

Chlorocebus djamdjamensis, Bale Monkey

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Primates	Cercopithecidae

Scientific Name: *Chlorocebus djamdjamensis* (Neumann, 1902)

Synonym(s):

- *Cercopithecus aethiops* ssp. *djamdjamensis* Neumann, 1902
- *Cercopithecus djamdjamensis* Neumann, 1902

Infra-specific Taxa Assessed:

- *Chlorocebus djamdjamensis* ssp. *djamdjamensis*
- *Chlorocebus djamdjamensis* ssp. *harennensis*

Common Name(s):

- English: Bale Monkey
- French: Cercopthèque du Balé, Grivet des Balé
- Spanish; Castilian: Vervet de las Montañas Bale
- German: Bale-Grünmeerkatze

Taxonomic Source(s):

Mittermeier, R.A., Rylands, A.B. and Wilson D.E. 2013. *Handbook of the Mammals of the World: Volume 3 Primates*. Lynx Edicions, Barcelona.

Taxonomic Notes:

Re-evaluated and re-established as a valid taxon by Dandelot and Prévost (1972) and recorded from the Bale Mountains National Park by Carpaneto and Gippoliti (1994). Listed by Grubb *et al.* (2003) as a subspecies of grivet *Chlorocebus aethiops*, but here treated as a species following Pocock (1907), Elliot (1913), Lernould (1988), Yalden *et al.* (1996), Kingdon (1997), Groves (2001, 2005) and Butynski *et al.* (2013). Groves (2001, 2005) and Butynski *et al.* (2013) include this taxon in *Chlorocebus*, in contrast to Grubb *et al.* (2003) who retained it in *Cercopithecus*. Taxonomic history reviewed in Butynski *et al.* (2013). Two subspecies are recognised here: djam-djam monkey *C. d. djamdjamensis* and Bale Mountains monkey *C. d. harennensis*.

Mekonnen *et al.* (2018c) found two distinct mitochondrial DNA clusters within *C. djamdjamensis*, one in the Bale Mountains and one in forest fragments in the Sidamo Highlands, central southern Ethiopia. These authors confirm hybridization with *C. aethiops* and report one phenotypic *C. djamdjamensis* x vervet *C. pygerythrus* hybrid. They also indicate that gene flow between *C. djamdjamensis* in the Bale Mountains and in the Sidamo Highlands is uncommon.

In 2020, Gippoliti proposed the name '*C. djamdjamensis harennensis*' for the form in Harenn Forest, Bale Mountains. As the Bale Mountains and Sidamo Highland populations demonstrate strong genetic differentiation (Mekonnen *et al.* 2018c), and differ phenotypically (Mekonnen *et al.* 2012), ecologically, behaviourally (Mekonnen *et al.* 2017, 2018a,b), and in gut microbiota (Trosvik *et al.* 2018), we provisionally recognise *C. d. djamdjamensis* and *C. d. harennensis*. Further studies are required to

better understand the genetic and morphological diversity, phylogenetics, and evolutionary history within *C. djamdjamensis*.

Assessment Information

Red List Category & Criteria: Vulnerable B1ab(i,ii,iii,iv,v) [ver 3.1](#)

Year Published: 2022

Date Assessed: March 5, 2022

Justification:

This species is listed as Vulnerable as its extent of occurrence (EOO) is *ca* 17,500 km² and the population is severely fragmented. There is a suspected continuing decline of the population size due to ongoing habitat loss and degradation, hunting and, perhaps, hybridisation (Mekonnen *et al.* 2012, 2017, 2018a,b,c). This species occurs at low densities in bamboo forest as well as in fragmented forests. *Cercopithecus djamdjamensis* occupies a specialised niche with unusual habitat and diet [reviewed in Butynski *et al.* (2013) and in Mekonnen and Jaffe (2016)]. Extirpated populations reported by Mekonnen *et al.* (2012).

