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From the Zoological Society of London, Whipsnade Park and the Royal Veterinary College,
Department of Medicine

A SHORT REVIEW OF THE DISEASES OF RHINOCEROS SKIN WITH CASE REPORTS
ON AN EXUDATIVE DERMATITIS OF THE WHITE RHINOCEROS (CERATOTHERIUM SIMUM)

By D. M. J o n e s and L. R. T h o m s e t t

Review:

Contrary to popular belief, Rhinoceros skin appears to possess all the main characteristics and properties of the skin of less pachydermatous mammals. C a v e (1969) and C a v e and A l l b r o o k (1959) examining the skin of the White Rhinoceros (*Ceratotherium simum*) found a relatively thin epidermis with a very dense, thick dermis. The latter contained hair follicles and large apocrine sweat glands, which specialisation allows the animal to release quantities of fluid in order to quickly dissipate excess body heat.

The epidermal layer is liable to dry and contract, leaving fissures which may allow the invasion of pathogenic organisms. In captivity, this problem can be overcome by the regular application of vegetable oils to the skin, or by the provision of water sprays or wallows. Lacerations and abrasions are frequently encountered in these species, because the thin epidermis is easily broken, revealing the highly vascular outer dermal layer. Healing of these wounds usually takes place rapidly in healthy individuals. Subcutaneous haematomas and abscesses occur infrequently and they usually respond to the well proven lines of treatment.

Of twenty White Rhinoceroses (*C. simum*) recently shipped from Natal to Whipsnade, only the four animals which had reached physical maturity (in excess of 1500 Kgm) suffered skin damage. The most consistent findings were chronic ulcers on the posterior aspects of the tarsal and elbow joints and the anterior aspect of the carpal joints. These were caused by friction on the floor of the travelling crates. Similar wounds with a similar cause were found over the ribs. Regular cleaning of these lesions and topical application of Cloxacillin ointment ('Orbenin' Beecham Veterinary Products) assisted recovery following release from the crates.

Infection of the base of the horn in an adult male White Rhinoceros (*C. simum*) was traced to necrotic fragments of fractured nasal bone. A similar infection in a female Indian Rhinoceros (*Rhinoceros unicornis*) had tracked down through a deep vertical fissure to the soft generative layer at the base of the horn. Both cases were treated by complete removal of the horn and excision of all underlying infected tissue. Topical sulphanilamide powder prevented secondary infection of the surgical site and regeneration of new horn was evident in six weeks.

A recurrent dermatitis described as "dermatitis exfoliativa" was observed in a female Indian Rhinoceros (*R. unicornis*) in the Philadelphia zoo (F o x , 1926). At the time this was considered to be a normal annual recurrence, although the author describes a resultant severe hyperaemia of the underlying dermis. However, D o d g e (1935) reports that *Pityrosporum rhinoserosum* was isolated from scaling of the skin of *Rhinoceros unicornis* in the Philadelphia zoo. This probably refers to the same animal. It seems most likely that the exfoliation was caused by excessive drying of the epidermis. The *Pityrosporum* invasion was probably secondary.

G r ü n b e r g and B u r t s c h e r (1968) described a number of epidermal erosions on the skin of a Black Rhinoceros (*Diceros bicornis*). These, they believed, were caused by a virus. M a y r and M a h m e l (1970) investigated this case further and isolated a virus which resembled that of fowlpox. S c h u l z and K l u g e (1960)

were the first to investigate an ulcerative dermatitis in the same species which they found was due to filarial nematodes. They described the detailed histology of active, intermediate and dormant lesions. R o u n d (1964) identified the nematode as being of the genus *Stephano filaria* and named it *S. dinniki*. Material for his work came from lesions described in Kenya by T r e m l e t t (1964). H i t c h i n s and K e e p (1970) reported the incidence and distribution of these lesions in Black Rhinoceros (*D. bicornis*) of different ages in Natal. All mature animals exhibited lesion at varying stages of activity. These were found mainly on the ventral neck, lower thorax, foreleg and presternal regions. Immature animals commonly exhibited lesions above the scapula. These authors are of the opinion that the intermediate stages of the parasite are transmitted by arthropod vectors. The lesions have never been seen on White Rhinoceroses (*C. simum*) in the same area. Two cases of filarial dermatitis were also described in captive held Black Rhinoceroses (*D. bicornis*) in Hannover by M e s s o w (1967). Both animals were recent imports.

