Some notes on nebulae and nebulosities.

By E. E. Barnard.

In the work of preparation of the Milky Way photographs made at Mount Wilson in the summer of 1905 with the Bruce telescope of the Yerkes Observatory, there are shown great masses of nebulosity in a number of places in the Milky Way. This nebulosity is noticeable and in some cases is not very faint, and had been shown more or less distinctly on my early photographs, but the pure sky of Mount Wilson brought them out unmistakably. I have collected here a few notes on some of these and shall give a more complete list later.

The star BD —19°4953 (1855.0 18h 9m 56s — 19°42'8") of the 7.6 magnitude is unsymmetrically placed in an almost circular nebula about 20' in diameter (see A.N. 3111 p. 233). Between this star and BD —20°5055 there is a large bed of diffused nebulosity which begins half way between these stars and extends to the west as far as —20°5055. Its following edge, which is quite straight, lies in Pos. A. 150°± and extends about 1° on each side of the line between these stars, from about 18h 6m — 1955 to 18h 12m — 22°. The following edge is irregular with small tufts of nebulosity projecting from it. Some 20' north of —19°4953 an irregular mass of faint nebulosity streams eastward for about 1°. The two stars BD —19°4881 and —19°4946 are closely and densely nebulous. The nebulosity about —19°4881 is somewhat extended n f and s p. They seem to be connected with the larger nebulosity surrounding —19°4953. Some of the diffused matter from the large bed extends to them from the west.

The magnificent star cloud, whose center is roughly in 1855.0 18h 18m — 1855, is remarkable for the definiteness and angularity of its south and following outlines. The east side is about 42' long and is very straight. The south side is somewhat irregular and much longer. It runs south preceding for about 90' and then joins the great bed of nebulous matter just described. The northern edge of this star cloud is diffused. In the cloud towards its northern edge, are two remarkable black holes. The preceding hole is in 1855.0 18h 7m — 18°10'. The north and south diameter of this small hole is about 13' and it is about half that in width. In its center is a 12 magnitude star with a fainter companion some 3' preceding which also has a yet fainter companion north. There are a few other faint stars in the hole nearer the edges. The following edge of the hole is singularly sharp cut, as if it had been outlined with a brush and black ink, while its preceding edge is diffused and seems to slope inwards. There is some structural detail in it. The second hole is in 1855.0 18h 9m — 18°15'. This is slightly curved and narrow and stretches southerly for some 10' or 12'. At its north end is a blacker spot or hole. The space between these holes is filled with nebulosity, the sharp cutting off of which makes the following border of the larger hole. This nebulosity runs for
nearly 2° along the north border of the great star cloud. Nebulous wisps extend from its north edge. Indeed all this region seems to be covered with a thin nebulous substratum which grows denser at the points mentioned where it is unmistakable. There is a cloud of this nebulousness mixed up with a massing of the stars in about 1855.0 18° 9' m. —16° 45'. This connects irregularly with the great star cloud. It also extends in a straggling manner towards and connects with the Omega Nebula, M 17.

There is a small V-shaped dark marking in 1855.0 18° 3' m. —18° 0' which is sharply defined. There is also a group of very small, definite, dark markings in 1855.0 17° 56' m. —18° 0'. They cover an area of about one square degree. These markings all exist in a general luminous groundwork, covering all this part of the sky. There are masses of this nebulousness farther on between M 17 and M 16.

Messier 17.

Messier 17 — the Swan or Omega Nebula (1860.0 18° 12' m. 42' —16° 13' 9') is a very remarkable object and covers a very much greater space than visual observations would indicate. Its full extent north and south is 42' and it is about 24' broad east and west. Its brightest portion would be comprised within a circle about 15' in diameter. The rest consists of faint diffusions from the south east around to the north. Preceding the brightest portion of the nebula, by about 15', are two small stars involved in a small nebulousness. These stars are BD —16° 48' 12 and —16° 48' 13 of the 9.2 and 9.4 magnitudes, whose positions are respectively for 1855.0

\[
\begin{align*}
\alpha &= 18° 11' m. 18' 1 \\
\delta &= -16° 4' 2 \\
\alpha &= 18° 11' 47.6 \\
\delta &= -16° 4.3
\end{align*}
\]

Messier 16.

