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## **The avifauna of the dry evergreen forests of Mali**

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### **Summary**

Mali is crossed from north to south by three phytochoria or biomes: Saharo-Sindian, Sahel and Sudanian. Despite the fact that rain forest was never known to occur in the country, several dozen species of rain forest birds (many of them normally endemic to the Guineo-Congolian forest region) have been reported from localities in the south and west. This was investigated by exploring evergreen or semi-evergreen forest localities in the country. Visits in the dry season (Feb 2002) and at the start of the rains (May–Jun 2004) showed that there are no remnants of rain forest in the country and that most patches of dry evergreen forest are typical Sudanian gallery forest. The avifauna is also typically Sudanian and directly comparable to that documented from similar habitat in neighbouring countries. The few exceptions are birds of the Guineo-Congolian/Sudanian transition zone, which were discovered in some galleries in the far south near the Ivory Coast border. There is no historical botanical or ornithological evidence that putative changes in the vegetation and avifauna of SW Mali in the last 30 years could account for these findings. Past and present botanical and ornithological evidence from these surveys and from neighbouring countries in the same vegetation zone, suggests that 68 species of Guineo-Congolian and other rain forest-associated species, claimed to occur in Mali based on single-observer sight records and without the support of extant specimens, must be deleted from the avifauna of Mali.

### **Résumé**

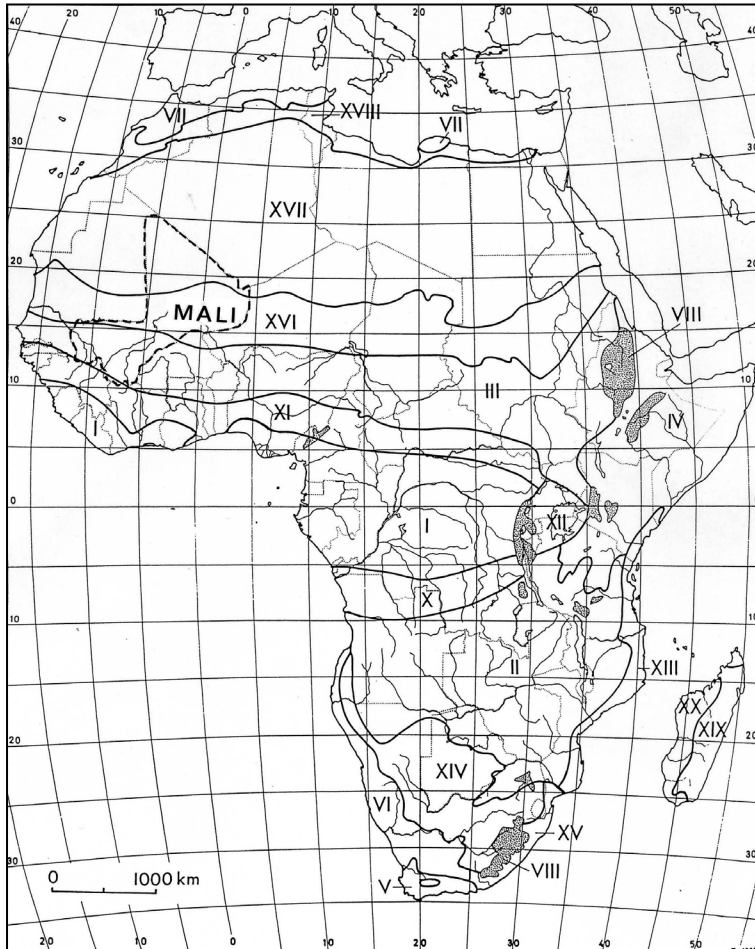
Le Mali est traversé, du nord au sud, par trois régions floristiques: le Sahara, le Sahel et la région soudanienne. Malgré l'absence de forêt ombrophile, plusieurs dizaines d'espèces d'oiseaux de la forêt ombrophile primaire ou secondaire ont apparemment été trouvées dans le sud et l'ouest du pays, beaucoup étant en principe endémiques à la région guinéo-congolaise. Nous avons tenté d'élucider ce problème en visitant la plupart des forêts sèches sempervirentes ou semi-sempervirentes du pays, en saison sèche (février

2002) et au début de la saison des pluies (mai-juin 2004). En tout, une vingtaine de localités de forêt sèche (se présentant le plus souvent sous forme de forêt-galerie) ont été visitées. Nos résultats montrent qu'il n'existe en effet pas de forêt ombrophile au Mali, que les forêts sèches riveraines abritent les espèces caractéristiques du même type de milieu ailleurs en Afrique occidentale et que les espèces de forêt ombrophile guinéo-congolaise y font défaut. Les rares exceptions concernent quelques espèces de la zone de transition guinéo-congolaise/soudanienne découvertes dans les plus belles galeries de l'extrême sud, près de la frontière avec la Côte d'Ivoire. Les études floristiques antérieures (au Mali et dans les pays voisins) ainsi que les enquêtes ornithologiques dans les forêts sèches des autres pays d'Afrique occidentale dans les années 1960-1970 excluent complètement l'argument selon lequel le milieu et l'avifaune auraient pu changer de manière radicale en 30 ans. Nous déduisons de ceci et de nos récentes investigations que 68 espèces de forêt ombrophile ou lisière forestière rapportées par un seul observateur, sans le support de spécimens, doivent être rejetées de l'avifaune du pays.

### Introduction

Mali is a large (1,240,190 km<sup>2</sup>) landlocked country, crossed by three phytochoria or biomes, from north to south: Saharo-Sindian, Sahel and Sudanian (White 1983, Fig. 1). The Sudanian appears as "Sudan-Guinea" in Fishpool & Evans (2001). Most of the ornithological research in Mali has taken place in the Niger Delta in the Sahel, an important wintering area for Palaearctic waterbirds, with three Ramsar sites and nine of the 17 Important Bird Areas of the country (Robertson *in* Fishpool & Evans 2001). The wooded savannas of the south of the country are far less well known; few ornithologists have explored them, with the exception of Lamarche (1980–1), whose annotated list of the avifauna of Mali was based largely on his own observations in the 1970s. This list includes a surprisingly high number of primary or secondary rain forest species, many of them Guineo-Congolian endemics, despite the fact that rain forest is not present in the country. Some of these forest bird species were apparently collected by Lamarche, but specimens were never deposited in a museum overseas and they are not to be found in Mali. Lamarche (*in litt.* 2002) claims they were left at the Ecole Normale Supérieure de Bamako, but this school holds no such collections and they could not be found among the University collections either (L. Granjon *in litt.*). Fishpool & Evans (2001) omitted all mention of forest species of the Guineo-Congolian biome in the chapter on Mali, due to serious doubts based on field experience of the area (L.D.C. Fishpool pers. comm.). Reservations about some of these records were expressed by Dowsett (1993), but Lamarche's publications have generally been taken seriously in the recent literature. The distribution maps in

Borrow & Demey (2001) often show a striking gap between the “normal” distribution of forest species and the two or three mentions in SW Mali. The northern limit of the Guineo-Congolian region is indeed far south of the border between Ivory Coast and Mali, and the northern limit of the Guineo-Congolian/Sudanian transition zone just about reaches the border between the two countries (White 1983 p. 38; Fig. 1).



**Fig. 1.** Map of phytochoria based on White (1983). Mali is crossed (from north to south) by the Saharo-Sindian (XVII), Sahel (XVI) and Sudanian regions (III); the Guineo-Congolian/Sudanian transition zone (XI) reaches the border with Ivory Coast.

In early 2002, in the middle of the dry season, we visited several areas of wooded savanna and dry forest (usually in the form of gallery forest) in the southwest of the country, including the Plateau Mandingue in the region of Haut-Bafing south to the Guinea border, and the region south of Bougouni, near Madina Diassa, close to the Ivory Coast border. We found only two strictly Guineo-Congolian endemic birds in the extreme south (Madina Diassa), one of them (Brown Sunbird *Anthreptes gabonicus*) a species of mangrove and riverine forest, the other (Simple Greenbul *Chlorocichla simplex*) a bulbul of secondary growth. Neither of these was previously reported in Mali, and we found several more species new for the country (not reported by Lamarche), some of them locally common (Dowsett-Lemaire & Dowsett 2002, Dowsett & Dowsett-Lemaire 2005). We were unable to confirm any of the stenotopic forest species claimed by Lamarche, e.g. *Criniger*, *Bleda*, *Andropadus*, *Illadopsis*, *Phyllanthus*, *Malimbus*, *Nigrita*, forest *Nectarinia* spp., Northern Red-billed Helmet Shrike *Prionops caniceps*.

Lamarche (1980–1, *in litt.* 2002), however, argued that most of his observations of forest birds took place in the rainy season, especially in May–June, and in November (just after the end of the rains). Lamarche (*in litt.*) assumes that these species must be able to migrate several hundred kilometres into the Sudanian region with the arrival of the pluvial front. This behaviour has rarely been observed elsewhere in west-central Africa, e.g. Snowy-headed Robin Chat *Cossypha niveicapilla* and the forest-edge Fanti Saw-wing *Psolidoprocne obscura* (Elgood *et al.* 1973). Most specialized forest birds are highly sedentary (Brosset & Erard 1986, Dowsett-Lemaire 1997).

Lamarche's claims have important consequences for the conservation of forest species in W Africa. The Upper Guinea rain forests were severely reduced in the 20th century, and some of the species reported for Mali by Lamarche (Yellow-casqued Hornbill *Ceratogymna elata*, Yellow-bearded Greenbul *Criniger olivaceus*) are Globally Threatened (BirdLife International 2000). The presence of these species is considered doubtful by Fishpool & Evans (2001), and this controversy deserves scrutiny.

Lamarche's claims have had such an impact that it seemed essential to verify them with a better-timed visit, at the beginning of the rains in May–June. In 2004, we revisited the best gallery forests we saw in 2002 (especially on the Baoulé-sud near Madina Diassa, and in the Haut-Bafing area), and explored other sites mentioned by Lamarche (1980–1), such as the dry forest patches dominated by *Gilletiodendron glandulosum* in the Manantali-Kita region, the gallery forests on the Baoulé (previously in the Parc National de la Boucle du Baoulé, now in part degazetted), the gallery or swamp forests in the Kangaba region (Haut-Niger), the Sikasso region in the far south, and the more north-easterly gallery on the Bani river, close to the Sahel region. The Boucle du Baoulé was also studied by Bie & Morgan (1989), who included some surprising records of rain forest species.

A gazetteer is given in Table 1, and Fig. 2 shows the study area. There are two Baoulé rivers in Mali. To avoid confusion, the southern one (originating in Ivory Coast) is termed here “Baoulé-sud”. The other takes its source on the Mandingue Plateau and forms the Boucle du Baoulé: the northern sector that we visited, between the confluence with the Badinko and the Bakoy is called here “Baoulé-nord”.

**Table 1. Gazetteer of localities in Mali**

	N	W
Bafing-Makana	12°33′	10°15′
Bagoé river bridge (Bagoé crossing)	11°28′	6°35′
Banifing river (Kouoro Bridge)	12°1′	5°42′
Baoulé river, near Négala	12°56′	8°38′
Baoulé–Badinko confluence	13°42′	9°35′
Baoulé–Bakoy confluence	13°32′	9°54′
Baoulé-sud river, near Madina Diassa	10°48′	7°40′
Bindougou, Bafing/Balé confl.	12°16′	10°20′
Deguéla river, near Kangaba	12°2′	8°23′
Famansa Plateau, Mandingue	12°14′	8°46′
Farako forest (near Sikasso)	11°14′	5°26′
Fié river, near Séléfougou	11°42′	8°29′
Kalana	10°47′	8°12′
Kénémanda stream, near Siby	12°34′	8°11′
Kéniéba, Falémé river	12°50′	11°14′
Kollé forest, near Bankoumana	12°11′	8°12′
Kouoro Bridge (Banifing river)	12°1′	5°42′
Nalla (Ouassoulou Balé river)	10°46′	8°5′
Ntjila, Baoulé-sud river (near Bougouni)	11°18′	7°34′
N'turaya river, near Sanfinian	12°31′	9°56′
Pont-Bani (Bani river)	13°13′	5°54′
Sagabari	12°35′	9°48′
Sanfinian	12°31′	9°56′
Sémé, near Kita	13°5′	9°32′
Soukoutali, Bafing river	12°29′	10°17′
Tambalé, Mandingue Plateau	12°33′	8°53′
Tombané, Mandingue Plateau	12°16′	8°46′
Woroni Chutes, near Loulouni	10°47′	5°34′
Yanfolila	11°11′	8°9′
Yorobougoula	10°55′	8°0′

Most bird observations took place in the early morning and late evening, from camp sites usually on the edge of forest. In 2004 the rainy season started in April in the far south (Bougouni–Sikasso) and late May or early June further north (Baoulé, Sagabari, Haut-Niger and Bani river); all sites visited had received at least one big storm. We started with a visit to the wetter south. Bird song activity was high everywhere. Temperatures were in the upper 30s °C, but lower in the far south (especially Sikasso).

