Note on "What is the Nature of the 'Resisting Medium' in Space."

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A PECULIARITY of certain of the comets, notably Encke's, is that their periods are gradually decreasing. Encke first discovered in 1824 that its period is shortened each revolution by about 2½ hours. Since his time its period has diminished by as much as 2 days and 3 hours. He found it was impossible to account for this diminution of the period by admitting errors in the computed masses of the planets which would have disturbed the comet in its orbital path. He, therefore, was led to attribute the cause to the existence of a resisting medium in the neighbourhood of the Sun. For such a resisting medium would diminish the major axis and eccentricity of the comet's orbit, and thereby increase its mean motion, without affecting the inclination of the orbit or the longitude of its nodes. He, therefore, assumed that the interplanetary space contained something of sufficient density to oppose the motion of comets moving in their orbits. This opposition or resistance must be of the nature of a tangential force, tangential to the comet's orbit. By the joint action of its own velocity and the Sun's attraction a comet's path is determined. These two forces are antagonistic. A resisting medium will reduce the velocity of a comet, and then the Sun's will be able to force it to describe a smaller orbit. And if the orbit be diminished, then the periodic time will be diminished in the same ratio. The resisting medium increases in density towards the Sun's centre. The path of the comet would then be not an ellipse but a spiral. It would eventually fall into the Sun. As to what this "resisting medium" may be is by no means agreed upon. Arago considers it to be the interstellar ether itself. But this theory seems to be highly improbable for many reasons. A sounder hypothesis is that this "resisting medium" is an atmosphere surrounding and belonging to the Sun, and that it increases in density in some such proportion as the inverse cube of his distance. If this be so, then it is quite certain from sound mathematical

principles, that it must itself be circulating around the Sun with nearly equal rotational velocity. And then the result would *not* be what is observed in the case of Encke's comet. Its orbit would depend on the relation between the original velocity of the comet on the one hand, and that of the layers of the solar atmosphere on the other. At first no doubt acceleration would be produced, until the comet's orbital eccentricity became zero. Then it can be mathematically demonstrated that its major axis would no longer be diminished, that its path would never become spiral, and hence its tendency would *not* be to fall into the Sun. Whatever then may be the true explanation of this "resisting force," which makes a comet describe a diminishing orbit, and hence accelerate its velocity—and this force I am convinced most certainly exists—it must be conceived of in any case as a compound of two forces, the radial force acting from the Sun, and a tangential force opposite to its motion. If this latter force then be not due to the solar atmosphere, it may possibly be due to a comet's "jets," which it belches forth towards the Sun in the neighbourhood of perihelion, exercising upon its centre of gravity a repulsive action, which would be sufficient to change and diminish its orbital path when in the Sun's neighbourhood. And certain researches of Argelander on the comet of 1811 undoubtedly support this latter theory.

The Bengali and Semitic Seasons.

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The seasons legitimately come within our jurisdiction; they are astronomical phenomena in the sense that they depend on the Sun's apparent annual motion in declination, due to the Earth's axis being tilted in relation to the plane of the Earth's orbit. I must assume that you are all familiar with the diagram given in such books as Heath's 20th Century "Atlas of Astronomy," and in passing will merely remind you that our word season comes to us through the French language, from the Latin verb Sero, I plant, or sow; Séréro, to plant or sow. The seasons are everywhere associated with changes on the Earth's surface, with conditions of temperature, moisture, and necessarily of vegetation. The word (season) itself is obviously related to the sowing period of the year, or spring time, as if that were emphatically the season of seasons. These periods occur in different parts