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# Notes and Records

## Lion predation on black rhinoceros (*Diceros bicornis*) in Etosha National Park

Recently, controversial literature has appeared regarding black rhinoceros susceptibility to predation (Berger & Cunningham, 1994; Lindeque & Erb, 1995), especially regarding the susceptibility of dehorned rhinoceros to hyaena predation. However, no data on actual observations of successful rhinoceros kills were observed and actual causes of death following disappearances after suspected predation of rhinoceros are not available. It has been suspected that young (<2 years) rhinoceros are particularly at risk of being killed and that this risk increases when the mother has been dehorned (Berger & Cunningham, 1994). This argument is viewed with caution as, in this particular case no actual killing of juvenile rhinoceros was observed. Cows vigorously protect their young and Goddard (1966) observed a cow kill a lion that was threatening her calf. Goddard however, estimated there to be a 16% loss of rhinoceros less than 2 years old to predation by lion and hyaena. Rhinoceros calves and subadults have been observed to fall prey to lions on several occasions (Joubert & Eloff, 1971; Hofmyer, 1984; Elliot, 1987) but these have been isolated cases. Over a 13-year period in the Hluhlwe/Corridor/Umfolozi game reserve complex, there were no records of lion predation on black rhinoceros, although there was strong evidence to suggest that there was hyaena predation on small calves (Hitchins & Anderson, 1983). Sub-adult rhinoceros (3–5 years) are capable of inflicting harm or killing threatening predators, as was observed in Etosha when a subadult female rhinoceros killed an adult hyaena. It therefore came as a suprise to us to record three subadult rhinoceros kills by the same lions in as many months. The physical measurements of the rhinoceros killed are examined here, together with the circumstances surrounding the kills and the characteristics of the predating lions.

### *Observations and discussion*

Three rhinoceros were killed on 8 June, 1 July and 17 September 1995 in the central area of Etosha National Park, Namibia. The kill on 1 July was observed directly and the other two were first recorded within a few hours after the actual killing. *Post mortem* examinations were carried out on the rhinoceros at each site to confirm death by strangulation in each case. It was also determined that the rhinoceros killed on 8 June had suffered some previous wounding to its hind quaters, but it is not known how, or if, this wounding influenced the kill. Measurements of each rhinoceros are shown in Table 1. The rhinoceros were aged according to tooth eruption and attrition (Hitchins, 1978) and all three rhinoceros were between 3 and 4 years old.

The description of the rhinoceros kill on 1 July follows:

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1. Five giraffe and about 30 zebra were drinking at the Okaukuejo waterhole. They moved off slowly and then suddenly galloped off as if frightened.
2. A subadult black rhinoceros appeared and started drinking.

**Table 1.** Body measurements of the three rhinoceros killed by lion

| Locality | Spine length (cm) | Shoulder height (cm) | Anterior horn front curve (cm) |
|---|---|---|---|
| Olifantsbad | 160 | 129 | 22.5 |
| Okaukuejo | 165 | 127 | 20 |
| Gemsbokvlakte | 162 | 131 | 18 |

3. Within 4 minutes a lioness appeared and started drinking, followed by three male lions.
4. After about 10 minutes, one male lion walked over towards the rhinoceros, which appeared unconcerned. As the rhinoceros was turning around to face this lion, the other two moved behind the rhinoceros. They attacked the rhinoceros simultaneously. As the rhinoceros went down with two lions on its back and one at its throat, the lion at the back moved around to the rhinoceros's throat so that two lions were now throttling the rhinoceros, which was now lying on its back. The attack until this time had taken around 4 mins.
5. The rhinoceros took $\approx$40 min to die (screaming all the time), during which the lioness started feeding from between the rhinoceros's back legs.

The three rhinoceros at *post mortem* had puncture wounds on the back and anterior ventral portion of the neck with severe trauma to the underlying tissue of the ventral neck region. Antemortal tracheal rupture was evident in two of the rhinoceros but was not recorded in one rhinoceros, as the ventral neck was the first part eaten in that particular case. In the two cases where the actual kill was not observed, track reconstruction showed that there was a great deal of struggling prior to death of the rhinoceros. Blood smears were examined for each rhinoceros to eliminate the possibility of the rhinoceros being infected with anthrax, a common cause of death of large mammals in Etosha. The three rhinoceros were all negative for anthrax.

The history of the three male lions is quite well documented. All three were born into a regularly monitored pride 60 km west of the central area of Etosha and are thought to be brothers or close pride mates of $\approx$6 years of age. In April 1995 they adopted a nomadic existence, roaming the central area of Etosha after being forced from their natal pride by new incoming males. It was during this nomadic existence that the three lions killed the rhinoceros. There had been no unexplained deaths of rhinoceros recorded in their original pride area or in their present range before this time. In each case, the lions killed the rhinoceros through strangulation and in the first two cases fed on the dead rhinoceros immediately after killing them. In the last case, the lions, shortly after killing the rhinoceros, killed a small elephant calf and fed on the elephant, leaving the rhinoceros to the jackals and hyaenas.

The three rhinoceros killed were of remarkably similar size and age (Table 1) and were killed over a short period of time. These findings have two major connotations. Firstly, subadult rhinoceros of a certain age appear particularly susceptible to lion predation: at this age the rhinoceros have just left their mothers and are still relatively small. Secondly, a form of 'specialized' cooperative hunting was developed by the lions concerned and they apparently sought rhinoceros of a particular size.

Because the rhinoceros were killed in areas and at waterholes where many other

rhinoceros drink, including mothers and small calves, the finding that the lions took the subadults and not smaller calves suggests there might be a substantial maternal deterrent effect. It is, of course, difficult to quantify the magnitude of such a deterrent and it could vary depending on the predator species concerned. However, considering the plight of the global rhinoceros population, it may become increasingly important to consider new methods for measuring the impact of large predators on breeding rhinoceros populations. This brief report emphasises the fact that it is desirable to be familiar with both predator and prey and to make certain of the causes of each death in rhinoceros, so that the appropriate management action can be made.

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