

# SCIENTIFIC AMERICAN

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## THE GREAT RUSSIAN TELESCOPE.

We have seen the wonders of the starlit sky through the largest and best refracting telescope in the world; but the wonderful instrument is not destined to remain in this country. The most important part of it, the object glass, with the cell that holds it in place, will soon be on its way to the Russian Observatory of Pulkowa, located on the Pulkowa hills, nine miles south of St. Petersburg, and commanding a fine view of the capital. The observatory was built and richly endowed by the Czar Nicholas in 1839, and has won high renown on astronomical annals for the work it has already accomplished under its first director, the eminent astronomer Wilhelm Struve, as well as under his son, Otto Struve, who became director in 1864, upon the death of his distinguished father, and still holds the honorable position.

The Russian Government was not satisfied with the capacity and size of the present working force of the observatory, and determined to have a new refracting telescope constructed which, in mechanism and optic power, should surpass any telescope in existence. The director (Struve) was commissioned to carry out the plan. The most perfect workmanship attainable was to be put in requisition, and Struve chose from all the world, for the execution of the difficult and delicate task, the Messrs. Alvan Clark & Sons, the famous telescope makers of Cambridgeport, Mass.

Struve came to this country, and intrusted to their skillful hands the making of the object glass, with a diameter of thirty inches, and its cell. The mounting of the great telescope is being made in Hamburg, Germany, by Messrs. Repsold & Sons. The Pulkowa object glass is four inches larger than that of the Washington telescope finished in 1873, and seven inches larger than that of the similar instrument recently completed for the Princeton Observatory, both telescopes being the work of the same makers. The arrangements with Messrs. Clark were made in the summer of 1881, and the great objective was completed in October, 1882.

A temporary equatorial stand was erected in the yard of the workshop, in order to test the quality, power, and perfection of the glass. It consists of a pier of solid masonry, to which a tube of sheet iron, made in three sections, is firmly fixed, with the necessary mountings to secure its movement in the required direction. The object glass, the eye pieces, and other appurtenances being then placed in position, the great refractor was ready to show its working power, and to reveal any slight imperfections in the polish or finish that required attention. The precious

glass bore the testing process with triumphant success, and is pronounced by the makers to be the best that has left their hands.

