review article, and the conventional textbook. For the professional biologist whose elementary botany is an experience of the distant past, and for the graduate student with somewhat different interests, such a book serves well for purposes of review and orientation. For the beginning student it could also be of value, if accompanied by a well-planned series of lectures and a carefully presented sequence of laboratory exercises.

An excellent glossary is included, and the illustrations are for the most part clear and well done. The authors are to be complimented on a very useful publication.

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Mathematics

Markov Processes. vols. 1 and 2. E. B. Dynkin. Translated from the Russian by J. Fabius, V. Greenberg, A. Maitra, and G. Majone. Academic Press, New York; Springer, Berlin, 1965. vol. 1, xii + 365 pp.; vol. 2, viii + 274 pp. Illus. $12 each.

Diffusion Processes and Their Sample Paths. Kiyosi Itô and Henry P. McKean, Jr. Academic Press, New York; Springer, Berlin, 1965. xviii + 321 pp. Illus. $14.50.

The theory of Markov processes has undergone a remarkable development in recent years. Two decades ago, many of what are now important parts of the subject were completely unknown, or were known only in an embryonic form. Although some special types of process had been studied in detail, the general (continuous time) theory consisted mostly of theorems which established, under various regularity conditions, that Markov transition probabilities were the solutions of certain functional equations. Little was known about path functions, aside from some sufficient conditions for continuity or step-function character.

A very different picture of the subject is presented in the volumes reviewed here. Dynkin's treatise, *Markov Processes*, gives an overall view of the general theory, almost to date. The work begins with the study of semigroups of transition probabilities, proceeds to the measure theoretic definition of Markov (and strong Markov) processes, and then turns to the relationship of the two aspects with each other. (The author has made fundamental contributions to this subject, among others.) These matters occupy about one-third of his book. The main topics treated in the remainder are functionals and their use in transforming one process into another, potential theory (not including boundaries), and strong Markov processes with continuous paths, especially the one-dimensional case. There are a sizable mathematical appendix and a brief historical one.

Markov Processes is a remarkable accomplishment, and the author is to be congratulated on creating a summary that will be indispensable for specialists in the field. It is not easy to read, because the number of definitions and notations which must be remembered becomes very large as one progresses through the book. Not much motivation is provided either, and unless the reader is sufficiently acquainted with special cases or "old fashioned" theory to supply his own, the going will be hard indeed. But in the hands of its proper audience, Dynkin's book should prove to be a great asset in performing further research.

"Diffusion processes" are strongly Markovian processes with continuous paths. (Dynkin uses the term in a more restrictive sense.) Their mathematical theory—and indeed, that of general Markov processes—began with Norbert Wiener's construction of the "Brownian motion" process, although physically motivated work had revealed glimpses of many of their properties before a rigorous foundation was available. Like the general theory, of which it forms a substantial part, the study of such diffusions has recently made great advances; Itô and McKean have themselves provided major contributions. Their book, *Diffusion Processes and Their Sample Paths*, has evolved with the subject during a ten-year period, and in its final form gives a remarkably comprehensive survey of an interesting and useful part of probability theory.

Diffusion Processes begins with a thorough study of the standard Brownian motion process on the line, which serves not only as the leading example but forms a basis for the construction of other diffusions. The most general one-dimensional diffusion is discussed very completely, and many deep properties of the sample paths are established. The multidimensional Brownian motion and its close relatives are then treated at some length, and finally a sketch of the general, as yet very incomplete, theory is given.

There is some overlap of content with Dynkin's book, *Markov Processes. Diffusion Processes*, restricted to a narrower field, goes more deeply into the subjects treated by both; in addition it contains many more of the details and examples which can make a subject "come to life." On the whole the style is pleasantly informal. However, the book is decidedly difficult to read, largely because the proofs are often very condensed. There are many interesting problems, usually with an outline of the solution.

Despite their differences of style and content, certain remarks apply to both of the books under discussion. Neither is for beginners, or suited to the casual reader—even the casual mathematical reader. But it is equally clear that both are major works, which will have no small influence on research and researchers in the theory of Markov processes for years to come.

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Faraday Reprint

Experimental Researches in Electricity. vols. 1 to 3. Michael Faraday. Dover, New York, 1965. vols. 1 and 2, 896 pp. (bound as one volume); vol. 3, 602 pp. Plates. $15.

It seems incredible that these volumes have never been reprinted in their entirety in the 20th century. They, and the facsimile reprint made by Bernard Quaritch in the 1870's, have become increasingly rare until they have now attained the status of a collector's item that sells for upwards of $200 a set.

Their value is not due entirely to their rarity but also to their contents. Here is the record of one of the most extraordinary intellectual adventures in the history of science. And, like a true adventure, it builds from humble, even commonplace, beginnings to a soaring conclusion. For what is recorded here are the origins of field theory from Faraday's first tentative and highly cautious rejection of action-at-a-distance, through his successful use of