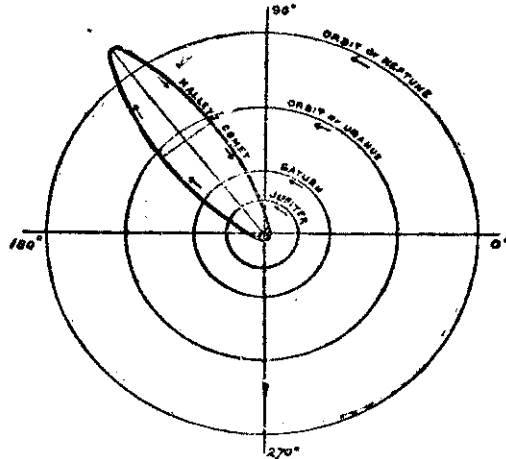


to fire a projectile more than a certain number of miles. So the light-pressure of the sun has its limitations. In order to explain the occurrence of tails which are ejected from the nucleus with a force that may be as much as forty times more powerful than gravitation, we must rely on the tremendous electrical energy of the sun.

The modern school of English physicists headed by Prof. J. J. Thomson, Sir Oliver Lodge, and Sir William Crookes, has taught us that a hot body, a metal upon which ultraviolet rays are allowed to fall, a Crookes' tube, and radium, discharge corpuscles with enormous velocity, and that the corpuscles are charged with negative electricity. Indeed, there is some evidence that the corpuscles are themselves what may be termed material electricity. Each corpuscle is about one thousand times smaller than an atom—the smallest body which chemists hitherto supposed could exist. About three hundred thousand chemical atoms laid side by side would measure an inch; yet one hundred thousand of these corpuscles can lie in the diameter of an atom. Compared with atoms they are as a buckshot to a Gothic cathedral. It is generally agreed

when the negative pole of one magnet is presented to the negative pole of another magnet, the one repels the other. Hence the sun, in order to repel negatively charged corpuscles, must itself be a negatively charged globe. When the corpuscular charges from the sun encounter the molecules constituting the gas which surrounds a comet's head,

little particle of soot is a miniature mirror that reflects the image of the sun. It may be that other causes contribute their share in the creation of a comet's elements. Two at least have been definitely discovered which adequately explain what was long a mystery but is really a very simply explained manifestation of cosmic forces.



ORBIT OF HALLEY'S COMET—THE FIRST TO BE ACCURATELY PLOTTED.

Its period is fifty-seven years.

they charge the molecules negatively. The result is obvious. Evidently the negatively charged gas molecules and the negatively charged corpuscles will both be repelled by the negatively charged sun. So terrific is the corpuscular energy lavishly expended by the sun that it is amply adequate to form tails of comets for which the pressure of light cannot be invoked.

That the theories of Arrhenius and Thomson are not mere scientific moonshine, but have some basis in fact, the spectroscope testifies. The gases which are so indispensable, if the corpuscular theory is to be accepted, have been traced in many a comet's tail for vast distances from the nucleus. In Swift's comet they persisted for three million miles from the head, which means that electrical forces were there at play. On the other hand, the presence of cometary dust impelled by radiation pressure is indicated by reflected sunlight; for each

Not the General's Cow.

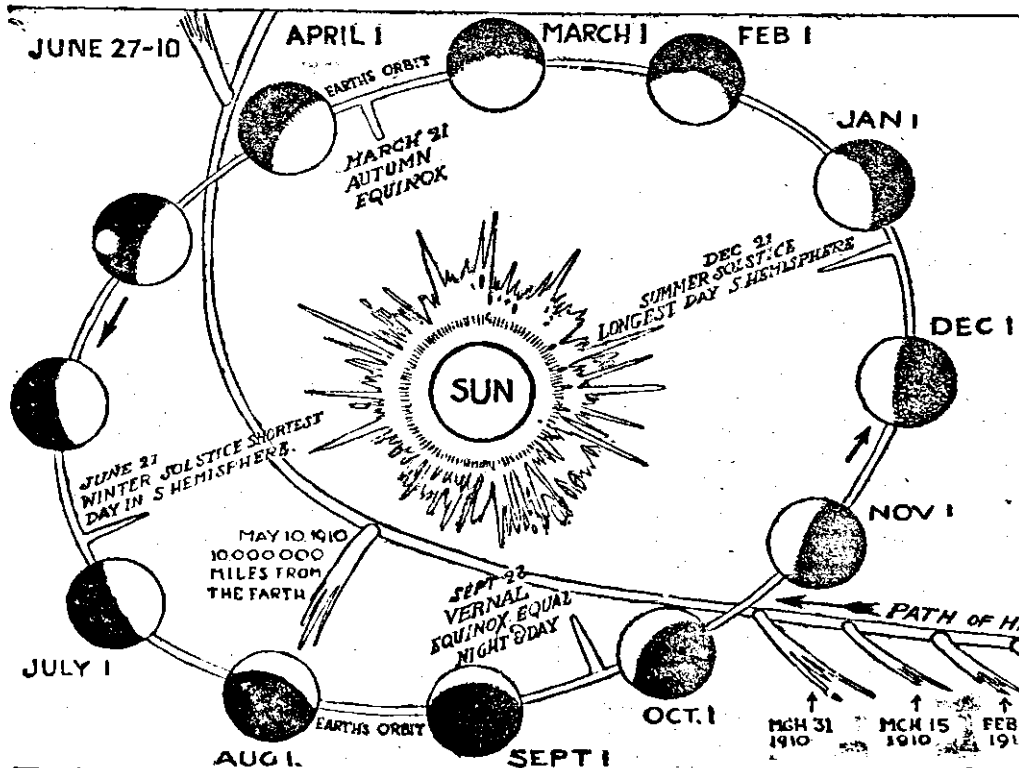
In a seaport town long ago a general and an admiral were neighbours. The general's house was fronted by a grass plot, on which he claimed the right to pasture a cow. One day his wife complained that the supply of milk was falling. The sentinel accounted for deficiency by saying that the grass had lately been much trodden down by the public. The martial despot immediately gave orders that no animal, human or other, except the cow, should be allowed on the grass-plot; and he added—men were not particular in those days—that if this rule were infringed the sentinel should be flogged. Soon afterward the admiral's wife, having a pressing engagement, took a short cut over the grass in disregard of the sentinel's repeated order to halt. "Sir," said the offended lady, "don't you know who I am?" "All I know is that you're not the general's cow."



WHAT THE INHABITANTS OF WESTERN EUROPE SAW IN THE GREAT COMET OF 1528.

The sword and severed heads described by Ambroise Pare.

that the sun is constantly bombarding the universe with countless millions of these infinitesimal charges of negative electricity. Every schoolboy knows that



THE PATH OF THE COMET.

The diagram shows the course of Halley's Comet, with the dates of its successive positions and the three principal danger points which are—when it enters the earth's plane, when it comes nearest to the earth, and when it leaves the earth's plane.

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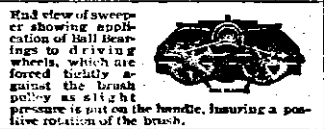
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