THE HEAVENS IN FEBRUARY.

BY HENRY NORRIS RUSSELL, PH.D.

The chief event of last month was one relating to one of our nearest neighbors in space, and yet most inconspicuous to the eye—the close approach of the asteroid Eros to the earth. Another of our celestial associates plays the leading part in this month's drama, but the spectacle which he offers is far more brilliant, though less unusual, for the actor is the war-like planet Mars.

His opposition, which occurs on the 21st, affords the best chance of the year to observe him; but one which must nevertheless be counted unfavorable when compared with those of other years. The reason for this is that at the present time he is in that part of his orbit which is farthest from the sun, so that his distance from that body is nearly 155 million miles, though on the average it is 141½ million. The earth is at the same time about 92 million miles from the sun, so that Mars is no less than 63 million miles away from us. When, on the other hand, an opposition occurs when Mars is nearest the sun, his distance from it is but a little over 128 million miles, and that of the earth (whose orbit is a little farther from the sun on this side) is over 93 million, so that the gap intervening between the two planets is but 35 million miles across.

It is, therefore, easy to see why Mars is much more favorably placed for observation at such an opposition than at the present one. He appears nearly twice as large with the same telescopic power, and in consequence much more detail can be made out on his disk. To the naked eye the disparity is even more striking, for the amount of light that Mars sends us varies as his apparent area, and when he is nearest the sun he is moreover most brightly illuminated by it. The combined effect of these two causes is that at his most favorable opposition he is nearly five times as bright as at the least favorable, being almost equal to Jupiter in the former case, and, by no means, rivaling Sirius in the latter.

At conjunction, when Mars and the earth are on opposite sides of the sun, he is only about 1-12 as bright as at the worst opposition, and appears about equal to the pole star.

Oppositions of Mars occur at intervals of a little more than two years. This interval is longer than in the case of the more remote planets, since Mars moves faster and, therefore, it takes the earth longer to overtake him. The favorable oppositions occur at intervals of 15 or 17 years. The last one was in 1892, and the next will occur in 1909.

On this present occasion things are about as bad as possible, for Mars reaches his greatest distance from the sun on the 24th, only three days after opposition. Nevertheless he will be, in all probability, assiduously observed, in the hope that something may be seen which will add to our knowledge of his surface.

The possessor of a small telescope can reasonably hope to see the dark greenish markings which are usually supposed to be oceans, and the white spots at the poles, which, since they decrease in size during the summer of the hemisphere in which they lie, and regain their full dimensions during the winter, are supposed to be ice-caps. By watching the planet for a couple of hours the motion of the surface markings across the disk caused by its rotation can be clearly seen. The two satellites, which are the smallest bodies in the solar system, can only be seen with a large telescope, and the same statement holds true with even greater force with regard to the much-discussed "canals," some theories of whose nature we hope to consider next month.

THE HEAVENS.

The southern skies present a magnificent spectacle at our chosen hour of observation, 9 P. M., on February 15.

Right overhead, and a little west of the zenith, is Capella, which forms an irregular pentagon with the other principal stars of Auriga. Below and to the right is Taurus, marked by Aldebaran and the Pleiades. Orion is farther down on the left, and the small constellations of Lepus and Columba are between it and the horizon.

Beginning again high up, but farther to the left, we first reach Castor and Pollux, then Procyon, on a level with Orion, and lower down the incomparable Sirius. Below Sirius, to the right, is an irregular cross of bright stars which marks the hindquarters of Canis Major, and about as far again in the same line, and close to the horizon, is the star Zeta Puppis, which Sir Norman Lockyer believes to be much hotter than any other whose spectrum has been examined.

Those who live south of the latitude of Washington may, if the air is clear, catch a glimpse low down on the horizon, under Sirius, of the brilliant Canopus which stands second to it in brightness among the fixed stars, but it is so far south that it never rises above the horizon of New York The most conspicuous constellations in the western sky are Perseus and Cassiopeia in the Milky Way, Aries and Andromeda below them, and Cetus in the southwest. In the east Leo is almost half way up the sky, bearing Mars with him. Ursa Major is conspicuous between Leo and the pole, and below the Lion the serpent Hydra stretches its ungainly length along the southern sky.

