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Taxonomy, Distribution, and Conservation of Prigogine's Angola Colobus *Colobus angolensis prigoginei* Verheyen, 1959 (Primates: Cercopithecidae)

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Abstract: The 'Endangered' Prigogine's Angola colobus *Colobus angolensis prigoginei* is endemic to the Kabobo Massif along the western shore of Lake Tanganyika, eastern Democratic Republic of Congo. As the validity of *C. a. prigoginei* has been disputed, we compared the holotype and first photographs of a live individual against three paratypes of Cordier's Angola colobus *Colobus angolensis cordieri.* We confirm that *C. a. prigoginei* is phenotypically distinct from *C. a. cordieri*. These two subspecies occupy different altitudinal ranges and forest types and are separated by a barrier of vegetation ~180 km wide. The number of primate species on the Kabobo Massif is probably not less than 16, of which four are threatened with extinction. Of these, at least 12 are expected to be sympatric with *C. a. prigoginei*. The forest that *C. a. prigoginei* relies on is being degraded, lost and fragmented due to unmanaged and unsustainable exploitation by a rapidly expanding human population in a region that experiences a high level of insecurity. Poaching and climate change are other serious threats. We provide recommendations for research and for reducing the threats to *C. a. prigoginei*.

Résumé: Le colobe de Prigogine, *Colobus angolensis prigoginei*, une espèce 'En danger', est endémique du massif de Kabobo le long de la rive ouest du lac Tanganyika, dans l'est de la République démocratique du Congo. Comme la validité de *C. a. prigoginei* est contestée, nous avons comparé l'holotype et les premières photographies d'un individu vivant à trois paratypes de Colobe d'Angola de Cordier, *Colobus angolensis cordieri*. Nous confirmons que le phénotype de *C. a. prigoginei* est différent de celui de *C. a. cordieri*. Ces deux sous-espèces occupent des aires de distribution altitudinale et des types forestiers différents et elles sont séparées par une barrière de végétation d'environ 180 km de large. Le nombre d'espèces de primates dans le massif de Kabobo n'est probablement pas inférieur à 16, dont quatre sont menacées d'extinction. Parmi ces espèces, nous pensons qu'au moins 12 sont sympatriques de *C. a. prigoginei*. La forêt dont dépend *C. a. prigoginei* est en voie de dégradation, amputée et fragmentée par l'exploitation mal gérée et non durable pratiquée par une population humaine en expansion rapide, dans une région qui connaît un niveau important d'insécurité. S'y additionnent d'autres menaces sérieuses comme le braconnage et le changement climatique. Nous formulons des recommandations pour la recherche et pour une diminution des menaces pesant sur *C. a. prigoginei*.

Key Words: *Colobus angolensis cordieri***,** Cordier's Angola colobus, Kabobo-Luama Landscape, Kabobo Massif, Kabobo Wildlife Reserve, Mitsoshi-Kabogo Massif, Mount Kabobo, Ngandja Wildlife Reserve

Introduction

Reliable information on the taxonomy and conservation status of populations is not only of scientific interest but also critical to setting science-based priorities for actions for the conservation of biodiversity (Grubb *et al*. 2003 Mace 2004; Zinner and Roos 2016; Vogel Ely *et al.* 2017; Gippoliti *et al.* 2018; De Jong and Butynski 2024). The polytypic and widespread Angola colobus *Colobus angolensis* Sclater, 1860, is frequently restricted to small and highly isolated areas. This is particularly the case for populations in eastern Africa. Museum specimens and photographs of live individuals from some of these populations are often few or absent (De Jong and Butynski 2024). Given the complex taxonomy of *C. angolensis*, this situation is hampering the assessment of the conservation status of the subspecies of *C. angolensis* and, as a result, the setting of priorities for conservation actions. For example, evidence for an undescribed subspecies of *C. angolensis* was obtained in 1966 in Mahale Mountains National Park, central west Tanzania (Nishida *et al.* 1981). Since then, this colobine was observed only twice by scientists (1976 and 1979) and remained unnamed. The first

photographs of this monkey, obtained in April 2022, enabled the formal naming of this subspecies in 2024. Previously referred to as '*Colobus angolensis* ssp. nov.' (e.g., Grubb *et al*. 2003) and assessed as 'Data Deficient' on the IUCN Red List (Butynski and De Jong 2020), this monkey was largely ignored. Now, with a formal name, the Mahale Angola colobus *Colobus angolensis mahale* De Jong and Butynski, 2024, is listed as 'Critically Endangered' (Butynski and De Jong in press). This new recognition and enhanced attention will facilitate the conservation actions required for the long-term survival of this colobine.

