The uniqueness of the African big-game fauna

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TROPICAL Africa has always been famous for the wealth of its ungulate fauna, but only the systematic research work of recent years has brought a realisation of the extent of the phenomenon and enabled its particularities to be defined. This note does not set out to summarise the results of the population studies, conducted chiefly in east and central Africa, but confines itself to reviewing some of the fundamental ecological characteristics of the game populations as revealed by these studies and to underlining their potential economic implications.

Population densities and standing-crop biomass of the various African habitats

On the basis of censuses taken in the various parks and reserves in eastern and southern Africa, it has been possible to calculate overall population densities for these habitats more or less completely protected from human intervention. Though of unequal value (some of the figures are based on a single numerical estimate, while others represent the mean of a series of censuses), these results at once bring out the great differences in population densities which exist as between different regions on the one hand, and between the different habitats within a given region on the other. Thus we find

An egret views Amboseli National Park from the back of a rhino.

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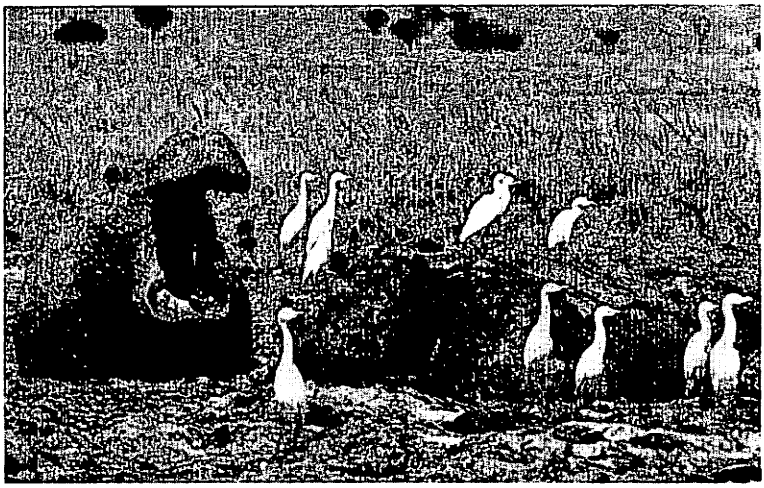
± 34 animals per sq. km. in the Albert Park (Rwindi-Rutshuru Plain), ± 36 per sq. km. in the Serengeti and ± 67 per sq. km. in the Nairobi National Park. In the plain south of Lake Edward, the density varies with the type of plant cover, from 17-18 ungulates per sq. km. in thickly wooded savannah to 77-86 in open low savannah. These figures by themselves, however, do not suffice to evaluate what stock-farmers call the "grazing capacity" of the different plant formations. To do this we must calculate the standing crop biomass by multiplying the number of individuals of each species by the minimum weight of the adult. In this way the excess involved in reckoning immature individuals at minimum adult weight is roughly compensated for by the underestimation of the weight of the oldest individuals. Results thus obtained for various regions of tropical Africa are given in the table.

Localities	Vegetation types	Number of species	Biomass in Kg/Km²	Type of Census G=Ground A=Air	Area Counted
Sahara (Rio del Oro) (Valverde—1955)	Salsola region	1	0.3	G	100
Sahara (Rio del Oro) (Valverde—1955)	Aizoon region, after rain	2	190	G	100
Sahara (Mauritania) (Monod—1960)	Erg, Majâbat al Koubra	1	5 to 20	G	1.360 to 816
Tchad (West of Oum-Chalouba) (Dragesco—1961)	Sahelian steppe	4	80	G	1.200
Southern Rhodesia (Dasmann & Mossman—1959-60)	Open mopane woodland	15	4.418	G	125
Tanganyika (Serengeti) (Grzimek—1958)	Acacia savanna	15	4.692	A	10.000
Tanganyika-Kenya (Serengeti-Mara) (Stewart & Talbot—1961)	Acacia savanna	8*	4.665*	A	38.700
South Kivu (Luama) (Pirlot—1953-54)	Forest savanna mozaic	5*	5.600*	G	75
Tanganyika (Tarangire G.R.) (Lamprey—1959)	Acacia savanna	12*	12.261*	G	?
Kenya (Nairobi National Park) (Ellis—1960-61)	Masai steppe (overgrazed)	18	13.215	G	116
Kenya (Talbot—1960)	Acacia savanna	?	15.760	G	?
Uganda (Queen Elizabeth Nat. P.)					
Whole Park (Bere—1960)	Open plains with thickets	11	18.795	G	1.670
(Undergrazed area)		7	11.100	G	30
(Moderately overgrazed area)		9	13.360	G	14
(Severely overgrazed area)		8	31.028	G	23
(Petrides—1956-57)					
North Kivu (Albert Park) (Bourlière & Verschuren 1959)	Open plains, partly overgrazed	11	23.556	G	600
Ghana (Tano Nimri Forest Reserve) (Collins—1954)	Rain forest	3	5	G	250

