JUPITER.

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During the present opposition of Jupiter, the disc exhibits a variety of phenomena of interest to the practical astronomer.

Although this planet has received a good deal of attention during the past century, yet, but few new *facts* have been added, with regard to its physical aspect, since the time of Sir Wm. Herschel.

It appears to be the generally accepted idea that its surface is subject to sudden and extraordinary changes, sometimes accomplished in a few days or even a few hours. New belts are alleged to have been formed or to have disappeared in the course of an hour or two.

We believe conclusions of this kind have been too hastily drawn from the obstructions.

Owing to the rapid rotation of Jupiter, the various spots and markings follow each other so closely that one might readily imagine that what he saw was subject to change under his eye.

The great red spot, which has been an object of so much interest since 1879, becomes visible, in the Chicago telescope, at 2h. 25m. from the meridian of the planet, when its length is about one second of arc. As the rotation carries it further on the disc, it gradually increases in size, until, when on the meridian, it subtends an angle at opposition, of 15 seconds. The smaller spots and markings, of course, become most conspicuous when near the meridian of the disc.

The visibility of objects depend, very much, also, on the condition of the seeing. Sometimes the smaller spots are invisible for weeks, simply because the seeing is not good enough with limited optical power, and not because there has been any radical change on the surface of the planet. Its distance from the earth is another important element in modifying the appearance of phenomena. After conjunction, the great Equatorial Belt and Red Spot are first seen and, as the earth approaches nearer, other markings gradually appear, until the time of opposition, the greatest variety of phenomena is noticeable.

From September, 1879, when micometer measurements were first begun, with the Chicago Refractor, on the markings of the disc, considerable change has taken place in its appearance at different times. But all changes, whether due to the distance of the planet from the earth, variable seeing, or other causes, have been slow and gradual.

The most noticeable change has taken place in belt No. 3 situated 6″ north of the equator. This belt, which was not conspicuous in 1879, gradually increased in width and distinctness in 1880, until at the present time its width is about 2″.5 of arc, and of the same color as the equatorial belt, viz.; reddish brown.

The equatorial region situated between the two outlines of the equatorial belt has been subject to considerable change, but the margins of the belt have not sensibly varied in width or latitude during the past three oppositions.

The great red spot, a conspicuous object even in a small telescope, is alleged to have materially changed in length during 1879, and again in 1880, but numerous micrometer measurements do not confirm this statement.

The following are the mean results, reduced to the mean distance.

	Length.	No. of Obs.	Breadth.	No. of Obs.	Latitude.	No. of Obs.
	″		″		″	
1879.....	12.25	9	3.46	8	—6.95	8
1880.....	11.55	20	3.54	10	—7.14	12
1881.....	11.50	8	3.49	3	—7.41	7

These numbers indicate a small possible displacement of the center in latitude, but it would be premature to assume such to be the case.

The color of the spot is reddish-brown; however, when the seeing is unusually good, it appears almost a light pink.

The oval-shaped white spots, a number of which were observed in 1880, are quite numerous at the present time. They are about one second of arc in length and are generally difficult objects to observe.

The following spots have been seen on belt No. 6. Latitude 9″. 5 to 12″. 6. They pass the meridian of Jupiter after the great red-spot as follows:

h.	h.	h.	h.	h.	h.	h.	h.
+ 2.8	+ 3.0	+ 3.3	+ 4.0	+ 4.7	+ 5.2	+ 5.5	+5.8

There are also two white spots—more easily seen—near the great red spot in latitude 9″. 63 and longitude 0h. 36m. and +0h. 24m.

The two white spots situated in latitude 3″. 0 south of the equator, which were observed in 1879 and 1880, were first seen this year on July 22. They appear to make a complete revolution around the planet in about forty-five days, corresponding to a rotation period of 9h. 50m. 9 sec.

These spots, which are both occasionally seen at the same time, appear to be fixed relatively to each other.

The difference of longitude was measured with the micrometer as follows:

1880.
July 24, +23.5m.
Nov. 8, +22.6m.
1881.
July 22, +27.5m.
Nov. 26, +27.5m.
Dec. 10, +23.0m.

The fact that they have maintained for a year and a half the same relative position, and at the same time apparently drifted with a velocity of over 260 miles per hour, would seem to disprove the old theory that they are clouds floating in the atmosphere of the planet.

From observations made during the present opposition, it is probable that all the matter between the two margins of the equatorial belt, whether in the form of white spots or dark ones, moves with the same velocity, viz.: a period of 9h. 50m. 9 sec. And it is possible that the belt itself partakes of this motion.

The rotation period of the planet, deduced from our observations on the red spot, made in 1879 and 1880, was 9h. 55m., 33.2 sec. + 0.09 sec. $\sqrt{t}$, in which t is the number of days after Sept. 25, 1879. The observations during 1880 showing that the spot was retrograding with an accelerated velocity.

This formulæ is found to be essentially correct for the present opposition.

The "mean" period for Dec. 14, 1881, comprising an interval of 811 days, being 9h. 55m., 35.80 sec. from observation and 9h. 55m. 35.76 sec. from the formulæ

Assuming the rotation period as above, the centre of the spot has retrograded more than fifty degrees since Sept. 1879, not uniformly, but with an accelerated velocity. It seems difficult to account for this fact on any known hypothesis.

IMPROVEMENTS OF PLANTE AND FAURE'S STORAGE BATTERY.

In a previous number of "Science" No. 57, July 30th, 1881, we gave excellent directions for making Planté and Faure's storage batteries.—In a recent paper before the "Society of Arts, of London, Professor S. P. Thompson states that almost any oxide or hydrate of lead will answer for use in the Faure battery—Litharge will answer if sufficiently finely divided for being painted on. Litharge mixed with a small proportion of binoxide of manganese works well. The most satisfactory cells I have yet tried were made by painting the lead plates with a coat of the brown peroxide itself, which is obtainable in commerce, although its cost is greater than that of red lead or litharge.