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Short communication

A SURVEY ON BIRDS OF THE YAYU FOREST IN SOUTHWEST ETHIOPIA

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ABSTRACT: A survey of birds in the Yayu forest, southwest Ethiopia, was conducted between August and December 2009. Timed Species Count (TSC) method was used. The survey was conducted in seven selected sampling blocks, each with an area of 0.5 km^2. The blocks were representative of vegetation types (afromontane forest, transitional rain forest and riverine forest) and conservation zones (core, buffer and transition). A total of 112 bird species were recorded. Species composition of birds showed significantly higher number during the wet season than the dry season. The number of bird species records of the seven blocks also showed significant difference. The study reinforces the designation of the Yayu forest as a biodiversity hotspot and it is recommended that ongoing conservation and biodiversity documentation efforts should continue.

Key words/phrases: Birds, diversity, Ethiopia, survey, Yayu

INTRODUCTION

The Yayu forest is one of three intact forests in southwest Ethiopia proposed to serve as *in-situ* conservation sites for wild coffee (*Coffea arabica* L.) gene pool. The other two proposed forests are Birhane-Kontir and Boginda-Yeba (Demel Teketay *et al.,* 1998 cited in Tadesse Woldemariam, 2003). The conservation of wild coffee in the three natural forests mentioned above needs to be carried out as a comprehensive conservation endeavour of the entire ecosystem as a whole (Tadesse Woldemariam, 2003). As a first step in the conservation activity of wild coffee in the Yayu forest, a large-scale vegetation study of the forest has been conducted (Tadesse Woldemariam, 2003). The study documented 220 species of vascular plants from an area of 100 km^2 intact forest.

The present study can be considered as a phase in the overall conservation undertaking of the Yayu forest in general and wild coffee in particular. It was aimed at surveying the avian diversity of the forest.

THE STUDY AREA AND METHODS

The study area

The Yayu forest is located about 560 km from Addis Ababa in southwest Ethiopia within the Illubabor Zone of Oromia Regional State. It lies between 8°21′–8°26′N latitude and 35°45′–36°3′E longitude within an altitudinal range of 1200–2000 masl. The study area is divided into three conservation zones, which differ in levels of conservation priority. In the core zone, no human activity is allowed; in the buffer zone some economic activities like collection of forest resources, including coffee, is allowed while the transition zone is the least restrictive and most accessible which allows free human activities including cultivation of crops (Tadesse Woldemariam, 2003).

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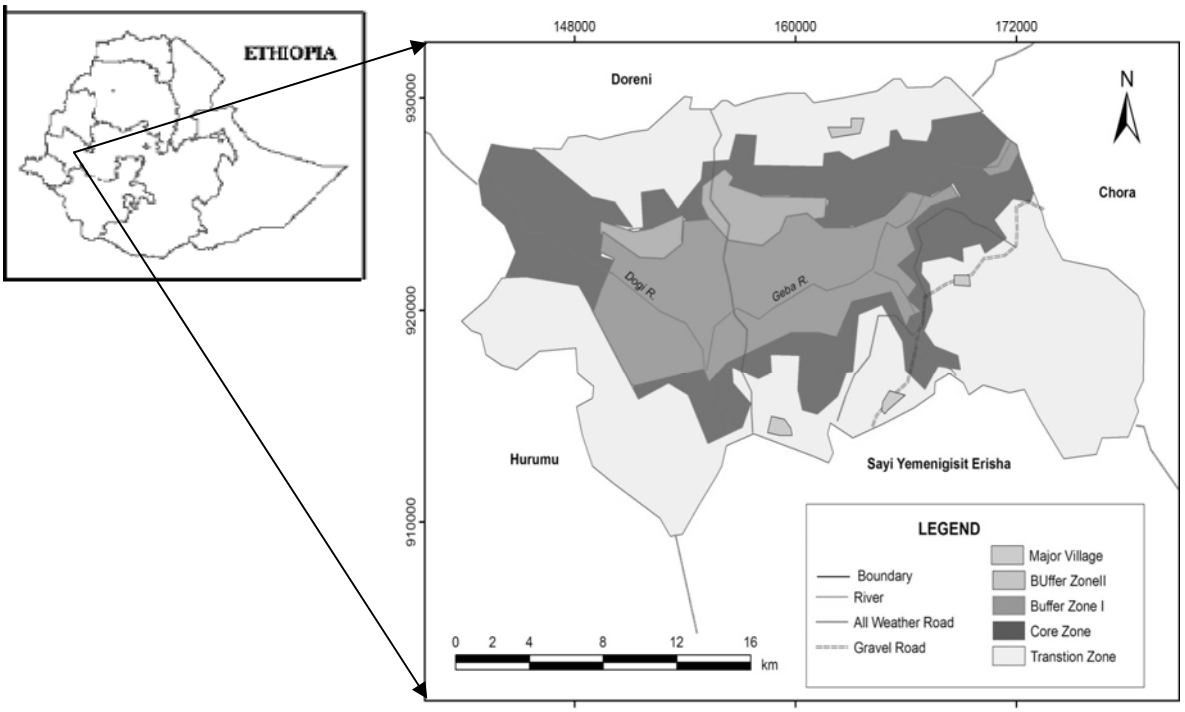

