THE HEAVENS IN JULY.

The splendor of the planetary displays in the evening skies of May and June will never be forgotten by those who, looking out from the shadow of the earth into the realm of sunshine beyond, beheld Jupiter and Mars and Venus and Mercury reflecting the solar glow like a fleet of signaling ships. In exchange for this, July has only the spectacle of the continued brightening of Venus. Mercury, in the constellation Gemini, was overtaken by the sun on the last day of June, after which it became a morning star, and Jupiter, also in Gemini, will become a morning star after July 10. Mars, in Cancer, still remains an evening star, but too near the sun and too much diminished in light to attract attention.

Venus alone continues to gain in brilliance every night. Viewed with a telescope, she now appears in the shape of a half moon. On the morning of the 11th she will attain her greatest apparent distance from the sun, and after that time, as, following her orbit, she begins to swing in between the sun and the earth, her form will gradually change to that of a crescent, which will grow longer and more slender as she gets nearer and nearer into line with our globe and the solar orb. Although, as Venus turns her back to us, the proportionate part of her surface which appears from the earth to lie in the sunshine grows smaller, her continued approach more than compensates for this, and so her brightness rapidly increases. At the middle of the month she will be twice as bright as she was on May 1, and between the beginning and the end of July she will gain more than one-third in brightness. Even then she will not have reached her greatest brilliance; that will occur about two weeks later.

As I remarked in a former article it seems to me that of all the planets belonging to the sun, besides the earth, Venus is the most likely to be now in a suitable condition to nurture living creatures resembling the inhabitants of our globe. The fact that she so nearly resembles the earth in size and mass is one of the strongest a priori reasons for this opinion. There is no planetary function so important in respect to the question of habitability as the force of gravitation. That governs the density of a planet's atmosphere, the circulation of its fluids, the ratio of the size of its inhabitants to the strength of their framework, all the mechanical processes and operations occurring upon its surface, etc. Now on Venus the superficial gravity is about 83 per cent of that on the earth. In other words, a weight of 100 pounds here if removed to Venus would weigh 83 pounds there. So slight a difference would probably produce no serious effect upon the conditions of habitability of Venus for creatures of terrestrial mould. The case is quite different for Mars, where the force of gravitation is only 38 per cent of its force here, and also for Jupiter, where the superficial gravity is 2·64 times as great as on the earth. It is true that judged by this test alone Mercury and Uranus might also be regarded as probably inhabited planets, since on the former the superficial gravity is five-sixths of the earth's, and on the latter nine-tenths, but in the case of those planets other considerations come to the front. Mercury, for instance, would seem to be too near the sun, to say nothing of the great eccentricity of its orbit, while Uranus is too far from the sun, receiving, as it does, surface for surface, only one 368th part of the solar light and heat that the earth gets. On Saturn, too, the force of gravitation would offer no obstacle to the existence of terrestrial forms of life, since it exceeds the earth's force only one-fifth, but there are many reasons for believing that the physical condition of Saturn is very different from that of our globe.

Moreover, Venus bears a striking resemblance to the earth, not merely in the conditions governing the weight of bodies at her surface, but also in the undoubted possession of an atmosphere containing watery vapor, in the similarity of her mean density, and probably in the practically identical period of her axial rotation. Indeed, there are two particulars in which Venus would seem to possess a possible advantage over the earth; the first being that her axis appears to be nearly or quite perpendicular to the plane of her orbit, from which it results that her seasons are uniform—always summer near the equator, always spring in middle latitudes, and always winter in the far north and south—and the second that her orbit is so nearly a circle that her distance from the sun is, for all practical effects upon climate, invariable. The intensity of the solar radiation is nearly twice as great on Venus as on the earth (in the inverse ratio of the squares of their mean distances), but inasmuch as the telescopic appearance of the planet suggests that it is deeply shrouded with clouds, the greater degree of light and heat received may, in this case, not be disadvantageous.

Everything considered then, it is to be regretted that our knowledge of the surface appearance of Venus should be so limited as it is. Schiaparelli has indicated one way in which the difficulty arising from the blinding brilliance of Venus may be avoided, namely, by studying the planet telescopically in broad day, and has himself set the example. Our best equipped observatories ought to be able to tell us something more about that other earth whose distant beauty just now lends so great a charm to the sunset heavens.

