

Popular Astronomy.

Vol. XXXVIII, No. 4

APRIL, 1930

Whole No. 374

A TRANS-NEPTUNIAN PLANET

On March 13 astronomers throughout the world were informed by telegraph and cable, and the reading public by headlines in the daily papers, of the discovery of an object apparently a part of the solar system and yet more distant from the sun than the planet Neptune. When one remembers that sixty-five years elapsed between the discovery of Uranus and that of Neptune, and that eighty-four years have elapsed since Neptune was discovered, one begins to realize the significance of this announcement. The discovery of Neptune was regarded as "the gratest triumph of mathematical astronomy." Information concerning the new discovery is, as yet, rather limited. It seems, however, that, in a sense, the circumstances of this event are a repetition of those which led to the former discovery and that the finding of this new planet will invest the year 1930 with a glory similar to that shed upon the year 1846 by the discovery of Neptune.

The suggestion in this case, as in the case of Neptune, of the existence of a more distant object came from certain small residual perturbations in the outer planets. These observed residuals, the known elements of the solar system, and the law of gravitation are the material upon which mathematics is able to work. Adams in England and Leverrier in France applied mathematical theory to data of a similar character during the years just preceding 1846 and came to almost identical conclusions relative to the location and size of the unknown planet, the cause of the observed deviations. Uranus under most favorable conditions is barely visible to the unaided eye. Neptune, whose brightness is equal to that of a star between the eighth and ninth magnitudes, is far below the naked eye vision. The new object, which is of the fifteenth or sixteenth magnitude, could be detected only after a most painstaking search. Great credit, therefore, is due to those who furnished the theoretical work and to those who carried out the practical work which together culminated in a remarkable discovery.

Up to the present time the most authentic account of this epochal event is contained in the circular by Professor V. M. Slipher as follows:

THE DISCOVERY OF A SOLAR SYSTEM BODY APPARENTLY TRANS-NEPTUNIAN

The message sent last night (March 12) to Harvard Observatory for distribution to astronomers read as follows:

"Systematic search begun years ago supplementing Lowell's in-

PLATE IV



THE TRANS-NEPTUNIAN OBJECT AS IT APPEARED AMONG THE STARS ON MARCH 4, 1930.
Photographed with the 42-inch Reflector of the Lowell Observatory by Dr. C. O. Lampland.

vestigations for Trans-Neptunian planet has revealed object which since seven weeks has in rate of motion and path consistently conformed to Trans-Neptunian body at approximate distance he assigned. Fifteen magnitude. Position March twelve days three hours GMT was seven seconds of time West from Delta Geminorum, agreeing with Lowell's predicted longitude."

For ease in finding object was referred to Delta Geminorum.
Position March 12.14 G.M.T. R.A. $7^{\text{h}} 15^{\text{m}} 50^{\text{s}}$ Dec. $22^{\circ} 6' 49''$

The finding of this object was a direct result of the search program set going in 1905 by Dr. Lowell in connection with his theoretical work on the dynamical evidence of a planet beyond Neptune. (See *L. O. Memoirs*, Vol. I, No. 1, "A Trans-Neptunian Planet," 1914). The earlier searching work, laborious and uncertain because of the less efficient instrumental means, could be resumed much more effectively early last year with the very efficient new Lawrence Lowell telescope specially designed for this particular problem. Some weeks ago, on plates he made with this instrument, Mr. C. W. Tombaugh, assistant on the staff, using the Blink Comparator, found a very exceptional object, which since has been studied carefully. It has been photographed regularly by Astronomer Lampland with the 42-inch reflector, and also observed visually by Astronomer E. C. Slipher and the writer with the large refractor.

The new object was first recorded on the search plates of January 21 (1930), 23rd, and 29th, and since February 19 it has been followed closely. Besides the numerous plates of it with the new photographic telescope, the object has been recorded on more than a score of plates with the large reflector, by Lampland, who is measuring both series of plates for positions of the object. Its rate of motion he has measured for the available material at intervals between observations with results that appear to place the object outside Neptune's orbit at an indicated distance of about 40 to 43 astronomical units. During the period of more than 7 weeks the object has remained close to the ecliptic; the while it has passed from 12 days after opposition point to within about 20 days of its stationary point. Its rate of retrogression, March 10 to 11, was about $30''$ per day. In its apparent path and in its rate of motion it conforms closely to the expected behavior of a Trans-Neptunian body, at about Lowell's predicted distance. There has not been opportunity yet to complete measurements and accurate reductions of positions of the object requisite for use in the computation of the orbit, but it is realized that the orbital elements are much to be desired and this important work is in hand.

In brightness the object is only about 15th magnitude. Examination of it in the large refractor—but without very good seeing conditions—has not revealed certain indication of a planetary disk. Neither in brightness nor apparent size is the object comparable with Neptune. Preliminary attempts at comparative color tests photographically with large reflector and visually with refractor indicate it does not have the blue color of Neptune and Uranus, but hint rather that its color is yellowish, more like the inner planets. Such indications as we have of the object suggest low albedo and high density. Thus far our knowledge

of it is based largely upon its observed path and its determined rates of motion. These with its position and distance appear to fit only those of an object beyond Neptune, and one apparently fulfilling Lowell's theoretical findings.

While it is thus too early to say much about this remarkable object and much caution and concern are felt—because of the necessary interpretations involved—in announcing its discovery before its status is fully demonstrated; yet it has appeared a clear duty to science to make its existence known in time to permit other astronomers to observe it while in favorable position before it falls too low in the evening sky for effective observation.

V. M. SLIPHER.

Lowell Observatory Observation Circular,
Flagstaff, Arizona, March 13, 1930.

Additional information received through the Harvard College Observatory is given here.

TRANS-NEPTUNIAN PLANET.—On a plate of eighty-three minutes exposure made on March 19 with the 16-inch Metcalf refractor at Harvard, the photographic magnitude of the Trans-Neptunian planet is estimated as 16.0 on the International magnitude scale, comparison having been made with the Harvard Standard Region C4 at 7^h 0^m, +15°.0.

From measures on plates taken with the 24-inch reflector at the Yerkes Observatory Professor Van Biesbroeck has deduced the following positions of the planet:

	1930 U.T.	R.A. 1930.0	Dec. 1930.0
March	16.05544	7 ^h 15 ^m 42 ^s .55	+22° 7' 10".6
	17.07928	7 15 40.92	+22 7 18.0

HARLOW SHAPLEY.

Harvard College Observatory Announcement Card 112, March 20, 1930.

TRANS-NEPTUNIAN PLANET.—A cablegram received today reports the following position of the Lowell Observatory object by Wolf at Heidelberg. The observation was transmitted from Dr. Kobold, of Kiel, through Copenhagen.

	1930	R.A.	Dec.	Mag.
March	19.9206	7 ^h 15 ^m 39 ^s .9	+22° 7' 38"	15

HARLOW SHAPLEY.

Harvard College Observatory Announcement Card 113, March 21, 1930.

TRANS-NEPTUNIAN PLANET.—Two positions of the planet, observed by Struve at Neubabelsberg, have been received from Copenhagen:

	1930	R.A.	Dec.	Mag.
March	21.9333	7 ^h 15 ^m 35 ^s .0	+22° 7' 47"	15
	22.9457	7 15 34.0	+22 7 54	

HARLOW SHAPLEY.

Harvard College Observatory Announcement Card 115, March 24, 1930.