

Where does the savannah fauna of the Batéké Plateau come from?

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Introduction

In 2007 we published the first country records for Congo-Brazzaville of three bird species (King & Chamberlan 2007), all from the Lesio-Louna Reserve in the Batéké Plateau, and all from the remarkable barbet family (Capitonidae; Fig. 1). One of them, Sladen's barbet *Gymnobucco sladenii*, is a forest-dependant species virtually endemic to the forests of the Democratic Republic of Congo, whilst the other two are savannah species. One, the yellow-fronted tinkerbird

Pogoniulus chrysoconus, probably has a continuous distribution from the nearest-known populations only 85 km to the east. However the presence of the third species, the miombo pied barbet *Tricholaema frontata* was particularly unexpected, as the species is almost exclusively restricted to mature miombo woodland in south-central Africa, with the nearest record 750 km south of the Lesio-Louna.

The discovery of these three barbets reinforced the classification of the Batéké Plateau as part of the Guinea-Congolian/Zambeian transition zone (Fig. 2;



Figure 1. Some of the barbet species (Capitonidae) found in the Lesio-Louna Reserve, Batéké Plateau, Congo. Top line: a) grey-throated barbet *Gymnobucco b. bonapartei*; b) Sladen's barbet *G. sladenii*; c) miombo pied barbet *Tricholaema frontata*; d) hairy-breasted barbet *T. hirsuta*. Bottom line: e) speckled tinkerbird *Pogoniulus scolopaceus flavisquamatus*; f) red-rumped tinkerbird *P. atroflavus*; g) yellow-rumped tinkerbird *P. bilineatus leucolaima*; h) yellow-fronted tinkerbird *P. chrysoconus extoni*.

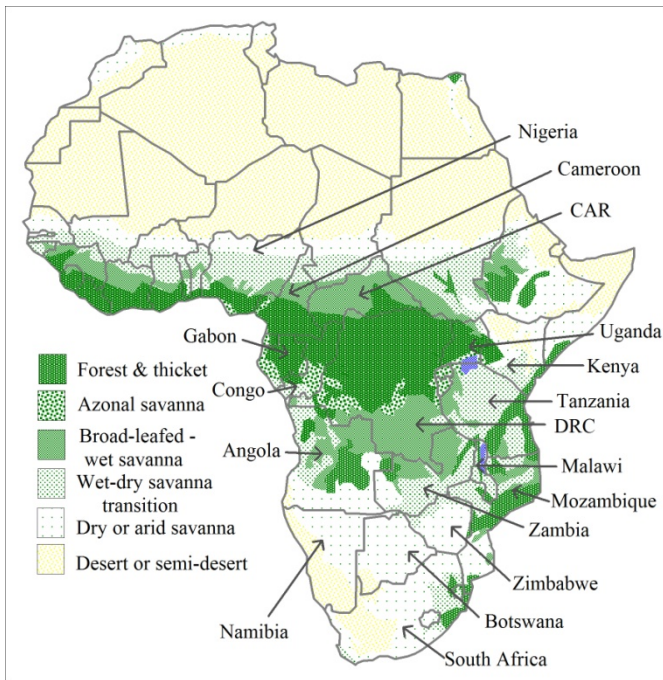


Figure 2. Simplified and generalised distribution of major vegetation types in Africa, adapted from NASA (undated). Forest and thicket = “Humid forest” and “Coastal forest, or evergreen thicket”; Azonal savanna = “Azonal savanna in wet savanna zone”; Broad-leaved – wet savanna = “Broad-leaved savanna – wet savanna”; Wet-dry savanna transition = “Transition zone wet and dry savanna (Northern Hemisphere)” and “Fine-leaved dry savanna - transition (Southern Hemisphere)”; Dry or arid savanna = “Fine-leaved dry savanna (Northern Hemisphere)”, “Fine-leaved dry arid savanna (Southern Hemisphere)” and “Fine-leaved dry savanna (Southern Hemisphere)”; Desert or semi-desert = “Desert, semi-desert, and water”.

