

OBSERVATIONS OF NEBULÆ WITH THE 36-INCH REFRACTOR OF
THE LICK OBSERVATORY.

BY S. W. BURNHAM.

The observations of nebulæ which follow were all made with the 36-inch equatorial, and substantially all of them in the months of September and October, 1891. Most of the objects were selected from the General Catalogue, because of some uncertainty in the descriptions of the nebulæ, or doubt concerning their places or actual existence. These observations were dove-tailed in with the regular work, so as not to interfere materially with the more important micrometer measures of close double stars; and, of course, the best nights were not used for this purpose, but the conditions were good enough for work of this character.

I have relied upon DREYER'S General Catalogue for the places and the general descriptions. The numbers used in all cases refer to this work. I have referred the places derived from the measures to 1860, the epoch of the General Catalogue. It would certainly be a great convenience to observers if the places of all newly discovered nebulæ were given in the same way. There is nothing gained by carrying the places forward to any current date. So far as setting on these objects is concerned, one time is as good as another, and since we have a general catalogue there is every reason for adhering to that epoch. For the general purposes of a catalogue approximate places are sufficient, and the nearest minute of R. A. is close enough; but it is very desirable that as many nebulæ as possible should be carefully observed with the micrometer, and measured directly (angle and distance) from some convenient star for the detection of proper motion. It is in this way only that change of this character is likely to be discovered. The R. A. and Decl. may have the highest accuracy, but there is no way of easily ascertaining whether there has been any movement. If we have the angle and distance from a star in the field, the micrometer wires can be placed in a couple of minutes so as to show whether or not it is necessary to do anything more. Of course, for this purpose it is a matter of no consequence that the comparison star is not found in any catalogue.

In the course of these observations some new nebulæ have been found in the vicinity of the catalogue nebulæ under examination. These are referred to in the proper places. No attempt has been made to find new objects, and in my regular

work with micrometer the faint nebulae which are occasionally met with are, as a rule, only saved when they are near enough to some prominent star for direct measures.

No. 607.

R. A. $1^h 27^m 16^s$ }
Decl. — $8^\circ 7'.8$ }

This is one of D'ARREST's nebulae, given in DREYER with the note, "11-m star nebulous?" and it is further stated, "No nebulosity seen by SCHÖNFELD, but AUWERS saw it (*Kon. Beob.*, 226)."

This should be, from the catalogue place, a little preceding an $8\frac{1}{2}$ -m star. There is certainly nothing in this place. I found a rather conspicuous nebula a short distance following, which was subsequently identified as DREYER 615. This has a bright central nucleus, with long nebulous wisps extending on each side in the direction of 160° — 340° . These streaks extend roughly about $33''$ on either side of the nucleus. This nebula is $20''$ following, and $126''$ north of the $8\frac{1}{2}$ -m star mentioned above. The star is S.D. (8°) 273. Applying these differences to the S.D. place of the star, we have for the place of the nebula (1860):

R. A. $1^h 28^m 26^s$ }
Decl. — $8^\circ 3'.3$ }

This agrees substantially with HERSCHEL's place. A few nights later (1891.753) this region was very carefully examined again. There was nothing in the catalogue place of DREYER 607 in the least suggestive of nebulosity. There is no doubt that No. 615 is the object which has been seen in looking for the other, and that it is one of the many instances of mistaken identity.

No. 618.

R. A. $1^h 28^m 20^s$ }
Decl. + $32^\circ 40'.6$ }

DREYER has the note: "Never found at Birr, nor by D'ARREST. SCHÖNFELD has two observations, very faint, excessively small = 13-m star, place agreeing with HERSCHEL. Query: only a faint star."

The catalogue place was carefully examined (1891.747) without finding the least trace of any nebulous object. I found two faint nebulae a short distance north, and compared them with the 8.2-m star, D.M. (32°) 281. The first is $1''$

$21''$ preceding, and $22''.4$ south of that star; and the second is $58''$ preceding, and $68''.4$ north of the same star. These objects are respectively DREYER 608 and 614. The differences applied to the D.M. place of the comparison star give for the nebulae (1860):

Dr. 608 R. A. $1^h 27^m 23^s$ }
Decl. + $32^\circ 56'.1$ }

Dr. 614 R. A. $1^h 27^m 46^s$ }
Decl. + $32^\circ 57'.6$ }

The right ascensions are each $7''$ less than the catalogue places, while the declinations are substantially the same. On a subsequent night this region was carefully gone over, with the same result so far as No. 618 is concerned. There is certainly nothing in the catalogue place, and this object has probably been confounded with one of those mentioned above. This is also the case with No. 627. The place of this is a little following the two measured, and in about the same declination. The place of this was doubtful to HERSCHEL, who says: "The R.A. conjectural, and P.D. liable to some error." It is safe to say that Nos. 618 and 627 do not exist, and that the observations credited to them really belong to Nos. 608 and 614.

No. 707.

R. A. $1^h 44^m 31^s$ }
Decl. — $9^\circ 12'.0$ }

This nebula was discovered by TEMPEL, and was described by him "very faint; faint star in center." I looked this up (1891.766) more particularly to see whether it belonged to the planetary class, the possibility of that being suggested by the central star mentioned. It does not belong to that order of nebulae. There are really two stars, one much fainter than the other, with a faint, diffused nebulous light surrounding them. I called the magnitudes 13.5 and 15.5. The latter would, of course, be entirely beyond the reach of the instrument used by TEMPEL. A rough setting of the wires gave for the angle between these stars 302° , and for the distance between them $10''.4$.

The nebula was compared with a small star preceding, S.D. (9°) 345. This is 9.8-m in S.D. The nebula is $45''$ following, and $26''.8$ north.

Applying these differences to the S.D. place of the star, gives for the nebula (1860):

$$\begin{array}{l} \text{R. A. } 1^{\text{h}} 44^{\text{m}} 31^{\text{s}} \\ \text{Decl. } - 9^{\circ} 12'.8 \end{array}$$

In identifying and fixing the place of this nebula I found a new one in the immediate vicinity, which was measured directly from the same comparison star used for the other.

S.D. (9°) 345, and New Nebula.

$$1891.766 \quad P = 260^{\circ}.9 \quad D = 221''.3$$

These measures give for the place of the new nebula (1860):

$$\begin{array}{l} \text{R. A. } 1^{\text{h}} 43^{\text{m}} 31^{\text{s}} \\ \text{Decl. } - 9^{\circ} 13'.4 \end{array}$$

This is fainter than the other, though easily enough seen.

