

definition of our glass. The appearance of the dusky ring is well described by Mr. Trouvelot as „somewhat like particles of dust floating in a ray of light traversing a dark chamber“.

(3). The outline of the shadow of the Ball on the Ring, as I have said, always appears of a regular and continuous curvature, but the convexity of this outline is turned toward the Ball, and not away from it, as it is usually drawn, and as we ought to see it if the surface of the Ring is a plane surface. This shadow of course appears on different sides of the Ball before and after opposition, and I have examined it in both positions and always with the same result, viz. the convexity of the outline is turned toward the Ball. In order to test this appearance I have placed the wire of the micrometer by the side of the outline, and at different distances from it, but have never got rid of the appearance of convexity in the outline of the shadow. It is true that on fine night this convexity is very

slight, and the outline, especially toward the outer edge of the Ring, is very nearly straight. For this reason, and because of the changes in the appearance of the shadow produced by varied conditions of the atmosphere, I am doubtful of the reality of this phenomenon. In his Handbuch der physiologischen Optik, p. 565 Professor Helmholtz has described some curious examples of the manner in which a system of straight, parallel lines may be made to appear bent or divergent by providing them with other systems of parallel lines. I can see nothing however in this case that could produce such a deception, and the test with the wire of the micrometer ought, I think, to dispel such an illusion. The appearance of the outline of the shadow during the past two years has been very much like that given by Sir W. Herschel in his drawing of Saturn, Philosophical Transactions, London, 1806, p. 466.

1877, Jan 10.

On δ Cygni.

$$\theta = 12^{\circ}48' - 1^{\circ}40'2'' (t - 1850) + 0^{\circ}0'006'' (t - 1850)^2$$

$$\rho = 1''64 - 0''0067 (t - 1850).$$

These formulae, which agree with the last of equal areas, give for 1783.72: $\theta_c = 108^{\circ}04'$ and $\rho_c = 2''09$. Dunér thinks that Herschel's position-angle should be read $18^{\circ}.35$ s. f. instead of n. f. Behrmann gives his distance as $2''50$, Dunér the same as $1''77$.

Markree Observatory, Collooney, Ireland 1877, Juli 19.

W. Döbereck.

Beobachtungen am grossen Refractor der Kopenhagener Sternwarte.

☾ a 1877.

1877	M. Kop. Zt.	$\Delta\alpha$	$\Delta\delta$	α app.	l. f. p.	δ app.	l. f. p.	Z. d. B.	*
Febr.	10 16 ^b 28 ^m 40 ^s	+ 0 ^m 17 ^s 03	+ 10' 41'' 1	17 ^h 18 ^m 58 ^s 77	9.419 ⁿ	+ 50' 28' 43'' 0	0.844	6-6	(a)
	12 15 4 59	- 0.10.13	+ 3 39 0	17 26.37.87	9.518 ⁿ	+ 14.31.59 1	0.826	4-2	(b)
	15.37.52	+ 2.16 53	+ 5.45.0	17 26 45.32	9.493 ⁿ	+ 14.39. 3.2	0.814	12-12	(c)
	15.55.44	+ 1 51 81	+ 5. 5.0	17.26.48.16	9.475 ⁿ	+ 14.43. 9.8	0.808	4-4	(d)
März	1 12.46 54	- 1.59 82	- 9.24 3	3.21.25.30	9.852	+ 66.15.17.9	0.727	10-10	(e)
	7 8. 0.15	- 0.42.56	- 6.22.3	3.58 31.32	9.658	+ 58. 7.48.9	0.951	8-8	(f)
	8 15.47 55	- 4.16 56	- 3. 4.6	4. 3. 1.39	9 247	+ 56.49.25.1	0.902	8-8	(g)
	13 12 25.10	+ 0.35 46	- 5.11.7	4.15. 2.71	9.705	+ 53. 7.30.0	0.779	6-6	(h)
	14 10. 9.27	- 0.32.03	- 0. 4 0	4.16.46.73	9.733	+ 52.34.24.6:	0.578	4-4	(i)
	11.29.26	- 0.24.77	- 2. 2.5	4.16.53.99	9 731	+ 52.32.26 1	0.713	4-4	„
15 8. 3.19	- 0.55.10	- 3. 8 5	4.18.26.22	9.617	+ 52. 3 51.2	0.284	8-8	(k)	
19 15.31 49	- 0.17.06	+ 9.21.0	4.25.10.29	9.145	+ 50. 1.27.2	0.923	14-14	(l)	
April	1 10.35.57	- 0.40.73		4.40. 5.57	9.678			6	(m)
	11 25.42		+ 1 59.9			+ 46 20.32.3	0.566	6	(m)
	2 12.15.18	- 0 51.13	+ 5 21.4	4.41. 9.86	9.596	+ 45. 8.29.2	0.474	10-10	(n)
3 10.48. 6	+ 0. 4.21	- 4 57.2	4.42. 5.18	9 668	+ 45.58.10.5	0.623	8-8	„	

Mittlere Oerter der Vergleichsterne für 1877.0.

