

BERGER

J. Berger

Notes and Records

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Disassociations between black rhinoceros mothers and young calves: ecologically variable or, as yet, undetected behaviour?

Many mammals use specialized behaviours to reduce neonate mortality early in life. Among ungulates an interesting relationship concerns whether young regularly accompany or move independently of their mothers, patterns referred to as either *followers* or *hidiers* (Lent, 1974; Ralls Kranz & Lundrigan, 1986; Green, 1992). Despite their endangered status, black rhinoceroses (*Diceros bicornis* (L.)) still live in several large areas that retain their natural predators, spotted hyenas (*Crocuta crocuta* (Erxleben)) and lions (*Panthera leo* (L.)) and allow examination of associations between mothers and young. Here, based on field observations of 22 mother–young pairs in four wild populations in Namibia, I document a previously undescribed pattern, the temporary disassociation of mothers and calves under about 6 months old; mothers may move more than 19 km from their young to go to water. I also suggest several possibilities to explain why this behaviour has not been reported from East Africa and then indicate a possible demographic consequence with bearings on conservation.

From April 1991 to July 1992 more than 90 individually identifiable black rhinos were studied in two areas of Namibia's Kunene Province and two in Etosha National Park (ENP). Observations were made both by day and by night, the latter aided by night vision equipment. Ages of wild calves were known imprecisely but, by comparing foot size with that of a hand reared (ENP) calf known to within one month of age, maximum ages were assigned. Assuming that the hand-reared animal grew faster, ages of wild counterparts would be overestimated but the bias does not alter the occurrence of the behaviour itself. A mean value of association for each of 22 dyads was calculated, by area (at, or away from, water) and by neonate age (older or younger than 6 months).

During the dry session (usually May to December), rhinos drink mostly at night (Cilliers, 1989) often moving over 10 km or more to reach water. Seventeen mothers with calves older than 6 months were regularly accompanied by their offspring to water ($\bar{X}=97.8\%$; $SE=1.54$) and were never encountered alone (Fig. 1). Similarly, younger calves were also invariant in their associations with mothers when not at water ($N=36$), observations that have inevitably led to the conclusion that mother and young must always be together. Given the invariant nature of these associations (Fig. 1), how is it possible to know that calves and mothers may separate during visits to water?

On two occasions, females previously *unsuspected* of being mothers were encountered away from water with calves about two to three months old. Previously calves had not been with them when they drank. Perhaps the calves remained lying in areas out of my view, but the tracks of three other solitary females (also previously unknown to be mothers) were followed for distances up to 19 km before encountering them with calves. On average, mothers with

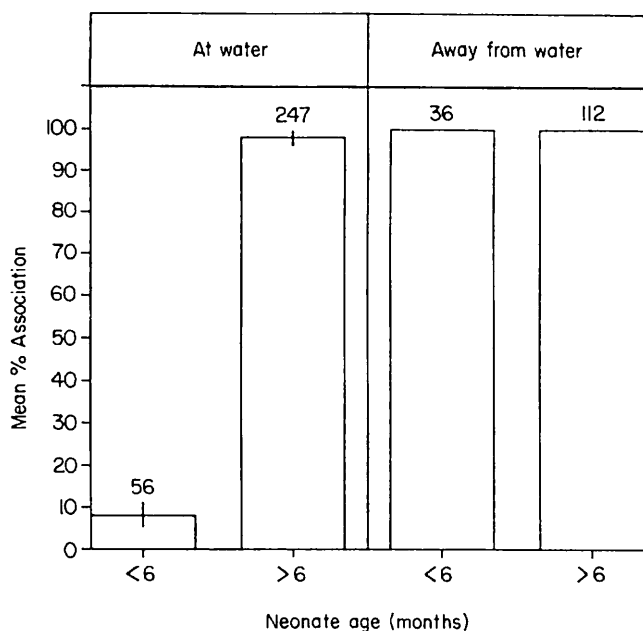


Fig. 1. Percent association between mothers with neonates of two age categories, more ($N=17$) and less ($N=5$) than 6 months at two locations as designated. Bars are standard errors

neonates of <6 months were accompanied to water less than 9% of the time (Fig. 1); calf age exerted a major effect on whether mothers drank alone ($t=18.43$; $df=20$; $P<0.0001$). Whether mothers or calves instigate the temporary disassociations remains unknown.

Since small calves and even subadults up to at least three years of age are vulnerable to lion and spotted hyena predation (Goddard, 1967; Kruuk, 1972; Western and Sindiyo, 1972; Hitchins and Anderson, 1983) some risk must be involved in mother-calf separations. To assess whether it is more risky for calves to be alone at, or away from, water, I compared the frequency with which rhinos encountered lions or hyenas at both locations. Based on 136 nights of observation at ENP waterholes, 33% ($N=45$) included visits by lions or hyenas resulting in 183 interactions with rhinos (Berger and Cunningham, unpubl.). A comparative sample of encounter rates when away from water was not available. Therefore, I used data from Stander (1991, 1992; pers. comm.) who observed nocturnal hunting behaviour of ENP lions in woodlands (e.g. rhino habitat) and savannas over a four-year period. Rhinos and lions were never seen together although more than 920 interactions with other species were witnessed during 3,134 hours of observation. Not all observations were at night or in woodlands but, even if only 40 nights (an extremely conservative value; Stander, pers. comm.) were restricted to following lions in woodlands, the probability that lions encounter rhinos differs dramatically from that at water ($G_{adj}=22.77$; $P<0.0001$). It is likely that the chances of encounter would be even lower for a calf that remains in one place rather than moving about on its own at night.

If predation pressure has ultimately shaped the evolution of this behaviour, then why has it not been reported from geographically diverse regions? One

possibility is that mother–neonate disassociations no longer occur in areas where predators are absent. This explanation appears untenable. Lion and hyena densities in the Kunene Province are, as a guess, less than 0.001 what they are in Etosha and in many areas neither species occurs. Interactions with rhinos must be precipitously low but two Kunene Province mothers each separated temporarily from their calves. Another possibility is that such behaviour is governed by ecological variation. For instance, because water is more abundant in equatorial Africa than at Namib Desert or Etosha sites, rhino mothers may regularly encounter non-risky drinking sites and have no need for temporary separation. Or, perhaps in regions with high lion densities relative to those in ENP (1.6–2.0 per 100 km²; Stander, 1991) the probability of encounter is so great that mother–neonate disassociation is a more risky tactic.

Despite these speculations, a more general issue is whether mother–neonate disassociations even occurs in East Africa. Detailed studies of individually known rhinos (Goddard, 1967; Schenkel & Hulliger, 1969; Mukinya, 1977; Frame, 1980; Kiwia, 1989) suggest an absence of temporary disassociations but it is also possible that the pattern has never been looked for. The dilemma is real — being analogous to rejecting the null hypothesis (no difference between regions) which can be done only once the behaviour is detected or not knowing when to quit trying to accept it, in which case some probability of Type II error exists (i.e. accepting a false null hypothesis).

Irrespective of its possible existence elsewhere, mother–calf separation has one potentially dramatic demographic effect. Where it is critical to know something about population size, adult females might erroneously be counted twice; once in areas away from water when they are accompanied by their calves and once in areas near water when unaccompanied by calves. Hence, without knowledge of individual rhinos, it is possible that the number occurring within an area may be overestimated.

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Joel Berger *Program in Ecology, Evolution, and Conservation Biology, University of Nevada, Reno, Nevada 89512, U.S.A. and Etosha Ecological Institute Okaukuejo via Outjo, Namibia.*

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