Fig. 1. Map of the study area.

Methods

Seven sampling blocks, each having a total area of 0.5 km^2, were selected. Selection was conducted in such a way that different elevation, vegetation and conservation zones could be included (Table 1).

Timed Species Count (TSC) method (Bibby *et al.*, 1998) was used with slight modifications. Surveys were conducted at selected hours of the day where activity of birds is maximum; 7:00–10:00 am (morning) and 3:00–6:00 pm (afternoon). The sampling blocks were surveyed once in the dry and wet season. The researcher walks randomly in the sampling block during each of the 6 hr data recording sessions of the morning and afternoon. A score of 6 was given to the bird species encountered first. Then an interval of 10 minutes was allowed before the second recording. The bird species encountered next was given a score of 5. In a similar way, new recordings were made in 10 minute intervals for one hour giving 1 point less for consecutive encounters. Each species was scored only once in the one hour period. In the next hour the scoring started all over again giving maximum points to the first species. At the end, the mean hourly encounter score (mean hourly abundance index) of each species was calculated by dividing the sum of scores by the total number of hours of observation *i.e.*, 6. For each sampling block, the three most abundant species in each season were determined based on their mean hourly abundance index values. Birds were identified in part using local assistants (for local names) and a field guide book (Ian and Peter, 2003).

The research was carried out in two sampling phases representing the wet (August 2009) and dry (December 2009) season.

Table1. Sampling blocks and their elevations, geographic coordinates and vegetation type and conservation zone categories.

Sampling block	Elevation (m)	Coordinates	Forest type	Conservation zone
Saki	1298–1325 m	08°21′N and 035°46′E	Riverine	Core
Geba	1476–1489 m	08°21′N and 035^{0}47′E	Riverine	Core
Geba-Dureni	1335–1458 m	08°22′N and 035°47′E	Transitional rainforest	Core
Wotetie	1490–1534 m	08°23′N and 035°53′E	Transitional rainforest + Afromontane forest	Core
Megela	1260–1385 m	08°21′N and 035°49′E	Transitional rainforest	Buffer
Mesengo	1252–1271 m	08°23′N and 035°48′E	Transitional rainforest	Buffer
Wabo	1373–1486 m	08°22′N and 035°54′E	Transitional rainforest	Transition

Statistical analysis

Species diversity between vegetation types and conservation zones were compared using independent sample *t*-test while avian diversity between the sampling blocks was compared using one-way ANOVA. Post-hoc test was conducted using the least significant difference (LSD) analysis on SPSS version 17.0. The 95% level of significance was used.

RESULTS

A total of 112 species of birds, which belonged to 37 families, were recorded (Appendix 1). Of these, 15 and 11 were Palearctic and Intra-African migrants, respectively. One endemic species, thick-billed raven (*Corvus crassirostris*), was also recorded.

The number of species recorded during the wet season was significantly higher than the dry season ($p<0.05$) (Fig. 2).

The number of species recorded in each sampling block showed significant difference when data were combined for both seasons ($F=4.784$; $p<0.05$). The highest mean number of species was recorded for Wabo and the least for Wotetie block (Fig. 3).

