

ASTRONOMY

Astronomer Finds Neptune's Day to be 15.8 Hours Long

Discovery By Dr. Moore, Who Also Measured Uranus' Rotation, Leaves Pluto and Venus To Be Studied

WITH THE discovery by Dr. J. H. Moore, Lick Observatory astronomer, that the planet Neptune turns once on its axis in about 16 hours, there remain only two of the larger members of the solar system for which the day is still unknown. Venus, which becomes brighter than any of the other planets, and which has been so conspicuous in the western evening twilight in recent months is one. The other is the newly-discovered Pluto, which represents the main contribution of 1930 to the history of astronomy, and which can only be discerned with the aid of a large observatory telescope.

It was the spectroscope, which analyzes the light of a star to tell what it is made of and how it is moving, that revealed to Dr. Moore the secret of Neptune's rotation. The light from the planets is reflected sunlight. Therefore the spectrum shows the dark lines crossing it that are characteristic of the spectrum of sunlight, the lines being caused by vapors of certain elements absorbing certain colors in the sun's light as it passes through the outer layer of that body. If light from a star, or planet, that is approaching the earth, is analyzed through the spectroscope, it is found that the lines are slightly displaced, towards the violet end of the colored spectrum. If the star is receding, on the other hand, they are shifted to the red end. This is because the waves are squeezed together and made shorter in the first case, while in the latter instance they are spread out and made longer. It is the length of the wave that determines color of light, so light from a rapidly approaching source is bluer and from a rapidly receding source redder than one that is standing still.

Secret of Spectrum Photographs

Dr. Moore photographed the spectrum of light from Neptune along a line crossing the planet's disc from east to west. The spectrum photographs showed the lines tilted, rather than

displaced in their entirety to one end or the other. This indicates, of course, that one side of the planet is approaching the earth and the other side receding, in other words that it is rotating. As the side of the lines made of light from the eastern edge tilted to the violet, it showed that the eastern side of the planet is approaching us. That is, the planet turns from west to east, like the earth, and all of the known planets except Uranus.

The faster the planet turned, the greater would be the tilt, so from a determination of the angles of the lines, Dr. Moore was able to measure the period of rotation, or "day" of Neptune. This came out as 15.8 hours, though he admits that there is a possible error in this figure of as much as an hour, either too fast or too slow.

Uranus Turns From East to West

Dr. Moore also has measured the day of Uranus. In 1911 Drs. Percival Lowell and V. M. Slipher, at the Lowell Observatory in Arizona, found by a similar spectroscopic method that Uranus rotates one in $10\frac{3}{4}$ hours, and that the planet turns from east to west, unlike all the other members of the solar



DR. J. H. MOORE

Of the Lick Observatory who has measured the length of a day on the planet Neptune

system. Dr. Moore has confirmed the direction of the planet's rotation, but gets slightly different values for the rotation with different sets of spectrum photographs. One set, made with a smaller spectrograph, gives values like those of Lowell's but another set, made with a more powerful instrument, gives about 11.5 hours. The latter photographs, however, are not fully exposed, and were difficult to measure. Dr. Moore said that the discrepancy is probably due to the small images of the planets, as a result of which such determinations are at best only approximations.

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SOCIOLOGY

Mice Crowded In Boxes Show How Slums Affect People

SLUM conditions in great crowded cities like London and New York are duplicated in colonies of mice raised in the laboratories of Prof. F. A. E. Crew of Edinburgh University. As a result Prof. Crew, the scientist who several years ago had a hen who turned into a rooster, has reported to the British Association for the Advancement of Science what happens eugenically when living conditions become overcrowded.

His mice were forced to live in very

crowded boxes, an experiment no more inhumane than everyday human life in city slums. Side by side with the slum mice, were other mice colonies in less crowded boxes which corresponded to the well-to-do sections of a great city. Such laboratory control is not possible with human beings and this is why Prof. Crew made his mice experiments.

The overcrowded mice showed a decline in birth rate and an increase in death rate. The baby mice born in the