ASPECTS OF THE PLANETS FOR NOVEMBER.

VENUS

is evening star, and leads off in the programme by initiating the most brilliant event of the month at its commencement. On the 1st day of November she reaches her period of greatest brilliancy as evening star, as every one who looks upward to the heavens will gladly acknowledge. She is also a beautiful object in the telescope, especially when observed in the daytime, for her light, unpleasantly dazzling on a dark sky, is then subdued to a soft, pearly luster. In the present part of her course she takes on the phase of a waning crescent, becoming larger, sharper, and thinner as the month advances, and she comes really nearer the earth, and apparently nearer the sun.

No one who has closely studied this charming planet need be told that the variations in her appearance are very great. When at superior conjunction, and on the opposite side of the sun, she is one hundred and sixty million miles distant, and presents the aspect of a small round disk, 10″ in diameter. When at inferior conjunction, where she will be on the 6th of December, she is directly between the earth and the sun, is only twenty-five million miles distant, and, if her whole face were visible, she would be 64″ in diameter. But her dark side is then turned toward us and she is invisible. Between these positions she takes on all the phases that the moon takes on from full to new. The law of her movement is that the nearer she comes to the earth the smaller is the portion of her illumined disk; but the larger would her disk appear if the whole of it were visible. Her greatest brilliancy occurs thirty six days before her inferior conjunction. After that period her illumined crescent diminishes so rapidly that the increasing nearness to the earth is insufficient to make up for her lessening light and her glory visibly wanes. This month is, therefore, the time to enjoy the lovely evening star, which, at its close, will be nearly eclipsed in the sun's rays, and will for many months cease to shine in our evening sky.

The right ascension of Venus is now 17h. 52m.; her declination is 28° south, and her diameter is 42″. Her place is in the constellation Sagittarius.

Venus sets about half-past six o'clock in the evening; at the end of the month she sets a few minutes before five o'clock.

SATURN

is morning star until the 14th, and evening star for the rest of the month. On the 14th, at 10 o'clock in the evening, he reaches the most interesting point in his course, as far as terrestrial observation is concerned. He is then in opposition with the sun, apparently farthest from the sun, and really nearest to the earth. The sun, the earth, and Saturn are in a straight line, with the earth in the center, and the planet is one hundred and eighty million miles nearer to us than when in conjunction. He is literally opposite the sun, for he rises when the sun sets, and sets when the sun rises.

The present opposition of Saturn is one of remarkable brilliance, combining three favorable conditions, all tending to increase the interest of his appearance as he comes glowing with soft light above the eastern horizon in the early evening. He is in high northern declination, and the law is, the farther north the planet the better is the position for observation. His rings are opening to their widest extent, thus largely increasing his size and brilliancy. He is approaching perihelion, the happy combination of events all lending an *éclat* to the Saturnian opposition of 1882. The wonderful planet deserves the closest study, and no one who has access to a telescope should fail to improve the opportunity for a view of this magnificent member of the system, with his rings, belts, and moons.

It seems anomalous to call Saturn a morning star when he rises before six o'clock in the evening. But astronomy has inexorable laws, and one of these laws is that the outer planets, including Mars, Jupiter, Saturn, Uranus, and Neptune, are morning stars from conjunction to opposition, and evening stars from opposition to conjunction. Therefore Saturn is classed as morning star until the 14th.

His right ascension is 3h. 28m.; his declination is 16° 22′ north, and his diameter is 19″. His place is in the constellation Taurus, differing little from that of last month.

Saturn rises on the 1st a quarter before six o'clock in the evening; at the end of the month he sets about a quarter before six o'clock in the morning.

JUPITER

is morning star during the month, and the brightest star in the heavens while he is above the horizon. For before he reveals his regal presence the short-lived glory of Venus has passed away, the peerless planet being hidden below the horizon.

The right ascension of Jupiter is 6h. 5m.; his declination is 23° north; and his diameter is 42·6″. His place is in the constellation Gemini.

Jupiter rises on the 1st a few minutes before eight o'clock in the evening; on the 30th he rises a few minutes before six o'clock.

NEPTUNE

is morning star until the 9th, and evening star the rest of the month. On the 9th, at four o'clock in the afternoon, he is in opposition with the sun; as he is then at his nearest point to the earth, he may be easily seen in a good telescope. He is the first of the four giant planets to reach opposition, preceding Saturn five days. The same laws govern his movements at opposition as those that have been described in the case of Saturn, but owing to the immense distance of this wanderer on the system's verge he is never visible to the naked eye.