(a)	17 ^h 18 ^m 41 ^s 66	+ 5°18'19".4	W. 305
(b)	17.26.47.96	+ 14.28.40.2	Lal. 31967
(c)	17.24.28.73	+ 14.33.38.4	W. 431
(d)	17.24.56.30	+ 14.38.25.0	Lal. 31907
(e)	3.23.25.42	+ 66.24.18.1	B. B. + 66 N. 274
(f)	3 59.13.52	+ 58.13.49.3	Lal. 7508
(g)	4. 7.17.50	+ 56.52. 7.9	Arg.-Oeltz. 4618--19
(h)	4.14.26.85	+ 53.12.21.0	Arg.-Oeltz. 4741
(i)	4.17.18.29	+ 52.34 8.4	" 4787
(k)	4.19.20.85	+ 52. 6.39.7	" 4825--26
(l)	4.25.26.89	+ 49.51.47.2	" 4915--16
(m)	4.40.45.90	+ 46.18.15.5	B. D. + 46 N. 922 micr. verb. mit N. 928
(n)	4.42. 0.61	+ 46. 2.51.1	Arg.-Oeltz. 5204.

Bemerkungen.

Dieser Comet, den ich am 9. Febr. selbständig entdeckte, ohne an diesem Morgen jedoch wegen Wolken mehr als eine rohe Position erhalten zu können, und dessen durch Borrelly am Morgen vorher schon erfolgten Entdeckung ich erst am 13. durch gütige briefliche Mittheilung des Herrn Prof. von Littrow und durch den „Times“ Kunde erhielt, kam mir jedesmal, wenn ich ihn beobachtete, ziemlich rund vor mit einer Verdichtung in der Mitte.

März 15. Comet rund; die in der Mitte sich befindliche Verdichtung erscheint punktirt. Diameter des Kometen = 80 à 90".

April 1.—2.—3. Am 1. April wurde der Comet noch ohne Kenntniss des genauen Ortes aufgefunden; nicht so am 2. und 3., wo er nur mit grosser Mühe gesehen und beobachtet wurde, ohne dass der Luftzustand an diesen beiden Abenden schlechter erschien als am 1. Der Beobachtung des 1. April ist darum vor denen des 2. und 3. ein überwiegendes Gewicht beizulegen.

Ich gedenke die definitive Bearbeitung dieses Kometen zu besorgen.

♃ b 1877.

1877	Mt.	Kop.	Zt.	$\Delta\alpha$	$\Delta\delta$	α app.	l. f. p.	δ app.	l. f. q.	Z. d. B.	✱
April	6	15 ^b 29 ^m 43 ^s		— 0 ^m 21 ^s 61	— 1' 1"8	22 ^h 8 ^m 33 ^s 39	9.538 _n	+ 16° 1' 32"6	0.836	16—6	(a)
	12	15.41. 4		— 0.39.67	— 5.45.9	22.14. 2.09	9.550 _n	+ 23.49.39.5	0.792	10—10	(b)
	13	15.48.27		+ 0.59.43	+ 11.13.1	22.15. 9 51	9.550 _n	+ 25.17.31.8	0.778	10—10	(c)
	15	14.47. 9		— 1.33.74	+ 13.51.6	22.17.33.98	9.578 _n	+ 28.17.32.6	0.802	6—6	(d)

Mittlere Oerter der Vergleichsterne für 1877.0.

(a)	22 ^h 8 ^m 54 ^s 79	+ 16° 2' 43"2	W. 144
(b)	22.14.41.77	+ 23.55.35.2	B. B. + 23 N.
(c)	22.14.10.09	+ 25. 6.28.8	Rümker 10102
(d)	22.19. 7.77	+ 28. 3.51.2	W. 396.

Bemerkungen.

April 6. Glänzend. 2' Diameter. Kern liegt östlich im Nebel.

April 15. Im Kometenstecher sieht man den Schweif sehr deutlich; nicht so im grossen Refractor.

♃ c 1877.

1877	Mt.	Kop.	Zt.	$\Delta\alpha$	$\Delta\delta$	α app.	l. f. p.	δ app.	l. f. p.	Z. d. B.	✱
April	15	11 ^b 34 ^m 5		— 0 ^m 32 ^s 93	+ 0' 38"6	1 ^h 14 ^m 48 ^s 79	8.015	+ 55°50' 39"1	0.915	8—8	
Vergleichstern 1877.0 $\alpha = 1^h15^m23^s31$ $\delta = + 55^\circ49' 56"8$ Arg.-Oeltz. 1442.											

Komet klein, recht hell, sehr verdichtet in der Mitte. Diameter = 50 à 55".

Jahre gemacht und schon längst den respectiven Berechnern geschickt habe, füge ich hier der Vollständigkeit halber hinzu:

Folgende Planeten-Beobachtungen, die ich im vorigen

777AN...90...153P
57

Peitho (118).