No. 736.

$$\begin{array}{l} \text{R. A. } 1^{\text{h}} 48^{\text{m}} 35^{\text{s}} \\ \text{Decl. } + 32^{\circ} 21'.1 \end{array}$$

There is a cluster of faint nebulae in this place. The catalogue places of the others are:

No.	R. A.	Decl.	
737	$1^{\text{h}} 48^{\text{m}} 36^{\text{s}}$	$32^{\circ} 21''.6$	Rosse.
738	$1^{\text{h}} 48^{\text{m}} 38^{\text{s}}$	$32^{\circ} 22''.0$	Rosse.
739	$1^{\text{h}} 48^{\text{m}} 47^{\text{s}}$	$32^{\circ} 28''.0$	Copeland.
740	$1^{\text{h}} 48^{\text{m}} 48^{\text{s}}$	$32^{\circ} 19''.7$	Rosse.

No. 737 is described: "Stellar nebula (? faint star) $27''$ north of h 169 (No. 736)." The 36-inch shows that this is not a nebula, but a faint star, 13.5-m. Two measures of this from h 169 were made with the Parsonstown reflector. Evidently they are only very rough settings, as the difference in the distances is much too large for careful measures. These observations and my own are as follows:

1850.775	10.4	27.0
1874.022	11.9	35.1
1891.766	9.8	32.31

The 36-inch shows a very faint star, which I have called 15.5 magnitude, between and a little preceding the line joining the two objects measured above (Nos. 736 and 737). A single setting of the wires makes the new star $22''.0$ from No. 736, in the direction of $7^{\circ}.6$. Of course a star of this magnitude is a faint object with the largest

apertures. There is no trace of any nebulosity about either star. There is no doubt that No. 737 should be rejected as a nebula from any future general catalogue.

The position of No. 738 was also measured from h 169 at Parsonstown. This and the later measures are as follows:

No. 736 and No. 738.

1850.775	43.7	75.00	Rosse	11
1891.766	47.3	82.34	β	11

DREYER 740 is not far from a 9.4-m star, and I have measured the angle and distance directly, as was done at Parsonstown:

D.M. (32°) 348 and No. 740.

1874.022	278.2	74.6	Rosse	11
1891.766	279.3	74.11	β	11

My measures applied to the D.M. place of the comparison star give for the place of the nebula (1860):

$$\begin{array}{l} \text{R. A. } 1^{\text{h}} 48^{\text{m}} 48^{\text{s}} \\ \text{Decl. } + 32^{\circ} 18'.5 \end{array}$$

There are some other faint nebulae in the vicinity (Nos. 733, 750, 751, 760, and 761), but I did not examine these.

No. 874.

$$\begin{array}{l} \text{R. A. } 2^{\text{h}} 9^{\text{m}} 43^{\text{s}} \\ \text{Decl. } - 23^{\circ} 50'.5 \end{array}$$

This was discovered by MÜLLER with the 26-inch refractor of the McCORMICK Observatory. The description is: "Excessively faint, pretty small, extended 170° (? double star), 10-m star n. p."

I could not find any nebula in or near this place. The vicinity was carefully swept over, without coming across any nebulous or suspicious object. The assigned place is well marked, as the nebula should be about $9'$ south of an $8\frac{1}{2}$ -m star (GOULD 2301). This star, by the way, is double (new), $160': 1''.2: 8.7 \dots 10$ estimated. It is safe to say that this nebula has no real existence. Probably a faint star was seen. The large telescope shows many near this place.

No. 878 is south following the place of the other. I compared this with a neighboring star (GOULD 2284), which is $2^{\text{m}} 19'.5$ preceding, and $43''.6$ south of the nebula. This gives for the nebula (1860):

R. A. $2^h 11^m 30^s$ }
Decl. — $24^\circ 1'.9$ }

This was discovered by LEAVENWORTH with the MCCORMICK telescope. The R. A. from my observations is 40^s greater than that given in the General Catalogue. The declinations are nearly the same. This is a faint globular nebula, and comparatively easy.

No. 905.

R. A. $2^h 16^m 26^s$ }
Decl. — $9^\circ 22'.2$ }

This is also one of LEAVENWORTH'S discoveries with the MCCORMICK 26-inch. In or very near the place I found what seemed to be an exceedingly faint patch of nebulous light. The seeing was not good enough to be certain that it was not due to faint stars, but it is probably a nebula. This is a very blank region for stars, and as there was no convenient comparison star, the place of the object was not taken.

No. 942.

R. A. $2^h 21^m 30^s$ }
Decl. — $11^\circ 27'.2$ }

No. 943 has exactly the same R. A., and is $1'.0$ less in Decl., and given with the description, "Very faint, round, neb. double star?" These were discovered by MÜLLER at the MCCORMICK Observatory. These objects should be very near a faint S.D.M. star, 9.4 -m. The R. A. of that star is but 4^s more than that given for the nebulae, and its Decl. — $11^\circ 24'.8$, and therefore the nebulae should be about $1'$ or $2'$ south. There are two faint stars nearly in this place, but they have no nebulous appearance, and are certainly nothing but faint stars. A little following this place there is a small faint nebula (*a*), and still farther following a double nebula (*bc*). Both components of the latter have faint nuclei. The brightest of the two is *b*, and *a* is considerably fainter than either. I have compared these with the star mentioned above, S.D. (11°) 466, with the following result:

Neb. (*a*) *s* of star $187''.5$ and $26''f$

Neb. (*b*) *s* of star $201''.6$ and $49''f$

The double nebula was measured directly: •

Neb. (*b*) and Neb. (*c*).

$1891.769 \quad P = 340^\circ.3 \quad D = 33''.90$

These observations give the following places for these nebulae for 1860:

Neb. (*a*) $2^h 22^m 0^s.5 \quad - \quad 11^\circ 27'.9$

Neb. (*b*) $2 \quad 22 \quad 23.5 \quad - \quad 11 \quad 28.1$

Neb. (*c*) $2 \quad 22 \quad 22.7 \quad - \quad 11 \quad 27.6$

There is but little doubt that the two nebulae discovered by MÜLLER are *b* and *c* of the foregoing observations. The other, *a*, is fainter, and might have been easily overlooked, and is certainly new.

There is a star $8\frac{1}{2}^m 13^s$ following, and $9'.4$ north of the comparison star previously referred to, which is a new double star. As the components are quite unequal, it will not be readily seen with most instruments. This star is S.D. (11°) 467 (= WEISSE II. 356 = SANTINI 197). The star catalogues differ some in the declination. My measures of the companion are as follows:

$1891.769 \quad 250^\circ.9 \quad 4''.02 \quad 8.2 \dots 13.0$

Two other nebulae were found north preceding the double star; subsequently identified as Nos. 945 and 948 of DREYER. The nearest was measured from the double star, and then the two nebulae with reference to each other, with the following results:

Weisse II. 467 and No. 945.

$1891.769 \quad P = 334^\circ.6 \quad D = 277''.5$

No. 945 and No. 948.

