

and a few others have tried to record in writing are already almost extinct.

KEITH OATLEY

On Rattlesnakes and Men

Rattlesnakes: Their Habits, Life Histories and Influence on Mankind. By Laurence M. Klauber. Volume 1: Pp. xxx + 1-740. Volume 2: Pp. 741-1533. (University of California: Berkeley, Los Angeles and London, February 1973.) £22.50 two volumes.

LAURENCE KLAUBER was a professional engineer whose hobby was herpetology. He was unusual as an amateur who not merely made a significant contribution to knowledge but who also influenced the methods of study of the professionals in the field. In these volumes we find many examples of Klauber's application of statistical methods to the study of variation and ontogenetic change and the discrimination and description of species and subspecies.

One of my strongest impressions on reading this work is that it displays the endearing enthusiasm of a critical but kindly man. Klauber obviously enjoyed collecting all kinds of information about rattlesnakes, both factual and fictional. He was neither hurrying to produce an impressive pile of publications nor striving to build himself a reputation; he took his time studying the animals in the field and laboratory, talking and corresponding with many people, and searching through newspapers, magazines, histories, travel stories, ethnographic and medical literature as well as the technical herpetological literature. He avoids holding correspondents up to ridicule by omitting their names where they give him highly doubtful information but attributes absurd printed statements "since the author has placed himself on record".

Rattlesnakes range from parts of southern Canada through the New World tropics to the northern provinces of Argentina. Klauber recognizes thirty-one species and seventy subspecies. The work is addressed to non-technical readers, but sufficient technical taxonomic information is given to enable the reader to make a detailed identification of any rattlesnake. There are keys, maps and ecological information for all forms and nearly all are illustrated with good photographs.

Few quantitative aspects of rattlesnakes have not been counted, measured, weighed or timed. Variation within and between populations is studied as well as in relation to ontogeny and ecology; characters are examined pair by pair for correlations. Amongst other interesting investigations we find an account of relative fang sizes of different species, fang replacement and changes of shape and proportionate size during growth. The development of

the rattle, the feature which gives these snakes their name in all languages, is described in detail. Klauber did these statistics in the days of mechanical calculating machines. His tens of thousands of raw data items must be waiting for someone with an electronic computer to extract yet more information from them.

The habits of the different species are considered at some length, both as they relate to the modes of life of the snakes and as they bear upon the risks of snakebite. There are sections on population density, control measures, collection, shipment and rearing and care of rattlesnakes. The venoms, their effects and treatment naturally receive generous attention and there is a discussion of the difficulties of compiling reliable snakebite statistics. If Klauber has no first hand knowledge of some aspect he reviews other people's work or, at the very least, mentions it and gives references.

This is a book about people as well as rattlesnakes. In addition to special chapters on folklore and Amerindian beliefs the book is sprinkled with examples of such human failings as ignorance, gullibility, foolhardiness and guile. The history of our knowledge is traced and many early anecdotes are recounted.

Such a compilation about a single group of animals, with more than 4,000 references, must make the group attractive to other researchers with evolutionary interests in various fields. Reading the text suggests many matters which would merit further study. The volumes are well produced, I found barely half a dozen typographical errors in 1,500 pages. They stand as a splendid memorial to a man who aroused the animosity of none and the respect and love of many.

GARTH UNDERWOOD

Facts of Malnutrition

The Hungry Planet: The Modern World at the Edge of Famine. By George Borgstrom, Pp. xviii + 552. (Collier: New York; Collier-Macmillan: London, March 1973.) £1.25.

"ONE and a half billion people are undernourished, and the diets of an additional one billion are deficient in one or several key nutrients" (page ix).

"Recent studies have established the prevalence of hunger and malnutrition among ten or even more millions in the United States" (page 55).

"Ecuador, Colombia, Bolivia and Guatemala [with protein consumption of 50-57 g/person d⁻¹] get hardly more than half the protein they need" (page 288).

"More deserts have been created by man than ever new land was gained through irrigation" (page 510).

It is difficult to tell whether the author really intended this to be regarded as a scientific book. He makes these and many other extraordinary statements without advancing any evidence for them, except for confused reading lists, consisting mostly of popular books, not scientific journals.

The legend that half the world is malnourished (the author throws in an extra billion people for good measure), which originated with the Food and Agriculture Organization (FAO), was later shown to rest only on the evidence that half the world did not, indeed, eat as much as the inhabitants of Western Europe (many of whom are dying from diseases brought on by overeating).

Recently, however, FAO has had a change of heart. Dr Pawley, Director of FAO Policy Advisory Bureau, has indicated that during the coming century we could without serious difficulty raise world food production to fifty times what it is now¹.

The author quotes 3,000 calories d⁻¹ as the minimum requirement for a man of 70 kg (too low), makes some adjustment for Indian body weights, but then hopelessly confuses requirements per adult man and requirements per head of the population, ending up by estimating Indian minimum requirements at 2,400-2,500 (the correct figure is about 1,650). Food supplies now available in India would give an average of 1,900, which if equally distributed would suffice to provide this minimum, with a small margin to spare.

I have published an estimate that the proportion of the population of India receiving less than minimum calorie requirements is about 25%². The distribution of income to landless labourers, poor tenant farmers, and the lower castes generally (something which only the rulers of India can correct) leaves 25% hungry.

The author produces no evidence on protein requirements; but his statements on Latin America imply a requirement of about 100 g/person d⁻¹.

Few serious estimates go higher than Dr Gopalan's³ 38 g (of protein as consumed, with conversion factor to reference protein averaging 0.65); and some estimates would only be two-thirds of this figure. Dr Gopalan, and several others, have recently brought about an important change of opinion on the question of protein requirements. While clinical manifestations of protein deficiency, in many countries, are all too clear, these are rarely due to a lack of adequate protein in the diet. When the diet is deficient in calories, the patient cannot assimilate the protein. What the developing countries need is more of their traditional diets, with only very limited protein supplementation. The need for animal protein, as such, is minimal.