ASTRONOMICAL NOTES.

BY BERLIN H. WRIGHT.

PENN YAN, N. Y., Saturday, May 4, 1878.

The following calculations are adapted to the latitude of New York city, and are expressed in true or clock time, being for the date given in the caption when not otherwise stated.

PLANETS.

	H.M.		H.M.
Mercury sets	7 13 eve.	Saturn rises	3 02 mo.
Venus rises	3 09 mo.	Uranus in meridian	7 00 eve.
Mars sets	10 40 eve.	Uranus sets	1 52 mo.
Jupiter rises	0 56 mo.		

FIRST MAGNITUDE STARS.

	H.M.		H.M.
Antares rises	9 11 eve.	Sirius sets	8 50 eve.
Regulus in meridian	7 11 eve.	Procyon sets	11 01 eve.
Spica in meridian	10 28 eve.	Aldebaran sets	8 36 eve.
Arcturus in meridian	11 19 eve.	Algol (2d-4th mag. var.) sets	9 18 eve.
Altair rises	10 24 eve.	Capella sets	0 29 mo.
Vega in meridian	3 44 mo.	7 stars (cluster) sets	8 18 eve.
Deneb rises	7 51 eve.	Betelgeuse sets	9 23 eve.
Alpheratz rises	1 23 mo.	Rigel sets	7 49 eve.
Fomalhaut rises	4 03 mo.		

REMARKS.

Mercury is at inferior conjunction May 6, making a transit across the sun's disk. Transit begins at 10h. 18m. morning; middle, 2h. 5m. evening; end, 5h. 52m. evening. To obtain the time at any other city, apply the difference of time between that point and New York city to the above figures. Mars is now at his greatest northern declination, and is very near the moon May 6, being only 2° south. Venus and Saturn are in conjunction May 6 also. The time of conjunction, right ascension, occurs after sunrise, but at the time Venus rises, 3h. 9m. morning, they will have nearly the same right ascension, and Venus will be 1° 15′ north of Saturn.

SATELLITES OF JUPITER.

I. Begins a transit May 7, 3h. 39m. morning. Reappears from an occultation May 8, 3h. 10m. morning.

II. Reappears from a transit May 7, 3h. 59m. morning.

IV. Reappears from an occultation May 8, 4h. 0m. mo.

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 find the planets.

M. M.

Position of Planets for May, 1878.

Mercury.

On May 1 Mercury rises at 5h. 15m. A.M., and sets at 7h. 36m. P. M.

The transit of Mercury across the sun's disk occurs on May 6. Instructions for observing this phenomenon, which will be visible all over the United States, have been issued from the National Observatory. The planet will come between the earth and the sun, and will enter upon the sun's disk as a small, round, black spot (the diameter of Mercury is 12″, that of the sun 1906″) at about 4 minutes past 10 A.M., Washington time. It will remain upon the face of the sun more than seven hours. The principal interest to astronomers will be the expectation of obtaining accurate observations of the position of Mercury, in order to investigate the correctness of Leverrier's calculations of disturbing bodies between Mercury and the sun.

Mercury having passed across the sun will be west of it, and will rise before the sun. On May 31 it will rise at 3h. 34m. A.M.

Venus.

Venus will be very beautiful in the morning hours throughout the month. It will be at its greatest western elongation May 1, when it will rise at 3h. 13m. A.M., come to meridian a few minutes after 9 A.M., and set at about 3 P.M. It will easily be seen at meridian passage, at an altitude in this latitude of 46°. On May 31 Venus rises at 2h. 35m. A.M., and sets at 3h. 33m. P.M.

Mars.

On May 1 Mars rises at 7h. 33m. A.M., and sets at 10h. 46m. P.M. On May 31 Mars rises at 7h. 1m. A.M., and sets at 10h. 6m. P.M.

Mars passes by μ Geminorum and above it on May 11, and on the 31st is above and a little west of δ Geminorum.

Jupiter.

Morning observers will rejoice in the earlier rising of Jupiter, and although it is very far south, it will be very conspicuous in May. It rises on the 1st at 1h. 10m. A. M., and sets at 10h. 46m. A.M. On May 21 Jupiter and the moon will rise at the same time. On May 31 Jupiter rises at 11h. 16m. P.M., and sets at 8h. 48m. of the next day.

Saturn.

On May 1 Saturn rises at 3h. 30m. A.M., and sets at 3h. 12m. P.M. On May 31 Saturn rises at 1h. 38m. A.M., and sets at 1h. 28m. P.M.

Uranus.

On May 1 Uranus rises 22m. after noon and sets at 2h. 3m. the next morning. On the 31st Uranus rises at 10h. 26m. A.M., and sets at 0h. 6m. A.M. the next day. Uranus having passed above Regulus and toward the west, is slowly moving in the other direction, approaching Regulus again, but on the 31st is more than a degree above it, and to the west of it 2°.

