

First record of Roan antelope (*Hippotragus equinus*) feeding on the fruits of the Sausage tree (*Kigelia africana*)

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Herbivores in African savannas are faced with large variation in forage quantity and quality over the annual cycle (Sinclair, 1975; Owen-Smith, 2008), to which they must adapt to maintain viable populations (Parker, Barboza & Grillingham, 2009). The greatest challenge over the dry season is obtaining sufficient energy and protein to maintain nutritional requirements (Parker *et al.* 2009). Energy and protein concentrations in dry season forage often fall below maintenance levels once leaves have senesced (Sinclair, 1975; Ellis & Swift, 1988; Owen-Smith, 2008). Adaptation to this constraint requires movement to parts of the landscape where greenery is retained (e.g. Fynn & Bonyongo, 2011), or alternatively, switching to distinctly different forage resources such as flowers and browse (e.g. Hensman *et al.* 2012).

Roan antelope, *Hippotragus equinus*, are large antelope (250-300kg) and highly selective feeders (Martin, 2003). They are predominantly grazers, although they include a small amount of browse in their diet during the dry season (Martin, 2003). Schuette *et al.* (1998) showed that as the dry season progressed and food became scarcer, roan switched from being strict grazers (>95% grass) to mixed feeders (<50% grass), although the amount of browse in their diet appears to be site specific (e.g. Andanje & Ottichilo, 1999). Studies of roan feeding ecology in southern Africa (none in Botswana) are spatially restricted and have shown them, as a species, to feed on 26 species of grass and 19 species of woody plants (Martin, 2003). We report on observations of roan not only including a new plant species in their diet, but one that few herbivores feed on due to its toxicity – the fruits of the sausage tree, *Kigelia Africana* (Lam.) Benth. Although we were unable to gather data regarding the frequency of occurrence of these fruits in their diet, to our knowledge the fact that they utilise them at all is novel.

Within Botswana, Sausage trees are distributed throughout the north and are a dominant tree species on the islands in the Okavango Delta (Van Wyk & Van Wyk, 1997; Roodt, 1998). The common name ‘sausage tree’ is derived from the large, hard, oblong, sausage shaped fruits that can grow up to 50cm long, 15cm wide and can weigh up to 5kg (Roodt, 1998; Saini *et al.* 2009). The fruits ripen in March/April but remain on the tree for long periods before they fall to the ground to shrink and rot

(Roodt, 1998). The sap within the fruits is reported to be inedible and toxic and the seeds poisonous, especially when green (Van Wyk & Van Wyk, 1997; Roodt, 1998). Consequently not many animals are known to feed on these fruits. Meyer's Parrots (*Poicephalus meyeri*) utilize the ripe but dehydrating fruits, whilst still hanging from the trees, and often open the fruits to feed on the seeds (Roodt, 1998; Boyes & Perrin, 2010; Map Ives pers. comm.). Baboons (*Papio cynocephalus ursinus*) and Vervet Monkeys (*Cercopithecus aethiops*) also feed on the seeds within the fruits, but difficulty in opening the fruits result in them only doing this sporadically (Hamilton, Buskirk & Buskirk, 1978). Elephants (*Loxodonta africana*), hippopotami (*Hippopotamus amphibius*), giraffe (*Giraffa camelopardalis*) and black rhinoceros (*Diceros bicornis*), have been observed feeding on the dried out fruits on the ground (Dierenfeld, Du Toit & Braselton, 1995; Roodt, 1998; Mduma, Sinclair & Turkington, 2007), however literature reporting the extent to which mammal species utilize the fruits of this tree species is scant.

A roan antelope herd, temporally ranging in size between 12 and 18 individuals (the "Abu herd") were observed seven times near Abu Camp in the NG26 concession, Botswana (Figure 1) during April, May and August 2012. Approximately three hours was spent with the herd during each observation, resulting in ~21 total observation hours between April, May and August 2012. During 40% of the observed time, at least one individual was seen consuming Sausage tree fruits (Figure 2a & b). All adults (8 to 11 individuals) and one sub-adult were observed feeding on the fallen fruits during all three of the months we visited the area. Only the juveniles did not feed on the fruits. Local photographic safari guides report it to be common to find this herd under Sausage trees during the dry season (May to October). During each observation, the roan spent approximately one hour feeding on the fallen dried out fruits. While feeding, the roan produced large quantities of saliva, observed dripping from the mouth, and on average spent more than ten minutes chewing individual fruits, before swallowing the entire fruit.