$1891.769 \quad P = 50^\circ.6 \quad D = 152''.4$

Using the WEISSE place of the comparison star, these observations give for the nebulae (1860) the following:

No. 945 R. A. $2^h 21^m 39^s$ }
Decl. — $11^\circ 11'.7$ }

No. 948 R. A. $2^h 21^m 47^s$ }
Decl. — $11^\circ 10'.1$ }

In the General Catalogue there is a difference of 24^s in the right ascensions, and $1'.6$ in the declinations. The first was discovered by HERSCHEL I., and the other by SWIFT at the WARNER Observatory.

No. 955.

R. A. $2^h 23^m 26^s$ }
Decl. — $1^\circ 44'.0$ }

This nebula, which was discovered by HERSCHEL I., has not been found at times by some observers, and variability has been suggested as

an explanation. DREYER has this note: "In *Monthly Notices*, xxxviii., 104, WINNECKE drew attention to the remarkable circumstance that this nebula was invisible to SCHÖNFELD in December, 1861, and to VOGEL in November, 1865, while it was easily seen by D'ARREST, SCHÖNFELD, and WINNECKE in 1856, 1863, 1864, 1868, and 1867. Possibly the brightness of this object is variable. In November, 1887, it was fully of the second class."

I found this (1891.747) in the proper place without difficulty. It is a long, narrow nebula, in a general way similar to DREYER 607, which was examined a few minutes before. It has a bright central condensation, with nebulous wings on either side in the direction of 15° — 195° . A setting of the wires gave for the extreme length, 75". On the whole it is rather a curious object, and should be easily found and seen. It is probable that the failures to find it, mentioned above, were due to unfavorable atmospheric conditions. This would fully explain the observations with the moderate apertures which were probably used.

No. 988.

R. A. $2^{\text{h}} 28^{\text{m}} 34^{\text{s}}$ }
Decl. — $9^{\circ} 57'.9$ }

This was discovered by STONE at the McCORMICK Observatory, and is described in DREYER as a "nebulous star 7.5-m." I could see (1891.766) nothing suggestive of any nebulosity about this star, or any peculiarity in its appearance. Other stars of about the same magnitude in the vicinity were looked at, and I could not detect any appearance in the star in question which was not common to the others. It was examined on the same occasion by BARNARD, and he came to the same conclusion. It is therefore safe to say that the suspected nebulosity about this star is a mistake.

No. 1059.

R. A. $2^{\text{h}} 34^{\text{m}} 45^{\text{s}}$ }
Decl. + $17^{\circ} 24'.5$ }

This is one of HERSCHEL's nebulae, "excessively faint, hardly sure." DREYER says, "Not found by D'ARREST on a very clear night." I examined this region very carefully, and am satisfied that there is nothing in the catalogue place. About 1^{m} preceding this place, and $12'$ south I found a very faint nebula. This would be esti-

mated as perhaps 14 magnitude. It is about $30''$ or $40''$ in diameter, with a gradual brightening toward the middle. It is impossible to say with certainty whether this is the HERSCHEL object, but it is improbable from the description. It is not otherwise in the General Catalogue.

This was compared with a 7.8-m star, D.M. (17°) 419 (= WEISSE II. 820). This nebula is $183''.9$ north of this star, and 37^{s} preceding, giving for its place (1860):

R. A. $2^{\text{h}} 33^{\text{m}} 37^{\text{s}}$ }
Decl. + $17^{\circ} 12'.7$ }

There is a small star near the catalogue place of HERSCHEL's nebula, D.M. (17°) 422, which is a new double star. I did not measure it, but estimated, $160^{\circ} : 1'' : 9.5 \dots 10.5$.

No. 1186.

R. A. $2^{\text{h}} 56^{\text{m}} 20^{\text{s}}$ }
Decl. + $42^{\circ} 16'.5$ }

This was discovered by the first HERSCHEL (= II. 502 = $\frac{1}{2}$ 281). DREYER has the following note: "Twice looked for by Lord ROSSE, but not found; often searched for in vain by D'ARREST. H. calls it 'a pretty bright star with two faint branches;' he has 'a star 14-m, with some kind of nebulous appendage.'"

This was readily found (1891.747) in the proper place. It is a 10-m star involved in a faint, elongated nebula. The conditions at this time were not very good, but the nebula appeared to be at least $2'$ or $3'$ in the longest direction. It precedes an 8.8-m star, D.M. (42°) 697, by 44^{s} , and is $274''$ south. From the D.M. place of the star we have for the nebula (1860):

R. A. $2^{\text{h}} 56^{\text{m}} 18^{\text{s}}$ }
Decl. + $42^{\circ} 17'.7$ }

No. 1363.

R. A. $3^{\text{h}} 28^{\text{m}} 6^{\text{s}}$ }
Decl. — $10^{\circ} 18'.8$ }

This nebula was found by me with the $18\frac{1}{2}$ -inch at Chicago in 1877. A companion nebula, No. 1364, was discovered subsequently by MÜLLER with the McCORMICK 26-inch. The first was measured by me at the time of discovery from the $6\frac{1}{2}$ -m star, L. 6634. The difference between the two distances is doubtless due to the fact that this is a large and generally round mass of diffused nebulosity without any central brightness for the

accurate placing of the wires. The nebula, as a whole, is bright enough to be easily seen with the large star in the field. The measures are as follows:

L. 6634 and No. 1363.

1877.997	P = 62°.1	D = 206".7
1891.845	60.8	203.4

No. 1363 and No. 1364.

1891.845	P = 84°.0	D = 136".5
----------	-----------	------------

Swift ix. 13.

In *Monthly Notices* for December, 1891, DREYER has called attention to a nebula discovered by SWIFT (*Ast. Nach.*, 3004) since the publication of the General Catalogue which may possibly be variable when all the observations, negative and positive, are considered. SWIFT was unable to find it again, and suggested that it might prove to be a comet. HERSCHEL II. had recorded an object in this place, but it was rejected in his General Catalogue as being identical with a nebula a short distance preceding, discovered by HERSCHEL I. It appears also to have been seen with the ROSSE reflector at times, and invisible at other times. For details concerning these observations reference is made to the paper in *Monthly Notices* previously referred to.

I examined (January 28th) the several nebulae in this region, No. 1397 (= III. 569), No. 1417 (= II. 455 = *h* 306), No. 1418 (= II. 456 = *h* 307), and No. 1424 (ROSSE), with the following result:

All of these objects were readily found as given in DREYER'S Catalogue. SWIFT'S nebula is in the place given by him, in line with Nos. 1417 and 1418. It is much fainter than No. 1418, the faintest of the HERSCHEL nebulae mentioned above, and has but half or two thirds of the light of No. 1424. I compared it with the 8-m star north following (LALANDE 6870). The nebula is 72" preceding that star, and 223" south. We have for the place of this object (1860) the following:

<i>h</i> 305	3 ^h 34 ^m 32 ^s .5	— 5° 7' ±
Swift	3 34 37.0	— 5 8.0
Burnham	3 34 34.0	— 5 7.0

It follows, therefore, that SWIFT'S nebula is really identical with the rejected *h* 305.

