recognition. This has been true of a considerable number of American astronomers including Professors Barnard and Swift, each of whom have been very recently so honored as has been reported in the pages of this publication.

In awarding the *Jackson-Gwilt Gift* to Dr. Swift, represented by the plate accompanying this note, Dr. Wm. Huggins, Foreign Secretary of the Royal Astronomical Society of England, wrote him as follows:

"I have the great pleasure to inform you that the council of this society has awarded to you the *Jackson-Gwilt Gift*, for your discovery of comets and for your other astronomical work. The gift consists of the interest on the invested capital, and a bronze medal. The interest amounts to $121.52, for which I enclose a draft on Messrs. Brown Bros. & Co., of New York. The medal I have placed in the hands of Professor Barnard who is now in this country. He has promised to convey it to you. I may say that this is the first time that the Jackson-Gwilt gift has been awarded. The president and council desire me to convey to you their best wishes for your future happiness and for your continued astronomical success. Permit me to add the expression of my personal congratulations and of my good wishes. I have the honor to remain faithfully yours."

The Herschel medal, which accompanied the letter, is of bronze, bearing on one side the inscription "William Herschel, MDCCXXXVIII—MDCCCXXII," surrounding a bas-relief of the great astronomer. On the reverse side is a graceful female figure supporting a globe and surrounded by the planetary system, with the inscription "Royal Astronomical Society, Jackson-Gwilt Gift." On the rim of the medal is inscribed "Lewis Swift, 1897."

Professor Swift has discovered nearly one thousand nebulæ and comets, and his discoveries in this line have been exceeded by those of Herschel, who found about fifteen hundred. Nine medals and two cash prizes have been awarded to him for his discoveries. We hope to publish a fuller account of Dr. Swift's Astronomical work in the near future.

HEAVENS FOR JUNE.

MARY PROCTOR.

The Great Bear (*Ursa Major*) occupies the greater part of the upper sky from west to north except a small space occupied by the Hunting Dogs (*Canes Venatici*). In the northwest are the Pointers, and due north, low down, is Cassiopeia

and somewhat toward the east, we find the constellation of Cepheus. The Camelopard is in the west of north. The Charioteer (*Auriga*) is low down in the northwest, whilst Castor and Pollux in the constellation of the Twins (*Gemini*) are nearing the western horizon. Nearly due west is the Crab (*Cancer*) the Sea Serpent (*Hydra*) being south of it, stretching its long body from the western to the southern horizon. Between the western horizon and the point overhead, are the constellations of the Lion (*Leo*) and *Coma* Berenices. On the Serpent's back we find the Crow (*Corvus*) and the Cup (*Crater*) and above these constellations, extending midway between the point overhead and the southern horizon is the Virgin (*Virgo*). Above the Virgin and nearly overhead, we see the Herdsman (Boötes). East of Boötes, are the constellations of *Corona Borealis*, *Hercules*, and on the eastern horizon the Eagle (Aquila) with its leading brilliant Altair. Northeast are the constellations of the Swan (Cygnus) and the Harp (Lyra), whilst (*Draco*) the Dragon, coils between the Great Bear and the Little Bear, midway between the point overhead and the northern horizon. Low down in the south is the Centaur (*Centaurus*), bearing on his spear the Wolf (*Lupus*). South of Hercules, is *Serpens*, the Serpent, and Ophiuchus, the Serpent-Holder. South of Ophiuchus, are the constellations (*Libra*) the Scales, and (*Scorpio*) the Scorpion, whilst (*Sagittarius*) the Archer, is rising due east.

Libra, the Balance.

Libra, the Balance is east of the zodiacal constellation Virgo. Virgo, was the goddess of justice, and Libra, the scales, which she is usually represented as holding in her left hand, are the appropriate emblem of her office. When the Sun enters the sign Libra, the days and nights are equal all over the world, readily suggesting the idea of a balance. Milton in "Paradise Lost" suggests another origin for the constellation of the Balance in the account of Gabriel's discovery of Satan in Paradise.

