

Short Note

Birds and biogeography of Mount Mecula in Mozambique's Niassa National Reserve

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The montane forests of northern Mozambique's isolated massifs are inhabited by numerous range-restricted and threatened bird species, but until recently were extremely little-known. We report on a first avifaunal survey of the isolated montane habitats of Mt Mecula (1 442 m), Niassa National Reserve, notable as the only currently protected montane area in northern Mozambique. Mount Mecula's moist forest is small (approximately 136 ha in total) and patchy, and although known botanically to have some montane affinities, was found to support an avifauna more typical of riparian forests of medium to low altitude. The only montane forest species recorded was Lemon Dove *Aplopelia larvata*. Other montane elements included Vincent's Bunting *Emberiza (capensis) vincenti*, one of six species recorded new to the Niassa National Reserve list. Overall, it appears that despite its intermediate location, Mt Mecula does not represent a biogeographical 'stepping stone' for montane forest bird species. This probably owes to its remoteness from the Eastern Arc Mountains of Tanzania to the north and the massifs of other parts of northern Mozambique, to the south and west.

Oiseaux et biogéographie du Mont Mecula dans la réserve nationale de Niassa au Mozambique

Les massifs montagneux isolés du Mozambique septentrional sont peuplés par de nombreuses espèces d'oiseaux menacées et présentant une aire de répartition restreinte, jusqu'à présent très méconnues. Nous rapportons ici une première étude de l'avifaune des habitats isolés du Mont Mecula (1 442 m), dans la réserve nationale de Niassa, constituant actuellement la seule zone montagneuse protégée dans le Nord du Mozambique. La forêt humide du Mont Mecula est petite (136 ha environ) et fragmentée, et bien qu'elle soit connue sur le plan botanique pour avoir des affinités avec les milieux montagnards, elle révèle une avifaune plus typique des forêts riveraines de basses à moyennes altitudes. La seule espèce de forêt montagneuse observée est le Pigeon à masque blanc *Aplopelia larvata*. Les autres éléments montagnards incluent le Bruant de Vincent *Emberiza (capensis) vincenti*, l'une des six espèces nouvellement enregistrées sur la liste de la réserve nationale de Niassa. Globalement, il ressort qu'en dépit de sa localisation intermédiaire, le Mont Mecula ne représente pas une « pierre angulaire » biogéographique pour les espèces aviaires des forêts montagneuses. Cela s'explique probablement par son éloignement des montagnes de l'arc oriental de la Tanzanie, au nord, et des massifs des autres parties du Mozambique septentrional, au sud et à l'ouest.

Keywords: Afromontane forest, island biogeography, Mozambique

Online supplementary material: Supplementary data for this article are available at <http://dx.doi.org/10.2989/00306525.2016.1206041>

Northern Mozambique has a series of isolated montane inselbergs whose avifauna has only fully come to light in the last two decades, owing in part to the civil war which made the area largely inaccessible from the 1970s until the early 1990s. These inselbergs are especially significant because, first, they contribute to a biogeographical link between the highly biodiverse Eastern Arc mountains of Tanzania, and the highlands of Malawi, eastern Zimbabwe and South Africa (Bayliss et al. 2014). Second, they are of increasingly significant conservation importance as the montane and mid-altitude forests of adjacent southern Malawi, in

particular, are degraded or destroyed (Spottiswoode et al. 2008). Recent discoveries of relatively large Mozambican populations of species highly threatened elsewhere, such as the Endangered Thyolo Alethe *Alethe choloensis*, have underscored the conservation importance of this vast region (Spottiswoode et al. 2008; Dowsett-Lemaire 2010). In recent years northern Mozambique's montane forests also have faced rapidly increasing threat from deforestation, particularly at Mt Namuli (Dowsett-Lemaire 2010), in addition to widespread commercial logging in miombo woodlands at lower altitudes (Hervey 2012).

