

EYE DISORDERS IN CAPTIVE SUMATRAN RHINOCEROS (*DICERORHINUS SUMATRENSIS HARISSON*) IN SABAH, MALAYSIA

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Summary

The present report describes the development of an ocular disorder in a male and a female Sumatran rhino living in the Rhino Breeding Centre in Sabah, Malaysia.

Introduction

The idea of a Sumatran rhino breeding programme was born in 1982 at a meeting of the Asian Rhino Specialist Group (KHAN, 1989). At this time, the logging activity in Sabah was fast developing. Large areas of rainforest, the natural habitat of the Sumatran rhinos, were converted into oil palm plantations (BOSI, 1996), resulting in a decrease of Sumatran rhino numbers by over 50 % (FOOSE and VAN STRIEN, 1997). Based on these facts, it was decided to establish a local capture and breeding program in Sabah, Malaysia. A rhino breeding centre was built, and all rhinos that were exposed to poaching due to the loss of their habitat were captured (BOSI, 1996). However, the lack of information about the natural behaviour of the rhinos, their nutritional requirements and their social and reproductive behaviour lead to problems in the captive management and breeding of the species. In recent years, information about the nutritional requirements (DIERENFELD et al., 2006) and the reproductive physiology of the species (ROTH et al., 2001, ROTH et al., 2004) has improved, but there are still a lot of challenges in the management of this species. A recently occurring problem in Sumatran rhino facilities is a so called 'ocular syndrome'. The eyes become cloudy, impeding the animal's vision and in severe cases the rhino goes blind (Roth, 2005). The syndrome has already been observed in different rhino facilities (SCHAFFER, ROTH, pers. comm., 2009) but the cause of the syndrome is still not found. Exposure to direct sunlight has been discussed as one possible reason for the turbid eye, but so far a publication describing the syndrome and its circumstances is still lacking.

In the Sumatran rhino facility in Sabah, Malaysia, we observed the development of an ocular disorder in the male and female Sumatran rhino. The female had 2 consecutive eye disorders 1 month apart from each other and she became blind on both eyes after the second incident. The male rhino developed an ocular disorder in his right eye leading to a partial blindness.

Materials and methods

The Sumatran Rhinoceros Breeding Center (SRBC) in Sabah, Malaysia, housed 2 Sumatran rhinos (1,1), both captured in the Kinabatangan area in Sabah, Malaysia. The male was captured in 1993, the female 1 year later, in 1994. Both rhinos were estimated to be born in 1988 or 1989.

Most of the time the rhinos were kept in individual night stalls, but irregularly, they were released into an outdoor enclosure, consisting of rainforest and a natural mud pool. The outdoor enclosure was separated in two different parts: one large area of 3.1 hectare in size and a second area of 0.4 hectare in size. The vegetation in the large outdoor enclosure consisted of secondary rainforest, with a few tall trees and lots of bushes forming a dense understory. The smaller outdoor enclosure was sloped and the vegetation was more similar to grassland with a few bushes and trees that provided little protection against direct sunlight. The period of behaviour observation of the rhinos started 30th March 2004 and finished on the 31st of October 2005. During this time, the behavior of the male and female was monitored, 6 days per week, on an hourly basis, from 9:15 in the morning until 5 in the afternoon. Each animal was observed for 15 minutes each hour and the frequency and duration of certain behavior categories were noted.

Case report

The initial situation

In March 2004, the right eye of the female appeared slightly clouded, mainly in the distal third of the eye and the conjunctiva showed a punctual red discolouration (figure 1) but there was no obvious impairment of her eyesight. The left eye of the female was normal. The eyes of the male rhino were both unremarkable.



Figure 1: The right eye of the female rhino in March 2004.

Female rhino, first incident in July 2004 - left eye

In the morning of the 8th of July 2004 it was noticed that the female had developed an opacity in her left eye suggestive of a corneal oedema (figure 2). The conjunctiva was markedly reddened with some lacrimation observed in the affected eye.

