POSITION OF THE PLANETS IN OCTOBER.

JUPITER

is morning star until the 12th, and then evening star. He is foremost on October planetary annals, reaching the culmination of his course as far as terrestrial observers are concerned. This epoch is his opposition with the sun, on the 12th, at 1 h. 14 m. P. M. Several features give to the event a more than usual significance. The planet is in northern declination, which lengthens his stay above the horizon, and increases his meridian altitude, and, as he is only about two months beyond perihelion, he is nearer to the earth than he will be until he comes round to perihelion again in 1904. Jupiter, in opposition, is opposite the sun, rising at sunset, looking down from the meridian near midnight, and setting at sunrise. The synodic period of Jupiter, or the time it seems to take him to pass from opposition to opposition again, is 399 days, or a year and a little more than a month, a number easily remembered. The time for succeeding oppositions may be readily calculated. His opposition took place last year on September 5, this year it is on October 12, and next year November 15 will be the date. He passes at this time from the sun's western side to his eastern and is ranked as evening star. He reigns without a rival until Venus rises, and well deserves the name of prince of planets, for he is the largest and brightest of the clustering throngs that people the celestial vault. It is no wonder that ancient astronomers named him for their great god, that astrologers welcomed his ascendancy in the horoscopes they cast as a benignant influence, or that modern observers have a sincere admiration for the star that is the embodiment of strength and majesty. He is at his best in October, and a fine study for the telescope, when possibly some new light may be thrown upon the famous red spot that has puzzled scientific brains since 1878.

The moon, on the day of the full, is in conjunction with Jupiter on the 6th, at 0 h. 45 m. P. M., being 3' north. The conjunction occurs when moon and planet are below the horizon, but the two heavenly bodies will be near neighbors when Jupiter rises about 6 o'clock on the evening of the 5th, and form a celestial picture that will be pleasant to behold. The moon will occult Jupiter to observers who see her in her geocentric position. She will also occult Saturn, Uranus, and Mercury under the same conditions.

The right ascension of Jupiter on the 1st is 1 h. 21 m., his declination is 6° 49' north, his diameter is 47".2, and he is in the constellation Pisces.

Jupiter rises on the 1st at 6 h. 8 m. P. M. On the 31st he sets at 4 h. 42 m. A. M.

VENUS

is morning star, rising in the small hours, and fulfilling her mission as herald of the dawn with queenly dignity. When she rises on the 1st at 2 h. 8 m. A. M., Jupiter is near the meridian, and the two rivals make a spectacle of surpassing beauty, the one, near her greatest distance from the sun, oscillating toward him, and the other beaming from the zenith, and rapidly drawing near that portion of his course where his luster is greatest. Venus, an inferior planet, oscillates east and west from the sun. Jupiter, a superior planet, makes the circuit of the heavens, and looks down from the zenith, amid the midnight darkness of the sky, a point beyond the reach of his fair rival.

The moon, four days before her change, is in conjunction with Venus, on the 16th, at 10 h. 8 m. A. M., being 4° 27' north.

The right ascension of Venus on the 1st is 9 h. 41 m., her declination is 13° 3' north, her diameter is 21".4, and she is in the constellation Leo.

Venus rises on the 1st at 2 h. 8 m. A. M. On the 31st she rises at 2 h. 56 m. A. M.

MARS

is evening star. He was watched at opposition as planet was never watched before; but he has had his day and is receding from the earth, lessening in size and ruddy light, while October closes the season when he is of much importance. His diameter at the close of the month is only one half as great as it was at opposition. He makes his transit on the 1st at 8 h. 17 m. P. M., and sets at 0 h. 59 m. A. M., so that he is below the horizon when Venus rises, and has to yield the precedence to Jupiter until he disappears from view. Mars is in conjunction with the third magnitude star, Delta Capricorni, on the 25th at 6 h. A. M., being 1' north of the star. The planet is below the horizon at the time of conjunction, but will be near the star on the night preceding.

The moon makes two conjunctions with Mars during the month. The first conjunction takes place on the 25th at 6 h. P. M., the moon being 1° 21' south. The second conjunction takes place on the 30th at 0 h. 19 m. A. M., the moon being 2° 57' south. It will thus be seen that the paths of the moon and the ruddy planet do not lie very near in October.

