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Breeding phenology and morphology of some forest birds in Benin and Nigeria

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Summary

In three rainforest patches in Nigeria and one in the Republic of Benin during 2017–2019, we mist-netted a total of 1035 birds (including 173 retraps) of 48 species. Excepting January and August, mist-netting was conducted in all months of the year, providing evidence for breeding phenology. Brood patches and juveniles revealed that 33 species were breeding, with more breeding evidence noted in the wet than the dry season. We document first recorded breeding attempts of four species for Nigeria (White-bellied Kingfisher *Corythornis leucogaster*, Baumann's Greenbul *Phyllastrephus baumanni*, Red-tailed Bristlebill *Bleda syndactylus*, Red-tailed Greenbul *Criniger calurus*) and one for the Republic of Benin (Little Greenbul *Eurillas virens*). The size and mass of adult birds, disaggregated by sex where possible, are also presented.

Résumé

Phénologie de la reproduction et morphologie de quelques oiseaux des forêts du Bénin et du Nigeria. Dans trois parcelles forestières du Nigeria et une en République du Bénin, au cours des années 2017–2019, nous avons capturé au filet japonais un total de 1035 oiseaux (incluant 173 recaptures) de 48 espèces. Hormis en janvier et août, les filets japonais ont été mis en place tous les mois de l'année, fournissant les informations sur la phénologie de la reproduction. Des plaques incubatrices et des juvéniles ont révélé que 33 espèces étaient en période de reproduction, avec plus de signes de reproduction notés en saison humide qu'en saison sèche. Nous documentons les premières observations de tentatives de reproduction de quatre espèces pour le Nigeria

(Martin-pêcheur à ventre blanc *Corythornis leucogaster*, Bulbul de Baumann *Phyllastrephus baumanni*, Bulbul moustac *Bleda syndactylus*, Bulbul à barbe blanche *Criniger calurus*) et une pour la République du Bénin (Bulbul verdâtre *Eurillas virens*). La taille et le poids des oiseaux adultes, différencié par sexes quand cela a été possible, sont aussi présentés.

Introduction

An understanding of the influence of environmental variables on bird breeding is critical for their conservation (Crick *et al*. 1997, Studds & Marra 2007). However, breeding data remain patchy for many African bird species (Elgood *et al.* 1994, Dowsett-Lemaire & Dowsett 2019) and are mainly based on observational studies (*e.g*. Watson *et al.* 1997, Ivande *et al.* 2012, Awoyemi *et al.* 2018). Mist-netting provides additional information, particularly about elusive birds, and in Nigeria has been used to understand trends in bird diversity (Sharland 1964, 1980), breeding (Cox *et al.* 2013) and body reserves (Nwaogu & Cresswell 2016). While these studies were mainly conducted in the savanna zone, our mist-netting study (2017–2019) advances knowledge about the breeding phenology and morphology of forest birds in West Africa.

Study sites

The study was conducted in four regenerating secondary rainforest patches (Table 1, Fig. 1), three of which are in south-western Nigeria, including the International Institute of Tropical Agriculture (IITA) Forest Reserve (IFR), Emerald Forest Reserve (EFR) and Lekki Urban Forest and Animal Sanctuary Initiative (LUFASI) Nature Park (LNP). The fourth, Drabo Gbo Forest Reserve (DFR) is located in the southern region of the Republic of Benin (hereafter "Benin"). These patches are privately-owned, dedicated to biodiversity conservation, research and recreation, and enjoy a relatively high degree of protection. During our surveys they also experienced a similar climate, with a Mar–Sep wet season and Oct–Feb dry season.

Table 1. Study sites and mist-netting details.

	Location		Size	Altitude	N days	N species
	N	E	(ha)	(m a.s.l.)	netting	netted
IITA Forest Reserve	7°30′	3°55′	360	243	36	42
Emerald Forest Reserve	7°18′	4°8′	120	130	36	19
LUFASI Nature Park	6°27′	3°39′	20	13	6	16
Drabo Gbo Forest Reserve	6°30′	2°18′	14	50	6	13

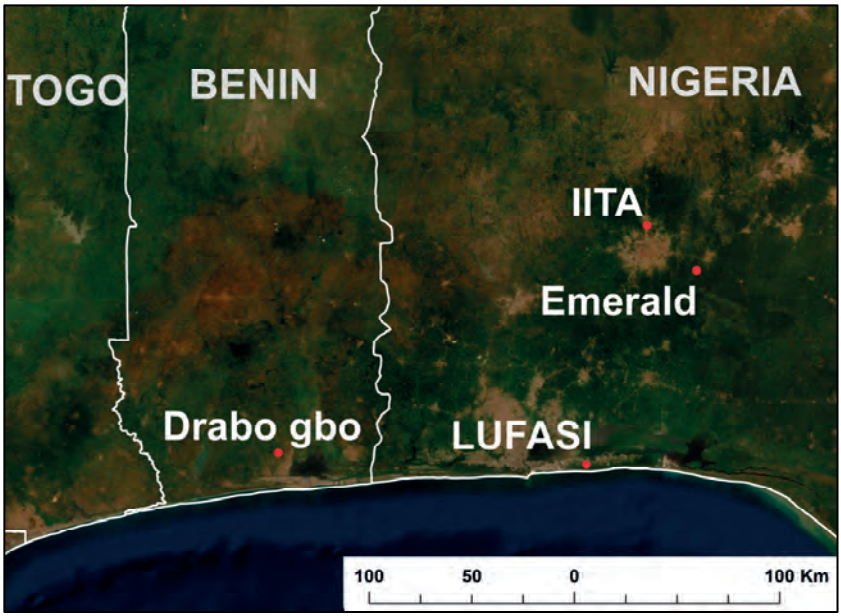

Figure 1. Nigeria and Benin showing the study sites (map by IITA GIS Unit).

The IFR is located within the campus of the IITA. Protection since 1967, with a perimeter fence and patrol, has allowed the regeneration of this forest, which holds large native tree species such as *Ceiba pentandra*, *Milicia excelsa*, *Terminalia superba* and *T. ivorensis* (Manu *et al*. 2005, Neuenschwander *et al*. 2015). The area experiences an annual rainfall of 1500–2000 mm (Ezealor 2001) and a daytime temperature of 26–38°C (Neuenschwander *et al.* 2015). Despite encroaching urbanization, the IFR supports a huge diversity of birds, and has been designated as an Important Bird and Biodiversity Area (IBA: Ezealor 2001).

The EFR is located *c*. 25 km south of Ibadan, with rainfall and temperature patterns similar to those of the IFR. The forest is dissected by two seasonal streams, the Aworin and Akinrin, which flow into the River Osun, which itself provides water to communities in the surrounding areas (Olajire & Imeokpartia 2000). The streams and river support luxuriant vegetation forming gallery forest, an important habitat corridor in the area (Ayoade *et al.* 2006). *Antiaris toxicaria*, *Brachystegia eurycoma*, *Cynometra megalophylla* and *Triplochiton scleroxylon* are some of the native tree species that dominate the EFR, which supports high diversity of Guineo-Congolian bird species and qualifies as an IBA (Awoyemi *et al*. 2020).

The LNP is in the heart of Lagos but protected by a perimeter fence. The area is on silty sands (Adebisi *et al*. 2016) and experiences a mean annual temperature of 30°C and mean annual rainfall *c*. 1700 mm (Ojeh *et al*. 2016). Consequently, LNP is mostly swampy, supporting native tree species such as *Ficus vogelii*, *Holarrhena floribunda*, *Lophira alata* and *Sarcocephalus latifolius*, all of which were identified during our study. The ground vegetation of LNP comprises wildlings, saplings and undergrowth, dominated by *Alchornea cordifolia*. The park has two lakes, Nora and Moses, which serve as an important source of water and habitat for wild animals. In a buffer zone, there are cabins, adventure playgrounds, a zoo and administrative offices. In this area, crops like *Mangifera indica*, *Elaeis guineensis*, *Cocos nucifera* and *Citrus sinensis* are cultivated. Although there are some stands of trees and bushes in the surrounding neighbourhood, LNP is isolated from other forest patches as a result of urbanization. Adjacent to the park are abattoirs, which provide an important source of food for scavengers.

The DFR is located *c*. 30 km north of Cotonou in Benin. The area has a mean annual rainfall of 1200 mm with two peaks, in May–Jun and Sep, and a long dry season Oct–Feb (Neuenschwander *et al*. 2015). During the peak of the harmattan in Jan, temperatures drop to 18°C, but reach 38°C in Mar–Apr (Neuenschwander *et al*. 2015). Despite its small size and the encroaching urbanisation, the DFR supports three species of monkey, including the Vulnerable Red-bellied Monkey *Cercopithecus erythrogaster* (sighted during this survey), Mona Monkey *Cercopithecus mona* and Green Monkey *Chlorocebus sabaeus*, and holds native trees such as *Blighia sapida*, *Celtis mildbraedi*, *Cola gigantea* and *Trilepisium madagascariense* (Neuenschwander & Adomou 2017).

Methods

At the IFR and EFR, birds were mist-netted during quarterly Constant Effort Surveys (Mar–Apr, Jun–Jul, Sep, Nov–Dec), from 2017 to 2019. Meanwhile, mist-netting sessions were held twice in each of DFR (May 2018 and Feb–Mar 2019) and LNP (Oct 2018 and Feb 2019). Birds were therefore mist-netted in at least one site in all months of the year except Jan and Aug, covering dry and wet seasons. Our analyses are based on seven months of wet (Mar–Sep) and five months of dry (Oct–Feb) seasons. We trapped birds for three days during each survey, and used the same mist-nets (120 m long, 2.5 m high, five shelves, 32 mm mesh size), pliers, vernier calipers, metre rules and electronic balance. Nets were opened at 6h00, closed at 11h00 and checked at 30-min. intervals. Birds were identified using Borrow & Demey (2014). Where possible, photographs were taken to confirm identification and document breeding evidence while all ringing data (SAFRING) were submitted to the A.P. Leventis Ornithological Research Institute, Jos, Nigeria. AGA participated in all surveys and ringed 550 birds (53 %). The remaining birds were ringed by co-authors and other visiting ornithologists.

All ringed birds were classified by age (adult; juvenile), sex (male; female; unknown for sexually monomorphic species), type (new; retrap) and breeding status (brood patch; juvenile). Juveniles were identified by the presence of gape, feather shape and structure, and dull eyes compared to adult birds, while brood patches were classified following Cox *et al*. (2013): little-developed (defeathering of breast and belly, wrinkles on skin), well-developed (skin of belly opaque, swollen and engorged) and post-incubation (refeathering). We estimated breeding period as the number of months a species was caught breeding in at least one site and assumed that all mist-netted juveniles had fledged 1–2 months earlier. We measured wing, tarsus and mass only for adult birds, disaggregated by sex where possible. All error measures presented are SD.

Results

We mist-netted 1035 birds of 48 species (Appendix 1). Of this total, 80 (8 %) were juveniles and 173 (17 %) retraps, tentatively interpreted as proportional to recruitment and survival rates, respectively. The totals of species mist-netted per site are indicated in Table 1, while the numbers of individuals of each species mist-netted are in Appendix 1. Olive Sunbird *Cyanomitra olivacea* (163 individuals), Yellow-whiskered Greenbul *Eurillas latirostris* (157), Grey-headed Bristlebill *Bleda canicapillus* (109) and Little Greenbul *Eurillas virens* (94) were the most netted species across all sites (Appendix 1). The presence of brood patches and juveniles indicated that 33 species were breeding during our surveys. More breeding evidence was noted during the wet season (61 birds with brood patches or juveniles) than in the dry (39) (Appendix 1).

Trapped birds of the following species included four new breeding records for Nigeria and one for Benin.

***Corythornis leucogaster* White-bellied Kingfisher.** Eight individuals were mist-netted along streams that dissect the EFR, mainly in the dry season (Sep–Mar), during which one individual with old primary feathers was observed with a little-developed brood patch, on 19 Sep 2018. One juvenile, with less striking plumage and bill colours, was trapped on 11 Oct 2017. These findings are consistent with breeding data from Cameroon (Jul, Oct) and Gabon (Jun–Sep, Jan) (Fry *et al.* 1988).

***Phyllastrephus baumanni* Baumann's Greenbul.** Twenty individuals were mist-netted. We observed well-developed brood patches on three individuals at IFR (6 Jul 2017; Fig. 2) and EFR (10 Oct 2017, 29 Mar 2018). We mist-netted two juveniles with dull eye colours and pale bills at IFR (2 Dec 2017, 11 Dec 2018). Although it appears that this species breeds during both seasons, we recorded more evidence in the dry than wet season. This is further supported by the report of a begging juvenile at the Abdoulaye Wildlife Reserve in Togo on 20 Oct 2015 (Dowsett-Lemaire & Dowsett 2019) and a breeding female (cloaca and brood patch) mist-netted in Cameroon on 23 Feb 2006 (Bobo *et al*. 2007). The plumage (Fig. 2) and measurements

Figure 2. Baumann's Greenbul *Phyllastrephus baumanni* with a well-developed brood patch, IITA Forest Reserve, 6 Jul 2017 (photo: AGA).

(Appendix 1) of the Baumann's Greenbuls mist-netted in our study are similar to those previously described (Fishpool 2000, Bobo *et al*. 2007).

***Bleda syndactylus* Red-tailed Bristlebill.** On 6 Jun 2018, we mist-netted two adults at the EFR, one of which had a well-developed brood patch. Although this was during the wet season, the Red-tailed Bristlebill is known to breed all year round in other African countries (Keith *et al*. 1992); but breeding attempts remain unrecorded in the Dahomey Gap, including Benin and Togo (Dowsett-Lemaire & Dowsett 2019). Another individual was trapped on 12 Dec 2019 at the same site, where it coexisted with the Grey-headed Bristlebill *Bleda canicapillus* (Fig. 3).

Figure 3. Red-tailed Bristlebill *Bleda syndactylus* and Grey-headed Bristlebill *B. canicapillus* coexist in the Emerald Forest Reserve, 6 Jun 2018 (photo: OO).

***Criniger calurus* Red-tailed Greenbul.** Six adults were mist-netted at the EFR, of which two had little-developed (4 Sep 2019) and well-developed (30 Mar 2018) brood patches. Breeding is reported to be independent of season in other African countries (Keith *et al.* 1992).

***Eurillas virens* Little Greenbul.** Four adults were mist-netted at the DFR on 12 May 2018 (Fig. 4), two of which had little- or well-developed brood patches. Surprisingly for such a common bird species (Akker 2003), breeding had been unrecorded for Little Greenbul in the Dahomey Gap (Dowsett-Lemaire & Dowsett 2019), despite being plausible all months of the year (Keith *et al.* 1992; Appendix 1).

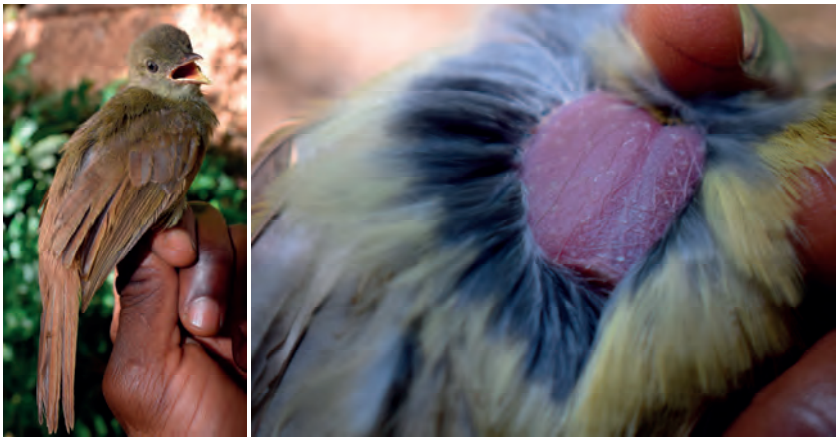

Figure 4. Little Greenbul *Eurillas virens* with a little-developed brood patch, Drabo Gbo Forest Reserve, 12 May 2018. (photo: AGA).

Discussion

We provided baseline data on the diversity, morphology, breeding, and survival and recruitment rates of relatively elusive forest birds, which appear to be under-studied in the area (Elgood *et al.* 1994, Dowsett-Lemaire & Dowsett 2019), and which are useful for comparison with other regions and vegetation zones. The observed variation in species diversity recorded between the study sites may be due to forest patch size and quality (remnant forests are very fragmented and degraded in the region), and survey duration. However, failure to capture some bird species does not imply their absence from a site. For instance, elusive forest species such as the Yellow-browed Camaroptera *Camaroptera superciliaris* and Fire-crested Alethe *Alethe castanea* were occasionally heard at the EFR but were never mist-netted.

All of our new breeding records for Nigeria were documented at the EFR, a previously unknown site until recent work by Awoyemi *et al.* (2020). This not only demonstrates the value of exploring potential sites for bird conservation but also of deploying different and suitable census techniques. Through the Constant Effort Surveys employed in this study, we also confirmed the presence of breeding populations of the Buff-spotted Woodpecker *Campethera nivosa* and Rufous-sided Broadbill *Smithornis rufolateralis* in the IFR (Appendix 1), both new species for the IFR, as they were not recorded while designating the site as an IBA (Ezealor 2001, Adeyanju *et al*. 2014). Baumann's Greenbul *Phyllastrephus baumanni* was also mist-netted at the IFR while the observation of active brood patches in both sexes of the Olive Sunbird *Cyanomitra olivacea* (Appendix 1) in the area suggests that both sexes incubate.

In addition to our netting results, we observed an average of 15 Hooded Vultures *Necrosyrtes monachus* (Critically Endangered) at LNP, mainly in Red Ironwoods *Lophira alata* (Vulnerable), the only emergent tree species (*c*. 35m tall) found in the park. Although no breeding attempts were confirmed, we observed two old but visited nests in these trees, *c*. 500 m away from the abattoir where the vultures foraged. Based on previous awareness campaigns by the staff of LNP, abattoir staff and neighbouring households were aware of the threats facing the Hooded Vulture, and expressed support for its conservation. The DFR could play a similar role as a hotspot for birds of conservation concern in the highly urbanizing southern region of Benin. Following notable regeneration in the last 20 years, the DFR now resembles the other Guineo-Congolian forests visited during this study. Bird species characteristic of this biome were recorded during our surveys at the DFR, including the Chestnut Wattle-eye *Dyaphorophyia castanea*, Red-bellied Paradise-flycatcher *Terpsiphone rufiventer* and Western Nicator *Nicator chloris*.

Our study sites are unlikely to experience severe degradation in the immediate future, thanks to their private ownership. While this is encouraging, the impacts of anthropogenic activities in surrounding areas could nonetheless reduce species richness and diversity. For instance, urbanization has isolated the DFR, IFR and LNP from nearby forests. While the EFR appears still to be connected to the gallery forest along the River Osun, over-fishing and dry-season arable farming pose serious challenges to the avifauna in this area. To promote the conservation of these sites, we recommend community-based approaches, sensitization campaigns, protection against logging and poaching, and constant biodiversity monitoring. Such monitoring programs will unravel trends needed for informing conservation actions.

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Appendix 1

Birds mist-netted, measurements (mm) and mass (g) of adults (excluding retraps), months (1–12 = Jan–Dec) when brood patches and juveniles were recorded, during 2017–19. Sites: D = Drabo Gbo Forest Reserve; E = Emerald Forest Reserve; I = IITA Forest Reserve; L = LUFASI Nature Park.

