

lens, white lines on a black ground were seen at an angle of  $1''.2$ ; a spider's thread at  $0''.6$ ; and a fine glistening wire at scarcely  $0''.2$ . This problem does not admit generally of a numerical solution, since it entirely depends on the form of the objects, their illumination, their contrast with the back-ground, and on the motion or rest, and the nature of the atmospheric strata in which the observer is placed.

During my visit at a charming country-seat belonging to the Marquess de Selvaegre at Chillo, not far from Quito, where the long-extended crests of the volcano of Pichincha lay stretched before me at a horizontal distance, trigonometrically determined at more than 90,000 feet, I was much struck by the circumstance that the Indians who were standing near me distinguished the figure of my traveling companion Bonpland (who was engaged in an expedition to the volcano) as a white point moving on the black basaltic sides of the rock, sooner than we could discover him with our telescopes. The white moving image was soon detected with the naked eye both by myself and by my friend the unfortunate son of the marquess, Carlos Montufar, who subsequently perished in the civil war. Bonpland was enveloped in a white cotton mantle, the poncho of the country; assuming the breadth across the shoulders to vary from three to five feet, according as the mantle clung to the figure or fluttered in the breeze, and judging from the known distance, we found that the angle at which the moving object could be distinctly seen varied from  $7''$  to  $12''$ . White objects on a black ground are, according to Hueck's repeated experiments, distinguished at a greater distance than black objects on a white ground. The light was transmitted in serene weather through rarefied strata of air at an elevation 15,360 feet above the level of the sea to our station at Chillo, which was itself situated at an elevation of 8575 feet. The ascending distance was 91,225 feet, or about  $17\frac{1}{3}$  miles. The barometer and thermometer stood at very different heights at both stations, being probably at the upper one about 17.2 inches and  $46^{\circ}.4$ , while at the lower station they were found, by accurate observation, to be 22.2 inches and  $65^{\circ}.7$ . Gauss's heliotrope light, which has become so important an element in German trigonometrical measurements, has been seen with the naked eye reflected from the Brocken on Hohenhagen, at a distance of about 227,000 feet, or more than 42 miles, being frequently visible at points in which the apparent breadth of a three-inch mirror was only  $0''.43$ .