". . . Now dreadful deeds
Might have ensued, nor only paradise
In this commotion, but the starry cope
Of heaven, perhaps, or all the elements
At least had gone to wrack, disturbed and torn
With violence of this conflict, had not soon
The Eternal, to prevent such horrid fray
Hung forth in heaven his golden scales, yet seen
Betwixt Astrea and the Scorpion sign."

According to Virgil, the ancient husbandmen, were wont to regard this sign as indicating the proper time for sowing their winter grain. The Greeks declare that the Balance was placed among the stars to perpetuate the memory of Mochus, the inventor of weights and measures.

Libra contains about 180 stars, including two of the second magnitude, two of the third, and twelve of the fourth. Its mean declination is 8° south, and its mean right ascension 226°. Its center therefore is on the meridian about the 22d of June. It may be easily traced among the constellations, as it has four principal stars, forming a quadrilateral figure, lying northeast and southwest, and having its upper and lower corners nearly in a line running north and south. The two stars forming the northern scale, are situated about 7° apart, on the northeast side of the square. The two stars in the southern scale, are situated about 6° apart, forming the southwest side of the square. On referring to map VI of "*Half Hours with the Stars*," it will be found that Alpha in Libra, Alpha in

Scorpio and Alpha in Virgo, are nearly in a direct line with each other. This is a useful guide when there is any difficulty in locating Libra, which is an insignificant constellation, not having any leading brilliant to attract notice.

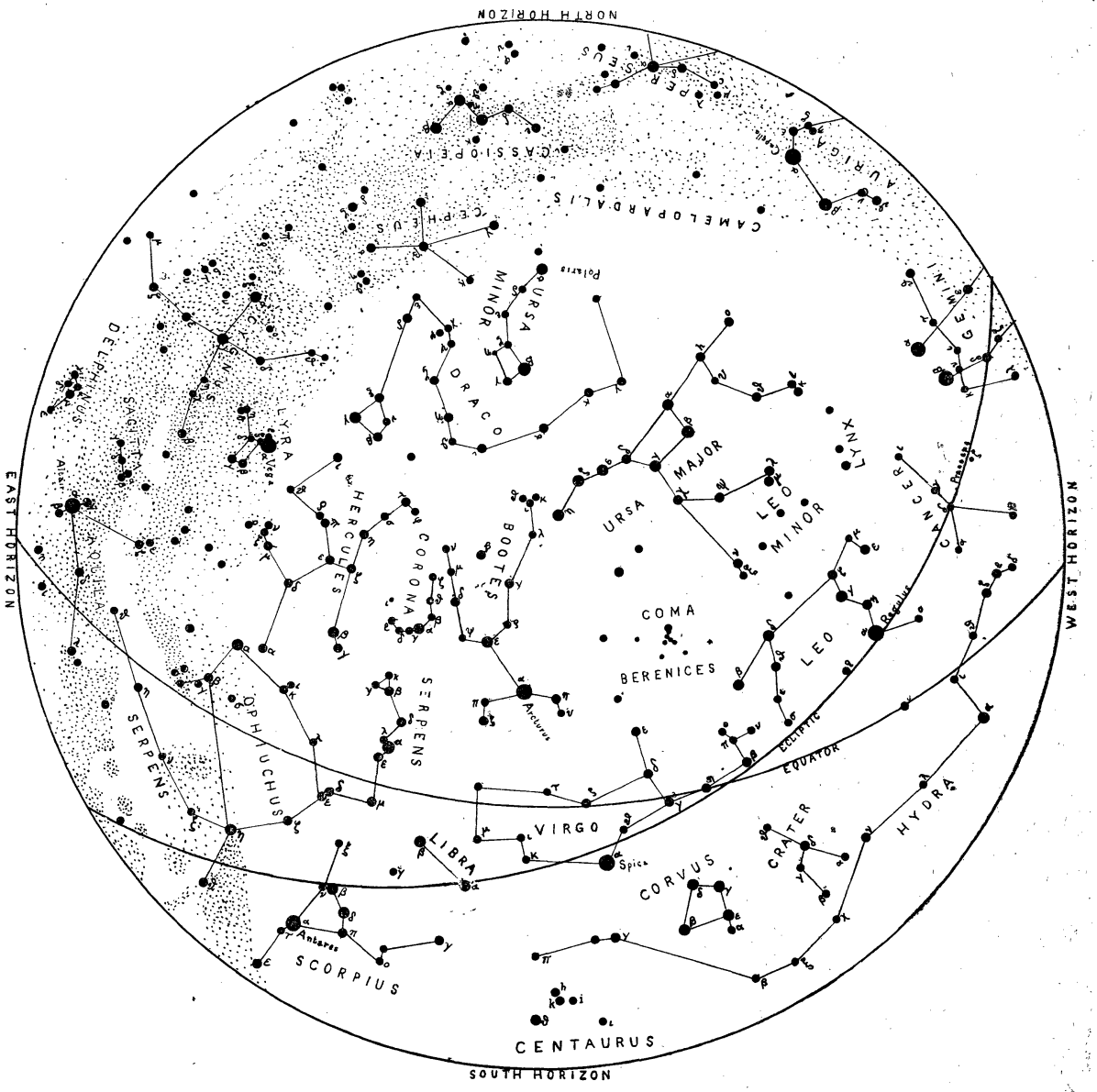
Beta Libræ.