	Sex	Sites	N adults (+ retraps)	N juvs	N measured	Wing length	Tarsus length	Mass	Brood patch months	Juveniles months
Turtur tympanistria Tambourine Dove	F	I	2		2	116, 127	24.4, 24.4	68.9, 59.6		
	M	ED	2		2	116, 119	25.6, 26.0	49.1, 75.4		
	U	IL	2	1						2
Centropus monachus Blue-headed Coucal	U	I	1							
Ceuthmochares aereus Yellowbill	U	D	1		1	114	31.6	40.0		
Kaupifalco monogrammicus Lizard Buzzard	U	I	1		1	220	63.2	245.9		
Accipiter tachiro African Goshawk	U	ID	5(+2)		5	160.6 ± 56.0	57.8 ± 3.5	188.9 ± 93.4		
Lophoceros nasutus Grey Hornbill	U	I		1						4
Ispidina picta Pygmy Kingfisher	U	ILD	4	1	4	52.3 ± 2.8	12 ± 1.3	9.6 ± 1.6		9
Corythornis leucogaster White-bellied Kingfisher	U	E	6(+1)	1	6	57.8 ± 1.8	13.1 ± 1.8	14.5 ± 2.6	9	10
Halcyon malimbica Blue-breasted Kingfisher	U	I	3		2	111, 101	26.7, 23.1	83.0, 82.1		
Pogoniulus scolopaceus Speckled Tinkerbird	U	IEL	6		6	54.2 ± 1.2	18.6 ± 0.5	15.0 ± 1.2		
Campethera nivosa Buff-spotted Woodpecker	F	I	1(+1)		1	87	20.8	37.0	10	
	M	I	1		1	86	35.8	20.5		
Falco biarmicus Lanner Falcon	U	I	1		1	330	636	385.8		
Smithornis rufolateralis Rufous-sided Broadbill	M	I		1						5
Dyaphorophyia castanea Chestnut Wattle-eye	F	IED	4		4	57.8 ± 1.3	14.8 ± 5.1	12.5 ± 0.5	10	
	M	E	1		1	56	18.4	14.6		
	U	I		1						12
D. blissetti Red-cheeked Wattle-eye	M	I	17(+1)		16	51.4 ± 1.3	19 ± 1.9	10.4 ± 1.1		
	U	I		1						3
Dicrurus ludwigii Square-tailed Drongo	U	I	3		3	107 ± 6.1	20 ± 1.2	27.2 ± 1.5		
Trochocercus nitens Western Crested-flycatcher	F	I	1		1	61	18.1	9.6		

	Sex	Sites	N adults (+ retraps)	N juvs	N measured	Wing length	Tarsus length	Mass	Brood patch months	Juveniles months
Terpsiphone viridis African Paradise-flycatcher	U	ID	3		3	84.3 ± 2.5	18.4 ± 0.4	12.9 ± 2.9		
T. rufiventer Red-bellied Paradise-flycatcher	U	IELD	54(+2)	7	54	78.1 ± 3.7	19.5 ± 8.8	15.4 ± 5.5	5,6,10–12	3,11,12
Nicator chloris Western Nicator	U	ILD	10(+2)	2	10	100.4 ± 7.4	34.3 ± 2.4	42.5 ± 10.7	5	5,12
Sylvietta virens Green Crombec	U	I	1							
Macrosphenus kempi Kemp's Longbill	U	I	2	1	2	60, 53	27.4, 20.5	13.7, 14.0		12
Camaroptera brachyura Bleating Camaroptera	U	ID	4		4	54.3 ± 3.3	22.8 ± 1.7	11.1 ± 3.5		
C. chloronota Olive-green Camaroptera	U	IEL	39(+7)	11	39	54.1 ± 3.5	22.6 ± 4.1	11.2 ± 3.7	5,6,10	5,6,9,10,12
Bleda syndactylus Red-tailed Bristlebill	U	E	3		3	111.7 ± 4.9	29.5 ± 0.4	42.4 ± 3.0	6	
B. canicapillus Grey-headed Bristlebill	U	IEL	64(+44)	1	61	102.7 ± 4.8	28.1 ± 2.8	38.4 ± 5.2	3,5,6,10	11
Chlorocichla simplex Simple Greenbul	U	IL	2	2	2	99, 96	26.9, 27.6	38.9, 33.8		6,12
Eurillas latirostris Yellow-whiskered Greenbul	U	IE	126(+20)	11	126	82.6 ± 4.0	19.2 ± 1.7	21.9 ± 5.3	3,5–7,9,10,12	3,5,6,11,12
E. virens Little Greenbul	U	ILD	75(+14)	5	70	75.1 ± 4.4	20.5 ± 1.8	20.7 ± 5.0	2, 3,5,6,12	3,9,11
Criniger calurus Red-tailed Greenbul	U	E	5(+1)		5	94.4 ± 5.2	27.0 ± 0.9	29.3 ± 10.1	3,9	
Phyllastrephus albigularis White-throated Greenbul	U	IE	56(+16)	3	55	79.0 ± 5.9	19.7 ± 1.6	18.0 ± 4.5	6,9	9,10
P. baumanni Baumann's Greenbul	U	IE	16(+2)	2	14	78.5 ± 3.2	21 ± 1.9	19.8 ± 2.6	3,7,10	12
Pyrrhurus scandens Leaf-love	U	I	2		2	105, 100	30.2, 30.0	49.6, 39.7		
Hylia prasina Green Hylia	U	IEL	12(+2)	1	12	66.3 ± 5.6	20.3 ± 1.6	12.6 ± 1.6	2,6	5
Illadopsis fulvescens Brown Illadopsis	U	IL	9(+1)		7	75.7 ± 3.7	29.6 ± 0.9	29.2 ± 2.5	3,9	
Phyllanthus rubiginosus Black-crowned Capuchin	U	I	2		2	121, 119	45.9, -	90.4, 97.6	7	
Neocossyphus poensis White-tailed Ant-thrush	U	IE	2(+2)	1	2	105, 115	32.5, 30.5	31.7, 55.1		9
Turdus pelios African Thrush	U	ID	4		4	111.0 ± 8.3	40.1 ± 10.2	46.2 ± 12.8	5	
Cossypha cyanocampter Blue-shouldered Robin-chat	U	I	7(+2)		7	83.0 ± 13.8	30.8 ± 1.3	28.6 ± 1.4	6	
C. niveicapilla Snowy-crowned Robin-chat	U	ID	16(+1)	2	16	96.7 ± 4.9	27.1 ± 2.2	28.8 ± 5.7	6	6,12
Stiphrornis erythrothorax Western Forest Robin	U	IE	16(+9)	2	16	65.4 ± 2.3	24.6 ± 0.8	15.4 ± 2.0	5,6,9	9,12
Hedydipna collaris Collared Sunbird	F	ILD	10	2	10	47.7 ± 1.5	17.4 ± 3.9	6.4 ± 1.3		2,12
	M	IELD	16		14	50.0 ± 1.4	17.9 ± 0.6	8.2 ± 2.9		
	U	IL	3	6						3,9,10

Cyanomitra olivacea Olive Sunbird	F	IE	58(+13)	1	58	55.9 ± 2.0	11.8 ± 3.4	5.9 ± 2.1	3,6,7,9–12	12
	M	IE	60(+18)		55	62.0 ± 1.8	14.6 ± 1.3	7.8 ± 1.2	3,5,7	
	U	IE	3(+8)	2						6,12
Cinnyris chloropygius Olive-bellied Sunbird	M	L	2		2	48	16 ± 0.3	6		
Ploceus nigricollis Black-necked Weaver	F	L	1		1	72	24.2	23.4	10	
	M	L	1		1	74	24.7	26.1		
Malimbus nitens Blue-billed Malimbe	U	IEL	8(+1)	5	7	83.3 ± 4.9	24.0 ± 2.1	34.3 ± 3.4		3,6,11,12
Spermophaga haematina Western Bluebill	F	IE	11(+1)	4	9	70.0 ± 1.6	24.8 ± 1.0	25.4 ± 1.7	5,6,9	7,12
	M	IEL	16(+2)		16	70.3 ± 2.0	24.7 ± 0.7	25.2 ± 6.7		
	U	IL		2						9,10
Spermestes bicolor Black-and-white Mannikin	U	I	2		2	53, 55	10.9, 10.1	15.6, 15.5		
Total			**782(+173)**	**80**	**717**					

Notes on the abundance and breeding of the Black-crowned Capuchin Babbler *Phyllanthus rubiginosus* in southwest Nigeria

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Summary

The abundance and breeding of the Black-crowned Capuchin Babbler *Phyllanthus rubiginosus* are described, based on a 4-year study (2016–2019) that combined line transect and mist-netting in southwest Nigeria. A total of 242 individual sightings was made during quarterly surveys (n = 16) of a total of *c.* 6 km of line transect each survey, with 15.1 ± 6.5 (SD) individuals encountered per survey. Birds were frequently recorded in groups along forest edges (group size: 5.9 ± 1.7; n = 41) but the encounter rate did not vary significantly across seasons and years. An open cup nest containing five eggs, the first nest described for this species, was observed for 28 days; this nest and two mist-netted adults with brood patches suggest that breeding takes place at least during the wet season.

Résumé

Notes sur l'abondance et la reproduction du Phyllanthe rubigineux *Phyllanthus rubiginosus* au sud-ouest du Nigeria. L'abondance et la reproduction du Phyllanthe rubigineux *Phyllanthus rubiginosus* sont décrites, basées sur quatre ans d'étude (2016–2019) ayant combiné transects et captures au filet dans le sud-ouest du Nigeria. Un total de 242 individus a été observé lors d'études trimestrielles (n = 16) sur un total par parcours de *c.* 6 km, avec 15.1 ± 6.5 (DS) individus rencontrés. Les oiseaux ont souvent été observés en groupes en bordure de forêt (taille du groupe: 5.9 ± 1.7; n = 41)

mais la fréquence des observations n'a pas varié de manière significative selon les saisons et les années. Un nid, le premier décrit de cette espèce, en forme de bol contenant cinq œufs a été observé pendant 28 jours; ce nid et deux adultes pris dans les filets avec des plaques incubatrices suggèrent que la reproduction intervient au moins pendant la saison des pluies.

Introduction

The Black-crowned Capuchin Babbler *Phyllanthus rubiginosus* was recently split at the species level from the Grey-hooded *P. atripennis* and Grey-caped *P. bohndorffi* Capuchin Babblers (Hoyo & Collar 2016). It is found along forest edges of the Guinea-Congo Forest Biome (Collar & Robson 2007, Dowsett-Lemaire & Dowsett 2014) and is probably locally common, as groups were collected for food by rural dwellers (Collar & Robson 2007). This hunting, along with forest clearance for agriculture, appears to be a leading cause of population decline in this species, which has been classified as Near Threatened on the IUCN Red List (BirdLife International 2016). In Nigeria, the Black-crowned Capuchin Babbler is found in a small area of the southwest (Lagos, Badagry, Abeokuta and Ibadan) and at Kagoro on the southern escarpment of Jos (Elgood *et al*. 1994), where urbanisation (Awoyemi & Bown 2019) and forest degradation (Abalaka & Manu 2007) are widespread. Of these areas, only the Forest Reserves of the International Institute of Tropical Agriculture (IITA) at Ibadan and Kagoro-Nindam at Kaduna are likely to survive in the near future, due to the impacts of urbanisation on wild areas around Lagos, Badagry and Abeokuta. Despite these threats, data on demography and breeding, which could be useful for conservation efforts, are largely lacking (Elgood *et al*. 1994, BirdLife International 2016). As part of a long-term plan to promote the conservation of birds and forests in southwest Nigeria, the IITA Forest Centre project was started in 2015, consolidating previous projects funded by the same donor, the A.G. Leventis Foundation. This article presents findings from the project concerning the Black-crowned Capuchin Babbler, from 2016 to 2019, with an additional observation of an adult with a brood patch in 2020.

Methods

Surveys were conducted within the IITA Forest Reserve, Ibadan (7.50°N, 3.92°E; *c.* 243 m a.s.l.), a *c.* 360-ha regenerating secondary rainforest, which supports large native tree species such as *Ceiba pentandra*, *Milicia excelsa*, *Terminalia superba* and *T. ivorensis* (Manu *et al.* 2005, Neuenschwander *et al.* 2015, Awoyemi & Bown 2019). The forest is a designated Important Bird and Biodiversity Area (IBA) and supports populations of the Black-crowned Capuchin Babbler (Ezealor 2001). The area experiences an annual rainfall of 1500–2000 mm (Ezealor 2001), a daytime

temperature of 26–38°C (Neuenschwander et al. 2015) and almost equal periods of wet (Mar–Sept) and dry seasons (Oct–Feb).

Standardised line transects and mist-netting were used in the framework of the Forest Centre project, to monitor bird populations in the study area from 2016 to 2019. These techniques were employed concurrently at quarterly intervals in Mar–Apr, Jun–Jul, Sep and Nov–Dec, between 7h00 and 11h00. At each quarterly survey, three transect lines, each *c.* 2 km long and separated by at least 200 m, were walked over a 3-day period (total *c.* 6 km per survey), while recording all birds seen and heard, and mist-nets (120 m long, 2.5 m high, five shelves and 32 mm mesh) were set up at three constant effort sites within the forest (7.29814°N, 3.53541°E; 7.29852°N, 3.53335°E; 7.29805°N, 3.52961°E), to trap and measure birds. The nets were checked for bird extraction at 30-min. intervals and all ringing data were deposited at the A.P. Leventis Ornithological Research Institute (APLORI), Jos, Nigeria. The birds were identified using Borrow & Demey (2014) and Chappuis (2000). All Black-crowned Capuchin Babblers noted during the study period were included in the present study. AGA participated in all surveys.

We calculated encounter rate as the total number of Black-crowned Capuchin Babblers seen and heard during line transects and estimated group size as the mean of the total number of individuals recorded at a time during the survey. We tested if encounter rate varied with season and year by conducting Wilcoxon signed-rank and Kruskal–Wallis tests respectively, in R statistical software (R Development Core Team 2013). All error measures presented are SD.

A nest of the Black-crowned Capuchin Babbler was discovered on 18 Jul 2019 and was monitored for 28 days at *c.* 5-day intervals. Nest measurements were taken with a vernier calliper on 23 August, nine days after the last activity at the nest was observed. Finally, as this article was going to press, an adult with a brood patch was netted during other work, and is reported below.

Results

A total of 242 bird sightings was made during the 16 line transect surveys, with a mean encounter rate of 15.1 ± 6.5 birds sighted per survey. The encounter rate did not vary between seasons (Wilcoxon signed-rank test, $W = 214$, $P = 0.86$) or years (Kruskal-Wallis, $\chi^2 = 1.5047$, df = 3, $P = 0.68$). All individuals encountered during line transects were found in groups of conspecifics (group size: 5.9 ± 1.7; n = 41), confirming the gregarious nature of the species reported by Collar & Robson (2016). Only two individuals of this species were mist-netted during the 2016–19 study: one with an active brood patch, netted along the forest edge at 8h00 on 1 Jul 2016 (wing 119 mm; mass 97.6 g), and one with no brood patch trapped at 8h30 on 13 Mar 2019 (Fig. 1; wing 121 mm; tarsus 45.9 mm; mass 90.4 g). An additional adult netted on 24 Jun 2020 also had an active brood patch (wing 121 mm; tarsus 43 mm; mass 91.5g).

Figure 1. Black-crowned Capuchin Babbler mist-netted in the IITA Forest Reserve, Ibadan, 13 Mar 2019 (photos: AGA).

The nest of the Black-crowned Capuchin Babbler was an open cup constructed of tendrils, twigs and leaves (Fig. 2), found *c.* 2.5 m above ground level in the fork of a young (*c.* 3 m tall) *Blighia sapida* tree along the forest edge (7.29805°N, 3.52961°E), in an area dominated by native trees, shrubs and climbers, including *Albizia zygia*, *Antiaris toxicaria*, *Ceiba pentandra*, *Combretum racemosum*, *Dioscoreophyllum cumminsii*, *Piper guineense*, *Pycnanthus angolensis* and *Trichilia monadelpha*. Observations at this nest are summarised in Table 1. The nest measurements (mm) were: external diameter 130; internal diameter 99; external depth 120; internal depth 111; thickness 9.

Table 1. Observations at a Black-crowned Capuchin Babbler nest in the IITA Forest Reserve, Ibadan, Jul–Aug 2019.

Date	Observation
18 Jul	Five green-blue eggs found in an open cup nest.
23 Jul	Eggs reduced to three (perhaps due to nest predation).
31 Jul	Closer observation revealed only one nestling, with a few bits of egg shell.
8 Aug	Adult left nest as observer approached; nestling developing feathers but a new egg seen next to it.
14 Aug	No eggs or nestlings in the nest but pieces of broken shells; adult calls heard *c.* 20 m away.

Figure 2. Nest of Black-crowned Capuchin Babbler in the IITA Forest Reserve, 2019: A, 23 Jul; B 31 Jul; C 8 Aug; D 23 Aug. (Photos A, B, D by AGA; C by TAA).

Discussion

The observed encounter rate suggests a small population, which appears to be stable (no significant differences across seasons and years). It is unlikely that these birds engage in local migration between sites as the species was recorded during line transects in all the quarterly surveys. All individuals recorded during line transects were found along forest edges and in groups of conspecifics, consistent with the findings of Collar & Robson (2016). This gregarious nature and preferred habitat (middle layer and edges of forests) could predispose the Black-crowned Capuchin Babbler to anthropo-genic threats, particularly collection for food. In addition, although the IITA Forest Reserve is protected against illegal logging and poaching, urbanization is a threat to the long term persistence of the Black-crowned Capuchin Babbler in this area.

The nest that we found appears to be the first of the Black-crowned Capuchin Babbler to be documented (*cf.* Fry & Keith 2000), since the breeding details given by

Collar & Robson (2007) for *P. atripennis sensu lato* were from nests recorded by G.D. Field in Sierra Leone in 1993 (C. Robson *per* N.J. Collar *in litt.*), which therefore refer to the taxon now separated as *P. bohndorffi*. Although these records show that both species utilise similar nesting materials and site, all of our breeding evidence (from mist-netting and nest observations) was obtained during the wet season (Jun–Aug), in contrast with the Nov–Feb (dry season) nesting period of *P. bohndorffi* reported from Sierra Leone (Collar & Robson 2007).

Although we cannot be sure, the inconsistency in nest contents observed in this study (Table 1) could be due to laying by more than one female, and predation. The clutch size given by Collar & Robson (2007), referring as we now know to *P. bohndorffi*, is two eggs, but although the breeding systems of *Phyllanthus* spp. are poorly known, their consistently gregarious behaviour suggests that they may be cooperative breeders, like other babblers found around the study area, including the Blackcap Babbler *Turdoides reinwardtii* and Brown Babbler *T. plebejus* (Elgood *et al.* 1994). It appears that at least two of the five eggs observed on 18 July were lost, probably to predation. Although only one nestling was observed on 31 July, all three eggs that had remained on 23 July may have hatched, in which case it is likely that two nestlings had been drowned by the downpour that preceded the 31 July observation. The new egg sighted on 8 August, next to the surviving nestling, may have been laid by a new female that had just commenced laying. Assuming that the nestling seen on 31 July had hatched about 29 July, this sequence suggests an incubation period of ≥11 days, which is consistent with what is known for other tropical African babblers (Fry & Keith 2000) and for another similarly sized bird that breeds in the area, the Ibadan Malimbe *Malimbus ibadanensis* (Awoyemi *et al.* 2018). If the nestling had fledged, the nestling period would have been between ten and 16 days (from 29 July to somewhere between 8 and 14 August), which is also consistent with what is known for related species (Fry & Keith 2000). However, the lack of evidence of a nestling from the later egg suggests that the nest might have suffered predation after the 8 August observation.

Our findings support the present conservation status of the Black-crowned Capuchin Babbler, though further studies are needed to determine population density and trends in the known sites of the species in Nigeria, explore new sites, and investigate the impact of habitat fragmentation on genetic diversity. Immediate conservation action is needed to raise awareness about the threats facing this species, especially those resulting from habitat destruction and the collection of groups for food, in the hope of reversing its decline.

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First records of Yellow-footed Honeyguide *Melignomon eisentrauti* and Ursula's Sunbird *Cinnyris ursulae* for Nigeria, plus other observations from the Cross River National Park area

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Summary

An account is given of the main findings of ornithological surveys of Cross River National Park, Cross River State, southeast Nigeria. Yellow-footed Honeyguide *Melignomon eisentrauti* and Ursula's Sunbird *Cinnyris ursulae* are reported from the country for the first time, constituting for the sunbird a small westward extension to its known range, from western Cameroon. Details are also provided of a further 44 species, of which 11 (Lemon Dove *Aplopelia larvata*, Black Spinetail *Telacanthura melanopygia*, Spotted Honeyguide *Indicator maculatus*, Little Green Woodpecker *Campethera maculosa*, Grey-headed Broadbill *Smithornis sharpei*, Pink-footed Puffback *Dryoscopus angolensis*, Crossley's Ground Thrush *Geokichla crossleyi*, Forest Penduline-tit *Anthoscopus flavifrons*, Short-tailed Akalat *Sheppardia poensis*, Johanna's Sunbird *Cinnyris johannae* and Pale-fronted Nigrita *Nigrita luteifrons*) were previously unknown from the national park, while the remainder are rarely recorded in southeast Nigeria or from the country as a whole.

Résumé

Premières observations de l'Indicateur d'Eisentraut *Melignomon eisentrauti* et du Souimanga d'Ursula *Cinnyris ursulae* pour le Nigeria, et autres observations dans la région du Parc National de la Cross River. Un compte est présenté des principales observations au cours d'études ornithologiques dans le Parc National de la Cross River, État de la Cross River, au sud-

est du Nigeria. L'Indicateur d'Eisentraut *Melignomon eisentrauti* et le Souimanga d'Ursula *Cinnyris ursulae* sont mentionnés pour la première fois dans le pays, ce qui constitue pour le souimanga une petite extension vers l'ouest de son aire de répartition connue, dans l'ouest du Cameroun. Des informations précises sont également fournies pour 44 autres espèces, dont 11 (Pigeon à masque blanc *Aplopelia larvata*, Martinet de Chapin *Telacanthura melanopygia*, Indicateur tacheté *Indicator maculatus*, Pic barré *Campethera maculosa*, Eurylaime à tête grise *Smithornis sharpei*, Cubla à pieds roses *Dryoscopus angolensis*, Grive de Crossley *Geokichla crossleyi*, Rémiz à front jaune *Anthoscopus flavifrons*, Rouge-gorge de Bocage *Sheppardia poensis*, Souimanga de Johanna *Cinnyris johannae* et Nigrette à front jaune *Nigrita luteifrons*) n'avaient pas encore été mentionnées pour le parc national, cependant que les autres ont été rarement observées au sud-est du Nigeria ou dans le pays entier.

Introduction

Cross River National Park (CRNP) is composed of two sections, Oban Division and Okwangwo Division, which are separated from each other by *c.* 50 km. As a result, and because of differences in topography and habitat, their avifaunas are distinct. During the course of ornithological surveys of CRNP, mostly in Oban Division, and some neighbouring forests in SE Nigeria in Nov–Dec 2004, three species were found new to the avifauna of the country. A full account of one of these, Mount Kupe Bush-shrike *Chlorophoneus kupeensis*, has already been published (Cox *et al.* 2011). Although news of the other two has also previously been reported (Ajagbe *et al.* 2005), few details and no supporting evidence were given. These are provided below. Brief notes on some other species we recorded, including some records from a preliminary visit to the area in Nov 2003 by MEG (Gartshore 2004), are also given because, based on Elgood *et al.* (1994), either they were previously undocumented in CRNP Oban Division and neighbouring areas, or there were few previously published reports, locally or nationally. Subsequent records of the species listed here are also mentioned.

Localities, and dates of our visits

Cross River National Park: Oban Division and proposed extension

Erokut Gate, 5°21′52″N, 8°26′4″E, *c.* 140 m: 19 Nov 2004 (LDCF, MEG, II); 26–28 Nov 2004 (AA, DB, LDCF, MEG).

Ina (= Eku) River campsite, 5°8′N, 8°41′1″E, *c.* 110m, *c.* 8 km NNE of village of Ekong Anaku (= Ekonganaku, Ekongahaku) (*c.* 5°4′N, 8°38′E): 20–25 Nov 2004 (LDCF, MEG).

Old Aking Hill base campsite, 5°32′48″N, 8°36′8″E, *c*. 300 m, Old Aking Hill peak 1014 m: 6–19 Nov 2003 (Gartshore 2004).
Old Ndebiji Hills base campsite, *c*. 5°34′N, 8°50′E, *c*. 330 m, SE of Old Ndebiji village: 22–30 Nov 2003 (Gartshore 2004); 29 Nov to 1 Dec, 7–10 Dec 2004 (AA, DB, LDCF, MEG, II).
Old Ndebiji Hills ridge campsite, 5°33′50″N, 8°51′28″E, *c*. 1025 m, situated on top of a steep-sided, flat-topped narrow plateau, all records are therefore from a similar altitude: 1–7 Dec 2004 (AA, DB, LDCF, MEG, II).

