The observations on which this orbit depends differ widely from the estimates of position at Cordoba and Windsor, which Mr. Chandler had used in his previous computations; and the elements now found are in fair agreement with those deduced by Mr. Finlay from the Cape observations of January 22, 25, and 28 alone, which are published in the above-mentioned number of the *Monthly Notices*.

THE COMPANION OF SIRIUS.—Prof. A. Hall gives, as the mean results of his observations during the present year (*Astronomical Journal*, No. 157): Epoch 1887·238; position-angle, 24°·18; and distance, 6″·508.

A SHORT METHOD OF COMPUTING REFRACTIONS FOR ALL ZENITH DISTANCES.—In continuation of his paper in *Astronomische Nachrichten*, No. 2768 (NATURE, vol. xxxv. p. 329), the application of which was limited to zenith distances less than 45°, Mr. Schaeberle, of Ann Arbor, U.S.A., in No. 2788 of the same publication, gives his method for the computation of refractions, with Bessel's constants, for 45° to 77° of zenith distance, and for zenith distances greater than 77°, with an accuracy sufficient for practical purposes. Starting from Bessel's expression $r = \alpha\beta^{\Delta}\gamma^{\lambda}\tan z$, Mr. Schaeberle finds that $\Delta r$ (the quantity to be added to the mean refraction $r_0$) can be represented only by $\Delta r = r_0 F + \epsilon\frac{\Delta\gamma}{\gamma}$, between the limits $z = 45°$ and $z = 77°$. In this expression $F = \frac{\Delta\beta}{\beta} + \frac{\Delta\gamma}{\gamma}$ and $\epsilon = r_0(\lambda - 1)$. For zenith distances greater than 77°, the final equation becomes $\Delta r = r_0 F + \epsilon\left(F - \frac{\sigma}{\gamma}\right)$, where $\sigma = 0{\cdot}9\frac{\Delta\beta}{\beta}$.

The requisite quantities can evidently be easily tabulated, and the computer is thus provided with a very convenient method for calculating refractions which will not materially differ from those deduced directly from Bessel's Tables.

## *ASTRONOMICAL PHENOMENA FOR THE WEEK 1887 JUNE 26—JULY 2.*

(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 June 26.*

Sun rises, 3h. 46m.; souths, 12h. 2m. 29·7s.; sets, 20h. 18m.; decl. on meridian, 23° 22′ N.: Sidereal Time at Sunset, 14h. 36m.

Moon (at First Quarter on June 28) rises, 9h. 35m.; souths, 16h. 38m.; sets, 23h. 29m.; decl. on meridian, 8° 53′ N.

| Planet. | Rises. h. m. | Souths. h. m. | Sets. h. m. | Decl. on meridian. ° ′ |
|---|---|---|---|---|
| Mercury ... | 5 51 | 13 51 | 21 51 | 21 6 N. |
| Venus ... ... | 7 39 | 15 11 | 22 43 | 16 40 N. |
| Mars ... ... | 2 39 | 10 55 | 19 11 | 23 23 N. |
| Jupiter... ... | 14 1 | 19 20 | 0 39* | 8 51 S. |
| Saturn... ... | 5 20 | 13 23 | 21 26 | 21 33 N. |

* Indicates that the setting is that of the following morning.

*Occultations of Stars by the Moon* (visible at Greenwich).

| June. | Star. | Mag. | Disap. h. m. | Reap. h. m. | Corresponding angles from vertex to right for inverted image. ° ° |
|---|---|---|---|---|---|
| 27 ... | 10 Virginis ... | 6 ... | 23 36 | near approach | 199 — |
| July. | | | | | |
| 1 ... | $\xi^1$ Libræ ... ... | 6 ... | 0 52 | near approach | 201 — |
| 1 ... | $\eta$ Libræ ... ... | 6 ... | 21 23 ... | 22 4 ... | 19 320 |

June. h.
29 ... 17 ... Jupiter in conjunction with and 3° 40′ south of the Moon.

July. h.
1 ... 10 ... Mercury at greatest elongation from the Sun, 26° east.
2 ... 9 ... Sun at greatest distance from the Earth.