Beta Libræ, is a beautiful light-green star when seen with the unaided eye, but the telescope shows it to be a wide double, pale emerald and light blue. The colors of the stars visible to the naked eye are faint and pale compared with those disclosed by the telescope.

Why are the Stars Colored?

The colors of the stars are due to the vaporous envelopes surrounding them. In Beta Libræ light shines through vapors of an emerald hue, and comes out tinged with emerald. The colors are real, just as the colors of red and green railway signals are real. Here we have lights which are colored, but we know that the light is really white and only appears colored because it shines through red or green glass. "Of course we know that the colored stars are not shining through any substance resembling glass. But since it has been ascertained that the light of every star in the heavens (at least every star yet tested) shines through vapors which must to some degree modify its color, the question is naturally suggested that in the case of very marked colors of certain double stars the real cause of the color is to be found in the nature of the vaporous envelope. When we examine the light of a star through a series of properly arranged prisms of glass, we get a rainbow-tinted streak of light, as in the case of the Sun, only very much fainter. Also, precisely as in the case of the Sun, the star's rainbow-tinted streak —or *spectrum*, as it is called—is crossed by a multitude of dark lines, which we know to be due to the presence of a number of vapors in the atmosphere of the star. Here I used the word atmosphere, but nothing is meant resembling our own air. Every one of the stars has an amazingly complex atmosphere of glowing vapors, so intensely hot that such substances as iron, copper and zinc are not merely melted but turned into vapor. Now, all stars are not alike as respects these vaporous envelopes. Some have substances in their atmospheres which others have not. And, again, some have apparently a much greater proportion of some substances than of others. Accordingly the dark lines across their spectra are differently arranged. Some have many dark lines in the red part of the rainbow-colored streak, so as in fact to have a great part of the red light cut off, and to shine therefore with a superabundance of the green, yellow and blue. Such stars have a greenish light. (*Beta Libræ*, is an instance). Others have most of their lines in the blue part of the rainbow-tinted streak, and so shine with an orange light. And of course it happens in many instances that the dark lines are spread with tolerable uniformity over the whole length, or the greater part, of the rainbow-tinted streak. By this method of observation, we have a means of answering the question, as to whether the colors of the stars are inherent or caused by the absorbing action of the vaporous envelopes surrounding them. The process has been applied very successfully to a beautiful double star called Albireo, or Beta Cygni. This star is seen, even with a small telescope, to be double, and one of the stars, the brightest, is orange, while the other is of a beautiful blue color. Now, when Dr. Huggins, the eminent spectroscopist, examined the spectra of these two stars, he found that whereas in the case of the orange star there are several strong dark lines in the blue part of the rainbow-tinted streak, in the case of the blue star, there is quite a cloud of fine lines in the red