The classification of the Angola colobus *Colobus angolensis* Sclater, 1860, endemic to tropical Africa, is founded on the coloration and pattern of the pelage, craniometrics, geographic distribution, and genetics. The most recent taxonomic arrangement, which we follow here, recognizes eight subspecies (Fig. 1; De Jong *et al*. 2020; Butynski and De Jong 2022; McDonald *et al*. 2022; Wallis 2023; De Jong and Butynski 2024). This classification is mostly based on Schwarz (1929), Rahm (1970), Dorst and Dandelot (1972), Dandelot (1974), Hull (1979, ~1996), Napier (1985), Colyn (1991), Groves (2001, 2005, 2007), Grubb *et al*. (2003), Bocian and Anderson (2013), Groves and Ting (2013), and Kingdon (2015). The least known of these eight subspecies is Prigogine's Angola colobus *Colobus angolensis prigoginei* Verheyen, 1959. Here we review the taxonomy, geographic distribution, and conservation status of *C. a. prigoginei*, list those primate species with which it is likely sympatric or parapatric, and make recommendations for research and conservation. We also review the taxonomy of its sister taxon, Cordier's Angola colobus *Colobus angolensis cordieri* Rahm, 1959. This article serves as a contribution to our on-going taxonomic and biogeographical review of *Colobus angolensis* (Kitamya *et al.* 2023; De Jong and Butynski 2024).

Taxonomy

Colobus a. prigoginei is known only from the Kabobo Massif (= Kabogo Massif = Mitsoshi-Kabogo Massif; ~100 km north to south) along the western shore of Lake Tanganyika, eastern Democratic Republic of Congo (DRC; Fig. 2; Rahm and Christiaensen 1960; Colyn 1991; Plumptre *et al*. 2008, 2016; Butynski and De Jong 2022; Kitamya *et al.* 2023).

Although *C. a. prigoginei* was accepted as a subspecies by most authorities, Groves (2007) was not convinced, pointing out that *prigoginei* and *C. a. cordieri* were both described in 1959 (the former published in September and the latter in June). He stated (p.12), "It is probable, but not certain in the present state of knowledge, that the two synonyms really are just a case of the same taxon being described in ignorance of one another in the same year." On this basis, he considered *prigoginei* to be a junior synonym of *cordieri.* Groves seems to have been unaware of a 1960 publication by Rahm and Christiaensen. Rahm and Christiaensen mentioned that, soon after the publication of these two subspecies names, they sent a *cordieri* paratype (adult male RG.28.534 collected by A. R. Christiaensen near the Tshoroba River, Kibila, DRC) to the Royal Museum for