Given the controversy, we outline our previous relevant field experience. This was acquired through years of full-time research in central Africa (mainly Congo-

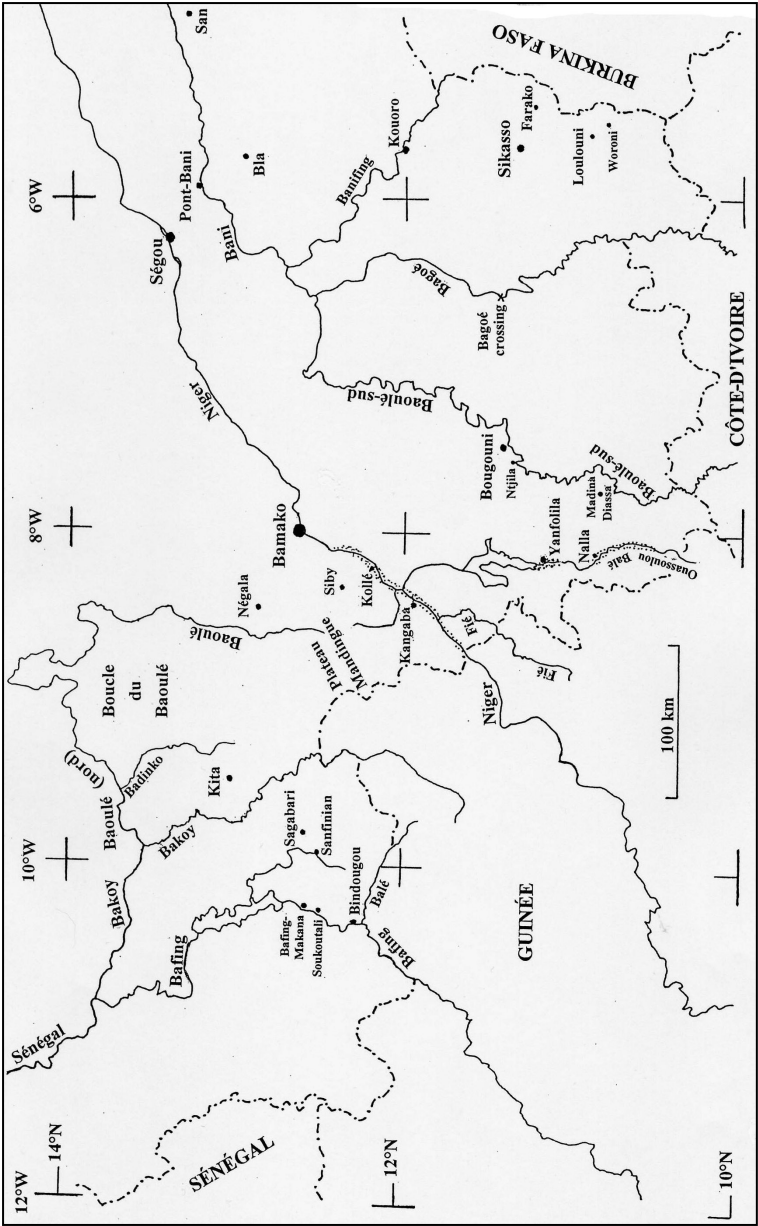


Figure 2. Map of the study area in Mali.

Brazzaville and Cameroon) and even longer in the woodlands and drier evergreen forests of Africa, mainly in the Zambebian region (which shares many species with the Sudanian region). Our experience of W African savanna ecosystems includes extensive visits to Nigeria, Senegal, Ghana and N Cameroon.

Nomenclature follows Dowsett & Forbes-Watson (1993) except for African Green Pigeon *Treron calvus* (Urban *et al.* 1986) and *Spermestes* in place of *Lonchura* (Payne & Sorenson 2003). The suffixes of some species names have changed following David & Gosselin (2002a,b). Some woody plants were identified using Arbonnier (2000); others were confirmed by P. Birnbaum (CIRAD, Bamako).

### Itinerary

#### 2002

25 Jan to 1 Feb: Bamako (including Botanic Gardens).

4–8 Feb: Plateau Mandingue (Tambalé and Tombané, Famansa Plateau).

10–15 Feb: Haut-Bafing (Soukoutali on the Bafing and Bindougou on the Guinea border, Balé/Bafing confluence), road from Kita through Bafing-Makana and back via Sanfinian and Sagabari.

19–21 Feb: Baoulé-sud at Ntjila (Bougouni) and near Madina Diassa.

21–22 Feb: crossing Ouassoulou Balé at Nalla to Yanfolila floodplain.

24 Feb to 5 Mar: in the Niger Delta near Batamani (Mopti) and in the Dogon country, outside the area of dry evergreen forest.

#### 2004

22–24 May: Baoulé-sud near Madina Diassa.

24–25 May: Ouassoulou Balé gallery near Nalla.

26–28 May: region of Sikasso, camping in Farako forest and visiting the riparian forest at Chutes de Woroni (Loulouni) and the Bagoé gallery crossed by the main road (Bougouni-Sikasso).

29 May: small gallery forest at a spring (Kénémanda) near Siby, 20 km from Bamako.

30 May to 1 Jun: Sémé, at the foot of the big rocky hill north-west of Kita, to explore dry *Gilletiodendron glandulosum* forest in rocky gullies.

1–3 Jun: N'turaya river at Sanfinian (south of Sagabari), best gallery found in the Haut-Bafing in 2002.

4–6 Jun: Baoulé at the Badinko confluence (ex Parc National du Baoulé).

5–6 Jun: Baoulé/Bakoy confluence.

7–8 Jun: Baoulé road crossing (near Négala).

9–10 Jun: Déguéla river, the best gallery forest found near Kangaba.

10–11 Jun: swamp forest near Kollé, Bankoumana (Haut-Niger floodplain).

12–13 Jun: gallery forest on the Bani river at “Pont-Bani”.

14–19 Jun: tour of the Sahel from Douentza to Gao.



19–20 Jun: Banifing river, Kouoro bridge.

20–21: Farako forest near Sikasso.

21–22 Jun: Fié river, the longest gallery in the Haut-Niger (south of Kangaba).

### Site descriptions

Sites are presented roughly in order from west to east (Fig. 2). In most places the gallery forest was largely intact, although some large *Khaya senegalensis* trees had been taken here and there, and occasionally small gardens had cleared riparian forest all the way to the stream. Gallery forest is still extensive; population density in southern Mali is generally low away from Bamako and a few other big towns. Shifting cultivation affects mainly woodland away from galleries, and this is usually followed by regeneration.

#### Haut-Bafing

The Bafing river flows permanently. The wide Bafing river at Soukoutali was lined by no more than thin strips of evergreen gallery forest often just 1–3 trees wide, as at Bafing-Makana. Important species are *Cola laurifolia*, *Cynometra vogelii*, *Erythrophleum suaveolens*, *Garcinia livingstonei*, *Pterocarpus santalinoides*, *Syzygium guineense* and *Ficus ingens*. A small patch of forest on an island (c. 1 ha) was dominated by *Parinari congensis* (20–25 m tall). Our second camp near Bindougou, at the confluence of the Balé and Bafing rivers (alt. 237 m) was on the border with Guinea. The gallery forest on the Bafing there is similar to that at Soukoutali, in addition there is also dry deciduous forest at the confluence, with *Acacia sieberiana*, *Anogeissus leiocarpus*, *Ficus sur*, *F. sycomorus*, *Piliostigma thonningii*, *Vitellaria paradoxa*, the odd large *Khaya senegalensis* and *Parkia biglobosa*. A sacred forest at nearby Bindougou (1–2 ha) is dominated by large *Khaya senegalensis*, with *Adansonia digitata*, *Diospyros mespiliformis*, *Ficus sycomorus* and many lianes (e.g. *Saba senegalensis*). We crossed several galleries near Sagabari and selected the best-developed (Sanfinian) for our 2004 visit. This is on the permanent N'turaya river (a tributary of the Bafing), still fast-flowing in places in early June. The gallery on each side was often 20–25 m tall but rarely more than 20–30 m wide, with *Berlinia grandiflora*, *Ceiba pentandra*, *Cola laurifolia*, *Daniellia oliveri*, *Ficus trichopoda*, *Ficus* sp. (photographed on p. 407 in Arbonnier 2000, but not *F. ovata*), *Garcinia livingstonei*, *Khaya senegalensis*, *Nauclea latifolia* and *Parkia biglobosa*. The palm *Raphia sudanica* is fairly common (as elsewhere in the Bafing), and there is much wild bamboo *Oxytenanthera abyssinica*. Lianes include *Saba senegalensis*, *Paullinia pinnata*.

#### Dry evergreen *Gilletiodendron glandulosum* forest near Kita (Sémé)

*Gilletiodendron* is dominant in dry gullies among rocks, forming tongues of forest often no more than 10–20 m wide, locally up to 50 m (where visited). The canopy is

usually 15–20 m high, with little understorey among the rocks (mainly the lianescent *Hippocratea africana*). Other tree species include *Albizia zygia*, *Gyrocarpus americanus*, *Vitex doniana*, *Syzygium guineense*, *Ficus glumosa* and *F. ingens*. The main canopy liane is *Saba senegalensis*. This forest type is also well developed on rocky hills in the Manantali region, especially in the recently created PN du Bafing where small populations of Chimpanzee *Pan troglodytes* survive.

### **Boucle du Baoulé**

At the level of the Badinko confluence the Baoulé-nord is a large, sandy river holding little water in the dry season (few isolated pools). The water table in the riverbed, however, is only 1–2 m below the surface. Small trees (e.g. *Guiera senegalensis*, *Ziziphus spina-christi*) grow on the sandbanks, and the river is lined by broad galleries of *Borassus* palms, 20–25 m tall and up to 100 m wide. The next most important large tree is the deciduous *Anogeissus leiocarpus*, with a few (mainly evergreen) *Celtis integrifolia* and *Diospyros mespiliformis*. The understorey is dominated by *Cordia myxa* and deciduous thickets of *Acacia ataxacantha* and *Combretum*, with also *Grewia* sp. and *Bauhinia rufescens*, and on their outside edge *Cassia sieberiana*. The main liane is *Saba senegalensis*. At the Baoulé/Bakoy confluence the vegetation is similar but more degraded by cattle and people; the Bakoy holds more water than the Baoulé and there are pools several hundred metres long in that area. West of Négala the riverbed contained some large pools but the river was not flowing. There are small clumps of evergreen riparian thicket with *Diospyros mespiliformis* and *Pterocarpus santalinoides* (also some *Berlinia grandiflora*, *Dialium guineense*, *Nauclea latifolia*, *Piliostigma thonningii*). Otherwise the dominant tall trees (20–25 m) are *Anogeissus leiocarpus* (in fresh foliage in June), above and on the edge of *Acacia ataxacantha*–*Combretum* thickets. *Mitragyna inermis* (deciduous) grows on the outer edge and near small seasonal tributaries.

