

are capable of solution by that more refined species of logic known as Mathematics. We may, in brief, define Natural History as embracing those branches of Physical Science which do not require the aid of Mathematics, and Natural Philosophy as embracing those which require it.

Whether the time will ever come when all branches of Physical Science will be so thoroughly known as to be included under Natural Philosophy thus defined, it is not easy to say. Possibly the inherent difficulties attaching to the study of those phenomena which most nearly concern the mysterious processes of life, in animals and vegetables, will prevent these phenomena from being ever brought under the dominion of strict law.

Some of the principal subjects at present included under the head of Natural Philosophy, are: mechanical force, heat, light, sound, and electricity. The laws or some of the laws of all these subjects are known with sufficient accuracy to admit of very refined applications of mathematical reasoning. Given, for instance, the velocity and direction of a planet's motion at one instant, we can calculate with precision where the planet will be at any time named, so complete is our knowledge of the laws of mechanical force.

On the other hand, to take an example which comes under the head of Natural History, when a grain of wheat is sown, we can predict that the ear which springs from it will contain a number of grains like that which was sown, but we cannot assert that this likeness will be perfect, neither can we predict the precise number of grains. The predictions of Natural History can only be given in broad and general terms, because the laws on which they depend are only known broadly and generally.

Natural Philosophy, properly so called is almost entirely of modern date. Some of the laws of Statics were known as far back as the time of Archimedes. Dynamics as a science, may be said to date from the time of Galileo, and the habits of thought and modes of working which have now become inseparable from the very idea of physical science, were first introduced to the favourable notice of the learned public by Lord Bacon. He first broke the chains which had fettered the free investigation of natural phenomena, insisted on the necessity of experiment, and pointed out that the logic even of the greatest masters could do nothing towards the investigation of nature's laws, unless furnished with experimental data on which to build.

The great authority on Logic, and on that vague kind of speculation which passed for knowledge in the days of the Schoolmen, was Aristotle, and his book on Logic was called the *Organon*. Bacon, desiring to establish a diametrically opposite method of investigation, called his book in which he described it, the *Novum Organum*, i. e., the new *Organon*. This famous work not only exhibits in the most forcible terms the futility of the old method, but prescribes at great length the course to be adopted in investigating natural laws by the new or experimental method, indicating and classifying in general terms the facts to be observed, the