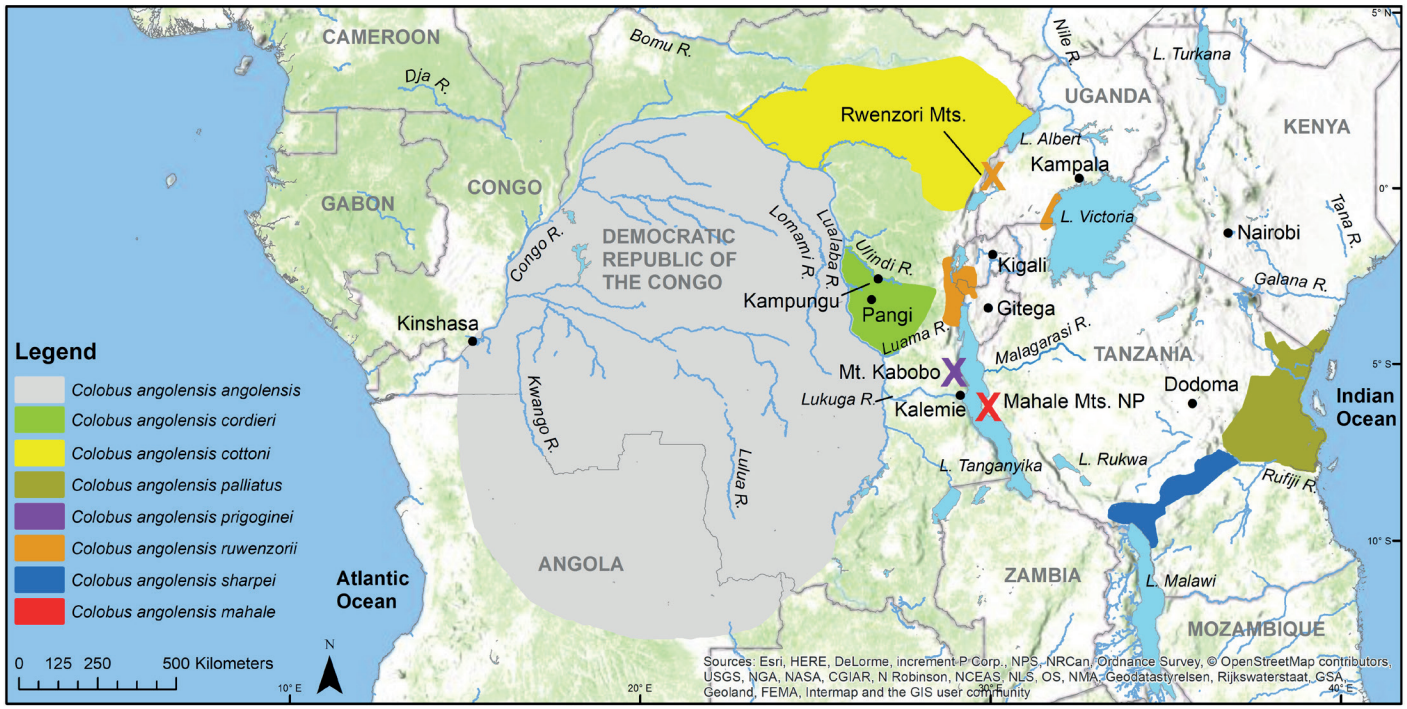

Figure 1. Geographic distribution of the eight subspecies of Angola colobus *Colobus angolensis*. Map based on Rodgers (1981), Colyn (1991), Bocian and Anderson (2013), De Jong and Butynski (2018, 2020, 2023, 2024), Cunneyworth *et al*. (2020), De Jong *et al*. (2020), Maisels (2020a, 2020b, 2020c), Rovero *et al*. (2020), Butynski and De Jong (2021, 2022), and Kitamya *et al*. (2023).

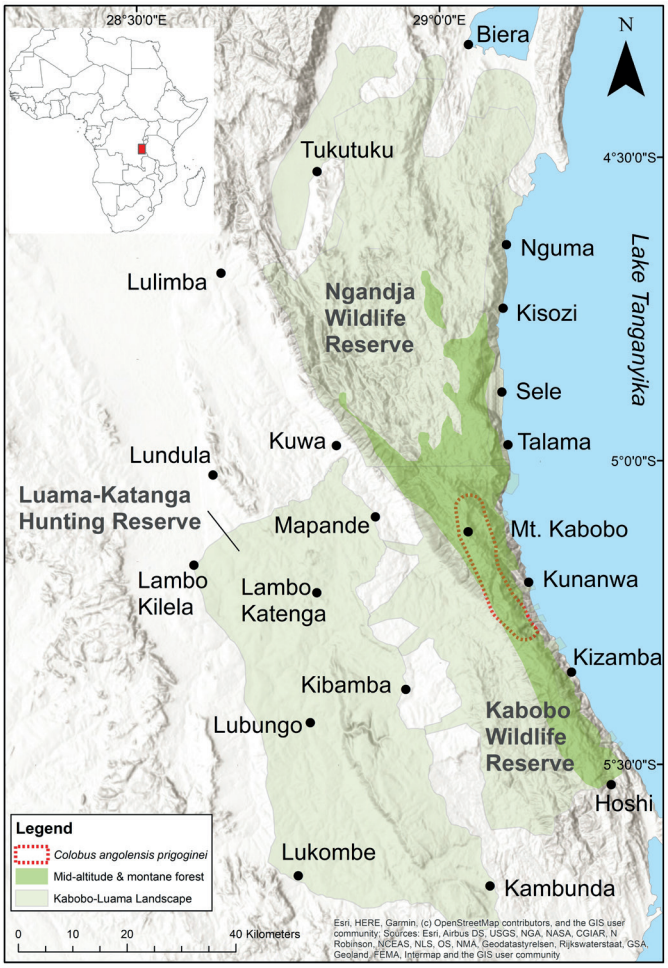

Figure 2. Location of the Kabobo-Luama Landscape and the known geographic distribution of Prigogine's Angola colobus *Colobus angolensis prigoginei* (from Kitamya *et al.* 2023). The Kabobo-Luama Landscape is comprised of Kabobo Wildlife Reserve, Ngandja Wildlife Reserve, and Luama-Katanga Hunting Reserve.

Central Africa, Tervuren, Belgium (RMCA), for Verheyen to examine. Already available at the RMCA were two *cordieri* specimens (subadult RG.26.460 and subadult paratype RG.26.461, both collected by M. Rollais in Wamaza, Maniema Province, DRC; 4°13'S, 27°12'E). Rahm and Christiaensen (1960) applied the following place names to this same locality; Wamaza Province, Kabambare Territory, DRC. Upon comparing the *prigoginei* holotype against the three *cordieri* specimens, Verheyen concluded that *prigoginei* and *cordieri* are distinctly different.

The holotype of *prigoginei* (RG.27.106) was collected on Mount Kabobo (05°06'S, 29°01'E; Verheyen 1959), while *cordieri* was described and named based on a living subadult male obtained by M. Cordier at Kampunzu (= Kampungu), Pangi Territory, Kivu Province, DRC (02°37'S, 26°47'E; Rahm 1959; Rahm and Christiaensen 1960), ~350 km to the northwest of Mount Kabobo (Figs. 1 and 3). See the Appendix for comments on Rahm's 1959 description and designation of *cordieri*. Since there is no museum specimen or photograph of the *cordieri* holotype, Rahm and Christiaensen (1960), a year later, designated a 'metatype' (adult male L.6758), now housed at the Centre de Recherche en Sciences Naturelles, Lwiro/Bukavu, DRC, along with an adult male paratype (L6757) and an adult female paratype (L6753).

