The Deseret News.
TRUTH AND LIBERTY.

GEORGE Q. CANNON,
EDITOR AND PUBLISHER.

Wednesday, - - - March 15, 1871.

rounding the body, and the nature of the materials composing its surface.

The telescope reveals several large mountains on the planet Venus, one of which is stated to be 22 miles in perpendicular height; another 19 miles; a third 11½ miles; and a fourth 10¾ miles in elevation. These mountains are far higher than any on our globe.

We can form some conception of the awful grandeur of these towering elevations, by imagining the chain of mountains bounding this valley on the east to be raised up seventeen times higher than they are now. Such a mountain scenery would be worth visiting; while the view from the top of such an elevation, would scope in many hundred miles in all directions.

From careful observations of the twilight observed on Venus, it is believed that its atmosphere is very dense for some three or four miles above the surface, and consequently that its atmosphere extends far above the highest of its mountains. If these observations and calculations can be depended upon, the surface of Venus will be in a measure protected from the intense glare of the sun's rays, and consequently it can be inhabited by beings not differing materially in their constitution, from us.

Several observers have been of the opinion that Venus is accompanied by a satellite, although seldom seen. A luminous appearance has occasionally been seen a short distance from the disc of Venus, exhibiting the same kind of phase as Venus, and about one fourth the diameter of the planet; it has been observed to move; and its supposed period is about 11 days, 5 hours, 13 minutes. Its distance from Venus is supposed to be about 259,000 miles. The inclination of its orbit to the ecliptic is very great, being about 63¾°. The observations on which these calculations are founded, being very imperfect, cannot fully be relied upon, therefore astronomers are still doubtful whether such a satellite exists. It is very evident that if Venus have such a satellite, it could not very easily be discovered. The most favorable positions of Venus for discovering its satellite, if it have any, are when that planet is near its greatest elongations east and west, or within about 40° of the sun; for then the amount of light reflected from the satellite and reaching the eye would be greater than in any other position.

The transit of Venus across the sun's disc, takes place about twice in one century. In 1874, December 8th, at 8 hours, 40 min. in the evening, mean time at Salt Lake, there will be a transit of Venus; but being after sunset it will not be visible in this city. There will be another transit which will be visible in Utah Territory. The middle of the transit will happen about 8 hours, 48 min. in the morning of December 6th, 1882, mean time at Salt Lake City. We have already observed, in one of our former lectures, that a transit of Venus was the surest and best method of finding the true distance of the sun from the earth.

Venus revolves in an orbit 433,800,000 miles in circumference. Its average velocity per hour is about 80,000 miles: equal to about 1,330 miles every minute and about twenty-two miles every second The density of Venus and the earth is about the same; and bodies will weigh nearly the same at their respective surfaces. The orbit of Venus approaches nearer to a circle than any of the rest of the planets; its eccentricity being only about 492,000 miles, or the 1-138 part of its mean distance from the sun. The inclination of the orbit of Venus to the ecliptic is only 3° 23′ 28″. 5; therefore its greatest deviation from the ecliptic either north or south, never exceeds seven apparent diameters of the sun. Its mean apparent diameter is 17″, and its greatest about 57½″. Its mean arc of retrogradation from east to west, contrary to the order of the signs, is 16°, 12′, and its mean duration about 42 days.

MARS.

The next planet in the order of distance after Venus is the earth; but as this planet has already received a lengthy description, we will pass on to the next in order, namely, Mars. The planet Mars revolves in an orbit 145,000,000 miles from the sun; consequently its orbit is 50,000,000 of miles exterior to the orbit of the earth. Mars is 4,100 miles in diameter. Its apparent diameter varies according to the position which it occupies in its orbit. When in conjunction with the sun, or in a line drawn from the earth, through the sun, and extended to the orbit of Mars, it is 190,000,000 of miles farther from the earth than when in opposition, or in that part of its orbit situated in a line drawn from the sun through the earth. The surface of Mars in opposition appears about twenty-five times larger than when in conjunction.

The orbit of Mars is 901,000,000 of miles in circumference; through this distance it moves in about 687 days. Its average rate of velocity is about 54,650 miles every hour; this is about 13,500 miles slower every hour than what the earth moves.—Mars rotates upon an axis from west to east in 24 hours and 37 minutes; its axis being inclined from the perpendicular to the plane of its orbit 30° 18′; this is nearly 7° greater inclination than the earth's axis has; consequently its seasons will be somewhat more rigorous, or intense than ours; each of the seasons will also be nearly double the length of ours. The inclination of the orbit of Mars to the ecliptic is 1° 51′ 6″. 2; hence it will never be seen to exceed four times the apparent diameter of the sun from the ecliptic.