There is no catalogue star near enough for

direct measurement. There is a 12-m star nearly following, which I have measured from the nebula as follows:

Neb. and star P = 92°.8 D = 155".0

There is a fainter star much nearer the nebula in the direction of about 300°, and distant, perhaps, 20" or 30".

With reference to the question of change, it can only be said that the evidence of change does not appear to be entitled to much weight, and the probabilities are that this object has been missed simply because the atmospheric conditions were not sufficiently favorable. The observer is much more liable to overlook differences of this kind when using the low powers ordinarily employed in work of this character. With powers of 400 or 500 and upwards used in making double-star measures, the difference in regard to illumination and definition on different nights is very apparent, and it is only on the very best nights that negative results have any value or significance. In double-star work it is almost a nightly occurrence with any telescope, large or small, that the instrument is pointed to stars which cannot be seen double on that occasion. In my experience this has happened thousands of times, but I have yet to find the first double star where these failures even suggested any variation in the light of either component. It would be very interesting to find a variable nebula, and this object should certainly be watched for awhile to see whether there is any change in its light. DREYER has pointed out that while this nebula was not seen on various occasions, it was only specially looked for in 1877 and 1890. It is easy to see how it might be overlooked under certain conditions, even with a pretty large instrument. In this connection I should say that the night on which my observations were made was much too poor to do any kind of double-star work, even on the easiest pair, and therefore this nebula would appear fainter than it really is, but this would not affect the comparison with the other nebulae in the vicinity.

Barnard's New Merope Nebula.

R. A.	3 ^h 37 ^m 52 ^s }
Decl.	+ 23° 20' }

In November, 1890, BARNARD discovered a new nebula in the Pleiades (*Ast. Nach.*, 3018) which had escaped detection by all previous observers

from the fact that it is so close to the bright star, *Merope*, that it is buried in the brilliant light of that star, and completely hidden in ordinary observations. I have lately made a set of measures of this singular object from *Merope* with the 36-inch equatorial. The nebula is readily seen with that instrument when one is aware of its existence, and it can probably be seen now with a somewhat smaller aperture; at the same time, its discovery with any instrument is little less than remarkable, from the difficulty of seeing it at all except when the bright star is placed outside of the field, and, of course, there is only one position which is favorable for this purpose. The distance between the two is so small, that the nebula even then is in the extreme margin of the field, and easily overlooked without careful attention.

Merope and New Nebula.

1891.689	167°.1	37°.72
.692	167.0	35.79
.728	164.2	36.00
.731	167.0	34.89

BARNARD, with the same instrument, measured the difference of right ascension and declination between the two objects, and obtained:

$$\text{Diff. R. A.} = 9''.04$$

$$\text{Diff. Decl.} = 35''.72$$

The position-angle and distance deduced from these observations, and the mean result of the foregoing direct measures, are as follows:

1890.92	165°.8	36°.85	B	2 n
1891.71	166.3	36.10	β	4 n

These independent results are certainly remarkably accordant, when the character of the new nebula is considered. If it were a star, or had a well-defined central point, there would be no difficulty; but in this case a faint disc of light, at least 10" or 12" in diameter, has to be bisected by the wire in the extreme margin of the field, and there is necessarily under the circumstances a good deal of uncertainty in doing this, as compared with the bisection of a star, however faint or difficult to see.

A rough setting of the wires to include the more readily visible diameter of the nebula in the direction of *Merope* gave 12".8; but this must not be taken as a measure, even approximately, of its extreme dimensions. In the paper referred to BARNARD estimated it as about 30" in diameter,

and I have no reason for changing this value. The drawing given in *Ast. Nach.*, 3018, is a faithful representation of the nebula and its position with reference to *Merope*.

This is not only far more interesting than any of the nebulae heretofore discovered in the Pleiades by visual and photographic methods, but, judging from its situation and appearance, is one of the most singular objects in the heavens. With respect to its nearness to a bright naked-eye star it is unique. There may be other examples, but certainly no other has ever been discovered, and this close association of a faint nebula and one of the prominent stars of the Pleiades is an interesting fact whether such association is accidental or otherwise. No star bright enough to be visible to the naked eye is known to have a small, definite nebula even within several times the distance of this nebula from *Merope*. Of course there are many examples of large stars involved in widely diffused and extended nebulous masses, of which TEMPEL's nebula about the star in question is an illustration, but these nebulous objects appear to be of an entirely different character from the circular, condensed forms so often found among the small detached nebulae. It may be that a careful examination of the bright stars by cutting off their light from the surrounding field would reveal other examples of companion nebulae.

These measures were made with a power of about 500, in order to give the best separation and get rid of the objectionable light of the star as far as possible. Of course, with such a power nothing would be seen of the nebulous background discovered by TEMPEL. These measures may be of more interest in the future when it will be possible by careful remeasurement to ascertain whether the new nebula is drifting in space with *Merope* and the other stars of this famous group.

Barnard.

$$\begin{array}{l} \text{R. A. } 3^{\text{h}} 38^{\text{m}} 34^{\text{s}} \\ \text{Decl. } + 34^{\circ} 37'.6 \end{array}$$

This planetary nebula was discovered by BARNARD with the 36-inch telescope of the LICK Observatory, in December, 1890, while examining the region near ZONA's Comet (*Ast. Nach.*, 3317). I have examined this on three different nights with the same instrument. It is a beautiful object, and has all the characteristics of the

regular planetary nebulae, with the single exception of the central star. On one occasion I suspected the existence of a faint star or nucleus, but could not be certain of it at that time or later. There are two small stars near it, as referred to in *Ast. Nach.*, 3017. The nearest I have measured from the nebula, and have also compared the latter with the 9-m star, D. M. (34°) 732.

Nebula and Companion Star.

1891.689	P = 288.4	D = 21.79 .. 13-m
.692	287.8	21.78 .. 13-m
1891.69	288.1	21.78 .. 13-m

The other star, which is fainter, 14.5-m, is 33" from the nebula in the direction of 347°.

Nebula and D.M. (34°) 732.

1891.689	P = 119.6	D = 204.5
.692	119.5	203.7
1891.69	119.5	204.1

The same comparison star was used by BARNARD, who measured the difference of R. A. and Decl. directly. Reducing my angle and distance to the same terms, the results are:

	Diff. R. A.	Diff. Decl.		
1890.94	14 ^s .4	102".0	B	1 n
1891.69	14 ^s .4	100".7	β	2 n

The nebula is slightly elliptical in a north and south direction. Measures of the diameter in the direction of 180°, using a power of 1,000, gave the following:

1891.671	10".9
.689	9".1
1891.68	10".0

The place of this nebula for 1860, given above, is derived from the D.M. place of the comparison star, and the measured differences.