The mean ± SD number of species per sampling block in the core and buffer zones was 21.25 ± 5.49 and 27 ± 3.91, respectively and the difference was not statistically significant ($F=0.632$; $P>0.05$). Similarly, the mean ± SD number of species per sampling block in the riverine and transitional rainforest was 25 ± 3.69 and 26.25 ± 6.22, respectively and the difference was not statistically significant ($F=1.905$; $p>0.05$).

The three most abundant species for each habitat type are given in Table 2.

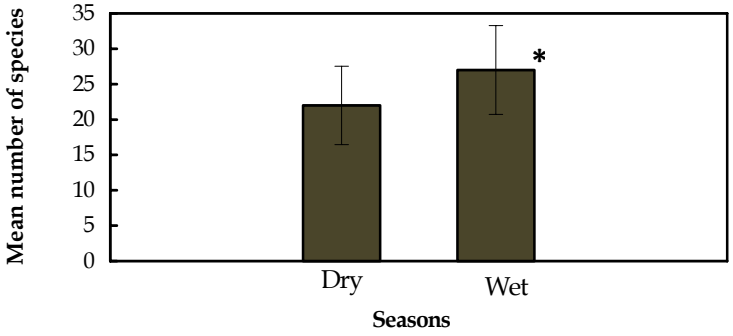

Fig. 2. Number of bird species (mean ± SD) recorded in the dry and wet seasons (*=values significantly different, p<0.05).

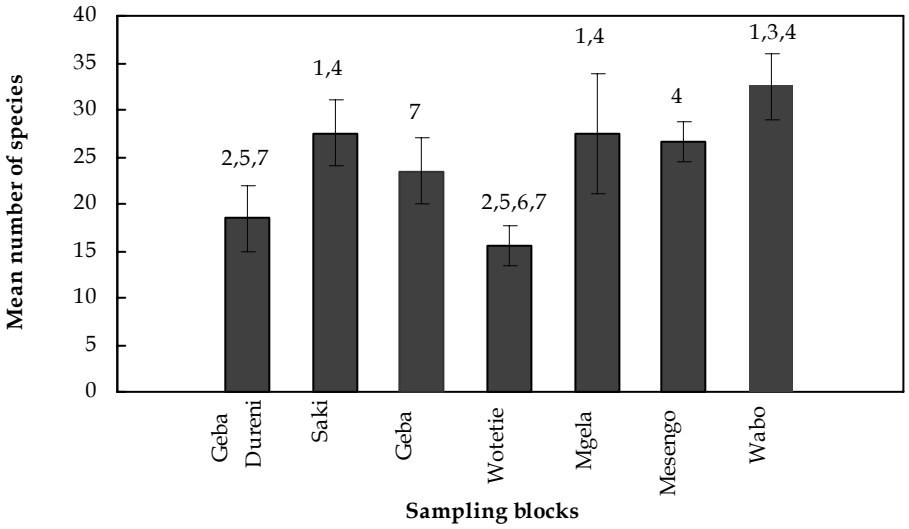

Fig. 3. Number of bird species (mean ± SD) recorded for each sampling block (Numbers on top of bars indicate the particular block with which there is significant difference; p<0.05); 1 = Geba Dureni, 2= Saki, 3 = Geba, 4= Wotetie, 5 = Megela, 6 = Mesengo, 7 = Wabo).

Table 2. Three most abundant bird species for each habitat type (abundance index values in parenthesis).

