

ASPECTS OF THE PLANETS FOR AUGUST.

VENUS

is evening star, and holds supreme sovereignty over her brother planets, as well as the myriad hosts that crowd the firmament on the moonless evenings of the last month of summer. The fairest of the stars is even more beautiful in aspect than she was during the last month. She has increased in size, her diameter now measuring fifteen seconds of a degree, instead of the thirteen seconds that marked her dimensions a month ago. She is longer, too, above the horizon after sunset, for she is still oscillating on her eastward track, traveling from the sun, and toward the earth. She will greatly increase in size and brilliancy before she completes her course as evening star. In December, her diameter will be sixty-four seconds, and she will be millions of miles nearer than she is at present. At the transit, she will be large enough to be seen by the naked eye through a smoked glass, as an exceedingly small dot.

Her course during the month is marked by one of the closest and most interesting conjunctions of the year. On the 2d, at 6 o'clock in the morning, she is in conjunction with Mars, being only five minutes north of him. Unfortunately, at the time of conjunction, both planets are below the horizon. But Venus will be at nearly the same distance from Mars on the evenings of the 1st and 2d, and near enough to make a lovely celestial picture on either evening. Five minutes is about one-sixth of the average diameter of the moon.

Those who watched the conjunction of Mars and Regulus on the 27th of June will be prepared to enjoy the far more beautiful and much closer conjunction of Mars and Venus in the early part of the present month. The approach of the planets before conjunction, and their seemingly rapid separation after conjunction, are worthy of note, as well as the more interesting scene when the two planets hang side by side in the sky. So close a conjunction between two planets has not occurred since the 18th of May, 1880, when Mercury and Neptune were one minute apart. So close a conjunction will not occur again until the 25th of June, 1884, when Mercury and Saturn will be one minute apart.

The present conjunction of Venus and Mars is not only rare, but takes place in a position and near a time when it may readily be observed, by simply glancing at the evening sky. The brilliant Venus will appear upon the scene an hour after sunset, in the glowing twilight of the west. As the shades of evening gather, a small red star will become visible a little distance to the south. This is Mars, dwindled to insignificant proportions by his distance from the earth, and shining feebly, while overpowered by the dazzling brilliancy of Venus.

On the 16th, Venus is in her descending node. This, at common times, would be a matter of little account; but when this beautiful planet passes, the next time, to her ascending node, she passes also between the earth and the sun, and makes the long-anticipated transit. If the orbit of Venus were on the plane of the ecliptic, we should have a transit at every synodic revolution; but as it is inclined nearly three and a half degrees, she is either above or below the ecliptic, excepting when at her nodes or crossing points. As the earth and Venus are both moving with different velocity, it is only at rare intervals that Venus is at one of her nodes at the time of inferior conjunction. As she will then be in line between the earth and sun, she must pass directly between them, and make a transit, just as the moon under the same conditions at new moon, causes an eclipse of the sun. The same laws govern both phenomena. Venus is so far away that she looks like a black dot passing over the sun's face. The moon is so near that she sometimes entirely hides the majestic orb.

Preparations for the transit are being carried on with increased ardor. The French parties have doubtless reached their destinations, and are hard at work, preparing and practicing for the great event. Two German expeditions have started on the same errand. The British Royal Astronomical Society has sent a portion of the valuable instruments prepared for the transit of Venus in 1874, to Oxford, to be used by Mr. Stone. Another portion of the same collection has been sent to the Observatory at the Cape of Good Hope. At both these points, the commencement of the transit will be visible, but not its close.

Venus sets on the 1st of the month, about 9 o'clock in the evening; at the close of the month, she sets a few minutes after 8 o'clock.

MARS

is evening star. The only item of interest connected with his movements throughout the month is his conjunction with Venus, which has already been described. Meantime, he keeps on his course, approaching conjunction with the sun; while Uranus recedes from him on the west, and Venus on the east. His right ascension is now 11h. 21m., and his declination is 4° 57' north. He is passing into the constellation Virgo, and traveling rapidly south, so that at the end of the month his declination will be 3° 9' south. Venus travels south still more rapidly. At the end of the month her right ascension is 13h. 22m., and her declination is 9° 52' south. Thus the two planets that are now in the same right ascension, and differ but five minutes in declination, will then be far apart.

Mars sets on the 1st, at 9 o'clock in the evening; at the close of the month, he sets about a quarter before 8 o'clock.