Dowsett-Lemaire 2001; King & Chamberlan 2007; King 2011), supporting floral and faunal species of typical of both forest and savannah (Walters *et al.* 2006; Pearson *et al.* 2007; King 2008a, 2008b, 2011; Vande weghe 2008; Bout *et al.* 2010; King & Dallimer 2010; King *et al.* 2012). The case of the miombo pied barbet is particularly interesting, shedding light on historic changes in vegetation cover in central Africa, and the possible biogeographic origins of the western-central African savannah fauna in general. Understanding historic processes related to faunal origins and evolution is crucial when considering reintroduction or reinforcement projects. In this article we will therefore use the miombo pied barbet as a case-study for investigating these processes, then review published literature on other savannah species, including large mammals.

Barbets and the Batéké Plateau

Outside Africa, the barbet family (Capitonidae) is

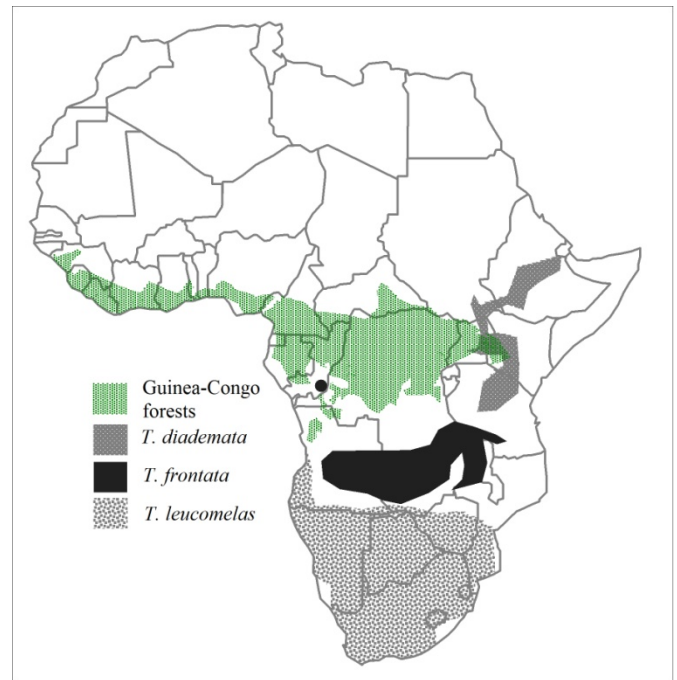


Figure 3. Approximate distributions (after Short & Horne 2001, Sinclair & Ryan 2003 and King & Chamberlan 2007) of three very closely related ‘pied’ barbets: red-fronted barbet *Tricholaema diademata*, miombo pied barbet *T. frontata* (including the isolated observation in the Lesio-Louna Reserve, Congo), and acacia pied barbet *T. leucomelas*.

exclusively forest-dwelling (Short & Horne 2001).

Their high diversification in Africa is regarded to be due to extreme cyclical changes that have repeatedly restricted lowland and upland forests, favouring adaptations in ancestral barbets to leave the forest and penetrate the woodland, bushland and scrubland habitats that today dominate much of the continent (Short & Horne 2001). Of the six species in the genus *Tricholaema*, only the hairy-breasted barbet *T. hirsuta* retains those ancestral forest links. Once forest-dependence was broken, speciation processes appear to have been most active within the woodland-grassland fringe of the African forest (Short & Horne 1988), due to the separation of woodland segments by forests or by xeric conditions (Short & Horne 1991), while mutations relating to replacement plumage patterning may also have played a role (Short *et al.* 1983).

The miombo pied barbet *T. frontata* forms a superspecies with the red-fronted barbet *T. diademata* and the (acacia) pied barbet *T. leucomelas* (Short &