Cross River National Park: Okwangwo Division

Barker's camp, 6°25′4″N, 9°20′26″E, 1683 m: 17–19 Dec 2004 (MEG, II).
Boshi Extension campsite, 6°26′10″N, 9°19′16″E, 1380 m: 14–17 Dec 2004 (MEG, II).

Elsewhere

Bashu village, 6°11′N, 9°13′E, near the southern tip of CRNP Okwangwo Division: 13–14 Dec 2004 (LDCF, P. Hall, P. Jones, A.P. Leventis, A. Martin, S. Rumsey).

Frequently mentioned localities with related records by other observers

Rhoko Camp, near Iko Esai, in the buffer zone of CRNP Oban Division (Hall *et al.* 2015).

Results

New species for Nigeria

***Melignomon eisentrauti* Yellow-footed Honeyguide.** On 19 Nov 2004, in forest beside the boundary path close to the Erokut entrance to CRNP Oban Division, Cross River State, a Yellow-footed Honeyguide was discovered, initially by its voice, which was heard at about 14h30, when there was no other bird singing. The song, with which LDCF was familiar from Ivory Coast (Rainey *et al*. 2003), was recorded. The bird responded rapidly to playback, approaching silently to within a few metres of the observers (which included LDCF, MEG and II), perching momentarily between repeatedly flying back and forth down to around head height, allowing close, if brief, views in relatively open vegetation. The following description was taken: upperparts uniform brightish olive-green, head grey, uniform grey below, becoming paler towards the belly; outer tail feathers white with narrow dark, dull outer margins and tips; bill and legs conspicuously bright pale chrome yellow; eye-ring narrow and dull yellow; crown feathers sometimes appeared erected, giving the head an elongated, rather strange, thin, ragged appearance. The bird's excited behaviour made photography difficult but enough of these features are apparent in Fig. 1, including the plain underparts, tail pattern, and in particular the yellow feet and bill, to corroborate the identification.

Singing in the afternoon seems to be characteristic of Yellow-footed Honeyguide: Dowsett-Lemaire (2008) found no records of it singing before 13h00. Dowsett-Lemaire (2008) included the observations reported here, but incorrectly stated that the encounter took place in Okumu National Park.

Since this observation the species has been seen again in SE Nigeria, "…on several occasions in April-July 2014" at Rhoko Camp, in the buffer zone of CRNP Oban Division (Hall *et al*. 2015).

The finding of Yellow-footed Honeyguide in Nigeria is not unexpected given that two museum specimens were collected a little to the east, in neighbouring western Cameroon (Louette 1981, Bowden *et al*. 1995), and that its main area of distribution is to the west. As a result of recent field work, it is now known to be relatively widespread in forests from Ghana, where 12 localities were documented by Dowsett-Lemaire & Dowsett (2014), to Sierra Leone (Gatter 1997, Dowsett-Lemaire & Dowsett 2008). The statement by Hoyo & Collar (2014) that "reports from Ivory Coast require confirmation" is incorrect, as is their corresponding map, since they overlooked Rainey *et al*. (2003) and Lachenaud (2006).

Figure 1. Two new species for Nigeria: left, Yellow-footed Honeyguide *Melignomon eisentrauti*, Erokut, Cross River National Park (Oban Division), 19 Nov 2004; right, Ursula's Sunbird *Cinnyris ursulae*, Old Ndebiji Hills, proposed extension to Cross River National Park (Oban Division), Cross River State, 3 Dec 2004. Photos: MEG.

***Cinnyris ursulae* Ursula's Sunbird.** First clearly identified by MEG on 2 Dec 2004 and subsequently seen by all authors on several occasions during the period 3–7 Dec, with two individuals caught in mist nets on 2 and 3 Dec. The sightings were made in intact sub-montane forest at an altitude of *c*. 1000 m in the proposed extension to CRNP Oban Division, in the hills east of the village of Old Ndebiji (Nedebijji on some maps), Cross River State, close to the border with Cameroon. In addition, the species was observed three times and heard on other occasions (recordings made) by MEG and II in the Boshi Extension, in steeply sloping, unbroken montane forest at *c*.

1500 m on 16 Dec 2004, the same date and location as that of the first record of Mount Kupe Bush-shrike (Cox *et al*. 2011). Apart from some limited metallic reflections on the fore-crown, the plumage was non-glossy, the sides of the face and fore-crown grey, the upperparts olive-green, the underparts greyish, becoming buffy on the lower belly and undertail-coverts, and the pectoral tufts orange-pink; the bill and legs were blackish (Fig. 1).

These records represent a small westward extension to the range of Ursula's Sunbird, from western Cameroon, where the nearest known localities are in the Rumpi Hills (Stuart & Jensen 1986, Fry 2000, Cheke *et al*. 2001), *c*. 75 km to the southeast. The population in the Old Ndebiji hills is likely to be small since, in Cameroon and Bioko, to where the species was hitherto believed restricted, it is not known to occur below *c*. 950 m (Fry 2000, Cheke *et al*. 2001), and the amount of forest above this altitude at Old Ndebiji is limited. Montane forest in the Boshi extension above 950 m is, however, extensive and contiguous with similar habitat in Cameroon.

Other selected species

***Peliperdix lathami* Forest Francolin.** Several birds heard calling overnight at Erokut, 26–28 Nov 2004. Described by Elgood *et al*. (1994) as an uncommon resident from Lagos to Oban and listed by Ezealor (2001) from five localities, including CRNP Oban Division, but few recent records except from Omo Forest Reserve (Green *et al*. 2007, Olmos & Turshak (2009).

***Agelastes niger* Black Guineafowl** A large black gallinaceous bird presumed to be this species was observed by MEG to take off from a track at Erokut, 26 Nov 2004. Elgood *et al*. (1994) mention only one previous record, from near Ekong Anaku but overlooked hunters' reports from the CRNP area mentioned by Ash *et al*. (1989). Listed by Ezealor (2001) from CRNP Oban Division and "encountered regularly" around Rhoko Camp (Hall *et al*. 2015).

***Aplopelia larvata* Lemon Dove.** One flushed from the forest floor on 6 Dec 2004 and another seen escaping from a mist net on 7 Dec 2004, in ridge forest in Old Ndebiji Hills. While known from three localities in SE Nigeria (Elgood *et al*. 1994), this appears to be the first record for CRNP.

***Telacanthura melanopygia* Black Spinetail.** Three or four together in company with Cassin's Spinetail *Neafrapus cassini* and Sabine's Spinetail *Rhaphidura sabini*, over farmbush and lowland forest near Old Ndebiji Hills base camp, 9 Dec 2004. Reported by Elgood *et al*. (1994) only from two localities in SW Nigeria, and since seen in Afi River Forest Reserve (Demey *et al*. 2003), these therefore appear to be the first records from CRNP. Subsequently recorded at Rhoko Camp (Hall *et al*. 2015), as well as from Omo Forest Reserve (Olmos & Turshak 2009).

***Apus batesi* Bates's Swift.** Groups of 3–4 seen several times in company with spinetails and Forest Swallow *Petrochelidon fuliginosa* over farmbush and lowland forest near Old Ndebiji Hills base camp, Dec 2004. Identified by its small size, all-

black plumage and long forked tail, sometimes held closed to form a single point. These records strengthen the view of Elgood *et al.* (1994) and Demey *et al.* (2003) that the species has hitherto been overlooked in Nigeria, at least in the southeast. Two previous records from CRNP, one in Oban Division (Ash *et al*. 1989), the other in Okwangwo Division (Ezealor 2001).

***Cercococcyx olivinus* Olive Long-tailed Cuckoo.** Heard between Old Aking Hill and Aking village, 18–19 Nov 2003 (Gartshore 2004) and at Ina River and Erokut, 27–28 Nov 2004. Not reported from eastern Nigeria by Elgood *et al*. (1994) but listed from CRNP Oban Division by Ezealor (2001) and also found in Afi River Forest Reserve (Demey *et al*. 2003).

***Himantornis haematopus* Nkulengu Rail.** Heard at night at Ina River, Erokut and Old Ndebiji Hills base and ridge campsites, Nov–Dec 2004. Elgood *et al*. (1994) cited only two records, overlooking two more, from CRNP Oban Division (Ash *et al*. 1989). Also recorded from Afi River Forest Reserve (Demey *et al*. 2003) and from Rhoko Camp (Hall *et al*. 2015).

***Bostrychia rara* Spot-breasted Ibis.** Heard on several occasions during early dawn and nightfall at Ina River, Nov 2004. Identified by the repeated disyllabic call with the emphasis heavily on the second syllable ("a-HA! a-Ha!"). First recorded in Nigeria, from CRNP Oban Division, in 1988 (Demey *et al*. 2003); subsequent records from Rhoko Camp, and a nest found at Abo Ebam, Boki Local Government Area, Cross River State (Hall *et al.* 2015).

***B. hagedash* Hadada.** Three seen to land together silently and forage on the bank of an open creek off the Ina River, shortly after dawn on 22 Nov 2004. Heard in flight there on several occasions during early dawn and at nightfall: the calls were originally thought to be of Olive Ibis *B. olivacea* (Ajagbe *et al*. 2005) but subsequent analysis of recordings revealed most to be *B. hagedash* (but see next species below). The presence of *B. hagedash* along such a small river within forest was unexpected, though there are reports of it in such habitat elsewhere, including Cameroon (Bates 1930), Gabon (Brosset & Erard 1986), Republic of Congo (Dowsett-Lemaire 1997 and *in litt.*), Sierra Leone (Dowsett-Lemaire & Dowsett 2007) and Ghana (Dowsett-Lemaire & Dowsett 2014). Its presence in this environment may be under-appreciated.

[***B. olivacea* Olive Ibis.** Two recordings made by MEG, one at Erokut overnight on 19–20 Nov 2004 and another at Ina River at night on 21 Nov, resemble the vocalizations of Olive Ibis on Chappuis (2000). Similar calls were heard at Old Aking Hill base camp on 12, 15 and (early morning) 17 Nov 2003 (Gartshore 2004), from an extensive area of continuous forest with small rivers under canopy. The quality of these recordings is too poor to be certain of the identity of the species, as Hadada cannot be excluded (F. Dowsett-Lemaire *in litt.*), but we draw attention to a need for further investigation. The wording used by Elgood *et al*. (1994) to describe the few previous claims from Nigeria, all from the Oban Hills area, is ambiguous but suggests that they considered the species unconfirmed in Nigeria, a view made explicit by

Demey *et al.* (2003). There is no proven record between Ivory Coast (Yapo) and Cameroon (Bipindi) (R.J. Dowsett *in litt.*).]

***Glaucidium sjostedti* Sjöstedt's Owlet.** In 2003, heard and recorded in forest near Aking Village, 7 Nov, at a campsite between Aking Village and Old Aking Hill, 19 Nov, and at the base of Old Ndebiji Hill, 25 Nov (Gartshore 2004). Heard calling and one seen in response to playback near Old Ndebiji Hills base camp, 30 Nov 2004, where one was subsequently caught in a mist net on 9 Dec. Two previous Nigerian records, both from CRNP Oban Division (Ash *et al.* 1989, Elgood *et al*. 1994) and since recorded regularly around Rhoko Camp (Hall *et al*. 2015).

***Bubo poensis* Fraser's Eagle Owl.** Heard on two occasions at Erokut, 26–27 Nov 2004. Although Elgood *et al*. (1994) cited few records, one of them from CRNP Oban Division (Ash *et al*. 1989), they believed the species to be under-reported. Recent records from near Calabar and Afi River and Omo Forest Reserves (Künzel & Künzel 1999, Demey *et al*. 2003, Green *et al*. 2007).

***Dryotriorchis spectabilis* Congo Serpent-eagle.** Heard once at Old Ndebiji Hills, CRNP Oban Division, 27 Nov 2003 (Gartshore 2004). Elgood *et al*. (1994) cite previous records from the Cross River Area and Ezealor (2001) reported it from CRNP Okwangwo Division.

***Urotriorchis macrourus* Long-tailed Hawk.** Call heard once at Erokut and once between Old Ndebiji Hills base camp and Old Ndebiji village, Nov 2004. Few previous Nigerian records, but already known from CRNP Oban Division (Elgood *et al*. 1994, Demey *et al*. 2003); since then reported frequently from Rhoko Camp (Hall *et al*. 2015).

***Apaloderma aequatoriale* Bare-cheeked Trogon.** Heard once near Aking village, 7 Nov 2003 and twice on top of Old Ndebiji Hills, 27–28 Nov 2003, where one was also seen (Gartshore 2004). In Nov–Dec 2004, heard at Ina River, where one was also closely observed in response to imitation of its call, and at Erokut and in Old Ndebiji Hills. Three previous records for Nigeria, all from CRNP Oban Division (Ash *et al*. 1989, Demey *et al*. 2003) and since reported frequently from Rhoko Camp (Hall *et al*. 2015).

***Merops mentalis* Blue-moustached Bee-eater.** Seen once at Erokut, 27 Nov 2004. Few prior Nigerian records although previously reported for CRNP Oban Division (Ash 1990); since seen at Iko Esai and Ebontema Tourist Camp in the buffer zone of CRNP Oban Division (Hall *et al*. 2015).

***Indicator maculatus* Spotted Honeyguide.** Heard at Ina River, individuals mist-netted at Erokut and Old Ndebiji Hills ridge camp, Nov–Dec 2004. Five records listed by Elgood *et al*. (1994) and while reported from other localities since (Ezealor 2001, Demey *et al*. 2003, Green *et al*. 2007, Adeyanju *et al*. 2014), ours appear to be the only ones from CRNP Oban Division.

***Campethera maculosa* Little Green Woodpecker.** Seen once near Old Ndebiji Hills base camp, 8 Dec 2004. This appears to be the second record for extreme SE Nigeria and the first from CRNP (Elgood *et al*. 1994, Demey *et al*. 2003).

***Dendropicos xantholophus* Yellow-crested Woodpecker.** A pair observed at length near Old Ndebiji Hills base camp, 9 Dec 2004. Two previous records for Nigeria, including one from CRNP (Elgood *et al*. 1994).

***Poicephalus gulielmi* Red-fronted Parrot.** Three records in 2003: heard at Old Aking Hill, 8 Nov and at Old Ndebiji Hills, 27 Nov; a flock of fifteen flying overhead at Old Ndebiji Hills, 30 Nov (Gartshore 2004). First recorded in Nigeria from near Aking (Künzel & Künzel 1999).

***Smithornis sharpei* Grey-headed Broadbill**. Seen and heard in Nov 2003 in Old Ndebiji Hills on several occasions, and near the summit of Old Aking Hill where it was mist-netted (Gartshore 2004). Seen on several occasions and heard regularly in ridge forest in Old Ndebiji Hills, where also caught in mist nets, Dec 2004. Also observed in Boshi Extension at *c*. 1500 m on 14 Dec 2004 and forests near Barker's camp, 18 Dec 2004. First recorded in Nigeria (Mambilla Plateau) by Payne *et al*. (1997): ours are the only records from CRNP.

***Dyaphorophyia tonsa* White-spotted Wattle-eye.** Seen twice at Ina River and once at the Ikpan River crossing on the approach to the village of Ekong Anaku, Nov 2004. Known in Nigeria only from a small area in the southeast and considered rare or very local (Elgood *et al*. 1994). Our observations are however consistent with the assessment that it is "fairly common" in CRNP Oban Division (Ash *et al*. 1989, Demey *et al*. 2003).

***Malaconotus gladiator* Green-breasted Bush-shrike.** Observed several times in the Boshi Extension and in other patches of montane forest around Barker's Camp, 14–18 Dec 2004. Previously known only from a few records from the Obudu Plateau (Elgood *et al*. 1994).

***Dryoscopus angolensis* Pink-footed Puffback.** Seen several times in ridge forest in Old Ndebiji Hills, 24, 27, 29 Nov 2003 (Gartshore 2004) and Dec 2004. First records from CRNP. Two prior observations in Nigeria, both from Obudu (Elgood *et al*. 1994), where subsequently reported by McGregor (2004). Also since found in Ngel Nyaki (Disley 2004).

***Anthoscopus flavifrons* Forest Penduline-tit.** One perched individual observed at length near Old Ndebiji Hills base camp, 9 Dec 2004. Few previous records for Nigeria (Elgood *et al*. 1994); ours is the first for CRNP.

***Sylvietta denti* Lemon-bellied Crombec.** Heard on two occasions at Erokut, Nov 2004. Three localities given by Elgood *et al*. (1994), including CRNP Oban Division (Ash *et al*. 1989), and recorded since from Afi River Forest Reserve (Demey *et al*. 2003). Also reported at IITA, Ibadan (Adeyanju *et al*. 2014) but in the absence of supporting details this record is perhaps best treated with caution, since this species is otherwise unknown from SW Nigeria and the Dahomey Gap.

***Macrosphenus flavicans* Yellow Longbill.** In 2003, one observed on top of Old Aking Hill, 10 Nov, another heard on the slopes, 12 Nov, and a third heard on top of Old Ndebiji Hill, 29 Nov. First recorded in Nigeria, from CRNP Oban Division, by Demey *et al*. (2003); since reported from Rhoko Camp (Hall *et al*. 2015).

***Petrochelidon fuliginosa* Forest Swallow.** At least three seen together on several occasions at Erokut while near Old Ndebiji Hills base camp flocks of up to 15 recorded in association with spinetails and Bates's Swift, Nov–Dec 2004. Identified by the matt blackish-brown plumage, tinged reddish below and tail only slightly forked, appearing rounded when making sharp turns. Three previous records (Elgood *et al*. 1994), including from CRNP Oban Division; subsequently reported from Rhoko Camp (Hall *et al*. 2015).

***Calyptocichla serinus* Golden Greenbul.** Two seen together at Erokut, 28 Nov 2004, and another two recorded at Bashu village, 13 Dec 2004. Four localities known to Elgood *et al*. (1994); Ezealor (2001) reported it from CRNP; subsequently recorded from Omo Forest Reserve (Green *et al*. 2007).

***Baeopogon clamans* Sjöstedt's Honeyguide Greenbul.** One observed at Old Ndebiji base camp, 1 Dec 2004. One seen and heard singing between Old Ndebiji Hills base camp and the village, 10 Dec 2004. Few previous records from CRNP Oban Division (Ash *et al.* 1989, Elgood *et al*. 1994). Also known from Afi River Forest Reserve (Demey *et al*. 2003) and since recorded from Rhoko Camp (Hall *et al*. 2015).

***Criniger chloronotus* Eastern Bearded Greenbul.** Recorded at Old Aking Hill and Old Ndebiji Hills many times in Nov 2003 (Gartshore 2004). Seen and heard many times in Nov–Dec 2004, at Ina River, Erokut, Old Ndebiji Hills base and Old Ndebiji Hills ridge camps (where also caught in mist nets) and near Bashu. Frequently observed in Dec 1997 by Demey *et al.* (2003) in CRNP Oban Division and Afi River Forest Reserve, prior to which it was only known in Nigeria from two specimens (Elgood *et al*. 1994), although it had also been reported (under the name *C. barbatus*) from the Calabar area (Mackenzie 1979). Since reported to be common around Rhoko Camp (Hall *et al*. 2015).

***Criniger ndussumensis* White-bearded Greenbul.** Recorded at Old Aking Hill and Old Ndebiji Hills on a few occasions in Nov 2003 (Gartshore 2004). Seen and heard at Erokut, Old Ndebiji Hills base camp and, most commonly, in Old Ndebiji Hills ridge forest, Nov–Dec 2004; caught in mist nets at the two Ndebiji localities (see Fishpool 2008). Also recorded near Bashu, Dec 2004. Previously recorded from CRNP Oban Division and Afi River Forest Reserve, by Demey *et al*. (2003): no confirmed records given by Elgood *et al*. (1994) due to difficulty of separation from *C. chloronotus*. This difficulty led Demey *et al.* (2003) to treat other localities listed by Ezealor (2001) as in need of confirmation, but a subsequent report from Omo Forest Reserve (Olmos & Turshak 2009) appears to offer this for one of them.

***Phyllastrephus xavieri* Xavier's Greenbul.** Recorded at Old Aking Hill and Old Ndebiji Hills many times in Nov 2003 (Gartshore 2004). Seen and heard at Ina River, Erokut, Old Ndebiji Hills base camp and, most frequently, in Old Ndebiji Hills ridge forest, Nov–Dec 2004; caught in mist nets at Erokut and both Ndebiji localities. First recorded in Nigeria, from CRNP Oban Division, by Manu & Demey (1999). Since reported to be common around Rhoko Camp (Hall *et al*. 2015).

***Geokichla crossleyi* Crossley's Ground Thrush.** Seen twice in Old Ndebiji Hills ridge forest where also caught once in a mist net, 7 Dec 2004. Known previously from

the Obudu and Mambilla Plateaux and the Gotel Moutains (Ash *et al*. 1989, Elgood *et al*. 1994); ours are apparently the first records from CRNP.

***Fraseria ocreata* African Forest-flycatcher.** One seen in Erokut, 19 Nov 2004; two together in Old Ndebiji Hills, Dec 2004. While described as not uncommon locally, and previously recorded from the CRNP Oban Division (Elgood *et al*. 1994), there are few published records. Ezealor (2001) reported it from Okomu National Park and Upper Orashi and, more recently, it has been recorded in Omo Forest Reserve (Green *et al*. 2007, Olmos & Turshak 2009) and IITA Ibadan (Adeyanju *et al*. 2014).

***Fraseria griseigularis* Grey-throated Flycatcher.** Observed and song recorded on Old Ndebiji Hill, 26–27 Nov 2003 (Gartshore 2004). Observed and song recorded at Erokut, 19 and 27–28 Nov 2004. Three records listed by Elgood *et al*. (1994), including one from CRNP Oban Division; one observation there subsequently (Demey *et al.* 2003).

***Fraseria olivascens* Olivaceous Flycatcher.** Recorded once at Ina River, 22 Nov 2003. Few Nigerian records, although these include one from CRNP Oban Division (Elgood *et al*. 1994); one subsequent observation from IITA, Ibadan (Adeyanju *et al*. 2014) but in the absence of supporting detail this record is perhaps best treated with caution, since this species is otherwise unknown from SW Nigeria and the Dahomey Gap..