The key highlands of northern Mozambique, which have received particular ornithological research interest in recent years are, in descending order of maximum altitude (see also Figure 1), Mt Namuli at 2 412 m (Vincent 1933; Ryan et al. 1999; Dowsett-Lemaire 2010), Mt Chipirone at 2 054 m (Benson 1950; Spottiswoode et al. 2008), Serra Jeci (also known as the Njesi Plateau) at 1 783 m (Benson 1946; Ryan and Spottiswoode 2003), Mt Mabu at 1 710 m (Spottiswoode et al. 2008; Dowsett-Lemaire 2010; Bayliss et al. 2014), and Mt Inago at 1 706 m (Fishpool and Bayliss 2010). Here we report on a first ornithological survey of Mt Mecula (maximum altitude 1 442 m; 12°05' S, 37°38' E), which also supports patches of moist forest in fire-protected valleys. Timberlake et al. (2004, p. 10) described their flora as indicating that Mt Mecula “appears to be an outlier of the East African highlands. The species composition shows similarities to that of higher altitude moist forests at 1 500 m altitude in Zimbabwe, and medium altitude forests at around 1 000–1 200 m on Mount Selinda and the slopes of the Chimanimani Mountains and Mt Gorongosa”, and noted that its forest is threatened by bushfires.

While Mt Mecula has received botanical (Timberlake et al. 2004) and herpetological (Branch 2003) surveys, previous ornithological study of Mt Mecula has been confined to a brief visit in 2003, published within an annotated bird list of the Niassa National Reserve as a whole (Parker 2005). While a useful baseline, this survey was limited in its coverage of the montane avifauna in particular. A more thorough survey was called for, particularly in view of the mountain's intriguing biogeographical position as the most outlying of the northern Mozambican massifs, potentially linking them to the Eastern Arc mountains and other isolated highland forests of Tanzania (Figure 1). Looking northwards, Mt Mecula is 400 km and 480 km from the nearest highland areas in Tanzania (the Livingstone and Udzungwa Mountains, respectively) that support significant montane forest bird communities, although some species of these habitats also occur at lower altitudes nearer the Tanzanian coast (e.g. the Rondo Plateau, 280 km away) (Baker and Baker 2001). Turning southwards, Mt Mecula is 260 km from Serra Jeci and 370 km from Mt Namuli. At present, Mt Mecula, situated as it is within the Niassa National Reserve, is the only formally protected montane area in northern Mozambique.

Our aims were to estimate the extent of moist forest on Mt Mecula, and to survey the composition of the avifauna of these moist forests and the mountain's other montane habitats, in order to try to shed light on Mt Mecula's biogeographical role within eastern Africa's montane chain. These surveys were undertaken as part of a multidisciplinary investigation of the biodiversity of Mt Mecula (see also Bayliss et al. 2013; Congdon and Bayliss 2013).

We visited Mt Mecula during 5–11 May 2012, including five full days on the top of the mountain, with a base camp in a patch of moist forest at 1 200 m above sea level, directly below the main granite peak on its south-eastern flank. We mist-netted in this forest patch (12°04'57" S, 37°38'05" E) for a total of 195 net-hours over four days, and surveyed other forest patches in the area with binoculars and sound recordings. We also surveyed the higher-altitude scrub vegetation of the inselberg, comprising low, scattered

