Astronomical Notes.

OBSERVATORY OF VASSAR COLLEGE.

The computations in the following notes are by students of Vassar College. Although merely approximate, they are sufficiently accurate to enable the observer to recognize the planets. M. M.

POSITIONS OF PLANETS FOR NOVEMBER, 1880.

Mercury.

Mercury will probably be seen after sunset early in November. The planet will be 9° south of the sun in declination, and will set about an hour after the sun on the 1st. The best time for seeing Mercury will be on the 3d or 4th. The crescent moon will pass east of Mercury on the morning of the 4th.

Mercury will approach the sun, and will scarcely be seen after the 15th.

Venus.

On November 1 Venus sets at 6h. 14m. P.M. On November 30 Venus sets at 6h. 46m. P.M.

It will be brilliant in the southwest all through November, setting farther and farther south until the 21st. The crescent moon will pass eastward of Venus on the 4th.

Mars.

Mars is not likely to be noticed in November.

On the 1st of the month it rises at 6h. 26m. A.M., and sets at 4h. 45m. P.M.

On the 30th Mars rises at 6h. 16m. A.M., nearly an hour before sunrise, and may perhaps be seen preceding the sun and about 2° north of the sun in declination.

Jupiter.

Although Jupiter has passed its best position, ordinary observers will scarcely perceive its diminished brilliancy.

On November 1 Jupiter rises at 3h. 47m. P.M., and souths before 10 P.M., at an altitude of 51° in this latitude.

The moon passes north and east of Jupiter on the 13th.

On the 30th Jupiter rises at 1h. 48m. P.M., and passes meridian before 8 P.M.

Making our observing hours between 8 and 10 P.M., we find from the "American Nautical Almanac" that the two satellites nearest to Jupiter (the 1st and 2d) may be seen to pass from the face of Jupiter nearly together on November 1, so that Jupiter will be seen at first with two moons only; on November 8 the same two may be seen to enter upon the planet's face again nearly together.

On November 9 the first satellite may be seen to come out from the shadow of Jupiter; on the 16th and 23d this satellite will go behind Jupiter.

On November 24, while the first is in transit, the second will disappear by going behind Jupiter, so that Jupiter may be seen with only two moons.

On November 10 the largest satellite will be seen to move slowly away from Jupiter, and the smallest moon will come out from the shadow. On the 17th the largest satellite may be seen to move toward Jupiter, while the smallest is again hidden in eclipse.

On November 28 the third will enter the shadow of Jupiter early in the evening and remain more than two hours, when it will come out and slowly regain its brightness.

Saturn.

Saturn follows Jupiter, coming to the meridian 50 minutes later, all through the month of November, and reaching an altitude about 4° higher than Jupiter.

On the 1st Saturn rises at 4h. 27m. P.M. On the 30th at 2h. 24m. P.M.

The moon passes east of Saturn on November 14.

Saturn appears small and pale beside the glowing color of Jupiter, but it even surpasses Jupiter in interest. Of its eight satellites, very few can be seen with ordinary telescopes. Titan, the largest, was west of the planet on October 7, and nearly at its greatest distance. As this moon goes around Saturn in a little less than 16 days, it will be seen again far west of the planet on October 23, and far east of Saturn on the last day of October. Its revolutions around can be counted in this way.

Japetus can probably be readily seen in its orbit path far from Saturn, and requiring about 80 days for a revolution.

A telescope which will show Rhea, the next smallest satellite, will afford a great source of interest, as Rhea goes around the primary in 4½ days, and its motion can be seen in one evening.

The ephemeris of these satellites, published by Mr. Menth in the "Astronomische Nachrichten," gives Rhea as in conjunction with the center of Saturn, and below the base of the planet, on November 12, a little after midnight, Washington time.

A good telescope of three inches aperture will enable an observer to see Rhea at that time.

Uranus.

Uranus rises on November 1 at 1h. 46m., and on the 30th at 11h. 52m. P.M.

Its diurnal path is almost wholly between midnight and noon.

Neptune.

Neptune is in excellent position early in the month, on the meridian near midnight, at an altitude of 62°. On November 30 Neptune crosses the meridian circle at 10 P.M.

The Electrical Spur.