Colyn (1991) gave the geographic distribution of *cordieri* as follows: western limit is the Lualaba River; eastern limit is the western (lowland forest) edge of the mountains on the west side of the Albertine Rift at ~28° E; northern limit is the Ulindi River; southern limit is the Luama River [Figs. 1 and 3; see also maps in Figure 1 of Rahm (1966) and in Figure IV.39 of Colyn (1991)]. The distance between the known northern limit of *prigoginei* (Kitamya *et al*. 2023) and the known southeastern limit of *cordieri* (Colyn 1991) is ~180 km. Much of this geographic gap is <800 m asl and includes the Kilombwe River Valley with its woodlands, savannas, and grasslands—vegetation types that are barriers for the forest-dependent *C. angolensis* [See maps in Figure 2 of Rahm (1966) and in Figure II.8 of Colyn (1991)].

The altitude at which the *prigoginei* holotype was collected (2,400 m asl; Verheyen 1959) is considerably higher than where the *cordieri* holotype was collected (~550 m asl).

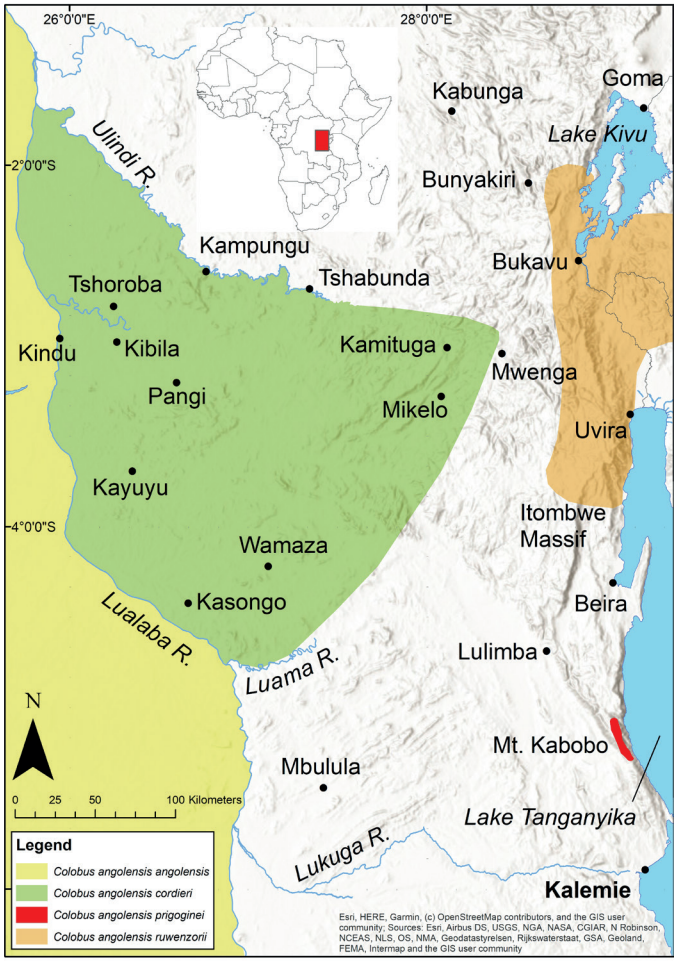

Figure 3. Central east Democratic Republic of Congo and the known geographic distribution of Prigogine's Angola colobus *Colobus angolensis prigoginei* and Cordier's Angola colobus *Colobus angolensis cordieri*. Map based on Colyn (1991), Bocian and Anderson (2013), De Jong *et al*. (2020), De Jong and Butynski (2023), and Kitamya *et al*. (2023).

The known altitudinal range for *prigoginei* is 1,230–2,400 m asl (Kitamya *et al*. 2023). Rahm and Christiaensen (1960) gave the altitudinal range for *cordieri* as 500–800 m asl, whereas our review of the literature and specimens yields an altitudinal range of 400–1,100 m asl. These altitudes indicate that *prigoginei* is a subspecies of mid-altitude (= transition) forest and montane forest (>1,200 m asl), whereas *cordieri* is a lowland forest subspecies (<1,200 m asl).

According to the formal descriptions (Verheyen 1959; Rahm and Christiaensen 1960; Colyn 1991), *prigoginei* and *cordieri* are phenotypically distinct. This is not surprising, given the considerable geographic distance between these two taxa, the fact that they occupy different altitudinal ranges and, therefore, forest types, and that a big part of the interlying area is composed of non-forest habitats that are unsuitable for *C. angolensis*.