***Sheppardia poensis* Short-tailed Akalat.** Recorded in Old Ndebiji Hills ridge forest and from near the summit of Old Aking Hill where it was also mist-netted, Nov 2003 (Gartshore 2004). Seen in Old Ndebiji Hills ridge forest on several occasions and caught in mist-nets, Dec 2004. Previously known in Nigeria only from the Obudu Plateau (Elgood *et al*. 1994); ours are the first records from CRNP.

Chalcomitra rubescens* Green-throated Sunbird.** A pair seen near Old Ndebiji Hills base camp, 9 Dec 2004. Distinctive subspecies ***crossensis, first recorded in Nigeria at three localities (Hopkins *et al*. 1999); subsequently reported from CRNP Oban Division (Ezealor 2001). There are few published records of this race, whose taxonomic status is unclear (Hopkins *et al*. 1999).

***Cinnyris johannae* Johanna's Sunbird.** At least two pairs recorded at Erokut and one pair at Old Ndebiji Hills base camp, Nov 2004, are the first records from CRNP. Two localities listed by Elgood *et al*. (1994), one of which, Lagos, is almost certainly an error as the species is otherwise unknown between Ghana and SE Nigeria (R.J. Dowsett *in litt*.). Subsequently reported from Gashaka-Gumti National Park and Afi River Forest Reserve (Ezealor 2001, Demey *et al.* 2003), and more recently from Rhoko Camp (Hall *et al*. 2015).

***Cinnyris batesi* Bates's Sunbird.** At least one seen with certainty at Ina River, in the company of other sunbirds, and another at Old Ndebiji Hill ridge camp, Dec 2004. Identified by the small size, non-glossy plumage, plain grey face, uniform dark olive-grey above, paler below with some yellow on the belly; bill strongly decurved, pale pinkish at the base, otherwise dark. Few confirmed records in Nigeria (Elgood *et al*. 1994), but suspected in CRNP Oban Division by Ash *et al*. (1989) and since reported

there by Ezealor (2001). Subsequently recorded from Omo Forest Reserve (Green *et al*. 2007, Olmos & Turshak 2009).

***Ploceus albinucha* Maxwell's Black Weaver.** A flock of up to six individuals at Ina River, 22 Nov 2004. Rarely reported from Nigeria, although previously recorded from the CRNP Oban Division area (Elgood *et al*. 1994). Since recorded from Omo Forest Reserve (Green *et al*. 2007, Olmos & Turshak 2009).

***Malimbus erythrogaster* Red-bellied Malimbe.** A pair in Bashu village, 13 Dec 2004. While said to be a "not uncommon resident" by Elgood *et al*. (1994) and reported from CRNP Oban Division by Ezealor (2001), we are unaware of any other recent records.

***Nigrita luteifrons* Pale-fronted Nigrita.** Three seen together once at Erokut, 27 Nov 2004. Few records from E Nigeria (Elgood *et al*. 1994) and this appears to be the first from CRNP.

***Parmoptila woodhousei* Woodhouse's Antpecker.** Recorded once at Ina River and several times at Old Ndebiji Hills ridge camp, where five caught in mist nets, 3–6 Dec 2004. Also mist-netted at Old Ndebiji Hills, 24 Nov 2003 (Gartshore 2004). Previously known from a few Nigerian localities, of which CRNP was one (Elgood *et al*. 1994, Demey *et al.* 2003). Since also recorded around Rhoko Camp (Hall *et al*. 2015), and from Omo Forest Reserve (Green *et al*. 2007).

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L'avifaune du sous-bois de la forêt montagnarde de Burhinyi (Massif d'Itombwe, République Démocratique du Congo) et effets des activités humaines

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Résumé

Cette étude avait pour but d'examiner la structure du peuplement aviaire selon un gradient altitudinal et évaluer les effets des activités humaines sur sa diversité dans le sous-bois de la forêt de Burhinyi, à l'est de la République Démocratique du Congo (RDC). La capture aux filets japonais et des observations opportunistes ont été faites dans quatre sites choisis dans la forêt intacte et dans la forêt perturbée. Parmi les 16 espèces les plus abondantes des 121 espèces et sous-espèces inventoriées, le Souimanga d'Aline *Cyanomitra alinae* et le Bulbul à gorge grise *Arizelocichla nigriceps* se démarquent avec une abondance élevée au site de Katasomwa (forêt montagnarde horizon moyen). La famille des Muscicapidae s'est avérée la plus riche, avec 13 espèces. Vingt-deux espèces et sous-espèces endémiques du Rift Albertin ont été identifiées, considérées comme importantes pour la conservation de cette forêt, parmi elles le Sénégali de Shelley *Cryptospiza shelleyi*, espèce en danger selon la Liste Rouge de l'UICN, et trois genres, à savoir *Pseudocalyptomena*, *Hemitesia* et *Graueria*. La présence du Gonolek de Willard *Laniarius poensis willardi* dans le massif d'Itombwe est confirmée au-dessus de 2000 m, en sympatrie avec le Gonolek de montagne *L. holomelas*, et la Grive du Ruwenzori *Geokichla piaggiae piaggiae* se trouve

en sympatrie avec la Grive du Kivu *G. p. tanganjicae*. Le nombre des espèces a varié entre les deux types de forêt (intacte et anthropisée), avec une diminution significative dans les forêts perturbées.

Summary

The birds of the understorey of the montane forest of Burhinyi (Itombwe Massif, Democratic Republic of Congo) and the effect of human activities. The aim of this study was to investigate the bird population structure across an altitudinal gradient and assess the effects of human activities on bird diversity in the understorey of the Burhinyi forest, eastern Democratic Republic of Congo (DRC). Mist-netting and opportunistic observations were made at four selected sites in the intact and disturbed forest. Of the 16 most abundant species among the 121 species recorded, the Rwenzori Blue-headed Sunbird *Cyanomitra alinae* and the Mountain Greenbul *Arizelocichla nigriceps* stood out with high abundance at the Katasomwa site. Muscicapidae was the richest family with 13 species. Twenty-two Albertine Rift endemic species or subspecies were found, considered of importance for the conservation of this forest, among them Shelley's Crimsonwing *Cryptospiza shelleyi* (Endangered according to the IUCN Red List) and three genera, *Pseudocalyptomena*, *Hemitesia* and *Graueria*. The presence of Willard's Sooty Boubou *Laniarius poensis willardi* in the Itombwe Massif is confirmed above 2000 m, in sympatry with the Albertine Sooty Boubou *L. holomelas*, and the Abyssinian Ground-Thrush *Geokichla piaggiae piaggiae* in sympatry with the Kivu Ground-Thrush *G. p. tanganjicae*. Species richness varied between the two types of forest (intact and disturbed), with significantly fewer species in disturbed forests.

Introduction

Malgré la richesse de la flore et la faune des forêts tropicales de montagne (Barthlott *et al.* 1996), la connaissance de leur distribution est toujours fragmentaire (Kessler 2001, Lomolino 2001). Les montagnes sont gravement menacées par les changements globaux (Beniston 2003) et le réchauffement climatique affecte davantage les forêts de montagne que celles de basse altitude, étant donné que le climat, l'hydrologie et la végétation y sont changeants sur une courte distance (Whiteman 2000, Borsdorf & Braun 2008). Les montagnes du Rift Albertin constituent un ensemble exceptionnel à haute endémicité (Guillaumet 2009); les Parcs Nationaux de Kahuzi-Biega et des Virunga y sont localisés, y compris la Réserve Naturelle d'Itombwe (RNI) et certaines forêts des communautés locales (Doumenge *et al.* 2015, Imani *et al.* 2016). Itombwe est parmi les plus importantes forêts d'Afrique pour la conservation des oiseaux car

elle abrite le plus grand nombre d'espèces d'oiseaux (588) jamais enregistré dans un seul bloc forestier en Afrique, soit la moitié de toutes les espèces d'oiseaux connues en République Démocratique du Congo (RDC). À ce titre, elle est un site par excellence pour la conservation de la biodiversité (Prigogine 1984, 1985, Wilson & Catsis 1990, Omari *et al*. 1999, Plumptre *et al*. 2007). Plusieurs études ont montré que le plus grand nombre des espèces endémiques du Rift Albertin sont confinées dans le massif d'Itombwe (Laurent 1964, Prigogine 1971, 1978, 1986, Greenbaum & Kusamba 2012).

La forêt de Burhinyi qui fait l'objet de cette étude est située dans la chefferie de Burhinyi, au nord du Massif d'Itombwe à 2°45′S 28°33′E et couvre une superficie d'environ 132 km^2 dans la partie orientale de la RDC (Fig. 1). Une grande partie de cette forêt fait partie de la RNI dont la délimitation participative et le zonage sont en cours depuis 2007. Les premières tentatives de délimitation non consultatives de la RNI avaient engendré beaucoup de frictions au sein des communautés locales, ce qui les avait poussées à initier leurs propres stratégies de conservation avec l'appui de quelques organisations non gouvernementales (ONG) locales. Depuis 2009 un processus conjoint incluant l'Institut Congolais pour la Conservation de la Nature et les ONG de conservation a été mis en place en concertation avec les communautés locales pour déterminer consensuellement les limites de la réserve (Mubalama *et al*. 2013, Plumptre & Kujirakwinja 2016). La présente recherche cadre avec cette initiative en abordant, entre autres, l'inventaire de l'avifaune de la forêt, avec l'objectif d'évaluer la structure du peuplement et les effets des activités anthropiques sur l'avifaune.

Méthodes

Le système hydrographique de la forêt de Burhinyi est très développé avec de nombreux cours d'eau, dont la rivière Kilungutwe constitue sa limite sud-ouest. La forêt possède un régime pluviométrique bimodal avec de grandes quantités de pluies en septembre–décembre et en mars–avril. La précipitation moyenne annuelle varie entre 1500 et 2400 mm, la température moyenne annuelle est d'environ 19,5°C et l'humidité, très élevée le matin, dépasse 90 % et varie autour de 77 % en moyenne (Prigogine 1978). La forêt est caractéristique d'un paysage montagneux entre 1000 et 3000 m d'altitude. Elle peut être subdivisée en quatre bandes altitudinales distinctes en raison de leurs caractéristiques floristique et structurale: sub-montagnard (1200–1500 m), montagnard horizon inférieur (1500–2000 m), montagnard horizon moyen (2000–2500 m) et montagnard horizon supérieur (2500–3000 m) (Doumenge 1998). La partie nord-ouest (village de Bushali) de la forêt fait l'objet d'une exploitation forestière commerciale. Parmi d'autres activités anthropiques observées, l'exploitation artisanale des minerais, l'agriculture itinérante sur brûlis, la production de charbon de bois et la chasse, notamment le piégeage, constituent une grande menace pour la diversité faunique.

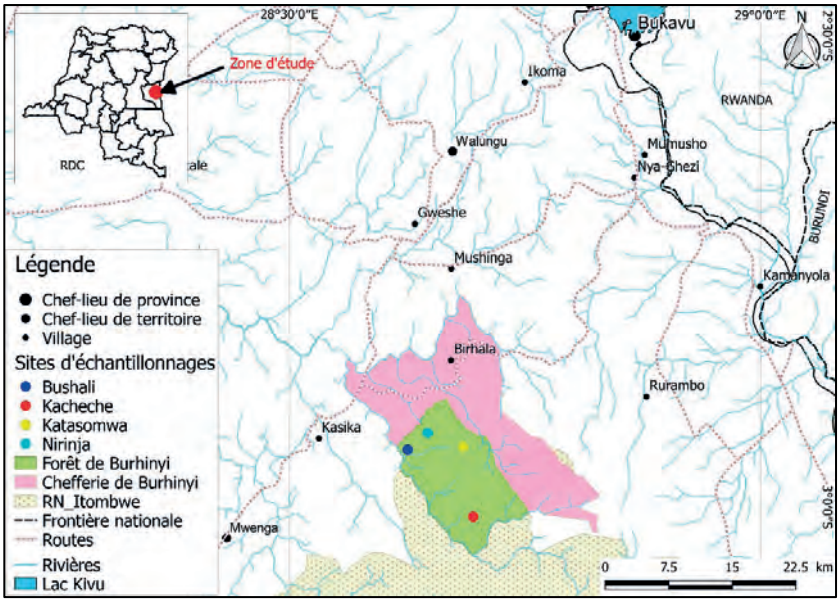

Figure 1. Localisation de la forêt de Burhinyi au Sud-Kivu en RD Congo.

L'inventaire des oiseaux a été effectué au cours d'une période allant de juillet 2015 à août 2019 en 12 campagnes de capture aux filets japonais, d'une durée de cinq jours par sortie de terrain. Au total 24 relevés d'oiseaux ont été faits dans quatre sites (6 relevés par site) qui représentent les quatre bandes altitudinales: Bushali, forêt sub-montagnarde; Nirinja, forêt montagnarde horizon inférieur; Katasomwa, forêt montagnarde horizon moyen; Kacheche, forêt montagnarde horizon supérieur. Dans chaque site, les captures ont été chaque fois faites dans deux différents types d'habitat: la forêt intacte (non perturbée) et la forêt perturbée ou anthropisée (espace au milieu de la forêt, soit jachère autrefois cultivée, ancienne carrière minière ou ancien site d'exploitation artisanale du bois).

Les dix filets japonais (de 12 m de longueur, 4 m de largeur et 36 mm de mailles) étaient placés d'une manière aléatoire dans chaque site, ouverts 12 h par jour et fermés la nuit. Leurs vérifications (relevés) se sont faites chaque fois après deux heures à partir de 6h00 du matin. Au total, les filets ont été exposés pendant 720 h (soit 12 h d'exposition par jour pendant 60 jours). Les oiseaux étaient identifiés en utilisant Sinclair & Ryan (2010) et Stevenson & Fanshawe (2002), et relâchés immédiatement dans leur station de capture sans toutefois être bagués. Les photos des spécimens non identifiés sur le terrain ont été envoyées au Field Museum of Chicago pour des études ultérieures.

Le test statistique Kruskall-Wallis a été effectué avec le logiciel Statistica 6 pour évaluer des différences entre les deux types d'habitats prospectés et la variation des captures en fonction des saisons.

Résultats

Au total, 121 espèces et sous-espèces ont été inventoriées dans les quatre sites prospectés (Tableau 1), avec trois genres (*Pseudocalyptomena*, *Hemitesia*, *Graueria*), 19 espèces et trois sous-espèces endémiques du Rift Albertin. La famille de Muscicapidae est la plus riche en espèces (13).

Tableau 1. Les 121 espèces inventoriées dans le sous-bois de la forêt de Burhinyi, leurs habitats (forêt intacte FI ou perturbée FP), sites (B Bushali, N Nirinja, KT Katasomwa, KC Kacheche), statut selon l'UICN (PC Peu concerné; QM Quasi-menacée; VU Vulnérable; DI Donnée insuffisantes; EN En danger) et en gras les espèces et sous-espèces endémiques du Rift Albertin.

	Habitat	Sites	Statut
Columbidae			
Columba arquatrix Pigeon rameron	FI	KT	PC
Turtur tympanistria Tourtelette tambourette	FI	B, KT	PC
Caprimulgidae			
Caprimulgus fossii Engoulevent du Mozambique	FP	KT	PC
C. poliocephalus ***ruwenzorii*** Engoulevent du Ruwenzori	FP	KT	–
Cuculidae			
Ceuthmochares aereus Coucal à bec jaune	FI	B	PC
Chrysococcyx klaas Coucou de Klass	FP	N	PC
Cercococcyx montanus Coucou montagnard	FI	KT	PC
Rallidae			
Rallus caerulescens Râle bleuâtre	FI	KT	PC
Musophagidae			
Gallirex johnstoni Touraco du Ruwenzori	FI	N	PC
Accipitridae			
Accipiter minullus Epervier minule	FI	KT	PC
Coliidae			
Colius striatus Coliou rayé	FP	N, KT	PC
Meropidae			
Merops oreobates Guêpier montagnard	FP	N	PC
Lybiidae			
Pogoniulus scolopaceus Barbion grivelé	FI	B	PC
P. coryphaea Barbion montagnard	FI	KC	PC

	Habitat	Sites	Statut
P. bilineatus Barbion à croupion jaune	FI, FP	B, N, KT, KC	PC
Indicatoridae			
Indicator pumilio Indicateur nain (Fig. 2)	FI	N, KT, KC	QM
I. variegatus Indicateur écaillé	FI	KT, KC	PC
Picidae			
Campethera nivosa Pic tacheté	FI	B	PC
Dendropicos griseocephalus Pic olive	FI	KT	PC
Eurylaimidae			
Pseudocalyptomena graueri Eurylaime de Grauer	FI	N	VU
Smithornis capensis Eurylaime du Cap	FI	KT, KC	PC
Oriolidae			
Oriolus larvatus Loriot à tête noire oriental	FP	KT	PC
Platysteiridae			
Batis diops Gobemouche soyeux du Ruwenzori	FI	N, KT, KC	PC
B. molitor Gobemouche soyeux molitor	FI	KC	PC
Dyaphorophyia castanea Pririt Châtin	FI, FP	B	PC
Malaconotidae			
Laniarius holomelas Gonolek de montagne	FI, FP	N, KT, KC	PC
L. poensis ***willardi*** Gonolek de Willard	FI	KT, KC	DI
Dryoscopus angolensis Cubla à pattes roses	FP	N	PC
D. gambensis Cubla de Gambie	FI, FP	KT, KC	PC
Tchagra australis Tchagra à tête brune	FP	N	PC
Telophorus dohertyi Gladiateur de Doherty	FP	KT	PC
Dicruridae			
Dicrurus atripennis Drongo de forêt	FI	N	PC
Monarchidae			
Terpsiphone viridis Gobemouche paradis d'Afrique	FI	B	PC
T. rufiventer Gobemouche paradis à ventre roux	FI	B	PC
Laniidae			
Lanius mackinnoni Pie-grièche de Mackinnon	FI, FP	N, KT	PC
Stenostiridae			
Elminia albonotata Gobemouche huppé à queue blanche	FI	KT	PC
E. albiventris Gobemouche huppé à ventre blanc	FI	N, KT	PC
Paridae			
Melaniparus rufiventris Mésange à ventre canelle	FI, FP	KT, KC	PC
Nicatoridae			
Nicator chloris Nicator à gorge grise	FI	B	PC
Macrosphenidae			
Sylvietta leucophrys Crombec à sourcils blancs	FI	KT, KC	PC
Graueria vittata Fauvette de Grauer (Fig. 2)	FI	KT	PC

	Habitat	Sites	Statut
Cisticolidae			
Oreolais ruwenzorii Apalis du Ruwenzori	FI	N, KT, KC	PC
Apalis binotata Apalis masquée	FI	N	PC
A. personata Apalis masquée des montagnes	FI	KT, KC	PC
A. porphyrolaema Apalis à gorge marron	FI	N, KT	PC
Camaroptera brachyura Camaroptère à tête grise	FI, FP	B, N	PC
Cisticola chubbi Cisticole de Chubb	FI, FP	N, KT, KC	PC
Bathmocercus rufus Fauvette rousse à face noire	FI	B, N	PC
Prinia bairdii Prinia rayée	FI	N, KT, KC	PC
Acrocephalidae			
Iduna similis Fauvette jaune de montagne	FI	KT, KC	PC
Locustellidae			
Bradypterus lopezi Fauvette brune des forêts	FI	KT, KC	PC
B. cinnamomeus Fauvette cannelle	FI	KT, KC	PC
Hirundinidae			
Psalidoprocne pristoptera Hirondelle hérissée bleue	FP	N	PC
Pycnonotidae			
Bleda syndactylus Bulbul moustac à queue rousse	FI	B	PC
Arizelocichla nigriceps Bulbul à gorge grise (Fig. 2)	FI	N, KT, KC	PC
A. masukuensis Bulbul de Masuku	FI	N, KT	PC
Eurillas latirostris Bulbul à moustache jaune	FI, FP	B, N, KT, KC	PC
E. virens Bulbul verdâtre	FI, FP	B, N	PC
Criniger chloronotus Bulbul à dos vert	FI	B	PC
C. calurus Bulbul huppé à barbe blanche	FI	B	PC
C. ndussumensis Bulbul de Reichenow	FI	B, N	PC
Phyllastrephus cabanisi Bulbul de Cabanis	FI	N	PC
P. hypochloris Bulbul de Toro	FI	N	PC
P. flavostriatus Bulbul à stries jaunes	FI	N, KT, KC	PC
Pycnonotus barbatus Bulbul aux lunettes	FP	N, KT, KC	PC
Phylloscopidae			
Phylloscopus laetus Pouillot à face rousse	FI	KT, KC	PC
Scotocercidae			
Hemitesia neumanni Fauvette de Neumann	FI	N, KT, KC	PC
Hylia prasina Hylia verte	FI	B	PC
Sylvidae			
Sylvia abyssinica Pseudalcippe d'Abyssinie	FI	N, KT, KC	PC
Zosteropidae			
Zosterops senegalensis Zostérops jaune	FI, FP	N, KT, KC	PC
Pellorneidae			
Illadopsis rufipennis Akalat à poitrine blanche	FI	B	PC
I. pyrrhoptera Akalat montagnard	FI	N, KT, KC	PC