THE PLANETS.

Mercury is evening star for the whole of the month. He is best placed for observation on the 19th, when he is in his greatest eastern elongation, and sets nearly two hours later than the sun. He is unusually bright, and the present opportunity for seeing him in the evening is the best of the year. Venus is morning star in Sagittarius and Capricornus. She rises little more than an hour before the sun, and is becoming inconspicuous. Mars comes to opposition on the 21st, as has been already described, and is visible all night. Jupiter, Saturn, and Uranus are all morning stars. In the middle of the month they rise 3½, 3, and 4½ hours respectively before sunrise. Neptune is in Taurus, near the border of Gemini.

THE MOON.

Full moon occurs on the forenoon of the 3d, last quarter near noon on the 11th, new moon on the night of the 18th, and first quarter on the afternoon of the 25th. The moon is farthest from the earth on the 8th and nearest on the 20th. She passes Mars on the afternoon of the 5th, Neptune near noon on the 13th, Jupiter on the night of the 14th, Saturn the next afternoon, Venus on the afternoon of the 17th, Mercury on the morning of the 20th, and Neptune on the night of the 26th.

TESLA'S WIRELESS LIGHT.

Nikola Tesla has given to The New York Sun an authorized statement concerning his new experiments on the production of light without the aid of wires, Mr. Tesla says:

"This light is the result of continuous efforts since my early experimental demonstrations before scientific societies here and abroad. In order to make it suitable for commercial use, I had to overcome great difficulties. One of these was to produce from ordinary currents of supply electrical oscillations of enormous rapidity in a simple and economical manner. This, I am glad to say, I have now accomplished, and the results show that with this new form of light a higher economy is practicable than with the present illuminants. The light offers, besides, many specific advantages, not the least of which is found in its hygienic properties. It is, I believe, the closest approach to daylight which has yet been reached from any artificial source.

"The lamps are glass tubes which may be bent in any ornamental way. I most generally use a rectangular spiral, containing about twenty to twenty-five feet of tubing making some twelve to fourteen convolutions. The total illuminating surface of a lamp is from 300 to 400 square inches. The ends of the spiral tube are covered with a metallic coating, and provided with hooks for hanging the lamp on the terminals of the source of oscillations. The tube contains gases rarefied to a certain degree, determined in the course of long experimentation as being conductive to the best results.

"The process of light production is, according to my views, as follows: The street current is passed through a machine which is an electrical oscillator of peculiar construction and transforms the supply current, be it direct or alternating, into electrical oscillations of a very high frequency. These oscillations, coming to the metallically-coated ends of the glass tube, produce in the interior corresponding electrical oscillations, which set the molecules and atoms of the inclosed rarefied gases into violent commotion, causing them to vibrate at enormous rates and emit those radiations which we know as light. The gases are not rendered incandescent in the ordinary sense, for if it were so, they would be hot, like an incandescent filament. As a matter of fact, there is very little heat noticeable, which speaks well for the economy of the light, since all heat would be loss.

"This high economy results chiefly from three causes: First, from the high rate of the electrical oscillations; second, from the fact that the entire light-giving body, being a highly attenuated gas, is exposed and can throw out its radiations unimpeded, and, third, because of the smallness of the particles composing the light-giving body, in consequence of which they can be quickly thrown into a high rate of vibration, so that comparatively little energy is lost in the lower or heat vibrations. An important practical advantage is that the lamps need not be renewed like the ordinary ones, as there is nothing in them to consume. Some of these lamps I have had for years, and they are now in just as good a condition as they ever were. The illuminating power of each of these lamps is, measured by the photometric method, about fifty candle power, but I can make them of any power desired, up to that of several arc lights. It is a remarkable feature of the light that during the day it can scarcely be seen, whereas at night the whole room is brilliantly illuminated. When the eye becomes used to the light of these tubes, an ordinary incandescent lamp or gas burner produces a violent pain in the eye when it is turned on, showing in a striking manner to what a degree these concentrated sources of light which we now use are detrimental to the eye.