and orange portions. Hence we learn that the two stars owe their color to the nature of their vaporous envelopes. Each star glows in reality with a white light but the white light has in one case to pass through vapors of a somewhat ruddy hue (because absorbing blue light) and therefore this star looks ruddy,



THE CONSTELLATIONS AT 9 P. M., JUNE, 1897.

while the light of the other star shines through bluish vapors, and therefore this star looks blue. We do not yet know how it chances that the vaporous envelopes of these stars, and of other pairs of stars, differ in this way. Perhaps we shall never know. It is, however, an important gain to our knowledge to have ascertained that the colors of the double stars are not inherent, but that these stars are, as it were, celestial signal lamps, shining through colored matter. (*Expanse of Heavens*, p. 223-225. By R. A. Proctor.)

A Double Star in Libra.

The star ε^1 and ε^2 Libra form a wide double, perhaps just separable by the unaided eye in very favorable weather. The larger component is of the third, the smaller of the sixth magnitude, the former yellow, the latter light grey. Here are two magnificent suns slowly revolving each around the other, and animated by movements in the same direction through the sky. Their distance from us is so great that although they are separated from each other by an enormous distance, yet to the unaided eye they appear as one, and we require the aid of a powerful telescope to part them. Double stars are usually termed binaries. Many of the periods of revolution are hundreds of years in length, whilst a few have a period less than a year.

A Variable Star.

Delta Libræ is a variable star with a period of 2⅓ days. During twelve hours it varies from the fifth to the sixth magnitude. Variables are stars which change in brightness, and their periods vary. Some, as in the case of Mira, in the constellation Cetus have a period of eleven months, the time required by this star to pass through one complete cycle of change; whilst a little variable star lately discovered by Dr. Chandler in the constellation of Pegasus, varies so rapidly that it may be fairly said to wink. Two or three times in the course of a single night this curious star can be seen to fade and then brighten like a signal light. For about two and three quarters hours it gets fainter and fainter; then comes a change and then at the end of two and three-quarter hours more it is as bright as at the beginning.

Cluster of Stars.

Just about 8½° from *Alpha* Serpentis, on a line with Beta Corvi, is a fine compressed cluster of very small stars, No. 5 of Messier's Catalogue. "It is scarcely resolvable in a three-inch achromatic, and merely appears like a nebula, brightening conspicuously toward the center." (*Hours with a three-inch Telescope*, p. 104. Capt. Wm. Noble.). The cluster is more than 7′ or 8′ in diameter; "A noble mass," says Smyth, "refreshing to the senses after searching for faint objects.

Constellation of Hercules.

We now come to the constellation of Hercules, which appears head downwards in the old maps, between the constellations of the Northern Crown (*Corona Borealis*) and the Lyre (*Lyra*). Alpha, in the head, is close by Alpha in the head of Ophiuchus on the south whilst the foot of Hercules is represented as resting upon the head of the Dragon (*Draco*) on the north. It is therefore bounded by Draco on the north, Lyra on the east, Ophiuchus, or the Serpent-Bearer on the South, and the Serpent and the Crown on the west. It contains 451 stars, including one of the second, nine of third magnitudes and nineteen of the fourth.

This constellation is intended to immortalize the name of Hercules, the Theban, celebrated for his brave deeds and invincible prowess. After his death Hercules was carried up to heaven in a chariot drawn by four horses.

> . . . "Almighty Jove
> In his swift car his honored offspring drove;
> High o'er the hollow clouds the coursers fly,
> And lodge the hero in the starry sky."

