

## Taxonomic history affects current conservation efforts: examples from the primates of the Horn of Africa

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### Abstract

Many users of taxonomic lists believe them to be based on consistent data, but this is rarely true, and biased knowledge may be the rule rather than the exception. In the present essay on the taxonomy of primates of the Horn of Africa, I show how taxonomic history has consequences for the present appreciation of primate diversity in the region, and thus in directing conservation efforts. To minimize future losses, it is necessary that international bodies recognize taxonomic checklists as works in progress, eventually encouraging further integrated approaches to taxa delimitation.

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The Horn of Africa, or North-east Africa (Eritrea, Ethiopia, Djibouti, and Somalia) is a well-defined geographic region of about 1,844,000 km<sup>2</sup>, characterized by a complex geomorphological profile and a high rate of biological endemism (Toschi, 1947; Friis, 1992; Lavrenchenko and Afework Bekele, 2017). Over the last thirty years, the present author has attempted to improve the basic knowledge of primate taxonomy and conservation through field work, examination of hidden historical literature, and the study of natural history collections (Carpaneto and Gippoliti, 1994; Gippoliti, 2006; 2010; 2017). As is typical elsewhere, conservation efforts, particularly in Ethiopia, began with a far-from-perfect knowledge of the alpha taxonomy of the region's mammals, and primates were no exception in this respect. Here, I will use four examples from four primate genera (*Chlorocebus* Gray, *Cercopithecus* Linnaeus, *Theropithecus* I. Geoffroy Saint-Hilaire, and *Colobus* Illiger) to illustrate how taxonomic history had a profound effect on their current perception in the scientific community and on the degree and extent of the conservation attention afforded them.

### *Chlorocebus*

As the case of the Bale monkey shows, taxonomy is essential for guiding focused and effective priorities for biodiversity research and conservation. The rediscovery of the Bale monkey *Chlorocebus djamdjamensis* (Neumann, 1902) in the early 1990's led to a general re-appreciation of the value of forest biodiversity in Ethiopia. In 2020, I proposed that the species would be a valuable “umbrella species” for forest ecosystems in the south-eastern highlands (Gippoliti, 2020), and Mekonnen et al. (2022) further evaluated, positively, its role as both a flagship and umbrella species. The formal description of *Cercopithecus djamdjamensis* in 1902 resulted in it being included in the IUCN Red List as a subspecies of *C. aethiops*, and, subsequently as a full species, following Groves (2001). The so-called *aethiops* complex was one of the few examples of the application of the superspecies concept in mammalogy (Dandelot, 1959) and, in retrospect, this long-time awareness of the group's taxonomic complexities may have played a role in the almost universal acceptance of *djamdjamensis* as a species.

### *Cercopithecus*

The Ethiopian endemic member of the *Cercopithecus mitis* Wolf, 1822 group – found only in the forested region of the north-western highlands – was described by Enrico Hyllier Giglioli in 1887 with the name *Cercopithecus boutourlini*. The taxon has been accepted as a subspecies of *mitis* by practically all subsequent mammalogists (cf. Napier, 1981). Based on Colyn's (1991) study of the skull and considering its geographic isolation, Groves (2001) suggested that this taxon may be a distinct species, a proposition that agrees with the growing evidence of a greater isolation of Ethiopian mammals from the rest of Africa (Bryja et al., 2019). This view, however, has never been formalized. Historically, taxonomic debate deals only with the rank of the two 'semispecies' – *mitis* and *albobularis* (cf. Napier, 1981). The *mitis* group is represented in the region by another endemic taxon; *Cercopithecus albobularis zammaranoi* de Beaux, 1923, from the riparian forests of southern Somalia (formerly Italian Somalia). The subspecies was little-known outside of Italy, and Grubb (2006), who examined specimens in the British Museum of Natural History, synonymized it with *Cercopithecus albobularis albotorquatus* Pousargues, 1896. It is, however, highly distinctive compared to its geographical neighbor (de Beaux, 1937; Gippoliti, 2006; Kingdon, 2015). The conservation status of *zammaranoi* is unknown but it must certainly be regarded as threatened considering the destruction of the remaining riparian forests of southern Somalia, and has, thus, a great potential as a flagship species for this ecosystem.

### *Theropithecus*

The endemic genus *Theropithecus* is restricted to the Ethiopian highlands. Interest in the taxonomy of *Theropithecus gelada* (Rüppell, 1835) was revived by the first firm scientific evidence of a new and isolated population of gelada in the south-eastern massif (Arsi Region) in 1990 (Mori and Belay, 1991) and later from a preliminary revision published by the present author (Gippoliti, 2010). The latter finally encouraged the first studies of the threatened and most northerly populations in Tigray (Girmay and Dati, 2020). A name for the Arsi gelada – *Theropithecus gelada arsi* – was finally proposed only in 2016 (Shotake et al., 2016), but to date no holotype nor any vouchers of this taxon are preserved in a natural history collection. All recent genetic data seem to support three distinct taxa (Zinner et al., 2018; Trede et al., 2020), the third being *obscurus* Heuglin, 1863, but more investigation is needed. So far, the Arsi gelada has not been included in the IUCN Red List, although it is probably one of the most threatened primates in all of mainland Africa. Compilation of an IUCN account is now underway (Roos, pers. com.).

### *Colobus*

Another, more widespread primate, *Colobus guereza* Rüppell, 1835 awaits a true appraisal of its diversity in Ethiopia. The distinctiveness of the endemic *Colobus guereza gallarum* Neumann, 1902 of the eastern Arsi and Harrar was recently confirmed by

molecular means (Zinner et al., 2019). Regrettably, the supposed range of *gallarum* has to date been extended well outside its true range, so immediate attention must be directed toward populations that meet the physical characteristics of this subspecies. There is a dire need for a revision of *Colobus guereza guereza*. The southern, completely white-tailed population of the Omo Basin, once considered as belonging to a distinct taxon, *poliurus* Thomas, 1901, fell victim to Schwarz's (1929) taxonomic oversimplification. With new specimens de Beaux (1943) revalidated the taxon, mainly on the basis of its smaller size, yet his paper remains little-known. Considering the recent threats to the Omo ecosystem due to dam construction, the Omo *guereza* should receive immediate conservation attention, and further taxonomic and genetic studies are urgently needed.

### Conclusions

Although taxonomy is a largely neglected discipline, the present paper argues that taxonomic history affects, in one way or another, our current conservation efforts. For instance, the early description of the Bale monkey by Neumann in 1902 was vital to studies from the 1990's that re-established the validity of the taxon, first as a subspecies and later as a species. On the contrary, the Arsi gelada was discovered in 1990 and has since been studied. Yet, despite growing evidence of its distinctiveness, the putative taxon still needs to be assessed for the IUCN's Red List of Threatened Species. As with the other case studies, taxonomic history is evidently key in explaining why scientific data does not always result in coherent taxonomic choices.

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### Conflict of interest

The author declares that there are no conflicting issues related to this short communication.

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