Messier 16, which is described in Dreyer's NGC. as 3Cl; at least 100 at L & S, and whose position for 1860.0 is 18° 10' m. 57' —13° 50' 0, is a beautiful object. It is a bright nebula very closely resembling the great Nebula of Orion, and is mixed up in a scattering cluster of stars. The brightest portion of it is about as large as that of M 17. A bay in the north edge very much resembles that in the Orion Nebula. From each side of this bay, wing like extensions run north following and south preceding for considerable distances. Faint extensions give it a diameter of nearly one degree. Dreyer does not mention any nebulousness in connection with this group of stars. In reality the nebula itself is the main thing. 1)

Messier 8.

1860.0 \( \alpha = 17° 55' m. 6' \) \( \delta = -24° 22.8' \).

This beautiful nebula and mixture of bright stars is a very extraordinary object, full of rich details, among which are a number of very black, small, sharply defined spots or holes. The stars are apparently freely mixed in the nebulousness. Though there are masses of greater density in the nebula, there is nowhere any appearance of condensation about the individual stars. This is a very singular feature often noticed in connection with these mixtures of nebulousness and stars. The stars apparently are freely mixed with the nebulousness without being centers of condensation. Of course one could avoid any attempt to explain why this should be so, by saying that the stars may not be in the nebula, but apparently so only by projection in the same direction. There are other reasons, however, which would lead one to believe that the stars and nebulousness of M 8 are actually mixed together. There are too many other cases of this kind to suppose that their association is a matter of perspective. In A. N. 3111, Bd. 130, p. 234, I have given a sketch of a group of nebulae, 11/2° following M 8. In that paper it is said: The singular mixture of stars and nebulousness, M 8, is shown on several of the photographs [in 1892], and is a very remarkable object. East and west its diameter is about 45', and north and south some 42'. The southern side is sharply defined and serrated with three distinct pointed projections. From its north following corner, a wisp of nebulousness extends nearly to the group of nebulous stars just mentioned, and possibly with a longer exposure would be found to connect with them.

The photographs of this region made with the 10-inch Bruce telescope in the splendid atmosphere of Mount Wilson in 1905, show that the fainter extensions of M 8 do reach to and envelop this group of nebulae. A faint diffusion of nebulousness from the eastern side of M 8 covers all the space between the larger nebula and the group of nebulous stars. At the latter it becomes denser over a region as large as that of the brighter part of M 8. It seems to condense rather strongly at the several stars shown in the sketch referred to in A. N. 3111. The star Gou 24695 of 7.1 magnitude is the center of a larger but very diffused condensation. The nebula NGC 6559 brushes out south following and has a short nebulous strip attached north preceding. The two nebulousness shown in the north preceding part of the sketch, are very striking features on the photographs. They are simply stronger condensations in the diffuse mass that involves all this region. Between these two is a vacant space, or black hole, which is sharply curved and well defined on its preceding edge. The plates of this region on 1905 July 26 and 27 show the planet Uranus in the middle of this small vacancy. Slightly north following a line drawn on the sketch, between the two novae nebulae, the diffused nebulousness involving the group extends for a considerable distance north preceding.

There is a conspicuous small nebula or nebulous star in the position 1860.0 18° 0' m. 35' ± —23° 26' ± and another in 1860.0 17° 59' m. 6' ± —23° 25' ±. There is a small elongated bright nebula in the position 1860.0 17° 59' 25' ± —23° 53' ±.

The entire length of M 8 east and west is 77' and north and south 45'. But if we reckon the faint diffused portion which extends to the group of nebulous stars to the east, the entire extension of M 8 would cover a space of about 2° east and west.

The Triangulum Nebula M 20.