To further support the validity of *prigoginei*, we compared the *prigoginei* holotype (adult male RG.27.106) against the two *cordieri* paratypes (adult male RG.28.534; subadult RG.26.461) at the RMCA, and one *cordieri* paratype (adult male ZD.1969.404) at the Natural History Museum, London (Figs. 4–8). Both subspecies lack a white brow-band, have white cheek whiskers that are relatively short and do not extend above the ears, have short and narrow white epaulettes, lack a grizzled grey or white pubic band or pubic patch, and lack a tail tuft. They differ from one another in the following respects.

Colobus. a. prigoginei: When viewed face-on, the black crown is narrow and high, being composed of hairs that do not form a whorl (hairs mostly ~80 mm long; longest ~120 mm). Cheek whiskers full, 'woolly', and straight. Narrow band of sparse white hairs connecting the cheek whiskers to the epaulettes is barely visible (being mostly hidden by longer black hairs). Ventral pelage woolly. Tail black in its basal part (~7% of total length), grizzled black and grey to pale brown in the intermediate part, and yellowish-white in the distal part (see below).

Colobus a. cordieri: When viewed face-on, the black crown is broad and low, being composed of hairs that form a whorl (hairs on paratype RG.28.534 mostly ~120 mm long; longest ~130 mm). Cheek whiskers sparse and curve forward. Band of white hairs connecting the cheek whiskers to the epaulettes is narrow but readily visible. Ventral pelage is not woolly. Tail is black in its basal part (~5% of total length), and grizzled black and grey with a brown tinge in the remaining parts (see next paragraph).

The main, and most obvious, difference between *C. a. prigoginei* and *C. a. cordieri* is the color pattern of the tail. In the *prigoginei* holotype, the basal ~7% of the tail is black followed by about a 25% transition zone that runs from grizzled black and grey to pale brown, with the distal ~68% white with a yellowish tinge (Figs. 4, 5 and 8). In the three *cordieri* paratypes, the basal ~5% is black followed by ~95% grizzled black and grey with a brown tinge (Figs. 6–8).

The shape of the crown of *prigoginei* is most similar to that of the Rwenzori Angola colobus *C. a. ruwenzorii* Thomas, 1901, another montane subspecies, but not like the crown of Sharpe's Angola colobus *C. a. sharpei* Thomas, 1902, or the crown of *C. a. mahale*, the two other montane subspecies of *C. angolensis* (Fig. 1).

The phenotypic characters for *prigoginei* are consistent with, to the best of our knowledge, the only photographs of a live *prigoginei* with the exception that the white cheek whiskers extend above the ears in the individual in the photographs (Fig. 9; Kitamya *et al*. 2023). We are unaware of photographs of a live *cordieri*, although a black-and-white photograph of a dead *cordieri* in the field is presented in Rahm and Christiaensen (1960). Based on the above, we support the recognition both of *prigoginei* and *cordieri* as subspecies of *C. angolensis*.

Drawings that compare the coloration and pattern of the pelage of *prigoginei* and *cordieri* are exhibited in Figure 10. Other drawings that compare the pelage of these two subspecies are presented in Rahm (1970), Colyn (1991), Gautier-Hion *et al*. (1999), Bocian and Anderson (2013), Groves and Ting (2013), Kingdon (2015), Fashing (2016), and Burgin *et al*. (2020).

As indicated above, *C. a. prigoginei* is phenotypically distinct and isolated from other populations of *C. angolensis* (see 'Distribution' section). We here treat this monkey as a subspecies. This is, however, a conservative assessment of its taxonomic status. Applying the Phylogenetic Species Concept (Cracraft 1983, 1992; Groves 2001, 2004; Groves and Happold 2013; Groves *et al*. 2017), this monkey merits recognition as a species—*Colobus prigoginei*.

Distribution

The geographic distribution of *C. a. prigoginei* is poorly understood as there is only one museum specimen and the total number of field locality records is six. Figure 1 in Kitamya *et al.* (2023) presents a map depicting these six localities. *Colobus a. prigoginei* is geographically isolated from *C. a. ruwenzorii* to the north by >130 km, from *C. a. cordieri* to the northwest by ~180 km, and from Sclater's Angola colobus *C. a. angolensis* Sclater, 1860, to the west by ~240 km (Fig. 1). *Colobus a. mahale* is ~100 km away across Lake Tanganyika, and ~560 km away across land (De Jong and Butynski 2023, 2024).

As far as is known, the entire geographic distribution of *C. a. prigoginei* is in the Kabobo Wildlife Reserve (~1,500 km²; 773–2,750 m asl; Fig. 2). The 'Area of Occupancy' (IUCN 2012) is no less than 6 km², and the 'Extent of Occurrence' (IUCN 2012) is at least 30 km² (Kitamya *et al.* 2023).

As mentioned above, the altitudinal range of *C. a. prigoginei* is at least 1,230–2,400 m asl, and the predominant vegetation types are mid-altitude forest and montane forest. Together, these two moist forest types cover roughly 560 km² (~310 km² in Kabobo Wildlife Reserve and ~250 km² in Ngandja Wildlife Reserve). Across the altitudinal

Figure 4. Holotype of Prigogine's Angola colobus *Colobus angolensis prigoginei* (adult male RG.27.106), Royal Museum for Central Africa, Tervuren, Belgium. Photograph by Yvonne de Jong and Tom Butynski.

