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A NOTE ON THE NUCHAL HUMP OF THE SQUARE-LIPPED RHINOCEROS *CERATOTHERIUM SIMUM SIMUM* (BURCHELL)

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One of the most obvious anatomical features distinguishing a square-lipped rhinoceros from any other species is the hump on the dorsal part of its neck. Neither of the other two genera of living rhinoceroses have this feature. Several writers have commented on the presence of the hump and made suggestions as to its composition. Cave and Allbrook (1959) were able to examine part of the nuchal region of a young *Ceratotherium simum cottoni* (Lydekker), sent to them from Uganda. They concluded that the nuchal hump consists of a collagenous thickening of the dermis.

We have been making a preliminary study of the matter in relation to the southern subspecies, *Ceratotherium simum simum* (Burchell), in the Umfolozi Game Reserve. Our observations on the living animals, under tranquillizing drugs, and also dissections of the nuchal humps of two specimens, a young and an adult animal, make it clear that the constitution here differs from that described by Cave and Allbrook. Either the two subspecies differ in their nuchal anatomy or, more probably, Cave and Allbrook were not sent the complete nuchal hump, but only its dermal covering and thus they had only incomplete material on which to base their description. It seems desirable, therefore, to present a report on the structure of the nuchal hump as we found it in *Ceratotherium simum simum*.

ANATOMICAL OBSERVATIONS

In the case of the adult animal dissected, there were three quite distinct components of the hump:

(i) the outer dermal and epidermal covering,
(ii) a layer of subdermal fat,
(iii) muscle tissue together with a very much hypertrophied nuchal ligament.

These will be described in turn although the layer of fat was almost entirely missing in the hump of the calf.

(i) The dermal and epidermal covering

In both specimens this tissue differed in no significant feature from that described by Cave and Allbrook and little further comment need be added here. The maximal thickness of the skin "callous" (49 mm. in the midline of the adult) was slightly more than three times the thickness of the skin just lateral to the hump, so that a very distinct thickening of the dermis certainly is present over the neck region in these animals, just as was described for *C. simum cottoni*.

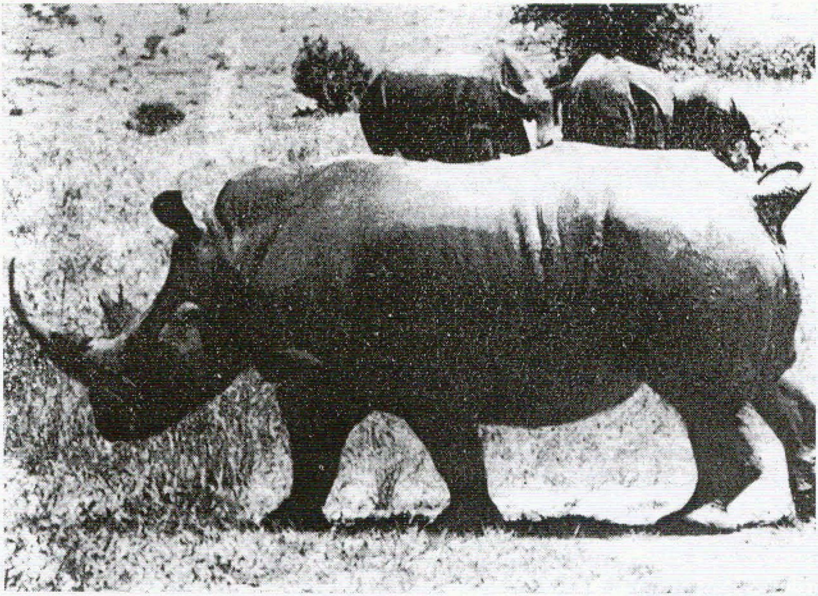

PLATE 1
Ceratotherium simum simum.

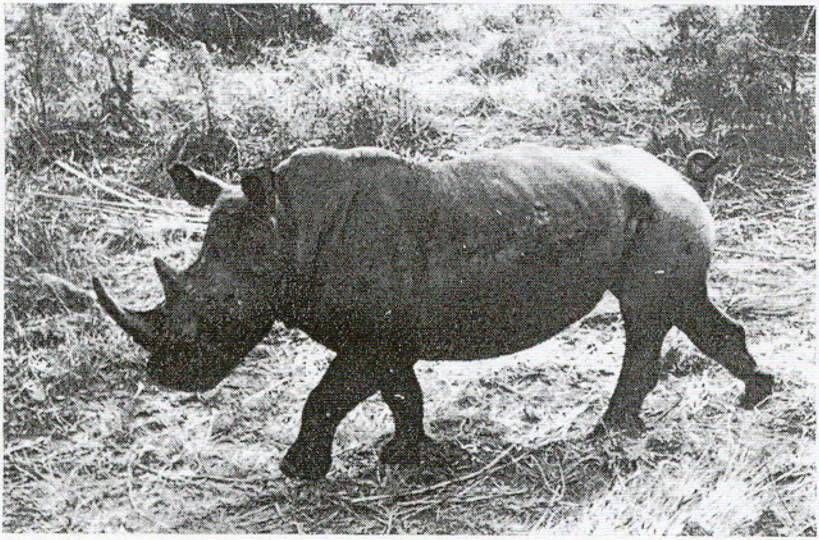

PLATE 2
Ceratotherium simum cottoni.

