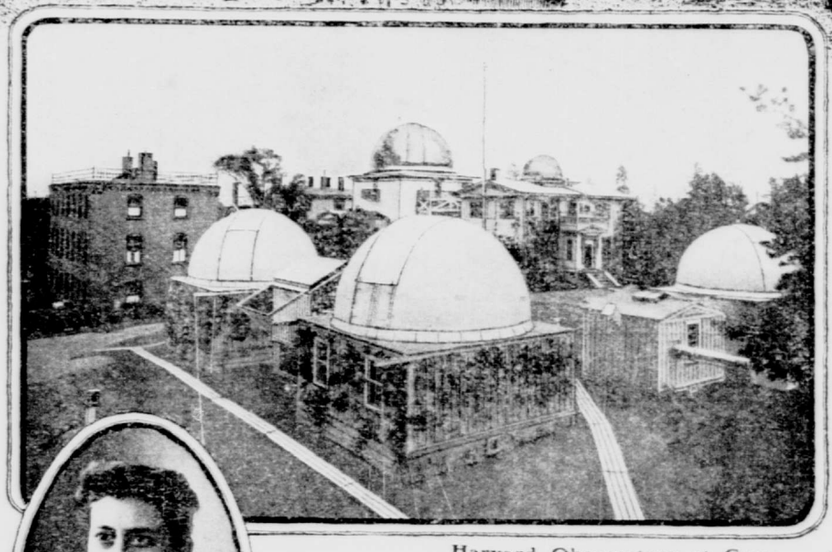
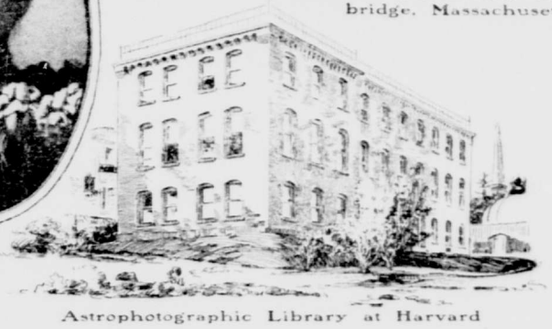
A LIBRARY OF THE SKY

By Pauline Carrington Bouvé



Harvard Observatory at Cambridge, Massachusetts

Mrs. Williamina Paton Fleming, Curator of the Library



Astrophotographic Library at Harvard

FROM the earliest period of man's existence the study of the stars has engaged his attention, and astronomy, the oldest of the sciences, was evolved gradually from a practical application to his daily needs of his observations of the external world about and above him. The stars in their courses were sure and unfailing guides alike to the mariner on the illimitable ocean and the wanderer in the trackless desert, and it was natural that they should become to him sources of infinite speculation and objects of reverent interest and regard.

Imagination, which as surely was an endowment of the primitive man of archaic times as it is the coping-stone of all the arts of modern civilization, traced for him in the fiery lines of the skies semblances of bird, beast and reptile, and these fancied images furnished the primitive astronomer with the first rude chart of the heavens, which, as the original constellations, has survived every stage of astronomical development. As the intellect of man expanded, the observations of the sun, moon and stars, which at first he had applied to his daily necessities, became the foundation of investigations concerning the relations and nature of the planetary objects themselves; and from this remote time may be dated the study of the heavenly hosts as a science.

Chinese records made twenty-four hundred years before the Christian era describe observations supposed to have been made at that time, while some of the sacred books of India refer to astronomical knowledge acquired centuries earlier. To a date not much later than this are attributed the first observations of the Chaldean priests of Babylon.

Certain Greek traditions assign a considerable knowledge of this ancient and wonderful science to Egyptian priests who lived thousands of years before Christ, and it is interesting in this connection to follow Proctor's theory, which partially is based upon a hint of Herodotus concerning the naming of the Egyptian pyramids "after Philiton, a shepherd who at that time fed his flocks about the place."

Mr. Proctor's deductions from this hint, together with certain other facts and the peculiar architectural features of these mysterious buildings, lead one to a strong conjecture that the knowledge of the Egyptian builders indeed was derived from those shepherd Kings of Palestine who induced Cheops to undertake the building of the Great Pyramid, not solely or principally as a royal tomb, nor a treasure-house, nor a refuge from the Nile's inundations, but as an astronomical observatory built for astrological purposes.

