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The Mount Kenya Potto is a Subspecies of the Eastern Potto *Perodicticus ibeanus*

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Abstract: The Mount Kenya potto is currently considered a subspecies of the western potto (i.e., *Perodicticus potto stockleyi*). We argue that the Mount Kenya potto is a subspecies of the eastern potto (i.e., *Perodicticus ibeanus stockleyi*). This subspecies has not been observed alive for 79 years, and is assessed on the 2017 Red List as Critically Endangered (Possibly Extinct). We indicate priority field sites in which to search for *P. i. stockleyi*.

Résumé: Le potto du Mont Kenya est actuellement considéré comme une sous-espèce du potto occidental (c-à-d. *Perodicticus potto stockleyi*). La présente étude suggère que le potto du Mont Kenya est une sous-espèce du potto oriental (c-à-d. *Perodicticus ibeanus stockleyi*). Cette sous-espèce n'a plus été observée vivante depuis 79 ans. En tant que telle, elle a été évaluée comme En danger critique (peut être Éteinte) sur la Liste Rouge 2017. Cet article présente des sites de terrain prioritaires pour la recherche de *P. i. stockleyi.*

Keywords: Aberdare, biogeography, conservation, primates, taxonomy

Potto Taxonomy

The pottos, genus *Perodicticus* Bennett, 1831, are small (*c*. 1.5 kg), arboreal, quiet (no loud call), highly cryptic, nocturnal primates, endemic to the moist forests of tropical Africa, from southeast Senegal (perhaps The Gambia) eastwards to central Kenya (Fig. 1). The taxonomic arrangement of *Perodicticus* is not yet resolved. For many years, the genus was regarded as monotypic (for example, Jenkins 1987; Groves 2001, 2005; Grubb *et al*. 2003; Butynski and De Jong 2007; Butynski 2013; Pimley and Bearder 2013). Several authors (for example, Groves 2001; Grubb *et al*. 2003), however, suggested that further study might show that *Perodicticus* contains several species. Subsequent detailed morphological study (dentition, cranium, post-cranium, body size, and pelage) by Stump (2005) and Ravosa (2007), together with mtDNA data provided by Roos *et al.* (2004) and Pozzi *et al*. (2015), yield convincing evidence for at least three species of *Perodicticus*: the western potto *P. potto* (Müller, 1776), the eastern potto *P. ibeanus* Thomas, 1910, and the central potto *P. edwardsi* Bouvier, 1879. Oates (2011), Nekaris (2013), Oates *et al*. (2016), De Jong *et al*. (2017), Svensson and Pimley (2017), and Svensson *et al*. (2017) all follow the three-species concept for *Perodicticus*.

Taxonomic Position of the Mount Kenya Potto

Butynski and De Jong (2007), who treated *Perodicticus* as a monotypic genus, reviewed the taxonomy and biogeography of the potto *Perodicticus potto*, and described a new subspecies—the Mount Kenya potto *Perodicticus potto stockleyi* Butynski and De Jong, 2007 (Fig. 2). This subspecies is known from only one specimen, collected by Lt.-Col. Charles Hugh Stockley in 1938, at 1,830 m above sea level (asl) on Mount Kenya, central Kenya. The holotype (MK-24) resides at the National Museums of Kenya, Nairobi, Kenya.

The elevation of *ibeanus* to species level means that the taxonomic position of *stockleyi* needs to be reassessed. Nekaris (2013) and Oates *et al.* (2016) accepted the three-species concept for *Perodicticus*, but retained *stockleyi* as a subspecies of *P. potto*. Geographically, however, *stockleyi* is much closer to *P. ibeanus* (*c*. 195 km) than to *P. potto* (*c*. 3,450 km) (Fig. 1). The large geographic range (i.e., extent of occurrence) of *P. edwardsi* (*c*. 2,430,000 km²) lies between that of *P. potto* and *P. ibeanus*. In addition, like *P. ibeanus*, but unlike most *P. potto* and most *P. edwardsi*, the pelage of *stockleyi* is very woolly and rippled, and has a dark russet 'saddle' over the shoulders with guard hairs that are heavily frosted silver-grey, although the saddle is not as obvious as for *P. i. ibeanus*

