could envision the scene on July 4, 1917,

when the 100-inch mirror, standing upright in its huge wooden crate and bound tightly to the back of the old Mack truck, first made its way into the observatory grounds. I stood in the spot outside the 60-inch telescope dome where Andrew Carnegie and George Hale had their picture taken together in March of 1910 and imagined Albert Einstein walking through the grounds chatting with Milt and other astronomers at Mount Wilson in 1931. As I stood on the observing floors of the great telescopes and wandered through the forest that surrounds the observatory I was swept up in the magic of the mountain. Somehow I identified with Milton Humason who, as a boy, fell in love with the mountain and determined that he wanted to be a part of the life there. I was hooked!

My goal in writing this book was to offer the first fully realized account of Milton Humason's life, the people he knew and worked with and the times in which he lived. The era that preceded him, and some of the men who dominated it, were integral to shaping the world Humason was born into near the end of the nineteenth century. For that reason the entire first chapter is dedicated to the changes in the North American physical, social and political landscapes of the time. A small reading list at the end of the book can be referenced for a closer look at any one of the subjects discussed in this brief history. This section is neither meant to establish the complete history of the period nor the people in it, but rather to give the reader a sense of the characters and events that set the stage for Humason's life.

This book is the culmination of nearly ten years of research in cities, libraries, observatories and mountain reserves all over the country in pursuit of the complete picture of the man Harlow Shapley once called "the Renaissance man of Mount Wilson." Humason was, among other things, a practical joker and he enjoyed weaving tales of life on the mountain as much as he did taking the observatory staff for their money in a game of poker. To that end this is as much a story about people as it is about science. From what I was able to glean from interviews with those who knew him, from manuscripts and letters, and from family photos and his published work, I have tried to infuse the book with as much of the substance behind Humason's actions and beliefs as possible. Readers may decide for themselves whether they agree with my assessments or not.

It should be pointed out that I am not a professional astronomer. Much of the science in this book has been gleaned during my research. I am a lifelong avid stargazer and amateur astronomer who, after many years of association with his family and the hunt for information about him, developed a real kinship to Milton Humason. Despite a slight discrepancy in age (he was born seventy-five years before I was) our lives bear some stark similarities. We both had to overcome our own inauspicious start in life, and we both appear to be overachievers. His curiosity and perseverance led Milt to become an expert authority in stellar spectroscopy and the nature of the universe as well as telescope optics, machinery, maintenance and their application on the instruments of his field. I have become an expert on Milton Humason.

The structure of the book runs along a mostly linear timeline. I have made a slight exception to this in the chapter that details Humason's collaboration with

Edwin Hubble, which required some exposition and background to fully understand.

To illustrate the varying degrees of Humason's association with the observatory during its creation, I have chosen to tell the story of the early developments in the construction and design of its instruments and buildings through the eyes of Mount Wilson Observatory founder, George Ellery Hale. In 1895 Hale, then founder of the Kenwood Astrophysical Observatory at his family home in the Hyde Park area of Chicago, Illinois, wrote to his friend James Keeler. Keeler had recently joined Hale on the editorial board of the nascent *Astrophysical Journal*, which had held its first meeting on November 2, 1894, at a 5th Avenue hotel in New York City, and included such scientific luminaries as Albert Michelson, E.C. Pickering and Henry Rowland of Johns Hopkins. Hale was writing Keeler in appreciation of his friend and colleague's recent discovery that Saturn's rings are meteoric in nature. Musing on the seemingly boundless limits of the field of astrophysics Hale wrote: "What a lot of fine fish there are in the sea for the right kind of fishermen."

Milton La Salle Humason was just the right kind of fisherman. Whether fishing the dotted darkness of the California sky or the cool running waters on the West Fork of the San Gabriel River, Humason grew to become a master at delving into the unknown reaches of space and time to extract evidence of the extraordinary world we live in. The life he led and the road he traveled in becoming one of the world's foremost authorities in the field of stellar spectroscopy is equally extraordinary.

His life straddled the late Victorian Era to the early 1970s, an age that began at the end of the Native American epoch in post-Reconstruction America and ended during the Cold War between the United States and the Union of Soviet Socialist Republics. As a boy growing up in Winona, Minnesota, in the 1890s, Humason was influenced as much by the era that preceded his birth as the events that unfolded after it. Legends of the Union victory in the Civil War and Abraham Lincoln's deft negotiation of the war handed down from veterans of the Union Army as well as the ongoing Republican domination in American politics led him to become a steadfast supporter of the party. He remained a staunch Republican throughout his lifetime long after the light had dimmed on Lincoln's era.

Humason was a staff astronomer at the Mount Wilson Observatory from 1922 to 1957. He excelled in the field of stellar spectroscopy, the science of studying the light of distant objects to better understand their structure and evolution. His pioneering work with Edwin Hubble in the late 1920s and 1930s led to discoveries that helped to set the foundation for our understanding of the world we live in, opening our eyes along the way to the seemingly boundless nature of the known universe.

Humason was especially gifted at gathering data for very faint objects. He spent more than forty years trolling the universe for signs of light from objects many thousands of times fainter than can be seen with the naked eye, often testing the limits of the most powerful instruments of his day as well as his own skill and endurance. At the telescope his shrewd thinking, deftness and unwavering dedication helped unravel some of the great mysteries of science. When he wasn't

working at the observatory his favorite pastime was fishing the waters of the West Fork of the San Gabriel River.

Carl Sagan once wrote, “The surface of the earth is the shore of the cosmic ocean.” It is a vast ocean, too, some 13.7 billion light years distant. We live on a lonely planetary outpost on the cosmic landscape we call Earth, revolving around a 4.6 billion year old class G2V yellow star (one of as many as 400 billion or so stars in our galaxy) on the Orion arm of a barred spiral galaxy known as the Milky Way, about 27,000 light years from its center. Our Solar System, like many across the cosmos, is enriched through the constant production of basic elements such as helium, nitrogen and oxygen by our parent star, and the occasional and very volatile explosions of stars in supernovas, which provide us with the other heavier elements that make up our home planet. Our home galaxy is roughly 100,000 light years across and is part of a universe that contains hundreds of billions of galaxies, each containing hundreds of billions of stars. A section of the sky seen through a straw 8-feet long might reveal as many as 10,000 galaxies if viewed with a powerful enough telescope.

That is the world we live in. What we know of it may be incredibly little in the grand scheme of things. What knowledge we do have, however, we owe in part to the work of Milton L. Humason, one of the most charismatic men of science, whose humble nature, skill and perseverance helped open our eyes to the vast and powerful nature of the universe and set the standard for generations of astronomical research.

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