No. 1458.

$$\begin{array}{l} \text{R. A. } 3^{\text{h}} 40^{\text{m}} 40^{\text{s}} \} \\ \text{Decl. } - 18^{\circ} 40'.7 \} \end{array}$$

This is from the catalogue of nebulae discovered by LEAVENWORTH at the MCCORMICK Observatory. The description in DREYER is, "Very faint; very small; round; planetary? nebula?" This region was carefully swept over, and the only thing found was a bright, globular nebula about 2" preceding the place given for No. 1458.

I had overlooked this object in the General Catalogue, and was not aware that it was No. 1440, and therefore fixed its position by comparing it with O. Arg. S. 2493. The nebula follows that star 29", and is 91".1 north. This gives for the nebula (1860):

$$\begin{array}{l} \text{R. A. } 3^{\text{h}} 38^{\text{m}} 43^{\text{s}} \} \\ \text{Decl. } - 18^{\circ} 42'.6 \} \end{array}$$

This is almost exactly identical with the place in DREYER. It is hardly possible that I should have missed No. 1458 if any such object really existed. The other object may have been observed under conditions which made it appear much fainter than it really is.

No. 1555.

$$\begin{array}{l} \text{R. A. } 4^{\text{h}} 13^{\text{m}} 48^{\text{s}} \} \\ \text{Decl. } + 19^{\circ} 11'.2 \} \end{array}$$

Not long since I found a new double star in the vicinity of HIND'S supposed variable nebula, and took occasion, when the measures of the new pair were finished, to examine the place of the nebula with the 36-inch refractor. The atmospheric conditions were always favorable. The distance of the components of the double star referred to is only 0".16, and therefore it would have been useless to turn the telescope in that direction when the definition was inferior.

The nebula is easily found from the 8.7-m star, D.M. + 19°, 704, which is 15" p and 4' s. The place of the nebula, as given by DREYER, on the authority of D'ARREST, is identical with that of D.M. + 19°, 706, the magnitude of which was estimated by ARGELANDER as 9.4; and this is *T Tauri* of the variable star catalogues. On October 11th, this star was estimated to be about 11.5 mag., but subsequent examinations indicated that it should be placed lower in the scale. I measured the difference in declination between this and the brighter star 15" preceding; but finding the two stars could be connected directly by using the lowest micrometer eye-piece, the angle and distance were also measured on two nights. The measures in declination are as follows:

1890.775	Diff. Decl. + 243".65
.777	243.40

The direct measures are:

1890.775	43.5	336.31	8.3 ... 11.5
.777	43.8	336.07	8.4 ... 12.5

This small star, if it is a star, is placed within a very small condensed nebula. It is somewhat elongated in the direction of $151^{\circ}.7$. A rough reading of the wires gave $4''.4$ for the length of the nebula in this direction. It is less extended on the opposite side of the star or nucleus, with a shorter diameter of perhaps half that measured. It was examined with various powers, but it was impossible to say whether or not it had a disc like that of an ordinary star. If it were the bright nucleus of the small nebula, it would probably present the same stellar appearance. It will be noticed that this description of the nebula does not correspond with that in the early observations, where it was noted, when it was seen at all, as about $1'$ in diameter.

On October 15th, I asked Mr. BARNARD to examine this region with the large telescope. His great experience in work of this kind, and remarkable acuteness of vision in detecting extremely faint, diffused objects, which would escape the ordinary observer, are well known. After careful attention he was able to see an excessively faint, round nebula, about $\frac{3}{4}'$ from the one previously described, in the estimated direction of 185° . This faint nebulosity was about $40''$ or $50''$ in diameter, and apparently not connected with the variable, and was of nearly the last degree of faintness for the light-power of the large instrument. It is, perhaps, too faint for any other telescope. I should not have seen it independently. Neither Mr. BARNARD nor myself, on any occasion, could see the slightest trace of the $O\Sigma$ nebula (seen also at times by D'ARREST, TEMPEL, and others, but invisible in the ROSSE reflector), which should be 15^s preceding HIND's, nor any nebula in the immediate vicinity. Subsequently we looked at the small nebula with the 12-inch telescope, by way of getting a better estimate of its magnitude, and found that it was a very faint object, and in appearance precisely like any ordinary star of that magnitude. The nebulous surrounding was completely lost with the smaller instrument. I do not think it can be any brighter now than 12.5-m of the scale used in my double-star observations.

On the night of November 1st, Mr. KEELER examined the nebula with the small spectroscope attached to the 36-inch telescope, and found that it was probably of the usual gaseous type, although on account of the extreme faintness of the nebula only the principal line at λ 5005 was

visible. The spectrum of the nucleus could not be seen.

Nothing seems to be definitely known of the period of this variable, *T Tauri*, and it seems to have been as much neglected as the nebula. It should be easy to determine, at least approximately, the extent and time of its change, and it is to be hoped that variable star observers will give this object systematic attention. An instrument of moderate size will answer this purpose. It is probably now not far from its minimum brightness, in which case the variation must have a range of at least three magnitudes. A large aperture will be necessary to ascertain whether the small nebula, which is now visible immediately about the nucleus or star, is also subject to any change.

It was again looked at several times in September and October, 1891. At first it was thought to be a little brighter than in 1890, but subsequent examinations made this doubtful. It was also looked at with the 12-inch in 1890 and 1891, and there was no apparent change in the interval. Any variation would perhaps be more easily detected with this instrument than with the larger aperture. It remains to be seen whether there is any change after all in this object.

About $20'$ north of this is the so-called variable, *U Tauri*. This is a double star, first noted as such by KNOTT. I have made the following measures:

1891.772	203.6	3.25	9.3 ... 9.4
.804	204.1	3.03	9.0 ... 9.2
.810	203.7	3.08	9.0 ... 9.1
1891.79	203.8	3.12	9.1 ... 9.2

The only other measures with which I am acquainted are:

1868.01	202°.1	3".10	9.9 ... 9.9	Knott	2 n
---------	--------	-------	-------------	-------	-----

Of course, very little, if any, change would be expected in a pair of this kind. The variability of this star does not seem to have been satisfactorily shown. On the whole, it is doubtful if there has been any change in the magnitude.

Nos. 1721, 1725, and 1728.