The right ascension of Mars on the 1st is 21 h. 2 m., his declination is 21° 6' south, his diameter is 18".2, and he is in the constellation Capricornus.

Mars sets on the 1st at 0 h. 59 m. A. M. On the 31st he sets at 0 h. 14 m. A. M.

MERCURY

is morning star until the 8th, and then evening star. He is in superior conjunction with the sun on the 8th, when, passing beyond the sun, he appears on the sun's eastern side and ranks as evening star. Mercury is in conjunction with Saturn on the 1st at 4 h. 35 m. P. M., being 34' south. He is conjunction with Uranus on the 20th, at 1 h. 29 m. P. M., being 46' south.

The moon, the day after her change, is in conjunction with Mercury on the 21st, at 8 h. 29 m. A. M., being 29' north.

The right ascension of Mercury on the 1st is 12 h. 17 m., his declination is 0° 3' south, his diameter is 5".0, and he is in the constellation Virgo.

Mercury rises on the 1st at 5 h. 29 m. A. M. On the 31st he sets at 5 h. 22 m. P. M.

SATURN

is morning star. The incidents of interest in his October course are his conjunction with Mercury on the 1st, and he is also one of the three planets that are to be found in Virgo during the first part of the month, Uranus being the third member of the trio.

The moon, two days before her change, is in conjunction with Saturn on the 18th, at 4 h. 58 m. P. M., being 42' south.

The right ascension of Saturn on the first is 12 h. 18 m., his declination is 0° 25' north, his diameter is 14".8, and he is in the constellation Virgo.

Saturn rises on the 1st at 5 h. 29 m. A. M. On the 31st he rises at 3 h. 49 m. A. M.

URANUS

is evening star until the 29th, and then morning star. He is in conjunction with the sun on the 29th, when he enters the ranks of the morning stars, because he is on the sun's western side. His conjunction with Mercury has been referred to.

The moon, the day after her change, is in conjunction with Uranus, on the 21st, at 6 h. 2 m. A. M., being 17' south.

The right ascension of Uranus on the 1st is 14 h. 10 m., his declination is 12° 41' south, his diameter is 3".6 and he is in the constellation Virgo.

Uranus sets on the 1st at 6 h. 38 m. P. M. On the 31st he rises at 6 h. 19 m. A. M.

NEPTUNE

is morning star. His right ascension on the 1st is 4 h. 40 m., his declination is 20° 34' north, his diameter is 2".6, and he is in the constellation Taurus.

Neptune rises on the 1st at 8 h. 34 m. P. M. On the 31st he rises at 6 h. 34 m. P. M.

Venus, Jupiter, Saturn, Mercury and Neptune are morning stars at the beginning of the month. Mars and Uranus are evening stars.

THE FIFTH SATELLITE OF JUPITER.

A new member of the sun's family has made its advent since the position of the planets was last chronicled. The new corner was as unexpected as is usually the case with celestial events of momentous importance. The fifth satellite of Jupiter has, however, come to stay. Barnard, who found the prize, has won immortal fame, and the Lick Observatory has at last done something worthy of the largest telescope in the world, and its fine location. There is not much to record concerning the new satellite. It was discovered on September 10, is 100 miles in diameter, shining as a star of the thirteenth magnitude, and revolving around its giant primary in about twelve hours, at a distance 112,000 miles from his center. It is difficult to tell whether the new moon is a blessing or a burden. Astronomers are puzzled to find a name for it, as Number 1 is already appropriated for the first satellite beyond it. Text books will have to be remodeled to recognize its presence in the sky. There is also a widespread popular disappointment that some important discovery about Mars, so ardently hoped for, could not have been made instead of this tiny moon that "flies swiftly round" the vast mass of Jupiter. At least, the Jovian moon of 1892 is not welcomed with the wild excitement that attended the discovery of the Martian moons in 1877.

About Sound.

Sound is transmitted to the ear by the vibrations of the air. When one particle of air is made to vibrate it sets the adjacent particles vibrating, and so a sound wave, if not obstructed, passes in all directions from the sounding body. The calculated velocity of sound in the air, when the temperature is at the freezing point, is 915·69 feet per second. But the experiments of Moll, Vaubeek, and Kuytenbrouwer, performed in 1823 over a distance of 57,839 feet, showed the velocity to be 1,089·42 feet per second. Laplace explained why it was that the actual velocity was greater than the calculated velocity, by showing that the sound vibrations increase the temperature of the air, and hence the sound travels faster than the calculated rate. This leads us to note the fact that an increase of temperature increases the velocity of sound by 1·11 feet per second for each degree of rise of Fahrenheit's thermometer. Hence sounds travel faster in summer than in winter, and in warm than in cold climates. It might be thought that sound would travel more slowly through a dense atmosphere, but the elasticity increases as rapidly as the density, and therefore the velocity of sound is not affected by varying density.

