vortex theory is full of inconsistencies, and that the consequences deduced from it by logical reasoning are incompatible with well-known and indisputable facts. Yet it found ready acceptance among intelligent men and good mathematicians, because it filled the void left in men's minds by the overthrow of the Ptolemaic system. Kepler had established his three laws as facts, but the human mind is never satisfied with the knowledge of a fact but ever seeks to know why the fact is so and not otherwise; Kepler himself sought for the explanation of his laws, and with wonderful prophetic instinct spoke confidently of a physical astronomy that would give a rational explanation of his laws. Descartes' *Principia*, then, appeared at a time when men's minds, shaken from the old faith, were willing to accept any plausible theory that afforded them even a temporary resting place, and most of the adherents of the vortex theory accepted it without much investigation; indeed, it is well known that the number of those who had the courage to read Descartes' *Principia* through was very limited.

Though the Cartesian vortices have long since been discarded, it would be unsafe to regard his theory as altogether absurd. The leaders of thought to-day are agreed that all space is filled with a medium capable of vortex motion, and some physicists are endeavoring to show that rigidity and all the other properties of matter are due to vortices in this medium; but, whereas Descartes' vortices were very large, the modern physicist prefers vortices of infinitesimal dimensions. However, without attributing any inherent absurdity to the Cartesian philosophy, it is necessary to point out that it was not in any sense an anticipation of, or a step toward, Newton's discovery. Newton, it is said, read only about eight pages of Descartes *Principia*, and on those pages he wrote the word "error" several times. This sketch of the vortex theory shows, what can also be shown from the writings of other authors, that inquiring minds were then eager to discover the deeper laws of which those of Kepler were but the outward expression and consequence.

Descartes' greatest service to science, however, was not his physical theories, but his invention of the method of Analytical Geometry. This is a genuine invention of the highest merit, and is a powerful and indispensable instrument in scientific investigations. Newton's discoveries could not have been made without the aid of the Cartesian geometry, and if Descartes had not invented it Newton would have had to spend some of his valuable time in working out some similar system himself. Moreover, the Cartesian geometry led directly to the invention of the Differential Calculus by Newton and by Leibnitz.

But the real foundation on which Newton erected his stately edifice was discovered by Galileo. In the last years of Galileo's life, when he was blind and helpless, he reasoned out the fundamental laws of motion on which the whole modern science of mechanics rests. These laws are sometimes called Newton's laws of motion, because Newton stated them in the following form:

1. *Every body continues in its state of rest or of uniform motion in a straight line, except in so far as it is compelled by forces to change that state.*

2. *The change of the quantity of motion is proportional to the force that causes the change, and takes place in the direction in which the force acts.*

In this law the quantity of motion of a body means the product of its mass and its velocity.

3. *To every action there is always an*