extraordinary phenomena to which I alluded in my last letter may account for this.

Besides, I have gained nothing by waiting, and at the present time, after successive delays which I much regret, I am hardly further than I was a month ago. Owing, perhaps, to the images being less satisfactory, or to the phenomena in question not having recurred, nothing has been added to my first observations.

The phenomena alluded to are brilliant projections, comparable in colour and brightness to the southern pole cap, observed on three different occasions—viz., June 10 and July 2 and 3, on the western limb of the planet.

The last time, July 3, I was able to observe the several phases of this singular appearance. On that day the luminous point began to emerge on the edge of the disc at 14h. 11m. (local astronomical time), very faint at first; then I saw it gradually increase, pass through a maximum, and then diminish, to disappear finally about 15h. 6m. The facts would not have been different had it been a case of an elevation of the surface of Mars traversing the illuminated edge of the disc by the simple effect of the rotation of the planet. The phase which affected the western limb of the planet at that time, could only modify it in amount and in duration. The previous night, July 2, I had seen the crescent in a phase approaching the maximum, at 14h. 10m., and I was able to follow the bright point up to its complete disappearance at 14h. 40m.

On July 2 and 3 the things happened in the same part of the disc, about the 50th parallel of latitude, and with a retardation of half an hour against the previous day, as usual for a thing taking place in the same region of the planet.

The first observation of this kind goes back as far as June 10, when it lasted from 15h. 12m. to about 16h. 17m. This time the bright point occurred in the vicinity of the 30th southern parallel, probably in the southern portion of the isthmus Hesperia of Schiaparelli's chart.

I may add that during these observations the portion of the disc adjoining the small protuberance has always appeared to me slightly deformed and as if raised.

Such are the facts. I shall not attempt to interpret them. They presented themselves with such clearness that it is hardly possible to consider them as the result of any illusion.

On the other hand, since it is a question of projection beyond the disc of at least one or two tenths of a second of arc, that is to say, of phenomena at a height of more than 30 or 60 km., one feels overwhelmed by such numbers, to which we are not accustomed on our globe, and it is undoubtedly luminous phenomena only which could explain heights like that.

The southern snow cap has been the object of several measurements, which will be published with the drawings of this opposition. This cap has notably diminished in the last two months; it is, in fact, shifting; it is traversed by at least two black lines, a kind of crevices analogous to those which I announced in 1888 in the case of the northern cap. The first of these lines was seen at the end of June, the second on August 8.

The outline is now more irregular than in the past; in particular there is seen, between the meridians of 300° and 0° (Schiaparelli's map), a deep black hollow which grows steadily.

Although the actual conditions are not very favourable for the canals (at least for a portion of them), several are well visible; some are apparent enough to convince the most prejudiced observers.

Two of our drawings of the Great Syrtis, made at widely different dates, indicate some slight changes in the most northerly portion of this sea. They are no doubt due to mists and clouds, which have sometimes appeared to me to invade the northern regions on the east of this Great Syrtis, hiding the canals which traverse them, and only allowing us to see their most southern portion.

Our drawings of the Lake of the Sun, when compared with those of M. Schiaparelli, also indicate some changes of detail in the aspect of the lake itself and of the seas and canals surrounding it.

The most interesting observation of this month is the one I have made, on August 6, of a very bright point placed precisely a little to the north of this Lake of the Sun. This point, which struck me by its extraordinary radiance, could not be seen the next day; if it still existed—the images were not so good as the previous night—it was certainly much less luminous.

This phenomenon, and the analogous phenomena sometimes noticed on the surface of the planet, are perhaps not without some relation with the appearances of the limb which I have announced. Future observations will no doubt inform us on this subject.

I should perhaps have still deferred sending this letter if I had not, within the last few days, received from Mr. Newcomb the extract of a journal, in which it is reported that the Lick astronomers have also observed the luminous projections on the edge of the disc.

I may add that in the beginning of July I had imparted my observations to M. André, director of the Lyons Observatory, who happened to be on a visit to Mont Gros, and whom I had invited to come on the 5th and verify the strange appearances which I had told him of. Unfortunately, the sky remained obscured all night, and my project could not be carried out.