### **Mandingue Plateau (or Monts Mandingues)**

The Mandingue is a rocky plateau extending from near Bamako to the Guinea border. At 600–700 m altitude, it is slightly cooler than the surrounding plain. Riparian vegetation at Tambalé and Tombané consists of small strips of (usually) single trees along temporary streams (with some permanent pools). *Raphia sudanica* and *Oxytenanthera abyssinica* bamboo are frequent; common trees are *Berlinia grandiflora*, *Khaya senegalensis*, *Parkia biglobosa*, with the odd *Erythrophleum suaveolens* and stilt-rooted *Uapaca togoensis*. A small forest in a rocky gully (with a spring) on the Famansa Plateau near Tombané had mainly *Carapa procera* and *Khaya senegalensis*. Near Siby (= Sibi) a small patch of gallery forest has developed on a permanent spring among rocks (Kénémanda stream). There are similar small patches in the area, including at Siby waterfalls (P. Birnbaum pers. comm.). Large trees are mainly *Berlinia grandiflora* and

*Carapa procera*; also *Bridelia micrantha*, *Cola cordifolia*, *Erythrophleum suaveolens*, *Ficus glumosa*, *Mimusops* sp., *Manilkara multinervis*, *Syzygium guineense*, some *Raphia* and one *Elaeis guineensis*. There is almost no shrub understorey among rocks, but quite a few lianes (including *Acridocarpus chevalieri*, *Combretum velutinum*, *Tetracera alnifolia*, much *Saba senegalensis*).

### From Haut-Niger to Ivory Coast border

The Haut-Niger floodplain (southwest of Bamako) holds a type of evergreen swamp forest that was not encountered elsewhere in Mali. Near Bankoumana, between the village of Kollé and the Niger, there are several long patches of *Parinari–Myrianthus* swamp forest on permanent deep pools of clear water (apparently an old arm of the Niger river). These must get flooded by the Niger in the late rainy season. *Parinari congensis* forms a tall (25 m), closed canopy, in tongues of forest several hundred metres long and 30–100 m wide. *Myrianthus serratus* (on stilt-roots) dominates the understorey. Trees on the edge of pools are mostly *Syzygium guineense*, with *Cola laurifolia*, *Cynometra vogelii*, *Garcinia livingstonei*, *Mitragyna inermis* and *Morelia senegalensis*. Nearer Kangaba, the “best” gallery on the N side of the Niger is that on the Déguéla river, a small stream flowing permanently from the Mandingue into the Niger. The dominant tree in the thin galleries on each side (usually not joining) is *Dialium guineense*, 15–20 m tall; also noted were *Carapa procera*, *Cola laurifolia*, *Cynometra vogelii*, *Daniellia oliveri*, *Ficus sur*, *Garcinia livingstonei*, *Khaya senegalensis*, *Manilkara multinervis*, *Nauclea latifolia*, *Parkia biglobosa*, *Vitellaria paradoxa* and *Syzygium guineense*. *Mitragyna* occurs on the outside edge and in small clumps in adjacent savanna.

The best gallery south of Kangaba is on the Fié river (which flows from Guinea into the Niger) as it is 35–40 km long within Mali and is accessible from the village of Séléfougou. There is dense gallery forest on both fairly steep banks, the width (10–30 m) being determined by the gradient, as the outside edge is sharply defined by the regular burning of the adjacent floodplain grassland. The dominant tree is *Pterocarpus santalinoides*, with *Cynometra vogelii*, *Eugenia nigerina*, *Garcinia livingstonei*, *Morelia senegalensis* and *Vitex* sp. *Syzygium guineense* is common on the water’s edge.

The long gallery on the Ouassoulou Balé south of Yanfolila is very similar, as the edges are also sharply defined by the burning of the adjacent floodplain. The forest galleries (usually not joining) are limited to the steep banks: *Syzygium guineense* is dominant at the water’s edge and *Khaya senegalensis* on the outside edge. Locally, *Khaya* regenerates and extends into the grassland, but most young trees get burned. Also noted: *Cynometra vogelii*, *Eugenia nigerina*, *Garcinia livingstonei*, *Pterocarpus santalinoides*.

The gallery on the Baoulé-sud, south of Bougouni, is also extensive, as the area is little populated. The *Simulium* blackfly (carrier of river blindness) has discouraged settlements but the parasite is in the process of being eradicated in the region. Near

Bougouni (Ntjila) the gallery consists of interrupted strips on sandy soils, with much *Mimosa pigra* bush near the water. *Cynometra vogelii* and *Pterocarpus santalinoides* are dominant, with *Cola laurifolia*, *Daniellia oliveri*, *Garcinia livingstonei* and *Parkia biglobosa*. In the Madina Diassa area further south, the gallery is much denser and up to 300 m wide. This is the widest gallery seen anywhere in S Mali. Some *Erythrophleum suaveolens* on the outer edge are at least 30 m tall. *Syzygium guineense* is dominant on the water's edge, and *Cola laurifolia* and *Cynometra vogelii* in the flooded section (also an unidentified tree 12–15 m tall). The small creeping bush *Mostuea brunonis* is common in deep shade. The commonest liane as usual is *Saba senegalensis*.

### The south-eastern region around Sikasso

The gallery forest on the Bagoé was examined briefly near the bridge crossing west of Sikasso. The Bagoé is a wide permanent sandy river, with *Mimosa pigra* common on beaches. Elevated banks have some dense evergreen thickets, often c. 15 m tall. The patch visited was 20–50 m wide, with mainly *Cola laurifolia*, *Diospyros mespiliformis*, *Garcinia livingstonei*, *Pterocarpus santalinoides* and *Syzygium guineense*.

The Farako gallery forest is c. 30 km southeast of Sikasso; there is a patch of evergreen forest at the “Chute de Farako”, but the main gallery is on a tributary of the falls and is several km long. This gallery is reached by taking the track signposted to Sényéna, for c. 1 km, which turns around a small plantation of *Eucalyptus* before approaching the gallery. This is the tallest gallery seen anywhere in Mali, and unlike others it has a closed canopy over a small, clear stream. The canopy (25–30 m tall) is dominated by *Carapa procera* and the forest varies in width from 10–20 m to at least 100 m. The outside edge merges into tall Sudanian *Isoberlinia* woodland, with many large *Khaya senegalensis* in the transition zone. *Berlinia grandiflora*, the palm *Elaeis guineensis* and stilt-rooted *Uapaca togoensis* are also particularly common, with *Breonadia salicina* on the edge of waterfalls and *Syzygium guineense* in clearings near water generally. Also noted: *Cola cordifolia*, *Ficus ingens*, *F. sur*, *Manilkara multinervis*, *Vitex doniana* and *Voacanga africana* (in the understorey). *Pandanus* sp. is very common in gaps on the edge of water and there are thickets of *Alchornea cordifolia* in clearings. The understorey is fairly open where the forest is liable to flooding (a spiny Araceae, *Anchomanes* sp., is the main plant in this area); thickets and liane tangles are limited to tree falls and edges. Lianes include *Saba senegalensis*, *Tetracera alnifolia* and *Paullinia*.

The Woroni waterfalls (south of Loulouni) are at least 20 m tall and 50 m wide, but there is less forest. The riparian evergreen forest is floristically similar to that of Farako, with also *Gardenia imperialis* on the edge of water. Secondary growth on the edges has *Alchornea cordifolia*, *Harungana madagascariensis* and *Trema orientalis*. *Psychotria* cf. *psychotrioides* (also noted at Farako) is particularly common in the understorey near the falls.

The Banifing river was examined at the Kouoro bridge between Sikasso and Koutiala. The Banifing is a tributary of the Baoulé-sud, like the Bagoé, and is fairly

wide with dense gallery on both banks, mostly 12–15(–20) m tall, but not very wide (usually < 40 m). Common trees are *Cola laurifolia*, *Cynometra vogelii*, *Syzygium guineense*, with *Daniellia oliveri*, *Diospyros mespiliformis*, *Eugenia nigerina*, *Garcinia livingstonei*, *Morelia senegalensis*, *Pterocarpus santalinoides*, some 30-m tall *Khaya senegalensis* (some felled), *Cassia sieberiana*, and *Mitragyna inermis* and *Nauclea latifolia* on the outer edges. *Parkia biglobosa* is the tallest tree in adjacent woodland.

**The Bani river**

North of the confluence with the Bagoé and Banifing, the Baoulé-sud becomes the Bani (Fig. 2) and flows into the Niger at the latitude of Mopti. We camped near Pont-Bani where the wide sandy river flows permanently between large sand beaches (bare or with *Mimosa pigra*). The evergreen gallery just north of the bridge is so dense that we could reach the edge of the water only by following a cattle track. Evergreen riparian thickets are 10–12 m tall and consist mostly of *Cynometra vogelii*, *Diospyros mespiliformis*, *Garcinia livingstonei*, *Pterocarpus santalinoides* and *Syzygium guineense*. They are only 20–60 m wide, merging without transition into dense deciduous *Acacia–Combretum* thickets and thicket clumps, with *Cassia sieberiana*, *Guiera senegalensis*, *Lannea* sp., *Mitragyna*, *Piliostigma reticulatum*, *Pterocarpus lucens*, *Terminalia* sp., *Ximenia americana* and *Ziziphus* spp.

**The avifauna of dry evergreen forest**

We list all the forest-associated bird species encountered in dry evergreen or semi-evergreen (gallery) forest. Obligate forest species (not met in other habitats in Mali) are indicated by (F). The detailed distribution of all forest-obligate and near-obligate species is summarized by forest in Table 2.

**Table 2. Selected forest or forest-edge bird species recorded in southern Mali.**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Gorsachius leuconotus</i>							+		+								+
<i>Bostrychia hagedash</i>	+	+					+		+	+		+					
<i>Gypohierax angolensis</i>	+	+	+														
<i>Circaetus cinerascens</i>	+			+					+			+					
<i>Podica senegalensis</i>		+	+				+		+		+	+				+	
<i>Streptopelia hypopyrrha</i>	+	+	+	+		+						+					
<i>Turtur afer</i>												+					
<i>Tauraco persa</i>															+		
<i>Musophaga violacea</i>	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Cuculus solitarius</i>										+		+		+			
<i>Chrysococcyx klaas</i>		+	+	+	+			+		+	+	+					
<i>Scotopelia peli</i>	+											+					

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Apaloderma narina</i>		+	+		+							+		+			
<i>Alcedo quadribrachys</i>			+			+			+	+		+					
<i>Alcedo leucogaster</i>															+		
<i>Ceyx pictus</i>		+	+	+	+		+	+	+			+	+			+	+
<i>Halcyon malimbica</i>	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pogoniulus bilineatus</i>															+		
<i>Indicator minor</i>	+		+												+		
<i>Campethera abingoni</i>						+				+	+	+	+				
<i>Campethera nivos</i>												+					
<i>Dendropicos fuscescens</i>	+	+	+	+		+		+			+	+					
<i>Psolidoprocne obscura</i>			+		+				+	+		+		+	+		
<i>Chlorocichla simplex</i>												+					
<i>Chlorocichla flavicollis</i>	+	+	+			+	+	+	+	+	+		+	+	+	+	+
<i>Pyrrhurus scandens</i>												+					
<i>Cossypha niveicapilla</i>			+	+	+			+				+	+	+	+	+	+
<i>Cossypha albicapilla</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Apalis flavida</i>		+	+		+		+	+	+	+	+	+	+	+		+	
<i>Hypergerus atriceps</i>	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+
<i>Muscicapa aquatica</i>	+	+	+				+		+	+	+	+	+			+	
<i>Platysteira cyanea</i>	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Elminia longicauda</i>		+	+		+	+		+	+	+	+	+	+	+			
<i>Turdoides reinwardtii</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+
<i>Anthreptes gabonicus</i>												+					
<i>Anthreptes collaris</i>						+				+		+					
<i>Nectarinia verticalis</i>			+									+		+	+		
<i>Nectarinia venusta</i>			+			+		+	+		+	+					
<i>Laniarius aethiopicus</i>												+		+			
<i>Malaconotus sulfureopectus</i>	+	+	+	+	+			+	+		+	+			+	+	+
<i>Dicrurus ludwigii</i>	+	+				+	+			+		+		+	+	+	
<i>Ploceus nigricollis</i>	+	+	+		+	+		+	+	+	+	+	+	+	+	+	
<i>Nesocharis capistrata</i>												+		+			
<i>Euschistospiza dybowskii</i>						+											
<i>Lagonosticta rufopicta</i>	+	+	+	+		+		+	+	+		+		+			
<i>Lagonosticta rubricata</i>			+	+													
<i>Lagonosticta rara</i>	+	+	+			+						+					

Key to sites. 1= Soukoutali (Bafing); 2= Bindougou; 3= Sanfinian; 4= Baoulé-nord (Badinko and Bakoy confluence); 5= Baoulé (Négala); 6= Mandingue; 7= Kollé (Bankoumana); 8= Kangaba (Déguéla river); 9= Fié river; 10= Ouassoulou Balé (Nalla); 11= Ntjila (Bougouni); 12= Baoulé-sud (Madina Diassa); 13= Bagoé crossing; 14= Farako; 15= Woroni; 16= Banifing (Kouoro); 17= Pont-Bani. Some localities (Bagoé, Woroni) were visited only at midday; others (Soukoutali, Bindougou, Mandingue, Ntjila) only in February 2002 when rainy season visitors were lacking. The dry evergreen *Gilletiodendron* forest near Kita is omitted, as only two forest species were found there (*Musophaga violacea*, *Turdoides reinwardtii*)

**Ardeidae**

*Nycticorax nycticorax* Black-crowned Night Heron. Found in some galleries of the south, to Baoulé-nord, but extends into Delta.