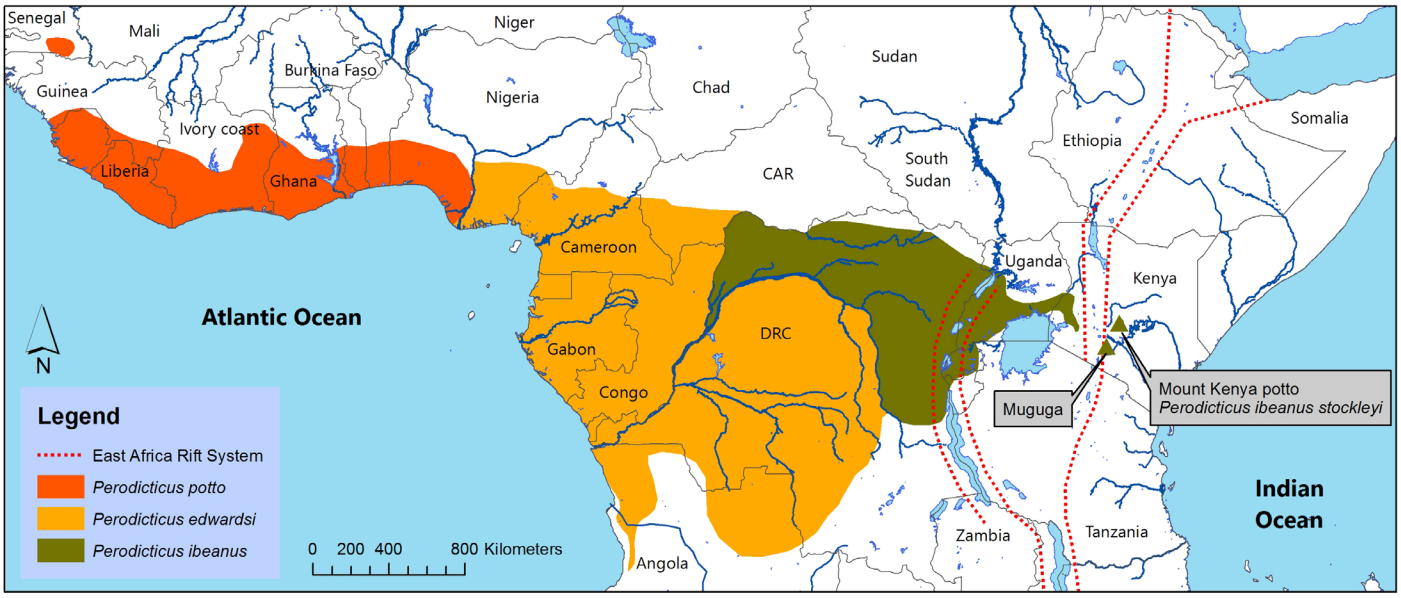

Figure 1. Geographic range of the three species of *Perodicticus*, type locality for the Mount Kenya potto *Perodicticus ibeanus stockleyi*, and location of Muguga. Based on Butynski and De Jong (2007), Oates (2011), De Jong *et al*. (2017), Svensson and Pimley (2017), and Svensson *et al*. (2017).

(see Figs. 4–7 in Butynski and De Jong 2007). It appears, therefore, that *stockleyi* is a subspecies of *P. ibeanus*, not of *P. potto*. As such, there are two subspecies for *P. ibeanus*: eastern potto *P. i. ibeanus* and Mount Kenya potto *P. i. stockleyi*. With this taxonomic change, the geographic distribution of *P. ibeanus* (Fig. 1) is as follows:

P. i. ibeanus – Democratic Republic of Congo (DRC) from the left (east) bank of the Ubangi River south to the right (north) bank of the Congo River, south along the right (east) bank of the Lualaba River to the Lulindi River, east to the Itombwe Mountains (Baraka) and northwest corner of Lake Tanganyika, then northeast through northwest Burundi, Rwanda, southwest and south Uganda, to the Kakamega, Nandi, and Mau Forests of southwest Kenya. The geographic range (i.e., 'extent of occurrence') is *c*. 850,000 km² (Butynski and De Jong 2007).

P. i. stockleyi – Known only from one site at 1,830 m asl on Mount Kenya, central Kenya.

Should *stockleyi* be Elevated to Species Status?

Although *stockleyi* is here designated as a subspecies, it should be noted that the single specimen available is not only phenotypically (i.e., diagnosably) distinct from the large number of *Perodicticus* specimens available, it is also (almost certainly) geographically (i.e., reproductively) isolated from other *Perodicticus* (both by the Eastern Rift Valley and by a distance thought to be at least 175 km). As such, under the 'Phylogenetic Species Concept' (Cracraft 1983; Groves 2001, 2004, 2012; Cotterill *et al*. 2014; Rylands and Mittermeier 2014), this taxon should be considered a species, *Perodicticus stockleyi*. We believe, however, that species designation at this time is premature given (1) that only one specimen is available and, therefore, we do not know anything about the extent of variation of phenotypic characters present in the population of *Perodicticus* on Mount Kenya (and, apparently, also on the Aberdares Range), and (2) the need for additional field time in support of our contention that this population of *Perodicticus* is indeed isolated.