Saturn is following the other planets in an apparent march sunward, and now crosses the meridian during the evening twilight, but it will remain an evening star until the 1st of November, and during July will be fairly well placed for observation. It is in the constellation Virgo, about ten degrees east of the bright star Spica. Its beautiful rings still present a most admirable spectacle for a small telescope.

Uranus remains in Libra, a few degrees in an easterly direction from the star α.

Mercury, which, as already remarked, became a morning star at the end of June, will attain its greatest distance west of the sun on the 22d, about which time it may be seen before sunrise.

The month opens with the moon near first quarter. The moon fulls on the 6th, about half past six o'clock in the evening, when it is situated in Sagittarius, near the "Milk Dipper." It reaches last quarter on the night of the 14th, at 10:30 o'clock, in the eastern part of Pisces, and new moon occurs on the 22d, at 32 minutes after midnight. The moon is in perigee, or nearest the earth, on the morning of the 23d and in apogee on the morning of the 11th. The moon will be near Venus on the evening of the 24th and near Saturn on the evening of the 28th.

The earth is in perihelion, or nearest to the sun, on the 1st, about an hour before midnight. Mars is in perihelion less than three days later, but this means more for Mars than it does for the earth, because the former is no less than 13,000,000 miles nearer the sun at perihelion than at aphelion, while the change of distance for the earth between the corresponding points in its orbit amounts to only 3,000,000 miles.

Possessors of small telescopes will be interested this month in the following among other beautiful objects:

Beta Cygni, the splendid colored double star—light orange and deep blue—situated in the foot of the Northern Cross in the constellation Cygnus. Epsilon Lyræ, the celebrated quadruple star near the brilliant Vega. A good 3 inch will easily divide both of the pairs composing the quadruple. The Ring Nebula between the stars Beta and Gamma in Lyra. A 3 inch will show it. 61 Cygni, an easily separated pair of small stars, until recently regarded as the nearest in the northern hemisphere of the heavens; and finally, the gorgeous star fields to be found scattered along the Milky Way, which at 9 P. M. about the middle of the month will be seen starting from Perseus, then just rising in the northeast, and passing in succession through Cassiopeia, Cepheus, Cygnus, Lyra, Aquila, Ophiuchus and Serpens, until, spreading widely as it enters Sagittarius and Scorpio, it disappears behind the horizon in the south. This star-jeweled baldric is the chief adornment of a midsummer's night.

GARRETT P. SERVISS.

Adansonia Fiber in Paper Making.

Adansonia bark is chiefly used for the preparation of strong wrapping papers, cartridges, and emery paper. In point of strength the fibers obtained from it are only surpassed by those from the mulberry bush. Papers made with an addition of adansonia fiber not only possess greater tensile strength, but offer greater resistance to tearing. This is characteristic of such papers in a marked degree, and is due to the long, strong fibers intermingling with the others in the sheet of paper. The fibers under the microscope exhibit so distinctive an appearance that they cannot be easily confounded with other fibers.

To obtain the fiber from the raw bark on the manufacturing scale, the adansonia is first of all cut into small pieces about an inch or an inch and a half long with an ordinary rag chopper, or by hand with strong knives. If it is desired to bleach the fiber after chemically treating the cut bark, it is necessary to subject the raw stuff to a system of purification to remove knots, etc. For unbleached papers this purification is not necessary beyond the usual dusting. When the material has been cut and dusted, it is placed in a revolving boiler, and there boiled for ten hours or so, according to what is considered necessary, in a caustic soda lye containing 3½ per cent of soda in the state of caustic and under a maximum pressure of fifty-five pounds above atmosphere. It is usual, in actual practice, to soak the bark in the lye within the boiler, and to see that it is covered with liquor before raising the pressure. The object of this is to prevent the fiber becoming discolored, direct steam having the tendency to darken it.

If the fiber is properly boiled, the particles of fiber should easily pass between the fingers when lightly pressed, and feel strong and tough. The pulp should not be allowed to lie long, owing to a species of fermentation setting in which destroys the strength of the fiber. It is usually worked up immediately after being boiled.

The pulp from the boilers is then washed in the breaking and washing engine, a process which takes a long time, owing to the slimy nature of the incrusting matter surrounding the fiber stopping up the wire cloth covering the washing drum. This latter is brushed at intervals to keep it open. Pure clean water must also be used, and the breaking-in roll should be adjusted to thoroughly open out or brush the fiber only, thus preserving its full length.