*Gorsachius leuconotus* White-backed Night Heron (F). Two full-grown immatures seen well by day in dense vegetation in swamp forest at Kollé, and characteristic low growl heard at dawn; an immature seen on the Banifing; “growl” heard at dawn and dusk on the Fié. This essentially piscivorous species is usually confined to dense riparian vegetation bordering permanent water. The distribution given by Lamarche (1980–1), with localities confined to the dry Sahel, therefore seems odd.

*Butorides striata* Green-backed Heron. Present at all localities of gallery forest visited, edge of rivers and large pools; can extend into wooded floodplain.

**Scopidae**

*Scopus umbretta* Hamerkop. Widespread on wooded rivers and pools; several nests located in gallery forest; also seen in more open situations and into the Sahel.

**Threskiornithidae**

*Bostrychia hagedash* Hadada (F). Confined to dense riparian forest in the southwest, in small numbers; curiously not found near Sikasso.

**Accipitridae**

*Haliaeetus vocifer* African Fish Eagle. Confined to the Bafing river (several pairs).

*Gypohierax angolensis* Palm-nut Vulture (F). A species whose distribution in Africa usually matches that of its favourite food, nuts of *Elaeis* and *Raphia*. Seen only in the region of Haut-Bafing, in Feb and June, where *Raphia sudanica* is common. The Oil Palm *Elaeis guineensis* is common only near Sikasso, but the bird was not seen there.

*Circaetus cinerascens* Western Banded Snake Eagle (F). Associated with well developed gallery forest in the west (from Baoulé-sud to the Bafing and Baoulé-nord). Recorded in both seasons but more easily located in May–Jun when giving its noisy aerial display.

*Kaupifalco monogrammicus* Lizard Buzzard. Widespread in gallery forest but also in woodland, throughout the southwest, extending marginally into the Sahel.

*Hieraetus spilogaster* African Hawk Eagle. Present on the edge of gallery forest at Sanfinian and near Kangaba, extends into woodland.

*H. ayresii* Ayres’s Hawk Eagle. Present in gallery forest and woodland at Soukoutali.

*Lophaelus occipitalis* Long-crested Eagle. In gallery forest and woodland at Soukoutali and Bindougou.

**Falconidae**

*Falco ardosiaceus* Grey Kestrel. Widespread in woodland and gallery forest in the west from Baoulé-sud to Baoulé-nord.

**Phasianidae**

*Francolinus bicalcaratus* Double-spurred Francolin. Throughout wooded grassland, woodland and old cultivation but commonly feeds or roosts inside gallery forest; extends locally into the Sahel (Gourma).

*Ptilopachus petrosus* Stone Partridge. Widespread on rocky hills (with scrub), in deciduous thickets and woodland; also common in gallery forests, even in the absence of rocks.

**Numididae**

*Numida meleagris* Helmeted Guineafowl. Almost exterminated through hunting, but survives in gallery forest near Madina Diassa and in the Bafing region. Also (locally) in woodland, even in the Sahel (Gourma).

**Rallidae**

*Amaurornis flavirostra* Black Crake. Regularly found on the edge of rivers or large pools in gallery forest, walking in deep shade on banks and over logs, locally even in the absence of water (on the Baoulé-nord a pair was singing in a patch of riparian thicket on the edge of dry sand, soon to be filled by rain water). Extends into marsh vegetation where available.

**Heliornithidae**

*Podica senegalensis* African Finfoot (F). Confined to permanent water (flowing or in large clear pools) with low, overhanging vegetation. Found at seven localities and likely to be more widespread.

**Columbidae**

*Columba guinea* Speckled Pigeon. Occasionally near wooded rivers, usually breeds on bridges or dams, one exception being the Baoulé-nord (in *Borassus*). Also seen on large cliffs and in fields.

*Streptopelia hypopyrrha* Adamawa Turtle Dove (F). Widespread in gallery forest in the southwest to the Baoulé-nord. Particularly conspicuous at the Badinko and Bakoy confluences with the Baoulé, where several birds came to drink in pools in late afternoon. Seen and heard singing in Feb and May–Jun. First discovered in Mali in 2002 (Dowsett & Dowsett-Lemaire 2005).

*S. semitorquata* Red-eyed Dove (mainly F). Practically confined to riparian vegetation and common in all localities of gallery forest in the southwest; also in degraded riparian bush at Bamako.

*Turtur abyssinicus* Black-billed Wood Dove. Very common in woodland and all localities of gallery forest; extends locally into Sahel woodland.

*T. afer* Blue-spotted Wood Dove (F). Confirmed at only one site, in the far south near Madina Diassa. Could be expected at one or two other southerly locations (e.g. Farako), but the comment by Lamarche (1980–1) that it is “fort commune” and “monte au Sahel en saison des pluies, jusqu’à 17°N” probably results from mis-identification.

*Treron waalia* Bruce’s Green Pigeon. Small numbers at figs and other fruit in gallery forest and adjacent woodland in southwest, extending locally into the Sahel (rocky gullies with figs).

*T. calvus* African Green Pigeon. Small numbers at figs and other fruit in gallery forest and adjacent woodland; of more southerly distribution than last, north only to the Mandingue Plateau.

**Psittacidae**

*Poicephalus senegalus* Senegal Parrot. Common in woodland and gallery forest in the southwest, locally into the Sahel (e.g. Dogon).



*Psittacula krameri* Rose-ringed Parakeet. Common in woodland and gallery forest in the southwest, numerous in *Borassus* forest on the Baoulé-nord. More commonly in the Sahel than last.

### **Musophagidae**

*Tauraco persa* Guinea Turaco (F). Two birds heard and one seen very clearly in tall, closed canopy gallery forest at Farako, 28 May.

*Musophaga violacea* Violet Turaco (mainly F). Common in rich woodland, thicket clumps and gallery forest in the southwest. Absent from the Sahel.

*Crinifer piscator* Western Grey Plantain-eater. Very common in woodland and gallery forest in the southwest, but also in dry thickets, orchards and gardens, and extends into the Sahel.

### **Cuculidae**

*Clamator levaillantii* Striped Cuckoo. Very common and noisy in May–Jun at all localities of gallery forest and woodland north to Baoulé-nord and Pont-Bani: a perfect overlap with the distribution of its putative hosts, *Turdoides plebejus* and *T. reinwardtii*. One seen watching a party of *T. reinwardtii* in the Bagoé gallery.

*Pachycoccyx audeberti* Thick-billed Cuckoo. Heard in tall woodland near Madina Diassa (and imitated by *Cossypha albicapilla* in nearby gallery forest) and in Farako gallery, May 2004. New for Mali (Dowsett & Dowsett-Lemaire 2005).

*Cuculus solitarius* Red-chested Cuckoo (F). This rainy season visitor is confined to the best galleries of the far south, although it can also be found in adjacent 25-m tall woodland (Madina Diassa). Noisy males (with females giving solicitation call) at Farako in May, less noisy in June after an interlude in the rains. Lamarche (1980–1) had only one record, Jun, collected on the Senegal border, which suggests he did not know its song.

*C. clamosus* Black Cuckoo. Associated with gallery forest and adjacent woodland in three localities (Farako, Kollé, Sanfinian), May–Jun.

*Chrysococcyx klaas* Klaas's Cuckoo (F). Confined to riparian situations in Mali, but probably resident (heard in the Bafing region and on the Baoulé-sud in Feb). Locally common in the southwest, from Baoulé-sud and Ouassoulou Balé to Boucle du Baoulé; curiously unrecorded from the Sikasso–Banifing region.

*C. caprius* Didric Cuckoo. Marginally on the edge of gallery forest, more often in low riparian bush and adjacent woodland, locally in southwest in May–Jun, extending into the Sahel (Douentza area).

*Centropus senegalensis* Senegal Coucal. Common in gallery forest, also in other habitats and extending into the Sahel.

### **Strigidae**

*Bubo lacteus* Giant Eagle Owl. Most records from gallery forest (seen and heard: near Madina Diassa, Kangaba, Sanfinian, Baoulé near Négala); but also in dry woodland and deciduous forest on rocks (Kita).

*Scotopelia peli* Pel's Fishing Owl (F). Located at only two sites, on the Bafing (primary feathers found) and on the Baoulé-sud (adult heard singing in Feb and immature calling in May). A piscivorous owl that requires well developed riparian

forest for resting and nesting. Not recorded by Lamarche (1980–1) but recorded by de Bie & Morgan (1989) from the Boucle du Baoulé.

*Glaucidium perlatum* Pearl-spotted Owlet. Occasionally in gallery forest (e.g. immature calling on the Déguéla, 10 Jun), but normally in dry open woodlands and gardens throughout the southwest.

### **Caprimulgidae**

*Caprimulgus pectoralis* (*nigriscapularis*) Fiery-necked Nightjar. Heard on the edge of riparian woodland at Tambalé on the Mandingue, Feb; several calling around gallery forest on the Baoulé-sud (near Madina Diassa), Feb; silent in May but several seen on the Baoulé-sud. New for Mali (Dowsett & Dowsett-Lemaire 2005).

### **Trogonidae**

*Apaloderma narina* Narina Trogon (F). First discovered in 2002, now recorded from five gallery forest localities, all with tall canopy. At Farako, near Madina Diassa and at Sanfinian the gallery is essentially evergreen; at the Balé/Bafing confluence and on the Baoulé west of Négala (where *Anogeissus* is the main large tree) the vegetation is at least partly deciduous. Could be expected to occur at Kollé also. Silent in Feb, singing regularly May–Jun (Dowsett & Dowsett-Lemaire 2005).

### **Alcedinidae**

*Alcedo quadibrachys* Shining Blue Kingfisher (F). Widespread on large forest streams in the far southwest, north to the Mandingue and Sanfinian.

*A. leucogaster* White-bellied Kingfisher (F). Found at the only site corresponding to its requirements (small forest streams under closed canopy), in the Farako forest. This must be the northern limit of its range. Lamarche (1980–1) claimed it from further north, and from the wrong habitat (“Haut Niger, dans les plaines alluviales inondées”). We believe these records were misidentified.

*Ceyx pictus* Pygmy Kingfisher (mainly F). Uncommon Feb 2002, when singles seen in sacred *Khaya* forest at Bindougou (Bafing) and inside forest near Madina Diassa. More common May–Jun when clearly augmented by migrants. Mainly in gallery forest, also in thickets and riparian woodland, rocky gullies with deciduous forest (Kita). Throughout the southwest, north to Baoulé-nord and Pont-Bani, but unrecorded around Sikasso. Two occupied nest holes (young being fed) in steep banks, 20 and 22 Jun.

*Halcyon leucocephala* Chestnut-bellied Kingfisher. Typically on the edge of gallery forest, throughout the southwest (May–Jun); one in woodland 21 Feb (Yorobougoula).

*H. malimbica* Blue-breasted Kingfisher (F). Quite common and noisy, but restricted to galleries that are essentially evergreen (e.g. present on the Bani but absent from Baoulé-nord). Known from at least 18 localities. Lamarche (1980–1) saw it only once.

