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February / février 2010

Timing of moult and new species records of birds in the Lesio-Louna Reserve, Republic of Congo

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Received 7 July 2003; revised 28 November 2003.

Summary

During three periods in 2002, 170 birds were netted, with 42 species identified, in the Lesio-Louna Reserve, Téké Plateau, Republic of Congo. The proportions of birds in primary moult differed between sampling periods. Fewer woodland-forest birds were in moult during the dry Jun–Aug sampling period than in the two wet sampling periods (Feb–Mar, Nov–Dec), suggesting a Nov–Mar moult season. The savanna species exhibited a different pattern, with 67% in moult during the Nov–Dec sampling period, and few in the other two periods. This suggests an earlier moult season than for woodland-forest birds, starting before late November and ending before the end of February. Nine species were added to the previous area list of 236, of which five (*Pogoniulus atroflavus*, *Lamprotornis purpureiceps*, *Ploceus nigerrimus*, *Quelea erythrops*, *Vidua macroura*) are widely recorded in Congo, while two (*Halcyon leucocephala*, *Anabathmis reichenbachii*) are recorded on either side of the Téké Plateau. A record of *Dendropicus elliottii* extends its known distribution south, and one of *Cossypha natalensis* adds to the few for Congo.

Résumé

Rythme de mues et signalement de nouvelles espèces d'oiseaux dans la Réserve de Lesio-Louna, République du Congo. Pendant trois périodes en 2002, 170 oiseaux furent capturés, et 42 espèces identifiées dans la réserve de Lesio-Louna, plateau Téké, République du Congo. Les proportions d'oiseaux en mue des primaires différaient entre les périodes d'échantillonnage. La proportion d'oiseaux de régions boisées en mue était plus faible pendant l'échantillonnage de saison sèche, juin–août, que lors des deux échantillonnages de saison humide (nov–déc et fév–mars), ce qui suggère une

période de mue de novembre à mars. Les espèces de savane montraient un schéma différent, avec 67% de mue au cours de l'échantillonnage de nov–déc, et peu au cours des autres échantillonnages, ce qui suggère une saison de mue plus précoce que pour les oiseaux de régions boisées, commençant avant fin novembre et se terminant avant fin de février. Neuf espèces furent ajoutées à la liste précédente de 236 espèces pour la région, dont cinq (*Pogoniulus atroflavus*, *Lamprotornis purpureiceps*, *Ploceus nigerrimus*, *Quelea erythrops*, *Vidua macroura*) sont largement représentées au Congo, tandis que deux (*Halcyon leucocephala*, *Anabathmis reichenbachii*) sont signalées de part et d'autre du Plateau Téké. Une mention de *Dendropicus elliottii* étends vers le sud sa présente distribution, et une de *Cossypha natalensis* s'ajoute aux quelques données pour le Congo.

Introduction

The Lesio-Louna Reserve, officially titled La Réserve Naturelle des Gorilles de Lesio-Louna, is an area of *c.* 500 km^2 located 130 km north of Brazzaville in the Republic of Congo (Figure 1). It is bounded by the Louna River to the west, the cliffs of Mâh to the east, the Galingolo River to the north, and a boundary from Mbina to the Louna River to the south. The Reserve comprises a small part of the Téké Plateau, an area of *c.* 58,000 km^2 in Congo, from Brazzaville in the south to Gamboma in the north, and extending west to Ewo and into Gabon (Dowsett-Lemaire 1997c). The climate of the reserve is similar to that elsewhere on the plateau, with a dry season from late May to Sep, the heaviest rains Oct–Nov and then again Mar–Apr, with a drier period around Jan–Feb (Moutsamboté 1994, Dowsett-Lemaire 1997c). The limited weather data available for 2002 (Table 1) suggest that the survey was conducted during a typical year. The altitude of the reserve ranges from 325 m along the Louna River in the north-west, to 700 m at the top of the cliffs in the south. The major habitat is savanna grassland (*c*. 360 km^2) with gallery and swamp forests along the water-courses (*c*. 90 km^2), plus some patches of dry forest on higher ground (*c*. 50 km^2). Four types of savanna have been classified, based on the dominant species found within each: *Loudetia demeusei* with *Hymenocardia acida*, *Hyparrhenia*, *Loudetia simplex*, and *Loudetia demeusei* (Moutsamboté 1994). Gallery forest is dominated by *Erismadelphus exsul*, with *Xylopia rubescens*, *Uapaca guineensis*, *Vitex rivularis*, *Pycnanthus marchalianus* and *Albizia* sp., while swampy areas also contain *Mitragyna stipulosa*, *Symphonia globulifera* and *Alstonia boonei*, with areas of *Ancistrophyllum secundiflorum* and *Raphia* palms (Moutsamboté 1994). Dry forest on higher ground is often dominated by *Piptadeniastrum africanum*, with other large trees such as *Pentaclethra eetveldeana*, *Pentaclethra macrophylla*, *Entandrophragma angolensis* and *Millettia laurentii* (Moutsamboté 1994).