Leading Brilliant, Ras Algethi.

The leading star in this constellation is ***Ras Algethi***, (*Alpha*) marking the head of Hercules, a star about 25° southeast of Corona Borealis. "It is a splendid double. *A*, 3½, orange; *B*, 5½, emerald or bluish green; *D*, 4.7″. Smyth calls this a lovely object, one of the finest in the heavens." (The Amateur Telescopists Handbook, p. 130. Frank M. Gibson.)

The companion stars are small, and require a good telescope to be well seen. Ras Algethi is a variable, changing from magnitude 3 to magnitude 3½ in a period of 66⅓ days.

Other Objects of Interest.

The star *p Herculis* is a close double. The components are 3″.7 apart, the larger being of the fourth magnitude, the smaller of the fifth. The color of the larger star is bluish-white, the smaller one pale emerald.

Delta Herculis is a wide and easy double—a beautiful object. It has an eighth magnitude companion, at a distance of 19.5″. The larger star is of the fourth magnitude, and its color is greenish-white, whilst the companion star is grape-red.

There are two planetary nebulæ in this constellation, but only one of these is at all within the reach of a three-inch telescope and neither, can be found with certainty save in one equatorially mounted.

Famous Cluster in Hercules.

One-third of the way from (Eta) η to (Zeta) ζ, is the famous cluster known as 13 Messier. It is one of the most magnificent objects in the heavens, with a blaze of light towards the center, and sprays of stars reaching out from it in all directions like the tendrils of a vine. It was discovered by Halley, and is sometimes called Halley's nebula. It is visible to the unaided eye, as a small misty, cloud-like object, but when seen through a telescope it reveals a scene of glory calculated to inspire a feeling of surprise in the mind of the observer. "Perhaps no one ever saw it for the first time through a telescope without uttering a shout of wonder." It requires a very powerful telescope completely to resolve this fine nebula, but the outlying streamers may be resolved with a good 3-inch telescope. Sir W. Herschel considered that the number of stars composing this wonderful object are at least 14,000. The cluster is close to the Northern Crown and in a line between the crown and the brilliant Vega.

Cluster seen with an Opera-Glass.

"While an opera-glass will only show it as a faint and minute speck, lying nearly between two little stars, it is nevertheless well worth looking for, on account of the great renown of this wonderful aggregation of stars. It is roughly spherical in shape though there are many straggling stars around it evidently connected with the cluster. In short, it is *a ball of suns*. The reader should not mistake what that implies, however. These suns, though truly solar bodies, are probably very much smaller than our Sun. Mr. Gore has computed their average diameter to be forty-five thousand miles, and the distance separating each from the next to be 9,000,000,000 miles. . . . . If you have a field-glass, by all means try it upon 13 M. It will give you a more satisfactory view than an opera-glass is capable of doing, and will magnify the cluster so there can be no possibility of mistaking it for a star." (*Astronomy with an Opera-Glass*, pp. 47-49. Garrett P. Serviss).

"APEX OF THE SUN'S WAY."

The constellation of Hercules is of special interest because it has been shown, that the Sun is now moving towards a point in this group of stars, having a right ascension of about 267° and a declination of about + 31°. This point is known as the "apex of the Sun's way." (*General Astronomy*, p. 460. C. A. Young).

"The great problem at Mount Hamilton today is to calculate the rate of speed at which the solar system is moving through space. According to some authorities, the rate is sixteen miles a second. The more one considers these celestial journeys the stranger seem the adventures of the Sun and his attendant worlds in their stupendous journey through space. The journey is an actual one, for the Sun is really carrying us towards the northern quarter of the firmament, at least five hundred million miles every year. A railroad train does not more surely whirl us to our destination than by this great solar migration, we are swept through the abyss of the heavens towards the constellation Hercules, only in one case the rate of speed is more accurately ascertained than in the other. The wildest imaginings of the eastern fortune-tellers with their magic horses and enchanted carpets seem spiritless in comparison with what science has to tell us of the wonderful journey in which we are all unconsciously engaged. Who would not wish to see with an all-seeing eye, the caravan of worlds on its endless journey? Always gathering new material from the realms of space, adding comets and meteor swarms to its domain, the Sun sweeps on, and the obedient planets follow but whither they are going and how it will all end, science cannot tell!"