The theory is supported by the fact that all of the pyramids, without exception, are built on astronomical principles, their square bases being so placed that two will lie east and west, two lie north and south, their four faces fronting the cardinal points. Between autumn and spring, therefore, the rays of the rising and setting sun would illuminate the southern face of a building of this peculiar figure and position, while during the other six months of the year, the period between spring and autumn, its northern face would be bathed in the sun's earliest and latest daily beams. At solar noon throughout the year the sun's rays passed from its eastern to its western face, while for three and three-quarters months before and after midsummer the noon rays would fall on all of its four faces or fronts.

This interesting and ingenious theory is convincing on one point, and that is that though these buildings were erected on astronomical principles, their purpose was not the advancement of the science of astronomy, nor for the recording of knowledge for succeeding generations. The astronomical principles of their structures were, we may be led to conclude, to subserve astrological purposes and were to solve the problems of the destinies and dynasties (each one separately) of Cheops, his brother and sons. They therefore were connected with the lives of the Kings rather than their deaths, though undoubtedly they served also as sepulchers.

Upon this hypothesis only can the sealing up of these edifices be explained. After the nativity horoscope had been cast by the stars, which, as the Chaldeans sincerely believed, foretold and directed the fates of individuals born under their respective influences, and the individual no longer needed the art of the shepherd astrological astronomers to consult the heavenly bodies that ruled his destiny and indirectly his dynasty, the colossal architectural telescope was closed to the light of the prophetic stars. The King's nativity observatory would serve to cast no other man's horoscope, though it might serve as the mighty tomb of a mighty ruler.

According to this hypothesis, the Egyptian pyramids really were the first observatories in the world's history, designed and executed by an ingenuity and skill unequaled in modern times, and for this reason must possess a peculiar fascination for the students and savants of that old science that still seeks to discover the secrets of those strange circling worlds in the space around us that we call the planetary system.

For this reason, it is not irrelevant in reviewing the remarkable work accomplished by an American astronomical institution, which in certain lines of research is acknowledged on both sides of the world to be pre-eminent, to wander back to those prehistoric but still enduring monuments to the early knowledge of the principles of a science used for tyrannical and selfish purposes, and compare the ancient uses and abuses of astronomy with its present aims and achievements.

Terah and Abraham knew more of this science than the Greeks knew after the time of Hipparchus, and there was no appreciable progress in astronomy from the time of Ptolemy's compilation of the "Almagest" to the time of Copernicus, who was born in a little trading town on the Vistula within the frontier of what is now the Kingdom of Prussia, in 1473.

The fifteenth century marked a great revival in learning, and was the period of both celestial and terrestrial discovery. The bearers of Mohammed's banner, the Arabs, had developed at the court of Bagdad, in the eighth century, a center of scientific activity, and Haroun al Raschid, of the "Arabian Nights" fame, and dear to the children of all nations, was having the famous "Almagest" translated from the Greek in 767 A. D.; but the fifteenth century marked the boundary line between astronomy of the middle ages and astronomy of modern times.

From the date of Copernicus' death to our own generation the science has been steadily moving onward in the path of progress, and the things done at the various observatories of the world to-day would be a source of great amazement to Tycho Brahe, Galileo, Kepler, Sir Isaac Newton and the Herschels, were they alive to witness them. But aside from progress in the way of facility and achievement there is another great difference in the present system of astronomical research.

This difference exists in the employment of women in this field of work, and may best be shown where this experiment has been most thoroughly tested—in the Harvard College Observatory at Cambridge, Massachusetts. In this institution forty-three of the officers employed are women, and one of these, Mrs. Williamina Paton Fleming, perhaps is the most distinguished woman astronomer living to-day, while several others among the number are engaged in lines of research that have made their names known throughout the civilized world. Among other branches of research, Harvard College Observatory was the pioneer in celestial photography. It was Professor George P. Bond, a predecessor of the observatory's present director, who in 1850 first photographed, by the aid of the large refractor, some of the double stars of the first and second magnitudes. The telescope in celestial photography is used as the camera, the sensitive plate usually being placed in the focus of the object-glass or mirror. In this way all the light of the star which falls upon the objective is concentrated upon a single point on the plate. A uniform motion corresponding to the apparent motion of the object to be photographed necessarily must be communicated to the telescope or to the plate-holder.

While it is admitted that for the detailed study of the brighter celestial objects, such as the sun, moon, planets and double stars, the visual method is superior, because, Professor Ritchey tells us: "In the case of objects in which there is an abundance of light, we can see smaller details directly in the telescope than we can photograph," the same authority goes on to say that even in the cases of those brighter objects "photography affords many important advantages." With the most powerful telescopes, photographs are now made which show countless details