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## RESEARCH NOTE

# New range record for the African brush-tailed porcupine, *Atherurus africanus*, in southeastern Senegal and northern Guinea

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## Abstract

The African brush-tailed porcupine (*Atherurus africanus*) is a rodent common from West to East Africa. The last IUCN assessment stated that its presence is uncertain in Senegal. Here, we report the presence of the African brush-tailed porcupine in the Dindefelo Community Nature Reserve (Dindefelo), in southeastern Senegal, and across the border in northern Guinea. From 2017 to 2022, we obtained 58 camera trap videos from seven different locations in Dindefelo and 86 camera trap videos from Sahoro cave, in Guinea, showing *Atherurus africanus*. It is likely that this species has always been present in both areas, but it may have gone undetected because it is nocturnal and may be less abundant.

## KEYWORDS

African brush-tailed porcupine, camera trapping, Dindefelo, Hystricidae, range distribution

## Résumé

Le porc-épic africain à queue en brosse (*Atherurus africanus*) est un rongeur commun de l'Afrique de l'Ouest à l'Afrique de l'Est. La dernière évaluation de l'UICN indique que sa présence est incertaine au Sénégal. Ici, nous signalons la présence du porc-épic africain à queue en brosse dans la Réserve Naturelle Communautaire de Dindefelo (Dindefelo), dans le sud-est du Sénégal, et de l'autre côté de la frontière, dans le nord de la Guinée. De 2017 à 2022, nous avons obtenu 58 vidéos de pièges à caméra dans sept endroits différents à Dindefelo et 86 vidéos de pièges à caméra dans la grotte de Sahoro, en Guinée, montrant l'*Atherurus africanus*. Il est probable que cette espèce ait toujours été présente dans les deux zones, mais elle est peut-être passée inaperçue parce qu'elle est nocturne et qu'elle est peut-être moins abondante.

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(Hoffmann & Cox, 2016).

INTRODUCTION

The African brush-tailed porcupine (Atherurus africanus, Grey

1842) is a rodent from the family Hystricidae (Happold, 2013; Jori et al., 1998). It is common from West to East Africa (Happold, 2013;

Monadjem et al., 2015; Rosevear, 1969), and it has been reported

in at least 16 countries (Benin, Cameroon, Democratic Republic

of the Congo, Ivory Coast, Equatorial Guinea, Gabon, Gambia,

Ghana, Guinea, Kenya, Liberia, Republic of Congo, Sierra Leone,

South Sudan, Togo and Uganda: Hoffmann & Cox, 2016; Monadjem

et al., 2015). It is currently listed as Least Concern by the IUCN be-

cause of its wide distribution and likely large population numbers

et al., 1998; Monadjem et al., 2015). It occupies different habitats in-

cluding woodland and rainforests near water edges, although it can

tolerate secondary vegetation and anthropogenic habitats, where it

gets to feed on crops (Emmons, 1983; Happold, 2013; Hoffmann & Cox, 2016; Jori et al., 1998; Monadjem et al., 2015; Rosevear, 1969).

The African brush-tailed porcupine is strictly nocturnal and gre-

garious, forming groups that range from two to up to 20 individuals per den, although they most commonly form groups of six to

eight individuals of different age and sex (Happold, 2013; Hoffmann

& Cox, 2016; Jori et al., 1998; Kingdon, 2015; Rosevear, 1969). It

normally forages alone, but can share foraging sites with conspe-

cifics (Emmons, 1983; Happold, 2013; Hoffmann & Cox, 2016; Jori

et al., 1998). The African brush-tailed porcupine has an elongated

rat-like shape, weights an average of three kilograms and both

sexes have a maximum body length of about 40 to 50 cm (Akpan

et al., 2015; Emmons, 1983; Happold, 2013; Hoffmann & Cox, 2016;

Jori et al., 1998; Monadjem et al., 2015). As other Hystricidae spe-

cies, its body is covered by quills, mostly dark, reaching a maximum

length at the middle of the spinal column (60mm), and a long tail

This species is found from sea level to up to 1500masl (Emmons, 1983; Happold, 2013; Hoffmann & Cox, 2016; Jori

