

$$\Pi V = \frac{la^2 \sqrt{1 - \epsilon^2} \cdot \sin(\phi - \lambda) \sin \gamma}{Pr \sqrt{1 - \epsilon^2} \cos^2 \phi} = k,$$

where ϕ denotes the angle between the tangent and major axis,
 λ denotes the angle between the line of nodes and major axis,
 γ denotes the angle between the plane of orbit and tangent plane to sphere,
 P denotes period in years,
 l denotes mean motion of earth in miles.

This equation therefore gives a relation between Π and V depending only on the period and the angular elements of the orbit, so that if either Π or V can be measured the other may at once be determined. If k be greater than unity, then either V must exceed ten miles per second, or Π one-tenth of a second of arc. If, then, the spectroscopes show the lines in the spectra of both stars to be absolutely coincident, it follows that the parallax must exceed $0''.1$, and the star will repay investigation. But if a measurable displacement be noticed, V can be determined, and the parallax will follow at once. So that "all double stars for which k is at any time greater than unity may be said to be within measurable distance either by the spectroscopic or the trigonometrical method." If, however, k be less than unity, the star may still chance to be within a measurable distance, for V may be small either from the small linear dimensions of the orbit or the length of the period; but if k be smaller than unity, and V be large, then we shall at once know, "with a certainty which the mere failure to measure its parallax trigonometrically could never reach, that the star is at an inconceivable distance from the solar system." Mr. Rambaut next proceeds to determine k for some 39 stars, the elements of whose orbits he takes for the most part from Houzeau's "Vade Mecum." In the case of five only does it exceed unity, viz., α Centauri 6.023, Sirius 5.400, γ Ophiuchi 1.270, η Cassiopeiæ 1.247, and γ Coronæ Australis 1.224. Of these the parallax has already been determined for all but the last named. This star, the components of the pair being of nearly equal magnitude, would be well adapted for examination by the spectroscopic method if one of the new giant telescopes were employed, and since $k = 1.224$, had it been examined in 1880 either the velocity in the line of sight would have been found to exceed 12 miles per second, or the parallax to exceed $0''.1$. Since a star fainter than the fifth and a half magnitude would be beyond the reach of even the most powerful instrument to successfully measure its movement in the line of sight, the field of inquiry is practically confined to α Centauri, and the following three stars for all of which k is fairly large though less than unity: ξ Ursæ Majoris 0.895, γ Virginis 0.624, and ζ Herculis 0.605. The result of Mr. Rambaut's inquiry is therefore to show that but little practical use can be made of the suggested combination of the two methods in the case of double stars.

NAMES OF MINOR PLANETS.—The following minor planets have recently received names:—No. 254, Augusta; No. 255, Oppavia; No. 257, Silesia; No. 260, Huberta; and No. 261, Prymno.

COMET FINLAY (1886 *e*).—Dr. J. Holetschek gives (*Ast. Nach.*, No. 2763) the following elements and ephemeris for this object, which, though now diminishing somewhat in brightness, becoming well placed for observation in northern latitudes:—

T = 1886 November 22.48418.

$$\begin{aligned} \omega &= 315^\circ 21' 05'' \\ \Omega &= 52^\circ 45' 43.2'' \\ i &= 3^\circ 19' 4'' \end{aligned} \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Mean Eq. 1886.0.}$$

$\log q = 9.997122$ $\log a = 0.533468$
 $\log e = 9.850744$ Period = 6.31 years.

Ephemeris for Berlin Midnight

1887	R.A.	Decl.	log r	log Δ	Bright-ness
	h. m. s.	° ' "			
Jan. 0	23 49 17	1 2' 3" S.	0.0565	9.9245	2.3
4	0 8 58	1 23' 7" N.	0.0670	9.9343	2.1
8	0 28 10	3 45' 0" N.	0.0779	9.9461	1.9
12	0 46 52	5 59' 9" N.	0.0889	9.9598	1.7

The brightness at the time of discovery is taken as unity.