Figure 5. Holotype of Prigogine's Angola colobus *Colobus angolensis prigoginei* (adult male RG.27.106), Royal Museum for Central Africa, Tervuren, Belgium. Photograph by Yvonne de Jong and Tom Butynski.

Figure 6. Paratype of Cordier's Angola colobus *Colobus angolensis cordieri* (adult male ZD.1969.404) at the Natural History Museum, London. Photograph by Yvonne de Jong and Tom Butynski.

range for *C. a. prigoginei*, mean annual rainfall ranges from ~130 cm in the mid-altitude forest to ~183 cm in the montane forest (WorldClim 2.1 Bioclimatic variable 12, resolution 30 arc second; WorldClim 2016; Fick and Hijmans 2017), and mean annual temperature ranges from about ~21°C in the mid-altitude forest to ~14°C in the montane forest (WorldClim 2.1 Bioclimatic variable 1, resolution 30 arc-second; WorldClim 2016; Fick and Hijmans 2017).

Figure 7. Paratype of Cordier's Angola colobus *Colobus angolensis cordieri* (adult male ZD.1969.404) at the Natural History Museum, London. Photograph by Yvonne de Jong and Tom Butynski.

Figure 8. Tail of adult male holotype Prigogine's Angola colobus *Colobus angolensis prigoginei* (RG.27.106; middle) compared to tail of adult male paratype Cordier's Angola colobus *Colobus angolensis cordieri* (RG.28.534; top), and tail of subadult paratype *C. a. cordieri* (RG.26.461; bottom) at the Royal Museum for Central Africa, Tervuren, Belgium. Photograph by Yvonne de Jong and Tom Butynski.

Figure 9. Adult (probably a male) Prigogine's Angola colobus *Colobus angolensis prigoginei*, Kabobo Wildlife Reserve, eastern Democratic Republic of Congo. In this individual, but not in the holotype, the white cheek whiskers extend above the ears. Photograph by Antoine M. Izak, Kabobo Biodiversity Conservation Project. To the best of our knowledge, this is the first photograph of a living *C. a. prigoginei*.

Figure 10. Adult male Prigogine's Angola colobus *Colobus angolensis prigoginei* (left) and adult male Cordier's Angola colobus *Colobus angolensis cordieri*. The drawing of *C. a. prigoginei* is based on the holotype (adult male RG.27.106). The drawing of *C. a. cordieri* is based on two paratypes (adult male RG.28.534 and adult male ZD.1969.404). Drawings by Stephen D. Nash.

The Kabobo-Luama Landscape (~6,951 km²; Fig. 2; Plumptre *et al*. 2008; Kitamya *et al*. 2023) is composed of the Kabobo Wildlife Reserve (~1,477 km²), the Ngandja Wildlife Reserve (~3,166 km²), and the Luama-Katanga Hunting Reserve (~2,308 km²). The Ngandja Wildlife Reserve is contiguous with the Kabobo Wildlife Reserve. While it has yet to be determined whether this reserve holds *C. a. prigoginei*, there is a good chance that this is the case.

To the west of the escarpment of the Kabobo and Ngandja wildlife reserves, the altitude drops rapidly ~700 m to a vast region of grassland, savanna, and gallery forest. There are ~834 km² of mid-altitude gallery forest and montane gallery forest in this region, some of it in the Luama-Katanga Hunting Reserve (Plumptre *et al*. 2008).

Other Primates in Kabobo Wildlife Reserve and Ngandja Wildlife Reserve

Colobus a. prigoginei is sympatric with at least eight other anthropoid species. The list below was compiled based on Plumptre *et al.* (2008), Kerbis Peterhans *et al*. (2013), and A. B. Kitamya (pers. comm.), with the current taxonomy and IUCN Red List degree of threat applied (IUCN 2024). All of these species have also been recorded for the Itombwe Massif, about 80 km to the north (Fig. 3; Omari *et al.* 1999).

Colobus angolensis prigoginei Verheyen, 1959 – Prigogine's Angola colobus (Endangered)

Piliocolobus foai (de Pousargues, 1899) – Kivu red colobus (Endangered)

Cercopithecus mitis opisthostictus Sclater, 1894 – Mweru monkey (Least Concern)

Cercopithecus ascanius schmidti Matschie, 1892 – Schmidt's red-tailed monkey (Least Concern)

Cercopithecus denti Thomas, 1907 – Dent's monkey (Least Concern)

Allochrocebus lhoesti (Sclater, 1899) – L'Hoest's monkey (Vulnerable)

Lophocebus albigena johnstoni (Lydekker, 1900) – Johnston's grey-cheeked mangabey (Near Threatened)

Pan troglodytes schweinfurthii (Gigliolo, 1872) – Eastern chimpanzee (Endangered)

Homo sapiens Linnaeus, 1758 – Modern human (Not Assessed)

Also present on the Itombwe Massif is the owl-faced monkey *Cercopithecus hamlyni* Pocock, 1909 (Vulnerable). This species is reported by local hunters to occur in the Kabobo and Ngandja wildlife reserves, but confirmation is required (Plumptre *et al.* 2008).