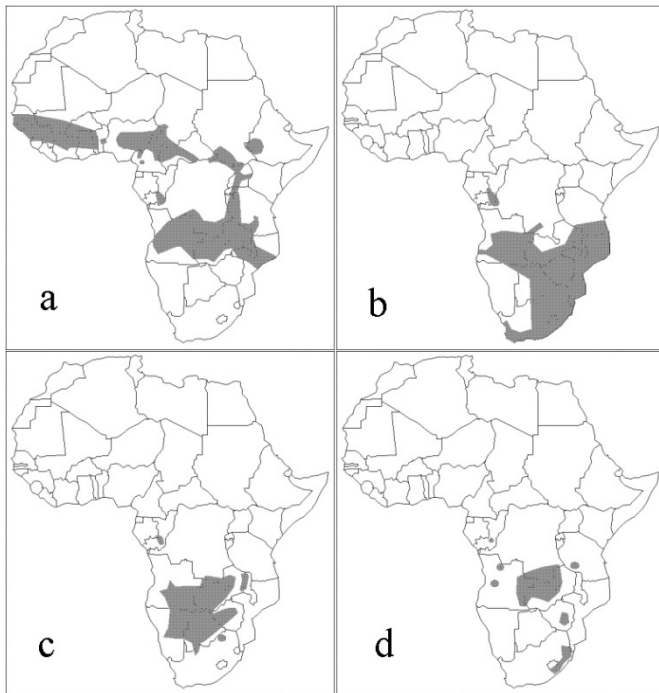


Figure 4. Approximate distributions (after Sinclair & Ryan 2003 and Borrow & Demey 2004) of selected species with isolated populations on the Batéké Plateau: a) yellow-bellied hyliota *Hyliota flavigaster*; b) piping cisticola *Cisticola fulvicapillus*; c) tinkling cisticola *Cisticola rufilatus*; d) pale-crowned cisticola *Cisticola cinnamomeus*.

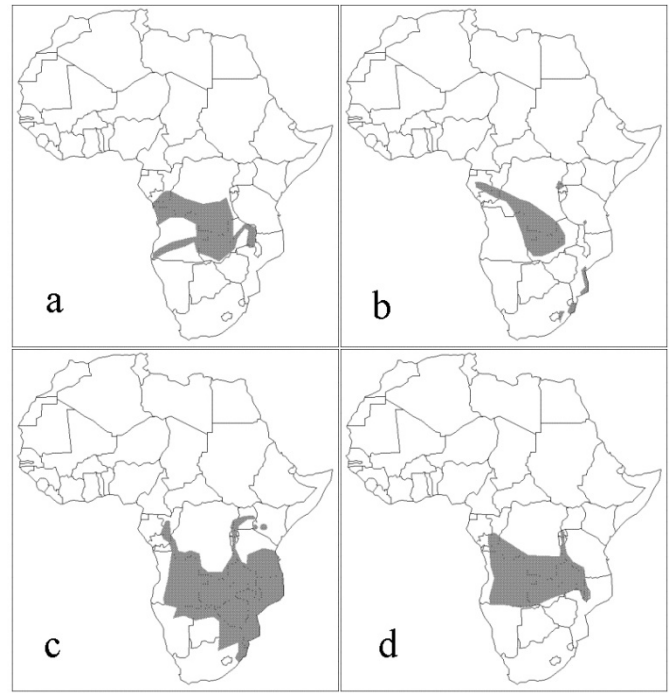


Figure 5. Approximate distributions (after Sinclair & Ryan 2003 and Borrow & Demey 2004) of selected species occurring on the Batéké Plateau with a strong affinity for Central African miombo woodland: a) red-capped crombec *Sylvietta ruficapilla*; b) short-tailed pipit *Anthus brachyurus*; c) grey penduline tit *Anthoscopus caroli*; d) Sousa's shrike *Lanius souzae*.

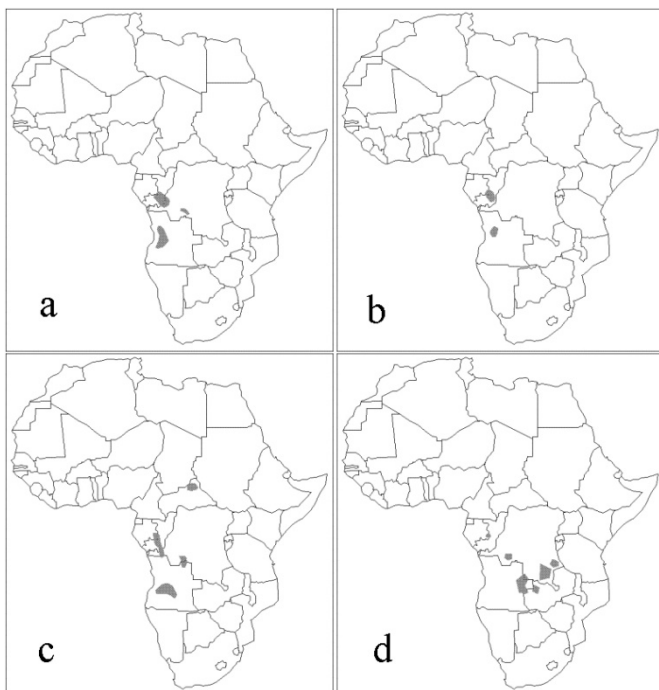


Figure 6. Approximate distributions (after Sinclair & Ryan 2003 and Borrow & Demey 2004) of a) Finsch's francolin *Fringilla finschi*; b) black-chinned weaver *Ploceus nigricapillus*; c) Congo moor chat *Myrmecocichla tholloni*; d) dambo cisticola *Cisticola dambo*.

