NOTE ON THE ACTION IN AN ELLIPTIC ORBIT.

IF the moving particle have unit mass, the expression for the action is

$$\int v ds.$$

But, if p and p' be the perpendiculars from the foci on the tangent, we have

$$pv = h,$$

and

$$pp' = b^2.$$

Hence the action may be expressed by

$$\frac{h}{b^2}\int p' ds.$$

That is; *while the time is proportional to the area described about one focus, the action is proportional to that described about the other.*

Of course it is easy to extend this result to parabolic and hyperbolic orbits. In the case of the parabola it becomes changed to the following, *the increase of action is proportional to the increase of distance from the axis.*

Sir W. R. Hamilton in his "General Method in Dynamics" (*Philosophical Transactions*, 1834) has shown that the action in an elliptic orbit is (with the usual notation) proportional to

$$u + e \sin u,$$

but he does not give the above simple interpretation.

T.