

## BARNARD AT THE LICK OBSERVATORY

ROBERT G. AITKEN, LICK OBSERVATORY.

Professor Barnard came to Mount Hamilton as Junior member of a staff carefully selected by Dr. E. S. Holden to inaugurate the work of the Lick Observatory, famous, even before its work began, because its chief instrument, a 36-inch refractor, was the largest and most powerful telescope in the world. Dr. Holden made very few mistakes in his selection of men, and that he was right in this instance was soon made evident by Barnard's record.

In those early days Mount Hamilton was far more isolated from the world than it is now, when automobiles can make the run to San Jose, our nearest town, and our base of supplies, in an hour and a half, or even less time. Then, the four-in-hand mail stage required 6 to 7 hours for the trip up the mountain and 5 hours for the descent. Life, accordingly, was more simple, and further, the residents of the mountain were practically restricted to their own little community for all social relations.

House room on the mountain is limited even today, and when Barnard came it was almost lacking. A little cottage on "The Flat," erected to shelter the workmen who built the observatory, was assigned to Barnard, and here Mrs. Barnard and he lived until 1894, when a brick house was completed on "Ptolemy," the ridge below the main peak on which the Crossly Reflector was erected in 1895. The "Ark," as the Barnard cottage was named by a later occupant, by reason of its outward aspect, soon became a social center, for Mrs. Barnard was always hospitality personified and Barnard was her able coadjutor. On pleasant Sundays they would often organize a picnic party, walking a mile or two, eastward to a grove of pines, or one of oaks, or on a cloudy evening have a gathering at the house. Note the adjective! On a clear night Barnard certainly, and most of the other men—as many as there were telescopes—would be at work in the homes. I recall a later night, after Barnard had gone to the Yerkes Observatory, when Mrs. Aitken invited the staff to the "Ark," then *our* home, upon a cloudy evening. About 9 o'clock one of the men looked out, and found that the clouds had broken away. Five minutes later, the ladies were left to continue the party by themselves!

At first, naturally, Barnard did not have the use of the 36-inch refractor. The 12-inch telescope was put in his charge, and likewise the 4-inch comet-seeker, and, when it was ready, the "Crocker" telescope, with its 6-inch doublet photographic lenses. With these instruments he searched for comets, studied the planets, measured the motions of satellites, the positions of double stars, and, a little later, began his splendid series of photographs of comets and of the Milky Way, a field of work in which he was a pioneer and which he continued to cultivate most successfully throughout his life.

There is a tradition that there was not a telescope on the mountain, except the meridian circle, with which Barnard had not found a comet, either one that was unexpected or a known one whose return to the neighborhood of the sun had been predicted. In all, the number of his cometary discoveries, at Nashville, Mount Hamilton and Williams Bay totalled 16.

In the summer of 1892, Barnard was given one night a week with the 36-inch refractor—and, later, more nights. His first program was the observation of the planet Jupiter, then very favorably placed. He had always been interested in this planet, as his earlier work at Nashville and at Mount Hamilton showed, and he was eager to study the planet's surface with the more powerful telescope. He did this, of course, but he also examined the sky about Jupiter to see whether or not any unknown satellites existed.

As we all know, his search was successful. On Friday night, September 9, 1892, he saw a tiny point of light near Jupiter, a light point so faint, that even to his keen eye it was visible only when the planet's light was excluded from the field of view. He felt confident of its nature on the first night, but with true scientific caution withheld announcement of the discovery until he had seen it on another night and had verified its motion about the planet. He did, however, write to Professor Burnham, then at Chicago, telling him of his suspicions.

On Monday, September 12th, the whole astronomical world was electrified by the announcement of the discovery of the fifth satellite of Jupiter!

This discovery, the most sensational one Barnard made, affords a capital illustration of his working methods and reveals his characteristics as an observer. It was no accidental discovery: he made his search with the definite object of determining whether or not a satellite existed nearer to Jupiter than the well-known Galileian satellites. A similar statement would hold true for nearly all his discoveries; almost every one resulted from a search definitely planned. That his keen eyesight was an important factor in his success goes without saying; but his alertness of mind was at least as important. Note also his confidence in the correctness of his interpretation of what he saw, coupled with his care to make sure of his facts before announcing his discovery. These are all characteristics of the great scientific observer.

It would be easy to enlarge upon his many discoveries at the Lick Observatory—to tell you of the eclipse of Japetus, the eighth satellite of Saturn and the evidence it gave of the transparency of the inner or crepe ring; or of the first comet discovered by photography—one of the few "accidental" discoveries Barnard made; or of his splendid series of photographs of Swift's comet of 1892 and of Brooks' comet of 1893, the first photographs that revealed the very rapid changes in the form and structure of comets' tails; or of his

pioneer work in photographing the Milky Way. All these, however, I shall dwell upon in the address\* it is my privilege to give tonight. Here I prefer to speak rather of Barnard the man, as I knew him in those early years of his professional career.

Two or three memory pictures are still most vivid. I recall the night, not very long after the discovery of the fifth satellite when a party of students from the State Normal School in San Jose surrounded him in the rotunda of the Observatory eager to see him and to show him how they honored and admired him. He was the picture of embarrassment. Half an hour later he told me it all made him feel very humble. And yet no man better knew his own ability, even while he said most sincerely "I have been very fortunate." It was this combination of confidence in his powers with simple-hearted and sincere humility that so endeared him to his fellows.

Others will tell you of his devotion to his work. Let me, however, give one instance. In 1895, he was photographing Comet Brooks, but he had agreed to give an evening lecture in San Jose. He gave the lecture, taking the mail stage from the mountain shortly after noon and reaching San Jose just in time to get a hurried dinner before going to the hall for his lecture. Then, to make his series of photographs continuous, he hired a horse and light buggy and drove up the long 26-mile road to the mountain—a 5-hour journey—and went at once to the Crocker Dome to photograph the comet. Any other course of action would have been quite unthinkable, from his point of view.

Even in these early days Barnard found it hard to sleep in daylight hours. He would retire at dawn, almost exhausted with his long hours of work, and fall asleep quickly. But any noise was likely to waken him, and once awake he could not get back to sleep. Everyone on the mountain understood this and special efforts were made to establish what we now call "a zone of quiet" about his house.

I shall not discuss the unfortunate conditions that led Barnard to leave the Observatory in 1895. It will suffice to say that, able as he was, Director Holden was a difficult man to work under, and particularly so to a man of Barnard's temperament. The opening of the Yerkes Observatory, gave him the opportunity to continue his work in a more congenial environment, and to the great regret of all his friends in California, he decided it was best to avail himself of it.

\*Dr. Aitken's address is published in full in *Scientific Monthly*, March, 1928.