Horne 2001). While *T. frontata* is generally restricted to miombo woodland in SC Africa, the two other species are found in generally more lightly-wooded (Short & Horne 2001) and drier (see Fig. 2) areas, *T. diademata* to the north and *T. leucomelas* to the south (Fig. 3). *T. frontata* and *T. leucomelas* are known to meet and hybridise in Zambia (Short & Horne 2001). Short & Horne (1988) note that the three species would surely be regarded as conspecific, if only the two morphologically more similar taxa were not separated by the more divergent *T. frontata* (see Fig. 3). To try to explain this apparent biogeographic anomaly, they tentatively propose that *T. frontata* may have extended eastwards to split the formerly adjacent (ie conspecific) *diademata* and *leucomelas*. Such a theory would suggest that the isolated Batéké Plateau *T. frontata*, located north of the western limit of the species current core range, may be an evolutionary relic.

Other birds

The Batéké Plateau, an area of undulating grasslands with limited forest cover, nestled within the general range of the large Congolian rainforest block (Fig. 2), is known to support several other apparently isolated populations of various grassland-woodland bird species otherwise widespread in Africa (Fig. 4). In addition,

several species that are found in (although are not restricted to) miombo woodland in SC Africa have ranges that extend northwards, apparently continuously, to the Batéké Plateau (Fig. 5). A further group of species occurring in the Batéké Plateau have distributions limited to the savannah areas of Central Africa (Fig. 6), and their presence adds to the conservation value of the region (Dowsett-Lemaire 1997, 2001, Christy 2001). They include black-chinned weaver *Ploceus nigrimentum*, Finsch's francolin *Francolinus finschi*, Congo moor chat *Myrmecocichla tholloni* and dambo cisticola *Cisticola dambo*. The distribution maps for these various species (Figs. 4-6) give a useful impression of the types of distributions we can expect from other savannah faunal groups.

Large mammals

Last year a group of researchers based in Copenhagen and Berkley published a review of the phlogeography of 19 African savannah ungulates, based on numerous genetic studies (Lorenzen *et al.* 2012). They illustrate that similar patterns of genetic structuring are present across these taxa, revealing “distinct regional lineages, which reflect the survival and divergence of populations in isolated savannah refugia during the climatic oscillations of the Pleistocene” (Lorenzen *et al.*, 2012). They define two overall continental “areas”, north and south, periodically separated during moist pluvials by the equatorial forest belt. They identify several distinct refugia, grouped within West, East, Southern and South-West Africa. Further, they note that high inter and intra-specific levels of genetic diversity in eastern Africa reflect a history of environmental instability, including periods when populations from the north and

south areas meet, whilst lower levels of genetic diversity in southern Africa are due to long periods of environmental stability in that region. The maps they give on page 3662 illustrate the biogeographic patterns for each of the 19 species examined. In several species a suture zone is indicated in East Africa, where biogeographical lineages meet. One well-known example is the waterbuck, with the ellipsen waterbuck (*Kobus ellipsiprymnus ellipsiprymnus*) occurring from south-east Africa to east Africa east of the Rift Valley, whilst the defassa waterbuck (*K. e. defassa*) occurs from central and east Africa west of the Rift, through to west Africa north of the Guinea-Congolian forest (IUCN 2012). There is an area of overlap in eastern Africa, with genetic studies strongly suggesting hybridization in Nairobi National Park (Lorenzen *et al.* 2006).

While the review by Lorenzen *et al.* (2012) sheds light on these major biogeographical regions, most of the species they deal with do not occur in the savannahs of the Batéké Plateau. Of the three that do, only one had a sample from the approximate area, and that was the buffalo, a species which is in fact more forest dependent than savannah dependent in central Africa. We therefore need to look elsewhere for data on the origins of the large mammal savannah fauna of Gabon and Congo.