These three nebulæ, all in the same field, were discovered by BARNARD, in 1886, at Nashville, with a 6-inch refractor (*Sid. Mess.*, January, 1886, and *Ast. Nach.*, 2755). The places in DREYER are as follows:

No. 1721	4 ^h 52 ^m 40 ^s	— 11° 20'.6
No. 1725	4 52 55	— 11 20.9
No. 1728	4 53 5	— 11 20.6

They were subsequently discovered independently by SWIFT, and given in his Third Catalogue. The places in DREYER are taken from this list. They are faint objects in the 36-inch, and are very much alike generally, but the preceding one is perhaps a little the brightest. The following one is extended in the direction of about 190°. All are considerably brighter in the middle. No. 1723 (TEMPEL), a short distance north of this group, is much like the others, but a little brighter. It is within a small triangle of stars, two of which are in the S.D. as 9-m, and the other is about 10-m.

I have measured the relative positions of BARNARD'S nebulae (1891.845), as follows:

1721 and 1725	P = 121°.4	D = 94".1
1725 and 1728	61.6	78.3

From these measures 1725 follows 1721 5°.4, and is 49".0 south; and 1728 follows 1725 4°.7, and is 37".2 north. The first of these I compared with an 8.4-m star preceding (L. 9349). The nebula is 1^m 52^s following, and 90".0 north. Applying these differences to the position of the star, we have the following as the places of the nebulae for 1860:

No. 1721	4 ^h 52 ^m 41 ^s	— 11° 19'.9
No. 1725	4 52 46	— 11 20.7
No. 1728	4 52 51	— 11 20.1

No. 1788.

R. A.	4 ^h 59 ^m 57 ^s
Decl.	— 3° 32'.7

This is one of the discoveries of the first HERSCHEL (V. 32). The description in DREYER is "B, c L, R, b M_{*}*15.* 10, 1½' 318°, inv. in the nebosity." The large telescope shows that the brightest part of the nebosity is around a star 11.5-m centrally placed, but it extends to the star referred to by HERSCHEL. This star is S.D. (3°) 1013, where it is called 9.5-m. There is no star near the central star, and I do not know what is meant by the reference in the description given above. It would seem to refer to a triangle of 15-m stars within the nebula. I have measured the distance and angle of the 11.5-m star from the 9.5-m:

1891.845	P = 137°.4	D = 99".07
23		

Between these two there are two faint stars, forming a wide pair, perhaps 6" or 8" apart, about one third of the distance from the 11.5-m star toward the other. There is also another faint star a little following the middle of the line joining the same stars.

Barnard.

R. A.	5 ^h 14 ^m 33 ^s
Decl.	+ 3° 20'.7

This double nebula was discovered by BARNARD in 1888 with the 12-inch telescope of the LICK Observatory. It is 55^s preceding, and 4' south of the wide double star 23 *Orionis* (Σ 696). The two nebulae with a 10½-m star form a nearly equilateral triangle. Calling the nebulae A and B in order of R. A., I have measured them with reference to each other, and also from the small star:

A and B.

1891.854	P = 115°.2	D = 36".32
.893	114.5	36.03
1891.87	114.8	36.17

10½-m Star and A.

1891.854	246°.3	30".42
.893	247.0	29.55
1891.87	246.6	29.98

10½-m Star and B.

1891.854	169°.8	25".91
.893	169.5	24.83
1891.87	169.6	25.37

The preceding one of the two is the brighter, and is a little larger than the other. They are faint objects even in the large telescope, and without any well-defined nucleus. The place given above is for A, and obtained from measures by BARNARD of its position with reference to D.M. (3°) 864.

In sweeping for these objects I found another nebula in the immediate vicinity, which is new. This is similar in appearance to the others, but one or two magnitudes fainter. The position of this was measured from a 9-m star, as follows:

D.M. (3°) 863 and Nebula.

1891.854	P = 317°.7	D = 132".8
.893	318.1	131.7
1891.87	317.9	132.2

Applying these measures to the place of the star as given in the *Albany Catalogue*, we have for the nebula (1860):

$$\begin{array}{l} \text{R. A. } 5^{\text{h}} 14^{\text{m}} 40^{\text{s}} \\ \text{Decl. } + 3^{\circ} 10'.4 \end{array} \}$$

No. 1931.

$$\begin{array}{l} \text{R. A. } 5^{\text{h}} 22^{\text{m}} 9^{\text{s}} \\ \text{Decl. } + 34^{\circ} 8' \end{array} \}$$

This is one of the discoveries of HERSCHEL I. It has been drawn by HERSCHEL II. (*Phil. Trans.*, 1833), and by D'ARREST. HERSCHEL, in his observations of nebulae, describes it as "a nebula including a triple star forming an equilateral triangle; sides = 4"; stars = 11, 12, 14-m." The triple was entered as No. 367 of his *Second Catalogue of Double Stars* (*Memoirs R.A.S.*, III.), with the following note: "One of the most curious objects in the heavens. It is a triple star forming an equilateral triangle, and placed exactly in the center of a small circular nebula which extends a little beyond the stars." No measures were made, but the distance was estimated as 7".

In 1876 I looked at this with the 6-inch and found the nebula faint with that aperture, but the three stars were easily seen. With the 18½-inch in 1878 I noted several other stars in the group, just outside of the nebula. The 36-inch telescope now shows that one of the stars of the triangle is double, having an exceedingly faint attendant at a distance of a little more than 2". This is a difficult pair under ordinary conditions with this telescope, and probably could not be seen at all in any other telescope with which this object has been observed. In the following measures, A, B, and C are the stars which form HERSCHEL'S triangle:

A and B.

1891.753	234.3	7.88	9.5 .. 10.0
.766	233.0	8.16	9.5 .. 10.0
.785	234.1	7.97	9.5 .. 9.7
1891.77	233.8	8.00	9.5 .. 9.9

A and C.

1891.753	309.9	10.33	.. 11.5
.766	311.4	10.62	.. 10.5
.785	309.0	10.65	.. 11.5
1891.77	310.1	10.53	.. 11.2

B and D.

1891.766	327.9	2.40	.. 15.0
.785	321.4	2.22	.. 15.5
1891.77	324.6	2.31	.. 15.2

There is a 14-m star about 6".8 from A in the direction of 18°.7. HERSCHEL estimated the angles of AB and AC as 220° and 280°, respectively, and the distance of each 7". The only other measures which I have found were made with the large reflectors at Parsonstown. Some of the distant stars were observed, but the close star was not seen. The measures of the stars in the triangle are:

1873.775	239.2	7.1	AB
1873.775	310.5	9.7	AC

No. 1988.

$$\begin{array}{l} \text{R. A. } 5^{\text{h}} 29^{\text{m}} 4^{\text{s}} \\ \text{Decl. } + 21^{\circ} 7'.7 \end{array} \}$$

This is CHACORNAC'S so-called variable nebula near ϵ *Tauri*. DREYER states that TEMPEL pointed out many years ago that the supposed nebula was only the false image of the star. With the 36-inch there is not the least trace of any nebulosity in this place, and there is no doubt of the correctness of TEMPEL'S explanation. Too much time has been wasted in looking for this object, and particularly since there was no reason whatever for believing in its existence after CHACORNAC himself failed to see it in 1862. Possibly some of the nebulae may change, but the evidence of the actual disappearance of any object of this kind is very unsatisfactory, to say the least.

