Book Reviews

Effects of Electricity on Muscular Motion. Luigi Galvani. Trans. by Margaret Glover Foley. Burndy Library, Norwalk, Conn. 1954. 176 pp. Illus. + plates. $6.

This fine volume is the 10th publication in the Burndy Library series. It contains an English translation of Galvani's celebrated Latin monograph *De Viribus Electricitatis in Motu Musculari,* first issued in 1791, together with a facsimile reproduction of the original text. Margaret Foley supplies a clear and vigorous rendering of Galvani's rather complicated phraseology. I. Bernard Cohen has written an admirable introduction. By an unusual coincidence two English translations of the full text appeared within a few months of each other—the present volume and that prepared by Robert Montraville Green (Elizabeth Licht, Boston, 1953). Prior to this time only partial translations have been available, in particular the fragment published in 1935 by William Francis Magie.

A reading of the introduction and full text corrects certain misapprehensions that have been widely held concerning the scope and significance of Galvani's work. He was not the first to stimulate nerves and muscles with electric current. Earlier students, using discharges from the Leyden jar, or of atmospheric electricity, had observed such stimulation. Neither was he the first to detect animal electricity. John Walsh had demonstrated the electric character of the shock of *Torpedo* in 1774. Galvani's major contributions were, first, his observation that electric currents, generated by friction machines or by thunderstorms, could induce electric flow in metal conductors at some distance from the primary source, and, second, his discovery that pairs of dissimilar metals could excite living tissues.

The first discovery was not properly understood either by Galvani or by his contemporaries. He described with great enthusiasm the many ways in which he could stimulate nerves and muscles by touching them with metallic objects, scalpels, rods, or wires, in the vicinity of a frictional electric machine. With each spark contraction occurred, the living tissues acting as sensitive galvanometers to indicate current. He seems to have had clearly in mind the concept of electric induction, although he could not describe the phenomenon in modern terms and is not credited with its discovery. Forty years later Faraday discovered the phenomenon in all-metallic systems and inaugurated the modern electrical age.

His second discovery grew out of the first but revealed phenomena of a quite different character. He observed that, in the absence of a frictional machine or atmospheric electricity, he could stimulate nerve and muscle by touching them at two points by his "arcs" made by joining two dissimilar metals together. These curving metallic couples are a prominent feature of his illustrations. He believed that he thus led off electric charges that had accumulated in the tissues and thought that he had demonstrated the reality of animal electricity. Volta immediately built upon this work, shortly to reveal the existence of electrode potentials and to combat Galvani's interpretation. It is evident that Galvani did not clearly demonstrate animal electricity, but his faith in it was later vindicated in the growth of modern electrophysiology.

Galvani stands out in the stream of scientific history as a somewhat confused and neglected figure, yet one who, by his striking experimental demonstrations, compelled the attention of workers in several disciplines and opened the door to many fundamental discoveries. The present volume helps to bring his observations into proper focus and permits us to appreciate better the enthusiasm and devotion that he gave to his important pioneer work.

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The Distribution and Abundance of Animals. H. G. Andrewartha and L. C. Birch. Univ. of Chicago Press, Chicago, 1954. xv + 782 pp. Illus. $15.

The relatively new scientific field of animal ecology has, by now, split into two major divisions. Of these, in contrast with the more traditional ecology of communities, the newer is the ecology of individual species and populations. In recognizing this cleavage between methods and knowledge, the authors did not minimize the importance of the community approach in their own emphasis of the other; it is only that they undertook to explore and synthesize a literature that greatly needed exploration and synthesis, in order "to build a wide and satisfying general theory of ecology as we use the word to refer to the distribution and abundance of animals in nature."

Invertebrates, notably insects, furnish most of the examples of populations, and the original contributions of both authors are primarily entomologic, but the scope of the book nevertheless is about as broad as our collective knowledge of animal populations permits. Despite the obvious intentions of the authors to present the subject matter as simply, clearly, and logically as would be consistent with a comprehensive treatment—and in which I think they have succeeded—the natural complexities that are involved effectively limit the extent to which the subject matter may be simply presented. This is no book that any serious student of populations should read once and then consider himself through with; he should have convenient access to it for as many readings of particular parts as his own studies may require.

It is written for mature workers who can do their own thinking and, to them, it should be of outstand-