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AVIAN BIOGEOGRAPHY OF THE TAITA HILLS, KENYA

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ABSTRACT

The Taita Hills of south-east Kenya contain three endemic and threatened birds and many other endemic taxa. The area is combined with the Eastern Arc Mountains of Tanzania-Malawi in the latest analysis of centres of endemism in birds. Based on our recent fieldwork and historical records, we analyse the distribution and biogeographical affinities of forest birds within the Taita Hills. We find that the Taita Hills avifauna has been influenced as strongly by the Kenyan Highlands as by the Eastern Arc, especially in the high altitude moist forests. However, since the area is sufficiently differentiated to hold three endemic bird taxa, we feel that it merits consideration as a centre of endemism in its own right. Such recognition will hopefully foster the conservation of the Taita Hills forests and their unique species, before this biodiversity is lost.

[1] All fieldwork on this paper was completed while the authors were at the following address: Ornithology and Entomology Departments, National Museums of Kenya, P.O. Box 40658, Nairobi, Kenya.

INTRODUCTION

Recent taxonomic changes have thrust the forests of the Taita Hills (03°20'S, 38°15'E) of south-east Kenya into conservation infamy, for three of their endemic bird taxa are now considered both full species and globally threatened in *Birds to Watch 2* (Collar *et al.*, 1994). The high level of endemism in the Taita Hills for many other taxa (*e.g.* at least 13 endemic plants, one snake, two amphibians and three butterflies) is also well known (Beentje, 1987). BirdLife International does not consider the Taita Hills to be an EBA (*i.e.*, an 'Endemic Bird Area' holding two or more species with restricted ranges of $<50{,}000$ km^2) in their own right, however, because of taxonomic uncertainties. Instead they are combined with the Tanzania-Malawi Mountains EBA, the 'Eastern Arc' (Stattersfield *et al.*, 1998). This is in spite of the decision rule that potential EBAs should only be combined if doing so adds more restricted-range species than the EBA with fewer restricted-range species holds alone (Stattersfield *et al.*, 1998). This is not the case here. The object of this study is to assess the biogeography of the forest birds of the Taita Hills, in order to provide a background for current conservation work.

METHODS

We surveyed birds in nearly all of the remaining forests of the Taita Hills in July and August 1996. This was part of a broader National Museums of Kenya/University of Tennessee project assessing times for bird extinctions to occur following deforestation. Fieldwork in each site comprised extensive surveys with the aim of locating every bird species present, intensive standardised mist-netting (ringing schedules filed with the East African Natural History Society) and surveys of the structure and composition of the forests (Wilder *et al.* this volume). Full details of these surveys can be found in Brooks *et al.* (1998). Fieldwork has been ongoing in 1997 by the joint University of Antwerp/National Museums of Kenya/Kenyatta University Project. We also carried out a comprehensive literature search and review of museum specimens.

RESULTS

In table 1 we summarise the current distribution of the 48 species of forest birds known from the Taita Hills. Our definition of forest specialist (F) and generalist (FF) species follows Bennun *et al.* (1997). For taxonomy and systematic order we generally follow Zimmerman *et al.* (1996), with three exceptions. For *Andropadus nigriceps*, we follow Roy (1997), who showed that the northern taxa in this group (*nigriceps*, *usambarae* and *kikuyensis*) belong to a clade that is evolutionarily distinct from *neumanni*, *chlorigula* and *fusciceps* of the southern Eastern Arc. For *Apalis fuscigularis* and *Zosterops silvanus* we follow Collar *et al.* (1994), although we recognise that the taxonomy of all three Taita Hills endemic bird species is undecided and requires thorough revision.

Two—*Turdus helleri* (Mearns, 1913), and *Zosterops silvanus* (Peters & Loveridge, 1935)—were originally described as full species. The third was described as the subspecies *Apalis murina fuscigularis* (Moreau, 1937). *T. helleri* and *Z. silvanus* were subsequently synonomised as *T. olivaceus* and *Z. poliogaster* respectively, while the apalis was moved into

Table 1. Current distribution of forest birds within the Taita Hills. Our sites are 1—Sagalla, 2—Ronge, 3—Mbololo, 4—Ngangao, 5—Chawia, 6—Fururu, 7—Vuria, and 8—Mwachora. We take distributional data from Brooks et al. *(1998) with additional records from 1997 marked* 1. *Historical records, including* Accipiter rufiventris *and* Andropadus nigriceps *for which no specific localities are known, are in parentheses and Taita Hills endemic taxa are marked *. Widespread species are marked* W, *those with affinities to the Kenyan Highlands* K, *and those with affinities to the Tanzanian Eastern Arc* T. *Forest dependence scores are from Bennun* et al. *(1997).*