The preparation and bleaching of the fiber is very similar to jute and manila and such like raw stuffs. The difficulty of bleaching to a good white color with a reasonable amount of bleaching power is also apparent in practice, and depends largely on the nature of and the care with which the chemical treatment has been carried out in the boiling. The loss in weight which the raw adansonia undergoes varies from 50 to 60 per cent, that is to say, 100 parts of adansonia bark will yield from 40 to 50 parts of paper. Papers made from adansonia fiber alone are not frequently to be met with, the bulk of the fiber being used in conjunction with others in making compound papers. These compound papers possess a strength in proportion to the quantity of adansonia fiber used in their manufacture.—Chem. Tr. Jour.

Electric Distribution of Power from Gas Engines.

Captain Lenevue, of France, has recently made a report upon the power installation at M. Linet's chemical works at Aubervilliers, near Paris. The power is generated by gas engines worked with poor gas and transmitted by electricity throughout the works. The plant is considered a model one of its kind.

The complete generating plant consists of three 80 horse power "Simplex" gas engines, placed side by side and capable of working separately or together, each engine driving a dynamo by a belt through an intermediate shaft, to which is also belted a lighting dynamo and a pump. The shaft is provided with couplers. There are also two steam engines that were used before the gas plant was put in. Each generator is of 56 kilowatts, as is also the lighting dynamo, and about twenty motors of from 4 to 15 kilowatts are placed at convenient points about the works. At present only one of the power generators, the lighting dynamo and six motors are in use. The first two exert a useful effect of 91 per cent at 450 amperes, falling to 75½ per cent at 130 amperes. The efficiency of the 18 horse power motors is 89 per cent; of the 9 horse power, 88 per cent; and of the 5 horse power, 86 per cent.

The results of the test of this plant made by Captain Lenevue and the engineer of the works are as follows:

Circumference of the pulley on which the friction brake was mounted	21 feet 9 inches.
Diamcter of ditto	6 feet 11 inches.
Circumference of brake's action	22 feet.
Diameter of ditto	7 feet.
Diameter of cylinder	23 inches.
Piston stroke	30 inches.
Net total coal consumed	511 pounds.
Duration of trial	4 hours 19 minutes.
Mean speed (per minute)	120,220 revolutions.
Indicated horse power	81·42 horse power.
Organic yield or useful effect	0·769.
Maximum horse power at the brake	95·81 horse power.
Maximum indicated horse power	124·518 horse power.
Indicated horse power of the small motor, estimated at	4 horse power.
Indicated horse power of the two motors	109·81 horse power.
Coal consumed per hour	118·56 pounds.
Coal consumed per brake horse power hour	1·457 pounds.
Coal consumed per indicated horse power per hour	1·12 pounds.
Coal consumed per indicated horse power per hour by the two motors	1·08 pounds.

The Royal Crown of England.

The crown used at the coronation of Queen Victoria in 1838, which is said to be the heaviest and most uncomfortable diadem in Europe, contains 1,273 rose diamonds, 1,363 brilliants, 273 round pearls, four large pendant shaped pearls, one immense ruby, four smaller rubies, one large sapphire, 26 smaller sapphires and 11 emeralds. The large ruby is set in the center of a diamond Maltese cross at the front of the crown. This stone was given to Edward I by Don Pedro the Cruel, and was worn by Henry V at the battle of Agincourt, when it was set in his steel casque. It is peculiarly cut and its center is hollowed out to form a setting for a smaller ruby. Many of the stones were taken from old crowns now unused and others were furnished by the Queen herself. They are placed in settings of both gold and silver and incase a crimson velvet cap with an ermine border. Four imperial arches spring from the four sides and support the mount, which is composed of 438 diamonds, and the whole is surmounted by a diamond cross whose center is a single rose cut sapphire.

IT is proposed to include an international exhibition of aeronautical apparatus among the interesting features of the Paris Exposition of 1900. The sub-committee on aerostation in charge of the matter are making preparations for the admission of balloons of all kinds, flying machines and soaring apparatus of every description. The competition for honors will, it is stated, be open to foreigners and French inventors on equal terms. Commandant Renard is at the head of the committee.

© 1895 SCIENTIFIC AMERICAN, INC.