

compound, and lacernal prisms; reflecting and refracting telescopes, solar microscopes, micrometers, spectacles, opera glasses, cameras, magic lanterns, kaleidoscopes, and other optical instruments owe their origin to the application of the principles of optics. By the use of these instruments the natural powers of human vision have been wonderfully increased, and our prospects into the work of the Creator extended far beyond what former ages could have conceived.

Acoustics, the *Science of Sound*, treats of the nature, phenomena, and laws of sound, and deals with the theory of music, concord and harmony.

Electricity deals with the origin of the current in battery cells or in dynamos, and is closely related to Magnetism. In fact, Ampere supposes the magnetism of a body to be due to electric currents circulating around the small particles of which it is composed. Telegraphing over land or under sea, telephoning, electrotyping, electroplating, electric lighting, and electric traction are only a few of the many useful applications of electricity.

Chemistry investigates the simple forms of matter, the modes or processes by which they are combined or separated, the laws by which they act, and the properties of the compounds they form. Without a knowledge of chemistry it is quite impossible to form any conception of many of the most important phenomena of the universe; and there is scarcely any process in the arts or manufactures over some part of which chemistry does not preside. The economic reduction of iron, copper, tin, zinc, lead, nickel, and silver from their ores are in a great measure questions of chemistry. Gas-making, sugar refining, and soap-boiling are operations all partly chemical, as are

also the processes by which are produced glass and porcelain. Imagine, if you can, the state of civilization if all the iron, lead, soap, gas, glass and porcelain in existence were to suddenly vanish, and you will have some idea of the importance of chemistry, and how much it contributes to human welfare and to human comfort.

Biology, the *Science of Life*, includes Botany and Zoology. It treats of the origin and nature, the continuance and progress of life, and pre-supposes some knowledge of the natural history, structure, physiology and distribution of both plants and animals. Every observant person is something of a naturalist; fewer are botanists or zoologists; and still fewer are biologists. Biology is the philosophical aspect of both botany and zoology, and the study of the advanced student rather than the beginner.

In conclusion—the tendency of modern physical science is toward more complete generalization; its goal being the discovery of a principle that shall connect all physical phenomena. Its divisions and subdivisions do not remain separate, but now and again reunite in direct and indirect ways. They mosculate; they generally send off and receive connecting growths; and the intercommunion has been ever becoming more frequent, more intricate, more widely ramified. In marvellous contrast to the fragmentary and disjunctive science of 80 years ago, modern science presents the spectacle of a simple, unified and comprehensible cosmos, consisting everywhere of the same prime elements, drawn together by the same great forces, animated everywhere by the same constant and indestructible energies, evolving everywhere along the same lines in accordance with the selfsame underlying principles. Ours has been an age of firm grasp and of wide vision.