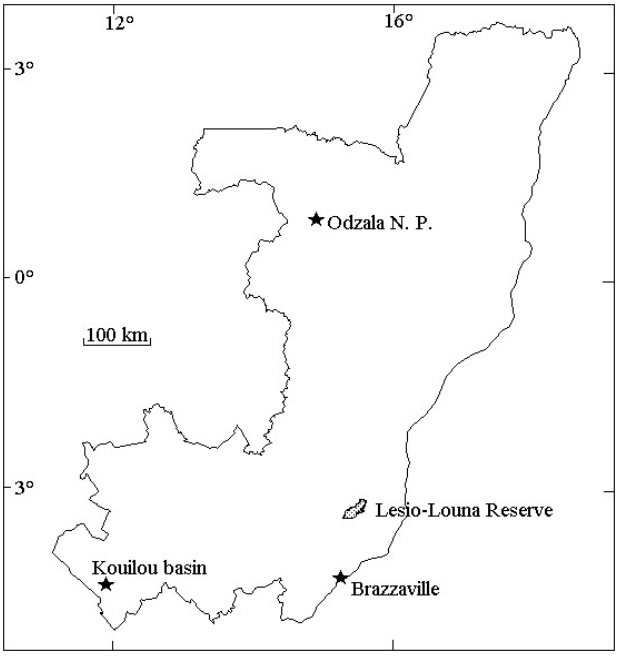

Figure 1. Location of the Lesio-Louna Reserve and other sites mentioned in the text, in the Republic of Congo.

Table 1. Weather data from Base-Vie, Lesio-Louna Reserve, during 2002.

Period	Mean daily minimum (°C)	Mean daily maximum (°C)	Mean daily temperature (°C)	Rain (total, mm)
2 June to 11 July	-	-	-	0[1]
12–31 July	20.8	30.5	25.7	0
August	21.1	30.6	25.9	30
September	21.8	31.0	26.4	165[1]
October	21.6	30.1	25.9	177
November	21.8	30.3	26.0	247
1–16 December	21.7	31.0	26.3	97

[1]Following the last rain before the dry season on 1 Jun, the first heavy rains of the next wet season fell on 18 and 19 Sep.

A list of 236 birds for the reserve was presented by Dowsett-Lemaire (1997c), based primarily on a week-long survey of the Mâh region of the reserve in April 1996, but incorporating records from previous visits to the area, and records by L.M. Matteo and others. Since this report, no further observations of the avifauna of the reserve have been published. The current report summarises moult data collected during mist-netting in three distinct seasonal periods in the reserve in 2002, plus a few new species records for the reserve added by opportunistic sightings.

