

THE HEAVENS IN FEBRUARY.

BY GARRETT P. SERVISS.

The general aspect of the starry heavens in February is not widely different from that which they presented in January. The constellations, all moving together, like an endless panorama, have simply shifted their positions thirty degrees, or two hours of right ascension, toward the west. This change of place is sufficient to cause the stars that in January were near the western horizon to disappear beneath it, and to bring into view above the eastern horizon other stars, not visible a month earlier. But the central and more conspicuous part of the sky shows little change except that Orion now stands on the west instead of the east side of the meridian, while the brilliant Sirius, at 9 o'clock in the evening at the middle of the month, appears almost exactly on the meridian, and some thirty-odd degrees above the southern horizon.

In the SCIENTIFIC AMERICAN for December 31 last, the constellation Orion was described with sufficient detail to enable anyone not previously familiar with the stars to recognize it, and to use it as a center of reference in finding other constellations. It will serve the same purpose in February, but it may be interesting and helpful to the beginner to point out the fact that the Milky Way may now be used as a line of reference for many of the most brilliant stars and constellations. The Milky Way is, however, too delicate a phenomenon to be well observed except on a perfectly clear and moonless night. It is also hopelessly dimmed by the glare of near-by electric lights. But seen in a country neighborhood, it is a marvel of beauty. At this season it rises like an arch (very irregular in outline, and varying greatly in brightness at different points) in the north-northwest, passes through the zenith, and disappears in the southeast. Its brightest parts are those overhead and toward the north.

Along the western border of the Milky Way, beginning in the south and ending in the northwest, the observer will see, in the order named, Canis Major with the flaming Sirius, Orion, Taurus with Aldebaran and the Pleiades, Perseus with Aries almost directly south of it, and Andromeda, the lowermost of whose long row of stars marks a corner of the Square of Pegasus, now sinking below the horizon. Along the eastern border of the Milky Way, following the same direction as before, he will see, opposite to Canis Major, an almost blank region occupied by Monoceros, then Canis Minor with the brilliant Procyon, then Gemini with its pair Castor and Pollux, then Auriga, whose chief star Capella is within the edge of the Milky Way, then Camelopardalis very inconspicuous, and finally Cassiopeia, whose zigzag of bright stars is entirely enveloped in the galactic glow.

Over in the northeast, opposite to Cassiopeia, as if balancing with her on a seesaw having the pole-star for its point of support, appears Ursa Major or the Great Dipper. East of Gemini is Cancer, recognizable by the glimmer of the little star cluster called Præsepe, or the Manger, and east of that again, having risen into a more prominent place since January, appears the sickle-shaped figure of Leo, whose brightest star is Regulus. Below Cancer is seen the diamond-shaped head of Hydra, a very long but not brilliant constellation which stretches away and disappears under the eastern horizon. Its single ornament is Alphard, a lone second-magnitude star below Regulus.

THE PLANETS.

Very splendid in the evening sky appear Jupiter and Venus. As in January, it is better to choose an earlier hour for observing them than that selected for studying the constellations, because they are both in Pisces, which is close to the western horizon and consequently sets early. Seven o'clock is not too early to begin observations. At the beginning of February the two great planets are between 20 deg. and 25 deg. apart, Jupiter being farther east and north than Venus. By the middle of the month they will be less than 15 deg. apart, and at the end of the month less than 5 deg., Venus in the meantime having moved northward as well as eastward. Although in actual magnitude Venus is very much smaller than Jupiter, she appears the brighter of the two because of her greater nearness to both the earth and the sun. The eye perceives at the first glance a notable difference in the color of the two planets, Jupiter's light having a pale golden tint while that of Venus is as white as if reflected from burnished silver. This difference arises from a variance between the nature of the reflection from the surfaces of these planets. The telescope shows that the disk of Jupiter is strikingly colored while that of Venus is virtually colorless.

Venus attains her greatest eastward elongation from the sun on the evening of February 14. At that time about one-half of her disk, as seen from the earth, appears illuminated; in other words a telescope will then show her in the form of a half-moon. After that date she will begin to assume a crescent shape, less than half of her disk appearing illuminated, yet she will continue to increase in brightness for more than a month, because she will still be approaching the

earth, and the effect of this approach will more than counterbalance that of the decreasing ratio of her illuminated disk.