No. 2182.

$$\begin{array}{l} \text{R. A. } 6^{\text{h}} 2^{\text{m}} 42^{\text{s}} \\ \text{Decl. } - 6^{\circ} 19'.0 \end{array} \}$$

This is a large nebula surrounding a wide double star. The nebula is IV. 38 (= *h* 381). The double star is H. 2298. It is much too wide to be of any interest as a double star. The description in *h* 381 is: "The large star of a double star has a very strong nebulous burr." The double was estimated (Fifth Catalogue) 90°: 35": 8-9 .. 10.

The large telescope shows that the principal star is centrally placed in a faint nebula, which is considerably extended in all directions. It is very much like the planetary nebulae so far as the

central star is concerned, but lacks the definite boundary which characterizes all nebulae of that class. The large telescope also shows, what is of more interest than anything heretofore seen in connection with this object, that this central star is a very close pair. It is much too difficult to have been discovered with the large reflectors with which the nebula has been observed. I have not looked at it with the 12-inch here; under favorable conditions the elongation would probably be detected, but it could not be properly measured with such an aperture. My measures are as follows:

A and B.

1891.854	122.5	0.52	8.7 ..
.859	126.2	0.48	8.5 .. 8.7
.903	124.7	0.45	8.5 .. 8.6
1891.87	124.5	0.48	8.6 .. 8.8

AB and C (= H. 2298).

1891.854	92.6	43.87	.. 10.5
.859	92.8	44.00	.. 11.0
.903	93.4	43.74	.. 10.5
1891.87	92.9	43.87	.. 10.7

There are no other measures of C. The principal star (AB) is S.D. (6°) 1431 (= Schj. 2066), and its position for 1860 is:

$$\begin{array}{l} \text{R. A. } 6^{\text{h}} 3^{\text{m}} 41^{\text{s}}.6 \\ \text{Decl. } - 6^{\circ} 18'.3 \end{array}$$

This is the place of the nebula, and therefore there is an error of about 1" in the catalogue R. A. given above. This star is 9.0-m in the S.D., and 9.3 in SCHJELLERUP.

There are a number of other nebulae in this vicinity which were also examined. No. 2167 is described as "a star 7-m, with a pretty strong nebulous atmosphere." I could not see any difference between this and other stars of similar magnitude in the neighborhood. I have sometimes thought that all of the stars in this region of the heavens had a glow about them not generally found elsewhere, but this may be only optical or imaginary.

No. 2170 is described as "a star 9-m, in a very faint, pretty large nebula, extended in 170°." The nebulous light around the small star, S.D. (6°) 1414, is very marked, and must be at least 2' or 3' in diameter. It is extended nearly north and south, as described in the catalogue.

No. 2183, discovered by D'ARREST, is very

small, and has a minute but relatively bright central condensation, which may be a faint star.

No. 2185 closely follows the last, but is too large to be seen to any advantage with the lowest micrometer eye-piece, and its extent could not be properly estimated. The brightest part of it seems to be about a star 10-11-m.

No. 7114.

$$\begin{array}{l} \text{R. A. } 21^{\text{h}} 36^{\text{m}} 13^{\text{s}} \\ \text{Decl. } + 42^{\circ} 12'.3 \end{array}$$

This is the well-known "Nova Cygni." In looking up this star I have relied entirely upon the admirable catalogue and accompanying map of the surrounding stars by COPELAND and LOHSE (*Copernicus*, II., 101). The arrangement of the catalogue is perfect in every respect, and the chart showing the relative positions of the stars could not be improved. Both should serve as models for all works of this kind. I may say, in addition, that it is remarkably complete in reference to faint stars. The large telescope shows very little more.

I estimated this star (1891.731) as about 13.5-m. The nearest star to the "Nova" given by COPELAND, 314°.2:19.1, is a little fainter, or about 14-m. The 36-inch shows nothing closer. At times the new star did not seem to have a perfectly stellar appearance under moderately high powers, but rather to resemble an exceedingly minute nebula. This appearance, however, may not be real. The star is too faint to allow one to decide a question of this kind with any certainty. I did not make any measures from surrounding stars, as that has been very thoroughly done by the authors of the paper referred to.

They have the following notes concerning some of the faint stars:

No. 20 (14.5-m). "Perhaps double."

No. 40 (14.5-m). "This star is probably double or multiple."

No. 82 (13.9-m). "Double?"

No. 88 (13.8-m). "Double?"

I have examined these stars, with the following results:

No. 20. While this is not double, strictly speaking, there is another star of nearly the same magnitude at a distance of 15" or 20", and that is probably what is referred to.

No. 40. There are two faint stars about 8" or 10" apart.

No. 82. I could not see any other star near this.

No. 88. This is a very faint pair of stars, with a distance of perhaps 2" or 3".

No. 7173.

R. A. $21^h 53^m 53^s$ }
Decl. $- 32^\circ 38'.1$ }

There are other nebulae in this group (Nos. 7172, 7174, and 7176). They were accidentally picked up with the 12-inch, and, in consequence of a blunder in referring to DREYER, they were supposed to be new, and therefore observed as given below. The comparison star is from the *Cardoba Catalogue*:

GOULD 30,117 and No. 7173.

1891.758 P = $30^\circ.1$ D = $361''.8$

GOULD 30,117 and No. 7176.

1891.758 P = $44^\circ.9$ D = $350''.1$

These measures give for the nebulae (1860):

No. 7173. R. A. $21^h 53^m 53^s$ }
Decl. $- 32^\circ 38'.7$ }

No. 7176. R. A. $21^h 53^m 58^s$ }
Decl. $- 32^\circ 39'.8$ }

The last named, No. 7176, is double in HERSCHEL, the companion being No. 7174. With the 36-inch, with which it was subsequently examined, it appears to be one nebula, with a second very faint nucleus or condensation. I made the following measures with the large telescope (1891.766):

No. 7173 and No. 7176. P = $130^\circ.1$ D = $89''.44$

No. 7176 and No. 7174. 238.2 25.62

No. 7172, which is about $5\frac{1}{2}'$ north of No. 7173, was not measured.

No. 7287.

R. A. $22^h 50^m 54^s$ }
Decl. $- 22^\circ 51'.1$ }

Discovered by MÜLLER at the MCCORMICK Observatory. It is described, "Excessively faint, slightly nebulous double star." I found two very faint objects about 20" apart. It may possibly be a double nebula, but the following component seems to be a faint star only. The preceding one is undoubtedly a faint nebula. It is a little brighter in the middle, giving it a stellar appearance. Rough measures of the two give P = $60^\circ.5$; D = $20''.7$.