COMET BARNARD (1886 *f*).—The following ephemeris for Berlin midnight is in continuation of that given in NATURE for December 9 (p. 134):—

1887	K.A.	Decl.	log r	log Δ	Bright-ness
	h. m. s.	° ' "			
Jan. 0	19 32 32	4 5' 2" N.	9.8652	0.1478	10.5
5	19 53 52	1 13' 5" N.	9.8935	0.1845	7.8
10	20 11 46	1 20' 1" S.	9.9243	0.2177	5.8

The brightness at the time of discovery is taken as unity

ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 JANUARY 2-8

(FOR the reckoning of time the civil day, commencing at Greenwich mean midnight, counting the hours on to 24, is here employed.)

At Greenwich on January 2

Sun rises, 8h. 8m.; souths, 12h. 4m. 14.9s.; sets, 16h. 1m.; decl. on meridian, 22° 55' S.; Sidereal Time at Sunset, 22h. 49m.

Moon (at First Quarter) rises, 11h. 56m.; souths, 18h. 12m.; sets, oh. 38m.*; decl. on meridian, 2° 25' N.

Planet	Rises	Souths	Sets	Decl. on meridian
	h. m.	h. m.	h. m.	
Mercury ...	6 41	10 39	14 37	22 38 S.
Venus ...	8 41	12 36	16 31	23 5 S.
Mars ...	9 34	13 52	18 10	19 35 S.
Jupiter... ..	2 10	7 16	12 22	11 11 S.
Saturn... ..	16 35*	0 40	8 45	21 49 N.

* Indicates that the rising is that of the preceding evening and the setting that of the following morning.

Occultations of Stars by the Moon (visible at Greenwich)

Jan	Star	Mag.	Disap.	Reap.	Corresponding angles from vertex to right for inverted image
			h. m.	h. m.	
4 ..	μ Ceti ...	4	20 28	21 33	87 348
5 ...	f Tauri ...	4	17 21	18 24	48 293
6 ...	γ Tauri ...	6	18 50	19 7	359 334
6 ...	θ^1 Tauri ...	4½	19 47	21 2	68 295
6 ...	θ^2 Tauri ...	4½	19 54	20 55	47 316
6 ...	B.A.C. 1391 ...	5	21 2	22 19	108 289
6 ...	δ Tauri ...	6	22 19	near approach	27 —
7 ...	Aldebaran ...	1	0 17	1 15	165 283
7 ...	η Tauri... ..	5½	19 51	near approach	340 —
7 ...	η Tauri... ..	6	20 53	22 6	95 261

Jan. h. 2 ... 20 ... Sun at least distance from the Earth.

Saturn, January 2.—Outer major axis of outer ring = 46".4; outer minor axis of outer ring = 18".5; southern surface visible.

Variable Stars

Star	R.A.	Decl.	h. m.
	h. m.	° ' "	
U Cephei ...	0 52.3	81 16 N.	Jan. 2, 0 3 m
			6, 23 43 m
λ Tauri ...	3 54.4	12 10 N.	" 5, 2 12 m
S Cancri ...	8 37.5	19 26 N.	" 5, 1 40 m
U Hydree ...	10 32.0	12 48 S.	" 5, M
R Crateris ...	10 55.0	17 43 S.	" 6, m
S Leonis ...	11 5.0	6 4 N.	" 6, M
W Virginis ...	13 20.2	2 48 S.	" 2, 4 0 M
δ Libræ ...	14 54.9	8 4 S.	" 3, 19 41 m
			" 6, 3 33 m
U Coronæ ...	15 13.6	32 4 N.	" 7, 2 14 m
U Ophiuchi... ..	17 10.8	1 20 N.	" 4, 4 18 m
			and at intervals of 20 8
W Cygni ...	21 31.8	44 52 N.	Jan. 4, M
δ Cephei ...	22 25.0	57 50 N.	" 4, 20 0 M

M signifies maximum; *m* minimum.

Meteor-Showers

The principal shower of the week is that of the *Quadrantids*, maximum January 2, radiant R.A. 228°, Decl. 53° N. Other showers are as follows:—From the borders of Gemini and Cancer, R.A. 119°, Decl. 16° N.; near θ Ursæ Majoris, R.A. 140°, Decl. 57° N.; near ζ Bootis, R.A. 220°, Decl. 13° N.