"I have found that in almost all its actions the light produces the same effects as sunlight, and this makes me hopeful that its introduction into dwellings will have the effect of improving, in a measure now impossible to estimate, the hygienic conditions. Since sunlight is a very powerful curative agent, and since this light makes it possible to have sunlight, so to speak, of any desired intensity, day and night in our homes, it stands to reason that the development of germs will be checked and many diseases, as consumption, for instance, successfully combated by continually exposing the patients to the rays of these lamps. I have ascertained unmistakably that the light produces a soothing action on the nerves, which I attribute to the effect which it has upon the retina of the eye. It also improves vision, just exactly as the sunlight, and it ozonizes slightly the atmosphere. These effects can be regulated at will. For instance, in hospitals, where such a light is of paramount importance, lamps may be designed which will produce just that quantity of ozone which the physician may desire for the purification of the atmosphere, or if necessary, the ozone production can be stopped altogether.

"The lamps are very cheap to manufacture, and by the fact that they need not be exchanged like ordinary lamps or burners they are rendered still less expensive. The chief consideration is, of course, in commercial introduction, the energy consumption. While I am not yet prepared to give exact figures, I can say that, given a certain quantity of electrical energy from the mains, I can produce more light than can be produced by the ordinary methods. In introducing this system of lighting my transformer, or oscillator, will be usually located at some convenient place in the basement, and from there the transformed currents will be led as usual through the building. The lamps can be run with one wire alone, as I have shown in my early demonstrations, and in some cases I can dispense entirely with the wires. I hope that ultimately we shall get to this ideal form of illumination, and that we shall have in our rooms lamps which will be set aglow no matter where they are placed, just as an object is heated by heat rays emanating from a stove. The lamps will then be handled like kerosene lamps, with this difference, however, that the energy will be conveyed through space. The ultimate perfection of apparatus for the production of electrical oscillations will probably bring us to this great realization, and then we shall finally have the light without heat or 'cold' light. I have no difficulty now to illuminate the room with such wireless lamps, but a number of improvements must be made yet before it can be generally introduced."

THE TWIN-SCREW CRUISING YACHT "PRINZESSIN VICTORIA-LUISE."

During the past week there was lying at the docks of the Hamburg-American line a vessel which was conspicuous for its clipper stem and flaring funnels, features which, while they were common enough in the trans-Atlantic steamers of twenty-five years ago, are not seen in these days, outside of the private pleasure yacht. Although this vessel flies the flag of a trans-Atlantic line, she is in design and appointments an out-and-out yacht, which differs from other yachts mainly in her great size. The "Prinzessin Victoria-Luise" was designed for a class of service which hitherto has been performed by the regular ships of this company, and she is, we believe, the first vessel of her kind to be built for a trans-Atlantic steamship company purely for yachting purposes. She is 450 feet in length, 47 feet in beam, 30 feet in depth, and of 4,500 tons displacement. She is driven by twin-screw, quadruple-expansion, engines of 4,000 horse power. These are capable of driving her at a speed of 16 knots an hour, but since speed is not one of the objects of a pleasure cruise, the vessel will ordinarily be driven at from 13 to 13½ knots an hour. The capacity of the ship is determined by the seating accommodation of the dining saloon, which is rated at 220. None but first-class passengers are carried, and the staterooms, which are unusually commodious, contain no upper berths; a large number of the rooms, moreover, contain but one berth. A novel feature, which, like many others peculiar to this vessel, was recommended by the Emperor William, is the provision of double-light portholes, which, by turning a crank, may be swung open when the vessel is in southern latitudes. Other special features are the provision of three-sided shelters facing to the stern, which will enable passengers to remain out on deck in stormy weather without being exposed to wind or spray; a large gymnasium and a darkroom.