Methods

Mist-netting was conducted at three sites in the reserve: Base-Vie (3°16′S, 15°28′E), Ngondoro (3°12′S, 15°31′E) and Lac Bleu (3°19′S, 15°29′E). Nets were operated during three distinct seasonal sampling periods: 23 Feb to 10 Mar 2002 (late wet season); 2 Jun to 31 Aug 2002, plus one bird captured 25 Sep (dry season) and 28 Nov to 16 Dec 2002 (early wet season). Nets were placed in four broad habitat types: forest interior, forest edge (in savanna but within 10 m of the forest), savanna (>10 m from forest edge, this includes savanna with trees and shrubs) and habitation (within the well established field camp, in savanna close to a small forested river). It should be noted that our classification of "woodland-forest" species includes species of forest interior, forest edge, thickets and heavily wooded savanna. Net effort, quantified as net-hours between 05h00 and 19h00, was unequally distributed between sites (Base-Vie 1222 net-hours, Ngondoro 217, Lac Bleu 37), seasonal periods (Feb–Mar 252, Jun–Sep 859, Nov–Dec: 365), and habitat types (forest interior 266, forest edge 166, savanna 366, habitation 678). Generally, three nets (6 x 2.5 m, 38 mm mesh) were set at a time, almost always at 0.5–5 m from the ground. Whenever possible, nets were left open for two to three consecutive days, although logistical issues often limited net-time.

Birds captured were identified (and sexed if possible) using Borrow & Demey (2001), whose nomenclature we follow. Standard measurements were taken but are not presented in this paper. Each flight feather was assessed for moult, and a bird was recorded as being in moult if at least one primary feather was either growing or still had a sheath. Birds exhibiting primary moult were assigned cumulative scores between 0 and 50 based on a score between 0 and 5 for each primary feather (0 = old feather, 1 = pin, 2 = pin with emerging feather, 3 = half-grown feather, 4 = three-quarter-length feather, 5 = full-grown new feather). Moult scores presented here are for the left wing; right wing scores were generally but not always similar. χ^2 tests for association are presented for comparison of numbers of birds in moult, while the Mann-Whitney U test is used for comparison of moult scores (Chalmers *et al.* 2000).

Opportunistic sightings were also recorded during the three survey periods, but only species considered new to the reserve (*i.e.* not in Dowsett-Lemaire 1997c) are reported here.

Results

Moult

We captured 170 birds, with 42 species identified (Tables 2 and 3). Almost half (48%) of these species were represented by single individuals, and just two species (*Andropadus virens* and *Cyanomitra obscura*) were captured with any regularity. Consequently, individual species totals in the three different study periods are very different, which could invalidate the conclusions of the following analyses (which use grouped data from all species), if moult patterns are different in different species.

Table 2. Number of woodland-forest birds netted in the Lesio-Louna Reserve during 2002, with number in primary moult and moult scores in parentheses.

	Feb–Mar	Jun–Aug	Nov–Dec	Total
Halcyon malimbica Blue-breasted Kingfisher		1		1
Ceyx pictus African Pygmy Kingfisher		2	2(1:41)	4(1)
Merops gularis Black Bee-eater		1		1
Pogoniulus atroflavus Red-rumped Tinkerbird			1	1
P. subsulphureus Yellow-throated Tinkerbird	2		1(1:13)	3(1)
Andropadus virens Little Greenbul	2(1:6)	27(2:9,47)	8(1:0)	37(4)
Thescelocichla leucopleura Swamp Palm Bulbul		3		3
Bleda notata Lesser Bristlebill		2		2
Pycnonotus barbatus Common Bulbul	1(1:41)		3(2:2,23)	4(3)
Nicator chloris Western Nicator	1		1	2
Cossypha natalensis Red-capped Robin Chat		1		1
Sylvietta virens Green Crombec		1	1(1:13)	2(1)
Hylia prasina Green Hylia		1		1
Fraseria cinerascens White-browed Forest Flycatcher			1(1:14)	1(1)
Myioparus plumbeus Lead-coloured Flycatcher	1	2		3
Terpsiphone batesi Bates's Paradise Flycatcher			1	1
Anthreptes aurantium Violet-tailed Sunbird		2		2
Anabathmis reichenbachii Reichenbach's Sunbird	2(1:?)	1(1:27)	1	4(2)
Cyanomitra verticalis Green-headed Sunbird	1		1	2
C. obscura Western Olive Sunbird	2(1:33)	17(4:4,11, 33,45)	3(1:11)	22(6)
Chalcomitra amethystina Amethyst Sunbird			1	1
Cinnyris chloropygius Olive-bellied Sunbird		1		1
Nectariniidae sp. unidentified	1		1	2
Spermophaga haematina Western Bluebill			1(1:13)	1(1)
Lagonosticta rubricata Blue-billed Firefinch			1	1
Total	**13(4)**	**62(7)**	**28(9)**	**103(20)**
Proportion in moult	**0.31**	**0.11**	**0.32**	**0.19**