Previously Published Red List Assessments

2019 – Vulnerable (VU)

<https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T4240A17958005.en>

2008 – Vulnerable (VU)

<https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T4240A10699069.en>

2000 – Data Deficient (DD)

1996 – Data Deficient (DD)

Geographic Range

Range Description:

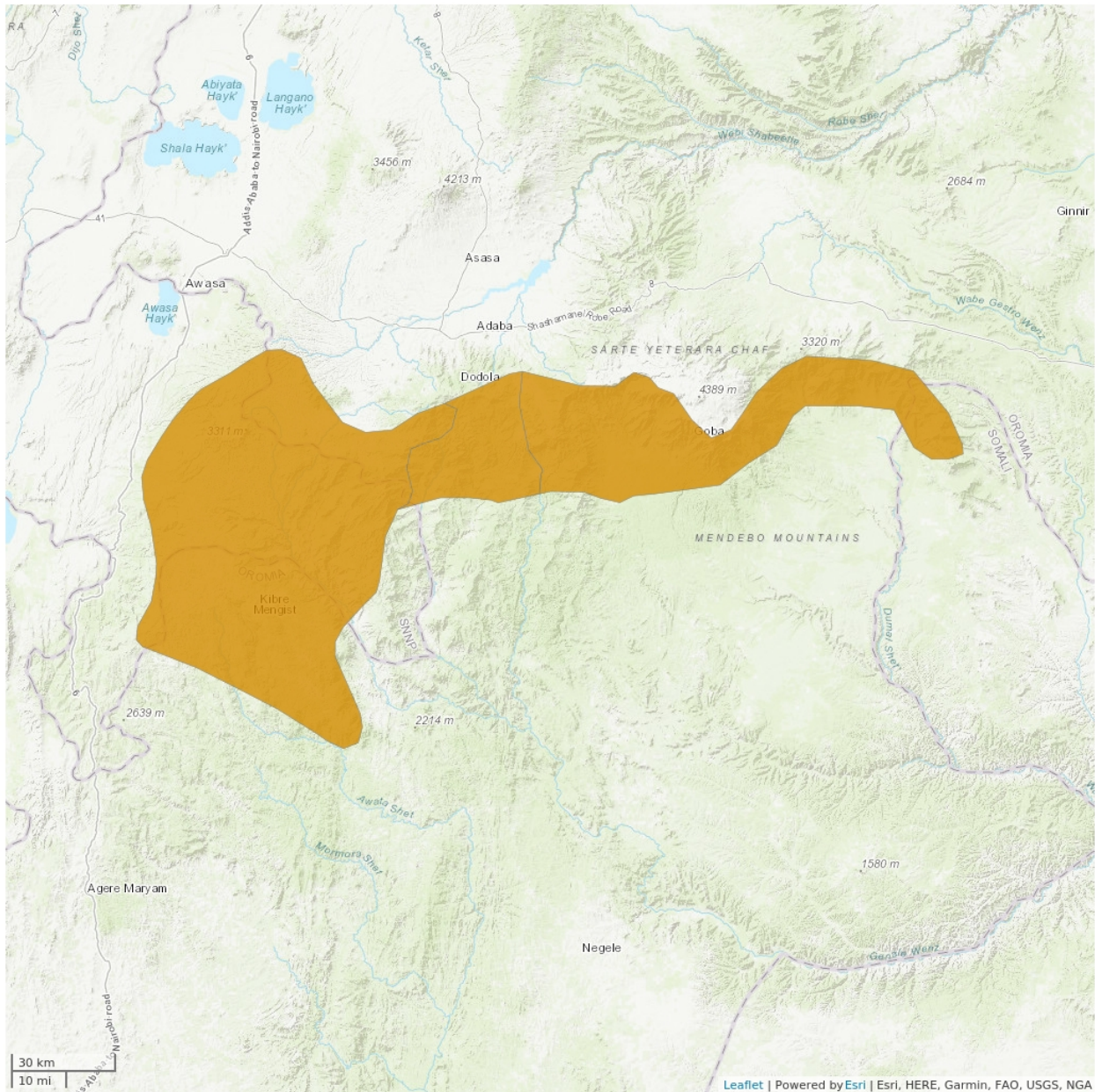
Chlorocebus djamdjamensis is endemic to the highlands of Ethiopia, east of the Eastern Rift Valley (= Ethiopian Rift Valley), in the Bale Mountains and Sidamo Highlands. The Extent of Occurrence (EOO) is *ca* 17,500 km². The known altitudinal range is from 2,315 m asl to 3,250 m asl (Wakjira *et al.* 2011, Mekonnen *et al.* 2012, Butynski *et al.* 2013, Mekonnen and Jaffe 2016).