The day before, the female had spent 5 hours (10:00 a.m. until 3:00 p.m.) in the large outdoor enclosure lying in the mud wallow. When she returned into her indoor enclosure nothing conspicuous was noted by the rangers. From the beginning of the behaviour observation, 30th of March 2004, until the 7th of July 2004, the female had been released 18 times into the large and 36 times into the small outdoor enclosure (see figure 3).



Figure 2: Left eye of the female on the 10th of July.

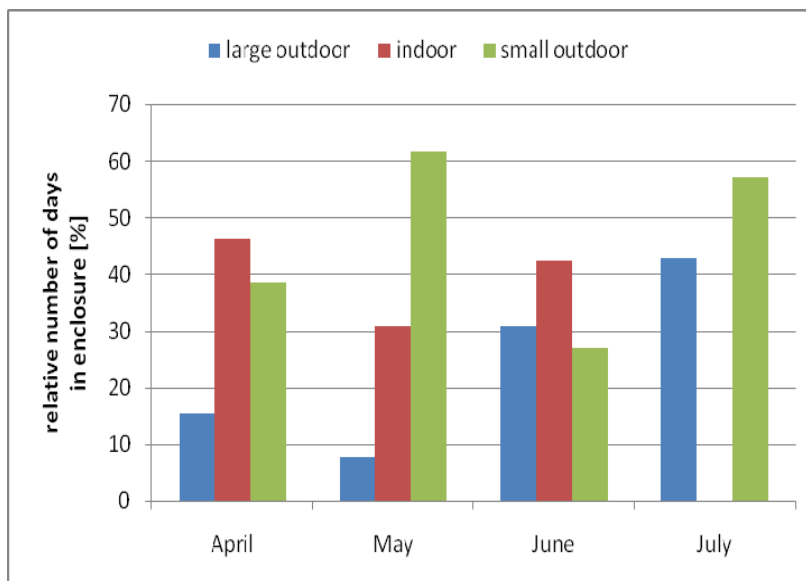


Figure 3: Frequency of days for which the female spend in her indoor and the two outdoor enclosures before the ocular eye disorder happened.

Immediately after the detection of the eye turbidity, treatment was started with Optrex eye drops 3 times on the first day (8th of July 2004). Optrex contains distilled witch hazel BPC 13 % preserved with Benzalkonium chloride 0,005% buffered with Borox and Boric Acid. The following day the eye was treated hourly for 24 hours with 20 ml Optrex and 2 ml Spersadexoline[®] eye drops (Novartis). Spersadexoline contains the active ingredients chloramphenicol, dexamethasone sodium phosphate and tetrazolinehydrochloride. The treatment showed effect within a few days. On the 14th of July, 5

days after the first ocular changes were detected, except a small white dot most of the whitish appearance of the cornea was gone.

Female rhino second incident in August 2004 - right and left eye

On the 6th of August 2004, 3 weeks after the successful treatment of the left eye, a leech was observed on the conjunctiva of the right eye of the female rhino and the eye was bleeding strongly after the leech fell off. During that day, the female spend again 5 hours (10:00 a.m. until 3:00 p.m.) lying in the mud wallow of the outdoor enclosure. The following week the right eye became more and more whitish in appearance and shortly afterwards the similar changes occurred in the left eye. Both eyes were treated every 2 hours with Spersadaxoline ® following a similar procedure as described above. Bacteriologic examination of the lacrimation fluid collected with a cotton swab, revealed Staphylococcus spp. and Flavobacterium spp., which were sensitive to Norfloxacin and Gentamicin. Therefore the treatment was changed to a combination of Norfloxine eye drops and Optrex. Norfloxine contains 0.3 % Norfloxacin and 0.01 % Benzalkonium chloride as a preservative. But the treatment showed only little effect. On the 18th of October 2004, the right cornea was pink in colour, the iris and pupil were not visible and the female rhino seemed to have pain as she was regularly rubbing the affected eye (figure 4). The cornea of the left eye was more whitish-pink and elevated in the centre indicating an increased turgor (figure 5).



Figure 4: The right eye of the female on the 18th of October 04.



Figure 5: The left eye of the female on the 18th of October 04.