Mars is still far over in the east, in the constellation Libra near the borders of Virgo, and cannot be well seen before two or three o'clock in the morning. He is slowly growing brighter, but his reign will not come until May and June, when he will be very bright.

Saturn is in conjunction with the sun on the 12th, passing after that date into the morning sky, but remaining for a long time too near the sun to be observed.

Mercury is a morning star in the constellation Sagittarius at the beginning of the month, and may be seen before sunrise. He is, however, approaching the sun. Mercury and Saturn are in conjunction on the 24th.

THE MOON.

New moon occurs on the morning of the 4th; first quarter near noon on the 12th; full moon on the afternoon of the 19th; and last quarter on the morning of the 26th. The moon is in apogee on the 8th, and in perigee on the 20th.

The lunar planetary conjunctions occur as follows: Mercury on the 2d; Saturn on the 4th; Venus on the 8th; Jupiter on the 10th; Neptune on the 15th; Mars on the 24th; Uranus on the 28th. There is a partial eclipse of the moon on the 19th, invisible in America.

JUPITER'S NEW SATELLITE.

The news from the Lick observatory of the discovery of a sixth satellite of Jupiter by Perrine, with the Crossley reflector, recalls in a striking way the recent discovery by Pickering of the ninth satellite of Saturn. Both are very minute bodies and comparatively distant from the planets that they attend. The new Saturnian satellite, however, is far more distant than that of Jupiter. It is probable that all of the larger planets are attended by minute satellites which escape telescopic scrutiny, but some of which may be detected from time to time with improved photographic apparatus.

AN ELECTRIC-ACOUSTIC SEA-SOUNDING APPARATUS.

A Norwegian engineer, H. Berggraf, has recently invented a new apparatus for sea sounding in which it is not necessary to touch bottom. This is accomplished by an acoustic method. The depths are also registered graphically upon a revolving drum. The operation of the device depends upon the time which sound takes to travel to the bottom and return, and the measurement of the time thus gives the depth to which the exploring apparatus is lowered. According to experiments it is found that sound takes 1 second to make the double distance of 2,000 feet. In his recent trials the vessel was equipped with an acoustic tube which could be lowered into the water. By means of an ordinary clock he could take the depth with considerable precision; thus four seconds shows about 8,000 feet. For more exact work he uses a registering apparatus, in which the depth is indicated on a band of paper. The apparatus consists of three parts—a transmitter, an acoustic receiver, and a chronometer. The sound is formed at intervals by a revolving disk which turns slowly and carries a projection on the periphery. The latter is made to strike against a fixed point and thus makes an electric contact at each revolution. The electric circuit has a magnet which operates a vibrating armature, and each time the contact is made, a sound is sent toward the bottom of the sea, whence it comes back to the vessel and is received in a microphone. The microphone is specially constructed so that it is only sensitive to sounds for which it is tuned, by means of a resonator. The vibrator is tuned to the same pitch, so that the membrane, upon receiving the sound from the bottom, will vibrate, and this movement is registered in the apparatus, taking account of the time which has elapsed between the closing of the electric contact and the reception of the sound in the microphone. It is said that the apparatus gives a very good set of curves for the different depths of sea bottom.

THE CURRENT SUPPLEMENT.

The current SUPPLEMENT, No. 1517, opens with an instructive article by Emile Guarini on an interesting producer-gas plant. Dr. N. Caro writes a valuable article on incandescent lighting by means of acetylene and the carburization of acetylene. The fifth installment of Prof. N. Monroe Hopkins's splendid series on experimental electro-chemistry likewise makes its appearance. In this paper the velocity of electrolytic induction is discussed, experiments with a high-speed special chronograph, capable of dividing a second into a million parts, being described. Prof. William Bateson concludes his splendid treatise on Breeding and Heredity. A new type of rotary pump is described which is reversible, and yet gives a true piston stroke like an ordinary pump. The British correspondent of the SCIENTIFIC AMERICAN describes a twelve-cylinder 150-horse-power racing motor for auto boats. Prof. E. C. Pickering writes on the light of the stars. Prof. G. W. Ritchey's paper on the Modern Reflecting Tele-

scope and the Making and Testing of Optical Mirrors is concluded. In this installment he describes how a great reflecting telescope is mounted.