Conservation Status of *Perodicticus ibeanus stockleyi*

It appears that *P. i. stockleyi* occurs at low density and/or has a highly localized distribution—or is extinct. Several primate surveys since 2001 in forests >1,050 m asl on and in the vicinity of Mount Kenya and the Aberdare Range have failed to reveal evidence of this subspecies (Butynski 1999; Butynski and De Jong 2007). As such, 10 years after being described, *P. i. stockleyi* appears on the 2017 IUCN Red List as Critically Endangered (Possibly Extinct) (Butynski and De Jong 2017).

The main threats to the long-term survival of *P. i. stockleyi* include habitat degradation, fragmentation, and loss, particularly from expanding, intensive, agriculture and settlement (Butynski and De Jong 2007, 2017). The cause of these threats is the rapidly growing human population (doubling every 20–25 years) in the region of Mount Kenya and the Aberdare Range. These two large blocks of forest are under great pressure. There, most of the mid-altitude (transition) and much of the montane forest has already been destroyed (Butynski and De Jong 2014).

Where to Search for *Perodicticus ibeanus stockleyi*

Many areas of highland moist forest (>1,300 mm mean annual rainfall) east of the Eastern (Gregory) Rift Valley have not been surveyed for *P. i. stockleyi*. Most forest lies within Mount Kenya National Park and Aberdare National Park, and

in the many contiguous or nearby forest reserves. The degree of protection received by these forests, however, varies greatly—as does the level of past exploitation and damage. Since *P. ibeanus* can persist in successional and secondary forest, and is often found on forest edge close to human habitation, chances are that *P. i. stockleyi* occurs in this region. Future surveys to locate *P. i. stockleyi* should be conducted in the wettest forest of the Mount Kenya and the Aberdare Range region up to 2,300 m asl (the known altitudinal range for *P. ibeanus* is 600–2,300 m asl and the range of mean annual rainfall is 1,300–1,900 mm; Butynski and De Jong 2007), with a focus on moist forest at 1,500–2,100 m asl (the *P. i. stockleyi* holotype was collected at 1,830 m asl).

More specifically, on Mount Kenya, there are small areas of moist forest to as low as 1,800 m asl on the southwest slope along the lower reaches of the Thego River and Sagana River, and to as low as 1,500 m asl on the southeast slope, west of the villages of Kirege, Chuka, Kiini, and Mutindwa. Off the northeast flank of Mount Kenya, moist forest is present at 1,400 m asl in Meru Forest and as low as 1,050 m asl in Ngaia Forest at the north end of the Nyambeni Range.

On the Aberdare Range, only small areas of moist forest remain, confined to the extreme south end of the range at about 1,800–2,100 m asl. Forty-eight years ago, on 29 April 1969, Peirce (1972, 1975, pers. comm.) obtained one potto collected in Ndiya Village, Muguga Estate, about 30 km northwest of Nairobi (*c*. 2,100 m asl; *c*. 1,300 mm mean annual rainfall) on the south end of the Aberdares Range. This is the only other record (and first published record) for potto east of the Eastern Rift Valley. This specimen no longer exists; obtained for a parasitological study, it was neither described nor photographed. It is likely that this was *P. i. stockleyi* Butynski and De Jong 2007. Today, the forests nearest to Muguga are Gacuthi Forest, Bama Forest, and Gatamaiyo Forest Reserve. These forests should be searched for potto.

Being small, nocturnal, cryptic, and lacking a loud call, *P. ibeanus* is a difficult primate to detect, particularly if at low density. At some sites, the encounter rate with *P. ibeanus* during nocturnal primate surveys (using torchlight to elicit tapetal reflection) is as low as 0.02/h. It is recommended, therefore, that sites of a few square kilometers be searched at night for >50 h before concluding, with some confidence, that *P. ibeanus* is not present (Butynski and De Jong 2007).

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Figure 2. The Mount Kenya potto *Perodicticus ibeanus stockleyi.* Drawing by Stephen D. Nash from photographs and detailed written descriptions of the holotype. Reproduced from Butynski and De Jong (2007).

Muguga Estate in 1969, Jean-Pierre d'Huart for the French version of the abstract, and Stephen D. Nash for the drawing of *P. i. stockleyi*.

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