The synodical period of Mars, or the time which it occupies in going from opposition round to the same point again is about 2 years and fifty days. About 36 days before Mars attains to its opposition it will begin to retrograde and continue apparently to move contrary to the order of the signs for about 36 days after the opposition, the arc of the retrogradation is equal to about 16° 12′. All the superior planets, or those bodies which are more distant from the sun than the earth, when at and near their oppositions, have apparently retrograde movements. The greater the distance of the body from the earth, the less will be the arc of retrogradation and the longer the period of its apparent description, and the more frequently will such retrogradations happen.

The eccentricity of the orbit of Mars is 13,463,000 miles, consequently it is nearly 27,000,000 miles nearer the sun at its perihelion than at its aphelion. From the telescopic appearances of Mars it is probable that its surface consists of land and water; it is also very evident that it is surrounded by a very dense and extensive atmosphere in which numerous clouds float, as in the atmosphere of the earth; it is further evident that snows are congealed in the atmosphere of Mars and precipitated upon its surface in the polar regions, which is indicated by the brightness of those regions, after being exposed to their long winter of six months. The brightness of these spots is gradually diminished, by long exposure to the summer rays of the sun. The quantity of light on that planet, received from the sun, is not quite one-half as much as we enjoy. The mass or the quantity of matter, contained in Mars is 2,680,337 times less than the quantity contained in the sun. The density of Mars is about 19-20th of the density of the earth; that is about 4¾ times as dense as water. It would take about seven globes like Mars to weigh as much as our earth. One pound of matter on the earth's surface will weigh about ½ pound on the surface of Mars.

JUPITER.

The next planet beyond Mars is Jupiter; this is the largest planet in the system. Its distance from the sun is 495,000,000 of miles, and the circumference of its orbit 3,110,000,000 of miles. It completes one revolution in 4332½ days; its average velocity is nearly thirty thousand miles every hour. A faint idea of the great distance around the circumference of this planet's orbit, may be acquired by supposing a rail car to travel without intermission at the rate of 500 miles per day; with such a velocity it would require over 16,430 years to perform the grand journey. When Jupiter is nearest to the earth, at the time of its opposition to the sun, its distance is 400,000,000 of miles from us. A steam carriage, moving at the rate of 20 miles per hour, would require 2,300 years to pass over that distance. Even light itself, though it darts 192,000 miles every second, would require 34 min. and 43 sec. to come from the nearest point of Jupiter's orbit to us. When Jupiter is in conjunction with the sun it is 590,000,000 of miles from us; light will pass over this distance in 51 min. and 13 sec. If the light of Jupiter were to be extinguished at the moment of its conjunction with the sun, we should not be aware of the fact until 51 min. and 13 sec. after the conjunction; whereas, if its light were to be extinguished at the moment of its opposition we should be aware of it in 34 min. and 43 sec. after; or in other words let two planets be situated in Jupiter's orbit, one in conjunction and the other in opposition with the sun, and let the light of both planets be extinguished at the same instant, we should continue to see the planet in conjunction 16 min. and 30 sec. after the one in opposition had disappeared. This may be demonstrated by calculating the exact moment of the eclipses of Jupiter's moon's, when in conjunction and opposition; and it will be found invariably that the eclipse will happen 16½ min. later when in conjunction than when in opposition, and as Jupiter is 190,000,000 of miles further off when in conjunction than in opposition, it follows that it must take light 16½ min. to traverse that distance. It was in this manner that the velocity of light was first discovered.

The diameter of Jupiter is 87,000 miles and its circumference is over 273,000 miles. It has been found to revolve around its axis in the short space of 9 hours and 56 minutes. This is determined by telescopic observations of certain permanent spots upon its disc, which are seen to be carried across the same from east to west, remaining visible 4 hours and 58 minutes, and then disappearing for the same length of time. The equatorial regions of Jupiter must move with a velocity of over 27,000 miles every hour; this is very nearly equal to its velocity in its orbit. As that hemisphere of Jupiter which is turned from the sun rotates in the same direction as the orbitual motion, the velocity from west to east, at the time of their midnight, will be greatly accelerated, amounting to 950 miles a minute. And as that hemisphere which is turned towards the sun rotates in a direction from east to west, contrary to the orbitual motion, the velocity from west to east arising from the orbit motion, will, at the time of their noon be greatly diminished, amounting to no more than 50 miles a minute. The inhabitants of Jupiter, therefore, will be carried from west to east 900 miles a minute swifter at their midnight than at their noon. From noon to midnight, which is a period of only about 5 hours, the velocity will increase at an average rate of about 3 miles a minute, or 16 rods per second. The decrease from midnight to noon will be in the same proportion.