Sites Species (and Forest Dependence)	1	2	3	4	5	6	7	8
Macheiramphus alcinus F				(W)				
Circaetus fasciolatus F					T			
Accipiter tachiro F		W	W	W	W		W	
Accipiter rufiventris F—(K)								
Accipiter melanoleucos F	W		W	W	W	W		
Buteo oreophilus FF			K	K	K			
Stephanoaetus coronatus FF			W	W	W	W		W
Guttera pucherani F		W	W[1]					
Turtur tympanistra F	W	W		W				
Aplopelia larvata FF	W	W	W	W	W			
Tauraco hartlaubi FF		K	K	K	K	K	K	
Chrysococcyx cupreus F			(K)				K	
Strix woodfordii F		W	W	W	W			
Schoutendenapus myoptilus F					K			K[1]
Bycanistes brevis F		W	W	W	W			
Stactolaema leucotis F				(T)				
Pogoniulus leucomystax FF				W				
Andropadus nigriceps FF—(K)								
Andropadus milanjensis FF		T	T	T	T	T		
Phyllastrephus cerviniventris F	T	T						
Phyllastrephus cabanisi FF	K	K	K	K	K	K		
Chlorocichla flaviventris F	T	T						
Nicator gularis F	T							
Pogonocichla stellata F	W	W	W	W	W	W	W	W
Cossypha natalensis F	W							
Cossypha semirufa F	K	K	K	K	K	K		K
Zoothera gurneyi FF			T	T				
Turdus helleri FF*			W	W	W			
Muscicapa adusta F			W	W	W			
Muscicapa caerulescens F	(T)			T				
Phylloscopus ruficapillus F			T	T	T			
Bradypterus lopezi FF				W	W	W	W	
Apalis melanocephala FF*	T				T	T		
Apalis fuscigularis FF				T	T	T	T	
Platysteira peltata F	W							
Trochocerus albonotatus FF				(W)				
Trochocerus cyanomelas FF	T	T						
Zosterops silvanus F*		K	K	K	K	K	K	K
Malaconotus nigrifrons FF				(W)				
Malaconotus quadricolor FF	(T)							
Dryoscopus cubla F		W	W	W	W			
Cinnyricinclus femoralis FF					K			
Cinnyricinclus sharpii FF				K	K			
Anthreptes collaris F	(W)	W	W					
Nectarinia olivacea FF	W	W	W	W	W	W	W	W
Nectarinia mediocris F				W	W		W	
Mandingoa nitidula FF	W	W	W	W	W	W	W	
Hypargos niveoguttatus F	T	T						
Current totals	16	20	22	27	27	13	10	6

A. thoracica (*e.g.* Hall & Moreau, 1970). These treatments stood as recently as the publication of Sibley & Monroe (1990). However, Zimmerman *et al.* (1996) considered *T. helleri* a full species, and Collar *et al.* (1994) regarded all three as full species.

We group species into three categories of biogeographical affinity, following Hall & Moreau (1970) and Snow (1978). These are widespread (W); the Kenyan highlands and other volcanic mountains to the north and west with only small peripheral populations extending south (K); and the ancient Eastern Arc mountains of Tanzania and southwards with only small, peripheral populations extending to the north (T). Stuart *et al.* (1993) named these latter groups the Central East African Mountains and the East Coast Escarpment respectively. The aim of these classifications is to reflect likely origin rather than details of current distribution. We therefore consider *Buteo oreophilus*, *Tauraco hartlaubi*, *Chrysococcyx cupreus*, *Schoutendenapus myoptilus* and *Phyllastrephus cabanisi*, despite outlying populations in the Eastern Arc, to be K-species. Conversely, we consider *Stactolaema leucotis*, *Phyllastrephus cerviniventris*, *Chlorocichla flaviventris*, *Zoothera gurneyi*, *Apalis melanocephala*, *Trochocerus cyanomelas* and *Hypargos niveoguttatus*, despite outlying populations in the Kenyan Highlands, to be T-species. For the endemics, we give biogeographical affinity to most closely related species.

