NOTES ON COMET 1, FOR 1865,

Together with additional Notes on the Nebula surrounding η Argus.

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Various conjectures are frequently offered respecting the physical aspect, nature, origin and office of Comets, and these subjects are at the present time, still involved in great obscurity. A Comet when examined by proper optical means, has the appearance of an ill-defined gaseous or nebular substance surrounding a dark nucleus, which nucleus has different degrees of opacity in different Comets, and which in general becomes more brilliant as the Comet approaches its perihelion.

A second characteristic is their internal condensation. Most of them have a minute stellar point, called the nucleus, which occupies the position of maximum density. This centre of condensation, or brightest point is, with rare exceptions, placed on the side which is nearest to the sun, and is always very close to the centre of gravity.

Another feature of importance is the tail (so-called) although it sometimes precedes the nucleus in its motion, and usually in a direction opposite to that of the sun—the convex, and brightest side of the tail being ordinarily presented to the region towards which the Comet is moving.

To determine the orbit of a Comet requires a very difficult and troublesome computation, chiefly because none of them are visible through the whole of their revolution. Such a computation would occupy a person well acquainted with the subject about twenty-four hours ; but a Comet's proper course may be found by observing its distance, from time to time, from two fixed stars, whose positions are accurately known. Or by finding its altitude when in the same azimuth with two known stars. By either of these means the place of a Comet may be computed for each night, and thence its course, and if a great circle be drawn through three distant places thus laid down, it will intersect the Ecliptic, and show approximately the place of the node. The inclination of the Ecliptic being thus found from several triplets, independent of each other, a mean of the results may be considered tolerably correct.

In a similar way a Comet's distance may be approximately known by parallax. A Comet shortly before it disappears moves so slowly, that for several days it appears to have but little motion among the Stars, let it be first observed when it is high above the horizon, take any two stars between which the Comet lies in a right line parallel to the horizon, extend a

thread directly between the stars, and when the Comet approaches the horizon try again whether it continues in the same right line, between the same two stars. If there be any sensible parallax which depresses the Comet, it will not be seen in the same right line in both situations, but if the line is threaded by the two stars and Comet, it is a convincing proof that they have in these positions no sensible parallax, and must be at an enormous distance; refraction in this case will equally effect both Comet and Stars, and therefore need not be regarded.

The approximate distance of a Comet from the Earth—and its distance from the Sun, may be found by Plane Trigonometry. The length of a line drawn on a celestial globe or chart, from the position of the Sun to that of the earth, is known from the last transit of Venus to be 95,273,868 miles, a second line then drawn from the position of the Sun in the direction of the Comet's tail, and meeting a third line drawn from the earth to the Comet, will form a triangle, from which the two latter sides, or distance of the Comet from the Sun and earth may be computed, and if carefully conducted. especially if cleared from parallax and refraction, they will be found sufficiently near to correct the many contradictory and embarrassing statements, that during the apparition of the late Comet have found their way into the public prints. They are also sufficient for identification, and will enable anyone to ascertain whether the computed elements differ from authorised catalogues, upon the inclination of the plane of the orbit; upon the longitude of the node ; and upon the longitude of perihelion distance. When these parabolic elements are found none resemble any of those recorded in catalogues of calculated Comets, we are justified in concluding that it had not been observed before.

From the foregoing rule the recent Comet's approximate distance was found by a vertical angle to be on tho 21st January—From the earth, 88,000,000 of miles; from the Sun, 42,000,000 of miles. January 28th — From the earth, 92,000,000; from the Sun, 62,000,000. February 4th—From the earth 98,000,000; from the Sun, 73,000,000. February 18th—From the earth, 110,000,000 ; from the Sun, 98,000,000. Assuming the Sun's distance from the earth to be 93,500,000 of miles, which, from more recent observations, is probably nearer the truth, from these distances it will be apparent that the Comet was receding from the earth at its first appearance, on the 17th January, and must have passed the perihelion before it was seen at Hobart Town.

The low position of the Comet, together with the unusual cloudiness of the evenings, rendered it difficult to get suitable stars to observe with it. In obtaining the following positions

the Comet had frequently to be watched for between banks of dark cumulus clouds, and at times when few stars could be seen. The night of the 28th of January was the most favorable, the sky was clear and brilliant with stars; the penetrating light of the Comet on that evening shewed itself in the twilight a few minutes after the star Fomalhaut, and a few minutes before α and β Grus. It had a fine planetary nucleus, with a bushy tail, very little curved, about 14° in length. From this date it diminished in appearance as if moving slowly off into space, and on the 4th of February was much fainter, with a tail only 4° in length. On the 8th, 9th, 10th and 12th February, it was only seen with the telescope, the moon being near full, and the nights clear and moonlight. The 14th was favorable, for three days previous the weather had been close and sultry, but at 5 p.m. on that day a heavy shower of rain fell which rendered the atmosphere very transparent. The Comet had decreased much in size—the neuclus had lost its planetary appearance, and the tail was not more than $1\frac{1}{2}$° in length. It was also seen distinctly on the 1st and 3rd of March, after which the moon's light again interfered.

APPARENT POSITIONS OF COMET 1, 1865:—

	Mean Time	R. A.	N. P. Distance
	h. m.	h. m.	o
January 19.—	8 35	20 41	125 07
,, 20.—	8 30	20 47	127 15
,, 22.—	9 00	21 00	130 30
,, 23.—	8 30	21 06	132 12
,, 24.—	9 30	21 14	133 45
,, 26.—	9 45	21 26	136 22
,, 28.—	9 00	21 40	138 22
,, 31.—	9 15	21 58	140 15
February 3.—	8 40	22 14	141 30
,, 4.—	8 45	22 20	142 15
,, 7.—	8 30	22 36	143 22
,, 8.—	8 45	22 41	143 45
,, 9.—	8 20	22 47	144 12
,, 10.—	9 00	22 56	144 28
,, 12.—	8 20	23 02	144 40
,, 13.—	10 5	23 8	144 55
,, 14.—	8 15	23 12	145 00

From the above records it will be seen that the Comet from its first appearance on January 17th in Capricornus passed through the Constellation Microscopium, and when last seen on the 3rd of March, it was near to the extreme point of Grus.

SOME FURTHER NOTES ON η ARGUS.

[Continued from the Monthly Notices of June, 1863.]

This appears a suitable opportunity for continuing some Notes on the variable Star η Argus and the surrounding Nebula. I was glad to notice the communication on this