of such extreme delicacy as photographing the corona, and in which no little skill and special experience are necessary on the part of the *photographer* as well as on the part of the physicist.

Mr. Pickering has no doubt received authority from Dr. O. Lohse to say that "he (Dr. Lohse) considers that the halo on his plate is wholly atmospheric, and not coronal;" but Dr. Lohse's published statement reads differently. Dr. O. Lohse's words are, "Es gelang aber dieselben (die schwierigkeiten) zu überwinden und resultate zu erhalten welche zu einer fortsetzung der — hier freilich selten möglichen und mit grösserem vortheil in möglicht hoher lage anzustellenden — experimenten ermuthigen." — *Vierteljahrsschrift der Astronomischen gesellschaft*, xv. 134.

I have not seen Dr. Lohse's plates, and can therefore express no opinion as to the nature of the appearances upon them. William Huggins.

THE PRESERVATION OF NIAGARA.

Nearly seven years ago Lord Dufferin, then governor-general of Canada, suggested to Gov. Robinson of New York that the governments of the province of Ontario and the state of New York should purchase such lands about Niagara Falls as would be required to give free access to the principal points of view, and serve to restore and preserve the natural scenery of the great cataract, beside securing to visitors freedom from those vexatious annoyances which now abound. Subsequently the governor-general called the attention of the government of Ontario to the matter, and recommended co-operation with the state of New York in accomplishing this purpose.

Later, in January, 1879, Gov. Robinson, in his annual message to the legislature of New York, presented this matter, and recommended the appointment of a commission to investigate the question, to confer with the Canadian authorities, to consider what measures were necessary, and to report the results to a succeeding legislature.

By resolution the commissioners of the state survey were charged with the investigation. This commission included some of the most distinguished men of the state, — Ex-Gov. Horatio Seymour, Vice-President of the United States W. A. Wheeler, Lieut.-Gov. Dorsheimer, President Barnard of Columbia college, and others.

With breadth of view worthy of such men, they state in their report, that, "under this resolution, it became the duty of the commissioners to ascertain how far the private holding of land about Niagara Falls has worked to public disadvantage through defacements of the scenery; to estimate the tendency to greater injury; and, lastly, to consider whether the proposed action by the state is necessary to arrest the process of destruction, and restore to the scenery its natural character." In pursuance of these objects, the commissioners instructed Mr. James T. Gardiner, director of the state survey, to make an examination of the premises, and prepare for their consideration a project. He was assisted in this work by Mr. Frederick Law Olmsted, the distinguished landscape-architect.

The examination showed that the destruction of the natural scenery which forms the framework of the falls was rapidly progressing: unsightly structures and mills were taking the place of the beautiful woods that once overhung the rapids; the fine piece of primeval forest remaining on Goat Island was in jeopardy from projects looking to making a showground of the island; and every point from which the falls could be seen on the American side was fenced in, and a fee charged for admission. It was found, that, owing to the topography of the main shore, it was practicable to restore its natural aspect by clearing away the buildings from a narrow strip of land 100 to 800 feet broad and a mile long, and planting it with trees which would screen out from view the buildings of the village. When these trees should be grown, and the mills removed from Bath Island, and trees planted there, the falls and rapids would be again seen in the setting of natural foliage which formed so important an element in their original beauty. Every point from which the falls could be seen would also become free of access by the plan proposed. A map was made showing just what lands should be taken to carry out these purposes. The commissioners adopted the plan of Mr. Gardiner and Mr. Olmsted, and recommended to the legislature of 1880 the passage of an act to provide for acquiring title to the necessary lands by the exercise of the right of eminent domain, leaving it to a future legislature to consummate the purchase by appropriating the amount for the payment of the awards, if the sum should seem a reasonable price for the property. Such an act passed the assembly, but was defeated in the senate, although the movement was supported by petitions signed by the most distinguished men of this and other countries. The report of the state survey, with its complete descriptions, illustrations, and maps, then became the basis of a systematic effort on the part of a few determined friends of the falls to educate and arouse public opinion to save the scenery of Niagara. Early in 1883 this

movement ripened into the organization of an association to promote legislation for preserving the scenery of the Falls of Niagara, Mr. Howard Potter of New York being president, and Hon. J. Hampden Robb, chairman of the executive committee.

