

## Features

### **The distribution of the genus *Rhynchocyon* in the Eastern Arc Mountains, with an emphasis on the Black-and-rufous Sengi, *Rhynchocyon petersi*.**

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The four giant sengis, or elephant-shrews, (genus *Rhynchocyon*; Rovero *et al.* 2008, Rathbun 2013) are the largest members of the order Macroscelidea. They are associated with closed canopy forest and thicket habitats with dense leaf litter (Rathbun 2009). The Chequered Sengi (*R. cirnei*) has the widest distribution, ranging from northern Mozambique to at least northern Democratic Republic of Congo. The Grey-faced Sengi (*R. udzungwensis*) is endemic to the Udzungwa Mountains of Tanzania. The Golden-rumped Sengi (*R. chrysopygus*) is endemic to Kenya, narrowly distributed along the coast between Mombasa and the Tana River. On the north-eastern side of the Tana River, a distinct but taxonomically undescribed form of *Rhynchocyon* occurs (Andanje *et al.* 2000). The Black-and-rufous Sengi, the focus of this note, only occurs in south-eastern Kenya and north-eastern Tanzania, including the islands of Unguja and Mafia (but not Pemba).

Although the gross distribution of the giant sengis has been known for decades (e.g., Corbet and Hanks 1968; Kingdon 1974; [www.sengis.org/distribution](http://www.sengis.org/distribution)), our recent understanding has increased due to focused survey work in East Africa's coastal and montane forests, including the use of camera traps. Nonetheless, an accurate up-to-date summary of the current distribution of these diurnal but elusive sengis (Rathbun 2009) is needed, but difficult to do for several reasons.

Giant sengi habitats in the montane areas of eastern Africa are isolated islands that are often separated naturally from each other by large expanses of unsuitable habitat (Figure 1). These montane areas are often further fragmented by human activities and the mosaic of forest reserves, national parks and other reserve types, which can result in dynamic and varying levels

of protection (e.g., Newmark 1998). While some areas have been relatively well surveyed, several of the more isolated areas have not (Rovero *et al.* 2014), and in the latter cases failure to record sengis cannot necessarily be taken as confirmation of absence.



**Figure 2A:** Black-and-Rufous Sengi *Rhynchocyon petersi* camera-trapped in the Nguru North Forest Reserve, Nguu, Eastern Arc Mountains in 2007. © Francesco Rovero.



**Figure 2B:** Chequered Sengi *R. cirnei* camera-trapped in Matundu forest, Udzungwa, Eastern Arc Mountains in 2004 © Francesco Rovero.

Below and in Figure 1 we summarize the occurrence of giant sengis in each of the isolated portions of the Eastern Arc Mountains, with emphasis on the Black-and-rufous Sengi. We reviewed records taken from the literature ([www.sengis.org/bibliography](http://www.sengis.org/bibliography)), museum specimens, grey literature, and unambiguous reliable observations ([www.sengis.org/distribution](http://www.sengis.org/distribution)). We also include priorities for further survey work. Additional details of the Eastern Arc Mountain forests are provided by Burgess *et al.* (2007), Platts *et al.* (2011) and Rovero *et al.* (2014). We do not address the distribution of giant sengis in coastal forests, which are similarly fragmented and in various levels of anthropogenic decline, degradation, and protection (Burgess & Clarke 2000, Burgess *et al.* 2016).

**Taita Hills:** These isolated mountains, including Mount Kasigau and Mount Sagala, form the northernmost extent of the Eastern Arc Mountains in Kenya and have been relatively well surveyed (e.g., Bytebier 2001). No *Rhynchocyon* has ever been recorded.

**North Pare:** Black-and-rufous Sengis have been observed in Kamwalla II, Kindoroko, Minja, and Mramba forest reserves (Cordeiro *et al.* 2005). There are no records from Kiverenge Forest Reserve, which has been poorly surveyed.

South Pare: Black-and-rufous Sengis have been recorded by several observers from Chome Forest Reserve, the largest forest in the South Pare (e.g., Coster & Ribble 2005). Key survey priorities include Chambogo and Kwizu forest reserves.

West Usambara: Black-and-rufous Sengis are recorded from several localities, including a museum specimen from what is now Magamba Nature Reserve, but recent records are rare. In 1996, W.D. Newmark found a snared sengi at an elevation of 1,297 m near Ambangulu (reported by Stanley *et al.* 2011). Several large forest reserves, including Shaguya, Mkussu, Baga II, Ndelemai, Mafi Hill and Bangalai, are in need of survey.