The vervet *Chlorocebus pygerythrus* (F. Cuvier, 1821) (Least Concern) [probably reddish-green vervet *C. p.*

rufoviridis (I. Geoffroy, 1843)] and olive baboon *Papio anubis* (Lesson, 1827) (Least Concern) are present in the Kabobo and Ngandja wildlife reserves but, being woodland species, they are unlikely to be sympatric with *C. a. prigoginei*, or only rarely so.

It is not known which species of lorisoid are present in the Kabobo and Ngandja wildlife reserves. However, based on presence in the forests and woodlands of the Itombwe Massif (Omari *et al*. 1999), and on the distribution maps in Butynski *et al.* (2013), six lorisoid species are expected.

Perodicticus ibeanus ibeanus Thomas 1910 – Eastern potto (Least Concern)

Otolemur crassicaudatus monteiri (Bartlett, 1863) – Miombo silver large-eared greater galago (Least Concern)

Galago matschiei Lorenz, 1917 – Spectacled lesser galago (Least Concern)

Galago moholi moholi A. Smith 1836 – Mohol lesser galago (Least Concern)

Galagoides demidoff (G. Fischer, 1806) – Demidoff's dwarf galago (Least Concern)

Galagoides thomasi (Elliot, 1907) – Thomas's dwarf galago (Least Concern)

Four of these lorisoids are forest-dependent (*P. i. ibeanus, G. matschiei, G. demidoff, G. thomasi*) and, therefore, are probably sympatric with *C. a. prigoginei*.

In summary, the number of primate species in the Kabobo and Ngandja wildlife reserves is probably not less than 16, of which at least 12 are expected to be sympatric with *C. a. prigoginei*. This is a high diversity of primate species compared to other sites in Africa (Oates 1996; Chapman *et al.* 1999; Eeley and Lawes 1999; Butynski and De Jong 2019). Of these 16 species, four are threatened with extinction (IUCN 2024).

Threats and Conservation

The majority of African colobines (82% of all taxa) are 'threatened with extinction' (i.e., assessed as 'Vulnerable', 'Endangered', or 'Critically Endangered' on The IUCN Red List of Threatened Species; IUCN 2012, 2024; Butynski and De Jong 2022). *Colobus a. prigoginei* is categorized as 'Endangered' (De Jong and Butynski 2020). The forest on which this monkey depends is being degraded, lost, and fragmented due to frequent fire, artisanal gold mining, and conversion to farmland. In addition, this region experiences high levels of poaching and has been affected by civil unrest and armed conflict for decades (Plumptre *et al*. 2008, 2016; De Jong and Butynski 2020; Butynski and De Jong 2022; Kitamya *et al.* 2023).

The root cause of these threats to *C. a. prigoginei* is the rapid growth of the human population due to high birth rates and immigration. The population growth rate of DRC in 2022 was 3.3%, compared to a global population growth rate of 0.8% (United Nations 2022; Emina 2023). The large majority of people in this region rely heavily upon the direct exploitation of natural resources. Much of this exploitation is, however, not managed and unsustainable.

Colobus a. prigoginei is also threatened by habitat loss due to climate change. The rate of climate change is high along the Albertine Rift and is expected to have a considerable negative impact on the extent of mid-altitude forest and montane forest over the next 60 years (Plumptre *et a*l. 2016; De Jong and Butynski 2024).

Successful measures to conserve *C. a. prigoginei* will do much to conserve the many other species that depend on the mid-altitude forest and montane forest in which it lives, including many Albertine Rift endemic species and globally threatened species. The Kabobo-Luama Landscape is a biodiversity hotspot with >558 species of vertebrates (39 known Albertine Rift endemics) and >1,410 species of plants (71 known Albertine Rift endemics). Of these, 34 species are Red Listed as in danger of extinction (Plumptre *et al*. 2008, 2016). Four of the primates are globally threatened: *Allochrocebus lhoesti* (Vulnerable), *Colobus a. prigoginei* (Endangered), *Piliocolobus foai* (Endangered), and *Pan. t. schweinfurthii* (Endangered; IUCN 2024). With a population of ~2,500 *P. troglodytes*, this landscape is a priority site for the conservation of this species (Plumptre *et al.* 2016).

The Kabobo and Ngandja wildlife reserves hold the biggest block of moist forest (~800 km²) on Lake Tanganyika. This is one of the few places along the Albertine Rift, indeed, in Africa, where there is continuous forest over the altitudinal range of 770–2,750 m asl. Preventing the fragmentation of this forest is, therefore, a conservation priority. The forest of these two wildlife reserves is critical for protecting a large watershed for Lake Tanganyika, for mediating climate change, and as a source of forest products to support the livelihoods, culture and well-being of the local human population. In this regard, the endemic and endangered *C. a. prigoginei* can serve both as an indicator of the biological health of this forest and as a 'flagship' taxon for the conservation of its biodiversity.

