ON PENDULUM EXPERIMENTS ON THE SUMMIT OF FUJIYAMA FOR THE PURPOSE OF ASCERTAINING THE FORCE OF GRAVITY AT THAT POINT.

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[Abstract.]

These experiments were carried out during the first week of August, 1880. What is called an "invariable pendulum" was used. It consisted of a flat brass bar something more than a metre in length, with a knife-edge at right angles near one end and a heavy flat cylinder fixed at the other. To insure against entire loss of results by accident, a pendulum of nearly similar construction, except that the flat bar was of wood, was carried. Both pendulums had been vibrated in the physical laboratory of the Tokio Daigaku previously to their being used upon the mountain, and both were vibrated in the same place immediately after they were returned from the mountain. The mode of determining the time of vibration was similar to that described in a previous paper on the Force of Gravity at Tokio.

Reference was made to the difficulty of establishing a proper correction for the low barometer height on the

summit of the mountain, and to the principles involved. The times of vibration at both stations were reduced to the Tokio conditions, and from a comparison of them the value of the force of gravity on the mountain, based upon that previously obtained for Tokio, was easily obtained. This value was

$$g = 9.7886 \text{ metres.}$$

Attention was called to the fact that, provided the attraction of the mountain can be ascertained, these experiments afford a means of determining the density of the Earth.

The process by means of which at least an approximate solution of this problem had been made was explained.

The mountain being very symmetrical and approximately a cone, its angle had been measured by means of many photographs taken from different points. In this way it was determined that the mountain might be considered as a cone whose altitude was 2.39 miles, and whose semi-vertical angle was 69 deg. In order to get the density of the mountain, a number of specimens of surface rocks had been examined. It was found that, when they were allowed to retain the air in their pores, the density was about 1.75—but when pulverized and freed from air it was about 2.5. These facts were communicated to five geologists who knew the mountain, with a request that they would furnish an opinion as to the probable mean density of the mountain. The mean of the results thus obtained was 2.12—which happens to be the mean of the two already given. Assuming this to be the density of the mountain, and computing its attraction on a particle at its vertex—and then comparing this with the results of the pendulum experiments—the density of the earth is found to be 5.51. Assuming the density of the Earth to be 5.67—which is the result of the elaborate series of experiments of Baily, and is without doubt nearly correct, the mean density of the mountain can be ascertained from the pendulum experiments and the assumed angle; and when thus calculated it is found to be 2.18.