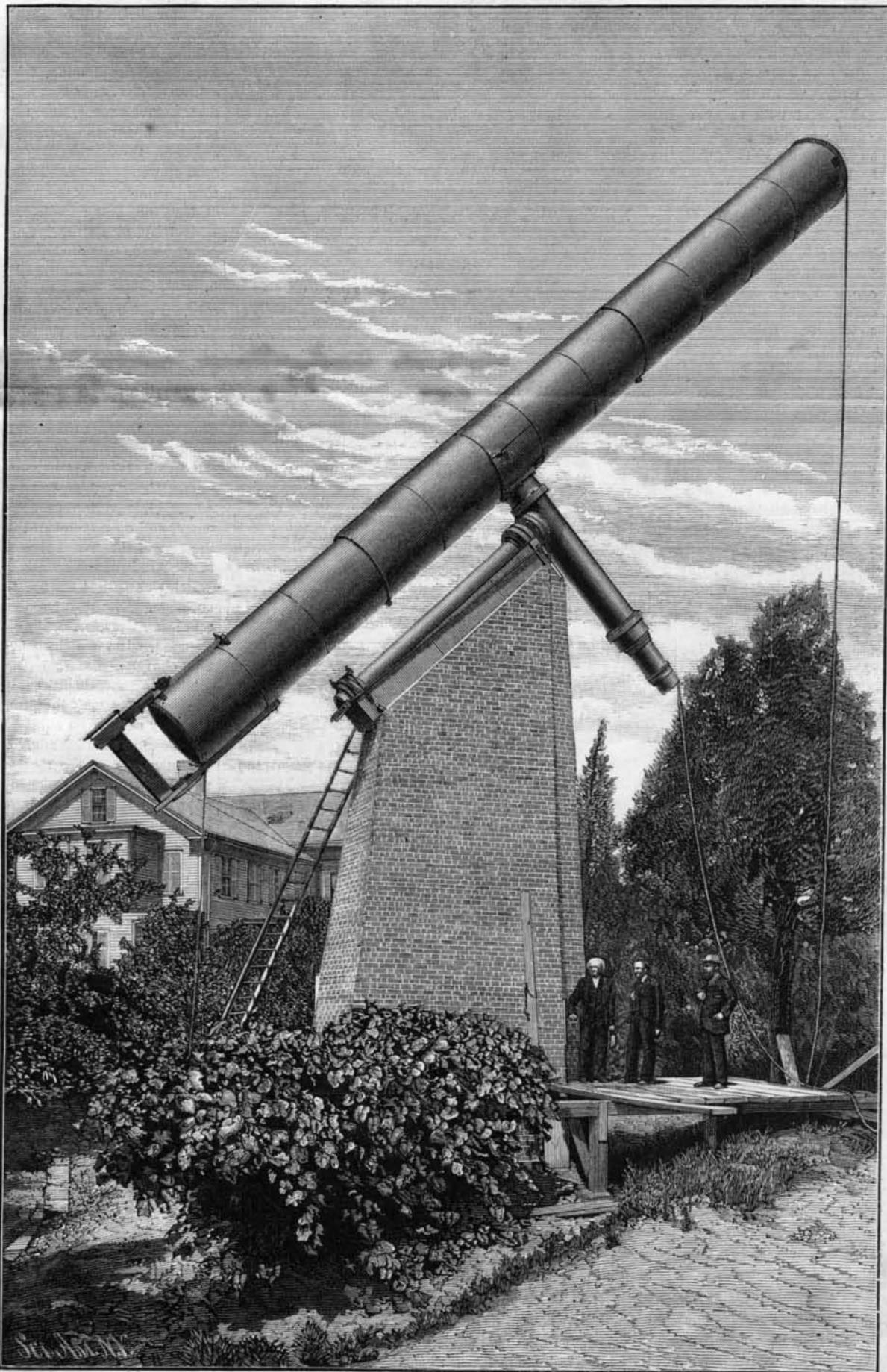
But the supremacy of the Russian telescope as the largest of its kind in the world will be of short duration. The same trial mounting will be used by the Messrs. Clark for testing the thirty-six inch object glass which they have engaged to make for the Lick Observatory of California.

The pier of the temporary structure is twenty-seven feet in height; the tube is forty-five feet in length, with an aperture of forty inches in diameter. Figures, however, give a faint idea of this giant structure. It must be seen looming up under the sky before its huge dimensions can be realized. A view of the heavens through its great eye must be taken before its wondrous light-gathering power can be imagined.

The evening of our observation is intensely cold, but the sky is undimmed by the shadow of a cloud, the atmosphere is free from a breath of moisture. The heavens present a scene of exceeding beauty as the party of observers take their places under the stars. The last lingering rays of twilight faintly suffuse the west, the new moon, only a day old, holding the old moon in her arms, is nearing the horizon, and the zodiacal light spreads its cone of pale gold high up among the eternal stars. Under the dark dome arching above us, the brightest stars and clusters of stellar space look down with friendly eyes, and seem to hang low, as if they would hold communion with mortals. Among them thread the planets Jupiter and Saturn, whose mysterious portals we, audacious invaders, are seeking to enter this night with necromantic art. Rising from a surface of unbroken snow, and looming up with shadowy indistinctness, the huge telescope seems to pierce the skies, while the observers at its base dwindle to pygmies.

After a short time the instrument is ready for action; its open eye is turned upon the planet Saturn. The serene star, upon which a moment before we had turned our unaided eye, is suddenly transformed into a creation of surpassing beauty. A superb golden sphere, as large as the full moon, lies before us. Saturn is softly cradled in the protecting embrace of his engirdling rings, and seven of his eight moons are visible as bright points on the dark background of the sky. Titan, the largest moon, has a perceptible disk. Every detail of the magnificent and complex Saturnian system is complete. The outer ring, with its faint line of division; the division between the outer and inner rings; the inner or second ring; the third or crepe ring, closely joined to the second; the break on the rings formed by the shadow of the planet; and the soft markings on his disk. Nothing is wanting in the minutest details, and there is but one imperfection in the picture. The definition is not good; the outlines are not clearly defined. The view does not differ greatly in dimensions from that presented by a smaller telescope, but planet and rings are flooded with light of delicious brilliancy and softness. Here lies the advantage of a great telescope. It brings to the eye all the light that enters it, so that, within certain limits, the larger the telescope, the larger the amount of light it collects, the more easily visible will faint objects become, and the greater the number of objects before unseen that will be revealed.