Habitat type (Sampling block)	Season	Three most abundant species	Scientific name
Saki	Wet	1st Scarlet-chested sun bird (2.3)	*Nectarina senegalensis*
		2nd Common swift (1.7)	*Apus apus*
		3rd Fan-tailed raven (1.5)	*Corvus rhipidurus*
	Dry	1st Glossy ibis (3.5)	*Plegadis falcinellus*
		2nd White wag-tail (1.3)	*Motacilla alba*
		3rd Fan-tailed raven (1.2)	*Corvus rhipidurus*
Geba	Wet	1st Glossy ibis (2.0)	*Plegadis falcinellus*
		1st Semi-collard flycatcher (2.0)	*Ficedula semitorquata*
		3rd Black cuckoo (1.8)	*Cuculus clamosus*
	Dry	1st Tawny pipit (3.3)	*Anthus campestris*
		2nd Erlanger's lark (3.0)	*Calandrella erlangeri*
		3rd Semi-collard flycatcher (1.7)	*Ficedula semitorquata*
Geba Dureni	Wet	1st Garden bulbul (4)	*Pycnonotus barbatus*
		2nd Spectacled weaver (3.2)	*Ploceus ocularis*
		3rd Richard's pipit (1.5)	*Anthus richardi*
	Dry	1st Tree pipit (2.5)	*Anthus trivialis*
		1st Icterine warbler (2.5)	*Hippolais icterina*
		3rd Ruppel's weaver (2.3)	*Ploceusgalbula*
		3rd Common fiscal shrike (2.3)	*Lanius collaris*
Wotetie	Wet	1st Tawny pipit (3.7)	*Anthus campestris*
		2nd Red throated pipit (2.3)	*Anthus cervinus*
		3rd Common fiscal shrike (2.7)	*Lanius collaris*
	Dry	1st Black bulbul (4.5)	*Hypsipetes leucocephalus*
		2nd Icterine warbler (2.8)	*Hippolais icterina*
		3rd Common fiscal shrike (2.7)	*Lanius collaris*
Megela	Wet	1st Red-throated pipit (1.8)	*Anthus cervinus*
		2nd Tawny pipit (1.5)	*Anthus campestris*
		2nd Fan-tailed raven (1.5)	*Corvus rhipidurus*
	Dry	1st White-necked raven (2.2)	*Corvus albicollis*
		2nd Thick-billed raven (1.7)	*Corvus crassirostris*
		3rd Long-tailed cormorant (1.5)	*Phalacrocorax africanus*
Mesengo	Wet	1st Fan-tailed raven (2.2)	*Corvus rhipidurus*
		2nd African fish eagle (2.0)	*Haliaeetus vocifer*
		3rd Woolly-necked stork (1.8)	*Ciconia episcopus*
	Dry	1st Kittlitz's plover (2.3)	*Charadrius pecuarius*
		2nd African black crow (2.2)	*Corvus capensis capensis*
		3rd Woolly-necked stork (1.7)	*Ciconia episcopus*
Wabo	Wet	1st Red-eyed dove (2.0)	*Streptopelia semitorquata*
		2nd Tawny eagle (1.7)	*Aquila rapax*
		2nd Lappet-faced vulture (1.7)	*Aegyptius tracheliotus*
	Dry	1st African paradise flycatcher (1.8)	*Terpsiphone viridi*
		2nd African mourning dove (1.5)	*Streptopelia decipiens*
		2nd Cape-turtled dove (1.5)	*Streptopelia turtur*
		2nd Spectacled pigeon (1.5)	*Columba guinea*

DISCUSSION

The present study surveyed the diversity of birds in one of the intact forest fragments of southwest Ethiopia. The Yayu forest is valued for its wealth of biodiversity that is evident by its designation as a bio-sphere reserve by UNESCO (2010). The forest also has agronomical significance due to its high wild coffee (*Cofea arabica*) gene pool. As a result, it has received high level conservation priority (Hindorf *et al*., 2010). The present study aimed to contribute towards the overall conservation of the forest biodiversity.

The results showed that the avian diversity within vegetation types (transitional rainforest vs. riverine forest) and conservation zones (buffer vs. core zones) did not show significant differences. This indicates that the different vegetation and conservation categories of the Yayu forest have comparable diversity of birds. Therefore, they should be given equivalent conservation attention. On the other hand, avian species composition within the seven sampling blocks showed significant differences. This could be due to floristic diversity of the sampling blocks. Fleishman *et al.* (2003) reported a correlation between vegetation and avian species diversity. It should be particularly noted that Wabo block, which is located within the transitional conservation zone (with the least conservation priority), had the highest records of avian species. As these results indicate, further conservation planning of the forest should give due consideration to such parts of the forest.

The study also documented the three most common and abundant avian species for each sampling area. The data will have practical importance in monitoring of biodiversity. Birds are known to be bio-indicators of the overall ecological status of a given wildlife reserve. The most common and abundant species (focal species) are used to monitor any significant disturbance of the ecological balance of a natural area. This is why knowledge in population size is valued for its importance in conservation practices (Johnson, 1980; Padoa-Schioppa *et al*., 2006). Therefore, biodiversity monitoring of the Yayu forest should also include the distribution and abundance of the three most common and abundant focal species determined for each sampling block in the present study.

