



Review: Ungulate Ecology

Reviewed Work(s):

The African Buffalo. A Study of Resource Limitation of Populations by A. R. E. Sinclair
John F. Eisenberg

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While there exist several dozen cover-to-cover English translations of Soviet scholarly journals, *naukovedenie* has not been included in them. Lubrano's book therefore fills a gap and, moreover, may encourage someone to undertake a historical and sociopolitical analysis of this unusual Soviet science of *naukovedenie*.

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Ungulate Ecology

The African Buffalo. A Study of Resource Limitation of Populations. A. R. E. SINCLAIR. University of Chicago Press, Chicago, 1977. xii, 356 pp., illus. + plates. \$20. *Wildlife Behavior and Ecology*.

The tribe Bovini of the family Bovidae has been somewhat neglected in recent studies of ecology and behavior notwithstanding the fact that *Bos taurus* has been domesticated for 5000 years and the true wild cattle of Asia have existed in an almost commensal state with mankind for an even longer period. The African buffalo *Syncerus caffer* is the focus of this volume, but a considerable quantity of data from the Asiatic water buffalo *Bubalus bubalis* have also been integrated in the text.

The author conducted fieldwork in the Serengeti over a period of some eight years. The length of the study, the execution of the fieldwork, and the analysis of the data mark this as a classic in ungulate biology.

The African buffalo is one of the largest mammals found on the African continent, exceeded in size only by the giraffe, the rhinoceros, and the elephant. Its efficient ruminant digestive system allows it to draw energy from structural carbohydrates. It should be no surprise, then, that where sufficient water for drinking is interspersed with grasses and forbs for grazing the buffalo may reach a point of dominance in terms of biomass within the ecosystem. It is as an adult large enough to deter significant predation, and its social system involves group defense of juveniles against predators. In the absence of disease its numbers can approach the carrying capacity of the habitat. The species is, in short, the perfect subject for analyzing one aspect of population regulation, namely regulation through food as a density-dependent mechanism. This is exactly what Sinclair sets out to do, and he does it admirably.

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Sinclair reviews the evolutionary history and present distribution of the Bovini and then proceeds to a detailed analysis of the habitat requirements and feeding ecology of *Syncerus*. Social behavior, reproduction, and growth are all covered in the first seven chapters. The last four chapters address themselves to the population dynamics.

Buffalo population densities vary from region to region depending on the length of the growing season, which at this latitude depends ultimately on rainfall. Mortality increases in adult age classes as density increases, and when this mortality is coupled with fluctuations in the juvenile mortality the resultant death rates serve to regulate the populations. Food

supply is now the major regulator of density, but prior to 1963 the major regulating influence was the bovine disease rinderpest. Adequate veterinary prophylaxis addressed to domestic grazing stock in the early '60's was indirectly instrumental in releasing the African buffalo populations from regulation through pandemic disease. Sinclair then goes on, by analyzing the forage quality, to explore the manner in which the food supply controls population. During the dry season forage quality declines and buffalo are forced to draw upon their fat reserves. Decline in nutritive intake and a constant parasite load act synergistically to promote mortality. Predation accounts for only 30 percent of the annual



"Wildebeest massing in a grazing front on the Serengeti Plains. March 1973" [From *The African Buffalo*]



Male African buffaloes of different ages. Left to right: young adult, middle-aged, two-year-old juvenile. [From *The African Buffalo*]

observed mortality. The author concludes that intraspecific competition from wildebeest and topi to some extent limits the food supply even more but that rainfall and retention of soil moisture ultimately set limits on the carrying capacity for all ungulates.

Sinclair concludes with a discussion of the management implications of his research. He rightly points out that conservation attempts in East Africa and elsewhere are hampered by deficits in our knowledge concerning distributions and our inability to define even an approximation to the carrying capacities of habitats designated as National Parks. His work is a refreshing blend of ethology, ecology, and management. It deserves to be read not only as a major field study of an ungulate species but also as providing a valid, pragmatic approach to the resolution of critical ecological questions related to long-term preservation.

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Muscle Research

The Biochemistry of Smooth Muscle. Proceedings of a symposium, Winnipeg, Manitoba, Canada, Aug. 1975. NEWMAN L. STEPHENS, Ed. University Park Press, Baltimore, 1977. xviii, 734 pp., illus. \$34.50.

This book is an essential source of information for all those interested in a remarkable set of relatively primitive cells, many of which can and do contract spontaneously and rhythmically and all of which can be stimulated to contract or relax by many drugs and can respond in many ways. Although we cannot control our own smooth muscles consciously, their behavior has enormous control over us and we should know much more about them. This symposium volume is a contribution to such knowledge.

There are 37 papers by 66 contributors in seven sections dealing with the energetics of contraction, carbohydrate and fat metabolism, cyclic nucleotides, contractile proteins, calcium metabolism and cell membranes, and applied biochemistry.

There is a significant degree of overlap between this book and an earlier symposium volume (*Physiology of Smooth Muscle*, Edith Bülbring and M. F. Shuba, Eds., Raven, 1976); both books are necessary reading for those interested in recent developments in our

knowledge of smooth muscle. Many of the gaps in earlier books on smooth muscle are filled by material in this one, and accounts of the subject are now reasonably adequate.

The book is as up to date as could be hoped. The references give ready access to what was known in 1975, although a flood of new, important, and sometimes contradictory findings has appeared since the symposium.

Perhaps the most remarkable development in the study of smooth muscle in recent years has been the effective application of virtually all appropriate sophisticated techniques to a tissue that for many years was mainly the basis for bioassays by pharmacologists. Smooth muscle was deliberately ignored by most others as being too variable and difficult to study properly. Many years ago it was even described as "headache muscle" (by A. Csapo in *The Structure and Function of Muscle*, G. H. Bourne, Ed., vol. 1, p. 232, Academic Press, 1960) because it plays a role in headaches, because thinking about it caused headaches, and because through "a lack of appreciation of the significance of adequate techniques, smooth muscle physiology [had become] an isolated and retarded discipline, conducted without regard to the fundamental similarity of contractile tissue."

That time has long passed, as this book clearly demonstrates. In fact, the great range of structure and behavior exhibited by smooth muscle makes it likely that investigations of it will produce new advances in even greater profusion than will investigations of skeletal and cardiac muscle.

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Body Politics. Power, Sex, and Nonverbal Communication. Nancy M. Henley. Prentice-Hall, Englewood Cliffs, N.J., 1977. x, 214 pp., illus. Cloth, \$9.95; paper, \$3.95. A Spectrum Book.

Chemistry and Properties of Crosslinked Polymers. Proceedings of a symposium, San Francisco, Aug. 1976. Santokh S. Labana, Ed. Academic Press, New York, 1977. xiv, 582 pp., illus. \$29.50. *To order this book circle No. 474 on Readers' Service Card.*

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The Eye in Chromosome Duplications and Deficiencies. Marcelle Jay. Dekker, New York, 1977. xii, 250 pp., illus. \$22.50. Ophthalmology Series, vol. 2.

For Theory Building in Archaeology. Essays on Faunal Remains, Aquatic Resources, Spatial Analysis, and Systemic Modeling. Lewis R. Binford, Ed. Academic Press, New York, 1977. xviii, 420 pp., illus. \$24.50. Studies in Archeology. *To order this book circle No. 477 on Readers' Service Card.*

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The Hartree-Fock Method for Atoms. A Numerical Approach. Charlotte Froese Fischer. Wiley-Interscience, New York, 1977. xii, 308 pp. \$22.95.

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