Neptune.

Neptune rises on May 31 at 3h. 4m. A.M. It is so near the sun in its right ascension as to render it invisible.

PITCHES OF ENGLISH GAS PIPE THREADS.

Dia. of pipe in inches,	1/8,	1/4,	3/8,	1/2,	3/4,	1,	1 1/4,	1 1/2,	1 3/4,	2.
No. of threads per inch,	28,	19,	19,	14,	14,	11,	11,	11,	11,	11.

The Keely Motor.

The Keely motor deception seems at last to be nearly exploded, and the secret of the means by which its inventor obtained his enormous pressure has been discovered. Mr. J. B. Knight, Secretary of the Franklin Institute, of Philadelphia, was recently allowed an opportunity to make a partial investigation of the machine, but when he asked the privilege of testing the gauge which recorded the pressure, he was refused. Professors Wm. D. Marks and George F. Barker, of the University of Pennsylvania, were afterwards invited to make a thorough study of the motor, and the results of their study are given to the public in a letter to the Philadelphia *Ledger* of April 6. They noticed a heavy wrought iron tube lying in front of the machine, but not connected with it, but just before the experiments it was connected. They at once suspected that in this tube lay the secret of the wonderful force, and that it contained compressed air secretly stored in it previous to their arrival. We give the conclusion to their report in their own words:

"At the close of the experiments, one of the writers said to Mr. Collier that he must consider the machine a fraud, unless it could be demonstrated beyond a doubt that compressed air was not stored in the wrought iron tube, and requested that the cocks in the end should be unscrewed; this Mr. Collier positively refused to do, stating that the tube was 'sensitized' (we do not know what he meant by 'sensitized'), and would require three or four hours' work to 'reinstate' it if the atmosphere was admitted. How puerile such an excuse was the writers leave for others to judge.

"On requesting Mr. Keely to operate the machine, without using the wrought iron tube, he admitted that he was unable to do so.

"On every occasion at which the writers have been present no one has been allowed to operate the machine but Mr. Keely himself, and none have been permitted to make any tests of any sort, or do more than look on.

"To attempt to apply the known laws of physics or mechanics to this machine without every facility being afforded for investigation, would be idle. An analysis of the so-called vapor by Dr. C. M. Cresson, revealed nothing more than common air, as stated by Mr. Keely himself. We observed in one part of Mr. Keely's shop a hydraulic screw pump, quite capable of producing pressures greater than ten thousand pounds per square inch, thus affording him the means of charging the tube so frequently mentioned above."

Our own opinion on the Keely motor is that it has been a success, not as a machine for producing force, but as a machine for swindling people out of their money.—*American Manufacturer.*

American Anthracite for Europe.

The Philadelphia and Reading Railway Company have entered upon an enterprise which, if successful, must prove of great advantage to Eastern Pennsylvania. It is nothing less than to create a European market for American anthracite, a variety of coal practically unknown in Europe. To this end, the company's new steam collier, the Pottsville, sailed from Philadelphia April 4, for Havre, laden with the products of the Schuylkill mines, and apparatus for burning them, for the purpose of illustrating at the Paris Exhibition the advantages of this clean, hard coal for domestic and manufacturing uses. Samples of anthracite of all sizes, from pea coal to a single mass weighing 16,000 lbs., will be exhibited by this company, together with maps, drawings, plans, etc., showing the vast facilities for shipping the coal. For showing practically the use of anthracite in this country, the Pottsville carried a variety of cooking and heating stoves for the exhibition, and also one of the company's refuse burning locomotives. This engine was built by the company for a fast freight locomotive, its peculiarity being a furnace designed for burning coal waste. The furnace grate, of sixty-five square feet, is composed of water tubes and intervening cast iron bars separated only three sixteenths of an inch. The engine steams freely with coal dirt fuel, which can be had at the mines so cheaply that this item of cost with one of these engines hauling coal trains is said to be only three cents a mile. The same grate is said to burn larger sizes of coal as well as coal dust, and with great economy. After the exhibition the engine is to be tendered to some European railway for a trial of its advantages there.

Type-Setting in Japan.

The advantages of alphabetic writing are nowhere more conspicuously shown than in a large printing office. The compositor stands within easy reach of every character he may have need of, and a boy can learn the position of each in the case in a few hours. It is quite another matter where each word has a distinct character, as in China and Japan. A correspondent describing the office of a Japanese paper says that a full font of Japanese type comprises 50,000 characters, of which 3,000 are in constant use, and for 2,000 more there are frequent calls. The type is disposed about the composing room on racks, like those in a reading room, and the compositors wander up and down the isles setting type and taking exercise at once. With so many characters it is no wonder that Japanese proofreaders have to be men of intelligence and high scholarship.