No. 7403.

R. A. $22^h 45^m 57^s$ }
Decl. $+ 0^\circ 44'.3$ }

This was discovered by COOLIDGE at the Harvard Observatory. The description is, "Star slightly nebulous." A careful examination (1891.728) shows that there is certainly nothing of the kind in the assigned place. It should be about 7' north of a 9-m star, D.M. (0°) 4935. In sweeping over this region I found a moderately bright nebula, which is probably the object in question. It is 38^s following, and $39''.5$ north of the D.M. star mentioned above. This gives as the place of the nebula (1860):

R. A. $22^h 46^m 37^s$ }
Decl. $+ 0^\circ 38'.2$ }

The nebula has a 10-m star $113''.0$ distant in the direction of $230^\circ.4$.

About $15'$ north of this, and a little preceding, there is a cluster of five faint nebulae (Nos. 7396, 7397, 7398, 7401, and 7402), all but the first discovered with the ROSSE reflector. These were readily found, and appeared to be in the catalogue places.

No. 7447.

R. A. $22^h 53^m 6^s$ }
Decl. $- 11^\circ 16'.7$ }

Described in the catalogue, "Star 11-12-m in neb." In the final notes it is stated that this was not found by TEMPEL on several occasions (*Ast. Nach.*, 2284). I examined this region very thoroughly on October 29th without finding anything in the least suggestive of a nebula of any kind. In or very near the catalogue place there is a 11-12-m star, but there is nothing nebulous about it. A little n. p. the place there is a faint triple star, AB $200^\circ:2''$; AC $270^\circ:10''$, and perhaps with a small aperture this group might be mistaken for a nebula. The place was carefully examined again on a subsequent night, with similar results. This object certainly does not exist.

Nos. 7472, 7477, and 7482.

These three nebulae are given in the General Catalogue as follows:

No. 7472 $22^h 56^m 34^s + 2^\circ 18'.0$ O. Struve.

No. 7477 $22 57 34 + 2 21.9$ D'Arrest.

No. 7482 $22 58 33 + 2 19.0$ Marth.

It seemed a little strange that three separate objects should be distributed in this way, and a

careful examination showed that all the observations related to one object. I went over the whole vicinity on two nights, and I am certain that there is only one nebula here. That is 1^m 23^s preceding, and 30".4 south of the 8.2-m star, D.M. (2°) 4609 (= LALANDE 45,206). Applying these differences to the place of the star from SCHJELLERUP, we have for the nebula (1860):

$$\begin{array}{l} \text{R. A. } 22^{\text{h}} 58^{\text{m}} 31^{\text{s}} \\ \text{Decl. } + 2^{\circ} 17'.2 \end{array}$$

This agrees substantially with MARTH's position, and his description is also correct.

No. 7693.

$$\begin{array}{l} \text{R. A. } 23^{\text{h}} 25^{\text{m}} 59^{\text{s}} \\ \text{Decl. } - 2^{\circ} 3'.9 \end{array}$$

This was discovered by HALL, in 1881, while observing FAYE'S Comet (*Ast. Nach.*, 2394). It is described as a "small nebula, or nebulous star." This was examined on two nights with the large telescope. It is a small, faint nebula, a little brighter in the middle, but there is nothing stellar in its appearance. There is a small star near it, with which it was compared:

Neb. and 13-m Star.

$$1891.675 \quad P = 111''.2 \quad D = 83''.72$$

For place it was compared with the nearest catalogue star, S.D. (2°) 5982:

Star and Neb.

$$1891.675 \quad P = 112''.4 \quad D = 277''.4$$

Applying these differences to LAMONT's place of the S.D. star, gives for the nebula (1860):

$$\begin{array}{l} \text{R. A. } 23^{\text{h}} 25^{\text{m}} 59^{\text{s}} \\ \text{Decl. } - 2^{\circ} 3'.7 \end{array}$$

No. 7804.

$$\begin{array}{l} \text{R. A. } 23^{\text{h}} 54^{\text{m}} 9^{\text{s}} \\ \text{Decl. } + 6^{\circ} 58'.1 \end{array}$$

The description is, "Very faint double star, nebulous?"; and in the final notes DREYER says: "Found by SCHWEIZER (*Observations de Moscou*, II., 115), and observed by BREDECHIN in 1875. Described as F, E, a little brighter s. p. ENGELHARDT, in four observations could only see a double star without nebulosity."

I examined this region very carefully on two nights. The faint pair mentioned was found; but there was no trace of nebulosity about it, or anywhere in the vicinity. I measured the double star as follows:

$$1891.675 \quad 55^{\circ}.6 \quad 9''.79 \quad 12.5 \dots 13.0$$

To find out whether this is in the place assigned to the supposed nebula, I measured it directly from the nearest catalogue star, D.M. (6°) 5233. This is a small star, 8.7-m. The principal star of the faint pair is 160".4 distant in the direction of 350°.0, giving for the place of the nebula (1860):

$$\begin{array}{l} \text{R. A. } 23^{\text{h}} 54^{\text{m}} 7^{\text{s}} \\ \text{Decl. } + 6^{\circ} 58'.2 \end{array}$$

This shows that it was certainly the object taken for a nebula by SCHWEIZER, and observed by BREDECHIN. The comparison star used above is a wide double. A single setting of the wires gave 266°.1 : 15".2. I ascertained later that it had been measured by DUNÉR in 1869. He found 265°.3 : 15".26.

New Nebulae.

In addition to the new nebulae incidentally noted in the foregoing observations, I found the two given below. They are both in the field with a 9.5-m star, D.M. (40°) 608, and I have measured them directly from this star. The following nebula of the two is double. The nuclei are small, and fairly well defined. The other is only a little brighter in the center, and considerably diffused. I have called the magnitudes of the nuclei of the double nebula each 14.

D.M. Star and Neb. I.

1891.673	P = 288.8	D = 109''.72
.689	288.8	110.83
1891.68	288.8	110.27

D.M. Star and Neb. II.

1891.673	285.5	169''.19
.689	285.6	169.34
1891.68	285.5	169.26

Neb. II (Nuclei).

1891.673	323.1	17''.02
.689	321.7	18.06
1891.68	322.4	17.54

Applying these measures to the D.M. place of the star, we have for the nebulae (1860):

Neb. I.	2 ^h 40 ^m 49 ^s	+ 40° 28'.5
Neb. II.	2 41 12	+ 40 28.6

The only catalogue nebula in the immediate vicinity is one discovered by SWIFT (No. 1086). This is larger than I., and brighter than either.