Is Ruspoli's turaco threatened by hybridization with White-cheeked turaco?

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The Ethiopian plateau has two endemic species of turacos, the widespread White-cheeked turaco *Tauraco leucotis*, with two subspecies, and Ruspoli's turaco *Tauraco ruspolii*, restricted to a small range in the southern part of the plateau. The ranges of *T. ruspolii* and *T. leucotis leucotis* abut along a narrow strip of land that makes the northern edge of *T. ruspolii*'s distribution (Figure 1). While White-cheeked turaco is still relatively abundant and therefore not considered a threatened species, Prince Ruspoli's has been of the Red List of globally threatened species for many years.

In 1995, one of us carried out a survey of *T. ruspolii*, concluding that this species was still reasonably common (population size about 10,000 mature individuals), with highest abundances in the north of its small range, of only 7,700 km² (Borghesio & Massa 2000). In 1995, *T. ruspolii* and the closely related *T. leucotis* co-occurred in the same region, but the two species were separated by habitat choice (*ruspolii* in woodland and forest edge, *leucotis* in closed-canopy forest) and no evidence of hybridization was obtained.

In 2002, the first observation of *T. ruspolii* X *T. leucotis* natural hybrids was reported (Lernould & Seitre 2002) together with the hypothesis that hybridization might have been caused by breaking of habitat barriers between the two species due to rapidly occurring habitat destruction. Hybridization might therefore be a new threat to the survival of one of Ethiopia's most charismatic endemic birds.

In 2007-2008 Tolera Kumsa, a student of Addis Ababa University, who worked under our supervision, did a pilot survey in the northern part of *T. ruspolii*'s range, to investigate the co-existence and hybridization of the two species of Ethiopian turacos. Here we briefly summarize Tolera's results and highlight the need for further research on this issue:

1) 374 points were surveyed between November 2007 and March 2008 in an area of approximately 50 x 10 km where the ranges of the two turacos abut (Figure 2)

2) At each point, recordings of the vocalizations of Ruspoli's (PRT) and White Cheeked turaco (WCT) were played for 10 minutes. The playback of recorded calls elicits the vocal response of nearby turacos, allowing their detection. Wild turacos can be very difficult to see when they are silent

3) WCT was contacted at 112 points, PRT at 59 and hybrids at 8 points. For each detection, the distance in meters between the observers and the birds was measured in order to obtain an estimate of the abundance of each species (for a given number of observed individuals, estimated density per unit area increases if detection distances decrease, because the same number of individuals are located in a smaller area)

4) Despite the relatively low number of observations, hybrid turacos were found in the entire study area, suggesting that hybridization is a widespread phenomenon

5) WCT could usually be contacted at much longer distances (average 125 meters from the observer) than PRT (52 meters). This is a consequence of the much louder

calls of WCT compared with those of PRT, and suggests that the apparent higher abundance of WCT (as indicated by the higher number of detections in the counts) is only a consequence of the larger area ((125/52)^2 = 5.8 times larger) where WCT can be detected around the census point. In synthesis, PRT and WCT are still widespread and numerous in the study area

6) Hybrids have by far the shortest detection distances (only 36 m) - suggesting that hybrid birds are difficult to detect and identify. The consequence is that a substantial number of hybrids is probably missed or confused with the pure individuals of either one of the parent species – only those seen at close distances can be reliably identified. Thus, the apparent low prevalence of hybrids (8 individuals in 374 sample points) is with all evidence a substantial under-estimation

7) Habitat selection of WCT, PRT and the hybrids differs. WCT occurs in more forested places than PRT, which instead reached high densities in woodland and along forest edges. Hybrids tend to occur in similar habitats as PRT, but usually with a higher abundance of crops and plantations – suggesting that human-driven habitat change might be one of the causes of hybridization between *T. ruspolii* and *T. leucotis*. Unfortunately, with a sample size of only 8 hybrid observations, this hypothesis is very weak – and much more fieldwork is needed to properly test it. The differences in habitats selections between PRT, WCT and hybrids can be seen in Figure 2, where the study area is shown in infrared satellite visualization (forest is deep red, woodland grey/green and crops pink/pale red). This offers support to the hypothesis that habitat degradation in the area is favouring hybridization between PRT and WCT

In synthesis, the survey yielded a number of interesting – albeit still preliminary - results. First of all, the suggestion that hybrids are widespread and probably abundant in the study area, is worrying and might call for a revision of the conservation status of Ruspoli's turaco. Second, the data seem indeed to suggest that habitat degradation is increasing the chances of hybridization between PRT and WCT. Third, the unusual case of a forest species that is apparently invading the range of a non-forest relative. Needless to say, we would have expected the reverse! How can this happen? And what is the role of human-driven habitat change in this process? A possible explanation is that increasing afforestation with exotic trees (*Eucalyptus* spp, *Cupressus lusitanica*) in the region might have provided *T. leucotis* with "stepping stones" through which this species is invading into the range of its relative.