The impossibility of telegraphing single-character words has kept this great instrument of civilization in foreign hands, and made it practically useless for the natives of China and Japan. To these the telephone is an especial blessing, which they are not slow to appreciate.

NEW YORK ACADEMY OF SCIENCES.

At a meeting of the Academy held Monday evening, April 1, Mr. I. C. Russell read a paper on

THE INTRUSIVE NATURE OF THE TRIASSIC TRAP SHEETS OF NEW JERSEY.

The author stated that although the trap sheets which traverse the triassic rocks of New Jersey and Connecticut are usually regarded as dikes of igneous rocks, yet proof of their intrusive nature is rarely given; and, as the igneous origin of these rocks had been questioned by some persons, he called the attention of the Academy to a locality where proof is positively shown that these sheets of trap were really forced out in a molten condition between the layers of sedimentary rocks. The trap ridges of New Jersey have a general north and south direction, usually conformable with the strike of the associated sandstones and shales which compose the great bulk of the triassic formation. The trap rocks also seem to be usually conformable in dip with the stratified rocks above and below them. For this reason, and also on account of the rare occurrence of the exposure of a junction of the trap with the stratified rocks overlying them—owing to the removal of the latter by denudation and to the line of contact being hidden by drift and vegetation—the supposition has obtained that the trap sheets were not intrusive, but were formed cotemporaneously with the shales and sandstones as a bed or stratum of igneous rock, spread out in a molten condition on the bottom of a shallow sea in which the stratified rocks were being deposited. He proposed to consider, then, (1) whether the plutonic rocks of the triassic were spread out in the form of a sheet of molten matter, and then cooled and consolidated before the rocks that rest upon them were deposited, both therefore being of the same geological period; or (2) whether the traps were forced out in a fused state among the sedimentary layers, after consolidation of the latter, which would make them more recent than either the over or underlying rocks.

To decide these questions he made an examination of the trap ridge, known as the First Newark Mountain, for some twenty miles of its course. He hoped through this examination to learn, in reference to the history of this mountain, (1) whether the sedimentary rocks that repose upon the igneous ones have been changed from their normal condition by the action of heat at the surface of contact; and (2) whether the trap sheets seem in all cases to be conformable in bedding with the stratified rocks with which they are associated. It is not difficult to find the junction of these igneous rocks with the shales and sandstones that underlie them; and in all cases the latter are found highly altered, and show plainly that they have been exposed to intense heat. This change may be observed at a number of places on the western shore of the Hudson beneath the trap rock forming the Palisades; in some instances the sandstones here have been metamorphosed into a compact vitreous quartzite. These observations very clearly show that the triassic traps were once in a highly heated, and probably molten, condition; and this is, moreover, shown by their crystalline structure. If these rocks had cooled and consolidated before the overlying shales and sandstones were deposited, the latter of course would show no such alteration as that we find in the underlying strata. As before mentioned, however, it is difficult to obtain proof of such alteration in the stratified rock above the trap. After many long excursions in hopes of finding an exposure, the author had been successful in but a single instance, and this was on the western slope of the First Newark Mountain, directly west of Westfield and near the little village of Feltville; at this point the desired junction is very plainly shown.

Here, in the sides of a deep ravine, which has been cut out by a small brook, the stratified rocks are well exposed. The trap rock, which appears in the bed of the stream, in some places presents its usual characteristics of a hard, bluish, crystalline rock. In other places it swells up into bosses and rounded masses, which penetrate the overlying rocks. The outside of these masses presents a scoriaceous or slag-like appearance; in the interior the cavities are filled with infiltrated minerals. The shales resting directly on these igneous rocks have, in many places, been disturbed from their normal position and greatly altered in texture and color. For the first two or three feet above the trap the shales have been so greatly metamorphosed that they are scarcely distinguishable from the trap itself. At a distance of six or eight feet above the traps the shales are still very much altered and filled with small, spherical masses of a dark green mineral resembling epidote. Midway up the ravine (which is thirty feet deep) the shales present somewhat their usual reddish appearance, but are filled with a great number of irregular cavities formed by the expansion of vapors while in a semi-plastic condition. At a distance of twenty-five or thirty feet above the trap, the shales and sandstones are changed but slightly, if at all, from their normal condition. A bed of limestone, from two to three feet in thickness, is here interstratified with the shales and the sandstones—a rare occurrence in the triassic formation of New Jersey—and where it approaches the trap it is considerably altered and forms a mass of semi-crystallized carbonate of lime. Near the junction of the metamorphosed shales and the igneous rocks beneath, the author found in a number of places a peculiar rock, composed of angular greenish fragments, bound together by a reddish cement, forming a typical breccia. This rock, in some places, is two feet or more in thickness; at other times it fills the spaces between concentric masses of igneous rock or metamorphosed shale. This interesting material seems to have a history somewhat similar to that of the "friction