*Greater than.

Two facts of utmost importance at once stand out. First, that the "grazing capacity" of the different regions in respect of wild ungulates varies very widely, and that these variations are far greater than are variations in overall population density. In the Sahara and the pre-desert steppe the standing-crop biomass is very low, from 0.3 to 190 kg/sq. km. In the more or less wooded steppes of southern and eastern Africa, as in the forest/savannah mosaic of southern Kivu, the range is already from 4 to 6 tons/sq. km. In the *Acacia* savannahs of Kenya and Tanganyika the figure reaches 12 to 15 tons/sq. km., and in the western Uganda and northern Kivu savannahs, at the



Immature hippos in their wallow, with egrets, in Albert National Park.

edge of the Congo forest, it reaches the record level of 18 to 23 tons/sq. km. In the rain forest of the western part of the continent the "grazing capacity" is very limited and the biomass consequently very low.

The second fact which stands out from this table is the unique character of these standing-crop biomass values as compared with those of other parts of the world. In this connection, certain figures from other parts of the world may usefully be recalled. In the prairies of North America, the only other habitat which can rival that of

Leopard in a tree at dusk, at Seronera, Serengeti National Park.

Topis eating earth in the Kagera National Park, Ruanda.

Africa in wealth of wild ungulates, the standing-crop biomass must have been of the order of 3.5 tons/sq. km.* The deer forests of Scotland support a standing-crop biomass of red deer of the order 1 ton/sq. km. (Lowe, 1961). The "primeval forest" of the Pol'ana mountain in Slovakia supports only ± 500 kg./sq. km. of herbivorous mammals (Turcek, 1953), and the great herds of saiga antelope on the steppes of southern U.S.S.R. represent only a standing-crop biomass of ± 350 kg./sq. km. in their winter concentrations (Bannikov, 1961). In the "barren grounds" of the Canadian far north, the caribou represent a standing-crop biomass of ± 800 kg./sq. km. (Banfield, 1954). Nowhere else in the world is so high a value of "wild" proteins in kg. per hectare found as in the African savannah.

*(Personal unpublished observations).

The variety of wild ungulate fauna of savannah areas

As was pointed out by J. Lebrun (1954) and F. F. Darling (1960), the chief reason for the high values of standing-crop biomass per sq. km., noted in the preceding pages, lies in the *variety of ungulate fauna* cohabiting in the different "open" regions of tropical Africa. It is not unusual to find *ten to twenty species living together*, as may be seen from the accompanying table. Each of these animals exploits to some extent a different category of plant foods produced by the environment. The young shoots are grazed by small antelope, thornbush is eaten by the black rhinoceros, giraffes browse on the foliage of medium-size acacias, and the elephant can digest practically anything—twigs, leaves, fruits and various grasses, including some