1860.0 17h 53m 54s — 23° 15'.

This singular object has faint extensions which I have not seen on any other photographs. The northern side reaches out beyond and involves the 6.3 magnitude star CoD = 22° 12' 44" (1875.0 17h 54m 20s 5 — 22° 45' 9") and

Yerkes Observatory, Williams Bay, Wisconsin, 1908 Jan. 30.

E. E. Barnard.

Die Veränderlichkeit der Radialbewegung von β Ursae majoris.

Die Ausmessung der von Prof. Eberhard und mir in den letzten Jahren aufgenommenen Spektrogramme von β Ursae majoris ergab, daß die Radialbewegung dieses Sterns veränderlich ist. Das Spektrum gehört der Klasse II B an, und in dem bei uns aufgenommenen in betracht kommenden Spektralbeizirk ist nur die Mg-Linie 2 4481 gut merkbar, während die Hγ-Linie wegen ihrer Breite und die übrigen, wenig zahlreichen Linien wegen ihrer großen Schwärze meist nur ungenaue Einstellungen gestatten. Die im folgenden angeführten Werte der Radialgeschwindigkeit v sind daher mit beträchtlichen Unsicherheiten behaftet, durch welche allein indessen die großen Unterschiede zwischen den einzelnen Werten nicht erklärt werden können. Die Ergebnisse meiner Messungen sind:

Potsdam, Astrophysikalisches Observatorium, 1908 Febr. 27.

H. Ludendorff.


H. L.

Observations of a moving object near Jupiter from photographs taken at the Royal Observatory, Greenwich.*

On examining a photograph of Jupiter VII taken on 1908 February 28 an object of an apparent planetary nature was noticed near Jupiter VI. On reference to earlier photographs the object was identified and traced back to Jan. 27. Provisional measures were made and the following places obtained. These include and supersedes those places on Jan. 27 and Feb. 28 already telegraphed which were slightly erroneous. The positions will be determined with greater accuracy later on in conjunction with Jupiter VI and Jupiter VII.

<table>
<thead>
<tr>
<th>1908</th>
<th>Gr. M. T.</th>
<th>app. α</th>
<th>app. δ</th>
<th>Object—Jupiter (Δα)</th>
<th>Δδ</th>
</tr>
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</table>
| Jan. 27 | 12h 44m 9s | 8h 45m 51s 78 | +18° 5' 32" | —0" 8' 32" | —43° 15' 8"
| Febr. 1 | 11 52 3 | 8 43 20 49 | +18° 17 35 7 | +0 2 0' 1" | —41° 41 7"
| 3 | 10 27 20 | 8 42 21 99 | +18° 22 25 2 | +0 6 4' 7" | —41° 4 7"
| 22 | 10 56 34 | 8 33 35 48 | +19° 5 48 9 | +0 48 4' 5" | —33° 59 0"
| 23 | 8 33 49 | 8 33 14 23 | +19° 7 36 6 | +0 50 5 6" | —33° 36 7"
| 24 | 12 24 53 | 8 32 47 26 | +19° 9 51 2 | +0 53 4 5" | —33° 9 3"
| 27 | 10 59 24 | 8 31 42 99 | +19° 15 17 9 | +0 1 0' 4" | —31° 59 8"
| 28 | 11 28 37 | 8 31 21 67 | +19° 17 5 3 | +1 2 26" | —31° 36 6"

Royal Observatory, Greenwich, 1908 March 9.

*f) Das Objekt ist, wie schon in Nr. 4237 geschehen, vorläufig als 1908 CJ zu bezeichnen. KB.

1908 CJ. (Telegramm aus Cambridge, Mass., vom 17. März.) Campbell telegraphs Greenwich object near Jupiter observed by Albrecht 1908 March 8. 8, 4, 86 Gr. m. t. α (o 8° 0') = 8h 28m 33s 2; δ (o 8° 0') = +19° 39' 11". Aitken observed visually magnitude 15. Pickering.