*H. senegalensis* Senegal Kingfisher. Typically at the ecotone between gallery forest and woodland. Absent in dry season 2002, present May–Jun 2004, locally from Madina Diassa to Baoulé-nord and Pont-Bani.

*Megaceryle maxima* Giant Kingfisher. Widespread on permanent rivers, large clear pools or springs with well wooded banks (thus usually associated with gallery forest), from Baoulé-sud to Bafing and north to Pont-Bani.

**Meropidae**

*Merops pusillus* Little Bee-eater. Typically in small thickets, grass or *Mimosa pigra* bush near water. Local in southwest to Baoulé-nord and Pont-Bani.

*M. bullocki* Red-throated Bee-eater. Widespread on the edge of rivers, often feeding from the edge of gallery forest and breeding in sandbanks, but feeds also in adjacent woodland.

**Coraciidae**

*Eurystomus glaucurus* Broad-billed Roller. No records in dry season; influx of migrants in the rains when they occupy gallery forest and adjacent woodland. Fairly widespread from extreme south (particularly common on Baoulé-sud) to Boucle du Baoulé and east to Pont-Bani.

**Bucerotidae**

*Tockus erythrorhynchus* Red-billed Hornbill. Widespread in Sudanian and Sahel woodland, sometimes very conspicuous in gallery forest (e.g. Banifing, Baoulé-nord).

*T. nasutus* African Grey Hornbill. Woodland and gallery forest throughout, from the far south to Pont-Bani and locally into the Sahel (some movements north in Jun).

**Lybiidae**

*Pogoniulus chrysoconus* Yellow-fronted Tinkerbird. Widespread woodland species, also quite common in all gallery forest localities, including the Farako gallery near Sikasso; north to Pont-Bani but not recorded on Baoulé-nord.

*P. bilineatus* Yellow-rumped Tinkerbird (F). Typical song (distinct series of 4–6 notes) heard in the small riparian forest at Woroni on 27 May. New for Mali (Dowsett & Dowsett-Lemaire 2005).

*Lybius dubius* Bearded Barbet. Often found in tall woodland but most regularly in gallery forest, including the dry *Gilletiodendron* forest and other types on rocky hills. Widespread (12 localities) from the far south (Farako-Woroni; Ouassoulou Balé) north to the Bafing, Kita and the Dogon Plateau.

**Indicatoridae**

*Indicator indicator* Greater Honeyguide. Mostly a woodland species but occasionally seen on the edge of gallery forest; widespread in southwest to the Dogon.

*I. minor* Lesser Honeyguide (F). Four records, all in evergreen gallery forest, including one singing at Farako in May.

**Picidae**

*Campethera abingoni* Golden-tailed Woodpecker (F). In W Africa supposedly excluded from Sudanian woodland by Fine-spotted Woodpecker *C. punctuligera*, and strictly confined to evergreen gallery forest. Located by nasal “kwweeeeah” call in the far southwest (common all along the Baoulé-sud, Ouassoulou Balé, Bagoé crossing); more local on the Mandingue (Tambalé). Distribution given by Lamarche (1980–1: “Sahel, zones boisées....Au sud, zones un peu rocailleuses ou rocheuses”) appears incorrect; the only woodpecker found in such habitat is *Mesopicos goertae*.

*C. nivos*a Buff-spotted Woodpecker (F). Only in the far south, in the wider part of the gallery on the Baoulé-sud near Madina Diassa. A pair on 23 May calling to each other with characteristic low purr. This is likely to be the northern limit of the species. The

distribution given by Lamarche (1980–1) from much further north, including the Sahel in S Mauritania (Lamarche 1988), is considered erroneous.

*Dendropicos fuscescens* Cardinal Woodpecker (F). Very local in Mali, and confined apparently to gallery forest. Recorded only from a few localities in the southwest, from Baoulé-sud to Baoulé-nord.

*Mesopicos goertae* Grey Woodpecker. Usually the most numerous woodpecker in gallery forest, throughout, also into other, drier habitats, including Sudanian woodland, dry forest on rocks, even locally *Acacia* groves in the Sahel.

### **Hirundinidae**

*Psaldiprocne obscura* Fanti Saw-wing (mainly F). Forest edges and clearings (extending a little into adjacent woodland). A rains migrant: absent in Feb, small numbers regularly encountered in S Mali in May–Jun, north to the Bafing (Sanfinian) and the Baoulé west of Négala.

### **Campephagidae**

*Campephaga phoenicea* Red-shouldered Cuckoo-shrike. Very uncommon in the dry season (a female at Soukoutali, 11 Feb), but influx of migrants in early rains, when widespread and common in gallery forest and adjacent tall, rich woodland from the far southwest through to Haut-Niger, the Bafing and the Baoulé near Négala, and to the Banifing (Kouoro); not noted at Farako.

### **Pycnonotidae**

*Chlorocichla simplex* Simple Greenbul (F). Only one record, at the northern limit of the species's range: one singing in thicket on the edge of the Baoulé-sud (near Madina Diassa), 21 Feb. Not found again 1 h later (with tape playback) nor in 2004. Almost certainly a wanderer from northern Ivory Coast (Dowsett & Dowsett-Lemaire 2005).

*C. flavicollis* Yellow-throated Leaflove (F). Widespread in gallery forest in the southwest, even in thin, broken strips (as on the Mandingue). Throughout the south, north to Haut-Bafing and Banifing. Not recorded from Boucle du Baoulé (gallery forest probably too dry and deciduous) nor from Pont-Bani. Birds at Farako (where very common) and elsewhere did not respond to tapes of *C. f. soror* but only to their own song, of a shorter, more contracted form. Often took small fruit, e.g. figs and *Manilkara multinervis*.

*Pyrrhurus scandens* Leaflove (F). Only in the far south: on the Baoulé-sud near Madina Diassa (heard once, seen by M. Crickmore). But no reaction to tape playback the next day, and possibly not resident.

*Pycnonotus barbatus* Common Bulbul. Very common in any wooded habitat (including dry evergreen forest) and gardens.

### **Turdidae**

*Turdus pelios* West African Thrush. Common in gallery forest (all localities north to Pont-Bani and Baoulé-nord), but also in woodland and gardens.

*Cossypha niveicapilla* Snowy-headed Robin Chat (mainly F). Absent in dry season, locally common in rains, in gallery forest but also adjacent deciduous thickets (as on

Baoulé-nord and Pont-Bani). Outnumbered by *C. albicapilla* in the evergreen galleries of the far south. In some places where the evergreen gallery is sharply defined and bordered with floodplain grassland or open wooded grassland, not located at all (e.g. Fié river), but on the Bani river where riparian (evergreen) thickets merge into dense deciduous thickets, it is far more numerous than *C. albicapilla*, and is the only *Cossypha* occupying the deciduous vegetation. Also found in thickets in Bamako Botanic Gardens.

*C. albicapilla* White-crowned Robin Chat (F). Common in all localities with evergreen or partially evergreen gallery forest, north to Baoulé-nord and Banifing, uncommon at Pont-Bani. Absent from dry *Gilletiodendron* forest in “Cirque de Kita”. At Bamako Botanic Gardens along stream. Songs contain clear imitations of *Pachycoccyx audeberti* (near Madina Diassa) and *Cuculus clamosus* (at Sanfinian). Appears sedentary (observed in similar numbers in 2002). In Borrow & Demey (2001) *C. niveicapilla* is indicated as a “resident” and *C. albicapilla* as undergoing seasonal movements, but this was an unintentional reversal of status (R. Demey pers. comm.).

### **Sylviidae**

*Hippolais pallida* Olivaceous Warbler. Several birds seen on the lower edge of gallery forest on the Bafing and Baoulé-sud, Feb; one in riparian bush edge of pool at the Baoulé/Badinko confluence on 4 Jun. In a variety of habitats in the Sahel.

*Cisticola lateralis* Whistling Cisticola. In several localities in the southwest: common on the outside edge of gallery forest and in tall woodland from Baoulé-sud through to Madina Diassa; edge of gallery on the Ouassoulou Balé (Nalla), Fié river, Kollé; several on the Baoulé west of Négala, feeding in perennial grass but also in riparian thicket edge of gallery, still in winter dress on 7 Jun. Very noisy in May–Jun and possibly overlooked in Feb. Only one previous record for Mali (a specimen mentioned by Lamarche 1980–1; apparently no longer in existence).

*Apalis flavida* Yellow-breasted Apalis (F). First found in Mali on the Baoulé-sud near Bougouni by Salewski (1998) and Spierenburg (2000). One of the most characteristic and common species of gallery forest, confined to evergreen types, from the far south to Baoulé and Banifing. Known from > 12 localities including Yanfolila. Absent from the Baoulé-nord at the latitude of Badinko, and local on the Baoulé west of Négala (where confined to evergreen thicket with *Pterocarpus santalinoides*). Not found at Pont-Bani but could be expected there.

*Camaroptera brachyura* Bleating Bush Warbler. Very common in the understorey of all types of gallery forest and riparian thicket, but also encountered in drier situations, including in the Sahel.

*Hypergerus atriceps* Oriole-Warbler (F). Common in dense evergreen gallery forest in the southwest, and in patches in rocky clefts (as on the Famansa Plateau). Throughout, from the far south to Pont-Bani; not found in largely deciduous gallery on the Baoulé-nord, nor west of Négala. Also recorded by C. Carter (*in litt.*) near Loulouni (next to Woroni, Fig. 2). Thus known from over 16 localities including Yanfolila. Lamarche (1980–1) recorded it from only two sites (Yanfolila and near Sikasso).

**Muscicapidae**

*Melaenornis edolioides* Western Black Flycatcher. Characteristic of gallery forest, singing in the canopy and feeding on the edges, and found in adjacent tall woodland. Throughout the southwest, north to the Baoulé-nord at Badinko.

*Muscicapa aquatica* Swamp Flycatcher (F). Absent from Farako gallery (virtually no open water, which it requires for feeding), but usually common elsewhere, from the far south to at least the Bafing region (Sanfinian). Not found on the Boucle du Baoulé (largely dry in early Jun). Feeding fledglings at Sanfinian, 2 Jun, and Fié, 22 Jun.

*Myioparus plumbeus* Lead-coloured Flycatcher. A species of the ecotone, often at forest edges and in liane tangles near Madina Diassa, on the Ouassoulou Balé (Nalla) and the Baoulé west of Négala.

**Platysteiridae**

*Batis senegalensis* Senegal Batis. Usually in Sudanian woodland but occasionally feeding in the top of gallery forest (as on the Baoulé).

*Platysteira cyanea* Common Wattle-eye (F). Confined to evergreen gallery forest. Common throughout the south, even in the small patch near Siby, north to Pont-Bani, and to the Baoulé west of Négala. Not on the Baoulé-nord (largely deciduous). Female begging from male, Fié, 22 Jun.

**Monarchidae**

*Elminia longicauda* Blue Flycatcher (F). Quite common in understorey usually in deep shade of evergreen forest, in the southwest, from the Baoulé-sud to the Bafing and north to the Baoulé west of Négala; at Sanfinian even in small thickets in adjacent woodland. Rarer in southeast (few at Farako, found on the Bagoé crossing but not on the Banifing).

*Terpsiphone viridis* African Paradise Flycatcher. Throughout the southwest in Feb (Bafing, Mandingue, Baoulé-sud and Yanfolila), in gallery forest and adjacent woodland. In May–Jun found north to Pont-Bani and the Baoulé-nord; extends into deciduous thickets and dry forest on rocks (Kita). Colour morph of males quite variable: red-and-black, red-and-black plus white feathers (in wing or tail or both), or black-and-white all found at some localities. Females had red vent, as in central African Rufous-vented Paradise Flycatcher *T. rufocinerea*, itself probably no more than a morph of *T. viridis* (Erard in Urban *et al.* 1997, C. Erard pers. comm.).

**Timaliidae**

*Turdoides plebejus* Brown Babbler. Woodland, thicket clumps and gardens, but occasionally in thin gallery or on the outer edge of large gallery forest; widespread in the southwest to at least 14°N.