As a supplement to the electrical bit, noticed by us some time ago, it may now be stated that Mr. G. Hüttmann, imperial equerry at Vienna, employs the electrical current in a very ingenious manner in order to facilitate the management of the horse, especially for ladies.

To the left side of the saddle a small box which contains a galvanic battery and an induction coil is fastened. From this apparatus two silk coated wires are conducted to a special girth-leather, which end into two blunt metallic brushes touching the flank of the horse at that place where usually the spur is applied. These wires are also connected with the riding whip, which has two ivory knobs. By a pressure of the finger upon one of these knobs the current is closed and conducted to the wire brushes, where it acts as a spur in a strong and sudden manner, while when the other knob is touched a weak and continued current is originated, acting like the pressure of the thigh of the rider.

The electricity may not only be used by ladies, but will also prove useful to the equestrian performer in the circus in order to manage several horses at the same time, and to the groom in order to prevent horses from crib-champing and other bad habits. In Paris electricity is also used for preventing carriage horses from running away, a battery being connected with the bit of the horse.

THE FAN-TAILED POODLE

The *Deutches Familienblatte*, of Berlin, gives the above, which it styles "A new American invention—dedicated to the Society for Preventing Cruelty to Animals."

Hot Ice.

In his experimental investigations of the boiling points of substances under low pressures, Mr. Thomas Carnelley has been able to maintain water in the solid state at temperatures far above the boiling point of water. The conditions under which it is possible thus to heat ice he describes as follows:

"1. In order to convert a gas into a liquid the temperature must be below a certain point (termed by Andrews the critical temperature of the substance), otherwise no amount of pressure is capable of liquefying the gas. 2. In order to convert a solid into a liquid the pressure must be above a certain point, which I propose to call the critical pressure, otherwise no amount of heat will melt the substance. If the second of the above conditions be true, it follows that if the necessary temperature be attained, the liquefaction of the substance depends solely on the superincumbent pressure, so that if by any means we can keep the pressure on the substance below its critical pressure no amount of heat will liquefy it, for in this case the solid substance passes directly into the state of gas, or, in other words, it sublimes without previous melting."

By maintaining a pressure below 4·6 millimeters of mercury—that is, the tension of aqueous vapor at the freezing point of water—Mr. Carnelley was able to keep water frozen in a vessel so hot that it would burn the hand. Other substances also exhibit these same phenomena, the most notable of which is mercuric chloride, for which latter the pressure need only be reduced to about 4·20 mm. On increasing the pressure the substance at once liquefies.

Shooting Oil Wells with Nitro-glycerine.

A few years ago nitro-glycerine was only used in the oil wells in the very small quantities of one or two quarts at a time. Within a short period it has become a very important agent in bringing petroleum to the surface. When exploded in the oil wells over the oil-bearing rock it opens wide seams, through which the oil flows with great force and freedom, thus saving much labor and expenditure of capital. There is now used in every well that is drilled from thirty to two hundred pounds, which is worth eighty cents a pound to the producer. It costs about thirty cents to manufacture, and nets fifty cents on every pound to the manufacturer. Thousands of pounds are consumed every month, and there is a growing demand for it.

A correspondent of the *Sun*, who had assisted at the reopening of one oil well by the explosion of 100 pounds of nitro-glycerine at its bottom, gives the following description of the operation: A cartridge case or shell of tin, 15 feet long, was lowered into the casing of the well by means of a wire rope, and then filled with water. The glycerine was then poured into the shell, and, being heavier than water, forced the latter to flow out. When all the glycerine had been poured in the shell was lowered 1,800 feet into the well, and there rested on what is called an "anchor," 25 feet from the bottom. It was now ready to be set off. There was about 700 feet of oil above the shell. Through the center of the shell ran a small tin tube, inside of which was a small iron rod in four pieces. On the end of each piece was placed a common percussion cap. At the top of this rod was a tin plate so arranged that anything dropped down through the casing would strike it, and the force of the falling article would set off the caps, which would in turn explode the nitro-glycerine. The charge was exploded by dropping a small piece of iron tubing into the well. At the moment of discharge "the earth trembled violently, then came a dull sound, and a second later there rose into the bright moonlight, 100 feet high, a solid stream of oil, which fell on everything near, and continued to fall for three minutes. This stream of oil was one foot in diameter when it began to flow, but it soon settled down to a stream of about 1½ inches, which is a natural flow."