THE NORTHERN CROWN.

The constellation of the Northern Crown is a very satisfactory group, because the eye at once recognizes its resemblance to the object it is supposed to represent. It is situated directly north of the Serpent's head, between Boötes on the west and Hercules on the east. The constellation contains 87 stars, of which only six are conspicuous. Its centre is on the meridian about the last of June and the first of July.

This beautiful little cluster of stars is said to be the crown presented by Bacchus to Ariadne, the daughter of Minos, second king of Crete. According to the legend, Theseus, king of Athens, was rescued from the celebrated labyrinth of Crete by Ariadne, who furnished him with a clue of thread. He afterwards deserted her when he arrived at the island of Naxos. Ariadne was so disconsolate at being abandoned by Theseus, that, as some say, she hanged herself but Plutarch gives a more cheerful ending to the legend. According to his statement she lived many years, after, and was espoused to Bacchus, who gave her a crown of seven stars, which after her death was placed among the stars:

"Near to Boötes the bright crown is viewed
And shines with stars of different magnitude
Or placed in front among the rest displays
A vigorous light, and darts surprising rays
This shone, since Theseus first his faith betrayed
The monument of the forsaken maid."

ALPHECCA, THE LEADING BRILLIANT.

Alphecca, of the 3d magnitude, is the leading brilliant and middle star of the crown and about 11° E of Mirac, in Boötes. It is easily found, on account of its

position and brilliancy. It has a distant companion star of the eighth magnitude, Alphecca being of the second. Alphecca (*Alpha*) is of a dazzling white hue, whilst the component star is pale violet.

R CORONÆ.

R Coronæ was discovered by Pigott in 1795. "Ordinarily of the sixth magnitude, it occasionally drops out of sight with small telescopes, and after lingering near the thirteenth magnitude for many months, slowly regains its lost light. But its phases at times cease wholly, as during the seven years 1817-24, at others the phases are ill-marked. Thus, at the minimum observed by Sawyer, October 13th, 1885, the star was still of 7.4 magnitude. It shows no decided peculiarity either of color or spectrum." (*System of the Stars*, p. 120.)

U CORONÆ, (ALGOL VARIABLE).

"*U Coronae* was discovered by Winnecke in 1869. Its period is 3 days, 10 hours, 51 minutes and 15 seconds. It varies from the 7.6 magnitude to the 8.8 magnitude in 9 hours, 42 minutes." "It appears to be slightly variable independently of its systematic changes. The disturbances of its period have been studied by Mr. Chandler." (*System of the Stars*, pp. 136-141).

T CORONÆ.

In May 12th, 1866, a star called T Coronæ, blazed forth suddenly, equalling Alphecca in magnitude. After it was discovered it declined in brightness, and had sunk below the 8th magnitude. An opera-glass now shows it as a star of the 9th magnitude. The star is a degree south of Epsilon, and is known as the famous "Blaze Star."

Miss Agnes Clerke, gives its history as follows: "On May 12th, 1866, Mr. John Birmingham, of Millbrook, near Tuam in Ireland, was amazed to perceive an unfamiliar star of the second magnitude shining in the constellation of the Northern Crown. On May 16, the application of Dr. Huggin's spectroscope showed the object to be wrapt in a mantle of blazing hydrogen. Five bright lines (three of them due to hydrogen) stood out from a range of continuous light broken up into zones by flutings of strong absorption. The incandescence of the star was hence largely atmospheric and for the rest, from the rapid rate at which it fell away, could have been only "skin-deep." That the compound nature of its spectrum testified truly to an immense diffusion of vaporous material in its neighborhood, was certified by Dr. Huggin's visual observation of a singular glow round the star on May 16th and 17th. Although its light decreased by a daily half magnitude and its color changed from white to orange, no alteration took place in the character of the spectrum. The bright rays, however, faded somewhat less promptly than the continuous light.