An animal's survival, growth and reproduction are dependent on nutritional resources it can obtain (Owen-Smith, 2002). The Abu herd was observed walking from one Sausage tree to the next to feed on the fallen fruits. Due to the amount of time and consequently energy expended consuming the fruit,

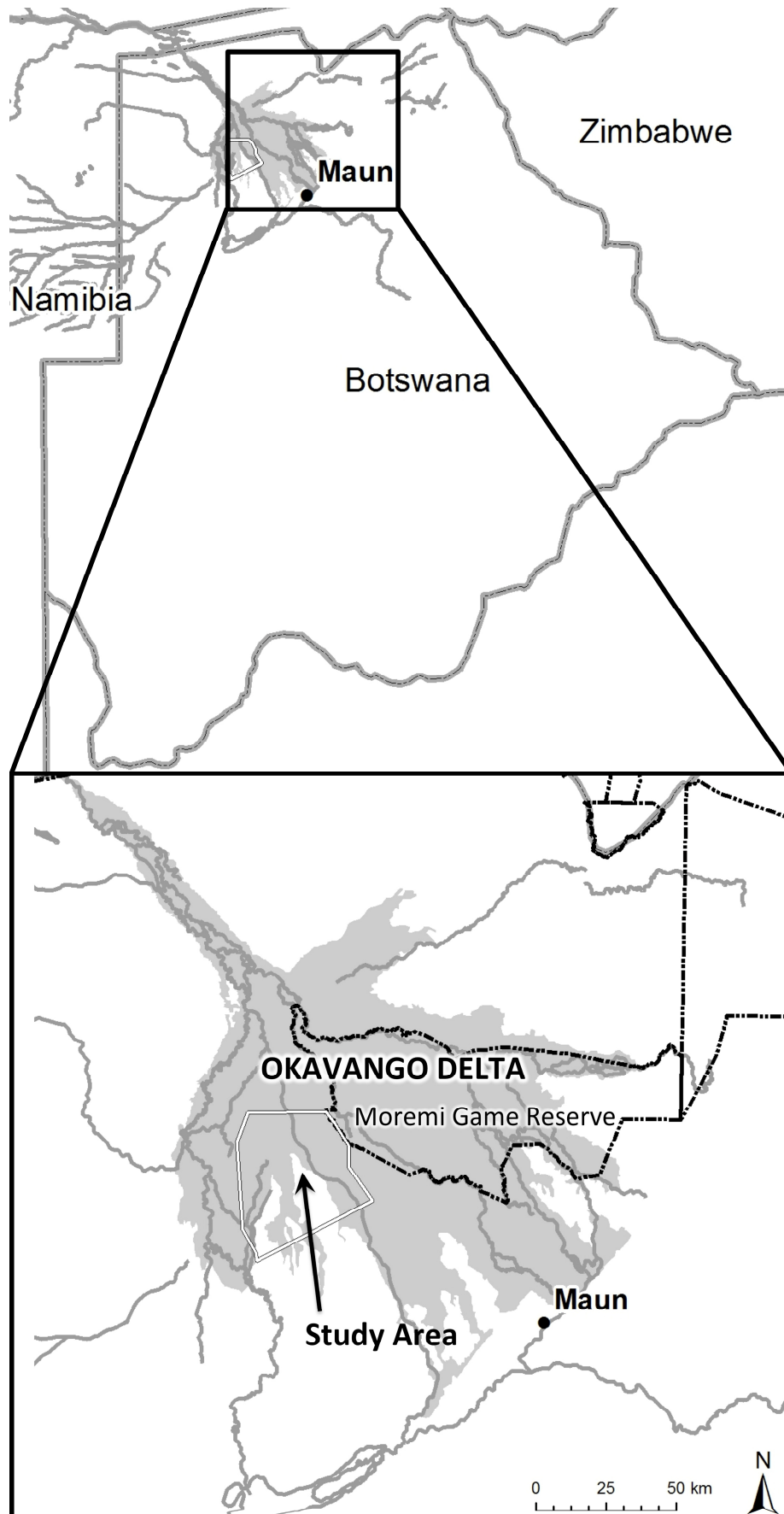


Figure 1: Map showing the study site NG26, situated on the western side of the Moremi Game Reserve.