	Habitat	Sites	Statut
I. albipectus Akalat à poitrine écaillée	FI	B	PC
Sturnidae			
Onychognathus walleri Etourneau de montagne à bec court	FP	N	PC
Pholia sharpii Etourneau de Sharpe	FI	KT	PC
Turdidae			
Neocossyphus rufus Néocossyphe à queue rousse	FI	B	PC
Stizorhina fraseri Néocossyphe de Fraser	FI	BUS	PC
Geokichla piaggiae piaggiae Grive du Ruwenzori	FI	KT, KC	PC
G. p. ***tanganjicae*** Grive du Kivu	FI	N	–
Turdus abyssinicus Merle d'Abyssine	FI	KT, KC	PC
T. pelios Merle africain	FI, FP	KT, KC	PC
Muscicapidae			
Muscicapa adusta Gobemouche sombre	FP	N	PC
Fraseria griseigularis Gobe mouche à gorge grise	FI	B, N	PC
Melaenornis fischeri Gobemouche de Fischer	FI	KT, KC	PC
Dessonornis caffer Cossyphe du Cap	FI	KT, KC	PC
D. archeri Cossyphe d'Archer	FI	KT, KC	PC
Pogonocichla stellata Rougegorge étoilé	FI	KT, KC	PC
Cossyphicula roberti Cossyphe à ventre blanc	FI	N, KT, KC	PC
Chamaetylas poliophrys Alèthe à gorge rousse	FI	N, KT, KC	PC
C. poliocephala Alèthe à poitrine brune	FI	B	PC
Saxicola torquata Traquet pâtre	FP	KC	PC
Stiphrornis erythrothorax Rougegorge de forêt	FI	B	PC
Sheppardia aequatorialis Merle rougegorge équatorial	FI, FP	N	PC
S. cyornithopsis Merle rougegorge Akalat	FI	N	PC
Modulatricidae			
Kakamega poliothorax Akalat à poitrine grise	FI	N, KT, KC	PC
Nectariniidae			
Anthreptes rectirostris Souimanga à bec droit	FI	KT, KC	PC
Hedydipna collaris Souimanga à collier	FP	N	PC
Cyanomitra verticalis Souimanga à tête verte	FP	N	PC
C. alinae Souimanga à tête bleue du Ruwenzori	FI, FP	N, KT, KC	PC
C. olivacea Souimanga olivâtre	FI, FP	B, N	PCPC
Nectarinia purpureiventris Souimanga à ventre pourpre	FI	KT	PC
Cinnyris stuhlmanni Souimanga de Stuhlmann	FI	KT, KC	LC
C. reichenowi Souimanga de Reichenow	FP	N	PC
C. regius Nectarin royal	FI, FP	KT, KC	PC
Ploceidae			
Ploceus baglafecht Tisserin baglafecht	FP	KC	PC
P. alienus Tisserin de montagne	FI	N, KT, KC	PC
P. bicolor Tisserin bicolore	FP	N	PC

	Habitat	Sites	Statut
Estrildidae			
Spermophaga poliogenys Grosbec à front rouge	FP	BUS	PC
Estrilda kandti Astrild de Kandt	FI, FP	KT, KC	PC
Mandingoa nitidula Bengali vert tacheté	FI, FP	B	PC
Cryptospiza reichenovi Bengali de Reichenow	FI, FP	B, N	PC
C. jacksoni Bengali de Jackson	FI	KT, KC	PC
C. shelleyi Bengali de Shelley	FI	KT, KC	EN
Nigrita bicolor Nigrette à ventre roux	FI, FP	B	PC
Parmoptila woodhousei Astrild fourmilier à tête rouge	FI	B	PC
Fringillidae			
Crithagra frontalis Serin à diadème	FP	KT, KC	PC
C. capistrata Serin à masque noir	FP	KT	PC
C. mozambica Serin du Mozambique	FP	KT	PC
C. striolata Serin strié	FP	N, KT, KC	PC
C. burtoni Serin de Burton	FI, FP	KT, KC	PC
Serinus flavivertex Serin jaune	FP	KT	PC

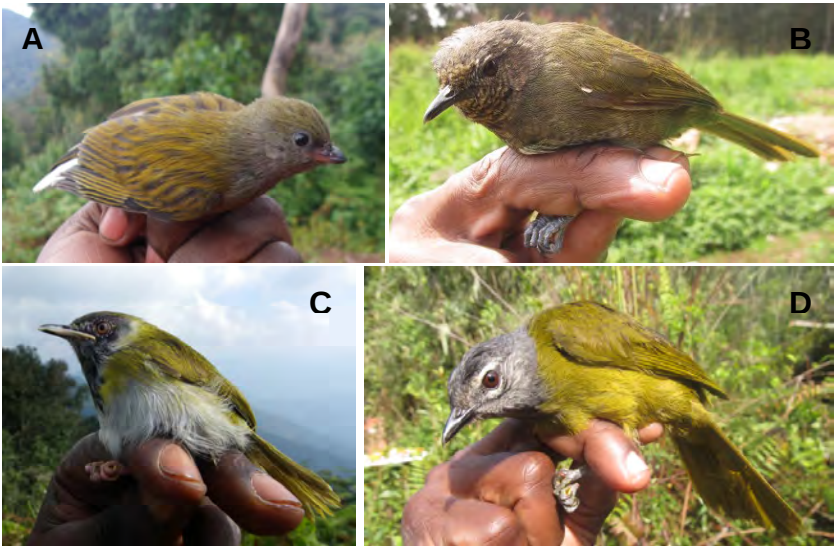

Figure 2. Sélection des espèces capturées sur les sites d'étude: A, Indicateur nain *Indicator pumilio*, Kacheche, 2795 m, 17 mars 2017; B, Fauvette de Grauer *Graueria vittata*, Katasomwa, 2096 m, 31 oct 2016; C, Apalis masquée des montagnes *Apalis personata*, Kacheche, 2509 m, 21 juin 2017; D, Bulbul à gorge grise *Arizelocichla nigriceps*, Nirinja, 1532 m, 23 oct 2016. Photos: BMC.

Le Tableau 2 montre que le site de Katasomwa (forêt montagnarde horizon moyen) est le plus riche en espèces (69), avec le plus grand nombre d'espèces forestières (44). Les activités anthropiques s'observent plus à Nirinja avec 14 espèces de milieux anthropisés.

Tableau 2. Répartition spatiale des espèces inventoriées dans la forêt de Burhinyi.

	Bushali	Nirinja	Katasomwa	Kacheche
Forêt intacte	21	26	44	34
Forêt perturbée	1	14	11	5
Les deux types de forêt	9	12	14	12
Total d'espèces	31	52	69	51

Le plus grand nombre d'individus (57,6 % du total de captures) a été capturé dans la forêt intacte de Katasomwa (forêt montagnarde horizon moyen) (Tableau 3), et une différence significative a été observée entre les deux types d'habitats (Kruskal-Wallis $P = 0{,}011$) (avec un effort de capture égal dans les quatre sites, et de même, égal dans les deux types d'habitats).

Sur l'ensemble de 121 espèces et sous-espèces, 16 représentent à elles seules environ 69 % de toutes nos captures dans le sous-bois de cette forêt, bien que les espèces les plus abondantes ne soient pas les mêmes dans tous les sites (Tableau 4).

L'espèce la plus souvent capturée, *Cyanomitra alinae*, est une espèce de montagne, plus souvent capturée sur les sites de Katasomwa et Nirinja, mais non récoltée à Bushali. Elle est suivie de *Arizelocichla nigriceps*, espèce de montagne avec une forte présence à Katasomwa. Toutes ces 16 espèces sont plus abondantes à Katasomwa sauf deux (*Cyanomitra olivacea* et *Eurillas virens*) qui sont généralement des espèces de basses altitudes. Trois espèces (*Cinnyris regius*, *Cryptospiza jacksoni* et *Pogonocichla stellata*) sont présentes sur uniquement deux sites (Katasomwa et Kacheche) et sont donc véritablement montagnardes.

Le plus grand nombre de captures a été réalisé en saison sèche, surtout dans le site de Katasomwa, mais il n'y a pas de différences saisonnières significatives ($P = 0{,}9164$). Pour l'ensemble des sites visités, les moyennes (± DS) des espèces ont été plus

Tableau 3. Captures des oiseaux dans les sites et types d'habitats.

	Forêt Intacte	Forêt Perturbée	Total captures
Bushali	301	64	365
Nirinja	193	111	304
Katasomwa	1081	270	1351
Kacheche	273	52	325
Total	1848	497	2345

Tableau 4. Nombres de captures des 16 espèces les plus souvent capturées aux quatre sites d'investigation.

	Bushali	Nirinja	Katasomwa	Kacheche	Totaux
Batis diops		10	52	9	71
Laniarius poensis		3	27	6	36
Oreolais ruwenzorii		2	35	3	40
Prinia bairdii		2	55	1	58
Arizelocichla nigriceps		7	129	55	191
Eurillas latirostris	30	32	29	1	92
Eurillas virens	75	12			87
Sylvia abyssinica		7	41	7	55
Zosterops senegalensis		14	48	6	68
Illadopsis pyrrhoptera		15	55	16	86
Pogonocichla stellata			98	18	116
Chamaetylas poliophrys		9	91	35	135
Cyanomitra alinae		32	186	10	228
Cyanomitra olivacea	74	21			95
Cinnyris regius			141	19	160
Cryptospiza jacksoni			83	10	93

élevées en saison pluvieuse (42 ± 32 espèces, n = 4 sites) qu'en saison sèche (37 ± 20), mais la différence n'est pas significative (χ^2, P = 0,561).

Une espèce en danger (*Cryptospiza shelleyi*) a été récoltée sur les sites de Katasomwa et Kacheche dans une tranche d'altitude de 2000 à >2500 m (Murhabale *et al.* 2019).

Laniarius p. willardi (Voelker *et al.* 2010) a été récolté pour la première fois dans la forêt de Burhinyi (Fig. 3). Au total cinq individus de cette espèce ont été capturés dont trois collectés le 18–19 août 2016 à Katasomwa (forêt montagnarde horizon moyen) entre 2300 et 2600 m, dans la strate arborescente d'un sous-bois dominé par *Xymalos monospora* et *Tricalysia cacondensis*, dans une forêt primaire dominée par *Symphonia globulifera*, *Rapanea* sp, *Ficalhoa laurifolia* et *Nuxia congesta*. La plupart des individus de la canopée supérieure sont plus représentés dans le sous-bois prouvant un taux de régénération propice à une dynamique de restauration forestière. Les deux autres spécimens ont été observés le 13 mai 2019 dans le site de Kacheche (forêt montagnarde horizon supérieur), généralement dominé par *Symphonia globulifera*, *Heisteria parviflora*, *Syzygium guineense*, *Faurea saligna*, *Ocotea usambarensis* et *Turraenthus africanus*, respectivement en ordre décroissant. Voelker *et al.* (2010) ont constaté que son aire de répartition ne dépassait pas 2000 m d'altitude, mais dans la forêt de Burhinyi nous avons récolté les cinq individus au-dessus de 2300 m, où cette espèce vit en sympatrie avec le Gonolek de montagne *Laniarius holomelas* (Fig. 4). Cette dernière espèce a été capturée plusieurs fois, dans

trois sites (Nirinja, Katasomwa et Kacheche) de 1500 m jusqu'à 2750 m d'altitude. Elle fréquente aussi la forêt intacte mais, contrairement au Gonolek de Willard, elle a été observée même dans la forêt perturbée (jachère).

Figure 3. Gonolek de Willard *Laniarius poensis willardi* à iris gris, Katasomwa à 2486 m, 19 août 2016 (photo: BMC).

Figure 4. Gonolek de montagne *Laniarius holomelas* à iris brun, Kacheche à 2530 m, 18 août 2016 (à gauche) et 12 mai 2019 (photos: BMC).

Par ailleurs, nous avons observé la présence de la Grive du Kivu *Geokichla piaggiae tanganjicae* et de la Grive du Ruwenzori *G. p. piaggiae*) dans le même habitat à Burhinyi (Fig. 5). Nous les avons capturées une fois dans un même filet à Katasomwa. Leur présence dans un même site plaide en faveur de leur séparation taxonomique moyennant des analyses supplémentaires, comme étant des espèces différentes.

Figure 5. A gauche, Grive du Kivu *Geokichla piaggiae tanganjicae* et, à droite, Grive du Ruwenzori *G. p. piaggiae*, Katasomwa à 2121 m, 26 avr 2018 (photos: BMC).

Discussion

L'avifaune de montagne de Burhinyi n'avait jamais fait l'objet d'une étude scientifique. Nous avons inventorié 121 espèces et sous-espèces le long d'un gradient altitudinal dans le sous-bois de la forêt de Burhinyi. Dans le massif d'Itombwe où se localise cette forêt, Prigogine (1971, 1975, 1977, 1978) a inventorié 565 espèces et Omari *et al.* (1999) ont trouvé 248 espèces avec un complément de 23 nouvelles espèces sur la liste de l'avifaune d'Itombwe. Comparée aux résultats de ces auteurs, l'avifaune inventoriée dans le sous-bois de la forêt de Burhinyi représente respectivement 49 % (Omari *et al* 1999) et 21 % (Prigogine), ce qui montre que cette forêt (qui ne représente que 0,9 % du Massif d'Itombwe) est extrêmement riche en avifaune.

Nos résultats relèvent 22 espèces et sous-espèces et trois genres endémiques dans la forêt de Burhinyi justifiant ainsi son importance globale pour la conservation de la biodiversité. Plusieurs études (Butynski *et al*. 1997, Omari *et al*. 1999, Bober *et al.* 2001, Plumptre *et al*. 2007) ont fait état de 41 espèces endémiques dans le Rift Albertin. Le sous-bois de cette forêt abrite ainsi 54 % des espèces endémiques du Rift Albertin et près de 63 % des espèces endémiques connues dans le Massif d'Itombwe, parmi eux, une espèce en danger (*Cryptospiza shelleyi*) et deux espèces vulnérables (*Pseudocalyptomena graueri* et *Cinnyris stuhlmanni*).

Cette étude a permis de confirmer la présence du Gonolek de Willard *Laniarius p. willardi* dans l'Itombwe. Depuis la description de cette espèce (Voelker *et al.* 2010)

peu de travaux de terrain ont été menés pour renseigner davantage sur son écologie, voire sa distribution. Vu l'insuffisance des données sur le Gonolek de Willard, nous ne saurions pas confirmer si sa présence au-delà de 2000 m d'altitude est un phénomène récent dû aux changements climatiques comme cela a été observé chez *Cryptospiza shelleyi* et plusieurs espèces de la région (Murhabale *et al.* 2019). Notons cependant que la forêt de Burhinyi n'a pas été explorée par Prigogine bien qu'il ait sillonné une bonne partie du massif d'Itombwe.

Globalement, les effets des activités humaines réduisent sensiblement la diversité des espèces, les structures des peuplements et des processus écologiques à diverses échelles spatiales (Olden *et al*. 2004). Plusieurs espèces d'oiseaux forestières ont des niches très étroites et montrent une certaine sensibilité aux dérangements de leurs habitats (Blondel & Mourer-Chauviré 1998). Nous retenons que dans la forêt de Burhinyi l'avifaune de sous-bois est significativement affectée par les activités anthropiques, où ces activités représentent actuellement une des principales menaces pour l'avifaune. Par ailleurs, le Souimanga d'Aline, connu comme spécialiste des forêts de montagne du Rift Albertin (Bennun *et al*. 1996), a été plusieurs fois récolté dans les blocs perturbés, voire même dans les jeunes jachères à Burhinyi. Il semble s'adapter aux conditions changeantes de cette zone.

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Distribution de l'Apalis de Bamenda *Apalis bamendae*

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Résumé

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L'ensemble des observations d'Apalis de Bamenda *Apalis bamendae* apporte des précisions sur la répartition de cette espèce quasi endémique du Cameroun, ses préférences altitudinales et relations interspécifiques. Cette analyse projette une répartition de > 100 000 km^2, répartie sur trois pays, en deux populations séparées. Il s'agit d'une distribution nettement plus large que celle généralement acceptée dans la littérature. Les limites altitudinales de l'espèce sont 657 m et 1850 m, où l'espèce paraît commune dans son habitat préféré, les galeries forestières de moyenne altitude, de sorte que son statut UICN de Préoccupation mineure semble mérité.

Summary

Distribution of the Bamenda Apalis *Apalis bamendae*. A compilation of observations of the Bamenda Apalis *Apalis bamendae* provides a more accurate picture of the distribution, altitudinal range and interspecific relationships of this species, which is almost endemic to Cameroon. This analysis results in a projected range of >100,000 km^2 extending into three countries, in two separate populations. This range is much greater than that generally accepted in published literature. The altitudinal limits of the species are 657–1850 m, within which it appears common in its preferred habitat, *i.e.* mid-altitude gallery forest, thus appearing to merit its current IUCN status of Least Concern.

Introduction

L'Apalis de Bamenda *Apalis bamendae* (Fig. 1) est une espèce quasi endémique au Cameroun, inféodée aux galeries forestières de moyenne altitude des régions du Nord-Ouest, de l'Ouest et de l'Adamaoua. Jusqu'au début des années 1990, l'espèce était connue dans huit sites seulement (Urban *et al.* 1997) et considérée comme Vulnérable, selon les critères de l'UICN (IUCN 1996). Des inventaires de 1998 à 2000 dans le cadre du programme sur les Zones Importantes pour la Conservation des

Figure 1. Apalis de Bamenda *Apalis bamendae*, Petpenoun, 14 août 2017.

Oiseaux de Birdlife International ont permis de mieux cerner la distribution et le statut de cette espèce (Bobo *et al.* 2001). Cette distribution était à l'époque confinée entièrement au Cameroun, dans deux zones distinctes. Depuis lors, l'espèce a été observée au Nigeria (Nso *et al.* 2014) et l'auteur a également compilé 70 nouvelles observations, dans le cadre d'un travail national sur la distribution des oiseaux au Cameroun (Languy 2019).

Méthodes

L'ensemble des données ornithologiques publiées, tant dans les revues régulières que dans la "littérature grise" (en particulier les rapports non publiés de différents projets ou de missions de terrain) ont été compulsées: Bannerman & Bates (1924, 1926), Bobo & Languy (2000a, 2000b), Good (1953), Keen (1993), Languy (1999, 2000), Languy & Ndeh (2000), Languy & Njie (2002), Larison *et al.* (2000), Louette (1981), Ngute *et al.* (2019), Njabo (2000, 2012), Njabo & Languy (2000), Njabo *et al.* (2000), Njie (2000, 2001a, 2001b, 2002), Robertson (1992), Serle (1950), Slabbekoorn & Ellers (1999), Smith & McNiven (1993), Stuart (1986) et Urban *et al.* (1997). Une copie de tous les rapports inédits a été remise à la Cameroon Biodiversity Conservation Society, P.O. Box 3055, Messa, Yaoundé, Cameroun. A ces données,

l'auteur a ajouté une cinquantaine d'observations personnelles lors de sorties ornithologiques visant spécifiquement à localiser l'espèce, en 1999–2000 et 2013–19. Les observations personnelles ont été effectuées essentiellement le matin, généralement de l'aube à 11h00 et, dans une moindre mesure, l'après-midi de 16h00 au crépuscule. Lorsque l'espèce n'était ni vue ni entendue, une repasse de son chant était effectuée via de petit baffles de 3 kW, afin de solliciter une réponse.

Toutes ces données ont été compilées en un fichier reprenant pour chacune d'elles les éléments essentiels, dont les coordonnées géographiques de la localité à la minute près (soit un peu moins de 2 km), la date et l'auteur (voir Languy 2019 pour plus de détails). Un total de 185 observations de l'Apalis de Bamenda a été noté, soit 70 de plus que celles analysées par Bobo *et al.* (2001). La moitié de ces nouvelles données proviennent d'observations postérieures à cette publication et l'autre moitié provient d'une recherche plus systématique de la littérature grise des années 1980 et 1990.

Pour chacune des 148 localités, l'altitude a été générée en utilisant une combinaison de Google Earth© et de cartes topographiques au 1:200 000 ainsi que l'altitude donnée par des GPS de marque Garmin pour les observations personnelles. Comme la vaste majorité des données ont été prises depuis une route ou un sentier, et que l'Apalis est confinée aux galeries forestières, il a été possible de définir facilement le point d'observation à <100 m près sur les images satellite. Ceci a permis d'estimer l'altitude de manière assez précise, à <30 m près.

Google Earth a également été utilisé pour définir les aires de répartition sur base des limites altitudinales, largement définies par les escarpements de l'Adamaoua ou la présence de galeries forestières dans les limites altitudinales de l'espèce. Les cartes de distribution ont été produites en utilisant le logiciel DMAP pour Windows© (<dmap.co.uk>).

La même étude a produit 257 données de l'Apalis à gorge rousse *Apalis rufogularis*, 74 pour l'Apalis à gorge jaune *A. flavida*, 63 pour l'Apalis cendrée *A. cinerea*, 55 pour l'Apalis à gorge noire *A. jacksoni*, 21 pour l'Apalis de Gosling *A. goslingi* et 48 pour l'Apalis à col noir *Oreolais pulcher* (Languy 2019).

Résultats

Distribution

Les 185 observations analysées sont réparties dans 148 localités différentes (distantes ≥ 2 km l'une de l'autre). La cartographie de ces localités montre clairement que l'espèce est répartie en deux zones distinctes: la zone montagnarde autour de Bamenda (connue sous le terme de "Bamenda Highlands") et le plateau de l'Adamaoua (Fig. 2). Des recherches actives menées par l'auteur entre ces deux zones ont été infructueuses, confirmant la déconnection totale entre les deux parties de l'aire de répartition, séparées de 40 km.

Les observations sont réparties entre 657 m et 1850 m d'altitude. Une correction importante est apportée ici quant à la donnée la plus élevée, provenant de la zone de

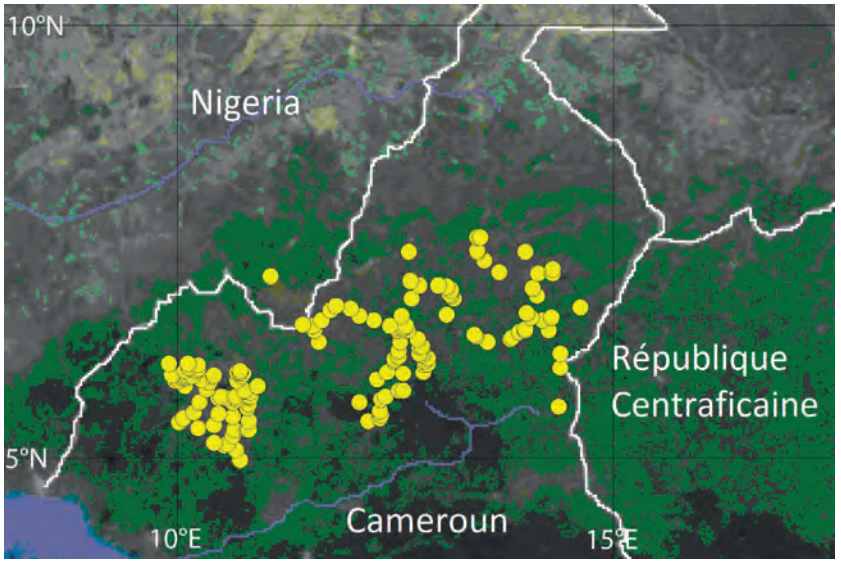

Figure 2. Localisation des observations de terrain de l'Apalis de Bamenda *Apalis bamendae*.