Neptune's right ascension is 3h. 3m.; his declination is 15° 20′ north; and his diameter is 2·6″. His place is in the constellation Taurus, near that of Saturn. There is only twenty-one minutes' difference in the time of transit of the two planets.

Neptune rises on the 1st about half-past five o'clock in the evening; on the 30th he sets about a quarter after five o'clock in the morning.

URANUS

is morning star during the month, but possesses little interest for the student.

His right ascension is 11h. 31m., and his declination is 3° 54′ north. He has entered the constellation Virgo, where he will remain for the next seven years.

Uranus rises about half-past two o'clock in the morning; at the end of the month he rises thirty-nine minutes after twelve o'clock.

MERCURY

is morning star throughout the month. On the 7th he reaches his greatest western elongation, and is then 19° 3′ west of the sun. For a week before and after that time he may be picked up as a beautiful morning star by bright-eyed observers. It will be the only opportunity for a glimpse of his face during the rest of the year. He rises on the 7th a few minutes after five o'clock, an hour and a half before the the sun, and must be looked for 8° north of the sunrise point. The bright star in his vicinity is Spica. It will be of no use to look for him unless the sky be exceptionally clear.

The right ascension of Mercury is 13h. 28m.; his declination is 7° 11′ south; and his diameter is 7·8″. His place is in the constellation Virgo.

Mercury rises on the 1st about five o'clock in the morning; on the 30th he rises about half-past six o'clock.

MARS

is evening star, and approaches conjunction. His right ascension is 15h. 14m., and his declination is 18° south. His place is in the constellation Libra.

Mars sets about half-past five o'clock in the evening; at the end of the month he sets about half-past four o'clock.

THE MOON.

The November moon fulls on the 24th at eighteen minutes past nine o'clock in the evening. The waning moon passes about 3° north of Mercury on the morning of the 9th, and will thus be a help in discovering the sky planet. The new moon of the 10th passes 56′ north of Mars on the 11th, and the three days' old crescent makes a lovely celestial picture, in conjunction with Venus, on the 13th. The moon pays her respects to Neptune on the 23d, to Saturn on the 24th, and to Jupiter on the 26th.

Railway Progress in Mexico.

The twenty-fifth anniversary of the opening of the first Mexican railway was celebrated July 24. The only railroad existing in 1857 was between four and five miles long. About 300 miles were added during the next fifteen years. In 1877 a new period of railway activity was begun, and since then nearly 2,000 kilometers—about 1,200 miles—have been put in operation. Before 1877 the only roads built were from Mexico to Vera Cruz, 471 kilometers; Vera Cruz to Jalapa and Coatepec, 144 kilometers; and various tramways aggregating 140 kilometers.

The roads now in operation or in process of construction are given officially as follows:

	Kilometers.
Vera Cruz to Mexico City, and branch to Puebla	371
Vera Cruz to Jalapa and Coatepec	144
Vera Cruz to Medellin	22
Esperanza to Tehuacan	50
Merida to Progreso	36
Mexico City to Leon (Mexican Central)	409
Mexico City to Toluca (Mexican National)	73
Mexico City to Cuantla Morelos	138
Paso del Norte to Chihuahua (Mexican Central)	360
Puebla to San Martin	38
Puebla to San Marcos	34
Vera Cruz to Anton Lizardo and Alvarado	25
Vera Cruz to Jalapa and Chalchicomula	19
Pachuca to Irolo and Teoloyucan	45
Altata to Culiacan	30
Meridan to Peto	26
San Luis Potosi to La Soledad (Mexican National)	6
Tampico to San Luis Potosi (Mexican Central)	38
Mexico City to El Salto (Mexican National)	83
Matamoras to Monterey (Mexican National)	7
Zacatecas to San Luis Potosi (Mexican National)	23
Mexico City to Toxoco	28
Nuevo Laredo to Monterey (Mexican National)	170
Guaymas to Magdalena	200
Puebla to Matamoras Izucar	23
Chalco to Tlalmanalco	15
Tramways in federal districts, city of Puebla, and city of Guadalajara	130
Total	2,626

This is equal to 1,632 English miles.

The Mexican National Railway from Corpus Christi, Texas, reached Monterey, a distance of 333 miles, Aug. 31.

Zinc in Boilers.