## SCIENTIFIC SERIALS.

THE *American Meteorological Journal* for August contains:—Synoptical sketch of the progress of Meteorology in the United States, by W. A. Glassford, and reprinted from the annual report of the chief signal officer for 1891. From this summary it appears that Isaac Greenwood, a professor of mathematics in Harvard College, prepared a form for observations at sea in 1728, thus anticipating the efforts of Lieut. Maury by more than a century. Observations of temperature and rainfall were begun in Charleston in 1738, and were soon followed by several other series. In 1817, J. Meigs, Commissioner of the General Land Office, proposed to Congress the establishment of meteorological stations at each of the land offices, and as this proposal was not adopted, he started a voluntary system among his subordinates, and supplied registers for the purpose. This system lasted until his death in 1822. The next service was established by the Surgeon-General of the Army, in 1819, and was maintained, with modifications, until 1854, when the records were handed over to the Smithsonian Institution, and in due time were transferred to the Signal Service. The Patent Office, of which agriculture formed a division, and the Coast Survey also manifested great interest in the science. The article contains a good review of the labours of the principal American meteorologists.—Note on winter thunderstorms; by Prof. W. M. Davis. He asks whether the convectional origin of thunderstorms in summer implies a like origin for thunderstorms in winter, even though they occur then at night, and he explains the reasons which seem to favour this supposition.—Objections to Faye's theory of cyclones; by W. C. Moore. The writer attempts to show why the generally accepted theories seem to him preferable to those brought forward by M. Faye. The discussion is to be continued in a future number.—Artificial rain; by E. Powers. The writer is the author of a work entitled "War and the Weather," and he supports the view that rain can be artificially produced, and endeavours to refute the objections urged by Prof. W. M. Davis and others.

*Wiedemann's Annalen der Physik und Chemie*, No. 8.—On the refraction of rays of great wave-length in rock-salt, sylvine, and fluorspar, by H. Rubens and B. W. Snow. A series of bolometric researches concerning the infra-red rays, to determine the refractive indices of the three substances for light of various wave-lengths up to $\lambda = 80,000$. Fluorspar, though showing a lesser dispersion than the other two in the visible portion, excelled them enormously in the infra-red, hence it is specially suited for the production of prismatic heat spectra.—Reflection and transmission of light in certain æolotropic structures, by H. E. J. G. du Bois. An æolotropic structure is a portion of matter, generally plane, in which it is possible to fix upon an optically favoured direction. This can be due to its coarse macroscopic or its molecular and microscopic structure. In both cases vertically incident or reflected light will be acted upon differently according as its plane of polarization is parallel or normal to the favoured direction. This action is in general unequal as regards both the amplitude and the phase of the two components. The objects experimented upon were, in the first class, bright silver wire gratings, platinum film gratings, scratched metal reflectors, and scratched glass gratings; in the second class, crystals of cobaltine and pyrites, and a loaded steel mirror. In the case of the silver wire gratings it was found that light polarized in a plane normal to the direction of the wires was let through in greater intensity

