

tion requires. Since 1789, its period has shortened two days and sixteen hours. Similar retardation—resulting in a similarly accelerated *angular* velocity—has been fully established in the cases of the comets of Brorsen, Faye, and D'Arrest.

The only explanation that has ever been offered of these exceptional phenomena is the assumption of the existence of an all-pervading resisting medium commonly called ether. Since the undulatory theory of light became established, the existence of such a medium has been recognized as necessary, and its presence has been assumed throughout all those realms of space to which light has penetrated.

A belief in the existence of an all-pervading ether is much more ancient than the observations which have made it a scientific datum. In the astronomy of the Brahmins, the stars are said to swim in ether, as fishes in the water. Kepler supposed comets to be native inhabitants of this ethereal medium, like fishes in the sea. The Cartesian doctrine of "vortices" presupposes an all-pervading material fluid. The existence of such a fluid was admitted by Newton; and he demonstrates that its tenuity must be greater than that of our atmosphere at the distance of two hundred miles from the earth. In more recent times this doctrine has been maintained or admitted by Whewell, Sir John Herschel, Thompson, Mayer, Littrow, Helmholtz, Grove, Tyndal, Watson, McCosh, Comte, Rorison, and, in short, by every physicist who has investigated the subject.

We are compelled, then, to assume the position that a resisting fluid permeates space, and that the heavenly bodies do *not* move in a vacuum. The consequences of this admission are stupendous beyond conception. Laplace demonstrated that if the planetary bodies are solid, and if they move *in vacuo*, their mutual perturbations, in long cycles, compensate each other, and the stability of the solar sys-