DERMATITIS IN THE BLACK RHINOCEROS (*Diceros bicornis*) DUE TO FILARIASIS.

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The cause of the frequent occurrence of ulcerative wounds behind the shoulder of black rhinoceros in the Hluhluwe and Mkuzi game reserves of Zululand has been the subject of speculation for many years[1]. The seasonal appearance of the lesions, coupled with the fact that they were only seen in adult animals, led to the belief that they were associated with secondary sex skin glands which became active during the breeding season. A similar condition has been described in the rhinoceros in the Ambolseli National Park in Kenya[1],[2],[3]. In Zululand only the black rhinoceros is affected and not the white (*Ceratothium simus*), despite the fact that the two species are often in close proximity. The condition appears in animals of both sexes.

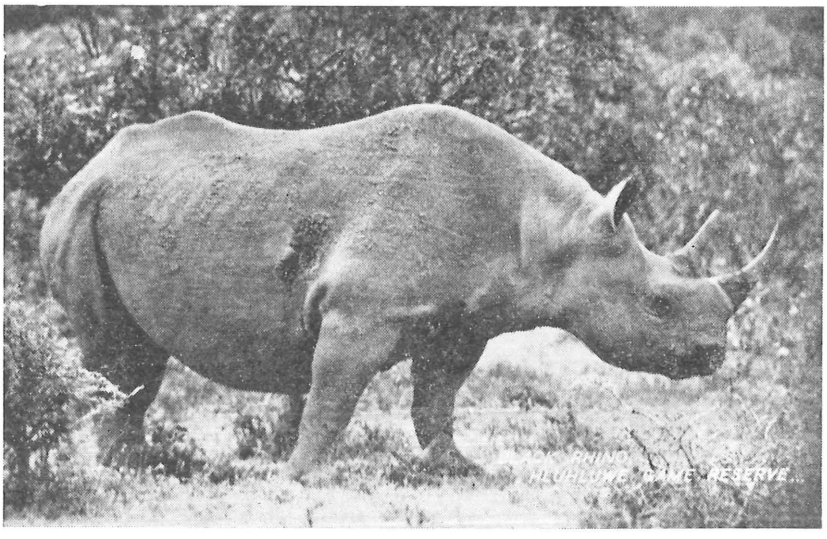

Fig. 1. Photo of a black rhinocerus taken in the Hluhluwe Game Reserve showing the lesion described.
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The most conspicuous lesions always occur behind the point of the shoulder and are some six inches in diameter. During the summer they are reddened and accompanied by pruritis. Rubbing and scratching causes further damage and secondary infection is common. During the winter the lesions recede and become almost unnoticeable. Similarly affected areas may be found on other parts of the body but these are seldom as obvious as those behind the shoulder.

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An investigation of the condition has now been made possible through the collection of specimens by one of the present authors (E.B.K.).

The pathological findings vary according to the age of the lesion and the season in which the specimen was taken. Three distinct stages can be differentiated, viz. florid, intermediary and dormant.

Macroscopically the florid stage is characterized by exfoliation, erosions, pustule and crust formation, ulceration and haemorrhage. Round the wound the skin is corrugated by variable sized nodules and depressions and has a mottled appearance due to depigmented areas and scar formation. (Fig 2). Here larvae, nymphae and adults of *Amblyoma hebraeum* and *Rhipicephalus maculatus* and adult *Dermacentor rhinocerinus* may be found attached. Nodular eruption of the skin, as described in the Indian elephant (*Elephas maximus* L.)[4],[5] has not been seen.