than that polarised parallel to them. The contrary was observed in scratched glass gratings, while a scratched metal mirror reflected 4 per cent. more perpendicular than parallel light.—The limiting index of refraction for infinitely long waves; transformation of the equations of dispersion, by E. Ketteler. The determination of the limiting coefficient of refraction is shown to be impossible, both in practice and by the current theory. Another form of the equation of motion of light is worked out, which promises a solution of the problem. —On the electricity of waterfalls, by Ph. Lenard. Numerous observations and experiments concerning the electricity developed by water falling in drops, jets, or waterfalls have led to the following general conclusions: Drops of water falling on to water or a wetted body generate electricity. Water is electrified positively, air escapes negatively electrified from the foot of the fall. Jets breaking up into spray make the electrification more apparent. Slight impurities in the water diminish the effect considerably. Other liquids and gases also produce electrification, but differing in intensity and sign. The essential conditions of electrification are the concussions among the waters themselves and against the wet rock. The friction against the rock and the fall of the earth-potential are of secondary importance, while no effect is due to the water's fall through air and its dispersion in it. The author explains these phenomena by the sudden diminution of the water surface, and the convection of negatively charged air away from the foot of the fall. A jet of water falling from an insulated tank into an insulated pail electrified the latter positively, while the negative electrification of the surrounding air grew to several hundred volts. A steady increase of potential was also produced by drops of water falling at the rate of two per second. Sparks were sometimes obtained from waterfalls, and in all cases the air was found to be negatively charged, though this charge was diminished if air bubbles were driven under water.—Note on a phosphoroscope with spark illumination, by Ph. Lenard. This ingenious apparatus consists of a Ruhmkorff coil with condenser and mercury interrupter, fitted with terminals of strip zinc or zinc wire, in order to produce as much ultra-violet and phosphorescent light as possible. The arm of the mercury interrupter is prolonged, and carries at its end a rectangular shade of black paper, large enough, in its mean position of rest, to hide the spark and the terminals. Hence when the coil is working the sparks are not seen. But if a phosphorescent substance be placed behind the terminals, it continues to glow when the screen is at its highest or lowest position, thus producing the impression as if the screen, which appears perfectly stationary, were only transparent for phosphorescent light. For lecture purposes the apparatus is placed behind a screen with an opening as large as the black paper shade. The results are in general the same as those of Becquerel's phosphoroscope. A brilliant green light is obtained from pentadecylparatolylketone. The interval between illumination and observation is $\frac{1}{600}$ second.—On the production and observation of very rapid electric oscillations (continued), by A. Toepler.—On the use and mode of action of the telephone for electric null methods, by A. Winkelmann.

## SOCIETIES AND ACADEMIES.

### PARIS.

**Academy of Sciences**, Sept. 5.—M. de Lacaze-Duthiers in the chair.—Note on the treatment of cancer and cholera by the testiculary liquid, by M. Brown-Séquard. Some recent results seem to indicate that the testiculary liquid, already proved to be efficacious in cases of pulmonary tuberculosis, leprosy, and other diseases, also exerts a beneficial influence on cancer patients. This is not due to any action upon the microbes producing the disease, but to an augmentation of the powers of the nervous system, which is enabled to resume its normal functions by subcutaneous injections of the extract. M. Ouspensky, a military physician sent by the Russian Government to study and cope with the cholera in the Caucasus, is reported to have "cured every patient" by this method. Whether or not this be true, there is no doubt that the injections strengthen the nervous system, which is much exhausted even in convalescents.—Observations of the comet Denning (1892, II.) made at the great equatorial of the Bordeaux Observatory, by MM. G. Rayet, L. Picart, and F. Courty, reported by M. G. Rayet.—Observations of the planet Mars, by M. Perrotin [see p. 482]. —Reappearance of the leafy celandine of Pumeterre, by M. D. Clos.—Observations of the new comet Brooks (C. 1892), and of the new planet Wolf, made at the Observatory of Paris (west equatorial), by M. G. Bigourdan.—Observation of the comet Brooks (August 28, 1892), made with the Brunner equatorial (0·16) of the Lyons Observatory, by M. G. Le Cadet.—On the calculation of inequalities of a high order, by M. O. Callandreau.—On a new form of induction apparatus, by M. J. Morin. The induction coils usually employed in electrotherapy are constructed with two cylindrical and concentric bobbins, sliding one over the other, and giving the maximum effect when the coils coincide along their whole length. There is a difficulty in reaching the zero by a regular diminution of the current. This is obviated in the apparatus as constructed by M. Morin. The conducting wires are wound on two flat concentric rings provided with channels of appropriate form. When an intermittent current is sent through the outer ring induced currents will be obtained from the inner ring. The effect will be greatest when the two rings are in the same plane. If one of these rings be turned round a diameter common to both the induced current will gradually diminish, and will vanish when the one ring is at right angles to the other. This arrangement could be employed for obtaining alternate currents by sending a continuous current through one of the rings and rotating the other. A sinusoidal current would be thus generated, the effects of which have been lately much appreciated in electrotherapy. For electric lighting the number of alternations might be increased by transforming the currents into induced currents of a higher order, by Prof. Henry's method, utilized recently by M. Tesla.—Removal of the thyroid in the white rat, by M. H. Cristiani (Geneva). The apparent immunity of the rat from the fatal effects of the removal of the thyroid is shown to be due to the rapid regeneration of this organ. If the extirpation is total, death, otherwise inevitable, can be averted by grafting the organ in the peritoneum.

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