

The First Moon-Photographs Taken with the Great Paris Telescope.

BY FRANÇOIS DELONCLE.



I AM a firm believer in the great rôle played by International exhibitions in the general advancement of the human race and in impressing peoples with a notion of their mutual solidarity. Prince Albert, who was the first to tenaciously follow up the idea that culminated in the gathering together of the nations in Hyde Park fifty years ago, deserves, in my opinion, to be ranked with the greatest inventors and benefactors of mankind.

In July, 1892, therefore, when I brought forward my motion in the Chamber of Deputies that France should celebrate the dawn of the twentieth century by holding another such exhibition in Paris, I was but obeying my most intimate conviction. Both in Parliament and in the country the proposition encountered at first, for one reason and another, marked hostility; but, eventually, all its most bitter opponents were won over. A fear, universally expressed, was that Paris would never be able to eclipse the Exhibition of 1889, the success of which was so enormous. I am free to confess, now, in the apotheosis of its successor, that I myself was not entirely without misgivings of this kind at times. From an artistic standpoint I had no such fear. I do not think I shall be charged with unjustifiable national bias when I say that I never doubted that France would once more be able to extort the admiration of the universe.

I felt, however, that it was not sufficient that the Exhibition of 1900 should be exclusively an artistic triumph; it must also, if possible, mark an epoch in history by bringing science, which bids fair to completely revolutionize the world in the near future, home to the popular mind. For a long time I revolved various schemes in my mind, rejecting one after another as impracticable. A chance visit I paid one day to the Paris Observatory was the means of deciding the point for me.

At this celebrated establishment, as most people who are interested in the question are aware, M. Lœwy has been engaged for some years past in compiling an elaborate atlas of the moon's surface from photographs taken by the large jointed equatorial telescope. Astronomy having long been one of my favourite distractions, M. Lœwy's work possessed a special charm for me.

"With an instrument of double the power of this you could, no doubt, obtain even better results?" I said to M. Lœwy.

"Certainly," was the answer.

"And if the telescope were three or four or six times as powerful, better still, no doubt?"

"Naturally; but such an instrument is not likely to be forthcoming for a long time."

At that moment my resolution was taken.

"Why," I asked myself, as I left the Observatory, "should I not have a telescope made for the Exhibition on a larger scale than has ever yet been attempted?—a telescope that would bring the celestial bodies almost to our doors? What could possibly be more calculated than such an instrument to enlarge the horizon of human understanding?"

Before I reached home I was determined that, if energy and perseverance could do what I thought they could, the dream should be converted into a reality.

I lost no time in drawing up the first preliminary outline of the scheme. As I anticipated, the project at once captured the popular imagination, and "*La Lune à un mètre!*" became in a day one of those catchwords that fly round the world as fast as the electric telegraph can take them.

If the public was sympathetic, however, it was far otherwise with most of the specialists, who almost stigmatized the whole scheme as the wild dream of a visionary, incapable of being realized in practice. At first, in my enthusiasm, I was inclined to pooh-pooh all these objections, but the farther I pursued



DIRECT PHOTOGRAPH OF THE MOON, OBTAINED WITH THE GREAT PARIS TELESCOPE, AUGUST 15TH, 1900, AT 3 A.M.

From a Photo. by M. C. Le Moirean.

The white circle in the lower corner is a shilling, which gives an idea of the size of the original negative, here reduced to $\frac{1}{4}$ size.

my investigations the more clearly did I perceive how well grounded some, if not all of them, were.

At every door at which I knocked I obtained a similar answer.

"Impossible to make lenses such as you require," I was assured in Paris, in Dublin, and in New York.

"Impossible to polish such lenses, even supposing they could be made."

"Impossible to poise such a telescope as you describe."

"Impossible to see anything through it if it were poised."

We Bretons, however, are an obstinate race. When we are persuaded we are on

the right track nothing will make us swerve from it. Obstacles serve but to increase our determination to surmount them. Rather will we go to the bottom with our ideas and our principles, as did my poor brother when in command of the ill-fated *Bourgogne*, than turn traitor to our convictions or our duties. The long series of "impossibles," in a word,

only served to stimulate my ardour. One by one I demonstrated their falseness.

The lenses were made of the size I wished, though, it is true, they were polished by machinery which had to be specially invented for the purpose, instead of by hand as had always hitherto been the case.

