

Comets of 1910.

Two comets were visible at the beginning of last year. One of these, Daniell's (1909e), was last seen at Algiers on March 15, but was photographed a month later by Professor Max Wolf at Heidelberg. The calculation of the definitive orbit has been undertaken by Dr. Krassowski, but the period will not differ greatly from 6.4 years. The other comet under observation was Halley's (1909 c), which is still visible in large telescopes, though the last published observation is dated December 7. The object is described as of the 14th mag., and the decrease of light will probably be very slow. This comet was observed in every observatory, public and private, and its return has produced an abundant literature; it is impossible to give here any useful analysis of observations so extensive and varied. This is the less necessary as a monograph is in course of preparation by a committee of American astronomers, which will be the authoritative source for information, aiming, as it does, at the exhibition of the history of the comet's variations from hour to hour. But, apart from the mass of observations, visual, photographic, and spectroscopic, that have been collected, an interest, distinct from that attaching to all bright comets, has centred around a few points to which reference must be made. First, the possibility of seeing the comet projected on the Sun. It is known that the centre of the comet was projected on the Sun's disc, but, notwithstanding some reported observations, it is doubtful if the comet was seen. It has been suggested that the comet, having a parallax of nearly a minute, would subtend an angle sufficient to include the Sun's disc. Another point which caused great excitement was the possibility of the Earth passing through the tail of the comet. If the tail were simply a prolongation of the radius vector, the question might be easily settled; but since the tail is shown to be of a very complex structure, spreading out as a fan, this question can only be settled by observation. Many observers have reported unusual atmospheric conditions, but whether such phenomena were traceable to the presence of Halley's Comet is very doubtful. It seems certain that the Earth did not pass through the more conspicuous portion of the tail, and equally probable that it did encounter some of the outlying fan-like extensions. Professor Birkeland suggested the possibility of magnetic disturbances being noticed if, as he supposed, the tail were formed of electrical corpuscular rays. He himself reported a magnetic storm, though no very decided fluctuations were seen at other observatories. Auroræ were seen in several observatories in America, but again there is no proof of any physical connection between these and the comet. Similarly with meteors: though a stream whose members are seen in the first week of May has been suggested as connected with Halley's Comet, no decided proof of connection is forthcoming, nor were more meteors seen than in other years. Many other

suggestions were made at the time the comet was increasing in brightness,—evidence of public excitement and of scientific activity, but of little practical service.

Comet 1910 *a*. In the middle of January a bright comet was seen in South Africa, and the first accurate observation appears to have been made by Mr. Innes at Johannesburg on January 17, when it was near to the Sun. The comet was moving rapidly northwards, and was very generally observed in Europe after the 20th. The comet was conspicuous owing to its tail, which was at its best 50° in length, and had much the appearance of that of Coggia's Comet in 1874. The spectrum of the nucleus resembled that of Comet Wells in 1882, in which the sodium lines shone with great brilliancy. By March the comet was too near the Sun for observations to be continued in this country. A great interest attaches to the orbit, or rather to the difficulties of determination it presented to the computer. Want of accuracy in the observations, due to the comet being low down on a bright sky, on which comparison stars could not be seen, explains some of the difficulties encountered, but Tscherny has shown that Lambert's equation could be satisfied by three values of the curtate distance at the first observation, with no criterion to determine the selection. Such cases do not seem particularly rare, but in this instance the difficulty was aggravated by the small perihelion distance, about $\frac{1}{10}$ R, so that the comet would pass over a large arc of anomaly in the first few days of observation. The orbit is probably parabolic, but an ellipse of 200 years' period has been assigned.

Comet 1910 *b* was a faint comet, discovered by Metcalf on August 8, distinguished by rather large perihelion distance and small geocentric motion. The comet is probably still under observation, having been seen at Algiers on 1910 December 6, when it was reported to be of the 12th magnitude. The orbit is probably parabolic.

Comet 1910 *c* is a return of D'Arrest's Comet, found by M. Gonnessiat in Algiers on August 26, who described it as an object of 2' or 3' in diameter, with a feeble central condensation of the 14th mag. The corrections to the ephemeris of M. Gustave Leveau, whose researches on the motion of this comet are well known, are comparatively slight, and can be removed by a slight diminution in the mean motion, making the time of perihelion passage 0.4 days later than the calculated time. The discovery of the comet and the closeness of the prediction are the more satisfactory, as the comet was not seen at its last return towards the close of 1903.

Of Comet 1910 *d* (Brooks) the perihelion passage really takes place this year, but the comet was happily found by Professor Aitken on September 28, and very close to the predicted place. The perturbations were calculated by Dr. Neugebauer from elements computed by Dr. Bauschinger, who reports that he has not been able to combine in one system the observations of 1889, 1896, and 1903. His elements were founded on the last two apparitions.

and the closeness of the prediction shows that the selection was warranted.

Comet 1910 e. On November 9, Dr. Cerulli of Teramo discovered a tolerably bright telescopic comet, which for some time was observed as unknown. As soon as the elements were determined, the similarity with those of Faye's Comet was at once apparent. There was no reason for any confusion, for the place of Faye's Comet was approximately known, although no ephemeris had been prepared. The last calculation of perturbations had been made by Dr. Strömgren for the 1903 apparition, when the comet passed through perihelion without being seen. Dr. Strömgren showed that in 1899 the comet approached Jupiter within half the Earth's distance from the Sun; and as the two objects were travelling approximately with the same velocity in the same direction, the comet would remain so long under the influence of Jupiter that very considerable alterations would be introduced into the orbit. As a matter of fact, the return to perihelion in 1903 was accelerated four and a half months, making the chances of observation very slender. That Dr. Strömgren's work was very exact is shown by the fact that although no perturbations have been applied to his 1903 elements, they represent the path of the discovered comet, requiring no more alteration than about +9 days to the date of perihelion passage. On the occasion of the 1896 return, when also no perturbations had been computed, the correction to the date of perihelion was +7½ days. The other elements show but slight differences between the unaltered work of Strömgren and the calculations from recent observations.

Spitaler's Comet, 1890 VII., has not been seen. It probably passed through perihelion in the middle of October. Measures have been taken to secure early observations of Westphal's Comet of long period, but it will probably not be seen until 1912.

Definitive elements of the following comets have been published during the year:—

Comet.	Character of the Orbit.	Calculator.	Authority or Source.
Comet 1883 II.	Elliptical	Moravi	<i>Ast. Nach.</i> 4400
„ 1904 II.	Hyperbolic	Sedlacek	„ „ 4453
„ 1908 I.	Parabolic	Matkiewitch	„ „ 4411

This last was the comet observed by Dr Max Wolf under the impression that it was Encke's.

W. E. P.

The Orbit of Halley's Comet.

The award of the Lindemann prize by the *Astronomische Gesellschaft* to Mr. Cowell and Mr. Crommelin for their essay on Halley's Comet* has been cordially welcomed by astronomers.

* Essay on the Return of Halley's Comet, by P. H. Cowell and A. C. D. Crommelin. Lindemann Prize Essay. *Publikation der Astronomische Gesellschaft*, xxiii.