

*Photographs of the Nebulæ M 31, h 44, and h 51 Andromedæ, and M 27 Vulpeculæ.* By Isaac Roberts.

*Nebulæ M 31, h 44, and h 51 Andromedæ.*

The photograph\* which accompanies these notes was taken on October 1 last, and it throws a very different light to that hitherto seen by astronomers upon the constitution of the great nebula, and we shall not exaggerate if we assert that it is now for the first time seen in an intelligible form.

No verbal description can add much to the information which the eye at a glance sees on the photograph, and those who accept the nebular hypothesis will be tempted to appeal to the constitution of this nebula for confirmation, if not for demonstration, of the hypothesis. Here we (apparently) see a new solar system in process of condensation from a nebula—the central sun is now seen in the midst of nebulous matter which in time will be either absorbed or further separated into rings. The farthest boundaries of the nebula have already separated into rings more or less symmetrical with the nucleus, and present a general resemblance to the rings of *Saturn*.

The two nebulæ *h 44* and *h 51* seem as though they were already undergoing their transformation into planets. But I must refrain from further running riot with the imagination and draw attention to some points shown upon the photograph, premising that we have now the means of keeping a strict watch upon many of the structural details of the nebula which in time may enable astronomers to arrive at a demonstration of the nebular hypothesis.

It will be observed that the nebula *h 44* is shown on Bond's drawing with its major axis forming an angle of about  $45^\circ$  with a line joining its centre with the centre of *h 51*, whereas the photograph shows the axis to be pointed much more directly towards that nebula—the angle being less than  $20^\circ$ .

The difference is so obvious that we may reasonably suspect that it is not wholly due to error in charting but is indicative of a change in the direction of the axis since the year 1847, and some confirmation of this supposition is also given by comparison of the distances between the centres of the two nebulæ and the nucleus of the great nebula.

On Bond's chart the distance ratio of *h 51* and *h 44* with the nucleus is as 32 to 54, but on the photograph it is as 36 to 54, thus showing a large discrepancy.

*M 27 Vulpeculæ.*

The accompanying photograph of this nebula was taken on October 3 last, and shows more of the structure than the one with shorter exposure which was presented to the Society last year. It would be difficult to recognise in the photograph any resemblance to a dumb-bell, and only in general outline does it resemble the best drawings published of it.

\* The photographs are deposited in the Library.