Denoting by a the radius of the circular area within which his skill would, on the average of an immense number of shots, enable him to plant half the total number discharged; and by M the fraction expressing the probability in question, certainty being expressed by 1, we shall have

$$M = \left(\tfrac{1}{2}\right)^{\frac{r^2}{a^2}}$$

while for H the *probability of hitting* the same area we have

$$H = 1 - M$$

(3.) From these expressions, knowing the value of a, which is the inverse measure of the skill of the shooter (being less the greater that skill), it is easy to calculate his chance of hitting a circle of any given radius in a single shot. And, reversing the question, his skill (measured by the fraction $\frac{1}{a}$) may be ascertained, by observing what percentage of shots he can plant, on a large average, from a given distance, within a circle of any given radius (r). For that percentage being the numerical expression of his probability of hitting the circle, or the value of H, or $1—M$, M is known, and a will be given by the formula.

$$a = r. \sqrt{-\frac{Log.\ 2}{Log.\ M.}} = r. \sqrt{-\frac{Log.\ 2}{Log.\,(1-H)}}$$

Thus, if a marksman be observed to plant 9 per cent. of his arrows within a circle of one foot in diameter at the distance of one hundred yards, we have