AGRICULTURAL INVENTIONS.

A sulky plow, patented by Mr. Thomas T. Harrison, of Aubrey, Kansas, is an improvement on the sulky plows for which Letters Patent No. 218,734 were issued to the same inventor August 19, 1879. The improvement simplifies the construction and renders the plow more easily controlled.

A fruit gatherer, for gathering oranges and other fruit without bruising or injuring the fruit or trees, has been patented by Mr. Levi J. Knight, of Manatee, Fla.

Mr. Lewis Y. Lenhart, of Red Wing, Minn., has patented a seed planter, so constructed that it may be operated from the drive wheel or by hand power, as the character of the ground may require.

Messrs. William V. Morgan and Thomas W. Hackman, of Allerton, Iowa, have patented an improved sulky plow so constructed that the plows may be easily attached to and detached from the carriage, and may be readily adjusted and controlled.

Mr. John H. McPherson, of Xenia, Ohio, has patented a tooth for grain drills, so constructed that it can be readily detached for sharpening and for convenience in passing from place to place, and which will swing back should it strike an obstruction.

Thread from Wood.

The manufacture of thread from wood for crochet and sewing purposes has, it is said, recently been started at the Aby Cotton Mill, near the town of Norrkoping, in the middle of Sweden. The manufacture has arrived at such a state of perfection that it can produce, at a much lower price, thread of as fine quality as "Clark's," and has from this circumstance been called thread "*a la Clark.*" It is wound in balls by machinery, either by hand or steam, which, with the labeling, takes one minute twelve seconds, and the balls are packed up in cardboard boxes, generally ten in a box. Plenty of orders from all parts of Sweden have come in, but as the works are not yet in proper order there has hardly been time to complete them all. The production gives fair promise of success, and it is expected to be very important for home consumption.

The Public Domain.

The annual report of Commissioner Williamson, of the General Land Office, shows that there were surveyed during the fiscal year ending June 30, 1880, 15,699,253 acres of public lands and 652,151 acres of private land claims. This is an increase in the amount of public lands surveyed of 725,347 acres over that of the last year. This great increase is attributed to the operation of the act of March 3, 1879, which led to a great increase in the number of applications by private individuals for public surveys. Disposals of public lands during the year were made as follows:

	Acres.
Cash entries	850,740
Homestead entries	6,045,570
Timber culture entries	2,193,184
Agricultural college scrip	1,280
Locations with military bounty land warrants	88,522
Swamp lands patented to States	3,757,888
Lands certified for railroad purposes	1,157,375

The area of public lands surveyed in the different States and Territories during the last year is as follows:

	Acres.		Acres.
Arizona	308,521	Nebraska	709,179
California	3,792,630	Nevada	938,694
Colorado	2,775,601	New Mexico	1,624,156
Dakota	2,130,808	Oregon	1,052,221
Idaho	225,637	Utah	440,585
Louisiana	80,504	Washington Territory	847,595
Minnesota	296,253	Wyoming	184,449
Montana	302,413		

In addition to this, surveys were made of private land claims in three States and Territories, as follows: California, 58,708 acres; Arizona, 149,258 acres; New Mexico, 444,184 acres. The total area of public lands surveyed from the beginning of surveying operations up to the close of the last year is shown to be 752,557,195 acres, leaving an estimated area yet unsurveyed of 1,062,231,727 acres.

THE Chester Steel Castings Company have just completed another addition of 60x90 feet to their works at Chester. The superiority of their steel castings for many purposes is becoming better known by locomotive and steam engine builders and machinists generally, and their orders have increased largely. They claim that their castings finish up smoother, admit of a finer polish, and will resist a greater amount of wear and tear than iron forgings, and require less labor in finishing, as a casting can be made nearer finished size than a forging.

An Elevated Railway for Costa Rica.

The government of Costa Rica has entered into a contract with J. Mosen-Chiarin for the construction of an elevated railroad from San José, the capital, to Rio Sucio, there to connect with the railroad in course of construction from Limon. The work is to begin within six months from August 9, and to be ready for traffic within ten months from the same date.