

that by a continuous progression, the last point becomes the first. So that, as was before stated, it is not surprising that the circle should be the principle of all wonderful properties."

Aristotle afterwards proceeds to explain more specially how he applies the properties of the circle in this case. "The reason," he says, in his fourth Problem, "why a force, acting at a greater distance from the fulcrum, moves a weight more easily, is, that it describes a greater circle." He had already asserted that when a body at the end of a lever is put in motion, it may be considered as having two motions; one in the direction of the tangent, and one in the direction of the radius; the former motion is, he says, *according to nature*, the latter, *contrary to nature*. Now in the smaller circle, the motion, contrary to nature, is more considerable than it is in the larger circle. "Therefore," he adds, "the mover or weight at the larger arm will be transferred further by the same force than the weight moved, which is at the extremity of the shorter arm."

These loose and inappropriate notions of "natural" and "unnatural" motions, were unfit to lead to any scientific truths; and, with the habits of thought which dictated these speculations a perception of the true grounds of mechanical properties was impossible.

7. Thus, in this instance, the error of Aristotle was the neglect of the Idea *appropriate* to the facts, namely, the Idea of Mechanical Cause, which is Force; and the substitution of vague or inapplicable notions involving only relations of space or emotions of wonder. The errors of those who failed similarly in other instances, were of the same kind. To detail or classify these would lead us too far into the philosophy of science; since we should have to enumerate the Ideas which are appropriate, and the various classes of Facts on which the different sciences are founded,—a task not to be now lightly undertaken. But it will be perceived, without further explanation, that it is necessary, in order to obtain from facts any general truth, that we should apply to them that appropriate Idea, by which permanent and definite relations are established among them.

In such Ideas the ancients were very poor, and the stunted and deformed growth of their physical science was the result of this penury. The Ideas of Space and Time, Number and Motion, they did indeed possess distinctly; and so far as these went, their science was tolerably healthy. They also caught a glimpse of the Idea of a Medium by which the qualities of bodies, as colors and sounds, are perceived. But the idea of Substance remained barren in their hands;