C. simum simum would appear to retain more hair in the adult than occurs in the northern race, since every one of more than 70 rhinoceroses captured in the Umfolozi Game Reserve has been covered with hair which could be easily detected by running a hand up the flanks or back.

A final point in relation to the dermis is that sweat glands as described by Cave and Allbrook certainly occur here as well. They do not, however, have a uniform distribution, as can easily be ascertained by examining the sweat patterns on the body of a rhino which has just succumbed to immobilizing drugs after being chased by a motor vehicle.

(ii) The layer of subdermal fatty tissue

In the adult specimen a pad of fat was present under the nuchal hump, thinning and disappearing to the sides, back and front of this part. In the midline the fat reached a thickness of 30 mm. In the calf there was a distinct connective tissue packaging present between the dermis and muscle, in the region where the fat of the adult was situated. It seems probable that the presence or absence of the fat layer depends on the nutritional state of individual animals. This phenomenon may well account for the comment made by Player and Feely (1960) that the nuchal hump is analagous to that of Zebu or Brahmin cattle and that it is larger in the summer months than during poorer feeding periods.

This fat layer would probably also contribute to a quality of the nuchal hump which seems to have impressed many naturalists and hunters of the past (see Cave and Allbrook for references), that is its edibility. A quantity of fat in close association with any muscle which is being cooked, especially under camping conditions, is likely to add considerably to the palatability of the flesh, especially in contrast to the notoriously lean meat of antelopes.

(iii) The muscle and nuchal ligament

This tissue constitutes the major part of the nuchal hump, both in thickness and in total volume, the muscle alone being more than twice the volume of the skin in the case of both specimens. It is, as was recorded by Bigalke et al (1950) for the entire nuchal hump of their live specimen, mobile upon palpation and when the animal moves its neck.

DISCUSSION

One might well have deduced correctly the constitution of the hump from examining its shape and apparent extent in the contrasting cases of a rhinoceros with head raised and lowered. In the former case the muscles, mainly *semispinalis capitis* and *rectus capitis*, that is elevators of the head, are contracted and the hump is therefore very obvious (Fig. 1 (a)). When the head is lowered, these muscles are relaxed and stretched so that the hump is barely evident, its visibility presumably being due to the dermal thickening and fat rather than to the muscle and ligament (Fig. 1 (b)).

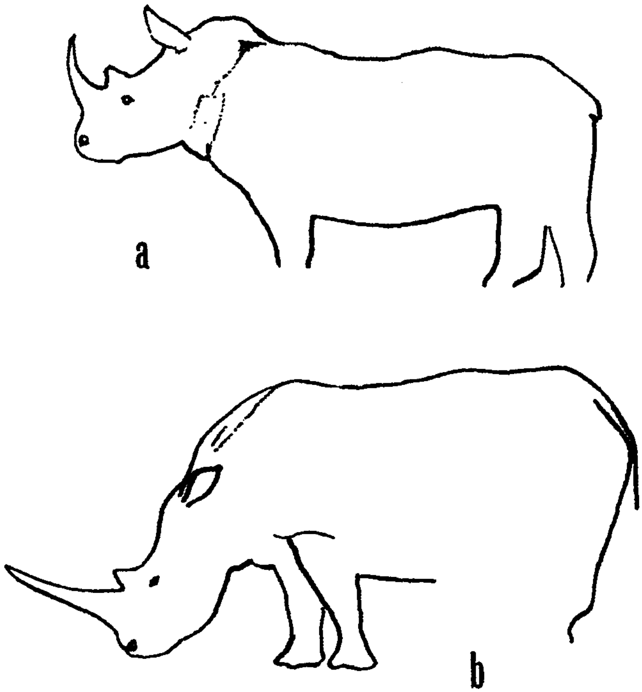

FIGURE 1. *Changes in appearance of the hump, with different postures.* (a) *Hump clearly visible when head is raised.* (b) *Hump scarcely evident when head is lowered.*

The phenomenon of change in appearance of the hump with head posture would be impossible if the hump consisted purely of dermal callosities. There is no reason to believe that the two subspecies do, in fact, differ in their nuchal anatomy, and we suggest that Cave and Allbrook's report was based on inadequate material.

The muscle itself makes for the edibility of the hump for neither the fat nor the skin, no matter how it was prepared, would be palatable alone.

The last point to be made in relation to the nuchal muscle is why the square-lipped (white) rhinoceros should possess a nuchal hump, whereas the prehensile-lipped (black) rhinoceros lacks it. The square-lipped rhinoceros is primarily a grazing animal and presumably the large, square mouth is particularly useful in relation to grass feeding. The prehensile-lipped rhinoceros is a browser, feeding on leaves, twigs and small roots, and its upper lip, almost a little trunk, is very well adapted to procuring such food material. The head of the square-lipped rhino is relatively much longer than that of the prehensile-lipped rhinoceros, the length from eye to ear being the part which is principally concerned. This extra length is associated with the characteristic posture of the head with mouth to ground (Player and Feely, 1960). The long head of the square-lipped species clearly makes grazing easier and the extra length of head, which is correlated with a difference in feeding habit, results in a relatively heavier head in the square-lipped than the black rhinoceros. The heavier head requires relatively better developed elevator muscles and a hypertrophy of the nuchal ligament stretching between head and withers. The nuchal hump is therefore of functional significance and forms part of the animal's adaptation to its way of life.

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