The visibility of the object to the unaided eye lasted only eight days, and already in the beginning of June, it had sunk to the 9th magnitude. Its slow subsequent decline was interrupted by fluctuations, thought by Schmidt to be periodical in about ninety-four days. When observed by Vogel, March 28th, 1878, it was of the tenth magnitude, and gave an ordinary stellar spectrum. Its leap upward to the second magnitude, involving a *thousandfold* gain of light, was accomplished with extraordinary suddenness. Two hours and a half previously to Birmingham's discovery, Schmidt surveyed at Athens the constellation in which the blaze was to occur, and noticed nothing unusual. He was certain the star could not have been as bright as the fifth magnitude. The name of "T Coronæ" was bestowed upon it in conformity with Argelander's system of

nomenclature, by which the variables in each constellation are designated, in the order of their discovery, by the Roman capital letters from R onward." (*System of the Stars*, pp. 99, 100).

SUNS IN FLAMES.

When a star suddenly blazes out in lustre, as in the case of T Coronæ, it means a catastrophe disastrous probably to the system of worlds, which may be circling around that star. Imagine if the Sun, which rules over the planetary system to which we belong were suddenly to blaze out for a time with several hundred times its usual lustre, what would be the result? "The creatures on the side of the Earth turned towards it at the time would be destroyed in an instant. Those on the dark or night hemisphere would not have to wait for their turn till the Earth, by rotating, carried them into view of the destroying Sun. In much briefer space the effect of his new fires would be felt all over the Earth's surface. The heavens would be dissolved and the elements would melt with fervent heat." (*Myths and Marvels of Astronomy*, p. 161, by Richard A. Proctor).

PLANET NOTES FOR JUNE.

H. C. WILSON.

Mercury will be at greatest elongation west from the Sun June 15, and will therefore be visible in the morning twilight about that time. Mercury and Neptune will be in conjunction June 29.

Venus will be at her greatest brilliancy on June 3. She is "morning star" shining in the east with a brightness far exceeding that of any of the stars. The Moon and Venus will be in conjunction June 25.

Mars will be too low in the west for good observations in June. The motion of this planet with reference to the stars Castor and Pollux has been very noticeable during the past month. In June Mars will continue his eastward course among the stars, passing from the Praesepe cluster in Cancer almost to Regulus in Leo.

Jupiter will be pretty well down toward the west horizon but may be observed in the evening twilight. His eastward motion begins now to be very evident with reference to the star Regulus, which is to be seen a few degrees to the west of the planet. The equatorial belt seems to have a little more color this year than usual. The "Great Red Spot" is still in place but is very dim and difficult to outline. Its location is indicated very plainly by the great notch in the broad red belt to the north of the spot. This "notch" is a far more conspicuous feature than the spot and equally permanent in form and position. Jupiter will be in conjunction with the Moon shortly after midnight, June 6.

Saturn and *Uranus* are in the constellation Libra visible toward the southeast in the evening. Saturn shines with the light of a bright first magnitude star and is of a golden yellow color. Uranus is not visible to the unaided eye, but a small telescope will show it as a small dull green disk with no definite markings. On June 18 the two planets will be in conjunction, Uranus being 2° 3′ or four diameters of the Moon, due south from Saturn.

Neptune is within the bright glow from the Sun and so cannot be seen.

The *Sun* will be at the summer solstice June 20. Sunspots are few and small, but in the early part of May one quite prominent spot was visible. It was photographed at Goodsell Observatory on May 3, 4, 6 and 7.