Despite the higher net effort in savanna than in forest interior, more woodland-forest species were netted than savanna species; however, woodland-forest species were netted in all habitat types, including savanna if it was close to forest or if it separated two forest patches, while savanna species were not netted in forest.

For the woodland-forest species, the proportion of birds moulting their primary wing feathers was significantly different between the three seasonal sampling periods ($\chi^2_2 = 6.585$, $P < 0.05$) with 11% in moult during the dry Jun–Aug sampling period, compared to 31% and 32% in the two wet sampling periods (Table 2). Further, the moult scores for these species during the early wet sampling period (Nov–Dec) were generally low (seven of nine less than 15), while during the other two sampling periods the moult scores were apparently but not significantly (U test, $P > 0.05$) more advanced (six of ten greater than 25) (Table 2).

The savanna species exhibited a significantly different pattern of moult timing in comparison to the woodland-forest species (using woodland-forest moult proportions to generate expected frequencies for savanna species: $\chi^2_2 = 13.09$, $P < 0.01$).

Table 3. Number of savanna birds netted in the Lesio-Louna Reserve during 2002, with number in primary moult and moult scores in parentheses.

	Feb–Mar	Jun–Aug	Nov–Dec	Total
Caprimulgus natalensis Swamp Nightjar		3		3
Merops variegatus Blue-breasted Bee-eater		6		6
Dendropicos fuscescens Cardinal Woodpecker			1(1:27)	1(1)
Mirafra rufocinnamomea Flappet Lark		1(1:0)		1(1)
Myrmecocichla nigra Sooty Chat		1	2(2:16,27)	3(2)
Cisticola galactotes Winding Cisticola			1(1:8)	1(1)
C. natalensis Croaking Cisticola		1		1
Prinia subflava Tawny-flanked Prinia	3	1		4
Camaroptera brachyura Grey-backed Camaroptera	2		2	4
Malaenornis pallidus Pale Flycatcher			1	1
Passer griseus Northern Grey-headed Sparrow	1			1
Ploceus nigerrimus Vieillot's Black Weaver	21(1:8)	1	1	23(1)
Quelea erythrops Red-headed Quelea		1		1
Euplectes macrourus Yellow-mantled Widowbird			1	1
Euplectes sp. unidentified	1			1
Estrilda melpoda Orange-cheeked Waxbill	3			3
Lonchura cucullata Bronze Mannikin		2(1:23)		2(1)
Serinus atrogularis Black-throated Seedeater			9(8:23,24,26, 33,38,39,45,45)	9(8)
Emberiza tahapisi Cinnamon-breasted Rock Bunting	1(1:45)			1(1)
Total	**32(2)**	**17(2)**	**18(12)**	**67(16)**
Proportion in moult	**0.06**	**0.12**	**0.67**	**0.24**

The proportion of savanna birds moulting their primaries was significantly different between the three seasonal periods (χ^2_2 = 24.972, $P < 0.01$), but low proportions were in moult during the Feb–Mar and Jun–Aug sampling periods (6% and 12% respectively), while a very high proportion were in moult during the Nov–Dec period (67%) (Table 3). Also, the moult scores during the Nov-Dec sampling period were significantly more advanced than for the woodland-forest species during the same period (U = 17.5, p < 0.05), with ten of 12 scores over 20 (Table 3).

New records

The mist-net survey produced five new species records for the Lesio-Louna Reserve, and a further four were added by sightings, as detailed below. These records bring the total number of species reported in the area to 245.

