a line (if the telescope is at rest, or has a motion different from that of the earth). 3. As a surface (if the spectrum is photographed).

According to the end in view, any one of these methods is employed at the Harvard Observatory; and the plate, after it has been developed, is given to one of the women assistants for examination. The first examination is directed toward the quality of the image; and this quality is estimated on a fixed scale. The estimate is based on the clearness or definition of the image; and only those plates estimated at four or five, and marked "A," are considered as effectually covering the region photographed. When the plate is poor, a second is made on another night, and the work is continued until a good one is obtained. The next step is the comparison of the good plate with a chart, to see whether or not it covers the region of sky intended to be photographed. After this second examination, the plate is placed on a frame making an angle of 45°, with a horizontal mirror which reflects the light back through the plate. Each image on the plate is then studied through a magnifying glass, and all plates showing marked peculiarities in any of the spectra photographed upon them are noted as objects of special interest for future investigation. The accompanying illustration shows a spectrum plate of the bright stars in the vicinity of Cygnus. The spectrum of a star, it will be remembered, is obtained by dispersing the ray of light coming from it into its component colors. On this spectrum plate, then, the stars appear photographed not as points, but as long, narrow surfaces. The spectra of the stars, as of other luminous bodies, vary in appearance according to the chemical constituents of the substances whose incandescence renders them luminous. Now, by the classification of the Draper catalogue, the bright stars are arranged in five groups; viz., first, second, third, fourth, and fifth type stars, — according to the varieties of lines in their spectra. The stars of the first three types offer a gradual yet marked sequence. Those of the first type are the simplest, and seem to present spectra showing an earlier stage of development than that of our sun; those of the second type present spectra resembling that of our sun; while those of the third type have spectra showing a stage of development in advance of that of our sun. Fourth and fifth type stars have not yet been assigned their precise place in the sequence.

The objects of special interest searched for on the spectrum plates and noted by the observer as worthy of future investigation are, first, third-type stars, the spectra of which have been divided into four classes. The first three classes show no special differences from red stars in general, but the fourth class has a striking peculiarity. The spectra of these stars have the lines due to hydrogen bright, and all these bright line spectric objects discovered from the examination of the plates have proved to be variables of long period. Several stars not before known to be variables have thus been proved variable. This important discovery was not made by chance. For some time previous to the spring of 1890 Mrs. Fleming had suspected that the presence of bright lines in the spectra of third-type stars indicated variability. A careful study of successive plates confirmed her suspicion, and on the 16th of April, 1890, she was able to announce her discovery that the star D. M. + 48° 2942 in the constellation Cygnus had been proved variable from a study of its spectrum. During the next year and a half, eleven new variables were discovered by Mrs. Fleming, and forty others were suspected of variability.

The second class of peculiar objects sought for on the spectrum plates is composed of fourth-type stars in color of so deep a red that it is extremely difficult to photograph their spectra. Yet in spite of difficulties the Draper Memorial work has added to this class six stars not previously known to belong to it; and the spectra of several known to belong to it have been photographed, although as yet not with entire satisfaction.

The third and final class of peculiar objects sought for on the spectrum plates consists of fifth-type stars, including bright line stars and planetary nebulæ.