It is suspected that this monkey's area of occupancy (and perhaps also its extent of occurrence) are declining due to ongoing habitat loss and degradation.

Country Occurrence:

Native, Extant (resident): Ethiopia

Distribution Map



Legend

EXTANT (RESIDENT)

Compiled by:

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The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.

Population

Chlorocebus djamdjamensis was more widespread and abundant in historic times. The current overall population size is unknown. The only locality with a known population size is Odobullu Forest (1,700–2,000 individuals; Mekonnen *et al.* 2010a). Population has been declining in the Sidamo Highlands where <800 individuals are present in 26 small, isolated, forest fragments (Mekonnen *et al.* 2012). Local extirpations were reported in 2012 (Mekonnen *et al.* 2012). New surveys and population size estimate are urgently required to assess the remaining number of *C. djamdjamensis* and their locations.

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Chlorocebus djamdjamensis has specialised habitat requirements, as it is found in the bamboo forest zone of the Bale Mountains and Sidamo Highlands (Mekonnen *et al.* 2010b, 2012). *Chlorocebus djamdjamensis* is a diurnal, bamboo-eating (*Arundinaria alpina*) primate (Mekonnen *et al.* 2010a, 2018b, 2021). During day-light hours, this monkey spends only about 2% of the time on the ground when in continuous forest. In contrast, it spends about 36% of its time on the ground when in forest fragments (Mekonnen *et al.* 2018b).

The diet of *C. d. djamdjamensis* comprised more species (forest fragments, 61 species, including mushrooms and insects) than that of *C. d. harenaensis* (continuous forest, 12 species), although food was less abundant (Mekonnen *et al.* 2018a). *Chlorocebus d. harenaensis* in continuous forest spent significantly more time feeding on young leaves of bamboo (61%) compared to *C. d. djamdjamensis* in forest fragments (8%; Mekonnen *et al.* 2018a). *Chlorocebus d. djamdjamensis* in forest fragments fed more on fruits, stems, petioles, insects, and leaves of plants other than bamboo, compared to *C. d. harenaensis* in continuous forest (Mekonnen *et al.* 2018a). As much as 10% of the diet of some groups consisted of crops, of which barley (*Hordeum vulgare*) and bamboo planted near houses were the most eaten (Mekonnen *et al.* 2020).

Besides humans, potential predators in the Bale Mountains include leopard *Panthera pardus*, lion *Panthera leo*, spotted hyaena *Crocuta crocuta*, and large birds of prey (Mekonnen *et al.* 2022). The main predators in forest fragments in the Sidamo Highlands include humans, domestic dogs, spotted hyenas, African wolves *Canis lupaster*, and large birds of prey (Mekonnen *et al.* 2020, 2021). Often forms polyspecific associations with black-and-white colobus monkey *Colobus guereza* (Mekonnen *et al.* 2016). *Chlorocebus djamdjamensis* is parapatric both with *C. aethiops* and *C. pygerythrus* which occupy the region immediately south of *C. djamdjamensis* (Mekonnen *et al.* 2012, 2018c).

Chlorocebus djamdjamensis is unique among species of *Chlorocebus*, with its specialised niche including habitat (bamboo forest), diet (bamboo young leaves and shoots), and high altitudinal range (inhabiting high altitudes in a narrow geographic range). Mekonnen *et al.* (2010a,b; 2012; 2016; 2018a,b,c) and Butynski *et al.* (2013) summarise the current state of knowledge of this diurnal, semi-terrestrial monkey.

Systems: Terrestrial

Use and Trade (see Appendix for additional information)

This species is persecuted for crop raiding, which causes intense conflict with local people. It is hunted with traps, spears and dogs (Mekonnen *et al.* 2012).

Threats (see Appendix for additional information)

The main threats to Bale Monkeys are ongoing habitat loss, degradation and fragmentation, hunting and, perhaps, hybridization. For example, the Haremma Forest, where *C. djamdjamensis* is generally uncommon, it is under threat from expanding human populations, fire, agriculture, and the removal of forest products such as bamboo, lumber, fuelwood, and charcoal. Threatened with extirpation in the Sidamo Highlands due to habitat loss that leave many populations in small, isolated, forest fragments in the human-dominated landscape. At least two populations have been extirpated (e.g. Abera; Mekonnen *et al.* 2012).