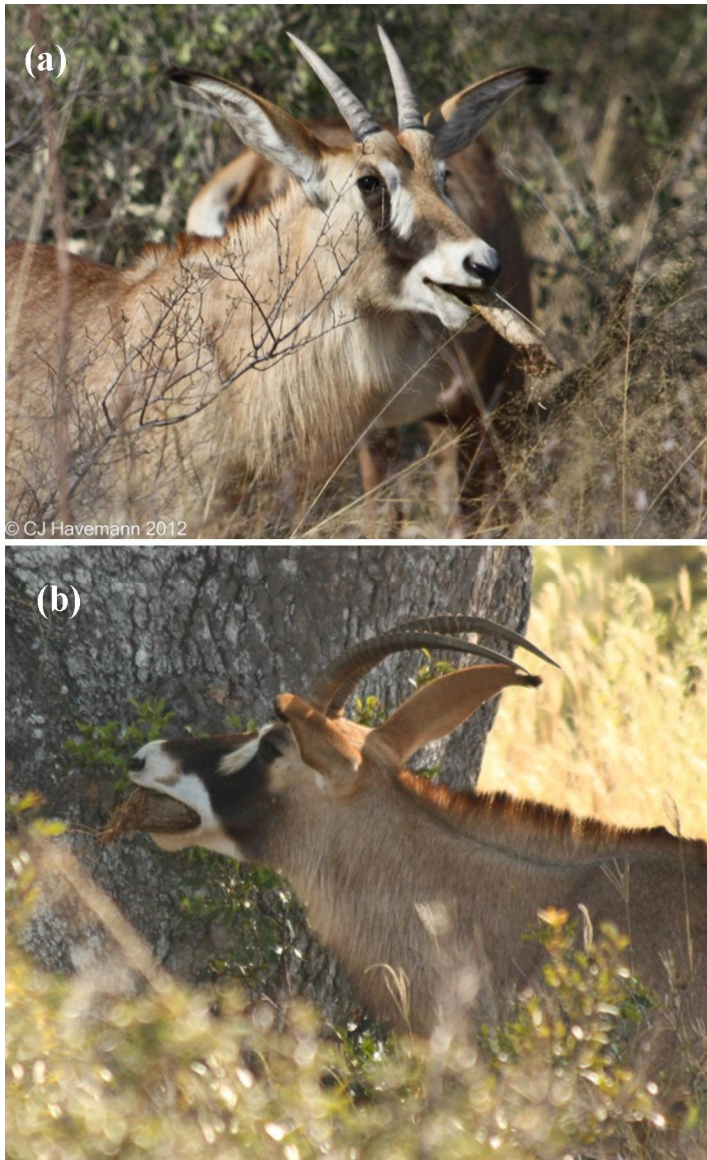


Figure 2: (a) Sub-adult male and (b) adult female roan antelope observed consuming the fruit of the Sausage tree, *Kigelia africana* (Lam.) Benth., in the NG26 concession, northern Botswana.

we surmise that the nutritional gain from the fruit must out-weigh costs. Energy may be the most limiting resource for herbivores over the dry season (Parker *et al.* 2009). Sausage trees have numerous medicinal properties due to the presence of many secondary metabolites (Saini *et al.* 2009). Roan may be feeding on the fruits to obtain these secondary compounds, but more likely in pursuit of sugars that provide the critical limiting resource of energy. To our knowledge, no other published material reports the presence of these fruits in the diet of this herbivore. Future studies are needed to accurately quantify time spent feeding on the sausage tree fruits relative to other food sources, particularly during the critical dry season.

This behaviour indicates that roan antelope foraging ecology may differ between different regions and at different times, with associated differences in other aspects of their ecology (e.g. movement patterns). Observations of previously unknown feeding behaviour are instrumental in long term studies attempting to elucidate the ecologies of species, given that such knowledge may highlight important related aspects of their ecology.

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