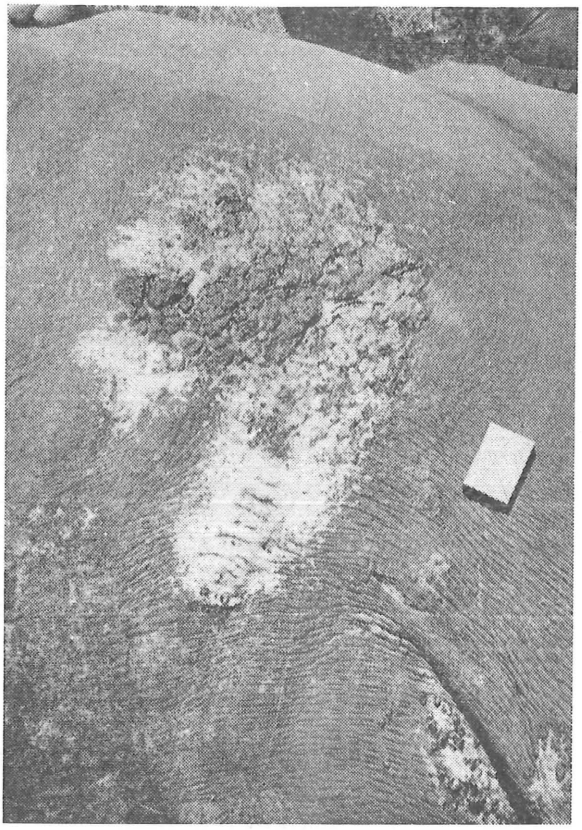

Fig. 2. Clearly indicates the roughened and mottled appearance of the affected skin of the black rhinoceros.

On microscopic examination the granulation tissue of the ulcers is seen to contain very numerous microfilariae, in adjacent areas these are difficult to demonstrate. In intermediate and quiescent lesions they could not be found even after a most careful search. Their

morphological characteristics such as the bluntly rounded head, curved and pointed tail and granular body are clearly visible. The parasites lie in irregular serpentile coils and are not provided with a sheath (fig. 3). They are situated in the superficial lymphatics and tissue spaces and have never been observed in blood vesels. Not infrequently microfilariae are in close proximity to the ulcerating surface and would be easily accessible to insects settling on the wounds. They are usually enclosed by inflammatory cells: plasma cells and lymphocytes predominating with occasional neutrophiles and eosinophiles present. Many of these cells exhibit necrobiosis. In a few instances microfilariae are seen in the vicinity of well defined encapsulated, calcified nodules, possibly the remains of dead helminths or trhombosed blood vessels. No sections of the mature filarid worm are seen in these areas.

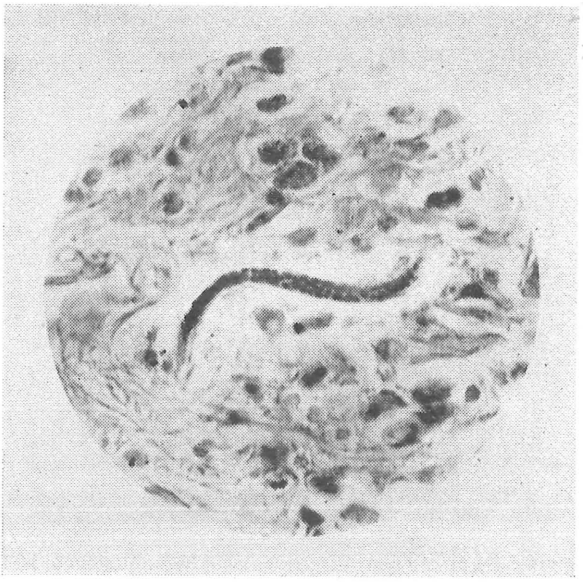

Fig. 3. The serpentine projection of the free lying microfilariae. No cellular reaction is seen.

Since in most active areas fragile, vascular granulation tissue is present, trauma is prone to cause bleeding very readily. Even in places where no alterations of the epidermis are manifest, there is a definite engorgement of blood vessels and haemorrhage subjacent to the surface epithelium. These changes probably account for the distinct red colour of the affected skin.

The intermediary (subacute) stage is characterized by marked hypertrophy and hyperplasia of the epithelium accompanied by pronounced desquamation (erosion) and crust formation. The most salient feature however, is the presence of superficially situated mature filariae, principally female worms. The uterine tubes contain either embryonated eggs or well developed larvae. The adult filarid lies

either free (fig. 4*a*) or is enclosed in a cystic structure lined by proliferating and desquamating epithelium and an inflammatory cellular exudate. From the epithelial lining long branching rete pegs extend into the adjacent stroma. No free microfilariae are present. These changes closely conform to those of "summer-sores" described in cattle[6]. The corium is definitely less vascular and cellular than in the florid stage. Well defined and extensive haemorrhages with an increase of eosinophiles in their vicinity are observed, the shape and distribution closely resembling those of burrows seen in other helminthic affections.

