

Disassociation between black rhinoceros (*Diceros bicornis*) mothers and their calves

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Berger (1993) reported disassociation between black rhinoceros (*Diceros bicornis*) mothers and their calves, typically when the mother went to a water point. We found only two further references (Joubert & Eloff, 1971:27; Anon., 1997) in the Rhino Resource Center database (Rookmaaker, 2018) mentioning this behaviour, neither of which provide insight into this behaviour. Though common in certain ungulates (Lent, 1974), this behaviour in black rhinoceros remains poorly understood.

During June 2018, we documented black rhinoceros on three ranches in Namibia as follows. We photographed left hind (chosen arbitrarily over right) rhinoceros footprints that were at most 24 hr old. By photographing multiple footprints in unbroken trails, we recorded variability due to changes in substrate and gait, although photography was restricted to tracks made when a rhinoceros was walking from point to point rather than running or moving about a bush while browsing, etc. Cracks in the pad of the foot create a pattern of raised lines in the footprint characteristic of each foot. Comparing the photographic record of trails, we found that trails of sufficient length to display details of the pad pattern could be catalogued by this pattern. Apart from young still paired with their mothers, each rhinoceros was unambiguously identifiable visually by ear notches, apart from the sole male at ranch B, which was thereby also unambiguously identifiable. Following trails until rhinoceros were located and visually examined, we confirmed that distinct pad patterns corresponded in a one-to-one fashion with the individuals of the population. Once all individuals had been documented so that no ambiguity in identification occurred, we could recognise the presence of any individual from its tracks. Although pad patterns change over time, they are stable enough to provide, with care, a unique identifier of individual rhinoceros in at least small populations (we have distinguished 26 white rhinoceros *Ceratotherium simum* in the field in this manner, Alibhai, Jewell, & Law, 2008) for intra-annual field seasons, offering an approach to monitoring and both ecological and ethological studies.

Black rhinoceroses were only recently released at ranch C, and there were no calves. Our censuses at ranches A and B revealed each had several adults but only one female with a small calf (aged 2–3 months). At ranch A, we encountered on each of two consecutive days the track of the mother coming to, and then leaving in the same direction, a water point in the absence of calf tracks. Though two rhinoceroses together often walk in single file with the follower obscuring the leader's track, one can usually recognise the presence of two rhinoceroses. Moreover, a small black rhino calf typically follows its mother. Tracking was performed by a local tracker, the lead author and two field assistants. We are convinced we did not fail to detect the presence of the calf spoor. On the first occasion, 15 min, and on the second occasion, 20 min, of efficient tracking led to where the mother's track reunited with the calf spoor, at most a kilometre from the respective water point. The mother's movement was fairly direct. Further tracking indicated this cow + calf pair confined their movements over this period to the area between the two water points, which were about 2.5 km apart. This pair had first been detected near another water point several kilometres distant, however.

At ranch B, we encountered the solitary track of the mother coming to, and then leaving, a water point (WP2) several kilometres from another water point (WP1) where she had first been detected with a calf. Upon tracking the mother, however, we found she moved, occasionally browsing, over a circuit that looped away from WP2 and then back towards it, rejoining the calf spoor in a small area with thicker bush, at most a kilometre from WP2. Although only about two kilometres was traversed, it took 2.5 hr to follow this trail across varying substrate. We encountered the cow + calf pair together near sunset about two kilometres from WP2. The following morning, spoor from the previous night of this pair was found near WP1. That afternoon, fresher spoor of the mother alone was encountered again at WP2. Tracking revealed that she took a more direct route through the area where we had found considerable spoor of the pair the previous day towards where we had seen them at sunset. Near that location, the mother's spoor was joined by the calf, and the two then

proceeded fairly directly towards the vicinity of WP1, a distance at least that covered by the mother alone.

Berger (1993) considered whether predation pressure shaped disassociation behaviour finding evidence inconclusive, but noted predator density was very low in his study area. Neither lion (*Panthera leo*) nor spotted hyaena (*Crocuta crocuta*) are present on ranches A or B. Berger also wondered whether distance to water was an ecological determinant of this behaviour. Our observations occurred in Kalahari shrubland with artificially permanent surface water. At ranch A, the distance travelled by the mother was quite short and fairly direct, while at ranch B, it was somewhat longer and less direct on at least the first occasion. At ranch B, the pair also moved comparable distances together in the early evening from the vicinity of one water point to that of another. Thus, sparing the calf the effort of travelling to water may not suffice to explain disassociation. Social interactions in black rhinoceros appear to occur typically at water points, and large gatherings have been recorded (BBC, 2013; Cunningham & Berger, 1997:102). Interactions between adult females and males are potentially hazardous to small calves in association with their mothers due to the large size and mass difference between them and bulls (personal observation, Greaver, Ferreira, & Slotow, 2014:440; Okita-Ouma, 2004 §3.2). We speculate that mothers leave their small calves when visiting water points at least in part to shelter those calves from the potential dangers of social interactions, especially with bulls. More observations of disassociation are required to elucidate this behaviour, especially how disassociation and recombination are enacted.

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