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## African Journal of Ecology 🤂–WILEY (up to 26 cm) ending with a characteristic brush-like tuft of white bristles (Happold, 2013, Jori et al., 1998, Monadjem et al., 2015, Rosevear, 1969; Figure 1). The African brush-tailed porcupine's main threat is its exploitation as bushmeat throughout its distribution range, being a favourite species sold in meat markets and commonly consumed in urban and rural areas in Gabon, Nigeria, Cameroon, Republic of Congo and Equatorial Guinea (Carpaneto et al., 2007; Happold, 2013; Hoffmann & Cox, 2016; Jori et al., 1998; Monadjem et al., 2015; Rosevear. 1969). The African brush-tailed porcupine has been reported in southern Guinea, country that borders with the south-east of Senegal, and in western Gambia, which borders with western Senegal (Happold, 2013; Monadjem et al., 2015). However, the last IUCN assessment by Hoffmann and Cox (2016) stated that its presence is uncertain in Senegal. Here we report the presence of the African brush-tailed porcupine in southern Senegal and in northern Guinea where, to our knowledge, it has not been recorded before. **STUDY AREA** The Dindefelo Community Nature Reserve (hereafter Dindefelo) is a 14,000ha community-managed reserve located in the Kedougou region, in southeastern Senegal. It borders with Guinea in its southern and western limits. The habitat is a savanna (sensu Lindshield et al., 2021) containing different vegetation types including woodland, grassland, bamboo forests and gallery forests (JGIS and A.P.E.S. Wiki Team, 2019; Fernández-García et al., 2013). The human population is distributed in 17 villages located inside and outside the reserve and uses its natural resources (JGIS and A.P.E.S. Wiki Team, 2019). The area is characterised by a marked seasonality, with a dry season from November to May and a wet season from June to October (JGIS and A.P.E.S. Wiki Team, 2019). Since 2009,

06-07-2020 02:43:50

# (a) (b) 10-18-2017 03:43:25 (C) (d)

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FIGURE 1 The African brush-tailed porcupine in a woodland (a) and in a gallery forest (b) in Dindefelo (Senegal); one and two individuals respectively in Sahoro cave in Guinea (c and d).

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the Jane Goodall Institute Spain (JGIS) has been implementing research and conservation programs in the area, focusing mainly on wild chimpanzees (*Pan troglodytes verus*). As part of this work, the JGIS conducts biomonitoring surveys in the reserve and some nearby (less than 1.5 km from the border) locations in Guinea.

With the aim of obtaining images of chimpanzees and other mammal species, a total of 58 camera traps have been deployed within the reserve since 2017 and three have been placed in Sahoro and Bili-Bili caves in Guinea. Browning (mostly Recon Force 4k edge) and Bushnell (Core DS 30MP) camera traps were placed in specific locations in order to record chimpanzee behaviour, such as fruiting trees, termite mounds and animal paths. They were placed on trees at about 50 cm from the ground. Inside the caves they were attached to the rock wall. Cameras operate 24 h, were set to record a 1 min length video when the passive infra-red (PIR) motion sensor was triggered, and had an invisible infrared LED flash at night. Sixty four different locations have been surveyed with camera traps through the years, three of which are in Guinea. An analysis of 102,293 videos was conducted to make an inventory of wild mammal species.

## 3 | OBSERVATIONS

Several camera trap videos from March 2017 to May 2022 showed the African brush-tailed porcupine in Dindefelo and in Sahoro cave.

In Senegal (Dindefelo), the African brush-tailed porcupine was detected in 58 videos obtained from seven different camera trap locations (Figure 2). Camera traps were placed in woodland near a degraded gallery forest (one location), in an ecotone of gallery and bamboo forest (one location) and in different sites of two gallery

forests (one and four locations, respectively), both south of the village of Dindefelo (Table 1). Most of the locations from where we obtained evidence of the African brush-tailed porcupine's presence were near water sources, similarly to what has been reported for the species through most of its distribution range (i.e. forests near water edges: Emmons, 1983; Happold, 2013; Hoffmann & Cox, 2016; Jori et al., 1998; Monadjem et al., 2015). Videos recorded only one individual, except for five videos which recorded two individuals together. All videos showing the African brushtailed porcupine were recorded during the night. Before 2022, videos showing this species were obtained between June and January, which corresponds to the rainy season and the early dry season, respectively. There were not videos showing the African brush-tailed porcupine from February to May, even though cameras recorded during this period as well. However, the videos from 2022 (n = 20) recorded the species from the end of February to the beginning of May, during the late dry season. Thus, we recorded the African brush-tailed porcupine in all months of the year in Dindefelo, albeit in different years.

In 52 out of the 58 videos from Dindefelo, the African brushtailed porcupine just passed in front of the camera, even when two individuals were detected together, presumably travelling. However, in six videos, there was evidence of *Atherurus africanus* rummaging through fallen leaves. Videos from 2022 were obtained in a location facing a *Treculia africana* tree, and despite the fact that the images were dark and the exact behaviour of the porcupines could not be seen, the movement of the individuals and the amount of time they spent in that spot suggested that they could have been feeding on *Treculia africana* fruit as reported by Rosevear (1969). In this location one *Treculia africana* fruit was found showing rodent teeth marks



FIGURE 2 Map showing the global distribution of the African brush-tailed porcupine according to the IUCN (Hoffmann & Cox, 2016) and Monadjem et al. (2015). Map of the study site showing the locations where the African brush-tailed porcupine was recorded (including Dindefelo and Sahoro cave in Guinea) and all other camera trap locations where the African brush-tailed porcupine was not recorded.