Since 1875 experiments have been carried on in the French marine, particularly with boilers having surface condensers, to test the efficacy of zinc leaves in neutralizing the effect of fatty acids in the boiler and giving rise to inoffensive products. Commandant Frené has recently given an account of the results obtained on board the Desaix to the French Academy of Sciences, of which *Engineering* gives the following summary:

The zinc inside and the iron of the boiler constitute a voltaic element which decomposes the water and liberates oxygen and hydrogen. The oxygen forms oxide of zinc, which combines with the fatty acids mingled with the feed water, thus forming "soaps" of zinc, which, coating the tubes of the boilers, prevent the adhesion of the salts left by evaporation. It is easy then to brush away the fixed matter on the tubes which is in a mealy state. As to the hydrogen, it behaves as MM. Gernez and Donny have described in the *Annales de Chimie et de Physique* for 1875. Ebullition takes place by evaporation at the surface of a gas whether dissolved in the liquid or clinging to the solid envelope of the containing vessel. If the gas is expelled from boiling water the latter can be superheated to 30° or 40° Cent. above the normal boiling point, and in such a case evaporation only takes place at the surface. When the temperature of the vapor emitted corresponds to the tension which equilibrates the pressure exercised at the surface of the liquid, the ebullition can be started at will by introducing a gas bubble into the liquid. Solid bodies operate in the same way by reason of the film of gas adhering to them. When by long boiling all the gas is expelled, the water becomes superheated, and thus an element of danger is introduced. But by the employment of zinc in the boiler a constant supply of gas is maintained, and all danger of superheating is avoided. The hydrogen not only starts the boiling, but keeps it up. It is, however, necessary from time to time to take out the zinc plates from the boiler and clean from them the salts adhering to them, else the galvanic action will dwindle and perhaps stop altogether. M. Frené is of opinion that the action of the zinc is, however, not so regular as theory might expect, and advocates the substitution of a sure and constant mechanical action under the form of a moderate but continuous injection of warm air by the lower part of the boiler, or, better still, a non-oxidizing gas, such as carbonic acid. This plan, he thinks, would produce a perfectly regular ebullition, a rapid evaporation, a saving of fuel, and freedom from risk. Superheating, which he figuratively calls a sleep of the liquid, would be no longer possible. The carbonic acid could be developed by the combination of carbonate of lime and hydrochloric acid.

New Green Pigment.

Chromium is always determined either as green oxide or as lead or barium chromate. It may also be exactly determined as phosphate, and this method is often convenient. A. Carnot says, in *Comptes Rendus* of May 8, that in boiling a solution of a salt of chromium slightly acidified, to which has been added an alkaline phosphate and sodium acetate, the whole of the chromium is precipitated as phosphate. This method succeeds both with the green and the violet salts, chlorides, and sulphates, and with the acetates, but not with the oxalates. It is also suitable for alkaline chromates, but in this case the action of the phosphoric acid must be combined with that of sodium thiosulphate (hyposulphite), which acts as a reducing agent. The solution of chromate, to which is added a sufficient quantity of phosphoric acid or of a phosphate, then of acetate, and lastly of hypophosphite, and which has been slightly acidified, is boiled for about an hour; it deposits all the chromium as phosphate, with a little sulphur derived from the hyposulphite. The phosphate precipitated is a green hydrate. It may be washed with boiling water, or, preferably, with hot solutions first of ammonium acetate followed by ammonium nitrate. On calcination it turns gray, and contains chromic oxide in the proportion of 51·86 per cent. In former researches on the determination of aluminum (*Comptes Rendus*, July 18, 1881), Carnot showed that alumina can be readily separated from chromium by converting the latter into an alkaline chromate, acidifying the solution slightly with acetic acid, and adding an excess of sodium phosphate. The mixture is boiled and filtered to separate the aluminum phosphate. When this is done it is easy to determine the chromium by pouring into the liquid hyposulphite, and, if needful, a further quantity of alkaline phosphate, and boiling. The precipitate of chromium phosphate is then washed, ignited, and weighed. The same reaction is capable of industrial application. It yields an insoluble green coloring matter, which retains, when dry, a very fine shade, and may be used in painting in place of the dangerous compounds of arsenic and copper. This color, which is perfectly inoffensive, may also be used in dyeing, as the insoluble green phosphate may be produced in the fiber.

A Growing Youth.

Jean Condoist has been brought to Paris as a medical curiosity from the Haute Caône. According to a medical contributor to a Parisian contemporary, this youth, aged 19, took a start on the 17th of May, 1881, being then six feet three inches high, and found one morning that he had grown an inch. Every week since then has he registered himself, and on the 14th of September this human beanstalk had gained nearly five inches; he grew five inches more before the 20th of January, 1882, and seven more before March 15, and he now stands 7 feet 10 inches. All this has been accompanied by great pains in the back, and he stoops considerably; but since last June, it is his legs only that have grown, and his feet are already twenty-four inches long.—*London Pall Mall Gazette.*