Halcyon leucocephala **Grey-headed Kingfisher.** One adult observed for several minutes, perched on low branches of forest-edge trees and nearby *Hymenocardia acida* trees in savanna, Base-Vie, 26 Jul 2002. A new record for the Téké Plateau, although already known from the Brazzaville area to the south and Odzala to the north (Dowsett & Dowsett-Lemaire 1989, Dowsett-Lemaire 1997a).

Pogoniulus atroflavus **Red-rumped Tinkerbird.** One mist-netted in scrubby savanna close to gallery forest, Base-Vie, 9 Dec 2002. Widely recorded elsewhere in Congo (Dowsett & Dowsett-Lemaire 1989, Borrow & Demey 2001).

Dendropicos elliottii **Elliot's Woodpecker.** One observed for > 2 min., perched on vine within gallery forest at Base-Vie, 12 Dec 2002. A new record for the Téké Plateau, and an extension of the known range of this species, east from Gabon and south from NW Congo (Borrow & Demey 2001, Dowsett-Lemaire & Dowsett1998).

Cossypha natalensis **Red-capped Robin Chat.** One mist-netted in riverside gallery forest at Base-Vie, 4 Jun 2002, around 6h00. Few records and poorly known in Congo, this is a new record for the Téké Plateau. Previous Congo records from Ménengué in Kouilou (Dowsett-Lemaire & Dowsett 1991), Dimonika & Manenga in Mayombe and the Brazzaville region (references in Dowsett & Dowsett-Lemaire 1989).

Anabathmis reichenbachii **Reichenbach's Sunbird.** Mist-netted four times, three of them in nets located close to the forest edge along a large stream (Ngondoro, 5 Mar 2002 (2), 20 Jul 2002), the last in scrubby savanna near a small river (Base-Vie, 1 Dec 2002). A new record for the Téké Plateau, but not unexpected due to previous records from Kouilou, Odzala and Nouabalé-Ndoki (Dowsett-Lemaire & Dowsett 1991, Dowsett-Lemaire 1997a,b).

Lamprotornis purpureiceps **Purple-headed Glossy Starling.** One pair observed in savanna trees close to forest-edge and small river, Base-Vie, 26 May 2002. Already known from the Téké Plateau (Gamboma) and widely recorded elsewhere in Congo (Dowsett & Dowsett-Lemaire 1989).

Ploceus nigerrimus **Vieillot's Black Weaver.** Breeding colonies at both Base-Vie and Ngondoro, mist-netted at both locations. Widespread and common throughout Congo (Dowsett & Dowsett-Lemaire 1989, Borrow & Demey 2001).

Quelea erythrops **Red-headed Quelea.** One female or non-breeding male mist-netted at Ngondoro, 30 Aug 2002. Widespread and locally common in Congo but subject to seasonal movements (Dowsett & Dowsett-Lemaire 1989, Dowsett-Lemaire & Dowsett 1991, Dowsett-Lemaire 1997a, Borrow & Demey 2001).

Vidua macroura **Pin-tailed Whydah.** A male in breeding plumage observed at Ngondoro, 6 Mar 2002. A widespread species (Dowsett & Dowsett-Lemaire 1989, Borrow & Demey 2001).

Discussion

In the southern tropics of Africa, moult often occurs between December and April, following a peak in breeding activity at the end of the dry season or beginning of the rains (Dowsett-Lemaire & Dowsett 1991). In Congo, two moult studies are available, from Odzala National Park in northern Congo (Dowsett-Lemaire 1997d) and the Kouilou basin in the south-west (Dowsett-Lemaire & Dowsett 1991) (see Figure 1). In Odzala, forest birds exhibited two main periods of moult, with some *Andropadus* (especially *A. virens*) moulting Aug–Dec, while most other species moulted Jan–Apr. In Kouilou, forest birds appeared to begin moult only in Jan, with just 6% and 8% recorded in moult in Nov and Dec respectively.

Our results suggest a moult pattern somewhat different from these, with a relatively high 32% of woodland-forest birds in moult during the Nov–Dec sampling period. Most of these birds were in very early moult, implying that moult had started no earlier than Nov. As elsewhere, the moult season appeared to continue to the Feb–Mar sampling period, when 31% of woodland-forest birds were still in moult.