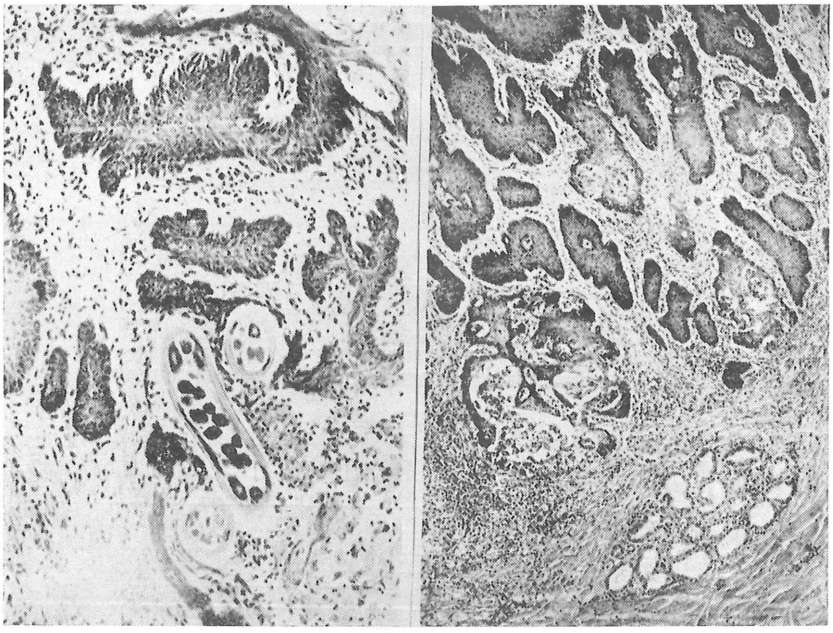

Fig. 4. (*a*) Superficially placed filarid (sections) and hyperplastic epithelium is evident. (*b*) Note the pronounced epithelial and inflammatory changes and the slightly affected sweat gland.

The genus of the infecting parasites could not be determined from the fragments of microfilariae and adult filarids in the sections.

Dormant or quiescent lesions do not show the presence of microfilaria. Occasionally a section of an adult helminth is detected. In some foci of the "dormant" lesion the eosinophile is the predominating cell, whereas in others lymphocytes and histiocytes appear in great numbers. There is an apparent reduction in the cell content but the collagen fibres appear more prominent.

The changes in the epidermis vary according to the amount of damage present. There is always exfoliation. In more severely affected areas hyperplasia of the epithelium with either clubbing or elongation of the rete pegs and a variable degree of parakeratosis or hyperkeratosis are evident. Sometimes distinct papilliform structures

are formed. In localized areas signs of malignancy become apparent, characterized by infiltrative growth of the epithelium extending for some considerable depth into the underlying vascular granulation tissue, or totally denuded ulcers may be formed. Occasionally the epithelium is distinctly acanthotic, pearl formation being evident. In one case streptothrix-like organisms and epithelial changes typical of Senkobo disease in cattle could be demonstrated[7].

All sections show more or less the same type of chronic inflammatory reaction, differing only in degree and extent. The cell content consists of lymphocytes, histiocytes, plasma cells, fibroblasts, relatively few neutrophiles and eosinophiles and occasional multinucleated giant cells. Inflammation occurs principally around and sometimes within the superficially placed blood vessels and dilated lymphatics, and to a lesser extent between the dense collagenous connective tissue fibres, where it is sparsely but diffusely distributed. The cellular reaction extends to a variable depth into the dermis often well beyond the deeply seated sweat glands. In the majority of these glands catarrhal changes are apparent, with some periglandular infiltration and occasionally even a purulent adenitis. There is no indication of any excessive secretory activity of these glands, although the superficial changes are very marked (fig. 4*b*).

These findings leave little doubt that the primary cause of the lesion is a filarid, as yet unidentified. Periodic exacerbation of such filarial infestations is known to occur in other species. It is possible that the microfilariae are transmitted by arthropods during the florid stage of the lesion. There is no evidence to support the popular belief that the condition is associated with the seasonal activity of secondary sex skin glands.

Summary

Cutaneous lesions frequently observed in the black rhinoceros (*Diceros bicornis*) and showing seasonal exacerbation have been shown to be due to a filarid infestation.

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