Recommendations for Research and Conservation

Colobus a. prigoginei has never been the focus of conservation activities and no conservation measures are currently planned. Here are our recommendations for research, for reducing the threats to *C. a. prigoginei***,** and for helping to secure its long-term survival and that of the forest on which it depends:

1. Undertake a comprehensive survey in the mid-altitude forest and montane forest of the Kabobo and Ngandja wildlife reserves, and of the larger gallery forests to the west of the Kabobo Escarpment (Fig. 2) to determine the geographic distribution and abundance of *C. a. prigoginei.*

2. Establish a network of people to help locate all groups and then monitor group size and age/sex composition, home ranges, and threats. Enter these data into 'PrigogineiBase' (see below).

3. Develop a habitat suitability model for *C. a. prigoginei*. Model the impacts of fire, mining, agriculture, and climate change on the extent and connectivity of mid-altitude forest and montane forest in the Kabobo and Ngandja wildlife reserves.

4. Undertake a detailed, long-term, ecological and behavioral study of *C. a. prigoginei*.

5. Conduct biogeographical, comparative, morphological, and molecular research across the geographic distribution of *C. angolensis* to further our understanding of the evolution, phylogeography, and taxonomic arrangement of this species.

6. Prevent poaching and reduce the incidence of fire in the Kabobo and Ngandja wildlife reserves.

7. Bring the plight of *C. a. prigoginei* to the people of DRC, particularly those living in the vicinity of Kabobo and Ngandja wildlife reserves, and encourage them to take action to conserve this monkey.

8. Establish *C. a. prigoginei* as one of the three 'flagship' species for the conservation of the Kabobo and Ngandja wildlife reserves, along with *P. t. schweinfurthii* and bongo *Tragelaphus eurycerus* (Ogilby, 1837).

A database, 'PrigogineiBase', has been created for storing spatial data, altitude, habitat type, date of encounter, group size, and group composition (Kitamya *et al.* 2023). PrigogineiBase will serve as a resource for monitoring the geographic distribution and abundance of *C. a. prigoginei*, help determine conservation priorities and actions, and yield information required for reassessments of its threat status for The IUCN Red List of Threatened Species.

If you have a record of *C. a. prigoginei*, or any of the other primates of the Kabobo-Luama Landscape, please insert the details on http://www.wildsolutions.nl/research/record/ or send them by email to: yvonne@wildsolutions.nl.

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Appendix

Comments on the descriptions of *Colobus angolensis cordieri* by Rahm (1959) and Rahm and Christiaensen (1960).

In 1959, M. Cordier live-captured a subadult male *Colobus angolensis* at Kampunzu (= Kampungu), Pangi Territory, Kivu Province, DRC (Rahm 1959; Rahm and Christiaensen 1960). Rahm and Christiaensen observed this monkey at Cordier's camp in Kabunga, DRC, ~180 kms from Kampungu (Fig. 3). Rahm (1959) described a new subspecies of *Colobus angolensis* based on this subadult male and 'provisionally' named it '*cordieri*'. He did not specifically identify this individual as the holotype, but that would have been understood as this was the only specimen available for examination. There is no indication that this subadult male was secured as a museum specimen or that a photograph was taken. Nonetheless, 'Rahm, 1959' is invariably given as the authority and year for the designation of *Colobus angolensis cordieri* [e.g., Rahm (1970), Dandelot (1974), Napier (1985), Colyn (1991), Groves (2001, 2005, 2007), Grubb *et al*. (2003), Groves and Ting (2013), Maisels (2020b)]. Later, Rahm and Christiaensen (1960) state that the live subadult monkey used to describe and name *cordieri* was lost. They, therefore, designated a 'metatype' (L.6758), as well as three paratypes from near Kibila, DRC, and one paratype from Wamaza Province, Kabambare Territory, DRC (Fig. 3). Colyn (1991) refers to L.6758 as the 'holotype', not as the 'metatype'.

The coloration and pattern of the pelage of the tail is the main trait for distinguishing *prigoginei* from *cordieri.* Interestingly, the original description of the tail of *cordieri* provided by Rahm (1959) differs from that given for the metatype, and also differs from those of the three paratypes that we examined (ZD.1969.404 at Natural History Museum, London, and L.6759 and L.26461 at RMCA). In the original description, Rahm (1959) stated that the basal half of the tail is greyish-white and that the distal half is pure white (translated from French via Google Translate). In contrast, Rahm and Christiaensen (1960) describe the tail of the metatype, and of the three paratypes from Kibila (all adults), as black over the proximal ~8%, followed by about ~14% grey, and the distal ~78% greyish with light brown tinge (translated from French via Google Translate).