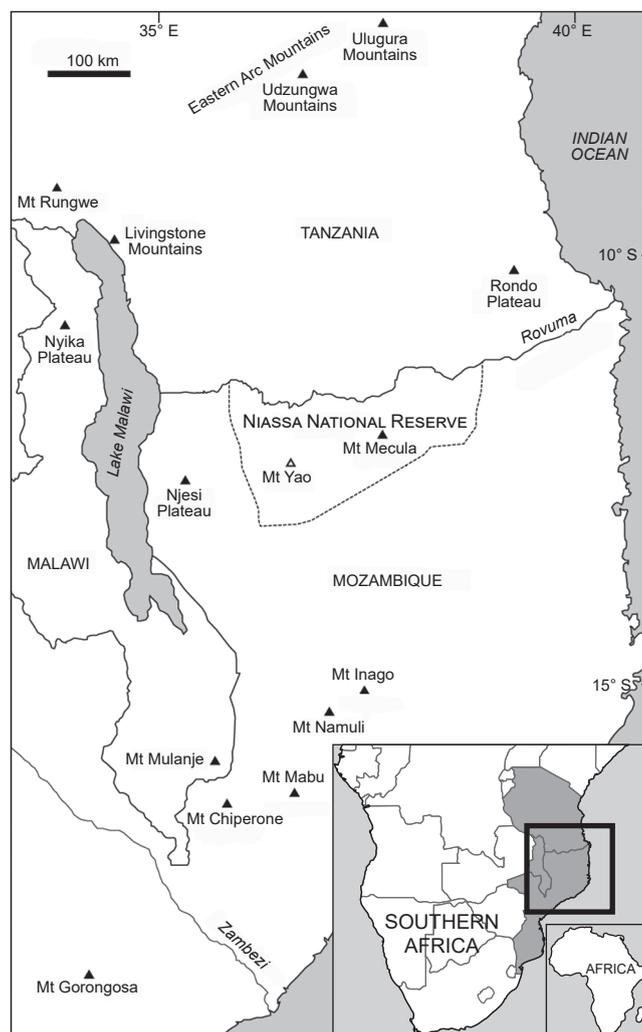


Figure 1: Map showing the position of Mt Mecula (centre) in relation to other areas of montane forest mentioned in the text, and some other notable montane forests in the region (closed triangles). Note that Mt Yao (open triangle) has not been confirmed to support montane forest

trees and various herbs and succulents adapted to the harsh, exposed conditions, punctuated with large areas of exposed rock. Less time was spent in other habitats on the mountain, which principally comprised tall grassland with scattered shrubs, and *Brachystegia*-dominated miombo woodland (Timberlake et al. 2004). We visited additional forest patches on foot in order to ground-truth subsequent estimates of forest area based on satellite data, and then estimated total forest area using satellite imagery provided by Google Earth.

Visits on foot to five separate potential forest patches (ranging in altitude from 992 to 1 370 m) confirmed that they contained moist forest rather than dense woodland, whereas only miombo woodland was encountered below this altitude. We therefore took 1 000 m to be a plausible lower altitudinal bound for moist forest when calculating total forest area from satellite imagery. This generated a total forest area of approximately 136 ha, distributed among

27 forest patches ranging from 0.5 to 34.7 ha in extent. A Google Earth satellite image showing the forest patches measured is reported in Supplementary Information 1.

Mount Mecula's moist forests did not support a typical montane forest bird community. The only truly montane forest species (at these latitudes; Dowsett-Lemaire and Dowsett 2006) we recorded was Lemon Dove *Aplopelia larvata*, of which we mist-netted one individual. Rather, the moist forests were dominated by species typical of riparian forest communities: the most commonly encountered species of the forest edge and interior were Tambourine Dove *Turtur tympanistria*, Crowned Hornbill *Tockus alboterminatus*, Trumpeter Hornbill *Bycanistes bucinator*, Grey-olive Greenbul *Phyllastrephus cerviniventris*, Yellow-bellied Greenbul *Chlorocichla flaviventris*, White-browed Robin-chat *Cossypha heuglini*, Eastern Bearded Scrub-Robin *Cercotrichas quadrivirgata*, Grey-backed Camaroptera *Camaroptera brevicaudata*, Yellow-breasted Apalis *Apalis flavida*, Black-throated Wattle-eye *Platysteira peltata*, Olive Sunbird *Cyanomitra olivacea* and Dark-backed Weaver *Ploceus bicolor*. Also of interest was Crested Guinea-fowl *Guttera edouardi*, of which feathers were found several times and one individual was seen briefly in a forest patch north of our camp, and Green Tinkerbird *Pogoniulus simplex*, which was heard once at the forest edge at 1 300 m.

We recorded 63 bird species from Mt Mecula (full list in Supplementary Information 2). These included one significant range extension of a non-forest montane species: Vincent's (Cape) Bunting *Emberiza (capensis) vincenti* (considered a full species by Fry and Keith 2004, but see Dowsett-Lemaire and Dowsett 2006) was seen on the main peak at c. 1 400 m, as well as on granite outcrops at c. 1 200 m. This taxon occurs mainly in Malawi and is also known from extreme south-western Tanzania (Fry and Keith 2004), but these are the first records from the far north of Mozambique. They are only the second records for the country since those of Vincent (1933), who collected the type series from Zobué on the Malawi border, west of Blantyre, and subsequently others from Mirrote (13°50' S, 39°34' E); the other being its discovery on Mt Inago (15°03' S, 37°24' E) in 2009 (Fishpool and Bayliss 2010).