*T. reinwardtii* Blackcap Babbler (F). Confined to dense gallery forest in the Sudanian region, usually very common, north to Pont-Bani and the Baoulé-nord. Tolerates partial deciduousness (Boucle du Baoulé); rare in dry *Gilletiodendron* forest on rocks (Kita).

**Nectarinidae**

*Antheptes gabonicus* Brown Sunbird (F). Two seen very well (one chasing the other) in thickets on the edge of the Baoulé-sud (Madina Diassa) on 21 Feb. New to Mali (Dowsett & Dowsett-Lemaire 2005). Not found in 2004.

*A. longuemarei* Violet-backed Sunbird. One or two birds feeding on flowers of *Syzygium guineense* on the Baoulé-sud (May); also encountered in woodland (rare, Soukoutali).

*A. collaris* Collared Sunbird (F). Confined to the far south, fairly common in gallery forest on the Baoulé-sud (Madina Diassa, Feb and May, in May often feeding on flowers of *Syzygium guineense*). Seen once on the Ouassoulou Balé (Nalla, May) and at Tambalé (Feb).

*A. platurus* Pygmy Sunbird. Wide variety of habitats, but locally in gallery forest (Baoulé-sud and Yanfolila in Feb but not May; Baoulé-nord in Jun). Apparently subject to local movements (pers. obs.) as in Nigeria (Elgood *et al.* 1973).

*Nectarinia verticalis* Green-headed Sunbird (F). Confined to evergreen gallery forest in the far south, common in the Sikasso area (Farako, Woroni) and on the Baoulé-sud (Madina Diassa); also on the N'turaya river at Sanfinian. Feeding on flowers of mistletoe and *Syzygium*.

*N. senegalensis* Scarlet-chested Sunbird. Throughout gallery forest (*e.g.* on flowers of *Syzygium*) and woodland in the south, to Baoulé-nord and Pont-Bani.

*N. venusta* Yellow-bellied Sunbird (F). Restricted to gallery forest and adjacent bush in the southwest, north to Sanfinian.

*N. coccinigastra* Splendid Sunbird. Once in gallery forest (a pair on flowers of *Berlinia grandiflora* in the Farako gallery, 27 May); also in tall woodland in the south (Tambalé 5–6 Feb, between Nalla and Kalana 25 May).

*N. pulchella* Beautiful Sunbird. Woodland and gallery forest throughout the Sudanian region (the only locality where not found in Feb being the Mandingue Plateau), and extending into the Sahel.

### **Zosteropidae**

*Zosterops senegalensis* Yellow White-eye. Very common in all types of gallery forest (attracted to fruit and flowers); extends into rich woodland and thickets away from water. Throughout the south and southwest, to Baoulé-nord and Pont-Bani.

### **Oriolidae**

*Oriolus auratus* African Golden Oriole. Fairly common in gallery forest and rich woodland in the south (Farako-Woroni) and southwest, to the Bafing and Négala area.

### **Malaconotidae**

*Dryoscopus gambensis* Northern Puffback. Common in all types of gallery forest and thicket, also in adjacent tall woodland, throughout the south and southwest to Baoulé-nord and Pont-Bani (nest-building there 13 Jun). Absent from dry *Gilletiodendron* forest near Kita.

*Laniarius aethiopicus* Tropical Boubou (F). Small populations (several calling) in dense gallery forest near Madina Diassa (Feb and May) and at Farako, partial to liane tangles. New to Mali (Dowsett & Dowsett-Lemaire 2005).

*L. barbarus* Yellow-crowned Gonolek. Characteristic of gallery forest understorey throughout. Extends into dry thickets or thicket clumps in savanna, including in rocky gullies and the Sahel.

*Malaconotus sulfurepectus* Orange-breasted Bush Shrike (F). Confined to gallery forest in the southwest, and fairly widespread, north to Baoulé-nord and Pont-Bani.

*M. blanchoti* Grey-headed Bush Shrike. Usually in woodland, occasionally in evergreen or deciduous forest, from the far south (Farako and near Madina Diassa) to Baoulé-nord.

### **Dicruridae**

*Dicrurus ludwigii* Square-tailed Drongo (F). Locally common in tall, evergreen gallery or swamp forest (Farako, Baoulé-sud near Madina Diassa, *Parinari* forest near Kollé); also several on the Banifing and Bagoé. On the Mandingue, not found in thin strips of riparian but in a larger forest patch in a rocky cleft (Famansa Plateau); similarly in the Bafing not in thin strips along the river but in larger patches (such as the sacred *Khaya* forest at Bindougou). Northern limit appears to be the *Parinari* forested island at Soukoutali. Lamarche (1980–1) had two (doubtful) records, based on eye colour: “Si couleur de l’iris est un critère valable, deux observations et deux sujets collectés”. Iris colour is not useful for separating the drongos, yet there are other characters that should have been clear in a specimen; these specimens are no longer available.

### **Sturnidae**

*Onychognathus morio* Red-winged Starling. Associated with rocky hills with scrub or dry thickets, but occasionally visits gallery forest to feed on fruits (e.g. of *Bridelia micrantha* and *Manilkara multinervis* near Siby). Common in dry *Gilletiodendron* forest at Cirque de Kita.

*Lamprotornis chalcurus* Bronze-tailed Glossy Starling. A pair nest-building in gallery forest on the Fié river, 21 Jun. More usual in Sudanian woodland.

*L. caudatus* Northern Long-tailed Glossy Starling. Frequently roosts and drinks in gallery forest, common in southwest and into the Sahel.

### **Ploceidae**

*Ploceus luteolus* Little Weaver. Marginally associated with gallery forest: breeds on the edge of the Baoulé (west of Négala) and old nests seen on the edge of the Baoulé-nord (also in dry *Combretum–Acacia* woodland away from water). Mist-netted in gallery forest on the Bafing (Feb) in non-breeding plumage. Widespread in drier habitats in Delta and Sahel.

*P. nigricollis* Black-necked Weaver (F). Confined to gallery forest, most common in the south, but overall widespread north to the Baoulé near Négala; pair nest-building on the Baoulé-sud (nest hanging on a twig of *Mimosa pigra*), 24 May.

*P. cucullatus* Village Weaver. Often feeds on the edge of gallery forest or in dry *Khaya* sacred forest.

*P. melanocephalus* Black-headed Weaver. In the south, clearly associated with gallery forest and riparian thicket. Seen in breeding dress (May–Jun) on the Baoulé-sud, Fié river, near Kollé, at Sanfinian, on the Baoulé west of Négala, on the Banifing (one male displaying next to a small round nest in bush just over the water, 20 Jun) and at Pont-Bani; old nests seen inside gallery forest on the Bagoé. Birds mist-netted in non-breeding dress (Feb) on the Bafing and in quite degraded habitat in the Delta.



### Estrildidae

*Nesocharis capistrata* White-cheeked Oliveback (F). Very local: one feeding in creepers on the Baoulé-sud (Madina Diassa) Feb; two feeding on the fruits of *Manilkara multinervis* at Farako, 20 Jun.

*Pytilia melba* Green-winged Pytilia. Pair in dry riparian (*Ziziphus*) thicket on the edge of the Baoulé-nord; also found away from riparian situations.

*P. phoenicoptera* Red-winged Pytilia. Associated with gallery forest and adjacent woodland, often feeding on the ground on the outside edge of galleries. Recorded from the Mandingue, Bafing, Madina Diassa and Nalla. Common at Sanfinian.

*Euschistospiza dybowskii* Dybowski's Twinspot (F). One drinking with Orange-cheeked Waxbills *Estrilda melpoda* at a pool in riparian woodland, Tambalé, 5 Feb. New to Mali (Dowsett & Dowsett-Lemaire 2005).

*Lagonosticta rufopicta* Bar-breasted Firefinch (F). Confined to gallery forest or riparian thickets in the south, and fairly widespread, north to Baoulé-nord.

*L. rara* Black-bellied Firefinch (F). Locally in small numbers, on edge of gallery forest and riparian thicket, from Madina Diassa to Sanfinian. New to Mali (Dowsett & Dowsett-Lemaire 2005).

*L. rubricata* Blue-billed Firefinch (F). Feeding on the edge of gallery forest at Sanfinian (with other *Lagonosticta* spp. and *Pytilia phoenicoptera*) and in thickets under *Anogeissus* canopy on the Baoulé-nord.

*L. larvata* Black-faced Firefinch. Often associated with other firefinches in feeding parties on the edge of gallery forest, but also found in Sudanian woodland away from water. Found throughout the Haut-Bafing (Soukoutali, Bindougou, Sanfinian) and near Madina Diassa.

*Estrilda caerulescens* Lavender Waxbill. Common and widespread in gallery forest and thickets in the southwest; extends into dry thickets on rocky hills, including in the Sahel.

*Uraeginthus bengalus* Red-cheeked Cordon-bleu. Often in thickets on the edge of gallery forest, but extends into a wide variety of drier thicket types (including thornbush in the Sahel).

*Spermestes fringilloides* Magpie Mannikin. A group of 7–8 feeding on seeds of *Oxytenanthera abyssinica* on the edge of gallery forest at Sanfinian (2 Jun). Likely widespread in the Bafing and also on the Mandingue where this wild bamboo is common, usually in riparian situations. *Oxytenanthera* seeds are known to be its almost exclusive food in E Africa (Benson 1952, Jackson 1972, pers. obs.).

## Discussion

### Present coverage and habitat

Some 20 localities of gallery forest were visited in 2002 and 2004. All major localities in Lamarche (1980–1) were explored except perhaps one (the Falémé river near Kéniéba on the border with Senegal). According to L. Granjon (pers. comm.) the

Falémé is lined with dry gallery of the same type as in the Bafing region. We visited a number of places that Lamarche did not mention, like the Baoulé-sud south of Bougouni and the Ouassoulou Balé south of Yanfolila.

Our main conclusion from the botanical inventory is that typical Guineo-Congolian rain forest does not exist in Mali, confirming White (1983: references for Mali listed on p. 272, F. White pers. comm. 1993). The Farako gallery near Sikasso, with *Carapa procera*, is perhaps closest to rain forest, but its scarcity of large canopy lianes, very low tree species diversity, lack of emergents and limited width are more typical of dry evergreen forest. *Carapa* extends into other forest types well beyond the Guineo-Congolian region, to E Africa and montane areas (Dowsett-Lemaire 1989, Styles & White 1991).

In most localities the habitat was dry evergreen gallery forest lining semi-permanent rivers, with dominant tree species typical of Sudanian vegetation (cf. Arbonnier 2000, Keay *et al.* 1960). Several of these trees, like *Khaya senegalensis*, are almost endemic to the Sudanian region (White *et al.* 2001: 40); others, like *Syzygium g. guineense* and *Erythrophleum suaveolens*, are found in fringing forest throughout the continent. *Diospyros mespiliformis*, a characteristic evergreen tree of the savanna regions (extending into the Sahel) is very widespread in tropical Africa but is largely absent from the Guineo-Congolian region (White 1988, with map on p. 336).

From south to north the proportion of deciduous elements increases. It becomes important on the Baoulé-nord, with *Anogeissus* the dominant canopy tree away from *Borassus* groves. In the Haut-Niger floodplain, the swamp forest at Kollé represents a type of evergreen forest uncommon in Mali, with *Parinari congensis* dominant in the canopy and *Myrianthus serratus* in the understorey. Otherwise, from the Ouassoulé Balé, most of the Baoulé-sud and Bagoé northwards (to at least the Bafing), the floristic composition and physiognomy of gallery forest changes little, and the same dominant tree species occur: galleries are rarely broader than 50 m and the canopy may be as low as 12 m. Only in the far south, near Madina Diassa (Baoulé-sud) and near Sikasso (Farako gallery) are forest patches much taller and wider (up to 300 m wide near Madina Diassa and 30 m tall at Farako). The Farako gallery near Sikasso stands out as the only example of gallery forest closing over a small stream, thus providing the necessary requirements for the forest kingfisher *Alcedo leucogaster*.