URANUS

is evening star. A single incident varies the monotony of his course. He is in conjunction with Mercury on the 28th,

the two planets being only eighteen minutes apart at 3 o'clock in the afternoon, the time of their nearest approach. The conjunction is one to be observed with the mind's eye, for the planets are both so near the sun that even the telescope will fail to bring them to view.

Uranus sets now a few minutes before 9 o'clock in the evening; at the end of the month he sets about 7 o'clock.

NEPTUNE

is morning star, and is the first of the morning trio to appear above the horizon. Although he rises before midnight throughout the month, he is numbered among the morning stars. Astronomers adopt the following classification for the outer planets. From conjunction to opposition they are morning stars, and are found on the western side of the sun. From opposition to conjunction they are evening stars, and are found on the eastern side of the sun. Neptune, Saturn, and Jupiter are traveling to opposition, and will be morning stars till they reach that goal.

On the 11th, at 7 o'clock in the evening, Neptune is in quadrature with the sun on his western side. He is then half way between conjunction and opposition, rising about midnight and setting about midday, being 90° west of the sun. Those who would follow the track of the outer planets should note the times of conjunction, quadrature, and opposition. Three outer planets, Neptune, Saturn, and Jupiter, are now moving from conjunction, the nearest point to the sun, to opposition, the nearest point to the earth. Two of them, Neptune and Saturn, reach quadrature during the month. Opposition, to terrestrial observers, is the most interesting of these epochs, for the planets are then nearest us, and, rising at sunset, are above the horizon during the entire night. This is the favorable opportunity for making discoveries on their surface, for they then reach their greatest size and brilliancy. When they get as far on the road as quadrature, it is time for telescopists to bestir themselves. If Neptune were nearer, we are reasonably sure that more than one moon would be seen revolving around him, and that belts would adorn his disk in a style of beauty befitting the rank of the third planet in the system.

Neptune rises now about half past 11 o'clock in the evening; at the end of the month, he rises about half past 9 o'clock.

SATURN

is morning star, and makes a fine appearance as in stately proportions he graces the eastern sky, rising a few minutes before midnight. He is now bright enough to be distinguished from the surrounding stars, though, in his best estate, he is not to be compared with Jupiter in size or the brightness of his shining.

On the 18th, at 6 o'clock in the evening, he reaches his quadrature or half way house, and thenceforth until opposition he will be nearer the earth than the sun. He will soon be a superb object in the telescope, with his moons, belts, and rings. His rings are opening to their widest extent, his perihelion is approaching, and his northern declination is specially favorable for observation. Thirty years must elapse before the same conditions occur again. If the present generation is destined to find anything new about Saturn, the discovery will probably be made between the present year and 1885, when these favorable conditions pass by.

Saturn now rises about a quarter of an hour before midnight; at the close of the month he rises about a quarter before 10 o'clock in the evening.

JUPITER

is morning star, and is glorious to behold, as, darting above the horizon in the small hours of the night, he rises with regal mien, and reaches a position half-way to the zenith before the sunbeams force him to retreat. His right ascension is now 5h. 48m., and his declination is 22° 45' north. He is moving in the constellation Taurus, and his high northern declination brings him comparatively near the bright star Capella.

Jupiter rises now about twenty minutes after 1 o'clock in the morning; at the close of the month, he rises about a quarter of an hour before midnight.

MERCURY

is morning star until the 14th, when he comes into superior conjunction with the sun, passes to his eastern side, and is evening star for the rest of the month. We have alluded to his conjunction with Uranus on the 28th. Mercury is of little account during August, being too near the sun to be visible, and we must leave him to pursue his swift course under the beams of a fervid sun, that would destroy every vestige of life fitted for conditions that rule in our planet. For the sun, seen from the surface of Mercury, looks seven times as large as it does to us, and the mean solar heat and light are seven times as great as the heat and light received by the earth. The inhabitants of this planet, with their present organization, will have little desire to take up their abode in the planet that travels nearest the sun.

Mercury now rises at a quarter before 4 o'clock in the morning; at the end of the month, he sets about a quarter after 7 o'clock.

THE MOON.