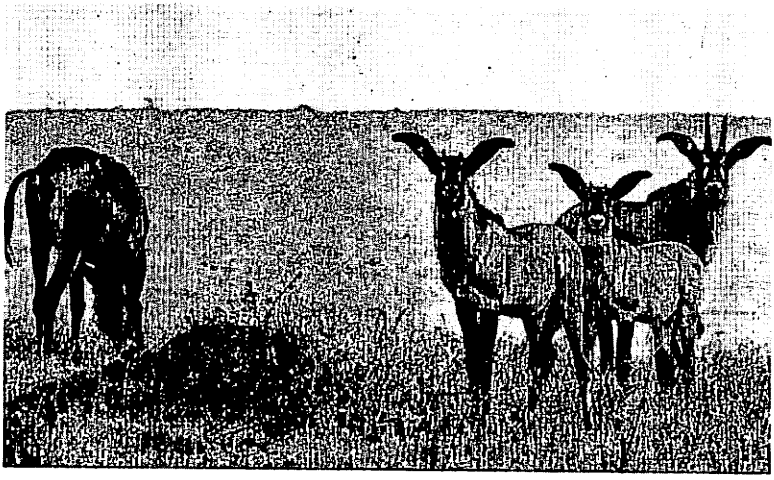
that are not wanted by other species. Thus *the total "load" of herbivores is distributed over the whole of the plant standing-crop biomass* and is not concentrated on a single constituent (the grass cover) as in the case of domestic livestock. The use made of plant foods by the wild ungulates of the African savannahs is, indeed, so complete that they constitute the dominant "consumer" element in this biotic community and leave little room for other herbivorous competitors, among the vertebrates at least. Thus, in the low savannahs of the Rwindi-Rutshuru Plain, the standing-crop biomass of the rodents and hares does not exceed 137 kg./sq. km. (against 23.556 kg./sq. km. for the ungulates living in the same place); whereas in the clay steppes of Trans-Volga there may be 32.500 ground squirrels and voles per sq. km. against only 0.4 saiga antelope!

Another possible reason for the magnitude of the standing-crop biomass of the African plains in respect of wild ungulates may lie in the nutritional efficiency of the species in question. The fact that the majority of them have a less voluminous digestive tract (from 36.8 to 49.4% of total weight) than do domestic ungulates of comparable weight (in which it is generally greater than 50%) implies a better utilisation of plant food (L.M. Talbot, H. P. Ledger and W. J. A. Payne, 1961).

Rate of turnover of savannah populations of wild ungulates

Our knowledge on this point is still rather limited and we need to determine rates of growth, fecundity and average duration of life of each species in each type of habitat before seeking to draw practical conclusions, which would permit of rational management of the populations, without risk of causing their decline.

Already, however, one thing is obvious. The highest standing-crop biomass values observed (W. Uganda and N. Kivu) always



Young roan antelope in Kagera National Park, Ruanda.

correspond to ungulate populations where about 70% by weight is made up of the two slow-growing, late-maturing species of large dimensions, the elephant and the hippopotamus. In such cases, therefore, the turnover of population is slow. In medium "loads" (savannahs and steppes of Kenya, Tanganyika and the Rhodesias) the situation is quite different: the small ungulates, fast growing and early-reproducing, are in a very big majority here, species weighing more than a ton represent no more than a minute proportion of the total standing-crop biomass. In this case, the population turnover is very rapid, the more so in that the greater "nutritional efficiency", already referred to, permits of a daily increase in weight generally greater than that of domestic species.

Nomadism and migration

Mobility of the different African ungulates varies greatly not only as between species, but also as between habitats for a given species. In the Albert Park, a marked elephant lived for several years consecutively within a radius of a few dozen km., whereas large-scale and fairly regular movements were observed among elephants from the Murchison Falls National Park and the Garamba. Wildebeeste and zebra migrations in the Serengeti are of spectacular dimensions, whilst in the Kruger Park these animals are much less mobile. These movements are all motivated essentially by seasonal variations in plant resources but they are also influenced by the remarkable resistance of many wild species to lack of free water. This enables them to travel distances of which domestic livestock, unable to remain more than 2 or 3 days without drinking, would be incapable.

These are the main observations which emerge from the first systematic researches on the ecology of wild ungulate populations of Africa. They lead one to suspect remarkable physiological adaptations, thanks to which these wild animals appear infinitely more prosperous than related domestic species. Stock-farmers and nutritionists would do well to bear this in mind.

Wild Birds of the O.F.S.

THE second of the South African Avifauna Series of the Percy FitzPatrick Institute of African Ornithology, which has just been published, comprises a list of the wild birds of the Orange Free State. The list has been compiled by A. van der Plaat, and constitutes a revision of his original check-list published in 1955. In the main the nomenclature conforms to Jack Vincent's "Check-List of the Birds of South Africa." In handing the list over to the Percy FitzPatrick Institute, the author acknowledges the assistance he has received from a number of ornithologists since his original list was issued. Published in roneo form in both official languages, the list, which is obtainable at R1.00, deals with more than 400 birds and includes, of course, the scientific name in all cases.