*Meteor-Showers.*

| | R.A. ° | Decl. ° | |
|---|---|---|---|
| Near $\sigma$ Herculis ... ... | 253 ... | 47 N. | Swift meteors. |
| $\delta$ Cygni.. ... ... | 294 ... | 39 N. | Slow meteors. |
| $\epsilon$ Delphini ... ... | 305 ... | 9 N. | |
| Between $\beta$ and $\gamma$ Cephei. | 330 ... | 77 N. | |

*Variable Stars.*

| Star. | R.A. h. m. | Decl. ° ′ | | h. m. | |
|---|---|---|---|---|---|
| U Cephei ... ... | 0 52·3 ... | 81 16 N. ... | June 27, | 23 54 | *m* |
| | | | July 2, | 23 33 | *m* |
| R Piscium ... ... | 1 24·8 ... | 2 18 N. ... | June 26, | | *M* |
| S Ursæ Majoris ... | 12 39·0 ... | 61 43 N. ... | July 1, | | *m* |
| W Virginis ... ... | 13 20·2 ... | 2 48 S. ... | ,, 2, | 22 0 | *m* |
| U Ophiuchi ... ... | 17 10·8 ... | 1 20 N. ... | June 30, | 23 25 | *m* |
| U Sagittarii... ... | 18 25·2 ... | 19 12 S. ... | ,, 28, | 0 0 | *M* |
| $\beta$ Lyræ... ... ... | 18 45·9 ... | 33 14 N. ... | ,, 30, | 0 0 | *M* |
| R Lyræ ... ... | 18 51·9 ... | 43 48 N. ... | July 1, | | *m* |
| S Vulpeculæ ... | 19 43·8 ... | 27 0 N. ... | June 26, | | *m* |
| $\eta$ Aquilæ ... ... | 19 46·7 ... | 0 43 N. ... | July 2, | 0 0 | *m* |
| S Sagittæ ... ... | 19 50·9 ... | 16 20 N. ... | June 27, | 23 0 | *M* |
| T Aquarii ... ... | 20 44·0 ... | 5 34 S. ... | ,, 26, | | *M* |
| W Cygni ... ... | 21 31·8 ... | 44 52 N. ... | ,, 29, | | *m* |
| $\delta$ Cephei ... ... | 22 25·0 ... | 57 50 N. ... | ,, 28, | 23 0 | *M* |

*M* signifies maximum; *m* minimum.

## *THE ZOOLOGICAL SOCIETY OF LONDON.*

A GENERAL meeting of the Zoological Society of London took place on the afternoon of Thursday, the 16th inst. In celebration of the fiftieth anniversary of Her Majesty's reign the meeting was held on the lawn of the Society's Gardens, which was reserved for the occasion. A very large number of the members and their friends were present.

After the meeting there was a garden party, the visitors being received by the President, Prof. Flower, F.R.S., and the Secretary, Dr. P. L. Sclater, F.R.S. Among those present during the afternoon were the following:—The Queen of Hawaii and Princess Liliuokalani, His Highness the Thakore Sahib of Limbdi, His Highness the Prince Devawongse, the Maharajah of Bhurtpore, the Earl of Buckinghamshire, the Earl of Cawdor, Lord Wantage, the Earl of Lauderdale, the Earl of Kilmorey, the Earl of Wharncliffe, Lord Coleridge, Lord Walsingham, the Dowager Marchione s of Tweeddale, Lord and Lady Thring, Sir James Paget, Sir Harry Lumsden, Sir Richard Pollock, Sir Joseph Hooker, Prof. Huxley, Capt. Gouglas Dalton, and the following members of the Council of the Zoological Society:—Lord Abinger, Mr. W. T. Blanford, F.R.S., Mr. H. E. Dresser, F.R.S., Mr. C. Drummond, F.R.S., Colonel J. A Grant, F.R.S., Dr. A. C. L. Günther, F.R.S., Dr. E. Hamilton, F.R.S., Mr. E. W. H. Holdsworth, Dr. St. George Mivart, F.R.S., Prof. A. Newton, F.R.S., Mr. Henry Pollock, Mr. H. Saunders, F.L.S., Mr. J. Travers Smith, and Surgeon-General L. C. Stewart.

At the general meeting the President presented the silver medal of the Society to the Maharajah of Kuch-Behar. In doing so he said that His Highness had been good enough to present to the Society a fine specimen of an Indian rhinoceros.

The Maharajah of Kuch-Behar, in reply, said that he would be happy to supply specimens of such animals as the Society might desire to possess, so far as it was in his power to do so.

Prof. Flower then delivered the following address:—

Nowhere has the progress which the world has made during the fifty years of Her Majesty's reign, the completion of which we are now happily celebrating, been more strikingly manifested than in the advance of that so-called "natural know ledge" for the improvement of which our Royal Society was instituted more than two centuries ago. Although there have been, without doubt, immense strides in other directions—in morals, in art, in historical and literary criticism—I venture to say that none of these can be compared with the marvellous progress that has been made in scientific knowledge and scientific methods.

The tangible results that have followed the practical applications of mechanics, physics, and chemistry have so deeply affected the material interests of mankind, that the progress of these branches of knowledge may seem to put into the shade the wonderful changes that have taken place in the kindred sciences. Nevertheless, I think we may safely say that zoology, in a certain sense one of the oldest of human studies, has in the e latter times undergone a new birth, which has not only changed the standpoint from which we view the special objects of our studies, but has also spread its influence far and wide, and profoundly modified our conceptions on many questions at first