

LOWELL OBSERVATORY

Observation Circular

The following message giving the results of the investigation here of the orbit of Lowell's Planet X was transmitted to Harvard Observatory for distribution to astronomers, on April 12th:

"Preliminary orbit of Planet X has been computed by Lowell Observatory staff with collaboration of Dr. John A. Miller,* Director of the Sproul Observatory, using positions January 23, February 23 and March 23, determined from Lowell plates by Lampland, and yielded following elements referred to mean equinox 1930.0:

Node	109° 21'
Inclination	17° 21'
Log. semi-major axis	2.3359
Eccentricity	0.909
Longitude perihelion	12° 52'
Mean Daily Motion	1".112
Mean anomaly 1930.0	3° 20' 47"
Distance from Sun	41.3

Positions computed from orbit for March 30 checked observed position within small fraction of one second of arc in both coordinates. However, because of very short arc available and object's extremely small latitudes, considerable revision of some elements, especially eccentricity, is not unexpected. Our first preliminary circular orbit computed from positions January 23 and March 23 had given node and inclination agreeing with these of elliptic orbit. Further details will appear promptly in Lowell Circular."

The positions used in the orbit computation and referred to above are as follows:

Date U. T. 1930	R.A.	Dec.
d h m	h m s	° ' "
Jan. 23 5 27.5	7 18 56.37	+21 57 40.1
Feb. 23 4 40.0	7 16 36.39	22 4 6.8
Mar. 23 3 23.5	7 15 33.85	22 7 55.6
Mar. 30 3 19.0	7 15 30.29	22 8 30.2

The positions are for mean equinox 1930.0; the comparison stars were taken from Astrophysical Catalogue zone +22°. The first two positions are from the search plates of the 13-inch instrument, while the other two are from plates made with the 42" reflector. Some of these early places with recent ones now available will, it is hoped, offer an opportunity for others interested to determine an improved orbit.

The computation of the orbit was, of course based upon the best available observations, but these covered only an exceedingly small fraction of the indicated orbit. Hence our knowledge of the orbit's shape and size—its eccentricity and semi-major axis—must be regarded as probably subject to considerable modification when more extended positions are available. But the plane of the orbit—its inclination and line of nodes—and the present distance of the object are fairly reliably known from the present orbital data.

In the previous Observation Circular reference was made to preliminary color tests of Planet X compared with stars and Neptune, which indicated this body was yellowish like the inner planets and very different from the blue planets Uranus and Neptune. This suggests an albedo and a density more like those of the inner planets. It is pertinent to state that if Mars were removed to the distance of 41.3 astronomical units his stellar magnitude would not be greater than Planet X. That is, this new body may be comparable with Mars in size and mass. If the albedo were lower, like Mercury or the Moon, the size of Planet X would be greater, and if the albedo were higher the body would be smaller. But, in the case of Mars or either of the others

* Fortunately Dr. Miller could be at Flagstaff during the orbit investigation.

the planetary disk would still be too small, 0."2 or 0."3, to be seen. Careful visual observations have not recognized the disk of Planet X, although on a few favorable occasions it has appeared to show not quite the same type of image as the equally faint stars. But how large the disk may be and escape detection remains to be determined because the object's faintness doubtless raises the size of minimum detectable disk and some experiments are planned to throw light on this question.

Concerning the nature of this object it is of record that the longest exposures with the reflector by Lampland and the repeated visual observations with the refractor by E. C. Slipher and the writer have revealed no cometary features about the object. Besides, comets have been observed at nothing like this distance from the sun. As for asteroids, Planet X would outshine 100-fold the largest of the asteroids, Ceres, (diameter 480 miles) if removed to the same distance. Finally the orbit is no sufficient ground upon which to venture a decision as to the nature of such an object. Here is suggested an obvious analogy between the Sun's increased family of planets and the satellite system of Jupiter whose newer satellites have orbits at considerable variance with these of the older satellites, just as the orbit of Planet X differs from those of its older brothers. It is pertinent to draw attention to the fact that Planet X has like the older planets direct motion about the Sun.

This then appears to be a Trans-Neptunian, non-cometary, non-asteroidal body that fits substantially Lowell's predicted longitude, inclination and distance for his Planet X. Lowell considered his predicted data as only approximate, and a one to one correspondence between forecast and find would not be expected by those familiar with the problem. As he himself said in his Trans-Neptunian Planet Memoir: "Analytics thought to promise the precision of a rifle and finds it must rely upon the promiscuity of a shot gun." This remarkable Trans-Neptunian planetary body has been found as a direct result of Lowell's work, planning and convictions and there appears present justification for referring to it as his Planet X.

It seems time now that this body should be given a name of its own. Many names have been suggested and among them Minerva and Pluto have been very popular. But, as Minerva has long been used for one of the asteroids it is really not available for this object. However, Pluto seems very appropriate and we are proposing to the American Astronomical Society and to the Royal Astronomical Society, that this name be given it. As far as we know Pluto was first suggested by Miss Venetia Burney, aged 11, of Oxford, England.† As a fitting symbol to go with the name we have suggested \mathcal{P} , easily remembered because the first two letters of the name and not to be confused with the symbols of the other planets.

V. M. SLIPHER.

Flagstaff, Arizona
May 1, 1930.

† Kindly cabled by Prof. H. H. Turner.