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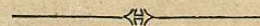


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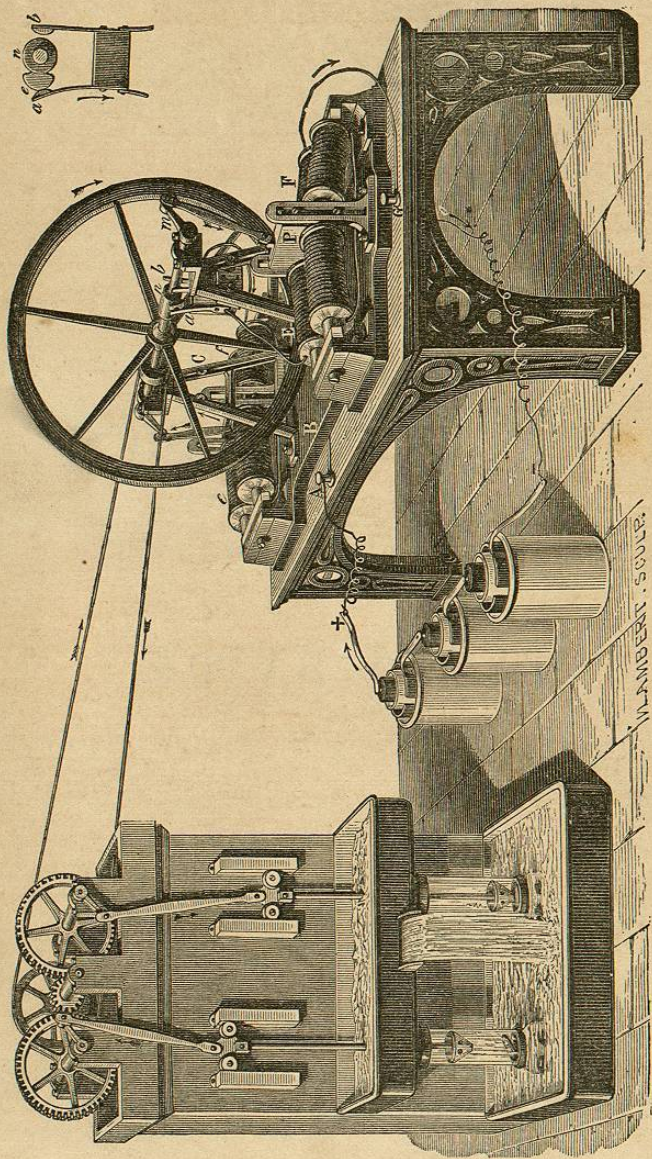
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POPULAR PHYSICS.



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OF

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BY

WILLIAM G. PECK, M. A.,

PROFESSOR OF MATHEMATICS, COLUMBIA COLLEGE, NEW YORK.



NEW YORK:

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POPULAR PHYSICS.

INTRODUCTION.

CLASSIFICATION OF THE SCIENCES.

SCIENCE is a knowledge of the laws that govern the Universe.

A Law is a necessary relation between cause and effect. It is assumed as the foundation of all Science, that *like causes produce like effects*. This principle is an inductive truth, founded upon universal experience.

By the UNIVERSE we mean all that has been created, whether material or immaterial. The Universe may be regarded as made up of *mind* and *matter*. MIND is that which thinks and wills; MATTER is that of which we become cognizant through the medium of the senses. Science admits of two corresponding divisions, *Science of Mind*, or METAPHYSICS, and *Science of Matter*, or NATURAL PHILOSOPHY.

NATURAL PHILOSOPHY is that branch of science which treats of the laws that govern the material Universe.

Matter exists in two states, *organized* and *unorganized*; it is organized when its particles are aggregated into organs adapted to the support of life; in all other cases it is un-

What is Science? What is a Law? Define the Universe. Mind. Matter. What are the two divisions of Science? What is Natural Philosophy? In what two states may Matter exist? Illustrate.

organized. Natural Philosophy admits of two corresponding divisions: *Science of Organized Matter*, or PHYSIOLOGY, and *Science of Unorganized Matter*, or GENERAL PHYSICS.

Physiology, which treats of the laws of matter as modified by the principle of vitality, is divided into two principal branches: *Animal Physiology*, or ZOÖLOGY, and *Vegetable Physiology*, or BOTANY. Both of these branches, with their various subdivisions, belong to the domain of NATURAL HISTORY.

All unorganized matter may be divided into two classes, *Celestial* and *Terrestrial*. General Physics admits of two corresponding divisions. That branch which treats of celestial bodies, including the earth as whole, is called ASTRONOMY; that which treats of terrestrial bodies, is called TERRESTRIAL PHYSICS.

TERRESTRIAL PHYSICS is again subdivided into two branches. The first is called *Physics Proper*, or simply PHYSICS; it treats of the general properties of bodies. The second is called CHEMISTRY; it treats of the nature of the ultimate particles of bodies and of their laws of combination. The first of these branches, or PHYSICS, is the subject treated of in the following pages.

Besides the branches above enumerated, and which may be called *Pure Sciences*, there are others that depend upon, or are applications of, two or more of them. Such, for example, are the sciences of GEOLOGY, MINERALOGY, PHYSICAL GEOGRAPHY, &c. These are called *Mixed Sciences*.

Into what may Natural Philosophy be divided? What is Physiology, and what are its branches? How may Unorganized Matter be divided? What are the corresponding divisions of General Physics? Define them. How is Terrestrial Physics divided? What is Physics Proper? Chemistry? What are the Pure Sciences, and what are some of the Mixed Sciences?

CHAPTER I.

PRELIMINARY PRINCIPLES AND MECHANICS OF SOLIDS.

I.—DEFINITIONS AND GENERAL PROPERTIES OF MATTER.

Definition of Physics—Physical Agents.

1. PHYSICS is that branch of Natural Philosophy which treats of the general properties of bodies, and of the causes that modify these properties.

The principal causes that modify the properties of bodies are: *Gravitation*, *Heat*, *Light*, *Magnetism*, and *Electricity*. These causes are called *Physical Agents*.

Definition of a Body.

2. A BODY is a collection of material particles; as a stone, or a block of wood. A body which is exceedingly small is called a *Material Point*.

Bodies are made up of small particles, called *Molecules*, and these again are composed of still smaller elements, called *Atoms*. These atoms are inconceivably small, and are held in their places by the action of two opposing systems of forces, called *Molecular Forces*. Those which tend to draw atoms together are called *Attractive Forces*, and those which tend to push them asunder are called *Repellent Forces*. Heat is the principal if not the only repellent force in Nature.

(1.) What is Physics? What are Physical Agents? Name them. (2.) Define a Body. A Material Point. An Atom. A Molecule. What are Molecular Forces? Define Attractive and Repellent Forces.