Our sites fall into three areas within the Taita Hills: Sagalla, at 1,500 m (1, Sagalla-4 ha); Mbololo, at 1,200–2,200 m (2, Ronge-1 ha; and 3, Mbololo-200 ha); and Dabida, at 1,400–2,200 m (4, Ngangao-92 ha; 5, Chawia-50 ha; 6, Fururu-5 ha; 7, Vuria-1 ha; and 8,

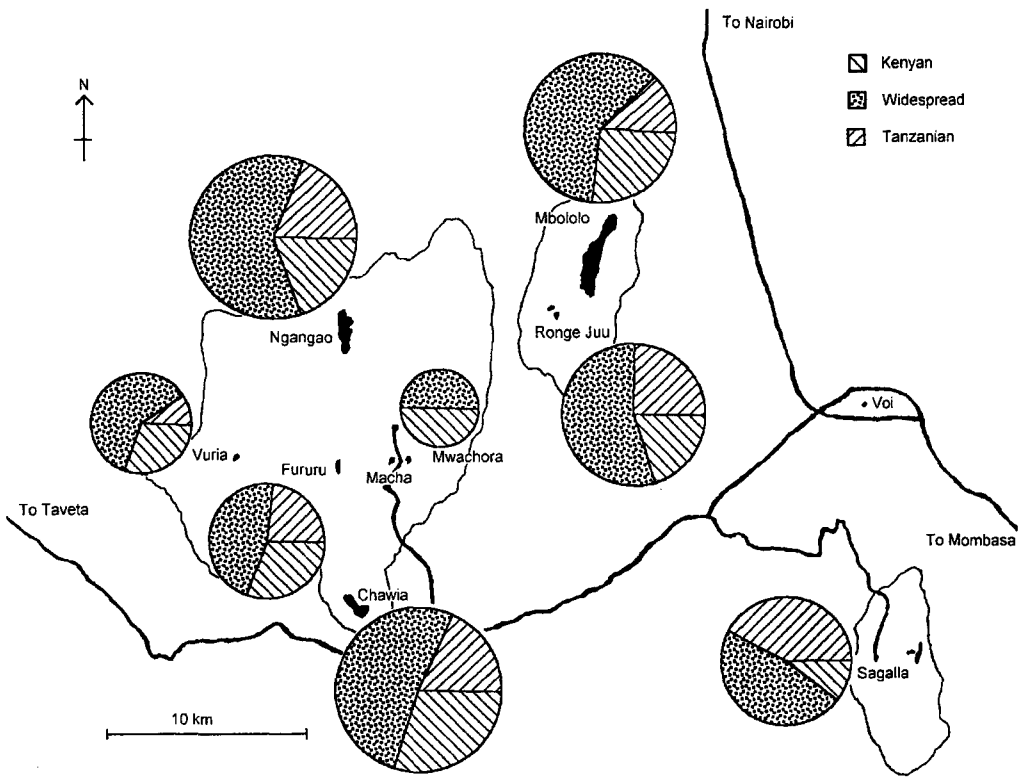

Figure 1. Distribution and biogeographical affinities of the Taita Hills forest birds. Pie-chart diameters are proportional to the total numbers of species known from each site.

Mwachora-2 ha). The distribution of sites and the biogeographical affinities of the forest species found in these sites are illustrated in figure 1.

DISCUSSION

Overall, 23 % of the forest birds of the Taita Hills have affinities with the avifauna of the Kenyan highlands, 29 % with the Eastern Arc of Tanzania, and 48 % are widespread. These proportions are similar for both forest specialists and generalists. However, six of the species of southern origin are found only in the low altitude drier forests of Ronge and Sagalla and not in the moist forest of the Taita Hills peaks (table 1). These forests, by contrast, hold rather higher proportions of species with affinities to the northern volcanic highlands (figure 1). We therefore suggest that the biogeographic affinities of the Taita Hills lie equally with the Kenyan Highlands and with the Eastern Arc. This contention is supported by the fact that the Taita Hills (and the Pare Mountains, immediately to the south), although geologically part of the Eastern Arc, resemble the Kenyan Highlands in ecoclimatic parameters (Fjeldså *et al.*, 1997).

In conclusion, we would strongly recommend that in future analyses, the Taita Hills are neither lumped with the Eastern Arc nor with the Kenyan Highlands. If we consider the three Taita Hills endemic birds to be full species, then the area holds more restricted-range species than would be added by combining it with either the Eastern Arc or the Kenyan Highlands. While their biogeography has clearly been strongly influenced by both regions, they are a centre of endemism distinct from either, as suggested by Stuart *et al.* (1993). The degree of subspeciation within the rest of the Eastern Arc forests may suggest that many of these forests should also be considered distinct centres of endemism. Cluster analysis, however, shows the Taita Hills as distinct from all of the rest of the Eastern Arc forests (Stuart *et al.*, 1993). A crucial task is now to preserve the remaining high altitude forests of the Taita Hills to prevent this uniqueness from being lost forever.

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