The lion (*Panthera leo*) is a good place to start. Once widespread across the forest-savannah mosaic zone of Congo and Gabon (Fig. 7), the lion is now virtually extinct in these two countries (Henschel 2006, 2009). The last reported sightings are from the Batéké Plateau and Odzala National Park (Henschel 2006, 2009; King *et al.* 2006). A pan-African genetic study of lions included a single specimen from Gabon, which



Figure 7. The forest-savannah mosaic of the Lesio-Louna and Lefini Reserves, Batéké Plateau, Congo, taken from Mt. Ngaka looking northwards in 2004. (Photo: T. King)



Figure 8. Defassa waterbuck *Kobus ellipsiprymnus defassa* in The African Experience at The Aspinnall Foundation's Port Lympne Wild Animal Park, Kent, UK. (Photo: Port Lympne Wild Animal Park)



Figure 9. Bushbuck *Tragelaphus scriptus* camera-trapped in the Batéké Plateau National Park, Gabon, January 2013. (Photo: PPG-Gabon / The Aspinall Foundation)



Figure 10. Bush duiker *Sylvicapra grimmia* in the Lesio-Louna Reserve, Congo, October 2005. (Photo: T. King)



Figure 11. Side-striped jackal *Canis adustus* in the Lesio-Louna Reserve, Congo. (Photo: T. King)



Figure 12. Black form of serval *Felis serval* camera-trapped in the Batéké Plateau National Park, Gabon, September 2011. (Photo: Torsten Bohm / The Aspinall Foundation)



Figure 13. Pale form of serval *Felis serval* camera-trapped in the Batéké Plateau National Park, January 2013. (Photo: PPG-Gabon / The Aspinall Foundation)

showed the Gabonese lion to share a mitochondrial DNA haplotype with lions from south-central and south Africa, rather than lions sampled from west, north or east Africa (Barnett *et al.* 2006). Similar evidence linking the region's savannah fauna to that of southern Africa is the formerly widespread occurrence of the southern reedbuck *Redunca arundinum* (Malbrant & Maclachy 1947, 1949), rather than the Bohor reedbuck *Redunca redunca* from north of the Guinea-Congolian forest. Like the lion, the southern reedbuck is also either extinct or virtually so in Congo and Gabon (Henschel 2009; IUCN 2012).

We have not found any studies to shed light on the genetic origins of other near-extinct large savannah mammals of Gabon and Congo, which include defassa

waterbuck, spotted hyena *Crocuta crocuta*, and African wild dog *Lycaon pictus* (Malbrant & Maclatchy 1949; Dowsett & Dowsett-Lemaire 1989; Dowsett & Granjon 1991; Fig. 8). For some of these species, there still may be time find and conserve some remnant groups or individuals (Henschel 2009; Bout *et al.* 2010). Genetic studies of these species, and of other savannah species still present in the Batéké Plateau, such as bushbuck *Tragelaphus scriptus*, bush duiker *Sylvicapra grimmia*, aardvark *Orycteropus afer*, side-striped jackal *Canis adustus* and serval *Felis serval* (Dowsett & Dowsett-Lemaire 1989; King *et al.* 2006; Pearson *et al.* 2007; Figs. 9-13), would provide valuable insights into the relationships between the virtually isolated savannah fauna of Gabon and Congo and that of elsewhere in Africa. In the meantime, we can only rely on observational records. For example, Malbrant and Maclatchy (1947) remarked that the bush duikers of Gabon and Congo appeared to be of the same race as those from Kassai and the north of Angola, the defassa waterbucks were of a form intermediate between *unctuosus* and *penricei*, and the side-striped jackals were of the *lateralis* form.

Implications for restoring the savannah fauna of the Batéké Plateau

The current isolation of the savannah zone of Gabon and Congo from that of West Africa by the Guinea-Congolian forest zone, and from that of the adjacent savannah zones of DRC and Angola by the Congo River, means that population extinctions are very unlikely to be reversible by natural immigration. If reintroduction or reinforcement of large savannah mammals is to be envisaged in the Batéké Plateau, the current evidence we summarise here suggests that the most closely related populations are likely to be those occurring to the south and south-east of Congo and Gabon, rather than those in West or East Africa. However, it would be very helpful to have genetic studies undertaken from Gabonese and Congolese populations of as many savannah species as possible to confirm or challenge this hypothesis. We therefore recommend the collection of appropriate samples from the Lesio-Louna Reserve in Congo, the Batéké Plateau National Park in Gabon, and the coastal savannahs of both countries, for genetic comparison with populations elsewhere in Africa.

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