### Biogeographical considerations

The most important single biome represented is Sudanian (= "Sudan-Guinea" of Fishpool & Evans 2001). The Sudanian bird species dependent on fringing forest include *Streptopelia hypopyrrha*, *Musophaga violacea*, *Cossypha albicapilla*, *Hypergerus atriceps*, *Turdoides reinwardtii*, *Nesocharis capistrata*, *Euschistospiza dybowski*, *Lagonosticta rufopicta* and *L. rara*. Other Sudanian endemics that are commonly encountered in or on the edge of fringing forest but extend into other habitats in the Sudanian region include *Merops bulocki*, *Lybius dubius*, *Pytilia phoenicoptera*, *Lagonosticta larvata* and *Estrilda caerulescens*; the rarer *Nectarinia coccinigastra* is also mainly Sudanian.

The two kingfishers *Halcyon malimbica* and *Alcedo quadribrachys* are widespread in the Guineo-Congolian region but extend significantly into the galleries of the Sudanian region. Using botanical terminology these could be called "Guineo-Congolian/Sudanian linking species". *Cossypha niveicapilla* also belongs here, occupying the Sudanian galleries and thickets mainly in the rainy season (Elgood *et al.* 1973). The Guineo-Congolian forest-edge swallow *Psalidoprocne obscura* (Dowsett-Lemaire & Dowsett 2001, Fishpool & Evans 2001) is also mainly a rainy-season visitor in the Sudanian region, and extends so widely into it that it might be termed another linking element. In Mali it extends at least as far as 13°N, as in E Senegal (Morel & Morel 1990); in Nigeria it extends north to 11°N in the rains (Elgood *et al.* 1994); it is not uncommon in Mole NP in Ghana (pers. obs.) well inside the Sudanian region.

In the far south, where the size and aspect of the forest change significantly, we are close to the northern limit of the Guineo-Congolian/Sudanian transition zone (Fig. 1; White 1983). This was where the few Guineo-Congolian birds were found, at Farako (*Tauraco persa*, *Alcedo leucogaster*) and on the Baoulé-sud, near Madina Diassa (*Campethera nivosus*, *Pyrrhurus scandens*, *Chlorocichla simplex* and *Anthreptes gabonicus*). The last two, found in 2002 but not 2004, are probably local wanderers from the south. The status of the *Campethera* and *Pyrrhurus* at Madina Diassa is unclear. Most of these species occur nearby in N Ivory Coast. The *Anthreptes* was recorded by Walsh (1986) as far north as Léraba (10°8'N, 5°5'W), also in Feb. Records of this species from the Comoé and PN du Haut Niger in neighbouring Guinea are undated (Salewski 2000, Nikolaus 2000), but it was found feeding young in riparian vegetation in Guinea as far north as 11°17'N, 12°30'W, in Mar 2003 (R. Demey *in litt.*). We found it nest-building in riparian thickets on the Black Volta in Bui NP, Ghana, at 8°37'N, 2°24'W, in Mar 2005. The *Campethera* has been collected in gallery forest at Korhogo (Traylor 1970) and has also been recorded from PN Haut Niger in Guinea (Nikolaus 2000), only slightly south of Madina Diassa. In Ivory Coast, *Chlorocichla simplex* is known as far north as Korhogo and Odienné (Brunel & Thiollay 1969) only 140 km south of Madina Diassa, on the same Baoulé-sud river. At Farako *Alcedo leucogaster* must be at its northern limit: in Nigeria it has been recorded north to Kagoro (9°35'N) alongside several other Guineo-Congolian species (Dyer *et al.* 1986). This area is clearly in the Guineo-Congolian/Sudanian transition zone (White 1983: 177). One specimen collected at Zaria (11°3'N) was considered a wind-blown migrant (Fry 1967), c. 180 km north of its normal range. The *Tauraco* and *Pyrrhurus* are the only Guineo-Congolian species which are regular, if rare, in the S Sudanian region in Nigeria.

The rest of the gallery forest birds of S Mali are species more widely distributed in dry evergreen forests, not restricted to one or two biomes (e.g. *Apaloderma narina*, *Chlorocichla flavicollis*, *Apalis flavida*, *Platysteira cyanea*, *Elminia longicauda*, *Nectarinia verticalis*, *Dicrurus ludwigii*). Others may be common in woodland or dry thicket in E or southern Africa, but in the dry regions of W Africa are essentially confined to evergreen or semi-evergreen forest (e.g. *Campethera abingoni*, *Dendropicos fuscescens*, *Malaconotus*

*sulfureopectus*). Most species confined to evergreen fringing forest are sedentary. The few intra-African migrants arriving in the rains are mostly species able to exploit other habitats, such as deciduous thickets (e.g. *Ceyx pictus*, *Cossypha niveicapilla*) or adjacent woodland (e.g. *Eurystomus glaucurus*, *Campephaga phoenicea*).

### **Birds of fringing forest in the Sudanian region of W Africa**

Table 3 gives the distribution of the main species dependent on fringing forest across the Sudanian region, from well documented localities from SE Senegal to N Cameroon. N Ivory Coast and adjacent Guinea are not included because this area clearly belongs to the Guineo-Congolian/Sudanian transition zone (White 1983). The localities we studied in Mali have been grouped into three regions as the country is huge and some bird species tend to be localized; the Boucle du Baoulé and Pont-Bani were excluded as they add nothing and some species do not occur that far north. The few species that have been recorded from only one of the regions are excluded from Table 3 but briefly mentioned below.

**SE Senegal.** Data from Morel & Morel (1990) and our observations (10–14 Feb 1993). *Lagonosticta rubricata* is the only species not in Morel & Morel (1990) and added recently (Sauvage & Rodwell 1998); it is left with a question mark as the observer's name is not given and Payne (*in* Fry & Keith 2004) does not include the record. Olive-green Camaroptera *Camaroptera chloronota*, has been claimed from Badi (Niokolo Koba) on the basis of specimens collected by P. Dekeyser and G.J. Morel. The habitat in and around Niokolo Koba does not appear suitable for this Guineo-Congolian endemic. The Muséum National d'Histoire Naturelle in Paris does not hold any *C. chloronota* from Senegal (E. Pasquet *in litt.*) and the Morels' collections at the IRD station at Mbour, Senegal (two collected Jun 1967, cf. Morel & Morel 1990: 131) actually belong to the widespread *C. brachyura* (J.-M. Duplantier *in litt.*). The Dekeyser specimen has not been traced, and without proof we feel the record should be queried. **Mali.** *Alcedo leucogaster*, *Campethera nivos*a, *Chlorocichla simplex* and *Anthreptes gabonicus* have not been listed in Table 3. At least the *Chlorocichla* and *Anthreptes* are suspected to be wanderers, as discussed above.

**N Ghana.** Mole NP is reasonably well known (Dowsett-Lemaire & Dowsett 2004). We recorded all but three of the relevant species ourselves. The status of *Tauraco persa* is unclear: it was not reported by Harvey & Harrison (1970), Greig-Smith (1976) gave its status as "rare" without a locality, and it has been reliably reported to us only as a vagrant in thin riparian forest on the Samole stream in the dry season 2002; we are unaware of any records since. Ashy Flycatcher *Muscicapa caeruleascens* is one of two species of fringing forest found in Mole and not elsewhere in areas listed in Table 3. The other is Willcocks's Honeyguide *Indicator willcocks*i, found singing in riparian forest in Mar 2005; this is a Guineo-Congolian species that extends locally into Sudanian galleries, as in SW Chad (cf. Chappuis 2000). The main evergreen riparian trees there are the same as in S Mali (*Cola laurifolia*, *Khaya senegalensis*, *Pterocarpus santalinoides*, *Syzygium guineense*, etc.).

**Table 3. Main forest species recorded in fringing forest in Sudanian region localities.**

	1	2	3	4	5	6	7
<i>Gorsachius leuconotus</i>			+	+	+	+	+
<i>Gypohierax angolensis</i>	+	+			+	+	
<i>Circaetus cinerascens</i>	+	+	+		+	+	+
<i>Podica senegalensis</i>	+	+	+	+	+	+	
<i>Streptopelia hypopyrrha</i>	+	+	+			+	+
<i>Turtur afer</i>	+		+		+	+	+
<i>Tauraco persa</i>	+			+	(+)	+	
<i>Musophaga violacea</i>	+	+	+	+	+	+	+
<i>Cuculus solitarius</i>	+		+	+	+	+	+
<i>Chrysococcyx klaas</i>	+	+	+		+	+	+
<i>Ceuthmochares aereus</i>					+	+	
<i>Scotopelia peli</i>	+	+	+		+	+	+
<i>Apaloderma narina</i>		+	+	+	+	+	(+)
<i>Alcedo quadribrachys</i>	+	+	+	+	+	+	+
<i>Halcyon malimbica</i>	+	+	+	+	+	+	+
<i>Pogoniulus bilineatus</i>	+			+			
<i>Indicator minor</i>	+	+	+	+	+	+	+
<i>Campethera abingoni</i>			+	+	+		+
<i>Dendropicos fuscescens</i>	+	+	+		+	+	+
<i>Chlorocichla flavicollis</i>	+	+	+	+	+	+	+
<i>Pyrhurus scandens</i>			(+)			+	
<i>Cossypha niveicapilla</i>	+	+	+	+	+	+	+
<i>C. albicapilla</i>	+	+	+	+	+	+	+
<i>Apalis flavida</i>		+	+	+	+	+	+
<i>Hypergerus atriceps</i>	+	+	+	+	+	+	+
<i>Muscicapa aquatica</i>	+	+	+	+	+	+	+
<i>Platysteira cyanea</i>	+	+	+	+	+	+	+
<i>Elminia longicauda</i>	+	+	+	+	+	+	+
<i>Turdoides reinwardtii</i>	+	+	+	+	+	+	+
<i>Anthreptes collaris</i>	+		+				?
<i>Nectarinia verticalis</i>	+	+	+	+	+	+	+
<i>N. venusta</i>	+	+	+		+	+	+
<i>Laniarius aethiopicus</i>			+	+	+	+	+
<i>Malaconotus sulfureopectus</i>	+	+	+	+	+	+	+
<i>Dicrurus ludwigii</i>		+	+	+	+	+	
<i>Ploceus nigricollis</i>	+	+	+	+	+	+	+
<i>Nesocharis capistrata</i>			+	+	+	+	+
<i>Euschistospiza dybowskii</i>	+		+				
<i>Lagonosticta rufopicta</i>	+	+	+	+	+	+	+
<i>L. rara</i>	+	+	+		+	+	+
<i>L. rubricata</i>	?	+				+	

Localities: 1= SE Senegal (Niokolo Koba to extreme SE); 2= W Mali (Bafing); 3= SW Mali (Mandingue to Ivory Coast border); 4= SE Mali (Banifing to Bagoé and Sikasso region); 5= N Ghana (Mole NP); 6= N-central Nigeria (10–12°N); 7= N Cameroon (Bénoué NP). (+) means unlikely to be resident.

**Nigeria.** The area considered is from *c.* 10°N northwards. Information comes from Fry (1965, 1975) and Elgood *et al.* (1994). The Jos Plateau is an enclave of semi-montane and transitional Guineo-Congolian forest, largely south of 10°N, so is not included in this comparison. Two forest species have been recorded from the Zaria region and not elsewhere in the areas under consideration: one is the Wood Owl *Strix woodfordii*, which Fry (1975) noted once (Danbagudu 10°19'N). Apart from one or two similar occurrences elsewhere in Senegal (Morel & Morel 1990), in W Africa this owl is usually confined to the Guineo-Congolian region. The other is Emerald Cuckoo *Chrysococcyx cupreus*, a rainy-season visitor regularly found north to Zaria (11°N) and occasionally further (Elgood *et al.* 1994).

**N Cameroon.** Information mainly from Dowsett-Lemaire & Dowsett (1999). The *Apaloderma* is unlikely to be resident (recorded once near Buffle Noir, S. de Kort *in litt.*). N. Borrow (*in litt.*) confirmed *Cuculus solitarius* and added *Nectarinia venusta* after our 1999 survey. The identity of *Anthreptes collaris* (one record) is considered doubtful. The only dry forest species common there but not included in Table 3 is Red-winged Grey Warbler *Drymocichla incana*, a Sudanian endemic which does not occur west of the Nigeria–Cameroon border. In aspect and vegetation the fringing forest on the Bénoué is reminiscent of that on Baoulé-nord in Mali; the wide, sandy river holds more water than the Baoulé but does not have many shady corners for such species as *Podica senegalensis* (unrecorded). The main evergreen trees are *Celtis integrifolia* and *Diospyros mespiliformis*.