	Months Time of day	:021 March-June, Between 8 PM and October-December 6 AM	March-May, November, Between 10 PM and December 5 AM	October, November Between 7 PM and 4 AM	June, July Between 8-9 PM and 2-4 AM	December Arround 7 PM	December Arround 4 AM	January, June Between 0 AM and 5 AM	August, September Arround 10 PM and 3-4 AM	March Between 8 PM and 5 AM
	Year of the videos	2017-2018, 2020-2	2017-2018, 2021	2017-2018	2018	2020	2019	2021	2019-2020	2022
	Vegetation type	Woodland (inside a cave)	Woodland (outside a cave)	Woodland near degraded gallery forest	Gallery forest	Gallery forest	Gallery forest	Gallery forest	Ecotone of gallery and bamboo forest	Gallery forest
	Number of videos	57	29	13	10	1	1	10	ю	20
obtained at each location.	Study site	Sahoro cave (Guinea)	Sahoro cave (Guinea)	Dindefelo (Senegal)	Dindefelo (Senegal)	Dindefelo (Senegal)	Dindefelo (Senegal)	Dindefelo (Senegal)	Dindefelo (Senegal)	Dindefelo (Senegal)
lay when videos where	Coordinates (X_Y)	0785664_1362621	0785683_1362633	0787641_1367171	0790360_1368977	0790396_1369103	0790767_1369749	0793903_1369811	0793909_1369805	0791000_1368410

TABLE 1 Information on the different locations where Atherurus africanus has been detected: coordinates, study site, number of videos, vegetation types, and years, months and time of the ;+; ch loc d at o htaine 4 i dov q day v -WILEY–African Journal of Ecology 🦪

(JGIS, unpublished data), even though we cannot attribute it to the African brush-tailed porcupine. At least three different individuals were recorded in this location: two porcupines with tails were filmed together, and one porcupine without tail was recorded in this location, which made it easily recognisable.

In Guinea, the African brush-tailed porcupine appeared in videos from two cameras placed inside and outside of Sahoro cave. Eighty six videos showing this species were obtained in this location. In the majority of the videos only a single individual was recorded, while six videos showed two individuals together. All the videos were recorded at night. Cameras have been placed in this location intermittently between 2017 and 2022, but encompassing every month of the year through the different years. The African brushtailed porcupine was detected in Sahoro only during the dry season (October-June).

## 4 | CONCLUSIONS

Although the African brush-tailed porcupine is a common species, it has only been studied in relation to its consumption as bushmeat, or during inventories in protected areas (Akpan et al., 2015, Carpaneto et al., 2007; Jori et al., 1998). Its classification as a least concern species may respond mostly to its large distribution range (Hoffmann & Cox, 2016); however, its high consumption rate by humans in some countries and its slow reproduction rates (Happold, 2013; Jori et al., 1998; Kingdon, 2015; Monadjem et al., 2015) highlights the need for assessing the current situation of the species.

As this species is strictly nocturnal (Rosevear, 1969), it is possible that its presence in areas where it is less abundant, and not hunted or consumed, has gone undetected, as is the case in our study area. Our finding evidences that conducting biomonitoring surveys using camera traps makes it possible to detect species outside their known distribution range and provides data to more accurately delineate their ranges. Obtaining recordings in the wild during successive years can be a useful tool to determine population trends at a local scale (Tobler et al., 2008). For conservation to be effective, it is important to know how the target species is distributed globally and locally. Species inventories, even if conducted in small areas, can help us detect species previously not known to occupy these areas and better determine their distribution ranges. Camera traps have proven to be a useful tool for detecting nocturnal and elusive species that otherwise would not be identified (Kelly, 2008). In our case, for example, even if guills were found in the forest, they are always attributed to the better known African crested porcupine (Hystrix cristata, Linnaeus 1758).

Although the hunting pressure of the African brush-tailed porcupine in our study area has not been assessed, it is likely lower in Senegal than in southern countries, as some people here practice subsistence hunting but no cases of bushmeat trade have been reported. Four JGIS local field assistants (two of them former hunters) from Dindefelo were asked to identify pictures of the African brush-tailed porcupine, and they could not recognise the species. Despite the IUCN pointing out that this species is an important crop feeder, there is no evidence that the local human population in Dindefelo identifies it as such. It is possible that the African brushtailed porcupine has always been present in the area, and its distribution range included northern Guinea and southern Senegal but has gone unnoticed until now. **ACKNOWLEDGEMENTS** We thank the Direction des Eaux, Forêts, Chasses et de la Conservation des Sols for permission to conduct research in Senegal, and the Ministère de l'Environnement, des Eaux et Forêts for permission to conduct research in the Republic of Guinea. We also thank the JGIS field assistants and volunteers for obtaining camera-trap videos and helping to code the footage. R. Adriana

also thank the JGIS field assistants and volunteers for obtaining camera-trap videos and helping to code the footage. R. Adriana Hernandez-Aguilar is grateful to the Serra Hunter Programme for support. We finally would like to thank the two reviewers, specially Dr. Mike Hoffmann, for providing very useful corrections and information to improve this note.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available in Table 1.

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