Sample sizes are too small to draw conclusions about most individual species, but *Cyanomitra obscura* at least appears not to follow this general trend. As reported for this species in Odzala (Dowsett-Lemaire 1997d), birds in moult were netted throughout our sampling periods, with highly variable moult scores. This suggests a lack of strong seasonality in moult, and probably therefore breeding, in this common species.

The timing of moult of savanna species appears different from that of woodland-forest species. During the Nov–Dec sampling period, 67% of savanna birds netted were in moult, many with advanced moult scores. By the Feb–Mar sampling period, just 6% were in moult. These results suggest an earlier moulting season than for forest birds, starting well before the end of November (perhaps as early as September, but certainly by October), and ending before the end of February. Data for savanna birds elsewhere in Congo is limited, although Dowsett-Lemaire (1997d) found a high proportion of savanna birds moulting or in fresh plumage in early April in Odzala.

The relationship between moult and breeding seasons has been the subject of much debate. For afrotropical birds, good reviews are given by Wilkinson (1983) and Dowsett-Lemaire (1997d). The latter found little evidence of overlap between

breeding and moult in individual birds, with only small numbers of two or three species suggesting exceptions to a rule. She argued that the only reliable records of breeding-moult overlap come from more seasonal habitats than tropical forest, or from areas of unpredictable rainfall. Her extensive studies in Congo and Gabon provided strong evidence that the onset of flight feather moult is relatively fixed within the annual cycle of birds there, and may be the major factor determining the end of breeding. If this is so in our area, and if there is indeed an earlier moulting season in the Lesio-Louna Reserve than elsewhere in Congo, this may suggest a corresponding difference in timing of breeding. In accordance with this suggestion, during a week's visit to the Lesio-Louna Reserve in April 1997, F. Dowsett-Lemaire (*in litt*.) observed breeding activity in several species (*Eupodotis senegalensis*, *Hirundo fuligula*, *H. abyssinica*, *Bleda notata*, *Cisticola juncidis*, *C. brachyptera*, *Muscicapa cassini* and *Cinnyris cupreus*), indicating egg-laying for March or April. She also noted an unusually high level of vocal activity in both forest and savanna species, as at Lékoni (Gabon) on the Téké Plateau, in April 2000. These observations contrast with those she made elsewhere in Congo, and suggest that there is indeed more breeding activity at that time on the Téké Plateau than further north (Odzala) or on the coast (Kouilou).

Of the nine new species records for the reserve, five (*Pogoniulus atroflavus*, *Lamprotornis purpureiceps*, *Ploceus nigerrimus*, *Quelea erythrops* and *Vidua macroura*) are widely recorded elsewhere in Congo (Dowsett & Dowsett-Lemaire 1989, Borrow & Demey 2001). The remaining four are new species records for the Téké Plateau, although two, *Halcyon leucocephala* and *Anabathmis reichenbachii*, fill a gap between records on either side (Dowsett & Dowsett-Lemaire 1989, Dowsett-Lemaire 1997a,b, Dowsett-Lemaire & Dowsett 1991). The record of *Dendropicus elliottii* appears to represent a small southern extension to its known distribution (Dowsett-Lemaire & Dowsett 1998, Borrow & Demey 2001), while that of *Cossypha natalensis* adds to the few records available for Congo (Dowsett & Dowsett-Lemaire 1989, Dowsett-Lemaire & Dowsett 1991), but its true status in the country remains uncertain.

Acknowledgments

We thank the Ministère de l'Economie Forestière et de l'Environnement of the Republic of Congo, and the John Aspinall Foundation of UK, for permission to undertake this research in the Lesio-Louna Reserve. We also thank the staff of the Projet Protection des Gorilles, Republic of Congo, in particular Ian Henderson, Christelle Chamberlan, Florent Ikoli, Nicaise Ngoulou and Prime Mobie. Françoise Dowsett-Lemaire and anonymous referees provided advice on several drafts of this paper. Waterproof notebooks were generously donated by BCB International Ltd.

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