

indifferent to the stimulus, which it carries in or out like a telegraph wire; which, whilst acting in every case in the same way, may, according to its terminal connection,¹ “deliver messages, ring a bell, explode a mine, decompose water, create or move magnets, produce light, &c. The same with the nerves. The state of irritation is, so far as the isolated nerve-fibre is concerned, everywhere the same, but in accordance with the nature of different parts, be it of the brain or of the external portions of the body, it produces motion, secretion, increase or decrease of blood, of heat in different organs, or lastly, sensations of light, sound,” &c.

The physiology of hearing had its brilliant application in a clearer understanding of the elements of language, of the formation of the vowel sounds, and in the study of the development of music—that art which, more than any other, seems founded on definite rules.² In analysing

¹ ‘Tonempfindungen,’ p. 222.

² “From the time when Pythagoras is said to have discovered the arrangement of tones in an octave, by observing that the sounds of the blacksmith’s hammer in the forge produce a fourth, a fifth, and an octave, and was then led to obtain harmonic proportion between the strings of the heptachord, all who investigate musical tones know that, although these are fleeting sensations, they depend physically on numerical relations between various kinds of movements; but it was Helmholtz, more than any other philosopher, who examined the whole range of the phenomena, physical as well as physiological, and whose work will for generations remain an enduring monument to his genius” (Prof. M^cKendrick in the Helmholtz volume of the

“Masters of Medicine” Series, p. 168).

Since the appearance of the last edition of Helmholtz’s great work, of which there exists an excellent English edition with valuable notes, many of the points first investigated by Helmholtz have been taken up by other experimentalists as well as by psychologists. The invention of the phonograph by Edison in 1877 gave a great impetus to exact research in the problems of audition, and various facts and theories have been advanced confirming or modifying the views put forward by Helmholtz. On these see the last chapter of Lord Rayleigh’s ‘Treatise on Sound,’ 2nd ed., 1894. On the psychological side see the 2nd volume of Prof. Wundt’s ‘Physiologische Psychologie,’ pp. 47-96.