Notong Awing, sur le flanc est des Bamenda Highlands; la localisation précise de la donnée d'origine dans ces collines a permis de corriger la première estimation mentionnée par Bobo *et al.* (2001), de sorte que l'altitude maximale enregistrée jusqu'à présent est 1850 m et non pas 2050 m.

La distribution altitudinale pour la région de Bamenda et de l'Adamaoua montre une amplitude de 730–1850 m et 657–1556 m respectivement (Fig. 3). Dans la zone de Bamenda, plus de la moitié des données (35/63) se situent entre 1100 et 1300 m, alors que sur l'Adamaoua, les observations sont plus étalées, essentiellement entre 700 et 1200 m.

Ségrégation avec d'autres espèces d'Apalis.

Au sein de sa répartition principale, le plateau de l'Adamaoua, *A. bamendae* est fréquemment rencontrée à proximité de l'Apalis à gorge jaune *A. flavida* sans qu'aucune observation de terrain n'indique une compétition entre ces deux espèces (Fig. 4). *A. flavida* semble cependant un peu moins commune et tolère les forêts galeries dans des zones plus sèches et/ou plus chaudes. Au sein des Bamenda Highlands, là où *A. bamendae* a été observée, aucune autre espèce d'Apalis n'a été enregistrée. Par contre, à l'occasion de la recherche de l'Apalis de Bamenda en limite d'aire de répartition, il s'est avéré que lorsque *A. bamendae* est absente, une autre espèce du genre *Apalis* est présente.

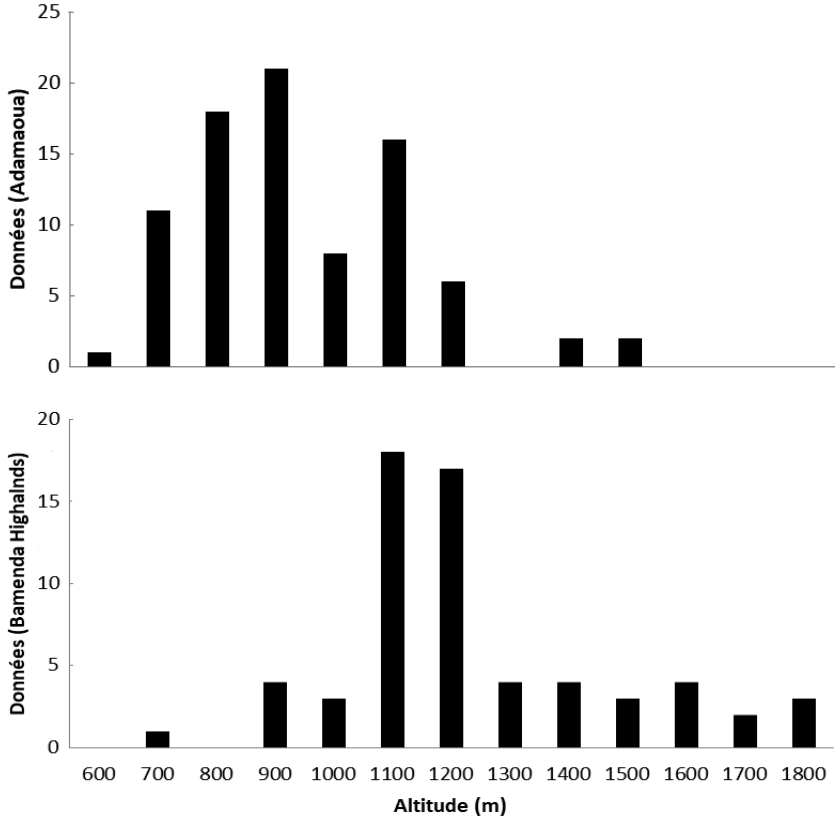

Figure 3. Répartition des observations de l'Apalis de Bamenda *Apalis bamendae* par classe d'altitude, pour les zones des Bamenda Highlands et du Plateau de l'Adamaoua.

La visualisation de cette situation est particulièrement évidente en limite altitudinale inférieure de l'Apalis de Bamenda: cette dernière est alors remplacée par l'Apalis à gorge rousse *Apalis rufogularis* (Fig. 5). A une échelle plus fine, les deux espèces ont été rencontrées très rarement sur la même localité, principalement sur l'escarpement sud de l'Adamaoua: *A. rufogularis* occupe les zones de forêt au pied de l'escarpement et est rapidement remplacée par *A. bamendae* sur les galeries forestières remontant le plateau. La limite altitudinale de rencontre des deux espèces n'est cependant pas fixe: *A. bamendae* a été notée à 657 m d'altitude au lieu-dit PK7 (5°25′N, 12°12′E) en contact avec *A. rufogularis*, sans que cette dernière ne se trouve

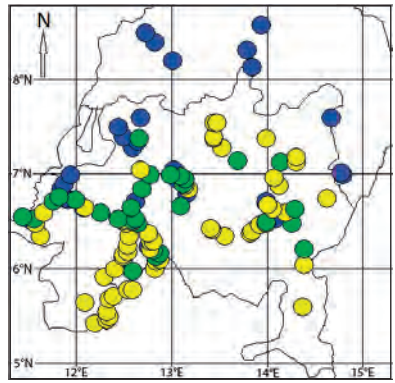

Figure 4. Points d'observation sur le Plateau de l'Adamaoua pour l'Apalis de Bamenda *Apalis bamendae* seule (jaune), Apalis à gorge jaune *Apalis flavida* seule (bleu), et où les deux espèces ont été notées (vert).

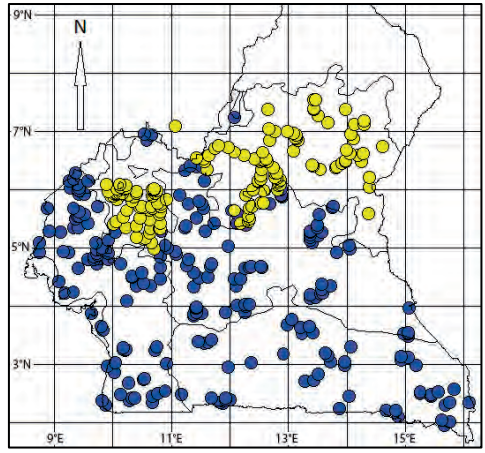

Figure 5. Répartition des données de l'Apalis de Bamenda *Apalis bamendae* (jaune) et de l'Apalis à gorge rousse *Apalis rufogularis* (bleu) au Cameroun.

plus haut, alors qu'une situation similaire existe à 750 m près de Mararaba (5°35′N, 13°51′E) et à 1100 m au sud-ouest de Mayo Darle (6°28′N, 11°30′E). Cette dernière localité se trouve à la limite nord de la plaine du Lac Bankim, entièrement occupée par *A. rufogularis*, où l'escarpement est particulièrement abrupt, *A. bamendae* occupant le plateau en lui-même. Dans le massif de Tchabal Mbabo, *A. bamendae* est

totalement absente et *A. rufogularis* n'est notée quant à elle que dans les galeries les plus basses du massif (J.-B. Dongmo comm. pers.).

L'Apalis de Bamenda a été considérée autrefois comme conspécifique avec l'Apalis de Sharpe *A. sharpii* en Afrique de l'Ouest, et donc absente du Cameroun, ainsi qu'avec l'Apalis de Gosling *A. goslingi* que l'on trouve le long des rivières forestières du sud Cameroun. Les deux localités les plus proches où se trouvent d'une part *A. bamendae* et d'autre part *A. goslingi* sont Yoko et Nguelemendouka, séparées de > 125 km, de sorte que les deux espèces n'entrent jamais en contact.

La limite nord de la répartition de *A. bamendae* correspond au sommet de l'escarpement septentrional du plateau de l'Adamaoua, à près de 8°N. Elle n'a cependant jamais été trouvée sur les pentes de l'escarpement en lui-même, contrairement à la situation dans l'escarpement méridional du plateau.

En ce qui concerne la limite altitudinale supérieure de l'Apalis de Bamenda, plusieurs espèces d'Apalis (*sensu lato*) d'altitude existent au sein de son aire de répartition: l'Apalis à gorge noire *Apalis jacksoni*, l'Apalis cendrée *A. cinerea* et l'Apalis à col noir *Oreolais pulcher*. En dehors de Tchabal Mbabo, dont *A. bamendae* est absente, ces espèces n'existent pas sur l'Adamaoua; toutes existent par contre dans les environs des *Bamenda Highlands*. Sur cette zone, *A. bamendae* existe dans 63 localités différentes (définies par des carrés de 2 x 2 km). *A. jacksoni* n'a été enregistrée dans aucune de ces 63 localités, *Oreolais pulcher* sur une seule et *Apalis cinerea* sur cinq seulement. Il n'existe donc pour ainsi dire aucun recouvrement entre la distribution d'*A. bamendae* et celle des autres espèces d'apalis.

La zone de distribution des données de *A. bamendae* et *A. cinerea* sur le carré de latitude 5–7°N et de longitude 9–11°E (environ 220 x 220 km), totalise 85 données où au moins une des deux espèces est présente (Fig. 6). Tout comme pour la situation entre

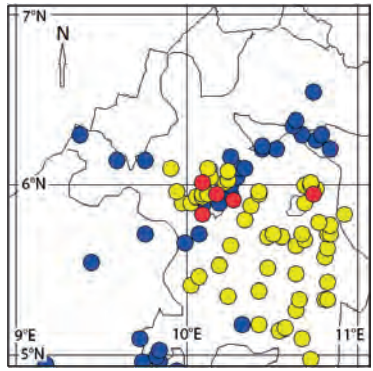

Figure 6. Points d'observation dans la région des *Bamenda Highlands* pour l'Apalis de Bamenda *Apalis bamendae* seule (jaune), l'Apalis cendrée *Apalis cinerea* seule (bleu), et où les deux espèces ont été notées (rouge).

A. bamendae et *A. rufogularis* en limite inférieure d'altitude, *A. bamendae* entre en contact avec *A. cinerea* dans les zones les plus élevées (>1700 m) de son aire, sans que les deux espèces ne se côtoient. Ainsi, près du mont Bana, j'ai observé *A. cinerea* à 1730 m d'altitude et *A. bamendae* immédiatement plus bas.

Statut de l'espèce

Les diverses sources d'observations n'ont pas donné d'estimation de l'abondance, même relative, de l'Apalis de Bamenda. Cependant, l'Apalis a été enregistrée dans la grande majorité des galeries forestières de son aire de répartition, et dans les limites altitudinales reprises plus haut. Ceci indique que l'espèce est commune au sein de sa distribution restreinte. La seule indication, grossière et non extrapolable, provient de séjours prolongés et réguliers près du Lac Petpenoun (5°38′N; 10°38′E) où j'ai eu des contacts répétés avec l'espèce. De ces observations, j'ai noté un adulte chanteur environ tous les 250–300 m de galerie forestière.

Discussion

L'analyse du jeu le plus complet de données de cette espèce à distribution restreinte confirme qu'elle se répartit sur deux zones distinctes. Sur base de la présence de son habitat et de ses limites altitudinales observées, on peut estimer une zone d'occupation totale d'environ 102 816 km^2, sensiblement supérieure à l'estimation de 80 000 km^2 de Bobo *et al.* (2001) et quatre fois supérieure à celle trouvée sur le site internet de Birdlife International (<http://datazone.birdlife.org/species/factsheet/7411>). L'aire de répartition probable dans la première zone, la région de Bamenda, s'étend sur 12 175 km^2 et celle dans la deuxième zone, centrée sur le plateau de l'Adamaoua, s'étend sur 90 641 km^2 dont 1758 km^2 au Nigeria et 81 550 km^2 au Cameroun. Comme déjà anticipé par Bobo *et al.* (2001), on peut dire de façon quasiment certaine que l'espèce se trouve en République Centrafricaine, ayant été observée au niveau de la frontière avec le Cameroun. La zone probable de distribution en République Centrafricaine est de 7333 km^2, sur les collines de Yadé, une extension de l'Adamaoua. La répartition globale probable de l'espèce est représentée dans la Fig. 7.

La distribution de l'Apalis de Bamenda semble déterminée par deux facteurs importants. L'un est une contrainte d'habitat, caractérisé par des forêts galeries d'altitude intermédiaire, et l'autre est la compétition interspécifique avec des espèces congénères: *Apalis rufogularis* en limite altitudinale inférieure et *Apalis cinerea* en limite supérieure.

Etant donné que l'espèce apparaît commune dans son habitat préféré, sur une aire de répartition de >100 000 km^2, le statut UICN Préoccupation mineure (Birdlife International 2016) semble mérité.

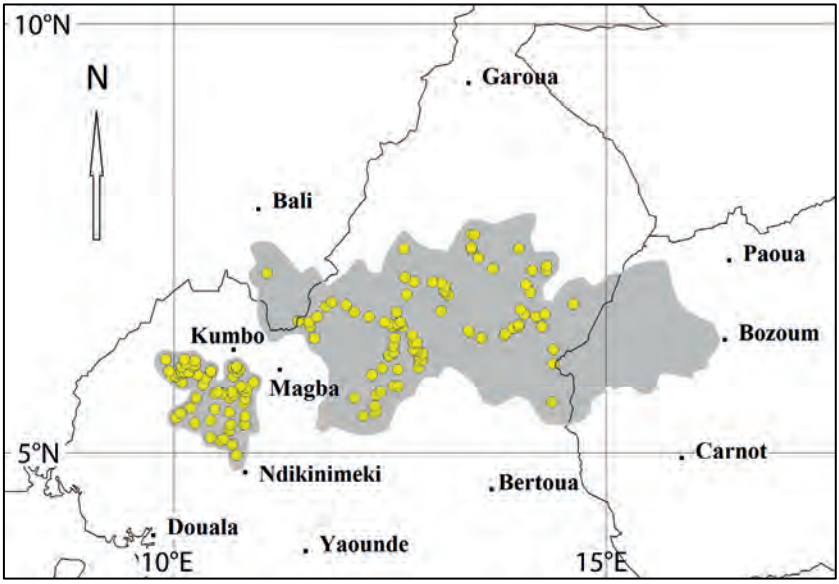

Figure 7. Carte de répartition probable de l'Apalis de Bamenda *Apalis bamendae* (zone grise) sur base d'extrapolation de l'habitat et de l'altitude.

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Effects of moult and breeding on the body condition of some forest birds in southwest Nigeria

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Summary

By using body mass and tarsus length as a proxy for body condition, the effects of moult (actively moulting, new feathers or old feathers) and breeding (breeding or non-breeding) on the Grey-headed Bristlebill *Bleda canicapillus*, White-throated Greenbul *Phyllastrephus albigularis*, Little Greenbul *Eurillas virens* and Yellow-whiskered Greenbul *Eurillas latirostris*, were investigated in two rainforest patches in southwest Nigeria, 2017–2019. The relative frequency of the studied species across the study sites and the numbers of moulting and breeding individuals are presented. Despite breeding and moulting birds being recorded over much of the year in all four species, only six birds (2 %) of three species were moulting while breeding, suggesting a trade-off. Moult did not significantly influence the body condition of any bird species, but the body condition of breeding Grey-headed Bristlebill, Little Greenbul and White-throated Greenbul was significantly lower than that of non-breeding birds. This was not the case for the Yellow-whiskered Greenbul, which may be able to synchronise moult and breeding with peak food availability.

Résumé

Effets de la mue et de la reproduction sur l'état corporel de quelques oiseaux forestiers du sud-ouest du Nigeria. En considérant la masse corporelle et la longueur du tarse comme significatives de l'état corporel, les effets de la mue (mue en cours, plumes nouvelles ou vieilles plumes) et de la reproduction (période de reproduction en cours ou non) ont été examinés sur le Bulbul fourmilier *Bleda canicapillus*, Bulbul à gorge blanche *Phyllastrephus albigularis*, Bulbul verdâtre *Eurillas virens* et Bulbul à moustaches jaunes *Eurillas latirostris* dans deux forêts humides du sud-ouest du Nigeria, 2017–2019. La fréquence relative des espèces étudiées dans les différents sites de l'étude et le nombre

des individus en train de muer ou en période de reproduction sont présentés. Bien que des oiseaux aient été observés en période de reproduction ou de mue pendant la majeure partie de l'année pour les quatre espèces, seuls six oiseaux (2 %) de trois espèces étaient en train de muer tout en étant en période de reproduction, ce qui suggère un compromis entre les deux processus. La mue n'a pas eu d'influence significative sur l'état corporel de ces espèces mais, pour le Bulbul fourmilier, le Bulbul verdâtre et le Bulbul à gorge blanche, l'état corporel des individus en période de reproduction était significativement moins bon que celui des oiseaux non reproducteurs. Ce n'était pas le cas du Bulbul à moustaches jaunes, qui pourrait être en mesure de synchroniser la mue et la reproduction avec la disponibilité alimentaire maximum.

Introduction

In view of energetic costs and the optimization of productivity, moulting and breeding birds exploit resource-rich habitats or synchronize these demanding activities with the peak of food availability (*e.g*. Aidley & Wilkinson 1987, Sherry & Holmes 1996, Cox *et al.* 2013). Moulting and breeding have contrasting effects on body condition (Gosler 1994), which can be regarded as the organism's physiological state (estimated from the levels of nutrients stored) that influences its performance (Brown 1996). A non-invasive technique based on morphometric measurements (such as mass, fat, pectoral muscle, tarsus, head, bill and tail), is commonly used in estimating the body condition of birds (Gosler & Harper 2000, Moya-Laraño *et al*. 2008). Most such studies have been conducted in temperate areas, where birds have shorter life spans and greater clutch sizes compared to tropical birds (Ricklefs & Wikelski 2002). As these life history parameters influence the allocation of resources to physiological and phenological activities (Ricklefs & Wikelski 2002), baseline data are needed in the tropics, particularly Africa, for comparison. In Nigeria, morphometric measurements have been used to elucidate the phenology of moult (Aidley & Wilkinson 1987), body reserves (Nwaogu & Cresswell 2016) and breeding condition (Cox *et al*. 2013) of resident and migratory birds. However, how these variables influence the body condition of birds is still poorly known in the area. The present study therefore analysed three years of data (2017–19) of four forest bulbuls ringed in the framework of studies by the Ornithological Monitoring and Forest Restoration Project in southwest Nigeria. The aim was to determine the influence of moult and breeding on the body condition of birds.

Study sites

All birds were trapped and ringed in two regenerating secondary rainforest patches, located *c.* 25 km apart in southwest Nigeria (Fig. 1): the International Institute of

Tropical Agriculture (IITA) Forest Reserve (IFR) and Emerald Forest Reserve (EFR). Both are private forests dedicated to biodiversity conservation, research and recreation, and enjoy a relatively high degree of protection.

The IFR (7°30′N, 3°55′E; 243 m a.s.l.; 360 ha) is located within the expanding city of Ibadan, which experiences tropical dry and wet conditions, with an annual rainfall of 1500–2000 mm (Ezealor 2001) and a daytime temperature of 26–38°C (Neuenschwander *et al*. 2015). The IFR supports important species of native trees such as *Albizia zygia*, *Ceiba pentandra*, *Cola gigantia*, *Milicia excelsa* and *Terminalia superba* (Manu *et al*. 2005, Neuenschwander *et al.* 2015). Although protected, with a perimeter fence and patrol against illegal logging and poaching, urbanization has isolated the IFR from surrounding forest patches (Awoyemi & Bown 2019). Despite this, the IFR supports *c*. 270 bird species (Adeyanju *et al*. 2014), including 67 species that are restricted to the Guinea-Congo Forests Biome (Ezealor 2001), qualifying it as an Important Bird and Biodiversity Area (IBA).

Due to their proximity, the EFR (7°18′N, 4°8′E; 130 m a.s.l.; 120 ha) and IFR experience a similar climate. The EFR is dissected by two seasonal streams, the Aworin and Akinrin, which flow into the River Osun (Awoyemi *et al*. 2020), which provides water to communities in the surrounding areas (Olajire & Imeokpartia 2000). The streams and river support luxuriant vegetation forming gallery forest, an important habitat corridor in the area. *Antiaris toxicaria*, *Brachystegia eurycoma*, *Cynometra megalophylla* and *Triplochiton scleroxylon* are some of the native tree species that dominate the EFR, which supports a high diversity of Guineo-Congolian bird species that qualify the reserve as an IBA (Awoyemi *et al*. 2020).

Figure 1. Southwest Nigeria, showing the location of the Forest Reserves where birds were mist-netted (map by IITA GIS Unit).

Methods

Birds were mist-netted at both forest patches during quarterly Constant Effort Surveys (Mar–Apr, Jun–Jul, Sep, Nov–Dec), from 2017 to 2019. In each forest patch and during each survey, birds were trapped at three sites for three days, using the same mist-nets (120 m long, 2.5 m high, five shelves and 32 mm mesh). For the measurements, pliers, vernier calipers, metre rules and an electronic balance were used. Nets were opened at 6h00, closed at 11h00 and checked at 30-min. intervals. Birds were identified using Borrow & Demey (2014). Where possible, photographs were taken to confirm identification while all ringing data (SAFRING) were submitted to the A.P. Leventis Ornithological Research Institute (APLORI), Jos, Nigeria. I participated in all surveys and ringed 231 (61 %) of the 376 birds of the four species (Grey-headed Bristlebill *Bleda canicapillus*, Little Greenbul *Eurillas virens*, White-throated Greenbul *Phyllastrephus albigularis* and Yellow-whiskered Greenbul *Eurillas latirostris*) considered for this study. These species were chosen for being the most commonly netted bulbuls within the framework of the project. The remaining birds were ringed by other visiting ornithologists.

Given the focus of this study, all newly captured and re-trapped (*i.e* birds that had been captured during previous surveys) adults, were included in the analysis. Measurements taken included tarsus and mass, while breeding evidence was estimated from brood patches, following the established scoring system (0–5), where 0 = no brood patch, 1 = patch forming, de-feathering process has begun, 2 = breast and belly fully de-feathered, some wrinkling of skin evident and signs of oedema, 3 = skin of belly opaque and engorged, broad swollen wrinkles, 4 = skin shows thin wrinkles, no longer engorged, and 5 = re-feathering (Beer *et al.* 2001). All individuals scoring 0 were classified as non-breeding while those with 1–5 represented breeding individuals (Beer *et al.* 2001). Further, the ten primary feathers of each bird were classified as actively moulting when having a score of 1–4 (where 1 = feather missing or new feather in pin, 2 = feather emerging from sheath up to ⅓ grown, 3 = new feather between ⅓ and ⅔ grown and 4 = new feather from ⅔ to fully grown but with remains of waxy sheath persisting), new when scoring 5 (new feather fully developed with no trace of sheath remaining at base) or old when scoring 0 (old feather remaining), following Beer *et al.* (2001). The relative frequencies of birds classified as moulting or breeding (Aidley & Wilkinson 1987) were expressed here as the numbers of individuals that were actively moulting or breeding respectively during the study period (only one record of breeding or moulting used per individual, irrespective of whether this was at its first capture or as a retrap), relative to the total number of captured individuals of that species.