Ulceration of the skin and mucous membrane of the external nares has been noted in three Black Rhinoceroses (*D. bicornis*) by L u c k e and P e a r s o n (1971). These cases began when an eight week old female suddenly collapsed, but recovered following administration of intravenous plasma expanders and B. complex vitamins. Epidermal eruptions then occurred over the whole body surface and ulcers appeared on the mucous membrane of the external nares. Similar lesions were seen at about the same time on this animals' mother, which had been in poor health for sometime and then later, to a lesser degree on the father. After some improvement, the young animal collapsed again and died. Post mortem examination also revealed a number of deep ulcers in the gastric mucosa. The adult female did not improve and was destroyed. Besides the dermatological findings, severe cirrhosis of the liver was seen at post mortem. The male recovered. Laboratory examination of cutaneous material from these animals revealed only secondary fungal and bacterial invaders. No signs of viral or parasitic infection were discovered. The specific cause remains undetermined, but it was felt by these workers that in the case of the two female animals at least, the dermatitis was superimposed upon and possibly a consequence of some other condition which remains undiagnosed.

B e n b o w (1971) observed a severe exudative dermatitis in a young White Rhinoceros (*C. simum*) recently imported from Natal. Marked generalised desquamation of the epithelium followed a period of partial anorexia. The animal was also very nervous and suffered from a carpal hygroma. Recovery was assisted by regular applications of liquid paraffin containing sulphanilamide powder to the skin. This case appears to be very similar to those recorded below.

Case Histories:

During the winter of 1970/1971, two young female White Rhinoceroses (*C. simum*) recently imported into Britain from Natal with eighteen others developed a severe exudative dermatitis.

Both animals were about two to three years old and somewhat smaller than the average of the group. They were also more nervous and often showed aggression towards the others over space and food. Both cases began with a recent history of lameness and a number of apparently superficial abrasions and lacerations of the skin. Both animals suffered from synovitis of the carpal joints caused by trauma.

The first and most severely affected of the two became stiff on both hind legs and spent most of her time lying down. She began to lose weight and would not eat anything apart from lucerne hay. Following narcosis, no severe injuries were found, but her white blood cell count rose markedly. A six day course of benzathine and procaine penicillin ('Ethacilin' P. A. V. - Bristol) with betamethasone ('Betsolan' Glaxo Laboratories Limited) led to an improvement of appetite. At this stage it was becoming evident that

a number of dermal erosions on the shoulders and thorax were not healing and that a larger number of erupting pustules were appearing in these areas and over the neck. These gradually enlarged, many coalescing to cover the majority of the body surface above a line from the elbow to the patellar region. The extensive ulcers thus formed were irregular in shape and varied in dimensions from two to twenty centimetres in length and breadth. Many were partly covered by detaching epidermis and masses of hardened exudate which encouraged the establishment of infection on the surface of the dermis. Around the periphery of the ulcers, a thick border of exudate was formed. The surface of the dermis became hyperaemic and, especially where the ulcers were partly covered by sloughing epidermis, quantities of pus and exudate were found.

The second animal was also initially lame and anorexic. The white blood cell count was also raised and the animal was given a six day course of procaine penicillin and beta-methasone with the same results. The skin lesions described above began to form on the thorax and neck. At this stage, the first animal was beginning to recover and immediate use of the same method of treatment on the second animal appeared to prevent the condition advancing.

Laboratory findings:

Blood samples removed from the auricular veins revealed a raised white cell count in both cases. Particularly large numbers of neutrophils were present and the numbers of eosinophils and monocytes were raised.

Early examination of affected skin from the region of the dorsal thorax demonstrated that the epidermis was separating from the dermis. Large quantities of clear exudate were being produced and hard crusts of dried exudate and dead epidermis lay on parts of the dermal surface. Inflammatory cells had infiltrated into the outer dermis. At this stage large numbers of gram positive cocci and gram negative rods together with fungal mycelia were in evidence on the surface of the dermis. Staphylococci, Proteus spp and Pseudomonas spp were identified. In the more severe case, Alternaria spp mycelia were found on and in the dermis. Lesions from the second case contained spores of this genus, but the mycelia here belonged to the genus Fusarium.

The most detailed histological examination was not carried out until the climax of the worst case, when almost the entire body surface apart from the legs and lower abdomen were affected. By this time a new epidermal layer had appeared on the thoracic lesions. The stratum corneum was parakeratotic and the upper dermis oedematous with some infiltration of lymphocytes. Swollen capillary endothelia were noted in this layer. A few coiled sweat glands filled with colloid were found in the dermis and in the deeper layers, large numbers of fibroblasts were seen. Swabs of the dermal exudate at this stage were mostly sterile, but one contained few contaminant bacteria.

Treatment:

Initially, the first case was immobilised and all the necrotic surface tissues removed. The ulcers were then cleaned and dried with sterile swabs. Sulphanilamide powder was applied. This did not however prevent the formation of further lesions, or the enlargement of those existing. A warm 2 % aqueous solution of oxytetracycline was then applied twice daily over the entire body surface, but lesions continued to spread. Following the initial laboratory findings a suspension of 0.5% thiabendazole (Thiabendazole' Merck, Sharp and Dohme Limited) and 2.0% oxytetracycline ('Terramycin' Pfizer Limited) was made up in Cod Liver oil. (British Cod Liver Oils Blend 3). This was sprayed into the affected areas every day. After three weeks of this treatment no further extension of the lesions occurred and examination of the skin surface, with the animals under narcosis, revealed that a new epidermal layer was regenerating. Although the second animal recovered within eight weeks, the first, more severe case, returned to normal in five months, the scar tissue still being evident at the time of writing, ten months after the beginning of the case.

