

account for the observed discordance in question, although not enough to destroy the general similarity of the orbits about the sun, of LEXELL and 1889 V, after 1779 and before 1886, respectively.

Another remark on this question of identity is essential. In my article of a year ago, the perturbation of *Jupiter* was shown to have changed the period from 27.0 years to its present one. The value just obtained by Mr. POOR is 28.18 years, which apparently destroys the fine coincidence by which the first result carried back the comet to *Jupiter* in 1779, making the date of appulse 1775 instead. But it will be seen that the period at the time of entry into the attraction-sphere was 29.73 years, and had been diminished more

Cambridge, 1890 Dec. 8.

than a year and a half simply by the perturbations during the previous fifty days. But even at the beginning of this interval the comet was at a very moderate distance from *Jupiter*, which had been very slowly approaching it for a long time — the distance being only 0.6, for instance, six months previous — during which time the period was lengthening probably very considerably. I would suggest that if Mr. POOR carries the perturbations back about a year from where he left them, he will probably find a period not far from what I gave, and confirm the relation of four periods of the comet to nine of *Jupiter*, and their consequent conjunction in 1779.

### COMETS *e* 1890 (*ZONA*, Nov. 15) AND *f* 1890 (*SPITALER*, Nov. 16).

By E. E. BARNARD.

The telegram announcing the discovery of *ZONA*'s comet was not received at the Lick Observatory until the forenoon of Nov. 17. The following is the only observation of this comet which it has been possible to obtain since the moon withdrew — our bad weather having set in the following day. At this observation I could hardly believe the object was the same that I had observed on Nov. 17, 18 and 19. Then it was about 12<sup>m</sup>, round, gradually brighter in the middle, with no trace of a nucleus. On Nov. 30, it was smaller, brighter, and had a perfectly stellar nucleus of 11½<sup>m</sup>. So much did the nucleus resemble a star that I waited some time before beginning observations for the comet to pass from over it.

When the moon rose scarcely any nebulosity could be seen about the nucleus, and it would then never have been taken for a comet. A comparison with Mr. CAMPBELL'S ephemeris, however, showed that it must be the same object previously observed. The change was singularly remarkable, considering the comet was so far past perihelion.

No announcement, telegraphic or otherwise, was received here at all of the discovery of a comet\* by SPITALER on Nov. 16, until the arrival of the *Science Observer Circular*, which was not received until Dec. 2, so that no opportunity has occurred to search for it, as the storm continues.

\* Except, indeed, a vague reference to one other comet somewhere near *ZONA*'S, in a letter from SWIFT, received at the time of full moon.

Mt. Hamilton, 1890 Dec. 4.

Mr. BARNARD has communicated a full observation of Comet *e*, giving the position,

Mt. Hamilton M.T.	$\alpha$	$\log p\Delta$	$\delta$	$\log p\Delta$
1890 Nov. 30 8 <sup>h</sup> 53 <sup>m</sup> 50 <sup>s</sup>	4 <sup>h</sup> 6 <sup>m</sup> 39 <sup>s</sup> .2	n9.539	+35° 7' 28".0	0.076

The details are postponed until the next number, in order to leave room for his observation of Comet *f*, which has been transmitted by telegraph, but did not reach the Editor until

this present number of the *Journal* had been sent to the press. This is:

$$1890 \text{ Dec. } 6.7797 \text{ Greenwich M.T.} \quad \alpha = 5^{\text{h}} 13^{\text{m}} 10^{\text{s}}.7, \quad \delta = +37^{\circ} 48' 55''.$$

A hasty computation indicates that the comet is approaching the earth, and that its perihelion, which is at about 90° longitude, will be passed not far from the close of the year; the longitude of the node being about 60°, the inclination

nearly 30°, and the perihelion distance very large, nearly 3.0. The inequality of the intervals and the great distance of the comet make it impracticable to furnish a trustworthy ephemeris within the short time available.

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