East Usambara: The East Usambaras have been the focus of extensive survey work. Besides Amani Nature Reserve, the Black-and-rufous Sengi is reported from: Nilo Nature Reserve and Bamba Ridge\*, Kambai\*, Kwamarimba\*, Kwamgumi, Manga\*, Mgambo, Mtai\* and Segoma forest reserves (\* denotes records from the 1990s). Evans *et al.* (1992) reported *R. cirnei* from Mtai Forest Reserve in the East Usambara, but this can only have been *R. petersi*. Surveys by Frontier Tanzania in Longuza North and Bombo East I/II forest reserves failed to record them, but they may be present; Longuza South and Bombo West are in need of survey.

Nguru: Cordeiro *et al.* (2005) observed Black-and-rufous Sengis in Nguru North Forest Reserve (and see Figure 2a), and they have been observed in Kilindi Forest Reserve at 900 m asl (F. Rovero, pers. obs. 2008; coordinates: 5.594S, 37.485E). Survey priorities include Derema, Mkuli, Pumila and Rudewa forest reserves.

Nguru: Black-and-rufous Sengis have been camera-trapped in Nguru South Forest Reserve up to 2,020 m, the maximum recorded elevation for the species, and also camera-trapped in Kanga and Mkindo forest reserves (Owen *et al.* 2007b).

Uluguru: This is the southern limit of Black-and-rufous Sengis in the Eastern Arc Mountains. They have been observed in both Uluguru North and Uluguru South forest reserves (e.g., Bracebridge *et al.* 2005a,b); there is one older museum specimen from Mkangazi (Lukangazi) by Swynnerton & Hayman (1951). Many of the reserves surveyed by Doggart *et al.* (2004), who documented them in Kasanga, are in need of further survey (e.g., Ruvu Forest Reserve).

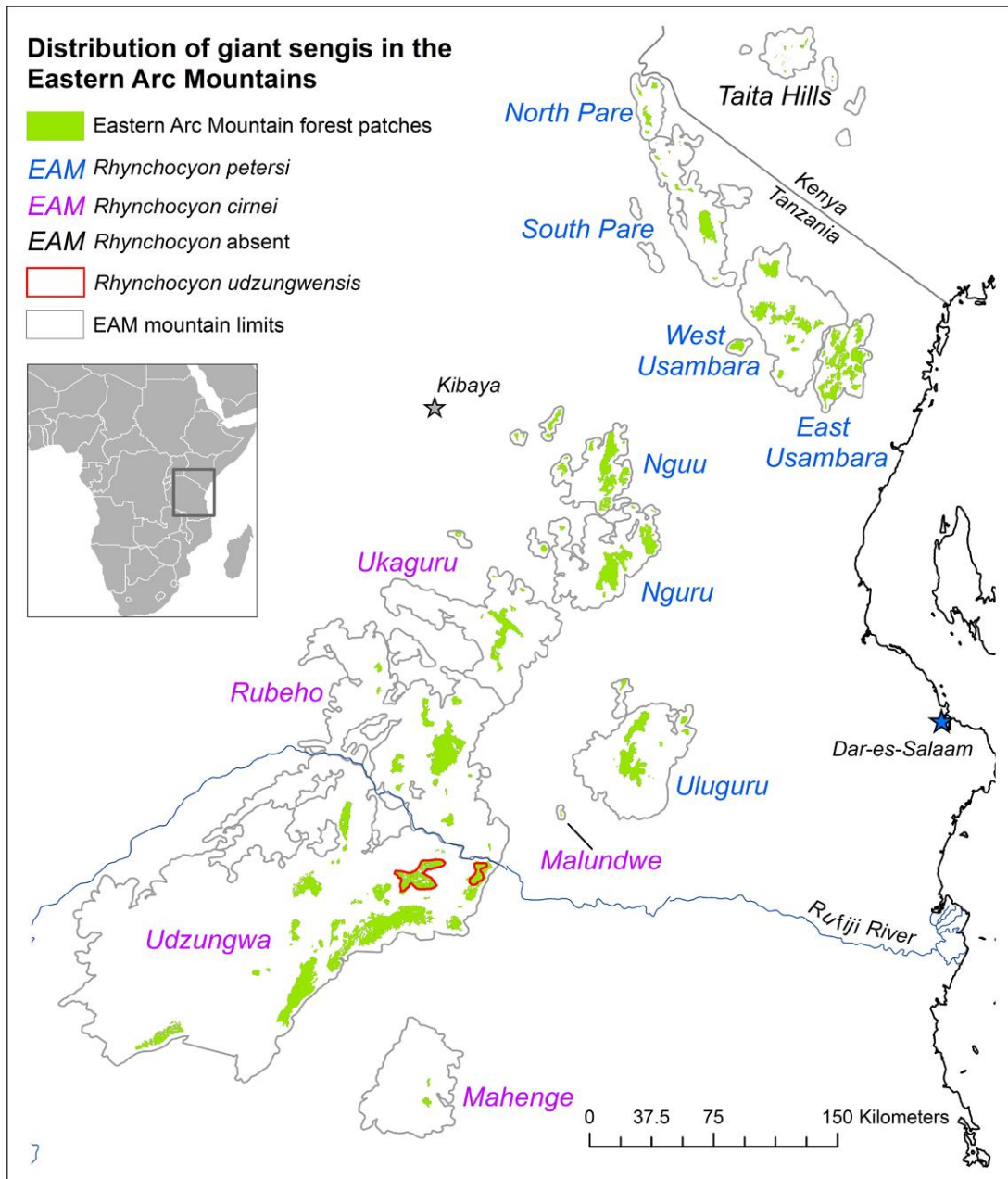
Malundwe: This is the most eastern area of the Eastern Arc Mountains for Chequered Sengis, which have been recorded at approximately 1,100 m (Stanley *et al.* 2007) and also camera-trapped in 2006 (L. Collett and G. Norton pers. comm.).