Discussion:

The exact aetiology of the condition remains unknown. Laboratory examination did not include any search for a viral infection and so this cannot be ruled out. No filarial nematodes were found in the lesions. The bacteria isolated were almost certainly secondary invaders. The significance of the fungal infection is difficult to assess. *Alternaria* were growing in profusion in the dermis of the first animal, but only spores were found in the second. In the latter case, *Fusarium* was growing at this site. Biopsy of normal skin from this species reveals a few spores of these fungi on the epidermis only.

In view of the clinical histories of both animals, it is the authors opinion that a number of abrasions, lacerations and sub-epidermal contusions became infected by bacterial and fungal spores and that the infection underran the outer dermal and epidermal tissues, so extending the lesions laterally. As both animals were originally in poor condition this must have encouraged the dermatitis further.

Recovery was assisted by careful nursing, with special attention to feeding and the removal of disturbance factors. At the same time necrotic, infected material was regularly removed from the skin surface and treatment was aimed at eliminating fungal and bacterial invaders and encouraging the regeneration of new tissue.

These two cases and those observed by Lucke and Pearson (1971) and Benbow (1971) would appear to demonstrate that skin problems in Rhinoceroses may be a sequel to other clinical conditions. The presence of skin disease in these species should perhaps lead the clinician to look at other body systems if concurrent disease of these systems is not immediately evident. These cases add further weight to the argument that Rhinoceros skin is not an inert armour plate, but a highly sensitive, delicate tissue. Skin care at all times, but particularly when these animals are in poor condition or sick, must be an important preventive measure in the management of captive Rhinoceroses.

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Summary:

A short review describing some abnormalities of Rhinoceros skin is followed by a description of two cases of a severe exudative dermatitis in young female White Rhinoceroses (*Ceratotherium simum*). The laboratory findings are described and the possible aetiology and method of treatment discussed.

Zusammenfassung:

Einer kurzen Zusammenfassung der Literatur über einige Abnormitäten der Haut von Rhinozerosen folgt die Beschreibung zweier Fälle von schwerer mit Geschwüren einhergehender Dermatitis bei jungen weiblichen Weißen Rhinozerosen (*Ceratotherium simum*). Es werden die Laboratoriumsergebnisse beschrieben, woran sich eine Besprechung der möglichen Ursachen und der Behandlungsmethode anschließt.

Résumé:

Un bref aperçu de la littérature relative à certaines anomalies de la peau du rhinocéros est suivi de la description de deux cas de dermatite ulcéreuse aigue avec des jeunes femelles rhinocéros blancs (*Ceratotherium simum*). Les constatations du laboratoire sont décrites et la cause possible ainsi que la méthode de traitement sont discutées.

Резюме:

Дан короткий обзор литературы, описывающей некие ненормальности кожи носорога, в котором следует описание двух случаев тяжело изъязвленного дерматита, проявляющегося у молодых самок белых носорогов / . Описаны также лабораторные результаты и поднят вопрос о возможной причине заболевания и средствах лечения.

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Address of author: D. M. J o n e s , Whipsnade Park, Dunstable Beds., Whipsnade 471, (England)

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1969. VI, 112 Seiten — 4° — 31,— M

Bestell-Nr. 761 265 3 (2136/R)

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Verhandlungsbericht des IX. Internationalen Symposiums
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1967. VII, 299 Seiten — 43 Abbildungen — 35 Tabellen — 4° — 38,— M
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Verhandlungsbericht des X. Internationalen Symposiums
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1968. VII, 254 Seiten — 26 Abbildungen — 19 Tabellen — 4° — 33,— M
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Verhandlungsbericht des XI. Internationalen Symposiums
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1969. IV, 256 Seiten — 26 Abbildungen — 39 Tabellen — 4° — 33,— M
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Verhandlungsbericht des XII. Internationalen Symposiums
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Bestell-Nr. 761 384 0 (2136/4)

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1971. IX, 340 Seiten — 49 Abbildungen — 60 Tabellen — 4° — 58,— M
Bestell-Nr. 761 605 6 (2136/5)

Die seit 1959 jährlich von der Abteilung für Zoo- und Wildtiererkrankungen der DAW abgehaltenen Internationalen Symposien über die Erkrankungen der Zootiere stellen auf internationaler Ebene die einzige Zusammenkunft von auf dem Gebiet der Zoo- und Wildtiererkrankungen tätigen Fachleuten dar. Die als Schriftenreihe herausgegebenen Verhandlungsberichte der Symposien beinhalten alle zu den Tagungen eingereichten Arbeiten und bieten damit allen Interessierten einen guten Einblick in die Problematik des gesamten Fachgebietes.

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