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COMMENTARY

What Is (Not) a Baboon?

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Abstract

The term "baboon" is the common name used for a subset of terrestrial Cercopithecines with large bodies and protruding snouts. Although the application of the term has changed considerably over the years, we argue that common names, such as "baboon," should reflect the current state of phylogenetic knowledge. This practice promotes a broader understanding of taxonomic diversity that can impact decisions related to ecotourism, wildlife management, and conservation. Thus, we argue that "baboon" should be used only for members of the genus *Papio*.

Keywords Gelada · Mandrill nomenclature · Primate · Taxonomy

History

"Baboon" as a name for monkeys in English dates back to the 1400s. The word came to English from one or more Old French words including *babuin* (thirteenth century), meaning foolish or stupid person, and *babine*, meaning the thick lip of an animal (mid-thirteenth century). The later term may stem from the *bab* sound as expressive of the movements of the lips in speech and therefore may be related to *babble* (*Oxford English Dictionary* 2018). An alternative origin of baboon is from the ancient Egyptian word "Babi" (for a baboon god) that was transferred to the present through Greek (von Bissing 1951) although this route is more speculative. Originally expressed in English

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as "babewyn" (or "baboyn"), it was first applied (fifteenth century) to grotesque statues and decorations (e.g., how *gargoyle* is used today). In the fifteenth century, the word in English also became associated with monkeys of any origin (*Oxford English Dictionary* 2018). By the late 1800s, the term was used mainly for members of the tribe Papionini (i.e., large-bodied primates of Asia and Africa); but, in the 1900s, it quickly came to be associated particularly with large-bodied, terrestrial, long-snouted monkeys of Africa. These included members of the genus *Papio* (standard baboons), members of the genus *Theropithecus* (geladas, *T. gelada*), and members of the genus *Mandrillus* (mandrills, *M. sphinx*, and drills, *M. leucophaeus*). The continuation of the historical narrowing of the meaning of the term "baboon" can be seen in current trends as mandrills and drills are now referred to almost exclusively by their more precise name ("mandrills" and "drills," respectively) with the additional modifier "baboon" rarely attached to these names. "Mandrill baboon" does continue to show up occasionally in the biomedical literature (e.g., Yamanouchi et al. 2018). However, many popular sources now go out of their way to correct the misunderstanding that mandrills are baboons (e.g., http://www.monkeyworlds.com/mandrill/). The application of "baboon" currently extends beyond the genus *Papio* mainly to the genus *Theropithecus*, as the gelada continues to be called the "gelada baboon" in scientific publications, including in primatology journals (e.g., Abie et al. 2017; Espinosa-Gómez et al. 2018; Reyes-Velasco et al. 2018; Thompson and Georgiev 2014).

Phylogeny

Unlike scientific names, common names do not always reflect our current understanding of the phylogenetic relatedness among species (e.g., "koala bears" are not closely related to other bears). Yet, common names typically do change to reflect more recent scientific discoveries of phylogenetic relatedness. Consider, for example, a small red canid that is endemic to Ethiopian highlands (currently called the "Ethiopian wolf," *Canis simensis*). Historically, based on its appearance, the Ethiopian wolf has been called both a fox (e.g., "Simien fox") or a jackal (e.g., "Ethiopian jackal"). Then, immediately following the discovery that this canid is phylogenetically more closely related to wolves than to foxes or jackals (Gottelli et al. 1994), the name "Ethiopian wolf" was quickly adopted. Common names that reflect true patterns of relatedness avoid confusion among scientists and other wildlife industries (e.g., tourism) and can lead to appropriate conservation and management decisions (just as with scientific names; Zinner and Roos 2016).

Therefore, we feel that common names are worthy of scientific discussion (Grubb 2006) and that they should describe monophyletic clades (i.e., a group of organisms that includes all the descendants of a common ancestor; Duckworth et al. 2014).

Our understanding of the relationships between the three main genera of historic "baboons" (*Mandrillus*, *Papio*, and *Theropithecus*) has shifted radically with the advent of molecular data in the last several decades. Based on morphological patterns, *Papio* and *Mandrillus* were previously considered to be each other's closest relatives (often considered members of the same genus), with *Theropithecus* being harder to resolve phylogenetically because of extinct diversity within *Theropithecus* (reviewed in Disotell 1994). However, we now know that the smaller, more arboreal, mangabeys

(members of the genera *Cercocubus* and *Lophocebus*, which are never considered baboons) are interspersed within the baboon-like animals, suggesting that much of the morphological similarity is convergent (either among the baboon-like animals or among the two genera of mangabeys). In retrospect, it appears that the broad use of the term "baboon" is a holdover from our previous misunderstanding of the relationships among these different taxa of monkeys.

Currently, there remains some uncertainty about generic level relationships within Papionini (the tribe that encompasses mandrills, geladas, baboons, macaques, and mangabeys). Nevertheless, there is general agreement about some patterns. Most analyses agree that *Macaca* is the outgroup and that there is a deep split in the other genera with *Mandrillus* and *Cercocebus* on one side, and *Papio*, *Theropithecus*, and *Lophocebus* on the other (e.g., Disotell 1994). The remaining uncertainty involves the *Papio*, *Theropithecus*, and *Lophocebus* relationship, which has proven difficult to resolve, presumably because of rapid branching, post-divergence hybridization, and/or mitochondrial capture (Liedigk et al. 2014). The preponderance of current evidence, particularly more robust nuclear genetic data (mitochondrial trees often misrepresent species trees; Liedigk et al. 2014), suggests that either *Papio* and *Lophocebus* are sister genera (Guevara and Steiper 2014; Liedigk et al. 2014), or it is an unresolved trichotomy with a split among the three genera dated at about 5–6 Ma (Liedigk et al. 2014). The least likely scenario, despite early support based on some mitochondrial DNA sequence data (e.g., Disotell 1994; see Liedigk et al. 2014 and references therein for differing mtDNA results with longer fragments) appears to be the grouping of *Papio* and *Theropithecus* to the exclusion of *Lophocebus* (Guevara and Steiper 2014). This is also the only grouping that would support the current use of the word "baboon" to refer to *Papio* and *Theropithecus*, but not *Lophocebus*. Therefore, applying "baboon" to the broadest clade that definitively does not include *Lophocebus* mangabeys means restricting this term to the genus *Papio*. This restricted usage is further reinforced by the recently discovered kipunji (*Rungwecebus kipunji*) that was not included in these previous analyses. In addition to having a complex history of hybridization with *Papio*, *Rungwecebus* is clearly the closest genera to *Papio* (Zinner et al. 2018). Yet, *Rungwecebus* are morphologically distinct and are not considered baboons (Zinner et al. 2009). Therefore, restricting baboon to *Papio* avoids obscuring important behavioral, morphological, and genetic differences between *Theropithecus*, *Lophocebus*, *Rungwecebus*, and *Papio*.

One final note on the term "baboon" is that in Belize and the Guyanas, howler monkeys (*Alouatta* sp.) are also referred to as "baboons," even though they are New World monkeys and quite morphologically and phylogenetically distinct from other baboons (howlers are arboreal folivores with short faces). This appears to be an oddity of the local creole dialects and does not reflect a larger confusion about baboons.

Recommendation

Our recommendation is to simply equate "baboon" with the genus *Papio*. Members of the genus *Mandrillus* should continue to be called mandrills or drills. Members of *Theropithecus* should be called geladas. Specifically, the term "gelada baboon" should be dropped from usage to reduce taxonomic confusion and increase awareness of the behavioral, morphological, and genetic diversity within the Papionini.

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