The coloring is exquisite. Terrestrial colors are muddy in comparison



THE TRIAL MOUNTING FOR THE GREAT RUSSIAN TELESCOPE, PULKOWA, RUSSIA. CONSTRUCTED BY MESSRS. ALVAN CLARK & SONS 1883.

with the celestial hues of liquid gold of the disk and rings, and the creamy tints of the belts that cross the disk with the lightness and grace of scudding cloud bands.

Jupiter is the next object to test the space annihilating power of the instrument. The Prince of Planets is superb, larger than the full moon, though but little larger than we have seen him many times in a telescope of eight inches aperture.

What shall we see next? is the question now discussed, for the extreme cold has congealed the oil, and the monster refuses to move. His eye is turned to the meridian, and no effort will make him swerve one inch to the right or left.

The little wisp of cloud haze visible to the naked eye is transformed into one of the most glorious visions that ever breaks upon the entranced eye of the observer.

The delicacy of the celestial glow that pervades the scene is beautiful beyond comparison. The central point of interest is the famous trapezium, consisting of four bright stars and two smaller ones.

It is said that no one can look upon the Apollo without standing erect and feeling a sense of the divinity inherent in human nature. But what is this masterpiece of Greek art, chiseled by human hands from a block of marble in comparison with this creation from Nature's fashioning hand brought near to mortal eyes by telescopic art!

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THE TOTAL SOLAR ECLIPSE OF MAY 6.

A total eclipse of the sun occurs on the 6th of May, that presents features of special interest. It is greatly to be regretted that this sublime and awe-inspiring phenomenon marks its path over a portion of the globe where there are so few to witness it.

There are, however, within the narrow path of total obscuration, two eligible points where the eclipse may be seen to great advantage. These points are two small islands, named Caroline Island and Flint Island.

Flint Island is five or six miles in circumference and is uninhabited. It is situated in 73° 40' west longitude from Washington, and in 11° 30' south latitude.

The eclipse of May next is especially favorable to observation on account of the exceptionally long duration of the total phase. The longest time a total solar eclipse can last is a little less than seven minutes.

Three expeditions are already on the way to these lone islands of the Pacific, for the purpose of observing the eclipse. The American expedition is sent by the United States Government, five thousand dollars having been appropriated for the purpose.

The astronomers started from New York on the 1st of March, reached Panama on the 9th, and Callao on the 22d. From Callao they will be conveyed by a government steamer directly to Caroline Island, which they hope to reach by the 25th of April.

British astronomers are but meagerly represented on the occasion. The Royal Astronomical Society has sent two representatives, who, joining the American observers at Panama, will go with them to Caroline Island.

The French expedition, under the charge of M. Janssen, is also on its way in pursuit of the same object. It will probably observe on Flint Island, or, divided into sections, may occupy both islands.

Thus, three of the most enlightened governments of the world send men of science to this far-away spot to "take notes" on the day when the light of the sun is hidden for less than six minutes.

They hope to learn something on three important points, two of which are connected with the surroundings of the sun, and are never revealed except on the rare occasions of a total eclipse. In the first place, they will make a study of the corona, the silvery halo that surrounds the sun, and comes into view the moment his bright orb is covered by the moon.

In the second place, observations will be made upon the zodiacal light, the glimmering glow of pale gold that, during portions of the year, appears in the west after sunset, and, assuming a cone-like form, rises high among the stars.

In the third place, careful search will be made for the small intra-Mercurial planets that probably circulate in the immediate neighborhood of the sun, and can only be seen when making a transit over his disk, or during a total solar eclipse.

Observations on various other points of interest connect