The August moon fulls on the 28th. The waning moon is in conjunction with Neptune and Saturn on the 6th, and with Jupiter on the 9th. The new moon of the 13th is in conjunction with Uranus on the 16th, and with Mars and Venus on the 17th. But as our neighbor the moon approaches the planets at a respectful distance, the lunar conjunctions will not contribute largely to the interesting

aspects of the August sky. She makes a nearer approach to Jupiter than to the other planets, her waning crescent hanging about two degrees south of him on the morning of the 9th.

THE AUGUST METEORS.

On the nights of the 9th, 10th, and 11th, there will be displays of celestial fireworks that never fail in their exhibition. The earth then plunges through the broad domains of an erratic number of the system known as the August meteor-zone. This zone is a gigantic ellipse or hoop, whose perihelion point is within the earth's orbit, and whose apellion point reaches far beyond the orbit of Neptune. It is mysteriously associated, as Schiaparelli discovered, with the second comet of 1862, or has been gradually formed from its substance. The meteors are now distributed through every portion of the vast ring, though somewhat unequally. Therefore, every year, when about the 10th of August the earth crosses this zone, there is a shower of meteors, more or less abundant, according to the density of the cosmical cloud. The August meteors shoot forth or radiate from the constellation Perseus, which is therefore called the radiant point, and the meteors are called Perseides. Sometimes the showers are very brilliant, almost rivaling the famous November ones. At ordinary times, an observer may be reasonably sure of counting several hundreds on the nights mentioned. These meteors are usually yellow, and leave behind trails of luminous vapor that often last several seconds.

The meteoric downfall may be easily explained. The earth, traveling with a velocity of eighteen miles a second, plunges into a mass of cosmical atoms, whose velocity is increased by her attraction to thirty miles a second. The meteors impinge upon our atmosphere with this tremendous velocity, become vaporized by the concussion, and leave a train of luminous vapor behind them when they fall. This ring of meteors is calculated to be nearly eleven thousand million miles in diameter, and four million miles in breadth. These are figures of which finite powers can have little idea. But if we cannot grasp dimensions of such extent, we may be thankful for the capacity to enjoy the beautiful picture the heavens afford when these blazing stars wander in all directions through the infinite depths.

The fiery tears of St. Lawrence is the name given to the August meteors by the poetry and superstition of the past, because they fall on the anniversary of the day made memorable by the martyrdom of the famous saint. The constellation Perseus rises late in the evening in the northeast, and may be known by a circular row of bright stars marking the sword of the hero. Observers who watch for the meteors will be rewarded for their pains if there be only the usual display, while it may be that their watch will be rewarded by a shower of golden rain of unusual brilliancy.

August, then, promises abundance of employment for the student of the stars. Venus comes first on the list for her close conjunction with Mars, and for the queenly grace with which she reigns during the evenings of the last month of summer. The lordly Jupiter holds his court in the morning sky, and rewards with a glance of his beaming face the early riser who anticipates the dawn. The full moon lends her silvery radiance to the nights of the last week of summer. The August meteors give variety to the monthly programme, and illustrate the delightful uncertainty of cometic astronomy, for no mortal can prophesy whether a few hundred meteors will be imprisoned in our atmosphere, or whether the annals of the year will record an unusually abundant shower of golden rain.

Progress of Education in Japan.

The seventh annual report of the Japanese Minister of Education states that there are 28,025 common schools in Japan, of which 16,710 are public, and the remainder private; there being an increase of 1,316 and 125 respectively, as compared with the previous year. The number of high schools is 107 public and 677 private, there being an increase of 42 and 63 respectively. Besides the above, many *Kindergarten* and primary schools were established. These private schools, even now, play a most important part in Japanese national life and education. Many of them have hundreds of students attracted by the fame of a single teacher. Youths flock from all parts of the country to sit at the feet of a renowned scholar, as men did in Europe to hear Abelard. The most celebrated of these leaders of youth—for this they are, rather than simple schoolmasters in our sense of the word—is Mr. Fukusawa, of Tokio, whose translations from European books and original works on the political and social questions of the day are read far and wide in Japan.

Nature says that the students of this gentleman fill many of the most important offices in the state; some of them recently formed themselves into a patriotic society, and established a newspaper, in which the acts of the government are subject to much caustic criticism. Long after the ordinary educational work of their teacher is done, and the young men have gone out into the world to do for themselves, they continue to reside near him, to study under his direction, and to form classes in which important public questions can be freely discussed under his guidance. One of his classes translated the whole of Adam Smith's "Wealth of Nations" into Japanese, with annotations, and many other important European works, especially those on philosophy and politics.