machines than on philosophy. That the breed of natural philosophers has not entirely died out, and that it would be a pity if it did, is evidenced by this book. *Knowing and Guessing* cuts across several disciplines—physics and philosophy, of course, and communication theory, cybernetics and statistics. And let it be added immediately, before the specialist in any one of these fields summarily dismisses the book as unworthy of his attention, that this is no shallow book with a smattering of this and that, but one from which each specialist probably has something to learn, even in his own field.

A unifying theme is the notion of the entropy of a probability distribution. The importance of the idea of entropy began to be generally appreciated, outside the realm of physics, following its introduction by Shannon in the field of communication theory, about 1948. Entropy can be interpreted as a "natural" measure of indeterminacy, uncertainty, disorderliness; and any attempt at quantifying these concepts inevitably involves this measure. It is not surprising, therefore, that the emphasis on quantitative thinking that is characteristic of the present age has resulted in manifold applications of the measure over a broad range of disciplines.

In this book, many of these applications are brought together. An entropy theorem for Markov chains, designated the H-theorem, is the mathematical counterpart of the second law of thermodynamics. An inverse H-theorem is relevant to an analysis of the learning process in terms of decreasing entropy of creditability distributions. The interdependence of two random variables depends on the information that one provides about the other, and entropy becomes relevant in measuring such interdependence, as in communication theory. Taxonomy and classification attempt to produce order, so entropy is again relevant. And so on.

The bringing together, in one book, of such applications of the notion of entropy is in itself a useful exercise. It would be wrong, however, for me to leave the impression that this book is only concerned with these applications. The whole notion is explored in depth, and, for instance, both Boolean logic and the modular logic underlying quantum mechanics are discussed.

The author's style is lucid, his comments are penetrating, his examples illuminating. The result is a fascinating book, which will be of interest to scientists in many different fields.   SAMUEL D. SILVEY

COLOURFUL FOODS

The Oxford Book of Food Plants
By S. G. Harrison, G. B. Masefield and Michael Wallis. Illustrated by B. E. Nicholson. Pp. viii + 206. (Oxford University Press: London, November 1969.) 55s.

As all well informed gourmets know these days, a succulent steak may not have its origin in the animal kingdom. It may be a reconstituted extract of the soybean, which the botanist calls *Glycine max*. This proteinaceous plant is an annual herb belonging to the pea family. It is erect and bushy, up to six feet tall and has white or purple flowers. You can see a picture of it—or at least a standardized version, for there are more than a thousand varieties—in *The Oxford Book of Food Plants*. True to the high standards of a series which already includes British wild flowers, garden flowers and flowerless plants, the colourful illustrations are the dominant feature of this book. Most of the fruits have been drawn from life, collected together from all parts of the world, and sometimes even grown specially.

The declared purpose of the book is to provide accurate and attractive illustrations and descriptions of the plants which serve the human race for food. On this subject it is a storehouse of information, and would be ideal equipment for Christmas revellers faced with the sort of news-

paper quiz that demands: what is the garden huckleberry ? or what would you do with a stray rambutan ? The answers should be that a garden huckleberry (*Solanum intrusum*) is a plant of the potato family, said to be a native of Africa, and sometimes grown in Britain and America for its small black fruits, which are said to be insipid and unpopular; while as for the rambutan (*Nephelium lappaceum*), you would naturally eat its fruit, which apparently have tasty white flesh surrounded by a coat of soft yellow spines.

Many other useful and astonishing pieces of knowledge can be gleaned from a reading of this book. Who knew, for example, that the cultivation of sugar beet (*Beta vulgaris* subspecies *cicla*) was first encouraged so that Napoleon could boycott cane sugar (*Saccharum officinarum*) from the British colonies, or that carambola is not a character from a Jacobean tragedy, but *Averrhoa carambola*, a small tree, native to Indonesia, with very juicy yellow fruits used in jellies, tarts and preserves, as well as for making a drink ?

And then, of course, there are pictures of all those plants which provide the more familiar potent drinks, from nettle tea (almost as good as nettle pudding) to absinthe and vermouth, which come from *Artemisia absinthum*, otherwise known less gloriously as wormwood. Habitual drinkers may be interested to know that they are probably being slowly poisoned by a perennial herb belonging to the daisy family. In short, this is the sort of book that makes learning enjoyable, although the knowledge gained may not be very high powered. It would make a suitable gift for one of those old fashioned people who think that botany consists only of giving names to flowers and is no use to anybody.   MARY LINDLEY

AFRICAN FOSSIL MAMMALS

Fossil Vertebrates of Africa
Vol. 1. Edited by L. S. B. Leakey. Pp. ix + 102. (Academic Press: New York and London, September 1969.) 50s; $7.50.

DURING the past three decades, mainly under the aegis of Dr L. S. B. Leakey, a very extensive programme of field work in East Africa has resulted in the collection of a vast quantity of fossil vertebrates, mostly of high quality, chiefly mammalian, and varying in age from Miocene through Pleistocene. The British Museum (Natural History) has published the scientific results in a series of monographs, *Fossil Mammals of Africa*, which between 1951 and 1967 ran to twenty-two papers. The volume under review is the first of a second series which promises to maintain the same high standards of scholarship. The quality of illustration is of prime importance in palaeontological work and in this volume there is some room for improvement. Line drawings alone are rather inadequate in Butler's systematic treatment of insectivores and bats, while the photographic plates of Leakey's Cercopithecoidea often have too much contrast to reveal clearly the tooth and bone morphology. The editor might consider halftone plates or the authors might be asked to coat specimens for photography.

The volume comprises four papers by authors from four different nations, each inevitably written in very different styles; while this in itself can be refreshing, the series would profit from some uniformity of presentation and more careful proof reading would have allowed fewer mistakes to pass. These criticisms, however, should not be allowed to override the real value of the scientific contributions.

Butler's paper on the Miocene insectivores and bats is a sequel to his papers in the earlier series. Some sixty-three additional specimens are reported on, coming from Rusinga, Songhor, Koru and Napak. The Macroscelidea are treated as a separate order and a new species of