

*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 nebulae *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° 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° .

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 nebulae 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.

Height of a Leonid Fireball. By W. F. Denning.

A large meteor observed under nearly similar circumstances to those attending the Perseid fireball of August 13 last (*Monthly Notices*, 1888, November, p. 19) was recorded at Bristol and Sunderland on the night of November 13, at 17^h 19^m.

The observations were as under :—

Bristol.—The writer recorded twenty-nine meteors between the hours of 15^h 30^m and 18^h (1888, November 13), and amongst this number there were seventeen which, by their directions and other features of appearance, conformed with the well-known stream of Leonids. The radiant point was in the usual position at 149° + 22°, and three of the meteors were unusually large with apparent paths as follows :

		Mag.	From	To	Appearance.
1888.	h m				
Nov. 13	16 41	4	166° + 34°	172° + 37½°	V. swift, b. streak 5 ^s
	16 55	Fireball	125½° - 22°	121° - 30½°	V. b. flash, swift, stk. 10 ^s
	17 19	4	252° + 33½°	257½° + 31°	Swift, streak 5 ^s

The fireball at 16^h 55^m was a splendid object, though it appeared very low in the southern sky. The meteor at 17^h 19^m was also of considerable size, but its apparent brilliancy must have been greatly subdued by its situation in the mist immediately contiguous to the N.E. horizon. It appeared slightly N. of ϵ *Herculis* and its line of flight was sensibly parallel with ϵ and ζ *Herculis*.

Sunderland.—Mr. T. W. Backhouse was watching the progress of the Leonid shower on the same night. At 17^h 19^m he became suddenly aware of a bright flash and, a few seconds later, discovered an unusually intense meteor-streak lying amongst the stars of *Boötes* and about 5° below *Arcturus*. It was estimated as 4° long at first, and proved very durable, for it remained in sight during a period of nine minutes, during which it exhibited some alterations both in its shape and position. Mr. Backhouse was careful to notice the place of the streak directly after its first detection, when it extended from 213½° + 16½° to 217¼° + 15°, and he justly surmised it had been left by a Leonid fireball.

On comparing the pair of observations at 17^h 19^m it becomes obvious they relate to the same body, and that a satisfactory path can be derived from them. The radiant point is shown at 149° + 25° in the northern part of the sickle of *Leo*, which was in azimuth E. 50½° S. at the moment of the meteor's apparition. The heights of the beginning and end points of its path, observed at Bristol, were 65 and 37 miles respectively, and its central position was above a place in the North Sea, in about lat. 55¼° N., long. 3¾° E. The long enduring light streak visible