Other non-forest species of interest included Dark-capped Yellow Warbler *Chloropeta natalensis*, which was seen in rank montane grassland around a seep at the forest edge at c. 1 300 m; Lazy Cisticola *Cisticola aberrans*, very common in grassland and bracken from c. 1 000–1 400 m; and Hildebrandt's Francolin *Pternistis hildebrandti*, common in montane grassland and bush, often interspersed with exposed granite, at c. 1 100–1 300 m. Other common species of the montane grassland included Tawny-flanked Prinia *Prinia subflava*, Variable Sunbird *Cinnyris venustus* (abundant), Red-collared Widow *Euplectes ardens* (abundant), Yellow-fronted Canary *Crithagra mozambicus* and, at the forest edge, Red-backed Mannikin *Spermestes bicolor*. Freckled Nightjars *Caprimulgus tristigma* were flushed several times from exposed rock and heard calling nightly.

The most notable finding of this survey was the lack of a true montane forest avifauna on Mt Mecula, despite its vegetational affinities with medium- to high-altitude forests

elsewhere in Mozambique (Timberlake et al. 2004). We only recorded one true montane species (Lemon Dove). The other species we found are typical of lower-altitude forests, often found along rivers, and which presumably colonised the mountain via these corridors. The current total area of moist forest was estimated to be just 136 ha, distributed over many small and discontinuous patches, although both their size and continuity might have diminished in the last few decades owing to increasingly common anthropogenic bushfires (Timberlake et al. 2004).

The absence of montane forest species on Mt Mecula may be attributable to this relatively small forest area, and/or to its remoteness from other areas of montane forest. The latter seems more likely since island biogeographic research has repeatedly demonstrated that species colonisation rates are more affected by patch distance than size (e.g. Diamond et al. 1976); across the Eastern Arc and associated forests for instance, species richness is unrelated to forest area (Stuart 1981). In another local example, Mt Inago, which is 350 km to the south and is broadly comparable to Mt Mecula in altitude and forest area, does hold several montane forest bird species (Fishpool and Bayliss 2010). However, it is only 50 km from the much larger and (at least historically) more extensively forested Mt Namuli. By contrast, the nearest highland area to Mt Mecula to have a significant montane forest avifauna is Serra Jaci, 265 km to the south-west. The lower Mt Yao (altitude 1 313 m; 12°39' S, 35°16' E) lies between the two, only 128 km to the south-west of Mt Mecula and also within the Niassa National Reserve (Figure 1). However, although pristine, Mt Yao appears to have largely riparian gallery forest and dense miombo woodland (Congdon and Bayliss 2013). Although the mountain still awaits thorough botanical investigation, it is safe to conclude that any montane forest elements there are very limited in extent.

At Mt Mecula, we recorded six species new to the Niassa National Reserve, as compared with the list compiled by Parker (2005). These were Lappet-faced Vulture *Aegypius tracheliotus*, Lemon Dove, Grey-olive Greenbul, Dark-capped Yellow Warbler, Golden Weaver *Ploceus xanthops* and Vincent's (Cape) Bunting. We note that while Grey-olive Greenbul was not previously reported, Placid Greenbul was; we did not see, hear or catch this usually noisy and conspicuous species, suggesting that an identification error may have been previously made. The records of Crested Guinea-fowl are of interest as this species is especially susceptible to hunting pressure (Dowsett-Lemaire 2010). That a population is able to survive in the small forest patches on Mt Mecula suggests that little hunting takes place in them and, indeed, we saw no evidence of it.

In conclusion, Mt Mecula does not support a montane forest avifauna, despite its montane forest vegetation. While it is notable as an important protected area of montane habitat, biogeographically it cannot be considered a stepping stone linking the Eastern Arc mountains of Tanzania to the more southerly montane 'islands in the sky' in northern Mozambique's Niassa and Zambezia provinces. The montane forest chain of Malawi, to the west, remains the more likely biogeographic connection between the two.

Acknowledgements — This survey was funded by a Waitt Grant from the National Geographic Society, with important contributions from the African Butterfly Research Institute (ABRI), Nairobi. We are extremely grateful for permission and logistical support from the Sociedade para a Gestão e Desenvolvimento da Reserva do Niassa Moçambique, and in particular from Madyo Couto, Bruno Guimarães, Quentin Rochat and Anabela Rodrigues. We are also grateful for the good fellowship, expertise and assistance of the other expedition members: Allan Bayliss, Steve Collins, Colin Congdon, Martin Hassan, Issa Lichengue, Malaika Sacranie and Roland van der Ven. We thank Françoise Dowsett-Lemaire and Neil Stronach for helpful discussion.

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