Table 3 reveals that most bird species typical of Sudanian gallery forest in Mali are also well represented in similar habitat elsewhere (especially *Musophaga violacea*, *Halcyon malimbica*, *Chlorocichla flavicollis*, *Cossypha niveicapilla*, *C. albicapilla*, *Apalis flavida*, *Hypergerus atriceps*, *Muscicapa aquatica*, *Platysteira cyanea*, *Elminia longicauda*, *Turdoides reinwardtii*, *Nectarinia verticalis*, *Ploceus nigricollis*). *Streptopelia hypopyrrha* should also be expected to occur in N Ghana and Ivory Coast.

Those found more rarely, and usually in the far south of Mali, are also localized elsewhere: for instance *Pogoniulus bilineatus* was discovered at just one site in SE Senegal (Dinndéfélou, on the Guinea border at 12°23'N: Morel & Morel 1990) and reaches only *c.* 9°53'N in Nigeria (Wells & Walsh 1969). Dinndéfélou has a waterfall (J.-M. Duplantier *in litt.*), like Woroni in SE Mali. Waterfalls modify the microclimate and may explain the presence of this tinkerbird so far north. *Tauraco persa* appears very uncommon in SE Senegal (Morel & Morel 1990) and in Nigeria does not reach north of 10°44'N (Fry 1975); similarly *Pyrhurus scandens* is very uncommon in N-central Nigeria, reaching Anara at 10°44'N (Fry 1965, 1975). *Anthreptes collaris* is local in Mali and elsewhere: a single record from SE Senegal (Morel & Morel 1990); in Nigeria it does not extend north of 9°53'N (Walsh 1971). *Euschistospiza dybowski* is known from only two sites in SE Senegal (Morel & Morel 1990) and its distribution in Nigeria (e.g. Jos Plateau) is mainly montane.

### Historical perspective

One question is: could the vegetation have changed a lot since the 1970s when B. Lamarche was prospecting Mali? The botanical evidence suggests not. Most of the prospective botanical work in W Africa was carried out from the 1940s to 1960s or 1970s (White 1983 and references therein), and the boundaries of phytochoria as drawn by White (1983) were based on these investigations. Most published works on Mali date from the 1950s to 1960s (White 1983: 272). It is impossible to imagine that, suddenly, in the 1970s (just as a series of droughts were starting to hit the Sahel, the first being in 1969), pockets of rain forest could have sprouted in numerous locations in the west and south of the country, and disappeared one or two decades later. It takes many decades for rain forest trees to grow, and in a country as sparsely populated as Mali (where riparian vegetation is still largely intact), it is equally unlikely that they could have disappeared without a trace. On the contrary, over a large area of SW Mali, from the Ouassoulou Balé, Baoulé-sud to the Bafing and Banifing, the size of live *Khaya senegalensis* (Mahogany), *Parkia biglobosa*, *Erythrophleum suaveolens* and others, which are slow-growing and often reach a height of 25–30 m, shows that they have been there for a very long time. In Malawi, charred trunks of forest trees killed by repeated bush fires can stand and remain identifiable for several hundred years (Dowsett-Lemaire 1985: 365). In other words, there is no reason to suspect that the forest types encountered today could have been any different 30 or 40 years ago.

Despite the lack of suitable vegetation, is there any evidence that species of rain forest birds have turned up within the Sudanian phytochorion with any regularity elsewhere in W Africa? The answer is, again, no. In the better documented Nigeria, Fry (1965, 1975) was studying the Zaria region at the same time as Lamarche was prospecting Mali, and found no Guineo-Congolian species other than the localized *Tauraco persa* and *Pyrrhurus scandens* (which also occur in S Mali). In Mole NP, Ghana, which was extensively documented in the 1960s and 1970s (Greig-Smith 1976), the only Guineo-Congolian forest species recorded then was *Tauraco persa*. Our recent survey there shows that the avifauna has not changed since in any significant way: our additions include species of short grassland as well as a few of fringing forest (Dowsett-Lemaire & Dowsett 2004, pers. obs.), most of which represent northward range extensions in Ghana (Grimes 1987) but all being species that could have been overlooked in the past. In any case, Mole had no definite past records of rain forest species other than *T. persa* (which may not be resident); it has not lost species of fringing forest and there is no evidence that the habitat has been drying out. Elsewhere, in Ghana (especially in the east) there is evidence that forest is expanding rapidly over savanna in their contact zone (pers. obs.). This is happening so rapidly in the proposed Kyabobo National Park (8°–8°30'N on the Togo border) that managers are worried about the survival there of large grazing mammals (P. Hartley pers. comm.).

## Conclusion

As a result of our investigations in 2002 and 2004, of the past and present botanical evidence and of the ornithological evidence in neighbouring countries within the same phytocorion, we conclude that several dozen Guineo-Congolian and other rain forest species claimed to occur in Mali by Lamarche (1980–1) have to be deleted from the national avifauna. Even for the few Guineo-Congolian species confirmed by recent surveys, we have doubts about Lamarche's localities, which are too far north and often mentioned in relation to the wrong habitat. Lamarche situated some in the Sahel (e.g. *Campethera nivosus* north to Mauritania, Blue-billed Malimbe *Malimbus nitens* north to Kayes, one of the hottest places in Africa), where the ecological requirements of these species are lacking. Lamarche claimed that several of these forest species (e.g. the conspicuous Pied Hornbill *Tockus fasciatus*) are "répandu dans le sud et l'ouest du pays", when no-one else has managed to find a single individual. Many forest species in Lamarche (1980–1) are confined to the deep shade of primary or old secondary rain forest and strictly sedentary. Several localities in the Bafing region (including Bafing-Makana and Sagabari) and Kangaba and surroundings are among the most frequently cited for several stenotopic forest species such as bulbuls of the genera *Andropadus*, *Criniger* and *Bleda*, Blue-shouldered Robin *Cossypha cyanocampter*, *Camaroptera chloronota*, Green Hylia *Hylia prasina*, Chestnut-capped Flycatcher *Erythrocercus mccallii*, Shrike-Flycatcher *Megabyas flammulatus*, Yellow-chinned Sunbird *Anthreptes rectirostris*, Johanna's Sunbird *Nectarinia johannae*, Crested Malimbe *Malimbus malimbicus* and *Nigrita* spp. Yet gallery forests at those places consist of no more than thin strips of dry evergreen vegetation, totally unsuitable for these forest birds at any time of year. Conversely, some of the most common species in this habitat were overlooked by Lamarche (e.g. *Halcyon malimbica*, *Hypergerus atriceps*, *Apalis flavida*).

We therefore recommend the deletion of the following 68 species from the country's list (these include Guineo-Congolian endemics, other rain forest species, and a few species of forest edges or herbaceous clearings which are confined to the Guineo-Congolian region in W Africa; those already rejected by Dowsett (1993) are in square brackets): Hartlaub's Duck *Pteronetta hartlaubi*, African Black Duck *Anas sparsa*, Black Goshawk *Accipiter melanoleucus*, [Red-breasted Sparrowhawk *A. rufiventris*], Western Little Sparrowhawk *A. erythropus (minullus)*, African Goshawk *A. tachiro*, Crowned Eagle *Stephanoaetus coronatus*, Ahanta Francolin *Francolinus achantensis*, Crested Guinea fowl *Guttera pucherani*, [White-spotted Flufftail *Sarothrura pulchra*], African Grey Parrot *Psittacus erithacus*, Brown-necked Parrot *Poicephalus robustus*, Emerald Cuckoo *Chrysococcyx cupreus*, Black-throated Coucal *Centropus leucogaster*, Blue-headed Bee-eater *Merops muelleri*, Black Bee-eater *M. gularis*, Blue-throated Roller *Eurystomus gularis*, White-headed Wood Hoopoe *Phoeniculus bollei*, Pied Hornbill *Tockus fasciatus*, White-tailed Hornbill *Bycanistes fistulator*, Yellow-casqued Hornbill *Ceratogymna elata*, Yellow-throated Tinkerbird *Pogoniulus subsulphureus*, Red-rumped Tinkerbird *P. atroflavus*, Hairy-



breasted Barbet *Tricholaema hirsuta*, Double-toothed Barbet *Lybius bidentatus*, Spotted Honeyguide *Indicator maculatus*, Golden-backed Woodpecker *Campethera maculosa*, Fire-bellied Woodpecker *Thripias pyrrhogaster*, Long-tailed Wagtail *Motacilla clara*, Purple-throated Cuckoo-shrike *Campephaga quiscalina*, Little Greenbul *Andropadus virens*, Slender-billed Greenbul *A. gracilirostris*, Grey-headed Bristlebill *Bleda canicapillus*, Red-tailed Greenbul *Criniger calurus*, Yellow-bearded Greenbul *C. olivaceus*, Western Nicator *Nicator chloris*, Blue-shouldered Robin Chat *Cossypha cyanocampter*, Green Crombec *Sylvietta virens*, Green Hylia *Hylia prasina*, Olive-green Camaroptera *Camaroptera chloronota*, Shrike-Flycatcher *Megabyas flammulatus*, Chestnut-capped Flycatcher *Erythrocercus mccallii*, [Rufous-vented Paradise Flycatcher *Terpsiphone rufocinerea*], Red-bellied Paradise Flycatcher *T. rufiventer*, Brown Illadopsis *Illadopsis fulvescens*, Puvél's Illadopsis *I. puvéli*, Capuchin Babbler *Phyllanthus atripennis*, Fraser's Sunbird *Anthreptes fraseri*, Yellow-chinned Sunbird *A. rectirostris*, Olive Sunbird *Nectarinia olivacea*, Olive-bellied Sunbird *N. chloropygia*, Johanna's Sunbird *N. johannae*, Superb Sunbird *N. superba*, Brown-headed Tchagra *Tchagra australis*, Many-coloured Bush Shrike *Malaconotus multicolor*, Red-billed Helmet-Shrike *Prionops caniceps*, Emerald Starling *Coccycolius iris*, Splendid Glossy Starling *Lamprolornis splendidus*, Blue-billed Malimbe *Malimbus nitens*, Crested Malimbe *M. malimbicus*, Red-headed Malimbe *M. rubricollis*, Red-faced Flower-pecker *Parmoptila rubrifrons*, Grey-crowned Negrofinch *Nigrita canicapillus*, Chestnut-breasted Negrofinch *N. bicolor*, White-breasted Negrofinch *N. fusconotus*, Crimson Seed-cracker *Pyrenestes sanguineus*, Bluebill *Spermophaga haematinus*, Black-and-white Mannikin *Lonchura bicolor*.

It is not impossible that, with time, a few of these forest species will be found in the far south of Mali, but documented evidence will be necessary. Unfortunately, this plethora of forest species apparently encouraged Bie & Morgan (1989) to report further improbable Guineo-Congolian species from as far north as the Boucle du Baoulé (Afep Pigeon *Columba unicincta*, Blue-headed Dove *Turtur brehmeri*, Cassin's Flycatcher *Muscicapa cassini*). We also recommend their deletion; the *Columba* and *Muscicapa* were deleted by Dowsett (1993).

How has such a situation arisen? B. Lamarche is the only ornithologist to have spent so long in Mali in recent decades. We have found no ornithologist who accompanied Lamarche in the field in Mali, so in the absence of extant specimens these are essentially single-observer sight records. The fact that Lamarche missed many species (some common) that are more often heard than seen suggests one source of possible error: mistakes in identifying vocalisations. Some probable visual misidentifications are readily explained (e.g. *Alcedo leucogaster* for Malachite Kingfisher *A. cristata*, *Criniger olivaceus* for *Chlorocichla flavicollis*, *Camaroptera chloronota* for *C. brachyura*, *Nectarinia johannae* or *N. superba* for *N. coccinigastra*, some *Malimbus* for *Euplectes*). For others an explanation is less obvious. Regrettably, one can no longer take for granted details of distribution given by Lamarche (1980–1) for even commoner species, and we believe all his records of forest birds must be disregarded.

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