Grazing, harvesting of bamboo, and collection of fuelwood are legal in most sites where *C. djamdjamensis* lives. These activities, at present levels of off-take, are having a negative impact on this monkey. Making the removal of these products sustainable and restoration of the forest on which this monkey relies (through the planting and care of bamboo, food-trees, and sleeping trees) are the two priority conservation actions (Mekonnen *et al.* 2018a, Mekonnen *et al.* 2021, Mekonnen *et al.* 2022). Bamboo harvest is legal but not managed in the continuous forest (e.g., Odobullu Forest), one of the strong-holds of the species. Continuous bamboo forest should be conserved through a science-based bamboo harvest strategy to help ensure the long-term survival of this monkey and the bamboo forest (Mekonnen *et al.* 2022).

The species is persecuted for crop-raiding. People deter raiding monkeys by throwing rocks, placing scarecrows, chasing with dogs, and hunting them with traps, spears, and dogs (Mekonnen *et al.* 2012, 2018a, 2020). Guarding crops appears the most effective deterrent (Mekonnen *et al.* 2020). The intensity of human-monkey conflict in Sidamo Highlands and Bale Mountains is expected to increase as the area of high-quality bamboo forest declines and the human population expands. As a result of these constraints, as well as hunting and administrative problems at the district level, wildlife populations are in decline even in continuous forest (Mekonnen *et al.* 2017).

Morphological and genetic studies suggest hybridization between *C. djamdjamensis* and *C. aethiops* on the margins of their ranges (e.g., Ekuma Mountain, Kulla Mountain, and Wotiye; Mekonnen *et al.* 2012, Haus *et al.* 2013). Monkeys at these sites exhibited intermediate characters of pelage colouration and pattern, tail length, and whisker length (Mekonnen *et al.* 2012). *Chlorocebus djamdjamensis* has not, however, been found in sympatry with *C. aethiops* or *C. pygerythrus*, suggesting that hybridization at these sites occurred more than a century ago.

All major threats are humans-related. The human population of Ethiopia is one of the fastest growing in the world with a 3.0% annual growth rate. At this rate, Ethiopia's population will double within 30 years (WPP 2021). 'Rate of Natural Increase' of the human population in Ethiopia is 2.6%, compared to a worldwide rate of 1.1% (PRB 2021).

Conservation Actions (see Appendix for additional information)

Chlorocebus djamdjamensis is listed on Appendix II of CITES and on Class B of the African Convention on the Conservation of Nature and Natural Resources. Present in the proposed Haremma-Kokosa National Forest Reserve, but formal gazettelement is required. Since habitat destruction is the major threat, and

since *C. djamdjamensis* relies heavily on bamboo, the taking of bamboo at sites with this monkey should be outlawed (Mekonnen *et al.* 2012). Additional surveys in the Bale Mountains are required to better understand the species' distribution and population status.

Credits

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Authority/Authorities: IUCN SSC Primate Specialist Group

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Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.9. Forest - Subtropical/Tropical Moist Montane	Resident	Suitable	Yes

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.2. Small-holder farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	-	-	Low impact: 3
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoing	Minority (50%)	Rapid declines	Medium impact: 6
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance 2. Species Stresses -> 2.3. Indirect species effects		

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action in Place
In-place land/water protection
Conservation sites identified: Yes, over entire range
Occurs in at least one protected area: Yes
In-place education
Included in international legislation: Yes
Subject to any international management / trade controls: Yes

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Action Needed
1. Land/water protection -> 1.1. Site/area protection
1. Land/water protection -> 1.2. Resource & habitat protection
2. Land/water management -> 2.1. Site/area management
5. Law & policy -> 5.1. Legislation -> 5.1.3. Sub-national level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.1. Taxonomy
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats

Additional Data Fields

Distribution
Continuing decline in area of occupancy (AOO): Yes
Estimated extent of occurrence (EOO) (km ²): 17500
Continuing decline in extent of occurrence (EOO): Yes
Continuing decline in number of locations: Unknown
Lower elevation limit (m): 2,315
Upper elevation limit (m): 3,250
Population
Continuing decline of mature individuals: Yes
Population severely fragmented: Yes
Continuing decline in subpopulations: Yes
Extreme fluctuations in subpopulations: Unknown
All individuals in one subpopulation: No

Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Movement patterns: Not a Migrant

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