The number of bird species recorded during the wet season was significantly higher than the dry season. The wet season coincides with the summer of the northern hemisphere where Palearctic migrants return to their breeding sites. In this regard the number of species is expected to show the opposite pattern (*i.e,*. low during the wet season and high during the dry). A possible explanation to this contradiction could be the occurrence of an increased local migration to the study area during the wet season. It has been reported that seasonal variation in the availability of food governs bird species composition (Malizia, 2001). Therefore, it could be possible that the Yayu forest food resources become plenty and attractive during the wet season resulting in substantial local migration of birds.

In conclusion, the present study indicates that the Yayu forest has rich avian diversity and that its conservation and biodiversity documentation efforts should continue uninterrupted.

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Appendix 1. Species of birds recorded during both seasons: ♠ Palearctic migrant, ◙ Intra-African migrant, ♥ Endemic

Family	Common name	Scientific name
Zosteropidae	Abyssinian (White-Breasted) Eye	*Zosterops abyssinicus*
	African Yellow White-Eye	*Zosterops senegalensis*
	Montane White-Eye	*Zosterops poliogastrus*
Pittidae	African (Grassveld) Pipit ◙	*Anthus cinnamomeus*
	Plain-Backed Pipit	*Anthus leucophrys*
	Red-Throated Pipit ♠	*Anthus cervinus*
	Richard's Pipit	*Anthus richardi*
	Tawny Pipit ♠	*Anthus campestris*
	Tree Pipit ♠	*Anthus trivialis*
Corvidae	African Black Crow	*Corvus capensis*
	White-Necked Raven	*capensis*
	Cape (Black) Crow	*Corvus albicollis*
	Thick-Billed Raven ♥	*Corvus capensis*
	Fan-Tailed Raven	*Corvus crassirostris*
	Pied Crow	*Corvus rhipidurus*
		Corvus albus
Rallidae	Common Moorhen	*Rougetius rougetii*
Fringillidae	Streaky Seedeater	*Serinus striolatus*
Malaconotidae	Tropical Boubou	*Laniarius aethiopicus*
Oriolidae	African Black Headed Oriole	*Oriolus larvatus*
Muscicapidae	African Hill Babbler	*Pseudoalcippe*
	Eurasian Reed-Warbler	*abyssinica*
	(European) Marsh-Warbler ♠	*Acrocephalus*
	Icterine Warbler ♠	*scirpaceus*
	Sedge-Warbler ♠	*Acrocephalus palustris*
	Semi-Collared Flycatcher ♠	*Hippolais icterina*
	Ruppell's Robin-Chat	*Acrocephalus*
	African Paradise-Flycatcher ◙	*schoenobaenus*
		Ficedula semitorquata
		Cossypha semirufa
		Terpsiphone viridi
Motacillidae	African Pied Wagtail	*Motacilla aguimp*
	White Wagtail ♠	*Motacilla alba*
	Grey Wagtail ♠	*Motacilla cinerea*
	Yellow Wagtail	*Motacilla flava*
Hirundinidae	Brown-Throated (Plain) Martin	*Riparia paludicola*
	Lesser Striped Swallow ◙	*Hirundo abyssinica*
	Sand Martin (Bank Swallow) ♠	*Riparia riparia*
	Wire-Tailed Swallow	*Hirundo smithii*
Pycnonotidae	Common Bulbul	*Pycnonotus barbatus*
	Dark-Capped (Black-Eyed) Bulbul	*Pycnonotus tricolor*
	Black Bulbul	*Hypsipetes*
	Garden Bulbul	*leucocephalus*
		Pycnonotus barbatus
Ploceidae	Yellow-billed waxbill	*Ploceus melanocephalus*
	Lesser Masked Weaver	*Ploceus intermedius*
	Ruppell's Weaver	*Ploceus galbula*
	Spectacled Weaver	*Ploceus ocularis*
	Village Weaver	*Ploceus cucullatus*
Campephagidae	Common Fiscal Shrike	*Lanius collaris*
	Gray-Backed Fiscal Shrike	*Lanius excubitoroides*
Paridae	White-Winged Black Tit	*Parus leucomelas*
Columbidae	Red-Eyed Dove	*Streptopelia*
	African Mourning Dove	*semitorquata*
	European Turtle-Dove ♠	*Streptopelia decipiens*
	Cape Turtle-Dove	*Streptopelia turtur*
	Emerald-Spotted Wood-Dove	*Streptopelia turtur*
	Ring-Necked Dove	*Turtur chalcospilos*
	Speckled Pigeon	*Streptopelia capicola*
		Columba guinea
Remizidae	White-Shouldered Black Tit	*Parus guineensis*
Ciconiidae	African Open-Billed Stork ◙	*Anastomus*
	Red-Billed Teal (R-B Duck)	*lamelligerus*
	Black Stork ♠	*Anas erythrorhyncha*
	Woolly-Necked Stork ◙	*Ciconia nigra*
	Yellow-Billed Stork ◙	*Ciconia episcopus*
		Mycteria ibis