In estimating body condition, the body mass of an individual bird was divided by its tarsus length (a proxy for body size) to control for variations that might arise as larger individuals tend to weigh more (see Battley *et al.* 2004, Moya-Laraño *et al.* 2008), independently of moult stage and breeding status. Other estimates of body size,

including head, bill and tail, were not measured during the present data collection. Although wings were measured, they do not give useful data in birds that are moulting. While the condition of the fat layer or the pectoral muscles are valuable characters for the study of migrants (Battley *et al.* 2004, Nwaogu & Cresswell 2016), body mass was used as an estimate of body condition of the resident birds on which this study focused.

Graphical exploration and Shapiro-Wilk Tests ($P > 0.05$) were conducted to determine normality of the dataset before fitting General Linear Models using R Statistical Software (R Development Core Team 2013), to test if the body condition (body mass / tarsus length) of birds was dependent on moult stage (actively moulting, new feathers or old feathers), breeding status (breeding or non-breeding), site (IFR or EFR) and species. In addition, two-way interactions across moult stage, breeding status, site and species were included in the models. Using stepwise backward elimination (Crawley 2013), variables with the highest *P* values were removed and the procedure repeated until the best model was attained. The surviving models were compared using Akaike's Information Criterion (AIC: Burnham & Anderson 2002) and the best model was selected as the one with the lowest AIC value. Statistical significance was considered at $P < 0.05$.

Results

The relative abundance of the four species across the study sites, and the numbers of individuals that were moulting and breeding, are presented in Table 1. Although evidence of breeding and moulting was recorded in most months of the year (Table 1), only six different birds (2 %) of three species (two Little Greenbuls, one White-throated Greenbuls and three Yellow-whiskered Greenbuls) were actively moulting while breeding. The fitted General Linear Models revealed that the body condition of breeding Grey-headed Bristlebills, Little Greenbuls and White-throated Greenbuls was significantly lower than that of non-breeding birds (Table 2, Fig. 2).

Table 1. Bird species mist-netted, showing relative abundance between study sites (IFR and EFR), number and % of individuals that bred (as indicated by brood patch) or moulted during the study, and the months when breeding and moult were recorded (similar in both sites), 2017–19.

	IFR	EFR	Total	N (%) bred	N (%) moult	Breed months	Moult months
Grey-headed Bristlebill	86	14	100	21 (21)	17 (17)	3,5,6,10	5–7,9–11
Yellow-whiskered Greenbul	92	48	140	29 (21)	25 (18)	3,5–7,9,10,12	3,6,10,12
Little Greenbul	71	0	71	11 (15)	16 (23)	2,3,5,6,12	3,6,9,10,12
White-throated Greenbul	41	24	65	10 (15)	11 (17)	6,9	6,9–12
Total	**290**	**86**	**376**	**71 (19)**	**69 (18)**		

Table 2. Summary statistics of variables retained in the final General Linear Model (breeding status, species, and breeding status x species) predicting the body condition of 376 birds by species and breeding status in southwest Nigeria, 2017–19. Significant *P* values are indicated in bold.

Variable	Estimate	SE	*t*	*P*
Intercept (Breeding and Grey-headed Bristlebill)	1.205	0.041	29.405	**<0.001**
Non-breeding	0.145	0.046	3.143	**<0.001**
Little Greenbul	–0.292	0.07	–4.184	**<0.001**
White-throated Greenbul	–0.305	0.072	–4.224	**<0.001**
Yellow-whiskered Greenbul	–0.076	0.054	–1.406	0.161
Non-breeding x Little Greenbul	0.026	0.077	0.331	0.741
Non-breeding x White-throated Greenbul	–0.051	0.079	–0.639	0.523
Non-breeding x Yellow-whiskered Greenbul	–0.126	0.061	–2.083	**0.04**

Adjusted $r^2 = 0.306$, AIC = –181.033.

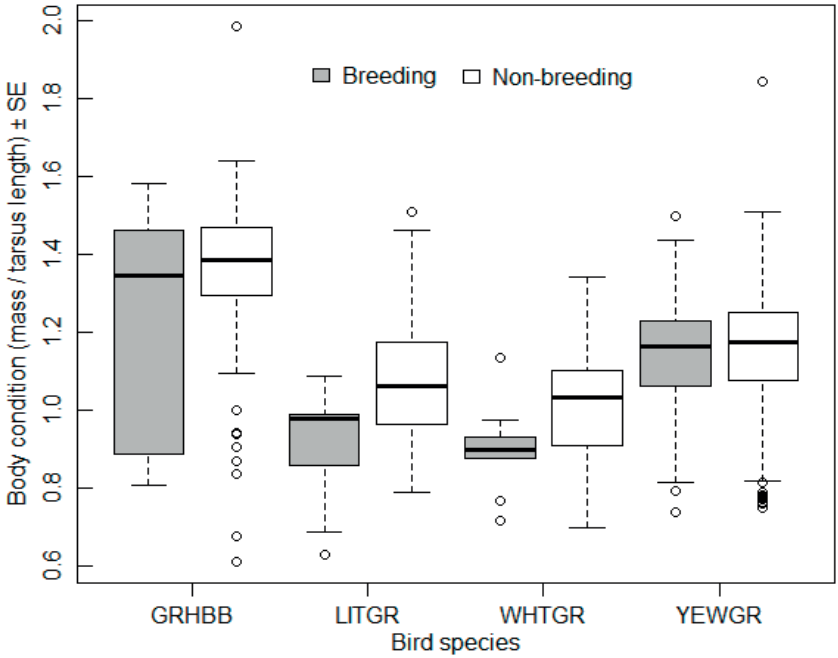

Figure 2. Body condition in breeding and non-breeding Grey-headed Bristlebill (GRHBB), Little Greenbul (LITGR), White-throated Greenbul (WHTGR), Yellow-whiskered Greenbul (YEWGR). The boxplots show median, first and third quartiles (box ends), 1.5 x interquartiles (whiskers), and outliers (points).

Discussion

The relative abundance of the mist-netted species between the study sites (Table 1) appears to be due to patch size rather than quality. The IFR is three times bigger than the EFR. Furthermore, since body condition, which is commonly used as a proxy to examine patch quality (Sherry & Holmes 1996, Johnson 2007) did not significantly vary between the two sites, there is no evidence that the two sites are not of similar quality, as might be expected considering their proximity and similarities in climate, altitude and vegetation. The similarities of moulting and breeding phenology between the sites (Table 1) further support this suggestion. While two individual Little Greenbuls, one White-throated Greenbul and three individual Yellow-whiskered Greenbuls were moulting while breeding, no Grey-headed Bristlebills were found undergoing both processes simultaneously, notwithstanding the trapping of 17 (17 %) moulting and 21 (21 %) breeding birds (Table 1). This suggests a strong trade-off, which is common in temperate birds (*e.g.* Siikamaki *et al.* 1994, Svensson & Nilsson, 1997). Although moult-breeding overlap is more common in tropical birds, it is usually associated with a prolonged breeding or moult period in relatively aseasonal areas (Foster 1974, Moreno 2004), whereas the climate of SW Nigeria is highly seasonal.

The lack of significant effects of moult on body condition suggests that only breeding was particularly energy-demanding relative to the resources available to the studied species. Excepting the Yellow-whiskered Greenbul, the body condition of all study species was significantly lower in breeding birds (Fig. 2, Table 2). Extra energetic costs on breeding individuals compared with non-breeding and moulting birds comprise nest-site selection, nest building, egg formation and fertilisation, incubation, food provisioning for dependent young and nest defence.

The phenological flexibility in assigning resources to either moult or breeding, independent of the season (Table 1), suggests an all-year round availability of food resources. Studies shedding more light on the phenology of insects and fruits are still needed in the area and would be helpful in unravelling synchronisation between food availability, moult and breeding. For instance, the lack of significant effects of moult and breeding on the body condition of the Yellow-whiskered Greenbul, which recorded the most netted adults (Table 1) and the most individuals with moult-breeding overlap (recorded in Mar and Oct), may be due to the ability of this species to synchronise moult and breeding with the peak in food availability, or to that peak being relatively extensive, thereby enhancing both survival and productivity.

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Short Notes — Notes Courtes

Nuptial gift tug-of-war during courtship feeding in the Yellow-rumped Tinkerbird *Pogoniulus bilineatus*

Little is known about pair bonds and courtship behaviour in tinkerbirds *Pogoniulus* spp. but recent research on phenotypic and genetic divergence between populations has examined traits potentially important in mate choice, such as song and plumage (Kirschel *et al.* 2009, 2018, 2020a, Nwankwo *et al.* 2018). In larger barbets, such as the Black-collared Barbet *Lybius torquatus*, pairs duet and various other sexual interactions have been noted including tail cocking and floating flight displays (Short & Horne 1983), while apparent courtship feeding has been witnessed in the Green Barbet *Stactolaema olivacea* (Short & Horne 1980) and Double-toothed Barbet *Lybius bidentatus* (L.H. Holbech pers. comm.). Bennun (1991) documented continuous feeding of a female Yellow-rumped Tinkerbird *Pogoniulus bilineatus* by a male with berries during bouts of copulation in North Kinangop, Kenya. This species is common across much of sub-Saharan Africa (Short & Horne 1988), and here I report a similar observation from Kyabobo National Park, Ghana (8.28194°N, 0.53023°E).

At 12h55 on 23 Oct 2010, I observed two Yellow-rumped Tinkerbirds interacting above me, *c.* 8 m high in the canopy of a tree. After realising that they were copulating, I started photographing the event, and took a series of 33 photos over > 4 min..

The male was initially mounting the female, then dismounted and perched next to her, after which he moved away and was not seen for a short time. I continued the photo series 3 min. later, with the female still in the same position but now holding the remains of a berry in her beak, perhaps regurgitating the pericarp. Moments later, the male again mounted the female with an oval orange berry in his beak. The pair appeared to be copulating thereafter (Fig. 1a) before the male dismounted, still with the berry in his beak, and perched next to her. Then the female also took hold of the berry and had a good grip but the male still held on (Fig. 1b). After this, it was unclear who held the berry, but eventually it appeared that the male had wrested the berry back and had sole grip of it (Fig. 1c). Then the female went for it again (Fig. 1d) but the male tugged it back (Fig. 1e), then she gained a good grip trying to tug it back (Fig. 1f) but the male finally gained a sole grip again. Soon he repeatedly offered the berry to the female and another tug of war ensued (Fig. 1g). When he offered the berry for what appeared to be the final time, the passage of the berry from male to female was concealed and unclear. In the last photos of the courtship bout, which ended with the perching male facing the other way, apparently no longer with the berry; the female's beak was hidden but perhaps she finally got the berry following this prolonged ritual.

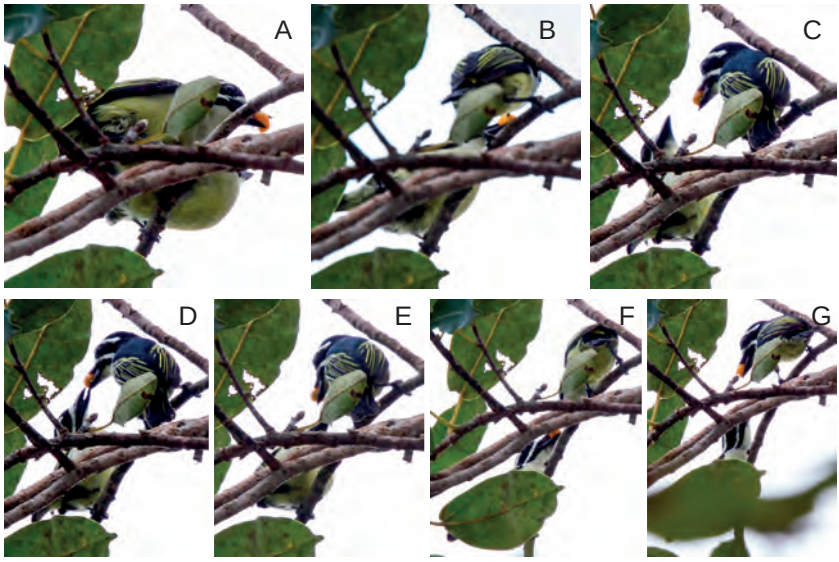

Figure 1. (A) male mounts female holding berry in beak, then (B) offers it to the female, (C) takes it back and (D) the female goes for it again. In (E) male has the berry again, (F) the female grips it and (G) male has it again.

In all, it appeared that the male offered the berry four times to the female but on three occasions when she took it, he did not let go and wrested it back, all this after he had already copulated at least twice with the female. It is uncertain to what extent the pair mated prior to my observation or even within the 3-min. gap in the photographs, though it is possible he returned unseen during this period and copulated more with the female, perhaps providing the first berry that the female was seen with between the two copulations witnessed.

Courtship feeding is common in birds (Lack 1940), including in barbets (Short & Horne 1980, Bennun 1991), and might play a role in mate appraisal or in providing nutrition for the female (Galvan & Sanz 2011). In support of the nutrition hypothesis, courtship feeding is especially common in granivorous birds with large clutch sizes, in which females exclusively build nests and incubate young (Galvan & Sanz 2011). Tinkerbirds, however, are chiefly frugivores, preferring mistletoe berries (Godschalk 1985, Dowsett-Lemaire 1988), have small clutch sizes and both sexes contribute to parental care (Short & Horne 1988), so the mate appraisal explanation might be more likely. However, Bennun's (1991) observations of courtship feeding in Yellow-rumped Tinkerbird in Kenya involved a succession of visits by the male to feed the female, at times without accompanying copulation, with as many as 32 berries

provided during 25 min., the male providing multiple berries on each visit and regurgitating them one by one, which might rather support the nutrition hypothesis. My observation was of a tug-of-war over a single berry, which could be a preferred food item, presented to the female by the male after he held it during copulation.

If courtship feeding occurs in other tinkerbirds, it might influence interspecific interactions between them. The often parapatric Red-fronted Tinkerbird *P. pusillus* and Yellow-fronted Tinkerbird *P. chrysoconus* hybridise extensively at their contact zone in southern Africa (Nwankwo *et al*. 2019) and this introgression appears to be asymmetric: Red-fronted Tinkerbird females mate selectively with Red-fronted males, but Yellow-fronted Tinkerbird females mate with males with either forecrown colour (Kirschel *et al.* 2020b). Whether the mate appraisal or the nutrition hypothesis is important, perhaps Red-fronted Tinkerbird males are more prolific nuptial gift providers than Yellow-fronted Tinkerbird males. While song and plumage are thought to play a role in mate choice and species recognition in tinkerbirds (Kirschel *et al.* 2009, 2018, 2020a, Nwankwo *et al.* 2018), perhaps courtship feeding does too.

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Red-pate Cisticola *Cisticola ruficeps* in Yobe State, northeast Nigeria

The Red-pate Cisticola *Cisticola ruficeps* is a mainly East African species, extending to West Africa through Sudan west to the northeast Lake Chad area of northern Cameroon, southern Chad and northeast Nigeria (Dowsett-Lemaire *et al.* 2005, BirdLife International 2020). However, most or all Nigerian records of *C. ruficeps* in Elgood *et al.* (1994) refer to Dorst's Cisticola *C. guinea* (previously known as *C. ruficeps guinea*, of which *C. dorsti* is a junior synonym: Dowsett-Lemaire *et al.* 2005). Dowsett-Lemaire *et al.* (2005) highlighted that *C. guinea* and *C. ruficeps* are recognisable vocally and morphologically. Morphological differences include the tail length of birds in breeding plumage (Borrow & Demey 2014), but the species are best distinguished by vocalisations.

C. guinea has been identified, mainly on its distinctive voice, in The Gambia, northern Ivory Coast, southwest Mali and northern Ghana where it is mostly locally common, and its distinctive call was likewise recorded in northwestern Nigeria around Gusau (Dowsett-Lemaire *et al.* 2005). Bates (1930, 1933–4) had noted the absence of *C. ruficeps* from northern Nigeria, but there were subsequent reports of *C. ruficeps*, most or all of which refer to *C.* (*r.*) *guinea*, from 13 West African countries including Nigeria (Dowsett-Lemaire *et al.* 2005) and as far west as Senegambia. There is still no vocal proof that *C. ruficeps* (*sensu stricto*) occurs in the Sahel belt west of Maiduguri in northeast Nigeria, where it was sound-recorded by Chappuis & Erard (1991). None of the claims of it further west was accepted by Dowsett-Lemaire *et al.* (2005), on the ground that they all refer to *C. guinea*. Despite this, Borrow & Demey (2014) suggest that there may be small populations of *C. ruficeps* scattered in the Sahel of West Africa.

C. guinea is currently known to range from Senegambia to Chad, in the Sudan-Guinea Savanna biome (Fishpool & Evans 2001, Dowsett-Lemaire *et al.* 2005), where most records are from lush understorey in open Sudanian forest (dry or occasionally wet), including, for example, dense secondary shrub growth in cut-through savanna woodland. *C. ruficeps*, on the other hand, seems confined to the drier Sahel zone where thorny vegetation is predominant, in grassy thorn scrub and open grassy areas with scattered trees or bushes (Lynes 1930, Dowsett-Lemaire *et al.* 2005, Borrow & Demey 2014). *C. ruficeps* and *C. guinea* approach each other in northern Cameroon, with the former in low thorn scrub vegetation of the Sahel plain between Maroua, Mora and Waza, and *C. guinea* in the adjacent Mandara Mts to the west, while in Chad *C. ruficeps* is found to the north of *C. guinea* (Dowsett-Lemaire *et al.* 2005). These two species therefore seem ecologically and biogeographically separated (Dowsett-Lemaire *et al.* 2005).

On a visit to Dumbulwa (11.16°N, 11.46°E, 442 m a.s.l.) on 15 May 2019, we came across two individuals of *C. ruficeps* in scrub around farmlands (Fig. 1). The area is characterised by vegetation of *Vachellia* sp., *Piliostigma reticulatum*, *Ziziphus mauritiana*, *Tamarindus indica*, *Guiera senegalensis*, and thorny grasses. On a visit to Yerimaram (11.72°N, 11.14°E) near Potiskum on 11 Dec 2019, we encountered two individuals of *C. ruficeps* (Fig. 1).

On a subsequent visit to Yerimaram on 8 March 2020, we found three individuals of *C. ruficeps* and recorded the high-pitched short song of *tweee-tsurrulu* and *twee-tsrrr* (as in Borrow & Demey 2014), including from a singing bird perched on *P. reticulatum*. The birds were often found with Zitting Cisticola *C. juncidis*, Tawny-flanked Prinia *Prinia subflava*, Speckle-fronted Weaver *Sporopipes frontalis* and Black-crowned Tchagra *Tchagra senegalus* in these areas. The recordings are deposited on Xenocanto, at <https://www.xeno-canto.org/555318> and <https://www.xeno-canto.org/559164>.

These records confirm the presence of *C. ruficeps* in northeast Nigeria and extend its range *c.* 200 km to the west of its previously know westernmost site (Maiduguri area), approaching the known range of *C. guinea*.

Figure 1. Red-pate Cisticola *Cisticola ruficeps*: left, in breeding plumage at Dumbulwa, 15 May 2019; right, in non-breeding plumage at Yerimaram, 11 Dec 2019. (Photos: HMA).

We appreciate Roger Wilkinson and Ulf Ottosson for their valuable comments that improved this note. They and R.J. Dowsett confirmed the song identification, and R.J. Dowsett also commented and provided vital data related to the history and distribution of *C. ruficeps* and *C. guinea*, for which we are grateful.

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Breeding of the African Pygmy Kingfisher *Ispidina picta* in a suburb of Ibadan, southwest Nigeria

The African Pygmy Kingfisher *Ispidina picta* (hereafter "Pygmy Kingfisher") is widely distributed in Nigeria, exploiting many habitats including mangrove, forest edges, wooded savanna and suburban gardens, and breeding mainly in the wet season and the southern part of the country (Elgood *et al.*1994, Borrow & Demey 2014).

From April to June 2020, we monitored breeding attempts of the Pygmy Kingfisher in a suburban garden, the Sunbird Bush, which lies at 7.58°N, 3.87°E (*c*. 250 m a.s.l.) in Ibadan, southwest Nigeria. At 7h33 on 13 April, we first observed two individuals of this species starting the excavation of a nest hole in a heap of sand awaiting construction purposes. The excavation involved the use of the bill for chiselling and feet for pushing sand backward, and continued until 25 April, when the tunnel was 0.4 m long and 55 mm diameter at the entrance (all nest measurements were taken after confirming abandonment or fledging). During the excavation period, within a radius of *c.* 15 m around the nest site, we observed courtship behaviour including feeding of a partner, calling and a display in which one individual, perhaps the male, perched on a branch *c*. 20 cm above the branch where the other bird was perched, facing each other, the upper bird shaking the body and raising the bill upwards, thereby clearly showing the breast area and bill. This behaviour adds to the only known previous published description of courtship display, where two partners perched parallel to each other and duetted, with one individual, probably the male, raising the rectrices, bobbing the head, and flying around the female (Brosset & Erard, 1986). We also observed one member of the pair chasing a third individual (perhaps another male), and the pair mating on 21 and 25 April. Thereafter, no activities were noted around this site, and no eggs were laid in the nest hole, suggesting abandonment. This may have been due to disturbance, as the sand was situated next to a laterite road frequently used by neighbours in the area.

