

First with the telescope; the dark spots, irregular in shape, coalescing, breaking up, moving over the disc of the sun at varying rates, not seen in all parts of the surface, but occupying particular zones, having a rough periodicity so that the years of maximum and minimum appearance can be foretold, what are they?

If the young amateur wishes to see these spots so as to form his own opinions about them, he will have no difficulty in the world. A spectacle lens of long focus in one end of a tube and a short focus lens in the other; present the objective to the sun and arrange so that the image of the sun will, after the rays have passed through the eye-piece, be projected upon a sheet of the whitest paper obtainable. If the "dark room and the hole in the window-blind" cannot be procured, all he has to do is to put a good sun-shade over the end of the tube and an artificial "dark room" is thus secured. With his telescope he will be able to watch the spots coming in over the east limb of the sun and passing across the disc; he can note their number, their frequency, their appearance; and he must remember that the first astronomer who proved that there is a periodicity in sun spots was an amateur, who with a very humble instrument observed day after day for thirty years, an example of stick-to-it-ive-ness unexcelled in the annals of astronomy or any other science. To Schwabe of Dessau this honour is due.

Our amateur will also see patches of the sun's surface brighter than the rest; the textbook will tell him that these are called faculae by astronomers, but now begin his questions. Now he begins to see that there is some mystery about the sun, and would like to know whether he might not be able to drag into light some other secrets than the one which

Schwabe made the sun himself reveal. With the telescope, however, he can make but little progress, for at its very best it only shows that the spots are most probably holes in the surface; they will be found to give that impression the more they are examined; but why they keep in certain zones, why greater in number at one time than at another, and what is the exact process by which they are produced, these are mysteries as yet unsolved to the satisfaction of the scientific world, although there are about as many theories as there are observers specially interested. The writings of Father Secchi and more recently Prof. Young may be read with advantage, but remembering that these astronomers made no headway with the telescope alone; they were obliged to call in the aid of a much more wonderful instrument and the reasonings of a science which has grown up, we may say, in our own time, since about 1860.

Spectroscopy tells us all we know about the sun that tends at all to reveal any of the mysteries surrounding the questions of its constitution and the phenomena exhibited by it. Such enormous strides has this new science made that all books upon astronomy now devote space to the general elucidation of its principles. The most casual reader is aware that the spectroscope, refracting and dispersing the rays from a luminous object, shows what colours white light is made up of; and when presented to the sunlight shows also that the band of colours, the spectrum, is crossed by dark lines and that each line has a signification of its own tending to give us some idea of the constitution of the source of light. For thousands of years the sun was waiting to be asked what its spectrum was like. Fraunhofer showed the dark lines, then a few