NOTICES FROM THE LICK OBSERVATORY.*

PREPARED BY MEMBERS OF THE STAFF.

DISCOVERY OF A SIXTH SATELLITE TO *JUPITER*.

Part of the programme of work decided upon several years ago for the Crossley reflector when its new mounting should be completed consisted of a search for new satellites about the outer planets.

The first photograph of the region about *Jupiter* was obtained on December 3d and others on the 8th, 9th, and 10th. A comparison of these negatives showed an object of the fourteenth magnitude which was moving with an apparent velocity among the stars not very different from that of *Jupiter*. *Jupiter* was retrograding slowly at that time. The suspected object was to the westward and moving a little faster than the planet. From so short an interval, however, it was not possible to decide whether the object belonged to *Jupiter* or was an asteroid so situated as to be moving with nearly the same apparent speed as the planet.

Observations were secured again on January 2d, 3d, and 4th, which showed the object to be following *Jupiter* in such a way as to indicate its dependence upon that body.

While the observations are not sufficient to determine an accurate orbit of the new body, they are at a favorable part of the orbit for testing its motion about *Jupiter*. A calculation shows that its apparent motion about *Jupiter* during the interval covered by the observations is approximately that which a satellite should have at that distance from *Jupiter*.

Its greatest elongation distance (west) appears to have been about 50′, and to have been passed about December 25th. The plane of its orbit seems to be inclined to the ecliptic at an angle somewhat greater than is the orbit-plane of the inner

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satellites. It is apparently moving in the *opposite direction* from the other satellites. Whether this retrograde motion is real or only apparent cannot be told until more observations have been obtained.

Assuming its orbit to be nearly circular, its period of revolution would be about six months. Its real distance from the planet is approximately six million miles, or about five times that of the fourth satellite.

The sixth satellite has been estimated to be of the fourteenth photographic magnitude. Visually, it is probably from one half a magnitude to a magnitude brighter, or about the same brightness as BARNARD's fifth satellite.

As soon as sufficient observations have accumulated its orbit will be determined. It is now moving toward the planet about 1′ per day.

The last observation was obtained on January 28th.

January 30, 1905. C. D. PERRINE.

VISUAL OBSERVATION OF SATELLITE VI TO *JUPITER*.

Last Saturday night, January 28, 1905, the first opportunity presented itself to me to look for PERRINE's satellite to *Jupiter* with the 36-inch refractor. As the telescope had been at the disposal of the regular Saturday-night visitors earlier in the evening, the planet was already low in the sky. The atmospheric conditions also were unfavorable, though the sky was clear. The satellite was picked up easily at the first trial from the position predicted by the Crossley photographs on preceding nights, and in a few minutes' time the motion in Right Ascension made the identification certain.

The satellite was followed for nearly an hour, and the extreme settings showed an hourly motion in Right Ascension of about $+20''$, which is in good agreement with the photographic results. No attempt was made to secure an absolute position, as this can be better obtained from the photographic plates.

The bad seeing made magnitude estimates very uncertain, but, from the appearance of faint stars of known brightness, I would say that the satellite is about equal to a fourteenth-magnitude star.

So far as I know, this is the first time the satellite has been seen with certainty, though Professor HUSSEY on one night early in the month saw an object near the predicted place of the satellite. Clouds interfered before motion could be observed.

R. G. AITKEN.

January 30, 1905.

A LIST OF NINE SPECTROSCOPIC BINARY STARS.

The following nine stars have been determined to be spectroscopic binaries, from observations made with the Mills spectrograph attached to the 36-inch equatorial. As is well known, the presence of an invisible companion in a star of this type is shown by its gravitational influence upon the visible star, causing the latter to revolve in an elliptical orbit around the center of mass of itself and the invisible companion. The velocity of the visible star in the line of sight therefore varies, and the spectrographic determination of the velocities at all points in the orbit enables us to determine the form of the orbit and its position in the orbit-plane. The position of the orbit-plane remains undetermined.

	Discovered by
α *Andromedæ*	HEBER D. CURTIS.
ξ *Ceti*	W. W. CAMPBELL.
γ *Geminorum*	KEIVEN BURNS.
α_2 *Geminorum*	HEBER D. CURTIS.
η *Boötis*	JOSEPH H. MOORE.
ξ *Serpentis*	HEBER D. CURTIS.
ζ *Lyræ*	HEBER D. CURTIS.
τ *Sagittarii*	HEBER D. CURTIS.
71 *Aquilæ*	HEBER D. CURTIS.

α_2 *Geminorum,* the brighter component of *Castor,* is of special interest. Dr. CURTIS has secured about twenty-five plates of its spectrum, from which it appears α_2 and the invisible companion revolve once around in their orbits in approximately 9.27 days. The fainter component of *Castor* (α_1) was discovered to be a spectroscopic binary in 1896, by Dr. BELOPOLSKY, at Pulkowa, Russia, with a period of 2.93 days. The system of *Castor* therefore comprises, so far as known at present, two visible and two invisible stars. Dr. CURTIS is engaged in a study of the entire system, based upon our spectrographic observations. It may be recalled that *Castor* is the double