1876	M. Kop. Zt.	$\Delta\alpha$	$\Delta\delta$	α app.	l. f. p.	δ app.	l. f. p.	Z. d. B.	*
März 18	16 ^h 28 ^m 43 ^s	+ 0 ^m 44 ^s 28	- 0' 18''6	13 ^h 39 ^m 36 ^s 99	9.328	- 3 ^o 11' 22''6	0.876	8-8	(a)
31	15.15.52	+ 2.23.73	+ 1. 0.8	13.28.12.48	9.302	- 2.26.55.4	0.874	8-8	(b)
April 13	13.35.58	+ 2.48.63	+ 7.25.5	13.15.22.62	9.193	- 1 45.27.0	0.872	10-6	(c)
1876				Una (160)					
März 31	11.10.33	+ 0.56.97	- 3 34.6	9.53 56.25	9.224	+ 15.32.53.3	0.768	16-8	(d)
April 18	10 14.39	- 2.47.74	+ 7.30.5	9.53. 7 01	9.262	+ 15. 3.40.7	0.777	16-8	(e)
19	10.13. 0	- 2.36.68	+ 4.43.1	9.53 18.07	9.262	+ 15. 0.53.3	0.777	10-10	"

Mittlere Oerter der Vergleichsterne für 1876.0.

- (a) 13^h38^m50^s94 -- 3^o10' 48''3 W. 650
- (b) 13.25.46.76 -- 2.27.41.2 Schjell. 4837
- (c) 13.12.31.89 -- 1.52.52.5 " 4772
- (d) 9.52.57.37 + 15.36.31.2 B. B. + 15 N. 2145
- (e) 9.55.53.05 + 14.56.12.8 Schjell. 3688

Sämmtliche Beobachtungen sind mit Ringmicrometer angestellt.
Kopenhagen d. 3. Juli 1877.

C. F. Pechüle.

Observations of Comet b 1877.

Made at the Cincinnati Observatory.

1877	Mean Time Cincinnati	δ -- *		App. α	l. f. p.	App. δ	l. f. p.	No. of Obs.		Comp. Star.
		$d\alpha$	$d\delta$					α	δ	
Mai 1	15 ^h 50 ^m 5 ^s	+ 3 ^m 37 ^s 79	+ 8' 33''0	23 ^h 6 ^m 1 ^s 34	9.934 _n	+60 ^o 26' 14''5	9.665	4	4	a
3	10.55.15	+ 0.25.67	- 6.12.2	23.19.36.24	9.803 _n	64.23.34.4	0.867	5	5	b
	11.40. 8	+ 1.23.23	- 12. 3 7	23.19 53.38	9.895 _n	64.27.54.4	0.818	3	3	c
9	10.59.46	+ 2.13.29	+ 1. 0.3	0.54. 9.07	9.819 _n	76.12.33.3	0.880	9	9	d
10	11.20.31	+ 6.16.71	- 3.13.3	1.26.39	9.850 _n	77.46.8	0.876	4	4	e
11	9.48. 0	+ 6.14.20	+ 7.53.8	2. 1.34.88	9.688	78.53.17.5	0.885	6	6	f
17	14.26.37	+ 8.35.28	- 5.34.3	6.26. 7.93	8.784	77.42.15.9	0.897	6	6	g
18	11.45.36	+ 0.43.20	+ 5.31.3	6.49.29.62	0.177	+76 38.55.0	0.752	8	8	h

Mean Places of Comparison Stars for 1877.0.

- a 23^h 2^m24^s60 + 60^o 17' 52''3 Comparison with O. Arg. No. 25161.
- b 23.19.12.22 64.29.58.8 " " c.
- c 23.18.31.86 64.40. 9.2 Radcliffe Cat. for 1845, 6065.
- d 0.52. 0.27 76.11 35.3 O. Argel. No. 937.
- e 1.20.27 77.50.0 Arg. D. M. 77^o, 53.
- f 1 55.26.24 78.45.21.3 Radcliffe Cat. for 1845, 592.
- g 6.17.53.11 77.47.33.0 O. Arg. No. 6791.
- h 6.48.45.74 + 76.33. 6.6 Comparison with O. Arg. No. 7361.

The observations were made with a filar micrometer. The columns $d\alpha$ and $d\delta$ are the observed differences uncorrected for differential refraction, which is included in the reduction to apparent place.

- * a = Arg. D. M. 60^o, 2486. It was compared micrometrically with O. Arg. 25161 as follows.
a - O. Arg. 25161 $d\alpha$ + 23^s06 $d\delta$ + 7' 44''9 2 comparisons.
- * b = Arg. D. M. 64^o, 1802. It was compared with * c, thus -
b -- c $d\alpha$ + 40^s38 $d\delta$ - 10' 10''4 3 comparisons.
- * h was compared with O. Arg. No. 7361, thus -
h - O. Arg. 7361 $d\alpha$ - 41^s85 $d\delta$ + 12' 20''1 5 comparisons.

The assumed position of this Observatory is -
lat. 39^o 8' 35''5 long. + 29^m29^s42 from Washington.

Cincinnati Observatory, June 9, 1877.

Winslow Upton.