and the future as is possible. Such an extreme provides a comparison for assessing later hypotheses.

The translation does not seem to be wholly correct; "une trentaine" and "une trentième" seem to have been confused on p. 32, and there is more than one bad sentence on p. 49. But the difficult points are few. The translators have set out to represent as closely as possible the author's outlook, rather than to translate the words literally; and on the whole they have succeeded.

"L'Univers" is a published version of a series of broadcast talks given by Canon Lemaître in 1950. It gives a popular account of the ideas described in more detail in "The Primeval Atom".

T. G. COWLING

MEASURE AND MEASURABLE FUNCTIONS

Measure Theory
By Prof. Paul R. Halmos. (University Series in Higher Mathematics.) Pp. xi+304. (New York: D. Van Nostrand Co., Inc.; London: Macmillan and Co., Ltd., 1950.) 45s. net.

THE theory of measure is an essential part of modern analysis, and an up-to-date treatment of it in the English language is very welcome. Prof. P. R. Halmos states that his purpose is to provide a book that should be found usable both as a text for students and as a source of reference for the more advanced mathematician. In my opinion, the advanced mathematician will find the work more useful than the student, who may be discouraged by the somewhat surprising arrangement of its contents. The preface says that "The only necessary prerequisite for an intelligent reading of the first seven chapters is what is known in the United States as undergraduate algebra and analysis. For the convenience of the reader, §0 is devoted to a detailed listing of exactly what knowledge is assumed in the various chapters. The beginner should be warned that some of the words and symbols in the latter part of §0 are defined only later, in the first seven chapters of the text, and that, accordingly, he should not be discouraged if, on first reading of §0, he finds that he does not have the prerequisites for reading the prerequisites." In fact, pp. 3–8 may well terrify the beginner, and are not needed until the last three chapters of the book are reached. If the young student omits these, he may yet be puzzled by the first sentence of chapter 1 (p. 9): "Throughout this book, whenever the word set is used, it will be interpreted to mean a subset of a given set, which, unless it is assigned a different symbol in a special context, will be denoted by X".

After this the book becomes more lucid, and the first seven chapters give a good account of sets and classes, measures and outer measures, extension of measures, measurable functions, integration, general set functions, and product spaces. There are many examples which are not as useful as they might have been. The author himself says (p. vi): "It might appear inconsistent that, in the text, many elementary notions are treated in great detail, while, in the exercises, some quite refined and profound matters (topological spaces, transfinite numbers, Banach spaces, etc.) are assumed to be known. The material is arranged, however, so that when a beginning student comes to an exercise which uses terms not

defined in this book, he may simply omit it without loss of continuity."

Chapters 8 and 9 are rather more difficult: the former, on transformations and functions, uses the concepts of metric space, completeness, separability and uniform continuity of functions on such spaces; the latter, on probability, includes some important theorems due to Kolmogoroff. This chapter is rather outside the main stream of the argument represented by the rest of the book.

There is a great increase in difficulty in chapters 10–12, in which systematic use is made of many of the results of topology and topological group theory. These are enumerated in pp. 3–8, to which I have already referred. Chapter 10 deals with locally compact spaces, chapter 11 with Haar measure, and chapter 12 with measure and topology in groups. The book concludes with a bibliography and a list of references to it appropriate to different passages of the text, a list of frequently used symbols, and an index.

The book has many merits, and one hopes it will reach a second edition so that the author can remove the unnecessary difficulties in the first few pages, which may conceal these merits from a timid beginner.

H. T. H. PIAGGIO

LIFE IN THE GRAN CHACO

A Naturalist in the Gran Chaco
By Sir John Graham Kerr. Pp. xiii+235+24 plates. (Cambridge: At the University Press, 1950.) 21s. net.

THERE is a rich tradition of naturalist travellers in the University of Edinburgh, dating from the days of James Bruce and Mungo Park in the eighteenth century, and this record of Sir John Graham Kerr's work in the Gran Chaco of South America places him worthily in their distinguished company. It is only from this account, with its day-to-day records and connecting narrative, that one can picture, half a century and more after the events took place, the foresight and planning skill, the endurance, persistence and enthusiasm which brought to successful conclusions two expeditions to a region then practically a scientific blank.

The whole story hangs by a thread—on a bleak afternoon in February 1889 an Edinburgh medical student picks up a copy of *Nature* at the bookstall in Waverley Station, sees a note about a projected Argentine expedition to certain high tributaries of the Rio de la Plata, and so the adventure is conceived and Graham Kerr's scientific future potentially fashioned. As naturalist on Captain Juan Page's expedition, the author penetrated the Gran Chaco, and his observations, made during 1889–91, form the greater part of the book. The second part describes the Lepidosiren Expedition in the same region, undertaken with John Budgett during 1896–97.

The aims of the two journeys were different in kind: the second had a definite objective, the elucidation of the habits and early development of the American lung-fish, about which nothing was known; but that does not preclude supplementary descriptions of other notable inhabitants of the swamps. Vividly the narrative recounts the difficulties and early disappointments encountered and surmounted; and most naturalists to-day are familiar with the value of the direct results, embryological and evolutionary, which followed from the