

OUT OF OLD BOOKS

By HELEN SAWYER HOGG

HALLEY'S LIST OF NEBULOUS OBJECTS

IN the *Philosophical Transactions of the Royal Society* for 1715, the astronomer Edmond Halley published a descriptive list of six "luminous spots or patches." He himself was responsible for first calling attention to the unusual qualities of two of the objects on this list.

These six objects still remain, and always will remain, as among the most important objects in the sky. It is rather curious that among the six is to be found a representative of each type of large nebula or system of stars which we know to-day.

The first on Halley's list, the great nebula in Orion, is the outstanding example of luminous diffuse nebulosity. The second on Halley's list, the great nebula in Andromeda is the best known representative of the great spiral nebulae, those systems of tens of millions of suns beyond our own galaxy. With a distance of three quarters of a million light years, this is the most distant object which the unaided human eye can see. Although Halley credits Bullialdus with its discovery, the first telescopic examination was made earlier, by Simon Marius in 1612, when he wrote his famous description that the light was "like a candle seen through a horn."

The third item in Halley's list is Messier 22, one of the largest and richest of the great globular star clusters. The fourth, Omega Centauri, and the sixth, Messier 13 in Hercules, are also well known globular clusters.

The "small obscure spot at the right foot of Antinous," a constellation now extinct, is the well known rich galactic cluster of stars, Messier 11, in Scutum.

Halley's conclusion about these objects is as brilliant as his prediction of the return of his comet for he says "since they have no Annual Parallax, they cannot fail to occupy Spaces immensely great, and perhaps not less than our whole Solar System."

We reprint here the version of Halley's list as given in the abridged volume of the *Philosophical Transactions*. Halley gives the positions of these objects with respect to the signs of the zodiac, the symbols of which are identified on page four of the *Observer's Handbook*; current positions, brightnesses, distances and other data for all these objects except Messier 11, are given on pages 72-74 of the 1947 edition.

From *The Philosophical Transactions* (From the Year 1700 to the Year 1720), Abridg'd. Vol. IV, p. 224, 1721.

VII. Wonderful are certain luminous Spots or Patches, which discover themselves only by the Telescope, and appear to the naked Eye like small Fixt Stars; but in reality are nothing else but the Light coming from an extraordinary great Space in the Aether; through which a lucid *Medium* is diffused, that shines with its own proper Lustre. This seems fully to reconcile that Difficulty which some have rais'd against the Description *Moses* gives of the Creation, alledging that Light could not be created without the Sun. But in the following Instances the contrary is manifest; for some of these bright Spots discover no Sign of a Star in the Middle of them; and the irregular Form of those that have, shews them not to proceed from the Illumination of a Central Body. These are Six in Number, all which we will describe in the order of time, as they were discovered, giving also their Places in the Sphere of Fixt Stars.

The first and most considerable is that in the Middle of *Orion's* Sword, marked with θ by *Bayer* in his *Uranometria*, as a single Star of the third Magnitude; and is so accounted by *Ptolomy*, *Tycho Brahe* and *Hevelius*: but is in reality two very contiguous Stars environed with a very large transparent bright Spot, through which they appear with several others. These are curiously described by *Hugenius* in his *Systema Saturnium* pag. 8. who there calls this Brightness, *Portentum, cui certe simile aliud nusquam apud reliquas Fixas potuit animadvertere*: affirming that he found it accidentally in the Year 1656. The Middle of this is at present in Υ $19^{\circ}.00$, with South Lat. $28^{\circ}\frac{3}{4}$.

About the Year 1661 another of this Sort was discovered (if I mistake not) by *Bullialdus*, in *Cingulo Andromedae*. This is neither in *Tycho* nor *Bayer*, having been omitted, as are many others, because of its smallness: But it is inserted into the Catalogue of *Hevelius*, who has improperly call'd it *Nebulosa* instead of *Nebula*; it has no Sign of a Star in it, but appears like a pale Cloud, and seems to send forth a radiant Beam into the North East, as that in *Orion* does into the South East. It precedes in Right Ascension the Northern in the Girdle, or ν *Bayero*, about a Degree and three Quarters, and has Longitude at this time Υ $24^{\circ}.00'$ with Lat. North $33^{\circ}\frac{1}{3}$.

The Third is near the Ecliptick between the *Head* and *Bow* of *Sagittary*, not far from the Point of the Winter Solstice. This was found in the Year 1665, by a *German Gentleman M. J. Abraham Ihle*, while he attended the Motion of

Saturn then near his *Aphelion*. This is small but very luminous, and emits a Ray like the former. Its Place at this time is $\overline{\text{C}}$ $4^{\circ}\frac{1}{2}$ with about half a Degree South Lat.

A fourth was discover'd by M. *Edm. Halley* in the Year 1677, when he was making the Catalogue of the Southern Stars. It is in the *Centaur*, that which *Ptolemy* calls δ ἐπὶ τῆς τοῦ νότου ἐκφύσεως which he names *in dorso Equino Nebula* and is Bayer's ω ; It is in appearance between the fourth and fifth Magnitude, and emits but a small Light for its Breadth, and is without a radiant Beam; this never rises in *England*, but at this time its Place is $\overline{\text{W}}$ $5^{\circ}\frac{3}{4}$ with $35^{\circ}\frac{1}{2}$ South Lat.

A Fifth was discovered by Mr. *G. Kirch* in 1681, preceding the Right Foot of *Antinous*: It is of its self but a small obscure Spot, but has a Star that shines through it, which makes it more bright. The Longitude of this is at present $\overline{\text{C}}$ 9° . *circiter*, with $17^{\circ}\frac{1}{6}$. North Latitude.

The Sixth and last was accidentally hit upon by M. *Edm. Halley* in the Constellation of *Hercules*, in the Year 1714. It is nearly in a Right Line with ζ and η of *Bayer*, somewhat nearer to ζ than η : and by comparing its Situation among the Stars, its Place is sufficiently near in $\overline{\text{W}}$ $26^{\circ}\frac{1}{2}$. with $57^{\circ}.00$. North Lat. This is but a little Patch, but it shews it self to the naked Eye, when the Sky is clear, and the Moon absent.

There are undoubtedly more of these, which have not yet come to our Knowledge, and some perhaps bigger, but though all these Spots are in Appearance but small, and most of them but of few Minutes in Diameter; yet since they are among the Fixt Stars, that is, since they have no Annual Parallax, they cannot fail to occupy Spaces immensely great, and perhaps not less than our whole Solar System. In all these so vast Spaces it should seem, that there is a perpetual uninterrupted Day, which may furnish Matter of Speculation, as well to the curious Naturalist as to the Astronomer.

Readers who are interested in reviewing the life of Halley are recommended to read the excellent article by N. T. Bobrovnikoff in the *Scientific Monthly*, Nov. 1942, vol. LV, pp. 439-446, (Perkins Observatory Reprint no. 30). For a more exhaustive account, readers may consult the volume "Correspondence and Papers of Edmond Halley" arranged and edited by E. F. MacPike, Oxford, Clarendon Press, 1932.