Ukaguru: Chequered Sengis have been camera-trapped in 2007 in the Mamiwa-Kisara Forest at 1,815 m (6.417S, 36.990E; Frontier Tanzania, unpubl.), and documented by Evans *et al.* (1992) from an undisclosed location at 1,800 m. Given that Ukaguru could be where hybridization and / or misidentification with Black-and-rufous Sengis may be plausible, we confirmed the camera-trap images from Mamiwa-Kisara were Chequered Sengis. More extensive sampling for sengis in this mountain block would be desirable, especially from Milindo. This is the northern limit of *R. cirnei* in the Eastern Arc Mountains.

Rubeho: Chequered Sengis are confirmed in Mang'alisa (Doggart *et al.* 2006; F. Rovero, T. Jones & N. Owen, unpubl.), and have been camera-trapped in 2006/2007 in Mafwomero (6.911S, 36.556E), Ilole (7.442S, 36.734E), and Pala-Ulangu (7.209S, 36.816E) forests (F. Rovero, T. Jones & N. Owen, unpubl.). The highest recorded elevation in the Eastern Arcs is 2,100 m in Mang'alisa and Mafwomero (F. Rovero, T. Jones & N. Owen, unpubl.). Survey work (including camera trapping) in Ukwiva Forest Reserve (a large forested area) has yet to document the presence of giant sengis, but further investigation is needed. The Wota Mountains (with Wota and Ligunga forests) to the west, and Image Forest Reserve to the south, often considered Rubeho isolates, require further surveys.

Udzungwa: The recently described Grey-faced Sengi, which is known only from the western Ndundulu-Luhomero forest and the eastern Mwanihana forest (Rovero *et al.* 2008, 2013), and the Chequered Sengi (subspecies *R. c. reichardi*) occur in parapatry, with evidence of introgression (Lawson *et al.* 2013; but see Carlen 2015). Extensive camera trapping efforts (see Figure 2B) over the last decade have provided a comprehensive understanding of the distribution of sengis.

Mahenge: This is the southernmost isolated outlier of the Eastern Arc Mountains (Figure 1). Owen *et al.* (2007a) reported both *R. petersi* and *R. cirnei* in Sali Forest Reserve, on the central part of the mountains. However, the *R. petersi* sighting was considered questionable, and this record is attributable to *R. cirnei* although further survey work should be undertaken.



**Figure 1.** The occurrence of giant sengis (genus *Rhynchocyon*) in the Eastern Arc Mountains of Kenya and Tanzania. Eastern Arc Mountain range limits and forest blocks from (Platts *et al.* 2011); forest blocks (in green) represent possible minimal extent of giant sengi occurrence in the mountains. The names of each isolated Eastern Arc Mountain (EAM) are colour-coded to species present (see legend and text). Parapatry is only known between *R. udzungwensis* (red polygon) and *R. cirnei reichardi*. Data on giant sengi distribution in lowland and coastal suitable habitats are not shown.



In summary, while the distributions of the genus in the major mountain blocks of the Eastern Arc Mountains appear to be relatively well resolved, especially with clarification of the identity of sengis on Malundwe and Mahenge, our brief review suggests some mountain blocks, such as Nguu and West Usambara, require further surveying. In addition, although not part of the Eastern Arc Mountains, the westernmost record of *R. petersi* from “Kibaya” (5.283S, 36.567E) mentioned by Swynnerton & Hayman (1951) and presumed to be an isolated forest habitat (Corbet & Hanks 1968), is urgently in need of a survey. We hope this short note will encourage researchers to be vigilant for the presence of giant sengis during field surveys and provide their data to the conservation community.

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