One year on Jupiter is nearly 12 of our years; during this time Jupiter makes 10,470 revolutions upon its axis; consequently there are 10,470 days of about 10 hours long in one of Jupiter's years. The rapid rotation of this planet will have the effect to make all bodies for many degrees each side of its equator lighter than what they would be if there were no rotation. Gravity at the surface of this planet is more than 3 times as great as at the surface of the earth; this is owing to the bulk and quantity of matter in Jupiter; its quantity of matter is 371 times as much as is contained in the earth; while its bulk is 1,323 times greater. A body, weighing one pound on the earth, would, if transported to Jupiter, weigh 3 pounds and one ounce—the centrifugal force diminishes the weight of bodies about 1-13, that is, a body which would weigh about 13 pounds if the planet had no rotation would weigh only 12 pounds with the rotation—while a clock pendulum would make 4 vibrations on the earth, it would in the same time make 7 vibrations on the surface of Jupiter. A body would fall through the space of 49 feet 3 inches in one second of time on the surface of Jupiter, if he had no rotation; this fall will be diminished at its equator 3 feet 8 inches by the centrifugal force of rotation. The density of Jupiter is about 2-7 of that of the earth, being 1 4-10 times heavier than a globe of water of the same size. The density of Jupiter and the sun is about alike. It would take nearly 1,048 such worlds as Jupiter to weigh as much as the sun. The inclination of the plane of Jupiter's orbit to that of the equator is 3 deg. 5½ min.; this inclination is so small that it will not produce any sensible variety of seasons. The torrid zone of that planet will be only 6 deg. 11 min. broad. But as the length of a degree on that planet is 755 miles, the breadth of the torrid zone will be 4,600 miles, and the diameter of its polar circles will be about the same length. At the poles there will be nearly 6 years day and 6 years night, while the day and night in the torrid and most part of the temperate zones will not vary much from 5 hours each.

The inclination of the orbit to the ecliptic is 1 deg. 18 min. 51.3 sec. The eccentricity of the orbit is 23,810,000 of miles: consequently it is nearer the sun by about 48,000,000 of miles when at its perihelion than when at its aphelion. Its apparent diameter when in opposition is 47½ sec. Its mean arc of retrogradation is 9 deg. 54 min., and its mean duration about 121 days. The equatorial diameter of Jupiter is 6,300 miles longer than the polar diameter; this is occasioned by its rapid rotation on its axis, which would have a tendency to draw away the matter from the polar regions and form a protuberance in the equatorial. Water, in running from its poles towards its equator would ascend on an average, over one mile in perpendicular height, for every 11 miles progression. Should the planet cease to rotate its equatorial oceans would rush to the north and south, forming two great polar oceans, several thousand miles in depth.

The apparent diameter of the sun as seen from Jupiter is only 6 min. 9 sec., while at the earth his apparent diameter subtends an angle of 32 min. 3 sec., which is over 5 times greater; the sun's disc, therefore, will appear at Jupiter 27/5 times less than what he appears to us, consequently the intensity of solar light and heat on the surface of Jupiter will be 27/5 times less than on the earth.

A large and powerful telescope will expand the disc of Jupiter to about the size of the full moon, and it is as clearly and distinctly seen as the full moon to the naked eye. Its disc is distinctly marked with belts of light and darkness, extending from west to east around the whole circumference of the planet; the darker belts are portions of the surface of the planet; the brighter ones are believed to be clouds, floating in its atmosphere. The brighter belts are subject to many changes, revealing sometimes more and at other times less of the dark surface beneath. These belts being parallel to his equator are no doubt produced by the great atmospheric currents from east to west, occasioned by the rapid rotation of that planet from west to east, combined with the northerly and southerly currents to and from the poles. These currents near the surface of the tropical regions of Jupiter will be much more deflected to the east than the trade winds of our globe, because of the great velocity of the rotation, while for the same cause the upper currents towards the poles will be much more deflected to the west than the similar ones of our globe. Therefore, the clouds would have a tendency to range themselves in zones or belts parallel to its equator; as they are actually seen by the telescope. The narrowest of these belts that can be distinctly seen will be about 1,000 miles in width. Some of the broadest occupy at least 1-8 part of the breadth of the disc, and consequently must be 11,000 miles broad.

Jupiter is attended by four satellites or moons—the distance from the surface of the planet to the first is nearly 220,000 miles, and its magnitude is about 1-6 greater than our own, therefore its apparent magnitude will be greater than that of the full moon. The distance from the planet's surface to the second satellite is 375,000 miles, and its real magnitude is nearly equal to our moon, therefore its apparent disc will be nearly three times less than that of the full moon. The distance of the third satellite is 624,000 miles; its real magnitude is somewhat over 1-2 greater than that of our moon; its apparent magnitude, therefore, will be about 1-3 of that of the full moon. The distance of the fourth satellite from the surface of its primary is about 1,131,000 miles; its real diameter is about 1-3 greater than the moon, therefore the apparent magnitude of its disc will be about thirteen times less than the full moon.