SCIENCE NOTES.

In the October number of the Astrophysical Journal, Herr A. Nippoldt, of the Potsdam Magnetic Observatory, criticised a recent paper by Father Cortie on "The Solar Prominences and Terrestrial Magnetism." The latter had endeavored to show that the eclipse spot group of 1901, if it may be so called, by far the largest spot group of the year, had no effect upon terrestrial magnetism. Herr Nippoldt claims that a small but evident disturbance did take place during the passage of the spot. He is also emphatic that we have no right to assume that no disturbance has taken place unless magnetic stations near the pole have exhibited no deviations from their normal curve. He insists that there should be no kind of statistical definition of the idea of disturbance, that the maximum amplitude can hardly be usable to decide whether or not a curve is disturbed, and that we may represent the nature of the effect of the solar action upon terrestrial magnetism as a sort of relay action—"the strength of the releasing solar activity need not have a definite relation to the strength of the magnetic storm." He therefore desires to substitute for the statistical method the investigation in detail.

Berlin, says Knowledge, possesses a successor to the late lamented chimpanzee Consul, in the shape of Consul II., of which the following account has been published: Recently Consul II. appeared before a meeting of the German Psychological Society, and was the subject of a lecture by the eminent psychologist, Prof. Hirschlaff. The ape stood on the platform beside the lecturer in a smoking jacket, top hat, black trousers, boots, and shirt. Prof. Hirschlaff gave Consul an excellent character. He has good manners, is of a friendly disposition, and manifests symptoms of what would be called in human beings a loving nature. He has no objection to the vicinity of dogs, cats, or snakes, but is afraid of horses. No traces are seen in Consul of any special liking for women and soldiers. Like most apes he delights in children, but evinces an abhorrence of dolls, of which he can make nothing, and retires vanquished from their presence. If Consul is tickled he sometimes shrieks with laughter. When punished he acts like a child, holding his hands before his face. If discovered at anything he is forbidden to do he assumes hypocritically an innocent demeanor, which is distinctly human. He is restless, and cannot sit long in one position. With an excellent memory, he is yet incapable of expressing his wants either by gestures or sounds. He cannot be taught to whistle, nor does he understand human speech. All he can comprehend is the tone of a voice or the rhythm of words; and he cannot be taught to reckon. Although Prof. Hirschlaff said that the psychological abilities of Consul are separated from those of human beings by a wide gulf, it is interesting to note how many complicated actions he can comprehend with the intellectual powers he possesses.

The description (in the Annals and Magazine of Natural History) of a new species of those strange worm-like burrowing amphibians generally known as cæcilians, but which may be better designated in popular zoology as snake-salamanders, would scarcely seem at first a subject for notice in this column; but, as a matter of fact, this particular case has a very wide and important interest. The species in question, which comes from Kacher district of Assam, is described by Major Alcock under the name of *Herpele fulleri*; and it is in regard to the peculiar geographical distribution of the genus that the interest of the new discovery lies. With the addition of the new species, the genus *Herpele* is represented in India, Panama, and West Africa; and, as Major Alcock remarks, such a distribution in the case of a worm-like burrowing group appears altogether inexplicable on the theory that continents and ocean-basins are permanent, or, indeed, anything like permanent. On the other hand, the distribution of *Herpele*, together with that of certain sublittoral hermit-crabs, which is curiously similar, affords strong support to the now generally accepted view that India and Africa were connected by land at a comparatively recent epoch of the earth's history (that is to say, within the lifetime of an existing highly specialized genus). The two instances also add one more link to the chain of zoological evidence which apparently points to a former land connection between Africa and South America across the Atlantic. The Indo-African connection, which is supported by geological as well as by zoological evidence, would explain the presence of cæcilians in the Seychelles as well as the absence of the above-mentioned littoral hermit-crabs from the east coast of Africa. The alternative view to the trans-Atlantic connection between West Africa and America (apart from one by way of the Pacific) would be that these snake-salamanders traveled from a common northern home down the Eastern and Western Hemispheres, but this seems almost incredible.