Breton though I be, however, I was not



From a Photo. by] QUARTER-SIZE REPRODUCTION OF A PHOTO. TAKEN AUGUST 16TH, 1900, AT 3.30 A.M. [M. C. Le Moisan.



From a Photo. by QUARTER-SIZE REPRODUCTION OF A PHOTO. TAKEN AUGUST 17TH, 1900, AT 4 A.M. [M. C. Le Moran.

so obstinate as to run counter to reason, and I very early saw the force of the objection which said it would be out of the question to poise a telescope, 200ft. in length, in the usual way. The difficulty was met by utilizing the siderostat, that invention of the renowned physicist, Foucault. The siderostat is a mirror

that can be turned in any direction, and in which the celestial bodies are reflected, their images and not themselves being thus observed. While the telescope remains always fixed, the mirror turns, in fact.

Readers of THE STRAND MAGAZINE have had all these material difficulties described to

them at length by the pen of an English journalist who has followed the growth of the telescope from its birth, so I will not enlarge further on them.

What, however, they do not equally well realize, perhaps, are the moral difficulties I had to encounter, both in the shape of active opposition and passive inertia, and my own frequent fits of discouragement, when I had nothing to oppose to what was apparently well-grounded argument but my firm conviction in ultimate success.

At last the day came when the telescope was finally completed and in place ready for the first trial of its capabilities.

What reader is there who will not sympathize with my feelings on this occasion, or with those of the men who had collaborated with me and stood faithfully by me from the first?

As is invariably the case, whenever an innovation that sets at naught old-established theories is brought forward, the prophecies of failure were many and loud, and I had more than a suspicion that my success would cause less satisfaction to others than to myself. Better than anyone else I myself was cognizant of the unpropitious conditions in which my instrument had to work. The proximity of the river, the dust raised by hundreds of thousands of trampling feet, the trepidation of the soil from the working of the machinery, the changes in temperature, the glare from the thousands of electric lamps in close proximity—each of these circumstances, and many others of a more technical nature, which it would be tedious to enumerate, but which were no less important, would have been more than sufficient to make any astronomer despair of success, even in observatories where all the surroundings are chosen with the utmost care.

"In regions pure of calm and serene air" large new instruments take months, more often years, to regulate properly.

In spite of everything, however, I still felt confident. Our calculations had been gone over again and again, and I could see nothing that, in my opinion, warranted the worst apprehensions of my kind critics.

It was with ill-restrained impatience I waited for the first night when the moon should show herself in a suitable position for being observed; but the night arrived in due course.

Everything was in readiness. The movable

portion of the roof of the building had been slid back and the mirror of the siderostat stood bared to the sky.

In the dark, square chamber at the other end of the instrument, 200ft. away, into which the eye-piece of the instrument opened I had taken my station with two or three friends. An attendant at the telephone stood waiting at my elbow to transmit my orders to his colleague in charge of the levers that regulated the siderostat and its mirror.

The moon had risen now, and her silvery glory shone and sparkled in the mirror.

"A right declension," I ordered.

The telephone bell rang in reply.

"Slowly—still slower—now to the left—enough—again a right declension—slower—stop now—very, very slowly."

On the square ground-glass plate before our eyes the moon's image gradually crept up from one corner until it had overspread the glass completely.

And there we stood in the centre of Paris examining the surface of our satellite, with all its craters and valleys and bleak desolation! I had won the day!

On August 14th the first of a successful series of direct photographs, 2ft. square, three times as large as the largest that had ever hitherto been taken, was obtained by M. C. Le Morvan, the distinguished astronomer who has long been M. Lœwy's right hand at the Paris Observatory. These epoch-marking photographs are here reproduced for the first time.

For me, at least, the appearances noted in these photographs completely re-establish and confirm the old theory that the moon is but a mass of volcanic basalt, without atmosphere and without life, another proof of the universality of the law of growth and decay, and an awe-inspiring example of what our own planet may some day be when more cycles of millions of years have rolled by.

What other discoveries the siderostat of 1900 may be destined to make the future alone can show, but that it will immeasurably increase our knowledge of the worlds by which we are surrounded there can now, I think, be no doubt.

I have at least the satisfaction of telling myself I have been the means of taking a great step towards bringing the oldest, the most comprehensive, and the most stupendous of the sciences down to the level of the least educated mind.