Appendix 1. (contd).

Family	Common name	Scientific name
Pteroclididae	Yellow-Throated	*Pterocles gutturalis*
	Sandgrouse	
Charadriidae	Egyptian Plover	*Pluvianus aegyptius*
	Kittlitz's Plover	*Charadrius pecuarius*
	Three-Banded Plover	*Charadrius tricollaris*
Accipitridae	Black Kite ♠	*Milvus migrans*
	Black-Chested Snack-Eagle	*Circaetus pectoralis*
	Black Shouldered Kite	*Elanus caeruleus*
	Brown Snake Eagle	*Circaetus cinereus*
	Lappet-Faced Vulture	*Aegyptius tracheliotus*
	Long-Crested Eagle	*Lophaetus occipitalis*
	Tawny Eagle	*Aquila rapax*
	Yellow-Billed Kite ◙	*Milvus aegyptius*
	African Fish-Eagle	*Haliaeetus vocifer*
	African Harrier Hawk	*Polyboroides typus*
Phalacrocoracidae	White-Breasted Cormorants	*Phalacrocorax lucidus*
	Long-Tailed Cormorant	*Phalacrocorax africanus*
Emberizidae	African Citril Canary	*Serinus citrinelloides*
Coliidae	Blue-Naped Mousebird	*Urocolius macrourus*
	Speckled Mouse Bird	*Colius striatus*
Meropidae	Blue-Breasted Bee-Eater	*Merops variegates*
	Carmine Bee-Eater	*Merops nubicus*
	Little Bee-Eater	*Merops pusillus*
	Northern Carmine Bee-Eater	*Merops nubicus*
	Red-Throated Bee-Eater	*Merops bulocki*
	White-Throated Bee-Eater ◙	*Merops* albicollis
Trogonidae	Narina's Trogon	*Apaloderma narina*
Bucerotidae	Silvery-Cheeked Hornbill	*Bycanistes brevis*
Apodidae	Common Swift ♠	*Apus apus*
	Pallid Swift ♠	*Apus pallidus*
Indicatoridae	Green-Backed Honey Bird	*Prodotiscus*
Zambesiae	Cassin's Honeybird	*Prodotiscus insignis*
	Lesser Honeyguide	*Indicator minor*
	Scaly-Throated Honeyguide	*Indicator variegates*
	Greater Honeyguide	*Indicator indicator*
Coraciidae	Broad-Billed Roller ◙	*Eurystomus glaucurus*
Threskiornithidae	Hadada Ibis	*Bostrychia hagedash*
	Glossy ibis	*Plegadis falcinellus*
Ardeidae	Grey Heron	*Ardea cinerea*
	Black- Headed Heron	*Ardea melanocephala*
Cuculidae	Blue-Headed Coucal	*Centropus monachus*
	Senegal Coucal ♠	*Centropus senegalensis*
	White-Browed Coucal	*Centropus superciliosus*
	Black Coucal ◙	*Centropus grillii*
	Black Cuckoo ◙	*Cuculus clamosus*
Strigidae	African Wood-Owl	*Strix woodfordii*
Nectariniidae	Variable Sunbird	*Cinnyris venustus*
	Scarlet Chested Sunbird	*Nectarinia senegalensis*
	Tacazze Sunbird	*Nectarinia Tacazze*
Alaudidae	Erlanger's Lark	*Calandrella erlangeri*
	Red-Winged Lark	*Mirafra hypermetra*
	Flappet Lark	*Mirafra*
		rufocinnamomea
Dicruridae	Fork-Tailed Drongo	*Dicrurus adsimilis*