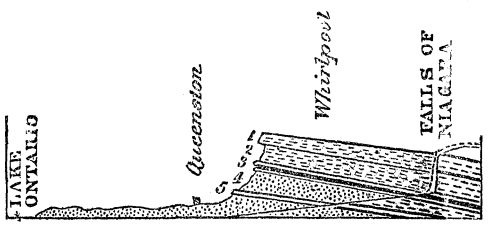
Through the efforts of this Niagara-Falls association, an act was passed, in 1883, providing for a commission entitled 'The commissioners of the state reservation at Niagara,' and giving them power to proceed through the courts to condemn the lands needed. Ex-Lieut.-Gov. William Dorsheimer is the president of this board; and the other members are President Anderson of Rochester university, Hon. J. Hampden Robb, Hon. Sherman S. Rogers, and Andrew H. Green. With some modifications made necessary by changed conditions, they adopted the plan proposed by the state survey. The lands selected were then surveyed, and their value appraised by a commission of very high character, appointed by the court, the total valuation of the lands being $1,433,429.50. The report of the commissioners of the reservation was made to the present legislature, and a bill to appropriate this sum was introduced. The Niagara-Falls association worked in every part of the state to arouse public opinion to the importance of making this appropriation, and the commissioners labored most earnestly among the legislators and the people. The battle was a hard one against ignorance and narrow-minded selfishness; but the victory is complete. The legislature, by more than a two-thirds majority, has appropriated the $1,433,429.50, and the governor has approved the act.

After six years of almost continuous effort on the part of the active friends of this enlightened project, it is secured by a law which declares that the lands are purchased by the state in order that they may be 'restored to, and preserved in, a *state of nature*,' and that every part of them shall be forever free of access to all mankind.

THE NIAGARA GORGE AS A CHRONOMETER.

THE recession of the falls of Niagara will be understood by reference to the accompanying figure.

The strata, as will be seen, dip gently (twenty-five feet to the mile) toward the south. The upper stratum (No. 1) consists of compact Niagara limestone about eighty feet in thickness. Underneath it (No. 2) is the comparatively soft Niagara shale of about the same thickness. Nos. 3 and 5 are also strata of hard rock, with a softer rock intervening. The river formerly plunged over the escarpment at Queenston, about seven miles below the present cataract, and where the perpendicular fall must have been upwards of three hundred feet. From that point to the present cataract, the river now occupies a narrow gorge from five hundred to twelve hundred feet in width, and from two hundred and fifty to three hundred and fifty feet in depth. The manner of the recession is easily understood from a glance at the diagram. The softer rocks (Nos. 2 and 4) rapidly wear away, thus undermining the harder rocks above, and leaving them to project over, and finally to break off in huge fragments, and fall to the bottom, where they would lie to obstruct the channel, were it not for the great momentum of water constantly pouring upon them, and causing them to grind together until they are pulverized and carried away piecemeal. The continuity of the underlying soft strata insures the continuance of a projecting stratum at the top, and a perpendicular plunge of the water when passing over it.



SECTION OF THE STRATA ALONG THE NIAGARA RIVER, FROM LAKE ONTARIO TO THE FALLS.

Double interest attaches itself to the Niagara gorge, when we consider the evidence of its post-glacial origin, and thus are permitted to regard it as a chronometer of the glacial age.

That the Niagara River can have occupied its present channel only since the glacial period, was shown by Professor Newberry when he proved that the Cuyahoga River, emptying into Lake Erie at Cleveland, occupied in preglacial times a channel about two hundred feet below its present bed, borings in the bed of the Cuyahoga extending that distance in glacial clays before reaching the rock. To receive a tributary at that depth, the level of Lake Erie must, of course, have been correspondingly depressed; and, as the lake is nowhere much more than two hundred feet in depth, we may confidently say, that, before the glacial period, such a body as Lake Erie did not exist, but