

THE SUN AND THE WORLDS AROUND HIM

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THIRD PAPER—SUN SPOTS.

In our last paper we attempted to describe the sun as seen through the telescope, and his appearance during solar eclipses; we simply alluded to the facts and offered no explanations. But the thoughtful reader will doubtless ask—"What are the spots which, with the telescope, we see on the sun?" If we cannot answer this question with positive certainty, we will state some facts which bear on the question, draw our own conclusions, and hope the reader will carefully weigh them.

Dr. Wilson, of Scotland, as far back as 1779, made numerous observations on sun spots, and he found that round spots, which had a nucleus in their centre when near the centre of the sun, and which nucleus was surrounded with a penumbra of equal width in that position, changed their appearance as they passed from the centre toward the edge (or, as astronomers call it, the sun's limb). When near the limb, the penumbra became invisible on the side of the spot nearest the sun's centre, and the nucleus, or black centre of the spot, seemed to touch the bright photosphere, or that nearest the centre of the sun. This was regarded as proof that the sun's spots were hollows or cavities, because such an appearance must be presented to an observer situated on the earth, if hollows really exist, provided the black nucleus were situated at the bottom of the cavity.* And another fact seemed to strengthen this view, namely, that spots have been seen as a gap or indentation on the edge of the sun as it has been passing off the disc. A photograph of the same spot was taken by De LaRue, at such an interval as to render the two pictures suitable for combining in the stereoscope, and this spot when viewed in that instrument is said to have appeared as a cavity.

From those facts a theory has been very generally adopted, which was first introduced by Wilson, and perfected by Sir W. Herschel, which may be stated as follows:—

The centre or internal part of the sun is a dark, or, at least, relatively obscure body, surrounded at a distance by an atmosphere, which atmosphere contains a continuous layer of opaque and reflecting clouds. Above this, a second and luminous atmosphere, known as the photosphere, envelopes the sun, covering the first, or non-luminous cloudy stratum;—this photosphere is supposed to be incandescent gas.

Herschel's theory supposes spots to be openings in the gaseous and cloudy envelopes which surround the sun; that, when there is an opening in the photosphere, *only* the dark cloudy stratum is visible, shining by light reflected from the lower side of the photosphere. In

*A spot is just now entering on the sun's disc presenting such an appearance. August 3rd, 1871.