A noticeable improvement of the eyes was observed, when the medication was changed to Gentamed® injections, containing 10 % Gentamicine sulphate, giving 6 ml of Gentamed® injections 3 times per day for 3 days. One week after the first injection, the eyes were less pink and less swollen and the female stopped rubbing them. The treatment continued with Gentamicin eye drops containing 3 mg of gentamicine sulphate, every 2 hours. It took several more months until the eyes of the female healed (figure 6), but she stayed blind. Luckily, she still managed well with the situation: She stayed calm without showing any sign of stress and was able to find her way throughout the enclosure and to her food.



Figure 6: The right eye of the female on the 3rd of January 05.

Male rhino in July 2005 - right eye

On the 28th of July 2005, almost 1 year after the first ocular disorder of the female, the right eye of the male rhino developed an ocular disorder. The day before, the male had also spend 5 hours (10:00 a.m. until 3:00 p.m.) in the outside enclosure with short periods wallowing in the mud. He was walking around, rubbing his horn against trees and marking the area with spray urination. Before he got the infection, the male was frequently released into this enclosure, in total 236 times (out of 403 days of observation, starting in March 2004). Similar to the female rhino the male became blind on this eye but he also managed very well to move around.

Discussion

It has been communicated between Sumatran rhino institutions that direct sunlight is causing the turbidity of the Sumatran rhinos' eyes. This could be a reasonable explanation as Sumatran rhinos live in tropical rainforest characterised by dense vegetation and a dense crown cover with little sunlight reaching the ground. Therefore it is likely that the eyes of the Sumatran rhinos do not tolerate direct sunlight, but on the other it remains doubtful whether direct sunlight had an effect on the development of the eye disorders in the described cases. The rhinos spend the day before it started to develop in the large outdoor enclosure which consists of secondary rainforest, with understory and a canopy cover. There was definitely more sunlight reaching the ground in comparison to a natural primary forest, but it is doubtful that the small patches of sunlight reaching the ground could have had an influence on the development of the eye disorder. The smaller outdoor enclosure which was frequently used especially for the female, had less cover against the sunlight. The sun was directly shining into the indoor enclosure and no damage to the eyes was observed.

All three eye disorders occurred after releasing the rhinos in the large outside enclosure. This might have been a coincidence, as this was not the first time that the rhinos have been released into this enclosure, but it has to be noted, that the enclosure was not very frequently used by the rhinos. The female spend only 21 % of all observation days in the enclosure while the male spend 58 % in it. The outdoor enclosures were originally built to facilitate natural breeding of the species but they also enabled the rhinos to follow their natural everyday behaviour: Selecting their own food plants, taking a mud bath or marking their territory. It is difficult to decide whether the fact that the rhinos have been in this area had an influence on the developing infection but it cannot be ruled out.

It is also interesting to note, that all eye disorders happened in almost in the same month, in July and August 2004 and in July 2005. It is therefore possible that the climate had an influence on the development of the eye disorder. ROTH (2005) mentioned that there is some evidence that other confounding factors (i.e., dry air) are contributing to the occurrence of the ocular episodes. The climate in Sabah can be characterised by its high humidity and rainfall throughout the year, only from February till April the weather becomes relatively dry as a result of dry winds coming from the Pacific Ocean. The average humidity in Sandakan, Sabah in July 2004 was 81 %, in August 2004 78 % and in July 2005 80 % (TUTIEMPO.NET). Dry air can therefore be ruled out as a possible factor contributing for the eye disorders in Sabah.

It is difficult to decide whether the eye disorders described here for the rhinos in Sepilok are similar to the ocular syndrome described by ROTH (2005). Further information from other Sumatran rhino institutions with similar cases is needed in order to find the causes of these eye problems. Nevertheless, the described cases show, that the eyes of the Sumatran rhinos can be very sensitive to infections, may it be exposure to sunlight and other influences and that special care needs to be taken in order to prevent further cases of blindness in Sumatran rhinos. The rhinos didn't appear to be negatively influenced by the blindness regarding their behaviour. But these animals are very important for breeding and it is very difficult to run a breeding project with a blind rhino.

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