The velocity of sound in water, when at the greatest density, is 4,707·4 feet per second. The experiments by which this velocity was determined were made by M. Colladon in 1826, across the Lake of Geneva, from Rolle to Thonon, a distance of about nine miles. Water, therefore, transmits sound about four times as fast as air does. Still, water is not as good a medium for transmitting sound as the air. If a bell is rung under water and the sound transmitted through that medium for more than six hundred yards, the tones are not heard, but only a short, sharp sound, "like two knife blades struck together." Our atmosphere seems to be of just the right nature and density to give to sound its mellow tones and musical cadences. Nor is sound in water diffused around intervening objects as it is in the air. In the air a noise is carried with considerable intensity around a building or wall, but in water an intervening wall intercepts the sound almost entirely.

Here we turn aside to consider a question which, perhaps, has not often suggested itself, but which is, nevertheless, quite interesting. Why can we hear, but not see, around a corner? Some may think that this question can be answered by saying that light moves in a straight line, while sound does not. But this answer is not satisfactory. It is known that light and sound are similar in character; each is due to the vibrations of a medium, and each is transmitted in waves. Why, then, may not light spread around a corner as well as sound? The answer is to be found in the different lengths of sound and light waves. Sound waves themselves are of different lengths, the graver sounds having waves of greater length than the more acute. Now it can be shown mathematically that the greater length of sound waves will cause the sound to be diffused around the obstruction. Hence the bass notes of a band of music are heard more distinctly far behind a wall than the higher notes, and as the person moves out of the "acoustic shadow," the more acute notes increase in distinctness. So, also, when sound is transmitted through water the sound waves are shorter than in the air, and the "acoustic shadow" is fully formed. As the length of sound waves in the air is sometimes many feet, while the length of the longest light wave is not more than ·0000266 of an inch, it is no longer a mystery why we can hear, but cannot see, around a corner.

It is easily demonstrated that the intensity of sound varies inversely as the square of the distance from the origin of the sound. Generally speaking, a sound will be heard farther the greater its original intensity and the denser the medium in which it is propagated. The greatest known distance to which sound has been carried through the atmosphere is 345 miles, as it is asserted that the very violent explosions of the volcano at St. Vincent have been heard at Demerara. Sound travels farther and loses less of its intensity in passing through the earth than through the air. In 1806 the cannonading at the battle of Jena was heard in the open fields near Dresden, a distance of 92 miles, though but feebly; while in the casements of the fortifications it was heard with great distinctness. It is also said that the cannonading of the citadel of Antwerp in 1832 was heard in the mines of Saxony, which are about 370 miles distant.—*J. A. Moore, in Popular Science News.*

Preservation of India Rubber Goods.

In an article (*India Rubber World*) on "The Deterioration of Druggists' Rubber Goods," Mr. J. A. Sherman mentions a few of the causes which go to spoil this class of stock, and criticises the means which are taken to prevent deterioration. Fine surface cracks are taken as evidence that the goods are going wrong, and this may be due to (1) being kept in warm, dry air, as on top shelves in the shop; (2) exposure to sunlight; thus all goods shown in the window rapidly become bad. These are really the chief sources of trouble. As to the means of preservation, a New York manufacturer claims that small articles like catheters and tubes keep well immersed in water, but Mr. Sherman says that this is an impracticable method when generally applied. It has also been claimed that keeping the goods in air-tight boxes preserves, but this again is denied, and so is the statement that a coating of paraffin is beneficial. Paraffin mixed with unvulcanized rubber will destroy the latter in a short time, and it is very problematical whether it would not have the same effect on vulcanized goods. Exposure to the air is not considered to be detrimental, although a jet of oxygen directed upon an India rubber ball causes it to soften. On the whole, proper vulcanization is the only security that India rubber goods will keep well, and as long as they are stored in a part of the shop where the temperature is equable and moderate, the most is done that can be to prevent deterioration.