The nearest moon to Jupiter revolves around him, in 1 day, 18 hours, 27 minutes, 33.506 seconds. The second satellite performs its revolution around the primary in 3d., 13 h., 14 m., 36.393 s. The third in 7 d., 3 h., 42 m., 33.362 sec; and the fourth in 16 d., 16 h., 31 m., 49.702 s. Each moon during its period exhibits all the phases seen in our moon; so that the inhabitants of the primary see each moon, during its period, of the shape of a thin crescent, afterwards halved, then gibbous and full. The periods of these satellites are such that all of them can never be on the same side of Jupiter at the same time, one at least must be on the opposite side from the other three, hence, there will always be one moon, near its full when the other three happen to be near their change, or in conjunction. But sometimes there will be two, and sometimes three moons near their full. All of these appendages will serve to render the nocturnal scenery of the heavens as seen from Jupiter grand and delightful.

All bodies on the surfaces of Jupiter's satellites will weigh much less than what they would weigh at the surface of our earth; for instance one pound of terrestrial matter, if transported to the surfaces of those satellites, would on the first or on the one nearest to the primary weigh but 1 oz., 0.36 dr. On the second satellite it would weigh 2 oz., 0.27 dr. On the third it would weigh 2 oz., 14.10 dr. On the fourth, it would weigh 1 oz., 14.34 dr.

If the density of the earth be equal to 1, the density of the first satellite will be equal to .20332.—The density of the second will be .48629. That of the third .42534; and that of the fourth .32713.

If the volume of the earth be equal to 1, the volume of the first satellite will be equal to .0316835. The volume of the second .0.776246. That of the third, .0773472; and that of the fourth, .0484780.

If the mass of the earth be taken as one, the mass of the first satellite will be equal to .00641771.—The mass of the second .008637727. That of the third .032899202; and that of the fourth, .015858697.

These satellites rotate upon their axes from west to east, precisely in the same time that they revolve around Jupiter; and consequently like our moon, they always turn the same hemisphere towards their primary.

Our descriptions of these four planets have necessarily been very brief. Much more might have been said upon these interesting subjects; but the time allotted for the continuance of this series of lectures, compels us to include within as small a compass as possible, the most striking and interesting particulars, pertaining to the grand science of the heavens.

AGRICULTURAL.

THE *Pacific Rural Press* says that, never in the history of the State (California) has so great an area of land been plowed and planted as this season. Plowing and planting have been pushed through almost continuously since the first rains; and never before in California has there been so little interruption of this work either from rain or for the lack of it. But it adds that the secret of abundance is due to the spring rains, and should they be anything like abundant the high prices which are sure to continue, will make the present the most prosperous season, in its agricultural results, of any which has preceded it in the history of California.

It says that the importation of butter to that State from the Eastern States is a reproach upon the farmers of that country.

THE Massachusetts *Ploughman* gives us some idea of the inconvenience to which farmers are put in that region through the hoof and mouth disease which has been prevalent there; this, of course, is in addition to the loss to which this disease has subjected them:

"It is not positively known whether the severe frosts we have had will destroy the virus or poison, or not, but if it does ordinarily, the manure under the barns where the disease has existed, has not, in all cases, been frozen, and it is very probable that moving it with oxen on the road would be the means of conveying the disease to sound cattle which should travel there. It is, therefore, best to be on the safe side and to avoid infecting the roads, and unless those who have had the disease in the barns will be cautious and avoid driving on the road for the present, the chances are that we shall have the disease perpetuated. If it is not stopped entirely before May, when the cattle go out to pasture, we shall find it extremely difficult and perhaps impossible to stop it at all. Better cut across lots where it is possible, in teaming the manure out, for if you do not, the neighbors will have a right to 'make a row' about it."

MASSACHUSETTS has in her laws the following section on the care of stock:

"Whoever shall deprive of necessary sustenance any horse, ox, or other animal; and whoever having the charge or custody of any such animal, either as owner or otherwise, shall unnecessarily fail to provide such animal with proper food, drink, and shelter or protection from the weather, shall for every such offense be punished by imprisonment in the jail, not exceeding one year, or by fine not exceeding two hundred and fifty dollars, or by both such fine and imprisonment."

"WALKS AND TALKS," in the *American Agriculturist*, in speaking of the much mooted subject of thick and thin seeding of land, says: if he had land that he thought was not rich enough to produce 15 bushels of wheat per acre, he would not sow over 1¼ bushels of seed;