the blood pressure, the simple action of atropin on the heart, and final asphyxia. One can not examine the book without recalling Mr. Abraham Flexner's discussion of physiological instruction in Germany in his valuable report to the Carnegie Foundation on medical education in Europe. He says:

> The practical course in Germany is a thing by itself, and is still unsatisfactorily carried on. . . . Consisting as it does of certain exercises specified and minutely described in a syllabus, the practical course tends to be an isolated series of experiments mechanically executed rather than a stimulating and successful application of scientific method to physiological problems. . . . If, then, physiology is to be taught as an experimental science, as a science of function, the student must be allowed to run risks, to calculate, to observe, to verify, to conclude. Eliminate risk and the experiment becomes a mechanical toy: it may amuse, it does not discipline.

Frederic S. Lee
Columbia University

Short Course in Electrical Testing. By Morecroft and Hehre. New York, D. Van Nostrand Company. 1911. Pp. 154. Price, $1.50 net.

This book is designed primarily for the use of students of other branches of engineering than electrical engineering. As such students are usually none too well versed in the theory of electrical engineering, due to the short time available for the study of this subject, the authors have included with the description of the experiments a brief statement of the more important principles involved. This feature should appeal to any teacher giving laboratory instruction in electrical engineering to students of another department.

The direct current experiments described deal with the measurements of the resistance of wires, of lamps and of the dynamos; the characteristics of the shunt and of the compound generator; the characteristics of the shunt and of the series motor, and the parallel operation of shunt generators and of compound generators. The alternating current experiments deal with determination of wave shape; phase displacement and power; the effect of inductance, capacity and frequency; the regulation of an alternator; transformer losses; characteristics of the induction and synchronous motors, and of the rotary converter; the parallel operation of alternators, and currents, voltages and power in three-phase circuits.

At the end of each experiment is given a number of questions concerning the principles involved and the reasons for the behavior of the various types of machines. It is to be regretted that the authors have not included in these queries more questions designed to bring out the bearing of the various characteristics upon the commercial application of the machines. Particularly for non-electrical students is it desirable, both for its inherent value and to keep the interest of the students, to bring out repeatedly the uses of the various types of machines and the features limiting their application. In some of the questions the premises are only partially stated. For example, on page 65, is the following: "Explain . . . why a series motor of the same horsepower rating as a shunt motor exerts a greater full load torque." In this connection, it may also be noted that nothing is said as to the difference in the methods of rating shunt and series motors. In fact, the question of rating and temperatures seems to be omitted entirely from the book.

In the alternating current section there are certain features which are not altogether desirable. In the first place the clockwise system of vector notation is employed. Again, the terms "impedance" and "reactance" seem to be avoided, although frequent mention is made of "conservative" and "dissipative" reactions, inductance and capacity reactions, etc. It is also to be regretted that the authors have given no index to the book.

The experiments selected and the directions given are in the main entirely satisfactory. On the whole the book should prove very useful for the purpose for which it is primarily intended, *i. e.*, a laboratory manual for non-electrical students.

Harold Pender
Massachusetts Institute of Technology