Unfortunately, the interest of these preliminary conclusions is reduced by the fact that the size of our data sample is very low - with only 8 observations of hybrids no definite conclusion on their prevalence and habitat selection can be reached. Therefore, we believe that a follow up of this survey would be a high priority. We are now working to select a new Ethiopian student at the University of Addis Ababa, to continue the work of Tolera. The task of the new student will be to survey the areas around Kibre Mengist, Zembaba Wiha, Haro Bori and Lolotu that could not be visited by Tolera. These sites represent a gradient of human impacts, from areas where natural vegetation is still largely untouched (Haro Bori and Lolotu) to sites where human impact is strong (vicinities of Kibre Mengist and Zembaba Wiha). This will allow us to test the hypothesis that human impact on habitats is the main driver of hybridization between turacos in southern Ethiopia. Based on this hypothesis, we expect that the prevalence of hybrids should be highest in man-modified habitats (especially where large plantations of exotic tree species are found) and lowest in areas where natural vegetation is still dominant. Finally, the role of plantations of

non-indigenous trees will be specifically looked for, trying to understand if really the expansion of *T. leucotis* outside of the forest might have been facilitated by them.

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References

Borghesio, L., and R. Massa. 2000. Status and conservation of Prince Ruspoli's turaco *Tauraco ruspolii*. Ostrich **71**:355-358.

Lernould, J.-M., and R. Seitre. 2002. Observation d'hybrides naturels entre le Touraco à joues blanches *Tauraco leucotis* et le Touraco du Prince Ruspoli *T. ruspolii*. Alauda **70**:247-251.

Figure 1. Distribution map of the turacos of the Ethiopian plateau

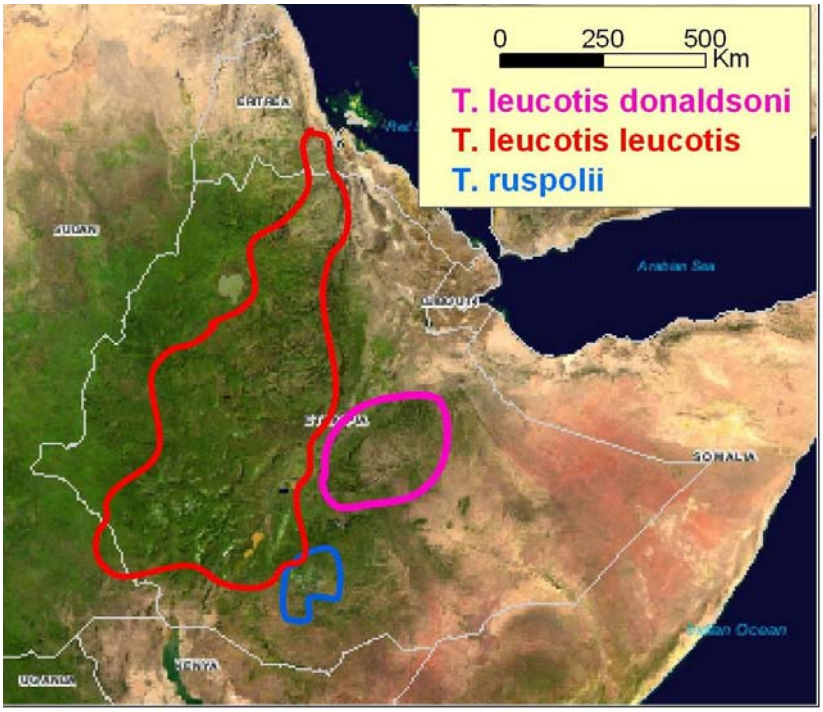

Figure 2. Map of the survey area. In this satellite image, forest appears as deep red, mainly agricultural areas have a pinkish shade, and natural bush/woodland is pale grey