At 7h10 on 16 May, we flushed a Pygmy Kingfisher from a 2 x 2 x 2 m pit that had been dug in the ground to collect waste water, *c.* 2 m away from the wall of a building and *c.* 32 m from the abandoned nest in the same garden. Closer inspection of the pit revealed a new nest hole, 0.3 m long and with a 62 mm diameter entrance, dug horizontally just below the ground level. The bird was probably incubating, as it returned *c.* 12 min. after flushing and spent *c.* 3 h inside before leaving the nest again. Thereafter we monitored the nest for 3 h (8h00–11h00) every day. Although this new nest site could only be approached by us, compared to the abandoned more public nest site, we maintained a minimum distance of *c.* 30 m to reduce disturbance during observations, except on five days when we inspected and photographed the nest. Although we could not obtain any details of the eggs, food provisioning commenced on 27 May, when two chicks were first observed in the nest (see Fig. 1), and continued until the chicks fledged between 9h30 and 11h00 on 13 June. The chicks were given insect larvae for the first six days and thereafter winged insects (mainly grasshoppers: Fig. 1a) and small lizards (observed on 2 June). Droppings of the chicks removed by the parent were seen at the entrance and around the nest hole. Apparently, only one adult conducted incubation, food provisioning and nest sanitation, although we do not know its sex given that the species is sexually monomorphic. We never saw two adults at once attending (or exchanging roles at) the second nest, whereas the excavation of the first nest was done by two adults. This contrasts with what was previously known for this species, with both parents reported to brood the eggs and feed the young (Fry *et al.* 1988).

Figure 1. An adult Pygmy Kingfisher *Ispidina picta* carrying a grasshopper, and its two chicks, Ibadan, Nigeria, 2020: left, 6 Jun; centre, 3 Jun; right, 12 Jun. (Photos: OAA).

The two nests that we found fall within the burrow size, brood size and laying date ranges cited by Fry *et al.* (1988). The number of fledglings and the contents of the second nest after fledging (some bits of eggshell and no evidence of unhatched

eggs) suggest a clutch size of two, also within the reported range (Fry *et al.* 1988). The similar sizes of the two nest holes, as well as our observations of mating at the first site, suggest that the first nest burrow was probably completed before being abandoned, giving an excavation period of 13 days. The incubation period of 11 days and nestling period of 18 days recorded by us compare with previous findings of 18 days and 18 days respectively (Fry *et al.* 1988), suggesting that incubation started a few days before we discovered the second nest.

We thank the A.G. Leventis Foundation for funding AGA's position at the Forest Centre of the International Institute of Tropical Agriculture, Ibadan, and Adetomi Jethro Awoyemi, whose curiosity to explore the environment led to the first sighting of the study species in the Sunbird Bush. Roger Wilkinson and Sam T. Ivande provided helpful comments on an earlier draft, and Robert J. Dowsett kindly provided a scan of the relevant page of Brosset & Erard (1986). This is contribution number 159 from the A.P. Leventis Ornithological Research Institute.

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Recent sightings of the African Woollyneck *Ciconia microscelis* in southern Nigeria

The African Woollyneck *Ciconia microscelis* is uncommon in Nigeria, and is mainly found south of the Rivers Niger and Benue (Elgood *et al*. 1994, Borrow & Demey 2014). Relative to other *Ciconia* spp. found in the country, data on the population trends, migration status and breeding of the African Woollyneck remain patchy (Elgood *et al.* 1994). In 2015–19, we conducted Rapid Assessment Surveys of birds and vegetation in southern Nigeria, covering the wet and dry seasons, during which four sightings of 15 African Woollynecks were recorded. We first sighted three individuals at Bonny Island (4°39′N, 7°17′E) on 9 Apr 2015 and two on 19 Jun 2019, all in the same *Delonix regia* tree. Others included an adult along forest edge (Fig. 1) and a pair in a nearby lake at the Okomu National Park (ONP: 6°25′N, 5°25′E) on 26 Apr 2019, and a flock of seven birds foraging in shallow waters in an urban park in Lekki, Lagos (6°56′N, 3°94′E) on 9 Jul 2019. Only two visits were made to each of ONP and Lekki but JDO made more than ten visits to Bonny Island. All of our sightings were in the wet season, and surveys conducted at other sites in southern Nigeria yielded no records, confirming the rarity of the African Woollyneck in southern Nigeria.

Figure 1. African Woollyneck next to a termite mound at the forest edge, Okomu National Park, Nigeria, 26 Apr 2019 (photo: AGA).

We thank the A.G. Leventis and Nigerian Conservation Foundations for funding the Rapid Assessment Surveys during which these observations were made. This is publication number 160 from the A.P. Leventis Ornithological Research Institute.

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Corrigendum

Ectoparasites (Phthiraptera) de quelques oiseaux de la ville de Kinshasa (*Malimbus* 42: 1–6)

Dans cet article par R. Kisasa Kafutshi, C. Bansomire & D. Malekani (2020), les lettres sur la Fig. 2 ont été omises en erreur. Pour éviter toute confusion nous présentons la Figure correcte ci-dessous.

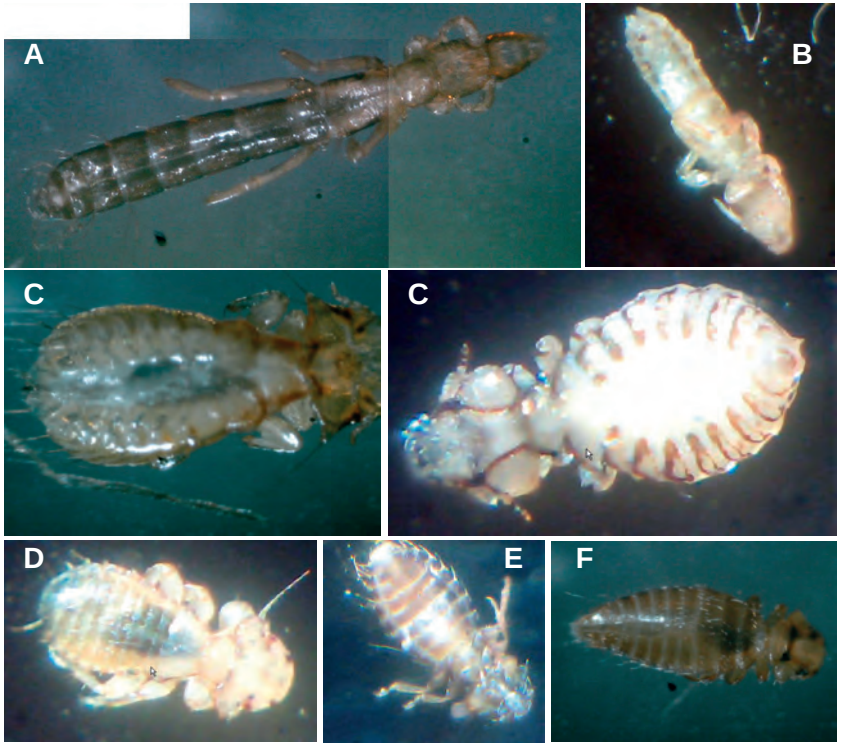

Figure 2. Ectoparasites de quelques oiseaux de Kinshasa. A *Ardeicola ciconiae*; B *Columbicola columbae*; C *Goniodes* sp. (deux photos); D *Cuculiphilus* sp.; E *Menacanthus stramineus*; F *Myrsidea balati*.

Nous tendons nos excuses aux auteurs.

Alan Tye, Rédacteur en chef

News & Comment — Nouvelles & Commentaires

Request for Saddle-billed Stork breeding localities

Recently, the first assessment of Saddle-billed Stork *Ephippiorhynchus senegalensis* distribution across Africa revealed a much more fragmented range than previously realized, particularly in West Africa (Gula *et al.* 2019). As a next step in gaining an empirical understanding of this species' range-wide status, colleagues from the IUCN Stork, Ibis, and Spoonbill Specialist Group and I intend to determine where Saddle-billed Stork breeding populations have persisted in recent decades. In West Africa, extirpations of breeding populations have already occurred in the Inner Niger Delta, Comoé National Park, Togo, and possibly Nigeria's Yankari Game Reserve. West of the Sudd in South Sudan, breeding activity (*i.e.* nests or dependent juveniles) has only been confirmed in the Saloum Delta (Senegal), Mole National Park (Ghana), and Pendjari and W National Parks (Benin), the last of which has no known nest records since 1987 (Dowsett-Lemaire & Dowsett 2019).

Anthropogenic habitat alteration compounded with drought is implicated in regional declines, and climatic niche modeling suggests the species may be particularly prone to extirpation in this already marginal region (J. Gula unpubl.). However, records spanning several decades in The Gambia, Guinea-Bissau, Senegal, Cameroon, Chad and Central African Republic suggest that these populations are sustained by local breeding but nests are yet to be confirmed. Thus, here I request any further information about confirmed breeding of Saddle-billed Stork in the region. Records and photos of juveniles are desired, and confirmation of nests is specifically requested. Generally, any other information that may provide insight into this enigmatic species is appreciated as well. Readers are invited to contact me with coordinates, dates of sightings, observed nest activity, and photos if relevant. I also ask that readers spread this request and my interest in the species to colleagues who may not yet be aware.

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Elevated spurfowl and francolin taxa: recent research and a request for photographs

The Galliformes comprise nine major groups of terrestrial gamebirds: megapodes, cracids, guineafowl, grouse, turkeys, pheasants, partridges (including francolins and spurfowl), Old World and New World quails. Recent studies have suggested that pheasants, partridges, quails, spurfowl and francolins are not natural evolutionary groups but rather mosaics of evolutionarily unrelated species; even the best-known gamebird and the wild ancestor of the domestic chicken, the Junglefowl *Gallus gallus*, has been moved on the gamebird evolutionary tree from the pheasants to a branch including a mix of francolins and partridges (Crowe *et al*. 2006).

Traditionally, the francolins were classified with partridges in the tribe Perdicini within the family Phasianidae, although the only anatomical feature that supports this grouping is that they all have 14 tail feathers. The 41 francolin species, 36 from Africa and five from Asia, were all usually placed in the genus *Francolinus* but we now know that they comprise two quite distinct lineages, the spurfowl and true francolins, which differ in plumage, escape behaviour and vocalisations: francolins have quail-like upperparts while spurfowl have streaked or vermiculated back feathers, francolins typically crouch and sit tight before flushing when disturbed while spurfowl tend to run for cover, and francolins have musical whistling calls while spurfowl have raucous crowing or cackling calls.

Mandiwana-Neudani *et al*. (2019a) support the four sub-groups historically recognised within the spurfowl (bare-throated, montane, scaly and vermiculated) within one genus, *Pternistis*, increasing the currently recognised number of species by two to 25 but reducing the number of subspecies from 59 to 16. The two new species (Table 1) are Schuett's Spurfowl *P. schuetti*, formerly the Scaly Spurfowl subspecies *P. squamatus schuetti*, occurring in the eastern Democratic Republic of the Congo (DRC) and eastern Africa (less vermiculated than *P. s. squamatus*, the scaly pattern on the lower neck less clearly defined, and each feather with a deep red-brown centre) and Cranch's Spurfowl *P. cranchii*, formerly the Red-necked Spurfowl subspecies *P. afer cranchii*, distributed across the southern DRC, northern Angola, northern Zambia, Malawi and east Africa. The Red-necked Spurfowl retains three subspecies, *P. a. afer, humboltii* and *castaneiventer*, distributed along the lower Cunene River bordering Namibia and Angola in the west, and down eastern Tanzania, Mozambique and eastern South Africa in the east.

Mandiwana-Neudani *et al*. (2019b) also support the four traditional sub-groups of francolins, but in four proposed genera, *i.e.* spotted *Francolinus*, striated *Ortygornis*, red-tailed *Campocolinus* (see Crowe *et al.* 2020) and red-winged *Scleroptila*, but separating the red-tailed Forest Francolin *lathami* into a fifth genus *Peliperdix*; also, the Ring-necked Francolin is shifted from the striated group to the red-winged group as *Scleroptila streptophora*. Mandiwana-Neudani *et al*. (2019b) recommend elevating 14 francolin subspecies to species level (Table 1) and lumping others into more inclusive subspecies, leaving only 14 in contrast to 52 previously. The eastern and southern

Table 1. Newly elevated spurfowl and francolin species.

Scientific name	English name	French name
Scaly spurfowl group		
Pternistis schuetti	Schuett's Spurfowl	Pseudofrancolin de Schuett
Bare-throated spurfowl group		
P. cranchii	Cranch's Spurfowl	Pseudofrancolin de Cranch
Striated francolin group		
Ortygornis grantii	Grant's Francolin	Francolin de Grant
O. rovuma	Kirk's Francolin	Francolin de Kirk
Red-tailed francolin group		
Campocolinus dewittei	Chestnut-breasted Francolin	Francolin à poitrine marron
C. spinetorum	Pale-bellied Francolin	Francolin à ventre pâle
C. maharao	Bar-bellied Francolin	Francolin à ventre rayé
C. hubbardi	Plain-bellied Francolin	Francolin à ventre uni
C. thikae	Thika Francolin	Francolin de Thika
C. stuhlmanni	Stuhlmann's Francolin	Francolin de Stuhlmann
Red-winged francolin group		
Scleroptila crawshayi	Crawshay's Francolin	Francolin de Crawshay
S. elgonensis	Elgon Francolin	Francolin du Mont Elgon
S. gutturalis	Archer's Francolin	Francolin d'Archer
S. jugularis	Kunene Francolin	Francolin de Kunene
S. uluensis	Ulu Francolin	Francolin d'Ulu
S. whytei	Rufous-throated Francolin	Francolin à gorge rousse

African Crested Francolin *Ortygornis sephaena* is split into three species. The Kunene Francolin *Scleroptila jugularis* is split from the Orange River Francolin, which retains two subspecies *S. l. levaillantoides* and *S. l. pallidior.* Archer's Francolin *S. gutturalis* in East Africa is supported as a full species. Crawshay's Francolin *S. crawshayii* from north of the Zambezi River is split from the Red-winged Francolin *S. levaillantii*, which now becomes a southern African endemic. The Coqui Francolin complex in the new genus *Campocolinus* (Crowe *et al*. 2020) has five newly elevated species: Pale-bellied *C. spinetorum,* Bar-bellied *C. maharao,* Plain-bellied *C. hubbardi,* Thika *C. thikae* and Stuhlmann's *C. stuhlmanni,* while retaining four subspecies *C. coqui coqui, C. c. ruahdae, C. c. vernayi* and *C. c. kasaicus.* Chestnut-breasted Francolin *C. dewittei* is split from the White-throated Francolin *C. albogularis,* Elgon Francolin *Scleroptila elgonensis* is elevated from Moorland Francolin *S. psilolaema,* and Ulu Francolin *S. uluensis* and Rufous-throated Francolin *S. whytei* from Shelley's Francolin *S. shelleyi.*

To assist with documenting these new spurfowl and francolin species, I would greatly appreciate receiving high-resolution photographs of the taxa listed in Table 2. Please share this request with colleagues and friends. I can receive email-attached photos of up to 10 MB, or file transfer facilities such as WeTransfer or Dropbox can be used.

Table 2. Taxa for which photographs are sought, particularly those in bold type.

	Range
Spurfowl	
Scaly *P. squamatus*	Nigeria to Central African Republic and DRC
Francolins	
Kirk's *O. rovuma* (crested type)	coastal Tanzania and Kenya,
particularly ***O. r. spilogaster***	E Ethiopia
Grant's *O. grantii* (crested type)	W Ethiopia
Chestnut-breasted *C. dewittei*	W Zambia, central Angola
White-throated *C. albogularis*	Senegambia
Bar-bellied *C. maharao* (coqui type)	Ethiopia, far northern Kenya
Thika *C. thikae* (coqui-type)	S-central Kenya (Tsavo NP area)
Pale-bellied *C. spinetorum* (coqui type)	W Africa
Stuhlmann's *C. stuhlmanni* (coqui type)	E Zambia, central Tanzania
Coqui *C. c. ruhdae*	Uganda
Ulu *S. uluensis* (Shelley's type)	W Tanzania, SW Kenya
Finsch's *S. finschi*	Angola, Gabon, DRC
Ring-necked *S. streptophora*	Burundi, Rwanda, Uganda, W Kenya, NW Tanzania

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Peter BROWNE, Webmaster, old website — Webmestre, ancien site internet

W.A.O.S. membership changes
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COWAN, Dr P.J.
MARTINS, R.
WOODBRIDGE, K.

Resignations and deletions — Renonciations et enlèvements

BERGH, M. VAN DEN
GREEN, A.A.
GUÉVORTS, B.
GULLICK, T.
HANDKE, C.
HENRY, L.
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KLOP, E.
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WAGNER HODGES, Ms V.J.
WALLACE, J.P.
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Veuillez consulter la nouvelle Liste des Membres publiée avec ce numéro de *Malimbus*,

Tim DODMAN, Treasurer and Membership Secretary

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Malimbus publie des articles de recherche, des recensions de publications et des nouvelles traitant de l'ornithologie ouest-africaine.

Les **Articles** et les **Notes Courtes** doivent être des apports originaux; ceux déjà publiés ailleurs, en partie ou en totalité, seront normalement refusés. Les Notes Courtes sont des articles de moins de 1500 mots (références comprises) ou de quatre pages imprimées. Autant que possible, les manuscrits auront été au préalable soumis à au moins un ornithologue ou biologiste pour un examen minutieux. Les manuscrits seront envoyés pour critique à au moins un lecteur spécialiste.

Les textes des **Nouvelles & Commentaires** ne devraient pas dépasser 1000 mots.

Les **textes** sont acceptés en anglais et en français; la Rédaction pourra aider les auteurs dont la langue maternelle n'est pas l'une de celles-ci. Nous préférons les envois de manuscrits par email (en pièce jointe). Consultez le Rédacteur pour plus de détails, par ex. les logiciels compatibles.

Tous les Articles (mais non les Notes Courtes) comporteront un **Résumé**, n'excédant pas 5 % de la longueur totale. Le Résumé mentionnera brièvement les principaux résultats et conclusions de l'Article et ne sera pas un simple compte rendu de ce qui a été fait. Les résumés seront publiés à la fois en anglais et en français (ou dans la langue officielle du pays dans lequel le travail a été réalisé) et seront traduits au mieux par la Rédaction.

La **présentation** des tableaux, chiffres, unités métriques, références, *etc*. doit correspondre à celles des numéros récents. A notez, en particulier: Les noms des auteurs doivent être listés en faisant précéder le nom de famille par le prénom ou des initiales (ex. John A. Smith); les dates seront écrites "2 fév 1990" mais les mois seuls pourront être écrits en entier; les heures seront écrites "6h45", "17h00"; les coordonnées "7°46′13″N" (pas de zéros en tête) ou en degrés décimaux jusqu'à cinq décimales (ex. 1.23456°N), mais non en minutes décimales; les nombres jusqu'à dix seront écrits en toutes lettres, excepté devant une unité de mesure (ex. 6 m); les nombres à partir de 11 seront écrits en chiffres sauf au début d'une phrase. Toutes les références citées dans l'article doivent figurer dans la bibliographie, et *vice versa*. L'utilisation de références accessibles en ligne uniquement doit être réduite au minimum: les publications avec un identifiant numérique d'objet (DOI) sont acceptées, mais d'autres références en ligne uniquement ne doivent être citées que s'il n'y a pas d'alternative évaluée par des pairs, imprimée ou disponible sous une autre forme de manière permanente.

La séquence taxonomique et **les noms scientifiques** des oiseaux doivent suivre la Liste de Birdlife International <http://datazone.birdlife.org/species/taxonomy>, à moins que des raisons de s'en écarter soient exposées. Les noms français doivent suivre les *Noms Français des Oiseaux du Monde* <www.digimages.info/listeoiseauxmonde/genre_cinfo.htm>. Les noms anglais de la Liste Birdlife, ou les autres noms employés de longue date et d'un usage courant en Afrique de l'Ouest, sont préférés. Des adjectifs tels que « commun » et « africain » ne peuvent être utilisés que s'ils font partie d'un nom commun employé de longue date.

Les **articles sur l'avifaune** doivent comprendre une carte ou un index géographique, incluant tous les endroits cités. Ils doivent comporter quelques brèves indications sur le climat, la topographie, la végétation et les circonstances ou événements inhabituels avant ou pendant l'étude (ex. pluies tardives, *etc*.). Les **listes d'espèces** ne doivent contenir que des enregistrements importants: les listes complètes ne sont justifiées que pour les régions encore non étudiées ou délaissées pendant long-temps. Autrement, ne citer que les espèces sur lesquelles l'étude fournit une information nouvelle sur la répartition, la période de séjour, la reproduction, *etc*. Pour chaque espèce, indiquer l'extension de l'aire de répartition, une estimation d'abondance (*Malimbus* 17: 38) et les données datées sur la reproduction; indiquer le statut migratoire et la période de séjour seulement tels qu'ils ressortent de l'étude. Des observations d'oiseaux accessibles en ligne uniquement ne seront normalement considérées comme des témoignages acceptables de faits réels qu'à la condition de pouvoir être validées de manière convaincante leur identification et localisation. Eventuellement, replacer les données dans le contexte en les comparant brièvement avec une liste régionale de référence. Les longues listes d'espèces peuvent être présentées sous la forme de tableaux (ex. *Malimbus* 25: 4–30, 24: 15–22, 23: 1–22, 1: 22–28, or 1: 49–54) ou sous la forme rédigée des numéros récents. Un **guide plus complet à l'intention aux auteurs** d'articles sur l'avifaune, comprenant l'échelle d'abondance des espèces conseillée, a été publié dans *Malimbus* 17: 35–39 et une version augmentée de celle-ci mise sur le site internet (http://www.malimbus.org/fr/instmalf.html). La Rédaction se fera un plaisir de donner des conseils pour les études spécifiques.

Pour le dessin des **Figures**, tenir compte des dimensions de la page de *Malimbus* et s'assurer que les caractères seront lisibles au format publié. On préfère les figures préparées sur logiciel graphique et sauvegardées en haute définition. Les fichiers de basse résolution et les impressions de mauvaise qualité seront refusés. Les auteurs sont encouragés à soumettre des **photographies** qui illustrent des points importants de leur article. Les photographies doivent être de préférence en couleurs et de haute définition. Les figures et les photographies doivent être envoyées comme fichiers de logiciel graphique (par ex. jpg ou tif), et non pas être incluses dans un fichier de Word. Consulter le Rédacteur pour tout renseignement.

Un fichier pdf des Articles et des Notes Courtes, et une copie du numéro de publication seront envoyés gratis à l'auteur ou à l'auteur principal.

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